

# CLIMATE RISK AND ADAPTATION AMONG PRIMARY PRODUCERS:

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## TOPLINE RESULTS FOCUSING ON PRIMARY PRODUCERS REPORTING THE EFFECTS OF ADVERSE SEASONAL CONDITIONS

*REPORT PREPARED FOR THE DROUGHT REVIEW BRANCH, AUSTRALIAN GOVERNMENT DEPARTMENT  
OF AGRICULTURE, FISHERIES AND FORESTRY*

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## KEY FINDINGS

### Background

This report is one of three prepared by the Social Sciences Program (SSP), Bureau of Rural Sciences (BRS), to support investigations of the social impacts of drought as part of the National Review of Drought Policy.

The report is based on a survey of 3300 primary producers conducted by the SSP in mid 2008 on issues around climate change and industry adaptation. It compares primary producers who reported that they have been affected by adverse seasonal conditions (i.e., drought or frost) with those who report they have not been affected.

### On-farm risk management

Primary producers who reported that they were affected by adverse seasonal conditions (i.e., drought or frost) reported a higher number of on-farm risk factors than those who were not affected by adverse conditions.

### Landuse factors

Dryland croppers (84 per cent) were more likely than other agricultural sectors to report they were affected by adverse weather conditions such as drought or frost and appear most affected by adverse weather conditions.

### Viability

Primary producers reporting the effects of adverse seasonal conditions are more likely to report that the financial viability of their properties and business was being threatened.

### Size matters

'Size of farm business' (based on annual gross turnover) has a significant influence on farm business profit. Those with an annual gross turnover of less than \$400 000 are less likely to report an annual farm business profit. Lifestyle property owners are more likely to have on-farm incomes of less than \$100 000.



## LIST OF ACRONYMS

<b>ABARE</b>	Australian Bureau of Agricultural and Resource Economics
<b>ABS</b>	Australian Bureau of Statistics
<b>ANZSIC</b>	Australian and New Zealand Standard Industrial Classification
<b>BRS</b>	Bureau of Rural Sciences
<b>DAFF</b>	Australian Government Department of Agriculture, Fisheries and Forestry
<b>EC</b>	Exceptional Circumstances: EC events are rare and severe events that are outside those that a farmer could normally be expected to manage using responsible farm management strategies. To be classified as an EC event, the event: <ul style="list-style-type: none"><li>• <i>must be rare, that is it must not have occurred more than once on average in every 20 to 25 years</i></li><li>• <i>must result in a rare and severe downturn in farm income over a prolonged period of time (e.g. greater than 12 months)</i></li><li>• <i>must be a discrete event that is not part of long-term structural adjustment processes or normal fluctuations in commodity prices</i></li></ul>
<b>MP</b>	Member of Parliament
<b>SSP</b>	Social Sciences Program, Bureau of Rural Sciences

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# BACKGROUND

In June 2008, the Social Sciences Program (SSP) of the Bureau of Rural Sciences (BRS) was asked by the Drought Review Branch of the Department of Agriculture, Fisheries and Forestry (DAFF) to examine the social impacts of drought on farm families and rural communities as part of its National Review of Drought Policy (The Hon. Tony Burke MP 2008a). This review follows on from the Primary Industries Ministerial Forum in Cairns earlier in 2008, where ministers agreed that current approaches to drought and Exceptional Circumstances (EC) might no longer be the most appropriate in the context of a changing climate (PIMC 2008, The Hon. Tony Burke MP 2008b). Ministers saw that drought policy needed to be improved to create an environment of self-reliance and preparedness, and to encourage the adoption of appropriate climate change management practices.

As part of the review process the Minister for Agriculture, Fisheries and Forestry appointed a seven member Expert Social Panel (2008) to:

- *assess the social impact of drought on farm families and rural communities*
- *identify gaps and areas for improvement in Australian, state and territory government social support services that are designed to mitigate the impact of drought on farm families and rural communities.*

To support the work of the Expert Social Panel, the SSP was asked by the Drought Review Branch to:

- *provide an analysis of the social circumstances, perceptions, and behaviour of farmers (including issues of concern, risk management, perceptions of drought, management of challenges) from the June 2008 SSP climate change and industry adaptation survey of farmers*
- *provide an analysis of the Quality of Life survey of farmers and farm workers in drought areas (compared with the total Australian community) using the recognised Deakin Wellbeing Index (based on a national Newspoll survey conducted in mid July 2008) (Hogan et al. 2008a)*
- *provide an analysis of the social circumstances of rural people and communities (compared with urban communities) based on previously unanalysed dimensions from the Household Income and Labour Dynamics in Australia (HILDA) survey (Hogan et al. 2008b).*

This report responds to the first of these requests. It draws on data from a broader study conducted by the SSP in mid 2008 concerned with primary producer perceptions of climate risk and adaptation.

## METHOD

Results presented in this report are based on the responses of 3300 primary producers who participated in the 2008 Bureau of Rural Sciences' quantitative study on climate risk and adaptation. These producers had an estimated value of agricultural output of \$5000 per year or more. The data are the result of a postal survey undertaken by the SSP in 2008. A valid response rate of approximately 51% was obtained. The trends reported in this paper are based on preliminary data. This report provides a thematic representation of trends in the dataset which are subject to confirmation in the study's final report. Statistical differences are reported at the 0.05 level. Since a large number of comparisons are reported in this preliminary report, it is possible that some results will be significant as a result of chance alone.

The survey contained 126 questions on a range of topics such as on-farm risks, self efficacy and social capital. These data are reported as summary scales. Readers interested in the analysis behind the development of these scales are referred to Appendix A of this report.

For the purposes of this analysis, respondents' were classified into one of two groups, depending on whether or not they reported adverse seasonal conditions (such as frost or drought) as being a risk factor on their property.

A profile of producer perceptions of their financial viability in the context of the size of their enterprise (business profitability) has been constructed from the SSP survey data. These analyses are supplemented with data available from the Australian Bureau of Agricultural and Resource Economics (ABARE) on business profitability.

# TOPLINE RESULTS

Survey respondents were asked to report the extent to which a series of issues were a problem for them in managing their property. Risk factors included low commodity prices, high input costs, physical risks (such as water and soil quality) and personal health. An index of risk was developed from these items (for more details please refer to Appendix A). The index can be understood on a 1 to 5 scale where a score of 1 means no risks and 5 means a very high level of risk on this property. Respondents' average scores for the risk index are presented in Table 1. A statistically significant difference (\*) in the level of risk can be seen between those reporting adverse weather conditions on their property and those not. Notably, those reporting such events also have a higher risk index.

## 1 AN INDEX OF ON-FARM RISK

	Adverse weather conditions	No adverse conditions
Risk index	3.2*	2.6

Respondents were asked to indicate activities they were considering or actually doing to manage risk on their property using a rate scaling of 1 to 4 where 1 means not doing now and don't plan to, 2 means not doing now and considering, 3 means doing now as part of seasonal risk management, and 4 means doing now as part of long-term management.

Mean scores are presented in Table 2 and statistical differences (\*) noted. The results suggest that those affected by adverse seasonal conditions are more likely to be taking strategic action than those not affected. It is noted, however, that mean scores generally fall within the range of contemplating action rather than taking action.

## 2 USE OF RISK MANAGEMENT ACTIVITIES BY PRIMARY PRODUCERS

Activity	Adverse weather conditions	No adverse conditions
Use operational management plan	2.70 *	2.40
Improve financial situation	2.52 *	2.21
Develop risk management strategies for natural hazards	2.50 *	2.26
Develop business management plan	2.41 *	2.17
Scale back operations	2.37 *	1.97
Add new technologies	2.34 *	2.11
Undertake succession planning	2.23	2.15
Undertake training to improve on-farm income	2.01 *	1.81
Diversify into other forms of production	1.84 *	1.74
Intensify or expand current operations	1.82	1.76
Undertake training to improve off-farm income	1.81 *	1.62
Sell or lease part of property	1.64	1.62
Exit the industry	1.53	1.49

### 3 PROPORTION OF RESPONDENTS REPORTING ADVERSE WEATHER CONDITIONS BY INDUSTRY

Industry sector	Adverse weather conditions %	No adverse conditions %
Dryland cropping (e.g. cereals and legumes)	84	16
Dairy	76	24
Livestock	75	25
Intensive agricultural purposes (e.g. feedlots, piggery and poultry sheds)	73	27
Irrigated crops (e.g. vegetables, horticulture, fruit, nuts, rice, cotton, grapevines and nurseries)	71	29
Forestry plantation	68	32

Respondents were asked to indicate the main areas of primary production on their property and to report whether they were affected by adverse weather conditions (Table 3). Dryland croppers were more likely than other agricultural sectors to report they were affected by adverse weather conditions such as drought or frost (84 per cent).

Respondents were asked to report their perceptions regarding climate change and climate variability using a rating scale of 1 to 5 where 1 means that the statement is false, 2 that the statement is probably false, 3 neither true nor false, 4 probably true, and 5 true (see Table 4). Mean scores are presented and statistical differences (\*) noted.

Table 4 shows that the financial viability of primary producers who reported adverse weather conditions such as drought is perceived by these respondents to be more at risk than for those producers not working in such conditions.

### 4 PERCEPTIONS OF CLIMATE CHANGE AND CLIMATE VARIABILITY

Issue	Adverse weather conditions	No adverse conditions
Changes in weather patterns are part of a natural cycle	4.2	4.2
Changes in weather patterns are hurting my business	4.2 *	2.8
The community has a moral responsibility to reduce greenhouse gas emissions	4.1	4.1
Climate change is both man-made and natural	4.1	4.0
Climate patterns really are changing	3.9 *	3.7
Some farming practices generate greenhouse gas emissions	3.8	3.8
I have a responsibility to reduce greenhouse gas emissions	3.8	3.8
Carbon emissions worsen the effects of natural climate cycles	3.7	3.6
It's the government's responsibility to legislate to reduce greenhouse gas emissions	3.5	3.4
Greenhouse gas emissions cause climate change	3.4	3.4
Climate change is threatening the viability of my property	3.3 *	2.5
The increased intensity of droughts, storms and floods is a result of climate change	3.3 *	3.2
Normal weather patterns will soon return	3.2	3.2
Enough is known about climate change to justify action	3.2	3.1
There is no such thing as climate change	2.4	2.4

## 5 PRIMARY PRODUCER PERCEPTIONS ON WHETHER ENVIRONMENTAL EVENTS MAY BE CAUSED BY CLIMATE CHANGE

Events	Adverse weather conditions	No adverse conditions
The melting of icebergs and glaciers	3.5*	3.3
Local changes in weather (e.g. less rain; more dust storms; warmer local average temperatures)	3.4*	3.2
Reduced availability of water on my property	3.4*	2.9
Extreme weather events (e.g. major floods, heat waves)	3.3*	3.1
Shift in seasons (e.g. earlier/later frosts)	3.3*	3.1
Rising sea levels	3.3	3.3

Table 5 reports respondents' perceptions of weather events using a 1 to 5 scale where 1 meant strongly disagree and 5 meant strongly agree. A middle score of 3 was used to indicate that the respondent was unsure about their response to an item. These items are listed in Table 5. Mean scores are presented below and statistical differences (\*) noted. Table 5 shows that primary producers affected by adverse

weather conditions were more likely to agree that all of the items listed in Table 5, except rising sea levels, were caused by or made worse by climate change. The reduced availability of water on my property was the variable with the greatest difference between the two groups.

## 6 INDICATORS OF SOCIAL CAPITAL AND SELF-EFFICACY

Issue	Adverse weather conditions %	No adverse conditions %
Social Capital	3.9	3.9
Self-efficacy	3.6*	3.7

\* Statistically significant differences.

Survey respondents were asked to report on their capacity to manage a series of challenges. Their responses to these items have been computed into scales on social capital and self

efficacy (for more details on the development of these scales please refer to Appendix A) where higher scores (between 1 and 5) reflect better outcomes. Table 6 indicates that both groups report positive scores on social capital and self efficacy and that there are few, if any, substantive differences between them. However, a small but statistically significant difference is evident between respondents on self-efficacy, with respondents adversely affected by weather conditions reporting a lower score.

Respondents were asked if they had used or participated in any of a series of government programs or activities in the past 12 months. Percentages are presented in Table 7 and statistically significant differences (\*) noted. The table shows that those reporting the impact of adverse seasonal conditions were more likely to be receiving government assistance through drought relief programs.

Respondents were asked to rate on a scale of 1 (not helpful) to 5 (most helpful) the extent to which a range of possible government programs might be helpful to them in managing the impacts of climate and weather. In Table 8, mean scores are presented for responses and statistically significant



differences (\*) noted. The table shows that those reporting the impact of adverse seasonal conditions indicated a higher desire for government assistance than those not reporting adverse conditions.

## 7 USE OF OR PARTICIPATION IN VARIOUS PROGRAMS, PERCENTAGE OF RESPONDENTS

Issue	Adverse weather conditions	No adverse conditions
	%	%
Agricultural extension programs (professional advice on farming practices)	50 *	42
Landcare program/ Caring for Our Country	39	36
Exceptional Circumstances Relief Payment	32 *	13
Exceptional Circumstances interest rate subsidy	29 *	12
Non-government groups e.g. MLA, AWI, Greening Australia, World Wildlife Fund	28	28
Industry programs	24 *	20
Regional NRM/CMA programs	19 *	12
Professional advice and planning through Exceptional Circumstance program	19 *	9
Rural financial counselling	13 *	5
Irrigation Management Grant	11 *	4

## 8 TYPES OF GOVERNMENT ASSISTANCE THAT MIGHT BE HELPFUL

Issue	Adverse weather conditions	No adverse conditions
Provide me with direct financial assistance to manage current problems (e.g. Exceptional Circumstances assistance for drought)	4.1 *	3.3
Provide me with direct financial assistance to enable me to invest in the property's long-term future (e.g. farm infrastructure, succession planning)	4.0 *	3.4
Provide me with an incentive to purchase more fuel efficient machinery	3.9 *	3.6
Provide me with research results on current issues (e.g. drought resistant crops)	3.9 *	3.5
Provide resources to support local groups (e.g. water and Landcare)	3.7 *	3.6
Enable me to access advice and support for farm and natural resource management	3.7 *	3.4
Enable me to develop more sustainable farming practices	3.7 *	3.4
Provide me with direct financial assistance to enable me to seek advice and/or training for managing climate risk	3.6 *	3.5
Provide me with training on managing climate change	3.4 *	3.0
Provide me with information on water allocations and availability	2.8 *	2.6
Improve/better manage my water trading arrangements	2.5 *	2.3

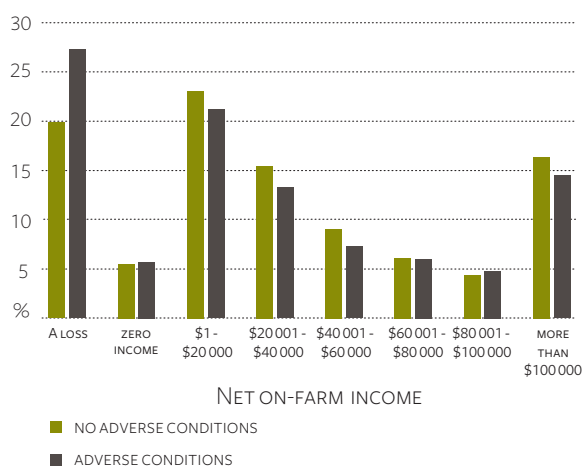


## ANALYSIS OF FARMERS' INCOME AND THEIR PERCEPTIONS OF VIABILITY

The Expert Social Panel asked whether the size of an enterprise affects its financial viability. Although this question fell outside the scope of the study of primary producer climate perceptions and adaptation, it was possible to undertake a limited analysis of this question using SSP data. This analysis is presented and is supplemented by analysis of ABARE farm survey data.

The SSP has conducted seven landholder surveys since 2002 (Byron et al. 2004a, b, 2006a, b, Hanslip et al. 2008a, Hanslip et al. 2008b, Kancans et al. 2008). To enable comparability between

### 1 NET ON-FARM INCOME, FINANCIAL YEAR ENDING 30 JUNE 2007



these landholder surveys and the survey of primary producer perceptions of, and adaptation to, climate change, income groupings for the current SSP survey were drawn from the landholder surveys. In the landholder surveys, income groups were broken down into \$20 000 income groups with the top group being '\$100 000 and above'. Figure 1 reports net on-farm income by those affected by adverse seasonal conditions (e.g. drought, frost) and those not affected by adverse seasonal conditions. Producers affected by adverse seasonal conditions were more highly represented (33 per cent versus 26 per cent) among those reporting a loss or zero income.

Producers were also asked whether they perceived their property to be financially viable based on their performance over the previous five years. Producers affected by adverse seasonal conditions were more likely to report (43 per cent versus 37 per cent) that they did not consider themselves to be viable. Further analysis was conducted to compare producers with on-farm income of less than \$100 000 and those with an on-farm income of more than \$100 000. The results of this analysis show that those with an income of less than \$100 000 were:

- *More likely to:*
  - have smaller properties
  - have livestock on their properties
  - say their property was primarily a lifestyle property.
- *Less likely to:*
  - have dryland cropping on their properties
  - have irrigated crops on their properties
  - have dairying on their properties
  - have intensive agriculture on their properties
  - say their property was primarily a business.

- *As likely to have:*
  - *irrigation on their properties*
  - *forestry on their properties.*

Respondents were also asked to indicate whether their average primary production income over the past five years was:

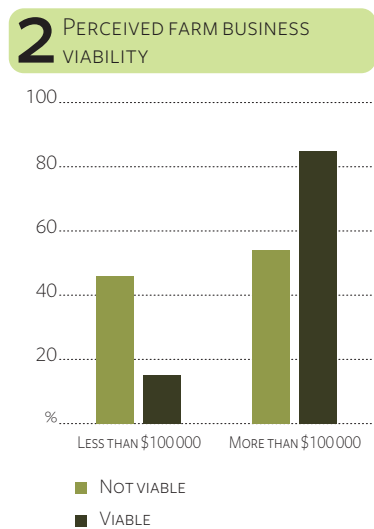
- *definitely not enough to keep the farm viable*
- *not quite enough to keep the farm viable*
- *enough to break even on the farm*
- *just enough to keep the farm viable*
- *more than enough to keep the farm viable.*

Respondents whose on-farm income was above \$100 000 were more likely to indicate that their production income was enough to keep their farm viable (Figure 2).

Those who indicated that their property was not viable (definitely not enough to keep the farm viable and not quite enough to keep the farm viable) were:

- *More likely to:*
  - *have smaller properties*
  - *have livestock on their properties*
  - *say their property was primarily a lifestyle property.*
- *Less likely to:*
  - *have dryland cropping on their properties*
  - *have dairying on their properties*
  - *have intensive agriculture on their properties.*
- *As likely to:*
  - *have irrigated crops on their properties*
  - *have forestry on their properties*
  - *have irrigation on their properties.*

Of those respondents who indicated that their property was not viable, 35 per cent had a total income (on-farm and off-farm income) of less than \$100 000 for 2005-06.



# FARM BUSINESS PROFITABILITY AND VIABILITY

To support the response to the question by the Expert Social Panel about whether the size of an enterprise affects the financial viability of farms, the following sections present farm profitability data derived from ABARE farm surveys for broadacre agricultural enterprises across Australia for financial years ending 30 June, between 2002 and 2007.

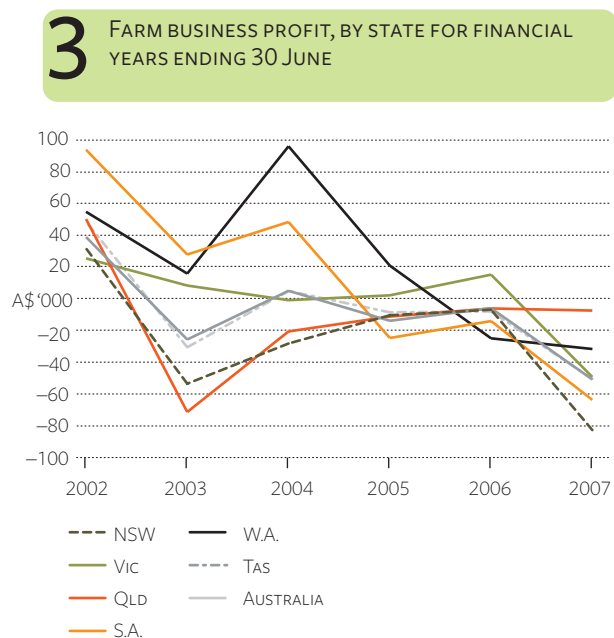
Broadacre is defined as 'all cropping and livestock' activities and is comprised of the following Australian and New Zealand Standard Industrial Classification (ANZSIC) industries:

- *Wheat and other crops industry (ANZSIC Class 121) – farms engaged mainly in growing cereal grains, coarse grains, oilseeds and/or pulses*
- *Mixed livestock–crops industry (ANZSIC Class 122) – farms engaged mainly in running sheep or beef cattle and growing cereal grains, coarse grains, oilseeds and/or pulses*
- *Sheep industry (ANZSIC Class 124) – farms engaged mainly in running sheep*
- *Beef industry (ANZSIC Class 125) – farms engaged mainly in running beef cattle*
- *Sheep–beef industry (ANZSIC Class 123) – farms engaged mainly in running both sheep and beef cattle.*

Excluded from the data are agricultural establishments coded to Nursery and Floriculture production (011); Mushroom and Vegetable Growing (012); Fruit and Tree Nut Growing (013); Other Crop Growing (015), which includes Sugar and Cotton; Poultry Farming (017); Deer Farming (018); and Other Livestock farming (019), which includes pig farming. Based on 2005–06 estimates, 42 per cent of farming businesses fall into these categories (ABS 2008).

## FARM BUSINESS PROFIT

Figure 3 presents farm business profit of Australian agricultural businesses (farms) by



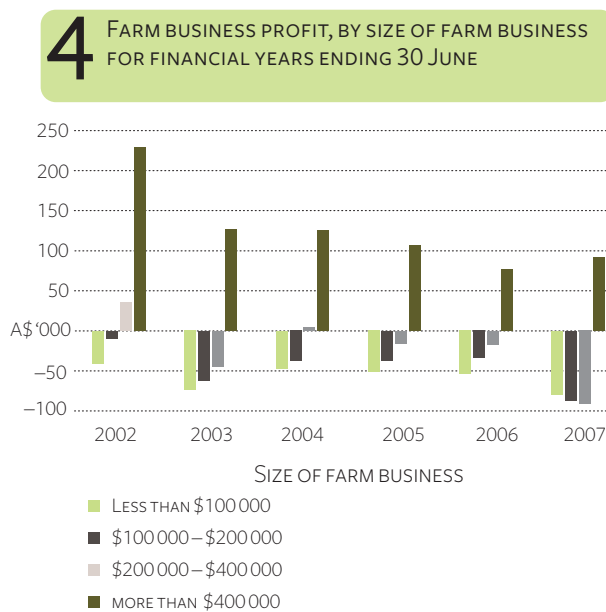
state for the financial years ending 30 June, between 2002 and 2007. Farm business profits fell sharply between 2002 and 2003 and have generally fallen across Australia over the past two financial years.

*Note:* All estimates are farm averages. All financial estimates are expressed in 2006-07 dollars. Farm business profit equals farm cash income plus build-up in trading stocks, less depreciation expense, less the imputed value of the owner manager, partner(s) and family labour.

## FARM BUSINESS PROFIT BY SIZE OF BUSINESS

Figure 4 presents a cross-tabulation of 'size of farm business', which is determined by the value of 'gross turnover' (total cash receipts plus build-up of trading stocks), and 'farm business profit' (net farm cash income plus build-up in trading stocks, less depreciation expense, less the imputed value of the owner manager, partner(s) and family labour), to provide an estimate of 'farm business profit' at varying levels of 'size of farm business' over time in Australia.

The sizes of farming businesses have been categorised as: less than \$100 000; \$100 000 to \$200 000; \$200 000 to \$400 000; and more than \$400,000. Figure 4 indicates that the size of farming businesses



is strongly related to farm business profit. Farms in the greater than \$400 000 category have a higher 'farm business profit' than those in the smaller farm business size categories. These results indicate that larger farms may be able to achieve greater efficiencies than smaller ones and that such efficiencies affect 'farm business profit'.

\* 'Size of farm business' is defined as gross turnover, which is total cash receipts plus build up of trading stocks. All estimates are per farm averages. All financial estimates are expressed in 2006-07 dollars. Farm business profit equals farm cash income plus build-up in trading stocks, less depreciation expense, less the imputed value of the owner manager, partner(s) and family labour.



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# APPENDIX A

## SCALE DEVELOPMENT AND ANALYSIS

Much of the work of social scientists is to identify and report on social attitudes, motivations, values and behaviours. While behaviours (e.g. voting behaviour) and social indicators (e.g. annual income) can be independently observed, attitudes and motivations are things that exist inside peoples' heads and as such, are more difficult to observe and report on. A number of analytical techniques were reported in this study. Techniques such as reliability analysis and factor analysis are commonly used in social science research to assess the extent to which larger numbers of survey items work well together to assess higher level constructs. These analyses are important to ensure that the data reported are statistically reliable and robust. In this section, typical methods used to assess the quality of social surveys are reported. This summary is intended to aid the reader in understanding how the analysis of data in this paper has been approached by the research team.

### *Constructs*

It is rare that an attitude, value or motivation (henceforth referred to as attitudes) is determined by just one thing. Typically in survey work, attitudes are measured as constructs, higher level concepts made up of a variety of factors that go together to form an overall whole. The construct is usually informed by a theoretical framework that the researchers have brought to bear on the project. Extensive psychometric work goes into the development of a reliable survey instrument including qualitative research, cognitive testing, survey piloting, construct testing and cross validation of survey results. Given this amount of work, researchers are reluctant to change an item in a validated survey without repeating this series of studies.

### *Background on psychometric analysis*

In this paper a number of statistical tests were applied to the survey data to ensure that the variables behaved properly in psychometric terms. The psychometric tests applied to the data are briefly discussed below.

### *Factor analysis*

Factor analysis is a statistical method that is used to reduce a large number of survey items about a particular attitude or behaviour into a few underlying new variables or factors. The way it does this is to look for covariance across the responses; that is, by identifying questions for which the answer patterning is the same. An important research factor for farmers managing climate change is that they actively plan to manage their on-farm risks. This idea or factor could be made up of a larger number of different attitudes or behaviours such as succession planning, use of an operational management plan and development of a business management plan. Factor analysis brings common variables such as these together in the dataset and reduces them to a single new variable (or factor) while losing as little of the response detail as possible. This new variable can then be used to more easily examine the question since one can focus on just one item (e.g. actively plan to manage their on-farm risks) rather than needing to think about a lot of variables all at the same time. In social sciences a factor score of

30 per cent – 40 per cent of variance explained is acceptable, but ideally one would like to see factor scores of 70 per cent. The higher score indicates that less information has been lost in bringing the items together and that together, these items explain much of what is going on with the behaviours of interest.

### *Reliability analysis*

Reliability analysis tests whether or not the survey items work together to make a coherent scale. If they do, an analyst may calculate a summary scale variable and use this instead of the larger number of survey items used in the original study. Once again, this makes reporting the data simpler and more coherent.

While there are some similarities between reliability analysis and factor analysis, reliability analysis can produce much more finely focused on assessing one central theme from a set of items, whereas than factor analysis can deal with multiple themes at the one time. Reliability analysis is concerned to ensure that respondents respond to survey questions in a similar way such that a set of items could be said to make up a consistent scale. Reliability analysis tests these items to see if they go well together as a scale and if they do, an analyst can compute a summary variable for the scale that is made up of these variables (by using the average for each item for example). When the new scale variable is produced it retains the survey's original scale (for example scores of 1 to 5 where 1 means strongly disagree and 5 means strongly agree). A common statistic produced by this routine is called the Cronbach Alpha. Like factor analysis, one looks for a score of around 70 per cent (or 0.7) to be satisfied that the items are working well together.

## *Psychometric analysis of scales used in this study*

### *Index of risk*

Reliability analysis was used to develop the risk index reported in this study. In Question 1 of the survey, respondents were asked to report the extent to which 16 issues were a problem in managing their property, using a rating scale of 1 to 5, where 1 means not at all a problem and 5 means a major problem. These issues were:

- 1 *low commodity prices*
- 2 *input costs (e.g. fuel, energy and fertiliser costs)*
- 3 *interest rates*
- 4 *cash flow*
- 5 *not enough farm income to support family*
- 6 *debt levels*
- 7 *labour (availability and/or cost)*
- 8 *not enough access to community services (e.g. banks, schools, healthcare)*
- 9 *lack of access to training or professional services*
- 10 *cost of training or professional services*
- 11 *water (e.g. allocations for irrigation)*

- 12      *water quality (e.g. salinity, pH, nutrients)*  
 13      *adverse seasonal conditions (e.g. frosts, drought)*  
 14      *soil (e.g. erosion, salinity, pH)*  
 15      *pests or diseases*  
 16      *my health/fitness.*

The Cronbach's Alpha for the risk index was a reliable 0.83.

### *Social capital and self efficacy scales*

Reliability analysis was used to develop the scales for social capital and self efficacy. Respondents were asked to report whether they (strongly) agreed or (strongly) disagreed with a series of statements taken from the literature and field work concerning aspects of social capital and self-efficacy.

The aspects of social capital that were included in the SSP survey instrument related to community cohesion and support were:

- *could ask someone to help them when problems arise*
- *was a member of a local community group (e.g. farmers' co-op, church, sports club, school committee, etc.)*
- *had carried out unpaid work for a community group in the past 12 months*
- *felt part of their local community*
- *felt that local people were willing to help each other.*

The Cronbach's Alpha for the self efficacy scale was a reliable 0.74

Self-efficacy is concerned with a person's sense of their own competence to manage a range of stressful situations. The survey included questions about the degree to which the respondent:

- *believed that they had the capacity to handle unforeseen situations*
- *could rely on their coping abilities to remain calm when facing difficulties*
- *believed they had the ability to think of good solutions when facing difficulties.*

The Cronbach's Alpha for the self efficacy scale was a reliable 0.80.

# THE SOCIAL WELLBEING OF RURAL AUSTRALIANS:

## AN ANALYSIS OF THE HOUSEHOLD, INCOME AND LABOUR DYNAMICS IN AUSTRALIA (HILDA) LONGITUDINAL DATASET

*REPORT PREPARED FOR THE DROUGHT REVIEW BRANCH, AUSTRALIAN GOVERNMENT DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY*

Anthony Hogan, Cain Polidano, Jacqui Russell and Patrick Stakelum

September 2008

This paper uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (MIAESR). The findings and views reported in this paper, however, are those of the authors and should not be attributed to either FaHCSIA or the MIAESR.

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## KEY FINDINGS

### Background

This report is one of three prepared by the Social Sciences Program, Bureau of Rural Sciences, to support investigations of the social impacts of drought as part of the National Review of Drought Policy. It reports on the social wellbeing of rural Australians using the Household, Income and Labour Dynamics in Australia (HILDA) dataset.

### The HILDA dataset

The HILDA Survey is a national study that asks a wide range of questions covering matters such as financial and emotional wellbeing, health-related quality of life and social connectedness. In this study, rural people are those living in rural areas and small towns with fewer than 1000 people.

### Rural people report being more satisfied with some aspects of their lives

HILDA data show that rural people express greater satisfaction across a variety of measures (satisfaction with relationships and financial situation) compared with urban people. Levels of connectedness are similar between communities.

### Rural people are less satisfied with access to services than people in urban areas

Rural people are significantly less satisfied with access to services than urban people. This difference between urban and rural people is the most marked of the indicators.

Rural people report poorer physical health. Rural peoples' summary quality of life scores show higher levels of physical pain and reduced body functioning. Mental health scores for rural people are marginally better than for urban people.

### Rural people face higher transport costs

Motor vehicle and fuel costs are higher for rural people. Urban people score at both extremes (low and high) of the index of social disadvantage.

### Rural people are happier at work but their workplace stress is increasing

Rural people are more likely to report higher levels of control over their daily work than urban people. However, over the period of the study, rural people moved from being less stressed than urban people to being equally stressed by their work.

### Limitations of this analysis

People living in remote areas, and Aboriginal and Torres Strait Islander people in particular, are under-represented in HILDA data. Wave 6 of the data (collected in 2006) was not available at the time of this analysis. Comparative analysis of wealth and social capital would be possible with use of Wave 6 data.



## LIST OF ACRONYMS

<b>ABARE</b>	Australian Bureau of Agricultural and Resource Economics
<b>ABS</b>	Australian Bureau of Statistics
<b>ANZSIC</b>	Australian and New Zealand Standard Industrial Classification
<b>BRS</b>	Bureau of Rural Sciences
<b>DAFF</b>	Australian Government Department of Agriculture, Fisheries and Forestry
<b>EC</b>	Exceptional Circumstances: EC events are rare and severe events that are outside those that a farmer could normally be expected to manage using responsible farm management strategies. To be classified as an EC event, the event: <ul style="list-style-type: none"><li>• <i>must be rare, that is it must not have occurred more than once on average in every 20 to 25 years</i></li><li>• <i>must result in a rare and severe downturn in farm income over a prolonged period of time (e.g. greater than 12 months)</i></li><li>• <i>must be a discrete event that is not part of long-term structural adjustment processes or normal fluctuations in commodity prices</i></li></ul>
<b>MP</b>	Member of Parliament
<b>SSP</b>	Social Sciences Program, Bureau of Rural Sciences

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## BACKGROUND

In June 2008, the Social Sciences Program (SSP) of the Bureau of Rural Sciences (BRS) was asked by the Drought Review Branch of the Department of Agriculture, Fisheries and Forestry (DAFF) to examine the social impacts of drought on farm families and rural communities as part of its National Review of Drought Policy (The Hon. Tony Burke MP 2008a). This review follows on from the Primary Industries Ministerial Forum in Cairns earlier in 2008, where Ministers agreed that current approaches to drought and Exceptional Circumstances (EC) might no longer be the most appropriate in the context of a changing climate (PIMC 2008, The Hon. Tony Burke MP 2008b). Ministers saw that drought policy needed to be improved to create an environment of self-reliance and preparedness, and to encourage the adoption of appropriate climate change management practices.

As part of the review process the Minister for Agriculture, Fisheries and Forestry appointed a seven member Expert Social Panel (2008) to:

- *assess the social impact of drought on farm families and rural communities*
- *identify gaps and areas for improvement in Australian, state and territory government social support services that are designed to mitigate the impact of drought on farm families and rural communities.*

To support the work of the Expert Social Panel, the SSP was asked by the Drought Review Branch to:

- *provide an analysis of the social circumstances of rural people and communities (compared with urban communities) based on previously unanalysed dimensions from the Household Income and Labour Dynamics in Australia (HILDA) survey*
- *provide an analysis of the social circumstances, perceptions, and behaviour of farmers (including issues of concern, risk management, perceptions of drought, management of challenges) from the June 2008 SSP climate change and industry adaptation survey of farmers (Hogan et al. 2008a)*
- *provide an analysis of the Quality of Life survey of farmers and farm workers in drought areas (compared with the total Australian community) using the recognised Deakin Wellbeing Index (based on a national Newspoll survey conducted in mid July 2008) (Hogan et al. 2008b).*

This report responds to the first of these requests in relation to the social wellbeing of rural Australians using the HILDA dataset.



# METHODS

The HILDA survey is a longitudinal household-based study that began in 2001. The same respondents in each household are surveyed each year, regardless of whether they have moved to another residence. The survey is funded by the Commonwealth Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA). HILDA has the following features:

- 1 *it collects information about economic and subjective wellbeing, as well as labour market and family dynamics*
- 2 *the study has funds for twelve annual surveys, or 'waves'*
- 3 *special thematic modules are included in each wave*
- 4 *Wave 1, conducted in 2001, consisted of 7682 households and 19 914 individuals. Interviews are conducted annually with all adult members of each household.*

The HILDA survey asks respondents a wide range of questions covering matters such as financial and emotional wellbeing, health-related quality of life and social connectedness.

The analysis in this paper is concerned with a comparison of social and economic wellbeing between urban and rural Australians. Within the HILDA dataset, individuals can be defined as being of urban or rural domicile, using one of several variables. For the purposes of this study, the Section of State (HHSOS) was the derived spatial variable that was used to assign respondents to a group as either Urban or Rural. The HHSOS classification is a standard geographic classification used by the Australian Bureau of Statistics and is employed in the HILDA studies.<sup>1</sup> Within HHSOS, respondents can be coded as major urban, other urban, bounded locality or rural balance.

In this report, a new variable was created that consisted of 'urban' (major and other urban) and 'rural' (bounded locality and rural balance, which includes people living in small towns, villages and rural areas with fewer than 1000 people). These two groupings constituted 84 per cent and 16 per cent of the sample respectively. In 2006, 'rural' comprised 12 per cent of the total Australian population (2.3 million people) (BRS 2008).

The sample size in the designated rural areas enables comparisons to be made between the social circumstances of people living in rural areas and those living in urban areas. However, it should be noted that the people living in rural areas (in places with fewer than 1000 people) include a range of different occupations, including working on farms, working in small towns, and people of retirement age.

The data from five annual surveys or waves (2001 to 2005) were available for this analysis. Not all questions were asked in all waves. For example, questions on access to services were only asked in Wave 2. Although not available at the time of the analysis, the inclusion of Wave 6 data would enable a comparison of respondents' changes in wealth between 2002 and 2006. In addition, Wave 6 data contain more in-depth information on social capital.

The aim of this analysis is to provide information to the Expert Social Panel (the Panel) on the wellbeing of rural Australians. Sets of items within the HILDA surveys likely to be of interest to the Panel were identified.

Thematically these are:

- 1 *Satisfaction with life*
- 2 *Connectedness*
- 3 *Access to services*
- 4 *Health status*
- 5 *Disadvantage in rural communities*
- 6 *Financial issues*
- 7 *Workplace issues.*

Since many of these sections of HILDA contained a number of survey questions, scaled variables were derived from the data for life satisfaction, financial stress, disposable income and workplace stress. Details on how these scales were derived can be found in Appendix A. The following sections in this report compare the various social circumstances of people living in rural areas with those of people living in urban communities. Statistically significant differences are reported for differences between urban and rural populations where differences were less than 0.05.

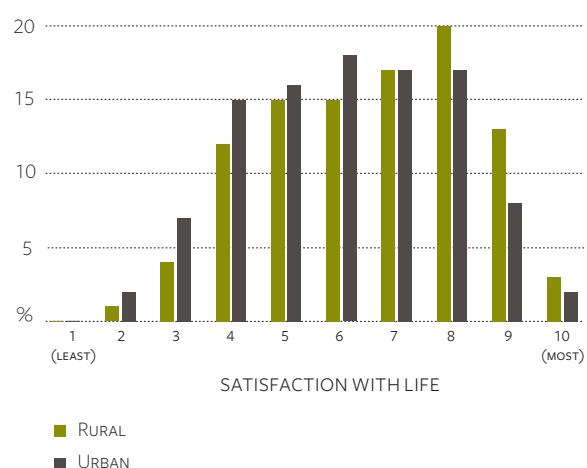
## FINDINGS

### SATISFACTION WITH LIFE

Satisfaction with life is reported as a summary scale with comparisons made between rural and urban communities. Figure 1 illustrates the finding for 2005.

People living in rural areas were more highly satisfied with their life than those in urban areas. For the higher levels of life satisfaction (score of 8 or more), 39.6 per cent of people living in rural areas were satisfied, compared with 28.5 per cent of people living in urban areas. These differences were statistically significant.

#### 1 COMPARISON OF SATISFACTION WITH LIFE FOR RURAL AND URBAN POPULATIONS, 2005



Source: Hilda 2005.

### CONNECTEDNESS

Respondents in the HILDA study were asked to report on a series of questions concerned with their connection with others in the community. These data are an indicator of social capital and social inclusion. The questions were concerned with levels of perceived loneliness, sufficiency of friends and visitors, and the perceived level of help available. Table 1 reports these indicators of social connectedness by rural and urban populations for 2005.

## 1 INDICATORS OF SOCIAL CONNECTEDNESS (PER CENT AGREEING), 2005

Measures of connectedness	Rural %	Urban %
Have enough friends	45.9	46.6
People visit me as often as I would like	30.7	30.7
I often feel very lonely	19.0	19.7
Have enough help	12.4	12.5

Source: HILDA 2005.

## 2 ADEQUACY OF ACCESS TO SERVICES, 2002

	Rural %	Urban %
Adequate access to services	9.1	40.0
Adequate transport	8.2	42.4

Source: HILDA 2002.

There were no statistically significant differences between the scores of rural and urban communities on these indicators.

## ACCESS TO SERVICES

It is often stated that people living in rural areas have a lower level of access to services, compared with people living in urban areas. The 2002 HILDA dataset contains a series of questions on peoples' living and lifestyle situations, including items concerned with the adequacy of transport and access to services. HILDA does not define the nature of services to which people seek access.

This analysis of the HILDA data quantifies a marked difference in the adequacy of access to services and transport for rural people. Fewer than one in ten people living in rural areas reported that they had adequate access to services or transport, compared with people living in urban areas where 40 per cent reported adequacy of services and transport.

Although not quantified in the HILDA survey, reduced access to services can result in reduced health care options for people living in rural communities (Berry 2008). Access to the latest forms of mental health assistance, for example, may be hampered by something as simple as reduced access to mobile telephone coverage preventing the delivery, for example, of SMS communication-based interventions.

## HEALTH STATUS

The HILDA dataset contains results on the internationally recognised health-related quality of life measure, the SF 36. This scale provides data on 8 measures of health, including aspects of both physical health and mental health. These are:

### 1 Physical health

- i physical functioning (i.e. level of mobility, e.g. ability to climb stairs or walk a certain distance)
- ii role-physical (i.e. the level of difficulty in mobilising)
- iii bodily pain (i.e. the magnitude of pain and/or level of interference with tasks)
- iv general health (i.e. a person's perception of their health status).

### 2 Mental health

- i vitality (i.e. the sense of 'energy' versus 'fatigue' experienced)
- ii social functioning (i.e. the extent of and amount of time spent engaging in social relations)

iii *role-emotional (i.e. perceptions of ability to accomplish tasks or degree of care taken in accomplishing tasks)*

iv *mental health (i.e. a person's sense of their mental health, e.g. 'down in the dumps' or 'happy').*

The raw scores on the SF 36 are transformed to a 0 – 100 scale where the higher score reflects better health.

Table 3 shows that overall there were no statistically significant differences between people in urban and rural communities on indicators of general health (e.g. ability to walk to the corner with a bag of groceries). Over the five years of data, people living in rural areas consistently showed slightly better mental health status than those in urban areas, with this difference being statistically significant. People living in rural areas reported statistically significant poorer health outcomes for physical functioning and bodily pain. Table 3 illustrates the differences in responses for 2005.

### 3 HEALTH-RELATED MEASURES OF QUALITY OF LIFE (SF 36) (%), 2005

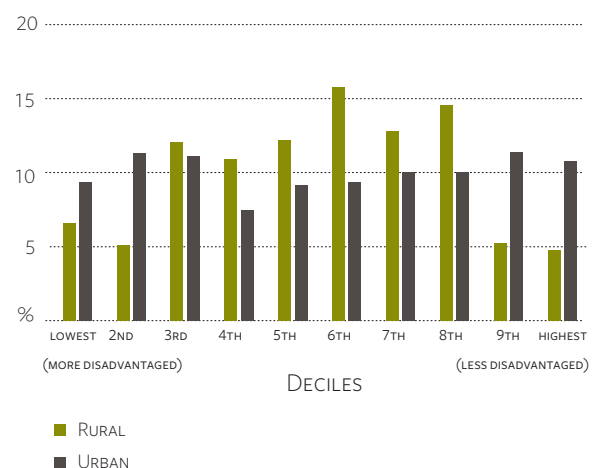
SF 36 measure	Rural	Urban	Rural compared with urban (p<.05)
Role-emotional	83.8	82.4	Better outcome
Social functioning	82.6	81.7	Better outcome
Physical functioning	82.3	83.0	Poorer outcome
Role-physical	76.9	79.1	Poorer outcome
Bodily pain	71.7	73.9	Poorer outcome
Mental health	75.6	73.7	Better outcome
General health	68.8	69.1	No statistical difference
Vitality	60.7	60.3	No statistical difference

Source: HILDA 2005.

## DISADVANTAGE IN RURAL COMMUNITIES

The HILDA dataset contains a series of indicators developed by the Australian Bureau of Statistics (ABS) on relative social disadvantage. One such indicator is the SEIFA10, an index of the Relative Socio-economic Disadvantage of individuals, derived from ABS Census variables related to disadvantage such as: low income; low educational attainment; unemployment; and access to motor vehicles. The highest relative disadvantage is associated with the lowest decile rating on the Socio-Economic Indexes for Area10 (SEIFA10). Higher scores reflect lower levels of disadvantage.

### 2 COMPARISON OF SOCIAL AND ECONOMIC DISADVANTAGE (SEIFA SCORES), 2005



Source: Hilda 2005.

Figure 2 illustrates the differences in the levels of disadvantage calculated using the SEIFA10 index for 2005.

Figure 2 shows that people living in rural areas are proportionately more highly represented from the third to the eighth deciles of the SEIFA scores. They are less likely than urban people to rank amongst the most disadvantaged or least disadvantaged people. These differences were persistent over time.

## FINANCIAL ISSUES

### *Expenditure patterns in households*

The HILDA dataset contains information on annual household income and expenditure. From these data a ratio was derived (see Appendix A) of the level of expenditure relative to available income. It is an indicator of the relative cost of living. Expenditures included in the ratio are:

- 1 Groceries
- 2 Alcohol
- 3 Cigarettes
- 4 Public transport and taxis
- 5 Meals eaten out, hobbies
- 6 Sports, gambling, and entertainment
- 7 Motor vehicle fuel
- 8 Clothing and footwear
- 9 Telephone rent and calls (excluding internet charges)
- 10 Holidays and holiday travel
- 11 Private health and accident insurance
- 12 Health Care
- 13 Home repairs/renovations/maintenance
- 14 Motor vehicle repairs/maintenance
- 15 Education fees
- 16 Electricity bills, gas bills and other heating fuel.

Figure 3 shows the differences in the ratio of income to expenses calculated for 2005.

Statistically significant differences can be observed between urban and rural communities. Rural people are more likely than urban people to spend a higher proportion of their income on living expenses. Of particular interest, there is a higher proportion of people living in rural areas whose costs of living are



either equal to or in excess of their income. At a summary level it can be said that people living in rural areas are over-represented when the ratio of costs to income is 80 per cent or greater (approximately 27 per cent versus 20 per cent).

### Expenditure on motor vehicle fuel and vehicle running costs

Comparative data were available on annual household expenditure on motor vehicle fuel for 2005 (Figure 4). Notably, these data were collected prior to the recent spike in global fuel prices. People living in rural communities were statistically significantly more likely to expend more than \$3000 each year on fuel than people living in urban communities (37.1 per cent compared with 23.8 per cent, respectively).

Figure 5 shows that people living in rural communities were also more likely to expend more than \$1000 a year on motor vehicle maintenance than people living in urban communities (47.8 per cent compared with 38.8 per cent).

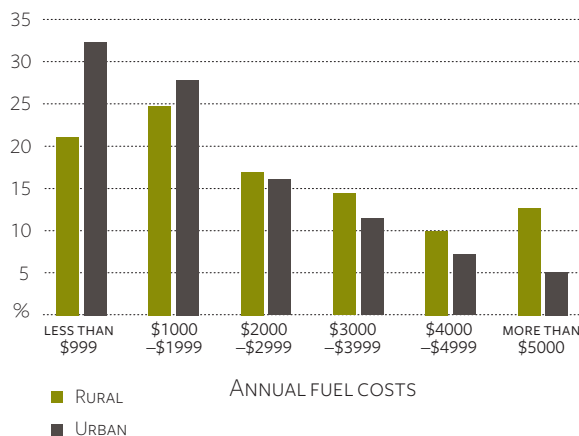
### Overall financial hardship

The HILDA dataset contains measures of items about the ability of respondents to pay bills, feed and house themselves and similar matters (see Appendix A for further details on these items). These data are presented in Figure 6. In all cases, urban people were more financially stressed than rural people, with the least difference in 2005.

## WORKPLACE ISSUES

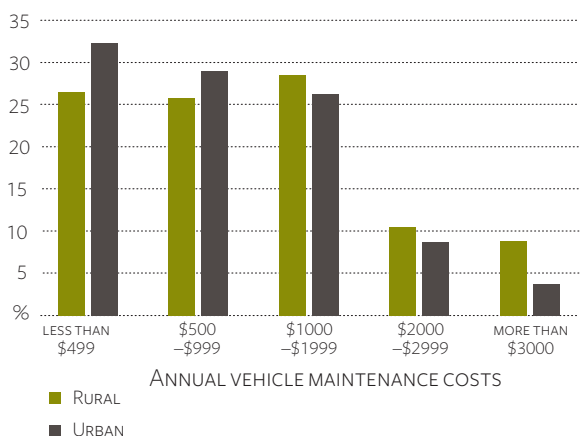
The HILDA dataset contains a series of items on workplace wellbeing (i.e. the Karasek workplace stress items) that are taken from the British Whitehall employment study (Ferrie 2004, Karasek and Theorell 1990). These items relate to job latitude, job security, job stress and fairness of pay as set out below:

**4** ANNUAL HOUSEHOLD MOTOR VEHICLE FUEL COSTS, 2005



Source: Hilda 2005.

**5** ANNUAL HOUSEHOLD MOTOR VEHICLE MAINTENANCE COSTS, 2005



Source: Hilda 2005.

## 4 WORKPLACE STRESSORS, 2005

7 point rating scale	Job security		Job latitude		Job stress	
	Rural %	Urban %	Rural %	Urban %	Rural %	Urban %
<b>Low</b>	0.7	0.7	5.2	4.5	1.7	1.9
	1.9	1.7	10.6	11.4	6.0	5.5
	6.1	7.0	16.0	16.8	11.0	11.7
	17.0	16.0	21.8	21.8	20.0	19.0
	24.8	26.4	20.7	21.6	20.8	20.8
	28.6	28.7	15.7	15.8	23.9	26.1
<b>High</b>	21.0	19.6	10.0	8.1	16.6	15.1

Source: HILDA 2005 (highlighted differences are statistically significant).

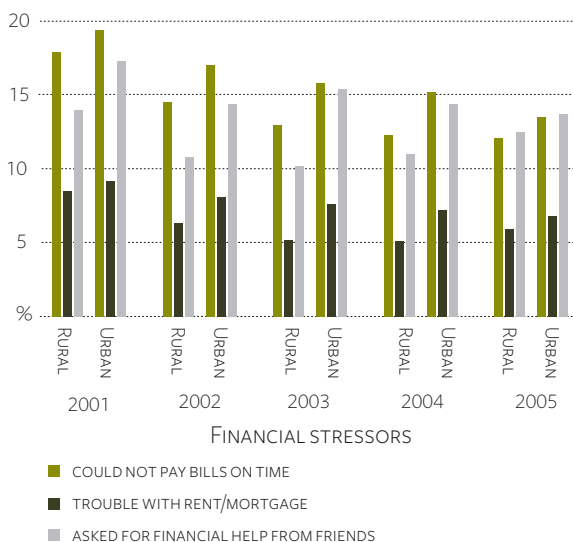
i Job latitude:

- I have a lot of freedom to decide how I do my own work
- I have a lot of say about what happens on my job
- I have a lot of freedom to decide when I do my work.

ii Job security:

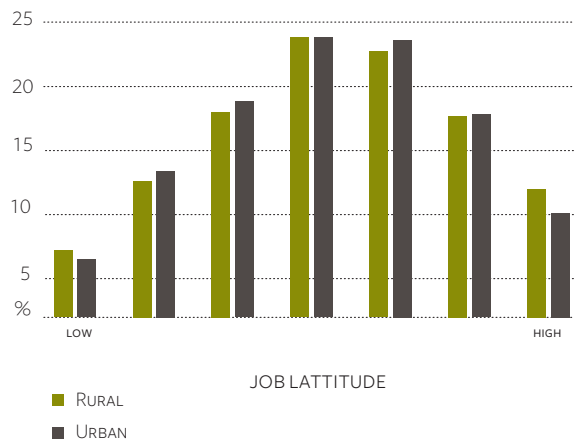
- I have a secure future in my job
- The company I work for will still be in business five years from now
- I worry about the future of my job.

## 6 FINANCIAL STRESSORS, 2001 TO 2005



Source: Hilda 2001-05.

## 7 JOB LATITUDE, 2005



iii *Job stress:*

- *My job is complex and difficult*
- *My job often requires me to learn new skills*
- *My job is more stressful than I had ever imagined*
- *I fear that the amount of stress in my job will make me physically ill.*

iv *Fairness of pay:*

- *I get paid fairly for the things I do in my job.*

Figure 7 and Table 4 indicate that rural workers were statistically more likely than urban workers to report slightly higher levels of latitude in their jobs (20 per cent more likely). Initially rural workers reported being less stressed than urban workers, however, over the course of 2001 to 2005 this gap closed. There were no statistical differences in relation to job security and fair pay.

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## APPENDIX A

# SCALE DEVELOPMENT AND ANALYSIS

Much of the work of social scientists is to identify and report on social attitudes, motivations, values and behaviours. While behaviours (e.g. voting behaviour) and social indicators (e.g. annual income) can be independently observed, attitudes and motivations are things that exist inside peoples' heads and as such, are more difficult to observe and report on. A number of analytical techniques are reported in this study. Techniques such as reliability analysis and factor analysis are commonly used in social science research to assess the extent to which larger numbers of survey items work well together to assess higher level constructs. These analyses are important to ensure that the data reported are statistically reliable and robust. In this section, typical methods used to assess the quality of social surveys are reported. This summary is intended to aid the reader in understanding how the analysis of data in this paper has been approached by the research team.

### *Constructs*

It is rare that an attitude, value or motivation (henceforth referred to as attitudes) is determined by just one thing. Typically in survey work, attitudes are measured as constructs, higher level concepts made up of a variety of factors that go together to form an overall whole. The construct is usually informed by a theoretical framework that the researchers have brought to bear on the project. Extensive psychometric work goes into the development of a reliable survey instrument including qualitative research, cognitive testing, survey piloting, construct testing and cross validation of survey results. Given this amount of work, researchers are reluctant to change an item in a validated survey without repeating this series of studies.

### *Reliability analysis*

In this paper a reliability analysis was applied to the survey data to ensure that the variables behaved properly in psychometric terms. Reliability analysis tests whether or not the survey items work together to make a coherent scale. If they do, an analyst may calculate a summary scale variable and use this instead of the larger number of survey items used in the original study. Once again, this makes reporting the data simpler and more coherent.

While there are some similarities between reliability analysis and factor analysis, reliability analysis is much more finely focused on assessing one central theme from a set of items, whereas factor analysis can deal with multiple themes at the one time. Reliability analysis is concerned to ensure that respondents respond to survey questions in a similar way such that a set of items could be said to make up a consistent scale. Reliability analysis tests these items to see if they go well together as a scale and, if they do, an analyst can compute a summary variable for the scale that is made up of these variables (by using the average for each item for example). When the new scale variable is produced it retains the survey's original scale (for example scores of 1 to 5 where 1 means strongly disagree and 5 means strongly agree). A common statistic produced by this routine is called the Cronbach Alpha. Like factor analysis, one looks for a score of around 70 per cent (or 0.7) to be satisfied that the items are working well together.

### *Psychometric analysis of scales used in this study*

#### *Life satisfaction scale*

Within the HILDA dataset, a variety of variables are used to describe life satisfaction. These items included satisfaction with partner, children, financial situation and life generally. Respondents rated their satisfaction for each item on a score of 0 (totally dissatisfied) to 10 (totally satisfied). To simplify reporting, a life satisfaction scale was derived from these data using reliability analysis. The Cronbach Alpha for this scale was an acceptable 0.67.

#### *Disposable income*

The HILDA dataset contains information on a wide range of household expenses such as food, clothing, fuel, and holidays. It also contains information on annual household income. To simplify reporting on these data a ratio of disposable income was calculated as a ratio of expenses over income.

#### *Financial stress*

The HILDA dataset contains information on a range of variables concerned with financial stress. These questions related to:

- 1 *the ability to pay electricity, gas or telephone bills on time*
- 2 *the ability to pay the mortgage or rent on time*
- 3 *the need to pawn or sell something*
- 4 *going without meals*
- 5 *ability to heat the home*

- 6 requests for financial help from friends or family
- 7 requests for help from welfare/community organisations.

Reliability analysis was used to develop a scale of financial hardship. The scale showed good internal reliability with an acceptable Cronbach Alpha of 0.70.

### *Conditions at work*

The HILDA dataset contains information on a range of variables concerned with wellbeing at work. These items have been drawn from the internationally recognised Whitehall study of workplace stress (Ferrie 2004, Karasek 1979) and include constructs such as job security, job latitude and job stress. Reliability analysis was used to check the internal reliability of these scales.

*i The job security scale consisted of the following items:*

- *I have a secure future in my job*
- *The company I work for will still be in business in 5 years' time*
- *I (do not) worry about the future of my job.*

The Cronbach Alpha for this scale was an acceptable 0.64.

*ii The job latitude scale consisted of the following items:*

- *I have a lot of freedom to decide how I do my own work*
- *I have a lot of say about what happens on my job*
- *I have a lot of freedom to decide when I do my work.*

The Cronbach Alpha for this scale was an acceptable 0.82.

*iii The job stress scale consisted of the following items:*

- *My job is complex and difficult*
- *My job often requires me to learn new skills*
- *My job is more stressful than I had ever imagined*
- *I fear that the amount of stress in my job will make me physically ill*

The Cronbach Alpha for this scale was an acceptable 0.79.

# THE SOCIAL WELLBEING OF RURAL AUSTRALIANS:

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## A COMPARATIVE ANALYSIS OF AGRICULTURAL WORKERS IN DROUGHT-AFFECTED AREAS AND THE AUSTRALIAN POPULATION USING THE DEAKIN PERSONAL WELLBEING INDEX

*REPORT PREPARED FOR THE DROUGHT REVIEW BRANCH, AUSTRALIAN GOVERNMENT DEPARTMENT OF AGRICULTURE, FISHERIES AND FORESTRY*

Anthony Hogan, Brigit Maguire, Jacqui Russell and Patrick Stakelum

September 2008

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# KEY FINDINGS

## Background

This report is one of three prepared by the Social Sciences Program, Bureau of Rural Sciences, to support investigations of the social impacts of drought as part of the National Review of Drought Policy.

The paper reports on a comparison of wellbeing of two populations:

- *a sample of 500 agricultural workers in drought-affected areas*
- *a nationally representative sample of 1203 individuals of the Australian population aged 18 years and over.*

## Methods

This study used the Deakin Personal Wellbeing Index, which contains eight items of life satisfaction or wellbeing measures, each one corresponding to a quality of life domain:

- *standard of living*
- *health*
- *achieving in life*
- *personal relationships*
- *safety*
- *community-connectedness*
- *future security*
- *spirituality or religion.*

It also contains a ninth summary question on overall wellbeing (life as a whole). A series of standard Newspoll Omnibus survey questions was also asked to both populations. These included gender, age, educational levels, and household income.

## Comparing wellbeing

For eight of the nine wellbeing measures, there was a significant difference between agricultural workers in drought-affected areas and the Australian population. Agricultural workers in drought-affected areas were less satisfied with their lives as a whole. There was no statistical difference between the two samples in satisfaction with what they are achieving in life.

For people working in agriculture in drought-affected areas, both white-collar workers (e.g. farm managers), and blue-collar workers (e.g. farm labourers), had similar measures of wellbeing.

## **Agricultural workers in drought-affected areas are less satisfied with their future security**

The most striking finding from the study is that agricultural workers in drought-affected areas were up to 40 per cent more likely to report feeling less satisfied with their future security than Australians in general.

### Descriptive statistics

There are fewer young people (under 34) working in drought-affected areas compared with the Australian population as a whole.

In comparison to the Australian population in general, agricultural workers in drought-affected areas were more likely to:

- *have children*
- *be married or living together*
- *finish school in Year 10*
- *have a diploma or certificate from a college or TAFE (including an apprenticeship) but less likely to have a degree or diploma from a university.*

## LIST OF ACRONYMS

**ABARE** Australian Bureau of Agricultural and Resource Economics

**ABS** Australian Bureau of Statistics

**ANZSIC** Australian and New Zealand Standard Industrial Classification

**BRS** Bureau of Rural Sciences

**DAFF** Australian Government Department of Agriculture, Fisheries and Forestry

**EC** Exceptional Circumstances: EC events are rare and severe events that are outside those that a farmer could normally be expected to manage using responsible farm management strategies. To be classified as an EC event, the event:

- *must be rare, that is it must not have occurred more than once on average in every 20 to 25 years*
- *must result in a rare and severe downturn in farm income over a prolonged period of time (e.g. greater than 12 months)*
- *must be a discrete event that is not part of long-term structural adjustment processes or normal fluctuations in commodity prices*

**MP** Member of Parliament

**SSP** Social Sciences Program, Bureau of Rural Sciences

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## BACKGROUND

In June 2008, the Social Sciences Program (SSP) of the Bureau of Rural Sciences (BRS) was asked by the Drought Review Branch of the Department of Agriculture, Fisheries and Forestry (DAFF) to examine the social impacts of drought on farm families and rural communities as part of its National Review of Drought Policy (The Hon. Tony Burke MP 2008a). This review follows on from the Primary Industries Ministerial Forum in Cairns earlier in 2008, where Ministers agreed that current approaches to drought and Exceptional Circumstances (EC) might no longer be the most appropriate in the context of a changing climate (PIMC 2008, The Hon. Tony Burke MP 2008b). Ministers saw that drought policy needed to be improved to create an environment of self-reliance and preparedness, and to encourage the adoption of appropriate climate change management practices.

As part of the review process the Minister for Agriculture, Fisheries and Forestry appointed a seven member Expert Social Panel (2008) to:

- *assess the social impact of drought on farm families and rural communities*
- *identify gaps and areas for improvement in Australian, state and territory government social support services that are designed to mitigate the impact of drought on farm families and rural communities.*

To support the work of the Expert Social Panel, the SSP was asked by the Drought Review Branch to:

- *provide an analysis of the Quality of Life survey of farmers and farm workers in drought areas (compared with the total Australian community) using the recognised Deakin Wellbeing Index (based on a national Newspoll survey conducted in mid July 2008)*
- *provide an analysis of the social circumstances of rural people and communities (compared with urban communities) based on previously unanalysed dimensions from the Household Income and Labour Dynamics in Australia (HILDA) survey (Hogan et al. 2008b)*
- *provide an analysis of the social circumstances, perceptions, and behaviour of farmers (including issues of concern, risk management, perceptions of drought, management of challenges) from the June 2008 SSP climate change and industry adaptation survey of farmers (Hogan et al. 2008a).*

This paper responds to the first of these requests, reporting on the wellbeing study of agricultural workers in drought-affected areas, and compares their wellbeing with that of a nationally representative sample of Australians aged 18 years and over. It provides findings in relation to the question of whether the quality of life of people and communities in drought-affected areas differs from that of Australians in general.

# METHODS

This study was provided to the Drought Review Branch in response to a request by the Expert Social Panel (the Panel) that a study be undertaken on the social wellbeing of agricultural workers in drought-affected areas, and to compare their wellbeing with that of Australians in general. There was a specific request by the Panel that the comparison be based upon the Deakin Personal Wellbeing Index (PWI).

The PWI was developed from the Comprehensive Quality of Life Scale (ComQoL) by Cummins et al. (2005, 1994). The method underpinning the ComQoL focused on the interaction of how happy a person is with aspects of life that are important to them.

The PWI scale contains eight items of satisfaction, each one corresponding with a quality of life domain.

The index asks:

Thinking about how satisfied you are with particular aspects of your life. Using a scale from 0 to 10, where 0 is not at all satisfied and 10 is extremely satisfied, how satisfied are you with each of the following:

- 1 *your standard of living*
- 2 *your health*
- 3 *what you are achieving in life*
- 4 *your personal relationships*
- 5 *how safe you feel*
- 6 *feeling part of your community*
- 7 *your future security*
- 8 *your spirituality or religion.*

A ninth item measures overall wellbeing:

Thinking now about your own life and personal circumstances, using a scale from 0 to 10, where 0 is not at all satisfied and 10 is extremely satisfied, how satisfied are you with your life as a whole?

The PWI provides a reliable measure of social wellbeing. Details about the robustness of the measure can be found in Appendix A. The appendix also provides an explanation of statistical tests used in the study.

In this study, respondents completed the study in two groups:

- 1 *as part of a national telephone Omnibus study conducted by Newspoll on a nationally representative sample of Australians aged 18 years and over (n=1203)*
- 2 *as part of a nationally representative telephone sample of Australians aged 18 years and over, who were working in agriculture (including farm owners and farm workers) in 23 drought declared areas in Australia (n=500).*

In addition to the PWI, a series of standard Newspoll Omnibus survey questions was also asked of both populations. These included gender, age, educational levels, and household income. Reliability and factor analysis were conducted on the data (see Appendix A for further details). These analyses confirmed that the data are robust.

In the national survey, interviews were conducted between 18 and 20 July 2008 by fully trained and personally briefed interviewers. The study of agricultural workers in drought-affected areas was conducted the following week. A system of call backs was put in place so as to include those people who were frequently away from home. To reflect the population distribution, results were post-weighted to Australian Bureau of Statistics (ABS) data on age, highest level of schooling completed, gender and area. Analysis was conducted on both weighted and unweighted datasets. There was very little difference between the two analyses. However, as the weights for each study are calculated differently it is not possible to simply put the datasets together. Certain statistical routines can become problematic when using weighted data (e.g. for regression). For these reasons the results reported in this paper are for unweighted data. The data reported compare outcomes for agricultural workers (farmers and farm workers) in drought-affected areas with the Australian population. For ease of reading, the data from agricultural workers in drought-affected areas in this report is at times referred to as 'drought-affected' and is compared with 'the Australian population'.

The data are reported in three sections. First, respondents' mean scores on the PWI items are reported by sub-group (agricultural workers in drought-affected areas and the Australian population), and statistical differences are reported. Second, since perceptions of wellbeing can be influenced by social factors, these results are subjected to further analysis that controls for the effects of age and income. Logistic regression is used for this analysis, comparing outcomes for the two samples—those in drought-affected areas and the national sample. Third, the demographics are reported for the two samples.

# COMPARING WELLBEING

This section reports on respondents' replies to the questions in the PWI. Table 1 provides a comparison of responses for agricultural workers in drought-affected areas with the Australian population. Statistical tests were used to assess whether there was a significant difference between agricultural workers in drought-affected areas and the Australian population on measures of wellbeing and these results are reported in Table 1.

## 1 WELLBEING OF AGRICULTURAL WORKERS IN DROUGHT-AFFECTED AREAS COMPARED WITH THE AUSTRALIAN POPULATION

Item of satisfaction	Agricultural workers in drought-affected areas		Australian population		Significant difference? (p<0.05)
	Mean	(SD)	Mean	(SD)	
how safe you feel	8.4	(1.7)	7.9	(1.8)	Yes
your personal relationships	8.3	(1.8)	8.0	(2.3)	Yes
your health	7.7	(1.8)	7.4	(1.9)	Yes
life as a whole	7.5	(1.8)	7.7	(1.7)	Yes
your standard of living	7.4	(1.7)	7.8	(1.7)	Yes
feeling part of your community	7.4	(1.9)	7.0	(2.0)	Yes
what you are achieving in life	7.2	(1.8)	7.4	(1.9)	No
your future security	6.7	(2.1)	7.1	(2.0)	Yes
your spirituality or religion	6.5	(2.8)	6.9	(2.8)	Yes

For eight of the nine wellbeing measures there was a statistically significant difference between respondents working in drought-affected areas and the Australian population. While these differences in mean scores are small, in real terms, they may translate into many people having different levels of satisfaction, which may indicate a slightly higher demand for services at a population level. Berry (2008) advises that constructs such as safety mean different things in urban and rural communities. The nature of violence, for example, is different in rural communities where assaults (e.g. sexual or domestic violence) may be perpetrated by people known to the victim, whereas assaults in urban centres are more likely to be committed by people not known to the victim. For reasons such as this, urban people may feel less safe (i.e. their environment is less predictable) than people living in rural communities.

The difference between the two samples in respondents' satisfaction with what they are achieving in life was not statistically significant, although agricultural workers in drought-affected areas had a lower score.

Agricultural workers in drought-affected areas had significantly lower levels of satisfaction with their life as a whole and their standard of living.

*Results of regression analysis*

The eight significant PWI items were examined for differences between agricultural workers in drought-affected areas and the Australian population. Table 2 provides the results for the model (further details of the analysis can be found in Appendix A). It includes odds ratios and confidence intervals that give an indication of the strength of the result. The percentage likelihood column is derived from the odds ratio and is included for ease of interpretation. A positive percentage figure indicates that agricultural workers in drought-affected areas are X per cent less likely to be satisfied than those in the Australian population. A negative percentage figure indicates that agricultural workers in drought-affected areas are X per cent more likely to be satisfied than those in the Australian population.

**2 WELLBEING OF AGRICULTURAL WORKERS IN DROUGHT-AFFECTED AREAS COMPARED WITH THE AUSTRALIAN POPULATION\***

Item of satisfaction	Percentage likelihood	Odds Ratio	Lower confidence interval (for odds ratio)	Upper confidence interval (for odds ratio)
life as a whole	16%	1.159	1.067	1.259
your standard of living	14%	1.136	1.044	1.236
your health	-11%	0.899	0.839	0.963
your personal relationships	-15%	0.873	0.820	0.929
how safe you feel	-31%	0.766	0.709	0.828
feeling part of your community	-10%	0.907	0.850	0.966
your future security	18%	1.176	1.101	1.257
your spirituality or religion	5%	1.049	1.011	1.088

\*D2=145.230 (10); p<0.001 (controlling for age and income)

The results show that in comparison with the Australian population (controlling for age and income), agricultural workers in drought-affected areas are approximately 14 to 16 per cent less likely to be satisfied with their life as a whole and their standard of living. They are 10 to 15 per cent more likely to be satisfied with their health, personal relationships and to feel part of the community. They are approximately 31 per cent more likely than the Australian population to feel safe and five per cent less satisfied with their spirituality or religion. Similarly, they are 18 per cent less likely to feel satisfied with their future security. In this model, 'income', explained approximately two per cent of the difference between the two groups.

Without taking into account the influence of other variables, agricultural workers in drought-affected areas were approximately 40 per cent more likely to report feeling less satisfied with their future than Australians in general. This is a notable difference in the results for the two groups.

Respondents in drought-affected areas who were dissatisfied with their future security were more likely to:

- *be over 40 years of age*
- *be male (although this may be because of the greater proportion of males in the drought-affected sample)*
- *have two adults in the household*
- *not have children*
- *work full time*
- *have Year 11 or 12 education*
- *be married*
- *earn under \$30 000*
- *have no post-school qualifications.*

It is possible that there may be some differences in wellbeing between farm owners and managers, and farm workers. This question was explored for the drought-affected respondents only, using white/blue collar coding according to the Australian Standard Classification of Occupations (ASCO).

Independent samples t-tests on agricultural workers in drought-affected areas revealed no significant differences between white-collar respondents and blue-collar respondents on measures of wellbeing. This result was confirmed using regression analysis controlling for income and gender.



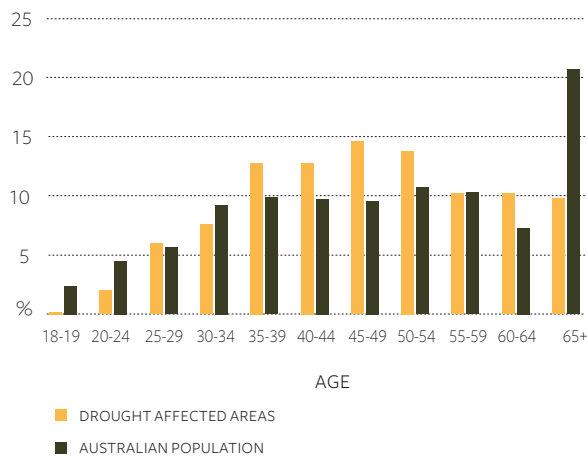
# DESCRIPTIVE STATISTICS

The survey results provide descriptive information about the respondents, including:

- age
- gender
- household structure
- school education
- post-school education
- marital status
- work status
- blue/white collar workers
- household income.

These variables can be used to compare the respondents who were agricultural workers in drought-affected areas and respondents from the nationally representative sample of Australians.

## 1 AGRICULTURAL WORKERS IN DROUGHT-AFFECTED AREAS AND THE AUSTRALIAN POPULATION, BY AGE



Since the drought sample was specifically targeted at people employed in the agricultural sector and not the general rural population, it is not appropriate to statistically compare this sample with the randomly collected Australian population sample on demographic items. Rather, general trends are described to illustrate differences between the respondents working in agriculture in drought-affected areas and the Australian population generally.

## 3 AGRICULTURAL WORKERS IN DROUGHT-AFFECTED AREAS AND THE AUSTRALIAN POPULATION BY GENDER

Gender	Agricultural workers in drought-affected areas %	Australian population %
Male	73	50
Female	27	50

Figure 1 shows that there are proportionately fewer young people (under 34 years) working in the agricultural sector of drought-affected areas than in the Australian population. It also shows that there is a greater proportion of people between 35 and 64 years working in agriculture in drought-affected areas, reflecting an ageing profile of agricultural workers. The biggest difference depicted in Figure 1 is for people aged over 65 years. These differences may be explained by the different characteristics of the two populations being compared; the ‘drought-affected population’ refers to respondents who identified that

they were working in the agricultural sector, whereas the ‘Australian population’ refers to a nationally representative sample of individuals of the Australian population aged 18 years and over.

Table 3 reports respondents by gender. The population sample used quotas to ensure equal representation by gender. The sample of respondents working in agriculture in drought-affected areas targeted only those employed in agricultural work and results in an anticipated gender split of males to female.

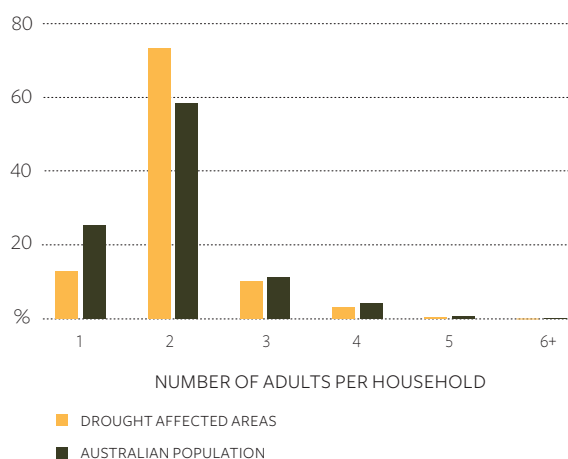
Figure 2 shows that respondents working in agriculture in drought-affected areas are more likely than respondents in the Australian population in general to report two adults in their households, reflecting the demographics of farming occupations.

Figure 3 shows that respondents working in agriculture in drought-affected areas are more likely to report that they had children than the Australian population in general.

Table 4 provides further information about the respondents who indicated that they had children. The table shows the proportion of respondents who indicated that they had children in each of five age categories. These categories do not add to 100 per cent because respondents may have more than one child in any given age category.

The table shows that the ages of children in the households of agricultural workers in drought-affected areas did not differ greatly from the ages of children in households across the general Australian population.

**2 THE NUMBER OF ADULTS IN HOUSEHOLDS OF AGRICULTURAL WORKERS IN DROUGHT-AFFECTED AREAS COMPARED WITH HOUSEHOLDS OF THE AUSTRALIAN POPULATION**

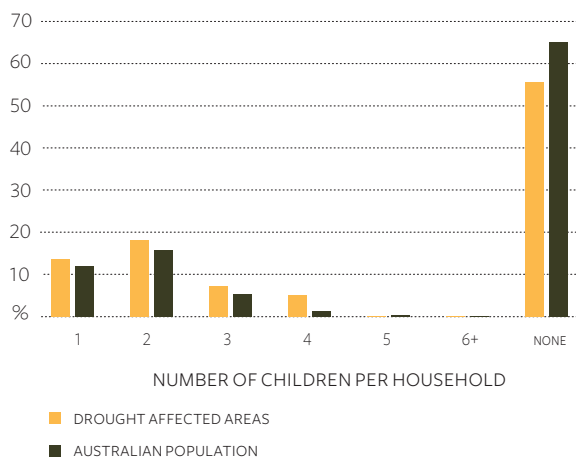


**4 AGES OF CHILDREN IN HOUSEHOLDS OF AGRICULTURAL WORKERS IN DROUGHT-AFFECTED AREAS COMPARED WITH HOUSEHOLDS OF THE AUSTRALIAN POPULATION**

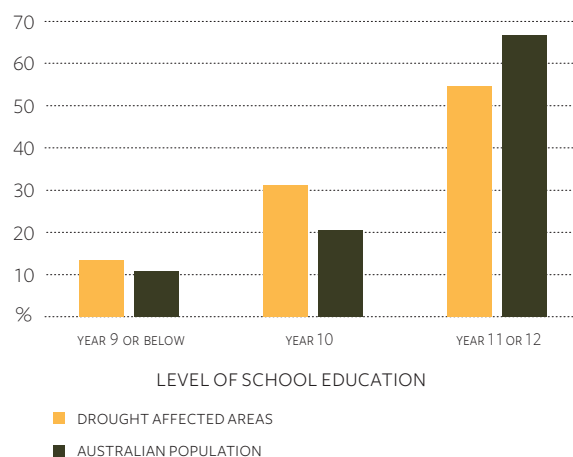
Age of children	Agricultural workers in drought-affected areas (%)	Australian population (%)
4 years or under	18	13
5-9	18	15
10-12	14	10
13-15	14	10
16-17	10	8

Figure 4 indicates that the number of agricultural workers in drought-affected areas who finished schooling in Year 9 or below was similar to the Australian population. Agricultural workers in drought-affected areas have a greater proportion of respondents with a Year 10 school education, but a lower proportion of respondents with school education including Years 11 or 12. This is consistent with the lower educational attainment of people working in agricultural occupations.

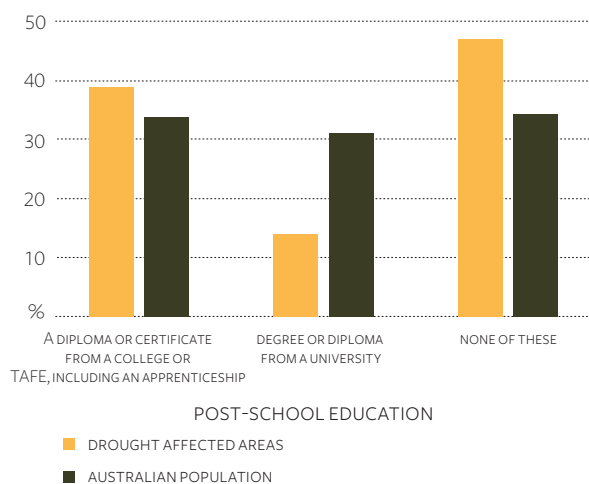
**3** THE NUMBER OF CHILDREN IN HOUSEHOLDS OF AGRICULTURAL WORKERS IN DROUGHT-AFFECTED AREAS COMPARED WITH THE AUSTRALIAN POPULATION



**4** LEVEL OF SCHOOL EDUCATION OF AGRICULTURAL WORKERS IN DROUGHT-AFFECTED AREAS COMPARED WITH THE AUSTRALIAN POPULATION



**5** LEVEL OF POST-SCHOOL EDUCATION OF AGRICULTURAL WORKERS IN DROUGHT-AFFECTED AREAS COMPARED WITH THE AUSTRALIAN POPULATION



The post-school education data show that agricultural workers in drought-affected areas are more likely to have a diploma or certificate from a college or TAFE (including an apprenticeship) but less likely to have a degree or diploma from a university (Figure 5). Agricultural workers in drought-affected areas are also more likely than those from the Australian population to select the ‘no, none of these’ category.

Figure 6 shows that the greatest proportion of respondents in both the sample of agricultural workers in drought-affected areas and the Australian population in general are married. However, this proportion is higher for respondents working in agriculture in drought-affected areas than in Australia more generally. Conversely, agricultural workers in drought-affected areas are less likely to have never been married, to be separated, divorced or widowed. This is consistent with the overall demographic and household structure of people working in agricultural occupations.

**5** COMPARISON OF NUMBER OF WHITE COLLAR AND BLUE COLLAR WORKERS

Type of worker	Agricultural workers in drought-affected areas %	Australian population %
White collar	87	51
Blue collar	13	49

More generally, 85 per cent of respondents working in agriculture in drought-affected

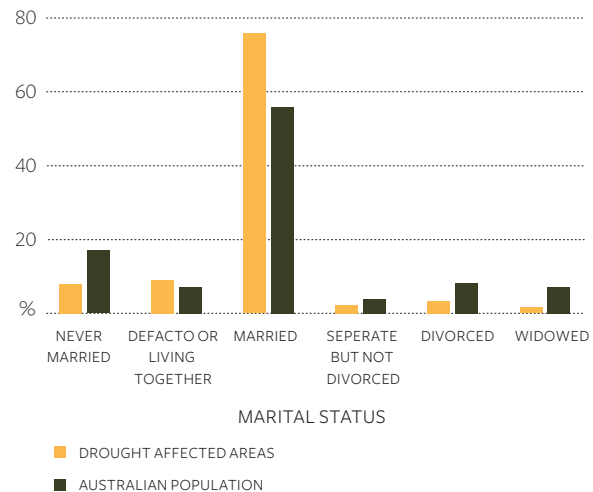
areas were married or living together, compared with only 63 per cent of Australians.

Thirty-nine per cent of respondents from the general Australian population were not working. Nineteen per cent worked part time and 42 per cent worked full time. Due to the nature of the collection methodology for respondents working in agriculture in drought-affected areas, there were no respondents in this sample who were unemployed. Consistent with the predominantly full-time working patterns for people in agricultural occupations, 81 per cent of these respondents worked full time, while 19 per cent worked part time.

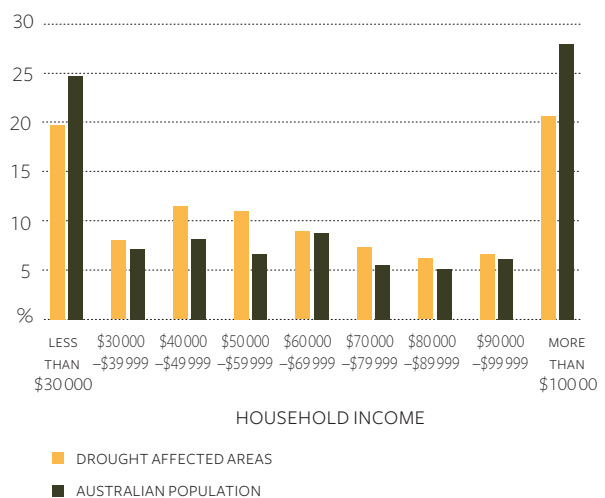
Table 5 provides data on employment status by white and blue collar worker. The white/blue collar coding refers to whether the main income earner of the household has been classified as a white collar or a blue collar worker according to the Australian Standard Classification of Occupations (ASCO) system. Within this classification system, farm owners and farm managers are considered to be 'management' and are therefore coded as white collar workers. For this reason there is a greater proportion of white collar workers in drought-affected areas compared with the general population.

Figure 7 presents data on household income for the Australian population compared with agricultural workers in drought-affected areas. Respondents who did not know their household income or who refused to answer the question were not included in the analysis of household income. Respondents working in agriculture in drought-affected areas were less likely than the general Australian population to be in either of the two extreme categories of high (above \$100 000) or low (under \$30 000) income. This means there were higher proportions of respondents from drought-affected areas in the middle income categories (from \$30 000 to \$99 999).

## 6 MARITAL STATUS OF AGRICULTURAL WORKERS IN DROUGHT-AFFECTED AREAS COMPARED WITH THE AUSTRALIAN POPULATION



## 7 HOUSEHOLD INCOME OF AGRICULTURAL WORKERS IN DROUGHT-AFFECTED AREAS COMPARED WITH THE AUSTRALIAN POPULATION



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# APPENDIX A

## DETAILS ON STATISTICAL ANALYSES CONDUCTED IN THIS STUDY

Much of the work of social scientists is to identify and report on social attitudes, motivations, values and behaviours. While behaviours (eg voting behaviour) and social indicators (e.g. annual income) can be independently observed, attitudes and motivations are things that exist inside peoples' heads and as such, are more difficult to observe and report on. A number of analytical techniques were reported in this study. Techniques such as reliability analysis and factor analysis are commonly used in social science research to assess the extent to which larger numbers of survey items work well together to assess higher-level constructs. These analyses are important to ensure that the data reported are statistically reliable and robust. In this section, typical methods used to assess the quality of social surveys are reported. This summary is intended to aid the reader in understanding how the analysis of data in this paper has been approached by the research team.

### *Constructs*

It is rare that an attitude, value or motivation (henceforth referred to as attitudes) is determined by just one thing. Typically in survey work, attitudes are measured as constructs, higher level concepts made up of a variety of factors that go together to form an overall whole. The construct is usually informed by a theoretical framework that the researchers have brought to bear on the project. Extensive psychometric work goes into the development of a reliable survey instrument including qualitative research, cognitive testing, survey piloting, construct testing and cross validation of survey results. Given this amount of work, researchers are reluctant to change an item in a validated survey without repeating this series of studies.

### *Psychometric analysis used in this study*

In this paper a number of statistical tests were applied to the survey data to ensure that the variables behaved properly in psychometric terms. The psychometric tests applied to the data are briefly discussed below.

### *Factor analysis*

Factor analysis is a statistical method that is used to reduce a large number of survey items about a particular attitude or behaviour into a few underlying new variables or factors. The way it does this is to look for covariance across the responses; that is, by identifying questions for which the answer patterning is the same. An important research factor for farmers managing climate change is that they actively plan to manage their on-farm risks. This idea or factor could be made up of a larger number of different attitudes or behaviours such as succession planning, use of an operational management plan and development of a business management plan. Factor analysis brings common variables such as these together in the dataset and reduces them to a single new variable (or factor) while losing as

little of the response detail as possible. This new variable can then be used to more easily examine the question since one can focus on just one item (e.g. actively plan to manage their on-farm risks) rather than needing to think about a lot of variables all at the same time. In social sciences a factor score of 30 per cent—40 per cent of variance explained is acceptable, but ideally one would like to see factor scores closer to 70 per cent. The higher score indicates that less information has been lost in bringing the items together and that together, these items explain much of what is going on with the behaviours of interest.

### *Factor analysis of the PWI explained 40 per cent of variance*

#### *Reliability analysis*

Reliability analysis tests whether or not the survey items work together to make a coherent scale. If they do, an analyst may calculate a summary scale variable and use this instead of the larger number of survey items used in the original study. Once again, this makes reporting the data simpler and more coherent.

While there are some similarities between reliability analysis and factor analysis, reliability analysis can produce much more finely focused on assessing one central theme from a set of items, whereas than factor analysis can deal with multiple themes at the one time. Reliability analysis is concerned to ensure that respondents respond to survey questions in a similar way such that a set of items could be said to make up a consistent scale. Reliability analysis tests these items to see if they go well together as a scale and if they do, an analyst can compute a summary variable for the scale that is made up of these variables (by using the average for each item, for example). When the new scale variable is produced it retains the survey's original scale (for example scores of 1 to 5 where 1 means strongly disagree and 5 means strongly agree). A common statistic produced by this routine is called the Cronbach's Alpha. Like factor analysis, one looks for a score of around 70 per (or 0.7) to be satisfied that the items are working well together.

The Cronbach's Alpha for the PWI was a reliable 0.75.

Readers interested in further information on the psychometric properties of the scale are referred to the survey manual. The manual reports that:

- *the survey produces consistent results over time*
- *it consistently measures the same construct*
- *respondents respond to the questions in quite similar ways*
- *it can detect differences between groups with differing levels of wellbeing.*

### Regression analysis

Regression analysis is a statistical tool that is used to measure the extent to which a set of variables predict a certain outcome. Standard regression analysis works well when the outcome variable is a continuous variable. However, when the outcome variable is an either/or variable a slightly different form of regression analysis is used. This is called logistic regression. Through the use of some complicated mathematics, logistic regression replicates the kind of data variability one can get with continuous variables so that the analysis can be conducted. Moreover, within this technique, it is possible to use an advanced statistical routine (called backward conditional regression) which eliminates from the analysis, any variable not directly contributing the prediction of the outcomes.

Specifically, the application of the logistic regression routine to the data in this study enabled:

- *analysis of the question of interest (e.g. to analyse the differences in wellbeing between those in drought-affected areas and Australians generally)*
- *bringing all the variables of interest into the analysis*
- *taking into account the extent to which the variables influence each other*
- *producing a result that highlights variables that are influencing the outcome, if they exist.*

Gender was excluded from the analysis in this study because the two samples were not comparable by gender. The model for this analysis (controlling for age and income) (see Section 3) was statistically significant ( $\chi^2=145.230$  (10);  $p<0.001$ ). The explanatory power of the model on the overall differences between drought-affected and the Australian population was between eight per cent and 11 per cent. This is a useful result given that only 'one' concept (wellbeing) was examined for differences between the groups. Overall, only one variable was eliminated in the analysis (satisfaction with achievement in life). Notably, the PWI manual identifies this variable as being problematic, possibly because it is a multi-dimensional item, meaning different things to different people.



