

## Climate, cardiovascular disease and crops—a tough trio?

Susan Brumby<sup>1,3</sup>, Stuart Willder<sup>2</sup>, John Martin<sup>3</sup>

<sup>1</sup>National Centre for Farmer Health, Deakin University, VIC, <sup>2</sup>Western District Health Service, VIC, <sup>3</sup>La Trobe University, VIC

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Associate Professor Sue Brumby is the Foundation Director for the National Centre for Farmer Health a partnership between Deakin University and Western District Health Service, Hamilton and oversees the implementation of its five key strategies including service delivery to farmers, research and development, AgriSafe clinics, education and training and the farmer health website (see [www.farmerhealth.org.au](http://www.farmerhealth.org.au)). In 2010 the National Centre for Farmer Health hosted the Opening the Gates on Farmer Health conference where the Hamilton Charter for Farmer Health was endorsed.

Sue is a registered nurse, midwife with experience in both rural and metropolitan health care and management and has been recognised with numerous personal awards for her service to rural health. She is also a graduate of the Australian Rural Leadership Program, has a Masters in Health Management, Diploma in Farm Management and background in Women's Studies. Additionally she has practical experience in farming and rural communities, which included managing the family beef and wool property for 12 years.

Sue is the principal investigator of the award winning Sustainable Farm Families™ (SFF) project, which has been delivered in all states of Australia and in 2006 was awarded a Victorian Travelling Fellowship to the USA and the EU looking at farmers, health and decision making. She is currently leading the longitudinal study on farm men and women five years post-SFF in four states of Australia.

Her current research focuses on rural health literacy, climate change, intersectoral collaboration, farmer health, wellbeing and safety and increasing capacity and career pathways for agricultural and health professionals.

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### Abstract

**Background:** Drought was removed from Australia's national disaster list in 1989 and replaced with an exceptional circumstances (EC) policy. The expectation being that drought was a regular risk that farmers must manage and that exceptional circumstance would occur once every 20–25 years. In 2008, two thirds of Australia's agricultural landscape was declared in EC (which followed from 40 per cent in 2002-2006). In 2009, just under half of Australian agricultural land was EC declared.

In 2009, the National Centre for Farmer Health was funded by the Collaborative Partnership for Farming and Fishing Health and Safety to undertake a longitudinal study 6 years since commencement of Sustainable Farm Families (SFF) to assess changes in health, wellbeing and safety and the impact of climate change on farm families. The original key message from the Sustainable Farm Families (SFF) (2003-2007) project was 'the most important aspect of a healthy Australian farm is a healthy farm family'. Sustainable Farm Families demonstrated that when farm men and women are provided with information relevant to their health, wellbeing and safety they include these factors in both day-to-day and strategic decision making.

**Methods:** 10 workshops were held in four states across Australia with previous participants from the Sustainable Farm Families program. Focus groups (in addition to follow up health assessments, demographic and health behaviours surveys) were held exploring if a changing climate had impacted on their health and wellbeing and farm business decisions. And if so, how?

**Results:** Climate variability is having a significant impact on these farming populations—Not least being the maintenance of their own health and wellbeing to respond to an increasingly variable and volatile natural environment, and what they grow (crop choices) and how they exercise.

This paper will outline the approach taken, and identify the farm men and women's voices and themes that reflect and reinforce the impact of climate change not only on farm families but our communities as a whole. It will provide key insights into how to work with farming families facing increasing climate variability and massive change, through a health promotion framework.

**Policy recommendation:** Climate variability, as a result of global warming, has significant impact on the economic, environmental and social sustainability of farmers as they cope with these challenging issues and decisions. This project demonstrated that when farmers are provided with information relevant to their health, wellbeing and safety they include these factors in both day-to-day and strategic decision making about

their farming business (crops, activity and health). There are however winners and losers in climate variability, but overall we heard that the impacts are typically negative and now need to be factored into their farm management practices.

1. That the SFF method of engagement should be rolled out across rural locations nationally and supported through a professional network of health and agricultural providers.
2. That the SFF method is effective, evidence based and efficient lifestyle modification program addressing obesity, diabetes, cardiovascular disease and climate. It should be piloted for repeatability and transferability into other at risk population groups nationally.
3. That the SFF program be recognised, supported and resourced through a cross sector whole of government response to rural health, wellbeing, safety and climate change.

## Introduction

Life in Australian Agriculture is no easy task, and when you think things cannot get any worse for farming families, throw in a varying climate, prolonged drought and flooding rains to the mix to see how they fare. Whether you believe in climate change or variability there is no doubt that we live in a land where we are at the mercy of our environment. As Banjo Paterson in the poem Australian Scenery alluded in his famous poem<sup>1</sup>:

Land of plenty or land of want, where the grey Companions dance,  
Feast or famine, or hope or fear, and in all things land of chance,  
Where Nature pampers or Nature slays, in her ruthless, red, romance.

Australia is a unique and ever changing nation with an environment that is both challenging and richly embracing.

Agriculture today is no different to 100 years ago with farming families facing the risks and rewards that Australia's climate throws their way. In 2008, more than half of Australia's farmers were eligible for Exceptional Circumstances (EC) funding, which followed on from 40% in 2002- 2006<sup>2</sup>. With one of the worst dry periods experienced in over fifty years many farmers felt the pressure of life on the land in an ever changing environment. As life would have it some farmers prospered from the variability in climate boosting production, outputs and commodity competitiveness, while others increased debt to cope or left the sector for good.

## Background

In 2002 the Sustainable Farm Families (SFF) projects was developed by Western District Health Service in Hamilton, Victoria, Australia using a process of intersectoral collaboration as described by Keleher et al<sup>3</sup> involving health services, university, agricultural agencies, training bodies and farming communities. The SFF program provides farm men and women with information on personal health, wellbeing and safety whilst exploring attitudes to personal health and providing opportunities for improving health and farm safety outcomes. The program uses service delivery and research to provide health information and services whilst exploring further the health issues effecting farming men and women and recognising that individual and family health levels do not occur in a vacuum<sup>4</sup>. Participants actively learn with and from other farmers during the program which is conducted annually over a two to three year time frame. Collaboration between health and industry partners (for example the Victorian Farmers Federation, Cotton and Sugar Research Development Corporations); work effectively to recruit and maintain linkages with farming men and women and supports the retention of participants throughout the program.

The outcomes of the SFF program have been well documented with their findings reported through both clinical and agriculture publications<sup>5-8</sup>. In 2009, the National Centre for Farmer Health was funded by the Collaborative Partnership for Farming and Fishing Health and Safety to complete a longitudinal study of SFF participants in ten sites to assess changes in health, wellbeing and safety and the impact of a changing climate since 2003.

These sites were located in South Australia, Victoria, Queensland and New South Wales covering mixed production systems (grazing, cropping and wool) and cotton and cane growers. The original research undertaken in 2003-2005 occurred during the early years of drought and early water shortages in eastern

Australia. Whilst farming conditions were challenging for many farming families, the promotion of health and wellbeing within the farming business was welcomed by participants. Following the 2006 drought, ECs were declared and farmers with poor access to health services were predicted to be most affected<sup>9</sup>. Living and working in a variable and changing climate was regarded as having potentially large impacts on farming family health, wellbeing and profitability.

The longitudinal study reported in this paper (SFF Future Directions) was designed to see if participation in the original SFF program enhanced farmers ability to prevent and/or manage cardiovascular disease and also to assist them in making the links between health, wellbeing and sustainable farming business decisions, such as climate adaptation through changing of crops and production systems. Notwithstanding it is noted that controversy continues in rural communities and resistance to the concept climate change is widespread<sup>10</sup>.

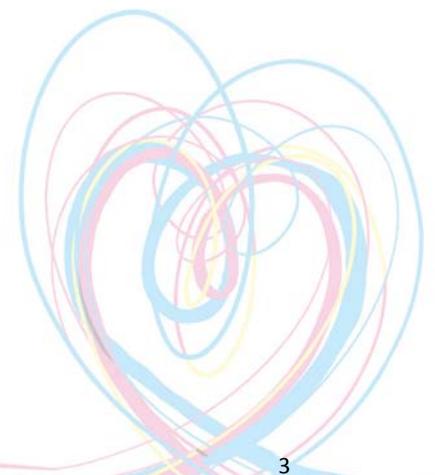
## Methodology

The original key message from the SFF (2003-2006) program was 'the most important aspect of a healthy Australian farm is a healthy farm family'<sup>8,11</sup>. Whilst these messages from this program have broadened in recent years the most important aspect of a healthy Australian farm continues to be a healthy farming family. To reinforce the SFF message the "SFF Future Directions" program consisted of a physical health assessment, self reported surveys, focus groups discussion and review of previous learnings from the initial workshop program. New information requested by participants on respiratory disease and agrichemicals was also provided along with a final focus group discussion. Participating farmers wanted to continue promoting the benefits of participation in the program.

In traditional farming families, the farm business and the health and wellbeing of farm family members is often seen as separate to the farm business, despite the fact that the physical ability of the farmer to work impacts both the economic and emotional relationships surrounding the farm<sup>12</sup>. SFF aimed to assist in making the connection between good health, wellbeing and safety and the success of the farm. To assist in making this connection the design of the SFF program is based on principles of adult education Kolb<sup>13</sup> and Azjen and Fishbein theory of reasoned action and planned behaviour<sup>14</sup>. The SFF also borrows from Keens<sup>15</sup> social learning model that enables reflection essential for farming families to see the linkage between individual health, farm systems, their farm business and climate, and that any constraint between parts affects the system as a whole. The SFF participant resource manual was also based on Kolb's experiential learning framework and provided farming men and women with reference material as well as chronicling their health status over time.

## Physical assessment

The farmer physical assessment process was undertaken following a minimum of 10 hours of fasting to aid in accuracy of the testing procedures which included the recorded tests as outlined in Table 1. The parameters used for at-risk levels are as determined by Shaw and Chisholm<sup>16</sup> and the multidisciplinary South West Ethics Committee. The medical equipment used was the same equipment used in previous programs with participants retested on the same machine or scales. Calibration of equipment was done prior to the each workshop. Trained nurses collected the anthropometric and biochemical samples). To ensure study integrity and compatibility with previous measurements the same set of evidence based physical and mental health surveys developed by the Victorian Department of Health Service Coordination Tool<sup>17</sup> were utilised. These include demographics, health conditions, health behaviours and psychosocial profile. All measures are outlined in Table 1 with measures marked **A** taken in the original SFF program and measures **B** taken in the longitudinal SFF Future Directions Program to allow for comparisons.



**Table 1 SFF workshops and SFF future directions data collection description**

Variable	Base line <sup>A</sup>	12 month <sup>A</sup>	24 month <sup>A</sup>	60–72 month <sup>B</sup>
Body weight (Body Mass index)	✓	✓	✓	✓
Height	✓	✓	✓	✓
Waist circumference	✓	✓	✓	✓
Hip circumference	✓	✓	✓	✓
Blood pressure	✓	✓	✓	✓
Pulse rate	✓	✓	✓	✓
Fasting blood glucose	✓	✓	✓	✓
Fasting blood cholesterol	✓	✓	✓	✓
Kessler K 10 psychological distress		✓		✓
Farm Safety Survey	✓	✓	✓	✓
Behaviours and conditions survey	✓	✓	✓	✓
Focus Group	✓	✓	✓	✓
Pre and Post knowledge	✓	✓	✓	✓
Climate Focus group				✓

## Workshop

All participants were provided with a healthy breakfast following the physical assessment. Participants were seated in table groups to facilitate discussion around learning needs and to promote behavioural change as identified in Azjen and Fishbein's<sup>14</sup> theory of reasoned action and planned behaviour model. Workshop topics were structured to refresh the original topics covered in previous workshop with additional topics of respiratory health and agrichemicals. The SFF resource manual in these follow up programs was also based on Kolb's experiential learning framework and provided both a written and a visual resource for participants<sup>13</sup>. Appendix 1 outlines the health, wellbeing and safety topics covered in the workshops over the duration of the SFF program.

## Focus groups

All focus groups were moderated by a social scientist allowing for exchanging of ideas, and further exploration. Participants were asked a series of focus group questions relating to their involvement in the program. These responses were documented and read and reread by two researchers with categories themed using an open coding process, 'invivo codes' as described by Grbich<sup>18</sup>.

The focus groups questions are listed below.

1. What specific behaviours/practices have changed in your farming family with regard to health, wellbeing and safety?
2. Have you made a significant family, career or farming business decision as a result of participating in the SFF program?
3. Reflecting on your learnings from SFF over the past five years, what are your goals for the next five years? (your health, family health, and business)
4. By the way, has a changing climate impacted your health and wellbeing and farm business decisions? If so, how?

## Results

The original research team revisited the 10 sites in south eastern Australia between November 2009 and June 2010 matching as close to possible the same time of the year that previous workshops and measurements had been undertaken in the original SFF program. 148 participants returned full sets of data with 76 males and 72

females attending with an average age of 52 years and range from 25–79 years. Retention rates from the original first year SFF programs and those returning for the SFF Future Directions program (4- 6 years) averaged 78% retention and the program with the lowest return (47%) was subject to the March 2010 floods in lower south east Queensland. Despite this most participants reported a history of shortage of water, extended drought, changes to irrigation water allocations.

A two tailed t test was undertaken to assess change in those that were at risk in the baseline year for risk factors of cardiovascular disease and diabetes. Participants at risk revealed significant improvement in key areas of fasting cholesterol, systolic and diastolic blood pressure. These are outlined in Table 2 below.

**Table 2 Participants at risk at baseline and changes in risk factors**

Numbers at risk in baseline year 2004-05	Change from baseline in 2010 mean change and standard error	Significant
Body mass index $\geq 25$ (n=93)	+0.47 (0.22)	.036 *
Total cholesterol level $\geq 5.5$ mmol/L (n=51)	-0.92 (0.12)	.000 ***
Total glucose level $\geq 5.5$ mmol/L (n=29)	+0.02 (0.09)	.826 N/S
Waist circumference Males $\geq 102$ cm (n=21)	+1.04 (1.38)	.460 N/S
Waist circumference Females $\geq 88$ cm (n=27)	-0.54 (1.19)	.651 N/S
Blood pressure systolic $\geq 140$ mm Hg (n=37)	-5.94 (2.27)	.010 **
Blood pressure diastolic $\geq 90$ mm Hg (n=30)	-6.23 (1.37)	.000 ***

Significance values\*\*\* $p \leq 0.001$ , \*\* $p \leq 0.01$ , \* $p \leq 0.05$ , N/S no significant difference. Base on two-tailed significance test.

Whilst blood glucose and waist circumference had changed, these changes were not statistically significant. However, body mass index for those with elevated BMI had increased ( $p = 0.036$ ).

As part of each workshop program participants were engaged in a number of group discussions about aspects of farming family health and wellbeing. We completed an exploratory factor analysis and have summarised their responses below.

### **What changes in specific behaviours and practices have you made since participating in the SFF program?**

One fifth of all responses to this question considered lifestyle choices with many responses related to families committing more or specific time for recreational purposes, like ‘setting time aside for leisure’ and ‘doing things together as a family’. Taking holidays away from the farm also featured strongly under this factor and ‘making a decision as a family [to take] a holiday makes a world of difference.

#### **Safety**

Eighteen per cent of responses reflected efforts to make the farm a safer work place. Ensuring guards on machinery was a common response: ‘getting rid of PTO [power take off] shaft for safety sake—replaced with a motor’, and ‘always let someone know where I am going on the farm’. Concern for the protection of children on the farm was expressed as ‘watching better for children on the farm, and ‘protection around the farm for children’. Greater attention to musculo skeletal wellbeing was found in statements like: ‘use of front end loaders—reducing lifting’ and ‘use of forklift more.’

#### **Exercise and diet**

Attention to exercise was mentioned in sixteen per cent of responses. Several responses reflected exercise being integrated with farm work: ‘Picking up the crow bar and combining work and exercise’. Family and group oriented exercise was also mentioned, such as: ‘very conscious of our health and the family—we walk or ride down the road with them most nights’ and ‘group involvement in exercise—better if in a group. The family diet was subject to more scrutiny for health outcomes. Typical responses were ‘change in diet—type of food, variations, more fruit and veggies. Before I didn’t care too much’, ‘Made the kids aware of good food’ and ‘growing our own vegetables.’

## Stress and other factors

Responses to stress management was nine per cent and included comments such as: 'More aware of stress, and a 'few things that have happened in the last 12 months have made me more aware of stress and its impact on my health.' 'I got out the SFF manual and re read the section on stress' and 'More tolerant—and managing stress better.' Other responses included: better handling of chemicals (5.97%); getting regular health checkups (5.97%); being self aware (5.97%) and substance abuse (stopped smoking and adhering to alcohol free days) (4.47%).

## Have you made significant family, career or farming business decision as a result of participating in the SFF program?

### Decision making and working life

Twenty two per cent of responses indicated participants were now more conscious of their decision making and its impact on health wellbeing and safety, for example: 'we kept talking and thinking about it—we have taken some steps, SFF is like an umbrella, we have taken some incremental steps' and 'helped us make decision in a more informed manner.' Another twenty two per cent of participants identified aspects of their working life which had changed as a result of their participation in the program. Some recognised that getting help with the farm had positive benefits to health and wellbeing. For example: 'some people had employed more labour to take the pressure off,' 'increased farm staff to take over workload—the knowledge gained from this program has validated those decisions' and 'working smarter and letting someone else do the hard work for you—realising we can't do it all.' This also included ten per cent identifying retirement.

Again the strong focus was on lifestyle with one fifth of participants making connections with their lifestyle choices. For example: 'course has made us think about our options—is something worth it ... previously we used to duck our head down and work hard. Now we ask is it worth the effort? Weigh up the options/happiness.' And, 'didn't think we had made any significant business decisions due to the program but have made lifestyle choices,' a view also reflected in specific behaviours and practices above.

### Impact of the SFF Program

Ten per cent of farmers referred specifically to the SFF program acknowledging that it was part of their business decision making process: 'SFF is always is the background and has all formed part of decision making,' 'not directly related—but has made us aware we are not alone' and 'lots of other factors—not necessarily SFF.'

## Has a changing climate impacted your health and wellbeing and farm business decisions?

The effect of a changing climate had a mental, social and economic impact upon farming families across SE Australia although this varied between industries. This is outlined in Figure 1.

### Too dry or too wet?

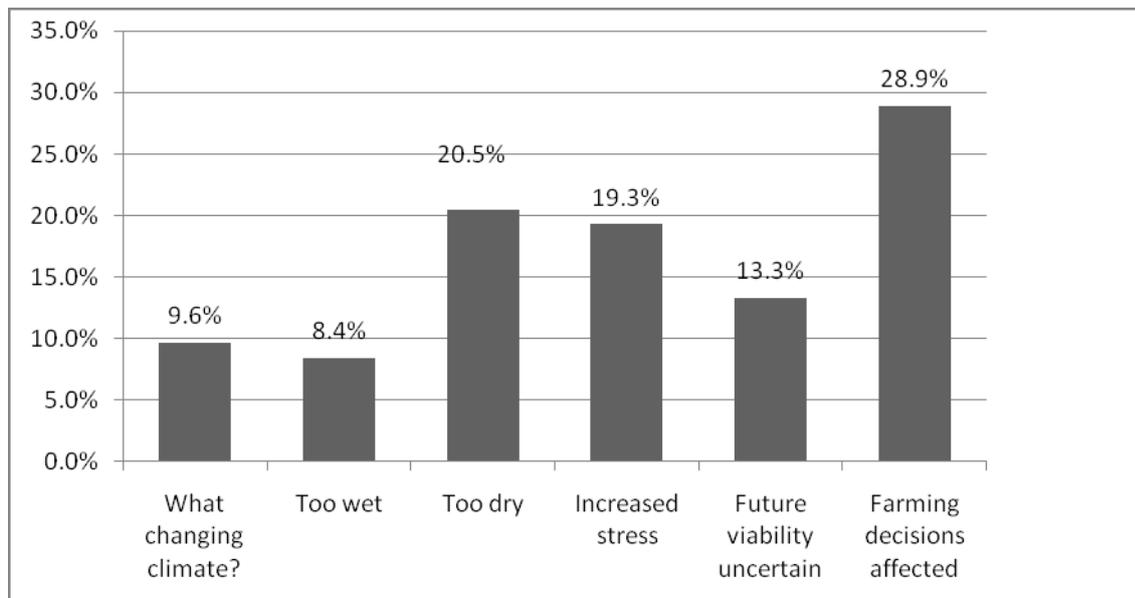
Twenty per cent of responses to this question related to their experience of living and working in a drier environment: 'last 10 years drought,' 'cannot do without water,' 'looking out of the window was really depressing there was just dust everywhere ... every time you opened the window.' there was recognition of the relationship between rainfall and farm productivity: 'We can do anything if we have got water,' 'pretty simple if we are not getting any rain we are getting less income,' 'the last 4 years have been very disappointing—very dry springs, and then last year wet spring followed with a very hot period.' Equally there were participants in the SFF who were experiencing extended wet periods (Queensland) which also impacted their farming success. While only nine per cent of responses having too much water was also a concern: 'Sugar cane is getting water logged,' 'Massive mould increasing'.

### Increased stress

Once again twenty per cent of responses to the question of a changing climate focused on farmer stress: 'don't like to comment that farming is not as good as was,' 'feeling locked in—no alternative' and 'with the changes you need to make decisions about diversifying—that increases your stress levels—new learning curve—it's all new—creates uncertainty.' Comments also focused on individual impacts: 'very depressed farmers,' 'the hope for season becomes very tiring' and 'significant stress levels = change in enterprise shift.'

### Farm business decisions

Decision making had changed as a result of their experience of a changing climate: ‘we are growing better varieties of grain—2 years ago I had the best season ever’—‘Definite more focus on managing the risk—we were expecting to receive 6% less rainfall but what we have seen is a halving’ ‘regardless of what people want to call it the *‘changing climate’* has impacted on our decisions’,. The recognition that analysis was more critical in their business decision making was also stated explicitly: ‘More analytical assessment’ and ‘a lot of waiting now ... got to see what is happening before you can make a decision.’ One saw the irony in less rainfall: ‘In some ways it has allowed us to do more health wise because the farm wasn’t as busy. If we had water I’d be really busy.’



**Figure 1** By the way—has a changing climate impacted on your health, career or farm business decisions?

### Viability/economic impact

Some thirteen per cent of responses recognised that commodity prices in addition to a changing and variable climate also had impacts on the future of their farming businesses: ‘Economic impacts are greater than climate factors,’ ‘It’s not just climate change it’s a lack of commodity prices—double whammy’ and ‘last 8 and 9 years have tested us out—lots of farms are up for sale and I have never seen it like this before in my lifetime. Many of these are due to financial problems.’

An independent evaluation undertaken by Roberts Evaluation<sup>19</sup> reinforces the focus group and health assessment results of the SFF Future Direction program. Roberts undertook fifty four semi-structured interviews of the participants and report that the workshops have:

Empowered 97% of the farmers to understand and manage their own health and that two thirds (68%) of the respondents, mostly men aged between 45 and 64, had altered their previous “she’ll be right” attitude to one of preventative action. They are now going for regular checkups in order to maintain their current level of health, and mitigate the risks which they now know are increasing as they age.

The findings from these focus group discussions provide weight to the outcome that farmers participating in this program certainly become more aware of the implications of not attending to their personal health and wellbeing via regular checkups with their family doctor. They appreciate the importance of taking time out, whether that is throughout the week or through planned annual holidays with their family. In addition they now make the connection between exercise, diet and wellbeing, and are more conscious and active in this regard.

While the focus of the SFF program is on the farming family health and wellbeing by associating attention to safe farming practices in the program participants have come to realise that like inattention to personal health and wellbeing a poor attitude to farm safety can also have dire consequences.

Climate change is seen as yet another external factor that farmers have to contend with in their business. Importantly the impacts vary depending on where the farm is, what the change in the weather is and how this impacts the type of farming they are involved with. There are winners and losers, but overall we heard that the impacts are typically negative and now need to be factored into their farm management practices.

## Conclusion

The findings of the SFF Future Direction follow up program and the Roberts Evaluation<sup>19</sup> research complement the original goals of the SFF program: to influence farm family health through education, behaviour changes, changes in clinical conditions and in morbidity and mortality rates. The farm men and women most at risk of cardiovascular disease had made the most significant improvements over the five to six year period in reducing cholesterol; and blood pressure. Importantly farm men and women realised that if *'you don't have your health you can't run your farm'* and that additionally SFF was like an 'umbrella' overarching and guiding the focus on their health. The high retention rates over the 5-6 year period illustrated the high level of motivation generated by the program. The variability in environmental and economic factors experienced by the participants in the SFF program highlights the stress this context creates for Australian farm men and women. As with their approach to farming in a changing and variable climate, most are innovative and creative in the way in which they respond to these changes. There are however winners and losers in climate variability, but overall we heard that the impacts are typically negative and now need to be factored into their farm management practices

The SFF program assisted participating farmers gain perspective and a deeper understanding of the impacts of health and safety on them, their families, their livelihoods with participants seeing the connection between their health and farm productivity during a climate of change.

## Policy recommendation

Climate variability, as a result of global warming, has significant impact on the economic, environmental and social sustainability of farmers as they cope with these challenging issues and decisions. This project demonstrated that when farmers are provided with information relevant to their health, wellbeing and safety they include these factors in both day-to-day and strategic decision making about their farming business (crops, activity and health).

1. That the SFF method of engagement should be rolled out across rural locations nationally and supported through a professional network of health and agricultural providers.
2. That the SFF method is effective, evidence based and efficient lifestyle modification program addressing obesity, diabetes, cardiovascular disease and climate. It should be piloted for repeatability and transferability into other at risk population groups nationally.
3. That the SFF program be recognised, supported and resourced through a cross sector whole of government response to rural health, wellbeing, safety and climate change.

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## Appendix 1: Workshop topics and duration of workshops held at all 10 locations

Workshop topics	Baseline Workshop 1	12 months Workshop 2	24 months Workshop 3	60–72 months Workshop 4
Workshop duration	2 days	1 day	1 day	1 day
Health Assessment	✓	✓	✓	✓
Introduction to Sustainable Farm Families	✓			
1. Rural Health	✓			
2. Getting to the heart of things	✓			
3. Cancer	✓			
4. Farm Health and Safety	✓			
5. You are what you eat (diet and nutrition)	✓			
6. Stress Less	✓			
7. Review of previous workshop learnings		✓	✓	✓
8. *Men's health	✓	✓		
9. *Women's health	✓	✓		
10. Mental health—anxiety and depression		✓		
11. Diabetes			✓	
12. Physical activity			✓	
13. Business decisions and health			✓	
14. Respiratory conditions				✓
15. Pesticides in agriculture				✓

\*Gender sessions swapped in year 2—that is men do women's health and women do men's health.

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