Impact of climate change on disadvantaged groups: Issues and interventions

Final Report

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IMPACT OF CLIMATE CHANGE ON DISADVANTAGED GROUPS: ISSUES AND INTERVENTIONS

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The role of NCCARF is to lead the research community in a national interdisciplinary effort to generate the information needed by decision makers in government, business and in vulnerable sectors and communities to manage the risk of climate change impacts.

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## Conclusion and Policy Implications

The conclusion and policy implications are discussed in detail, focusing on the relationship between social exclusion and climate change. The introduction of a socially just adaptation to climate change is emphasized, with principles for embedding climate change in the social inclusion agenda identified. The importance of the local community is highlighted, and the special case of the Aboriginal population is considered.
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ABSTRACT

In the international literature on climate change there is an emerging concern that the negative effects of climate change will be disproportionately experienced by those who are economically and socially disadvantaged, further widening the gap between them and more advantaged population groups. However, the relationship between climate change impact and social disadvantage remains little investigated. This study has sought to contribute to this gap by adding to the small body of empirical knowledge of the vulnerability and adaptive capacity of disadvantaged groups in Australia in the face of impending adverse impacts of climate change.

The study provides a discussion of the historical and future climate trends and its implications for the population. However, it goes on to discuss the concept of social vulnerability in the international literature and to show that at the local level population vulnerability to climate change is more likely to be defined by the socio-economic differences in the community, than by environmental impact.

Adding to the wide discussion of the concept and operationalization of climate vulnerability this study adapted an approach of developing a measure of social exclusion as a way of measuring social vulnerability and adaptive capacity. The study uses ABS 2011 Population Census data to measure social vulnerability at LGA level. It also uses quantitative data collected from 1800 CATI interviews in three contrasting communities in South Australia (Port Pirie, Port Adelaide Enfield and Berri/Barmera), as well as qualitative data from 57 in-depth face-to-face interviews with disadvantaged households, and 13 interviews with the main stakeholders in these LGAs.

Using ABS 2011 Census data, the study maps separate indicators, as well as the composite index of social exclusion across the LGAs in South Australia to identify the areas with the highest level of social exclusion. It then uses the concept of social exclusion to study vulnerability of disadvantaged groups to the impact of climate change at household level.

The results of the quantitative and qualitative data analyses provide a deeper understanding of the characteristics of social exclusion among disadvantaged groups, as well as of the associations between disadvantage, social exclusion and vulnerability of households in South Australia. The implications of these findings are discussed in the context of potential policy interventions to enhance resilience and decrease the negative impacts of climate change for disadvantaged groups.
EXECUTIVE SUMMARY

In Australia the impending effects of climate change and the widening gap between economically and socially advantaged and disadvantaged groups are both issues of widespread national government and community concern. However, the relationship between the two remains little investigated. This study has sought to contribute in this area by adding to the small body of empirical knowledge of the vulnerability and adaptive capacity of disadvantaged groups in Australia in the face of impending adverse impacts of climate change.

Increasingly large body of research has shown that Australia is undeniably experiencing long term changes in climate involving higher surface air and sea-surface temperatures, more hot extremes and fewer cold extremes and increased sea levels, and that these changes will continue in the future. There has been less advance, however, in tracing the complex interrelationships between the climate change scenarios on the one hand and socioeconomic change on the other. The assessment and measurement of population vulnerability (a concept central to considerations of the impact of climate change) has become a major focus of both academic and policy related work in this area and there is a great deal of contestation about the operationalization of the concept. This study adapted an approach of developing a measure of social exclusion as a way of measuring social vulnerability and adaptive capacity.

Based on this approach, the study has utilized the ABS 2011 Population Census Data to measure social vulnerability and through mapping identify the areas with the highest level of social exclusion at LGA level in South Australia. Among the most interesting findings of the spatial analysis was that there is a considerable overlap between various indicators of social exclusion, showing that multiple disadvantages are common in SA.

Using the concept of social exclusion as a measure of social vulnerability to the potential impacts of climate change, the project also included a survey of disadvantaged groups to study vulnerability and adaptive capacity of disadvantaged groups. The primary data were collected through a survey of 1800 households, and in-depth face-to-face interviews with 58 households and 17 service providers.

Key findings

Bivariate analysis

- Multiple disadvantages are common in the three study sites. Certain disadvantaged groups, such as Indigenous, single parent and renting households, are more likely to have reported more than one type of disadvantage than others.
- The greatest economic difficulty experienced by disadvantaged groups is related to the increasing cost of utility bills which the households find increasingly difficult to keep up with.
- The lack of economic resources among the less privileged households are not compensated for by stronger social networks, which are important for maintaining access to formal and informal social support systems for developing resilience and effective adaptation to climate change.
- The level of social support and social participation are very low among all respondents, however, those in metropolitan area show particularly low levels of social connectedness.
• The majority of respondents believe they are well informed about the causes and consequences of climate change, but much lower percent think they know how to respond to it.
• There is a high level of acceptance of the reality of climate change, but about one third of respondents believe it won’t affect them.
• While each of the disadvantaged groups recognize the challenges resulting from extreme weather events, less than half of them consider them climate change issues.
• Disadvantaged households have greater difficulty coping with extreme weather events, than households without disadvantages. Households with multiple disadvantages are especially likely to find heat and floods to be challenging.
• All disadvantaged groups have a higher proportion than the control group who believe they will have difficulty adapting to climate change.
• Unawareness of house energy efficiency was twice as great among the disadvantaged as among the control group.

**Multivariate analysis**

• The findings of multivariate analysis showed that the level of social exclusion can mostly explain the increased perception vulnerability and lower adaptive capacity of certain disadvantaged groups to the impact of climate change and of extreme weather.
• Despite the inconsistency in the results of multiple disadvantage analysis, there is some evidence that having multiple disadvantages may increase the perceptions of vulnerability and difficulty of adaptation that cannot be explained by the level of social exclusion.

**Qualitative interviews**

• The qualitative discussions revealed a strong feeling of vulnerability among disadvantaged groups with respect to the effects of extreme weather events and the rising cost of living.
• The in-depth interviews with excluded groups revealed that social exclusion and disadvantage exacerbate vulnerability to the effects of climate change in the three study areas.
• Especially in the non-metropolitan areas, considerable ingenuity and resilience was being demonstrated in adapting to environmental change. However, this was tempered by a deep, widely expressed concern that people’s resources and ability to cope were being stretched and exacerbation of these impacts could mean that this resilience will not be sufficient to offset its effects.
• Existing sources of information to help people adapt to climate change were largely not effective in getting through to disadvantaged groups.
• Regardless of views or beliefs on climate change, all interview participants were making adaptations to their immediate environment or daily lifestyle practices in response to changes in the weather and/or the rising cost of living.

**Policy Implications**

• It is important that social inclusion elements be injected into climate change adaptation strategies not only at national level but also state and local levels. However, it is equally important to include a consciousness of the effects of climate and environmental change in the social inclusion agenda.
• Effective adaptation to climate change is strongly influenced by local factors and this is especially the case for disadvantaged groups. The overall necessity
of strengthening local communities is of basic importance to responding effectively to climate change effects.

- An initiative on assisting Aboriginal adaptation to climate change is clearly an important and urgent priority.
- There is a clear role for better communication of information to support different groups, especially the disadvantaged, to adapt effectively to current and impending impacts of climate change. It is clear that 'one size fits all' approaches to communication are doomed to failure in the context of disadvantaged groups.
- Governments at all levels need to recognise that population is both motivated and able to make changes in their lifestyle and behaviour toward more sustainable practices, and be more prepared on the one hand to give communities complete information to enable them to make better decisions about lifestyle and behaviour and on the other hand assist people in making those lifestyle and behaviour choices with appropriate assistance programs.
- There is clear need in the support of wider initiatives to overcome disadvantage, to empower disadvantaged groups, to increase the economic resources available to them, to increase their social connectedness and sensitise all government and non-government activity to their needs.
- There is a need for developing synergy between the state, community and civil society in order to develop social capital and strong communities.
- As part of the nation’s Social Inclusion Agenda, it is imperative that the costs of utilities to the disadvantaged be addressed. Undoubtedly the strategy of more rational costing of resources like water and electricity are needed as a wider societal initiative to become more sustainable.
- An important ingredient in facilitating local intervention is the involvement of community and non-governmental organisations.
PROJECT BACKGROUND

Introduction

Social inclusion is a national priority for the Australian government which has established a national social inclusion board to develop strategies to combat disadvantage. This agenda is well advanced in South Australia where a social inclusion initiative has been in place for nearly a decade (ASIB, 2009). There is a need in this context to consider what the implications of climate change are likely to be in relation to social inclusion objectives and what strategies might be necessary to address the potential compounding effects of climate change on socio-economic disadvantage in Australia.

Social and economic disadvantage in the Australian community is diversely experienced and reducing it has proved difficult even in a rapidly growing economy and low unemployment regime (ASIB, 2009). The possibility that this situation will be exacerbated by climate change presents a significant challenge to policy makers, particularly in the context of state and national government social inclusion policies. The mechanisms through which climate change exacerbates social exclusion, however, are poorly understood.

There is evidence of the adverse effects of climate change on human morbidity, mortality (Kovats et al., 2008; Loughnan et al., 2010), mental health (Berry et al., 2010), and heat-related illness (McMichael et al., 2008; Knowlton et al., 2009). These effects are observed more commonly in particular vulnerable subpopulations including the elderly, people with chronic illness and those living in urban centres (Abrahamson et al., 2008; White-Newsome et al., 2009), as well as migrants and ethnic minorities (Cheng & Newbold, 2010). Older people are among the most at risk due to reduced physical and economic capacity, and isolation, all of which limit adaptive capacity (Filiberto et al., 2009). Low income groups are disproportionately at risk of coastal flooding (Kovats et al., 2010). Homeless people are one of the most vulnerable groups in developed regions experiencing new and resurgent disease processes linked to climate change (Ramin & Svoboda, 2009). The cost of living (on energy, water, food, transport) for disadvantaged groups, especially those living in more vulnerable areas is likely, in the absence of compensation, to keep rising, leading to deteriorate the capability of the affected vulnerable people to adapt. Various demographic, economic, cultural, geographic, sociological and behavioural factors impact on the vulnerability of different populations in adapting to the impact of climate change (WHO, 2010). Key factors include age, socio-economic status, ethnicity, English proficiency and relative acclimatisation to hot weather or heatwaves (Kosatsky, 2005; Luber, 2008; Cheng & Newbold, 2010). Lack of access (e.g., due to a lack of skills, labour and/or capital) to adaptation options is an important factor predisposing particular disadvantaged groups to social exclusion (Eriksen & Kelly, 2007). Exclusion from decision-making and difficulties in accessing information (e.g., via internet, mobile phone) and financial services further exacerbate vulnerability (Lambrou & Laub, 2004).

Climate change is a social equity issue as disadvantaged groups are most likely to become more vulnerable to many of the impacts (Dulal et al., 2009). Disadvantaged groups and their communities face many climate change impacts that can compound one another and accumulate over time. Climate change impacts can reinforce existing vulnerabilities by creating new health risks (e.g., increased mortality), reducing livelihood options, altering natural resource management, modifying markets that lead to the exclusion of disadvantaged groups, and trigger new or intensify existing forms of conflict (Christoplos et al., 2009).
Enhancing the resilience and adaptive capacity of vulnerable groups will be a key ingredient of effective adaptation policy, planning, and programs in a range of areas requiring considerations including housing (e.g., subsidising household energy efficiency and low carbon measures), on transportation (e.g., subsidising low income families for affordable fuel prices and transportation to workplace or school), and on livelihoods (e.g., providing training in ‘green skills’ to enhance employability of people). Understanding and identifying the unique challenges that disadvantaged groups face in areas anticipated to be climate change ‘hotspots’ is fundamental for local communities to devise countermeasures to enhance the resilience of vulnerable groups, thereby reducing social exclusion.

Moreover, the Australian population and workforce are ageing. Many people among the disadvantaged population groups cite poor health as the reason for not being in the labour force or withdrawing from paid work prior to the ‘standard’ retirement age of 65 (ABS, 2007; Australian Treasury, 2010). There is a need to ensure that the health and economic impacts of climate change do not add to this problem and further aggravate the potentially negative impact of ageing on workforce participation and the dependency ratio (Productivity Commission, 2005).

These together point to a significant gap in knowledge regarding equity dimensions of climate change vulnerability, and the pressing need for evidence-based research to ensure effective interventions that build and sustain resilience and adaptive capacity of various disadvantaged populations in differing regional contexts.

**Research aim and objectives**

This study seeks to make a contribution to this gap in our knowledge by investigating the vulnerability and adaptive capacity of disadvantaged groups to the adverse impacts of climate change and identify interventions which can enhance resilience and counteract these effects in South Australia (SA). Specific objectives of the research include:

- identifying the vulnerability and adaptive capacity of particular disadvantaged groups (poor, CALD (culturally and linguistically diverse), aged, disabled, Aboriginal, etc.) in differing spatial contexts to cope with climate change impacts;
- developing a set of indicators to measure their vulnerability and adaptive capacity using primary and secondary data;
- identifying intervention strategies to enhance adaptive capacity and reduce vulnerability.

Studying climate vulnerability and adaptive capacity of disadvantaged groups in South Australia will give us a deep understanding of climate change and disadvantage issues, which will allow extrapolating the results to the total Australian population.

**Project Design**

The project employs multiple methods and sources of both qualitative and quantitative information to address the research objectives. It was carried through several stages. At the initial stage of the project a systematic review of national and international literature was conducted to develop a conceptual framework and a set of indicators for the study of social vulnerability. The literature review included an overview of historical weather and future climate trends in South Australia, to identify the areas at most risk of being affected by the negative impact of climate change. This overview is presented in Chapter 2. The first stage of the project also included the overview of the climate
vulnerability literature and the framework of social vulnerability, discussed in Chapter 3. This framework was then used in the next stage of the project, which included secondary data analyses for the comprehensive demographic profiling and identification of the communities with the highest levels of social vulnerability. The project used the latest CENSUS data collected by the Australian Bureau of Statistics (ABS) in 2011 for this purpose. The results of the secondary data analysis are presented in Chapter 4.

The next stage of the project involved primary data collection from the selected sites using quantitative and qualitative methods. The framework and indicators of social vulnerability developed at the initial stage of the project were used to construct the survey instruments and interview guides. The data were collected both from the households and key stakeholders, such as key community members and organizations working with the disadvantaged population groups. The details of the survey sample, data collection process and results of bivariate analysis are presented in Chapter 5. The multivariate analysis of the quantitative data was conducted using advanced computer software for statistical analysis, the outcomes of which are presented in Chapter 6.

The next stage of the project involved qualitative data collection from a subsample of survey participants for an in-depth understanding of vulnerabilities and adaptive strategies among disadvantaged households. The household interviews were completed with stakeholder interviews in each study site. The in-depth interviews were subjected to thematic analysis. The sampling, process and the results of the qualitative study are presented in Chapter 7.

The findings from the quantitative and qualitative studies were used at the last stage of the project involving policy and strategy development, presented in Chapter 8. This chapter discusses the implications of the project findings for the social policy and makes policy recommendations for reducing vulnerability to climate change and increasing resilience of disadvantaged groups.

At each stage of the project the research team consulted with a Reference Group, comprised of experts representing various research and governmental organizations such as: Department of Environment & Natural Resources, Sustainability and Environment, and Primary Industries and Resources South Australia. The project was carried in a close partnership with the Social Inclusion Unit of the Department for Communities and Social Inclusion in South Australia.
THE CLIMATE CONTEXT IN SOUTH AUSTRALIA

Considerable effort has been made to be able to predict the potential changes in the climate in the future and to explore its potential consequences (IPCC, 2007; 2001; Department of Climate Change, 2009; PMSEIC Independent Working Group, 2007; CSIRO, 2010; 2011). However, the uncertainty associated with future changes in the climate remains large. Although the degree of damage is difficult to estimate, it has been established that climate change is going to have economic, social, physical and health effects, to impact the settlements and infrastructure, migration patterns, national security and resource scarcity at global, regional and local levels (e.g. Luo et al., 2003; Kjellstrom and Weaver, 2009; Hugo, 2011; Hennessy et al. 2003; Howden et al., 2003; Pitman, 2007; Hughes, 2003). It has also been suggested that these impacts are going to be unequally distributed not only between developed and developing countries, but also between different population groups within these countries (Schmidhuber & Tubiello, 2007).

**Historical weather in SA**

The evidence shows that climate change is already underway and it is affecting the biological and social systems (Garnaut, 2008, PMSEIC Independent Working Group, 2007; Department of Climate Change, 2009; CSIRO, 2010). The historical climate data for South Australia shows that in the last 50 years the climate has become drier and warmer. The climate trend maps obtained from the Australian Bureau of Meteorology show that the annual rainfall in SA has reduced between 5mm to 20mm per decade, with the southeast and northern regions having the largest decrease in rainfall (Figure 1). The temperature trend maps also show that the average, minimum and maximum temperatures in SA have all increased in the last half a century. Although the largest change is observed in the maximum temperature, it is also noticeable that the minimum temperatures have also been rising in South Australia (Figure 1: Trend in Annual Rainfall 1970-2011 (mm/10yrs) to 4).

The changes in the mean rainfall and temperature have also affected the duration of warm spells and the number of hot nights in the state. The data from the Australian Bureau of Meteorology show that the average warm spell duration (the annual count of days with at least 4 consecutive days when daily maximum temperature was larger than the 90th percentile) has almost doubled in the last twenty years (Figure 5). Meanwhile, the average number of hot nights (the annual count of nights with minimum temperature above 20°C) has increased by about 10 days per year in the last decade (Figure 5: Average warm spell duration 1960-2011 (Source: Australian Bureau of Meteorology)).

**Climate Change projections in SA**

Climate change projections take a wide range of variables into consideration, which vary across different approaches, resulting in a large number of climate change scenarios. There is also a great degree of uncertainty involved in calculations of future climate scenarios, due to our imperfect knowledge of climate system and of the amount of greenhouse gas emissions in the future, as well as due to the complexity of the natural environment and the socio-economic systems living in it (Balston et al., 2012). This makes the choice of future climate scenario in the assessment of climate
vulnerability very difficult. Moreover, Balston et al (2012) note that the large scale of the climate scenarios based on the global climate model are usually not useful for local level comparisons. Meanwhile the process of downscaling of the outputs, although improving the resolution of the projections, adds more uncertainty to the future climate models. This makes within-country comparisons of future climate trends at micro level even more cumbersome.
Figure 1: Trend in Annual Rainfall 1970-2011 (mm/10yrs)

Figure 2: Trend in Mean Temperature 1970-2011 (°C/10yrs)

Figure 3: Trend in Maximum Temperature 1970-2011 (°C/10yrs)

Figure 4: Trend in Minimum Temperature 1970-2011 (°C/10yrs)

Figure 5: Average warm spell duration 1960-2011 (Source: Australian Bureau of Meteorology)

Figure 6: Average number of hot nights 1960-2011 (Source: Australian Bureau of Meteorology)
Using the CSIRO climate data we have mapped the projected average annual temperature and rainfall change for South Australia for the years 2030 and 2050 in case of medium and high emissions scenario (Model: Max Plank ECHAM5/MPI-OM-high rate of global warming). The resulting GIS maps (Figure 7 and 8) do not allow for comparisons at LGA level due to low resolution of the maps. The data are also missing for certain LGAs around Adelaide Metropolitan Area. However, these maps help visualize the general temperature and rainfall trends for the region in the future. As can be observed from the maps, coastal and northern outback areas are going to see the largest decrease in rainfall both in case of medium and high emissions scenario (Figure 7). The temperatures are also going to increase more in the northern areas of SA than in the coastal and central areas (Figure 8).

More detailed regional comparisons are possible using series of reports provided by the Department of Environment and Natural Resources for South Australia based on CSIRO projections (Department of Environment and Natural Resources, 2010a; 2010b; 2010c; 2010d; 2010e; 2010f; 2010g). The reports are provided for the following eight NRM regions in SA: Adelaide and Mount Lofty, Eyre Peninsula, Murray-Darling Basin, Northern and Yorke, South East, Arid Lands, Alinytjara Wilurara and Kangaroo Island (See Appendix 4 for the map). By 2030, it has been projected that the annual average temperature across almost all regions will increase by about 0.8°C, while in Arid Lands and Alinytjara Wilurara regions it is projected to increase by about 1.3 and 1°C respectively under medium emissions scenario. The 2070 projections for medium emissions scenario show more variation in the temperature rise across SA regions. Adelaide and Mount Lofty, South East and the northern regions of Arid Lands and Alinytjara Wilurara are projected to have about 2.3-2.4°C increase in the annual mean temperature, while the annual mean temperature in Murray –Darling Basin and Northern and Yorke is expected to increase by about 2°C. The lowest increases (1.8°C) under medium emissions scenario are expected in the annual mean temperatures in Eyre Peninsula and Kangaroo Island by 2070.

The expected changes in the annual rainfall in South Australia are mostly negative. Considering medium emissions scenario, Adelaide and Mount Lofty region is expected to see the largest decrease in the annual rainfall by 2030 (about 4.5 percent), followed by Arid Lands and Alinytjara Wilurara (about 4 percent), Eyre Peninsula and Murray-Darling Basin (about 3 percent) and by Northern and Yorke, South East and Kangaroo Island regions (about 3 percent). The picture is slightly different for 2070 projections. Under the medium emissions scenario, Adelaide and Mount Lofty region, Eyre Peninsula, as well as Alinytjara Wilurara are expected to see the largest decrease in annual rainfall – about 15, 15 and 13 percent decrease respectively. Murray-Darling Basin, Northern and Yorke and South East regions are projected to have about 10 percent decrease in annual rainfall, while Kangaroo Island and Arid Lands are going to see the lowest decrease in annual rainfall by 2070 (8 and 9 percent respectively).

What do these numbers imply for the population vulnerability? The historical weather shows that up to 0.5°C increase in temperature and about 10mm decrease in rainfall every 10 years have resulted in increased number of hot nights and warm spell duration. Therefore, the projected increase in temperature and decreasing rainfall will further increase warm spell durations in South Australia. Garnaut (2008) has projected that the number of days per year above 35°C for 2030, 2070 and 2100 will be 22, 34 and 44 respectively, compared to the current 17 in Adelaide. However, whether or not the 0.5°C difference in the projected temperature increase and1-3 percent difference in the projected rainfall decrease between the LGAs will result in considerable variation in population vulnerability in South Australia is debatable. Thus, combined with the high level of uncertainty associated with future climate projections, local level temperature and rainfall trend projections provide limited insight into finding climate change
Impact of Climate Change on Disadvantaged Groups

‘hotspots’ and assessing different risks and population vulnerability across SA local areas.

**Medium emissions scenario**

**High emissions scenario**

Figure 7: Change in annual total rainfall (%), in SA for the years 2030 and 2050 – SRES marker scenario A1B (Moderate) and A1FI (High emissions)

Figure 8: Change in average annual temperature (°C), in SA for the years 2030 and 2050 – SRES marker scenario A1B (Moderate) and A1FI (High emissions)

Data source: http://www.csiro.au/ozclim/home.do
Along with rising temperatures and decreasing rainfall, the consequences of changing climate will include rising sea level and increasing frequency of storm surges (Department of Climate Change, 2009). This is especially concerning for Australia as the majority of population is living in coastal areas: in South Australia, over 90 percent of the population lives near the coast (Department of Climate Change, 2009). Moreover, most of the population growth in the recent years has occurred in the coastal areas and it is expected to continue to grow (Department of Climate Change, 2009). According to IPCC Fourth Assessment Report (2007), the best estimate of the sea level rise at the end of 21st century, relative to 1980-1999, is projected to be from 0.28m in case of low emissions scenario to about 0.43m in case of high emissions scenario. The sea level rise is also expected to be accompanied by increased intensity of storm surges and cyclones, endangering the coastal settlements (IPCC, 2007).

The sea level rise projections for Adelaide metropolitan area show that a substantial part of the coastal settlements is at risk of inundation (Figure 9). Port Adelaide seawater stormwater flooding study has estimated that the damage costs from storm tides could increase by 10-20 times in the future sea level rise scenarios (Tonkin, 2005). It has been estimated that between 25 thousand and 43 thousand residential buildings are at risk of inundation from a 1.1m sea-level rise in South Australia, which ranks as fourth largest number of at-risk buildings in Australia. The highest number of residential buildings at risk of inundation have been estimated to be in Charles Sturt (9-14 thousand buildings), Port Adelaide Enfield (5-11 thousand building) and Port Pirie City and Districts (1000-2000 buildings), which account for about 30 percent, 23 percent and 24 percent of the residential buildings in each LGA. However, the highest proportion of at-risk buildings, with over 40 percent of the buildings at risk of inundation is in the small LGAs across the south-east coast of South Australia. The projected sea-level rise and increased frequency of flooding will not only cause physical and financial damage in the area, but also impact health and social dynamics of the local communities, putting them at higher risk of being affected by the changing climate compared to the in-land areas.

In summary, the increasing number of extreme weather events, including heat waves, floods and storms, carry the promise of increased health issues (Garnaut, 2008), as well as social and economic stress for the local population across all SA regions. Therefore, to understand the varying risks faced by different population groups at a local level and to identify the climate change ‘hotspots’ it is more important to understand the social vulnerability and demographic profile of the local population.
Figure 9: Medium sea-level rise scenario of 0.8m (top) and high sea-level rise scenario of 1.1m (bottom) relevant to 2100 time period in Adelaide region

CLIMATE CHANGE AND SOCIAL VULNERABILITY

Conceptualization of vulnerability

Increasingly more research in the last two decades has been directed towards understanding what the consequences of changing climate will be for the social systems (e.g. Adger, 1999; Adger & Kelly, 1999; Bohle, et al, 1994; Nelson et al. 2010a; Smit and Wendel, 2006). The focus for most social researchers has been exploring the ways the negative impacts can be prevented and how we can adapt to them. Considerable effort has been devoted to the conceptualization and assessment of climate vulnerability (Füssel, 2005; O’Brien et al, 2004; O’Brien et al., 2007). Since the publication of the Third Assessment Report by Intergovernmental Panel on Climate Change (IPCC) in 2001, the definition of vulnerability as a function of exposure, sensitivity and adaptation has probably been the most cited and used conceptualization of vulnerability. However, many of the studies guided by this definition have also been criticised for using it as a framework to measure vulnerability to climate change (Hinkel, 2011).

Since then, many definitions of vulnerability, varying across multiple disciplines have been suggested and used for vulnerability assessments. Füssel and Klein (2006), summarizing the literature on the concept of climate change vulnerability, suggest that the concept of vulnerability has evolved over time and distinguish four stages of vulnerability assessments. The first stage, which they call Impact assessments, is described by a heavy focus on estimating the impact of future climate scenarios on an unchanging world. In the next stage, which Füssel and Klein (2006) call First-generation vulnerability assessments, non-climatic factors and the possible reducing effect of adaptation on climate impacts are considered in the assessments. In the Second-generation vulnerability assessments the element of adaptation gains more weight; however it is only in the last stage of Adaptation policy assessments (i.e. using policy to enhance ability to adapt communities) where the focus shifts towards finding specific adaptation measures to inform social policy.

To clear out the uncertainty around multiple and confusing definitions of vulnerability, Füssel (2005) assumes that there is no single correct approach to the conceptualization of vulnerability and suggests distinguishing between different concepts by the vulnerability factors under consideration and the terminology of vulnerable situations. For consistency and comprehensiveness, Füssel (2005) claims that the concept of vulnerability should define and include: temporal reference, scale, disciplinary domain, vulnerable system, valued attribute and the hazard. In climate change research, Füssel (2005) distinguishes between two interpretations of vulnerability, which serve two distinct information needs of policymakers: climate change mitigation and climate change adaptation. One of the interpretations views vulnerability as an “end point”, and the second views vulnerability as a “start point” (O’Brien, 2007). The research viewing vulnerability as an “end point” starts vulnerability assessment from projecting future emission trends, developing climate scenarios and then studying the impact and identifying adaptive options (Kelly and Adger, 2000). Meanwhile, the start-point view assumes that vulnerability is a pre-existing state generated by multiple environmental and social processes, making it difficult to cope with current changing climate conditions (Kelly and Adger, 2000). In the second approach, the concepts of vulnerability and adaptive capacity are almost inseparable.

O’Brien (2007) argues that the most important difference between the two interpretations of vulnerability is their association with adaptation, which affects how the problems and solutions are viewed. In the end-point view vulnerability is determined by adaptation and adaptive capacity; the main problem here is considered climate change
itself, and the reduction of greenhouse gas emissions and of sensitivity of various socio-economic systems is the solution (O’Brien, 2007). On the other hand, in the start-point view adaptive capacity is affected by vulnerability; in this case the main problem is the socio-economic marginalization and inequalities, and the solution lies within identifying and addressing these inequalities. O’Brien (2007) concludes that while the end-point view has been useful in measuring the extent of climate change and the costs associated with impacts and adaptations, there is a need to shift the focus towards start-point view of vulnerability, to be able to enhance adaptive capacity in both developed and developing countries. Similar conclusion is drawn by Bohle (1994) in his work on food insecurity in the context of climate change and social vulnerability. He suggests that in response to vulnerability the reduction of exposure and increasing the ability to cope must be based on the full understanding of the causes of vulnerabilities in the present and future.

Viewing vulnerability as a start point falls within the social constructivist framework, according to which vulnerability indicates the socio-economic capacity of individuals to respond to different external stressors (Füssel, 2005). Adger and Kelly (1999) propose that the response to climate change in the long term can be studied by understanding the processes that shape the current adaptive capacity and the processes that affect vulnerability to environmental stress in the present day. Vulnerability, according to them, is determined by the availability of resources and the entitlement of individuals and groups to call on these resources. Therefore, research on social vulnerability, as they refer to the vulnerability of individuals and social groups, should start from the understanding of human use of resources (Adger and Kelly, 1999). The role of the socio-economic disadvantage in vulnerability to climate change has also been discussed in the context of urban vulnerability to disasters in Latin American context (Hardoy and Pandiella, 2009). Hardoy and Pandiella (2009) show and stress the importance of considering the issues of poverty and community development in the effective strategy towards climate adaptation.

**Indicators of vulnerability**

Vulnerability indicators, the next step in vulnerability assessment, has in its turn resulted in great amount of confusion among researchers. As was the case of conceptualization of vulnerability, it has been suggested that there is no single and right way of measuring vulnerability (Hinkel, 2011). According to Hinkel (2011), indicators are a good media between science and policy; however they have been the reason for failed communication between the two in climate change research, due to two sources of conceptual confusion: confusion about what indicators are and what they can achieve; and confusion about the purpose of measuring vulnerability. He concludes that in climate change vulnerability operationalization it is important to not only clearly define the operational concepts, but also describe the relationships between them, which has been lacking from most of the climate change vulnerability work. Moreover, Hinkel (2011) finds that vulnerability indicators can only be appropriate for identification of vulnerable social units, which can be narrowly defined (people, communities, regions, etc.), but not for other policy purposes, such as identifying mitigation targets, raising awareness, allocation of adaptation funds and monitoring of adaptation policy.

Similarly, the importance of understanding the interaction between the factors constituting vulnerability is stressed in the work of Eriksen and Kelly (2007), who undertook a comparison of five national-level vulnerability assessment studies for the development of reliable vulnerability indicators for climate adaptation policy. They argue that understanding the processes generating vulnerability, rather than the attempt to aggregate environmental and social conditions, is important for defining
credible vulnerability indicators to be used in policy assessment. This is based on the conceptual approach viewing vulnerability as a pre-existing state, but the authors note that they are taking into account the fact that it is shaped by natural and societal factors. It is also stressed in this work that distinguishing between coping (short-term response) and adaptation (long-term response) is crucial in vulnerability assessment, as the factors affecting one may be different from the factors determining the other (Eriksen and Kelly, 2007).

The process of vulnerability assessment, following the identification and definition of vulnerability indicators, is further constrained by the availability of empirical data. Several empirical attempts have been made to generate indicators and measure vulnerability in climate change research. Brooks et al. (2005), using the concept of vulnerability as a state, determined by the internal properties of a system, in their work developing national level determinants of vulnerability to death, differentiate between generic and hazard- or context-specific determinants of vulnerability, where generic determinants are the factors, such as poverty, health, inequality and etc., influencing vulnerability to a variety of hazards. As a result of their analysis they have narrowed down a list of variables representing economic wellbeing and inequality, health, education, infrastructure, governance, geographic and demographic factors, agriculture and technological capacity, to 11 national-level indicators associated with mortality from climate hazards. Brooks et al. (2005) note that among the 11 indicators, the experts have distinguished between the variables indicating short-term vulnerability and those determining the capacity to adapt over longer period of time. Importantly, however, their indicators are functional only at national level comparisons and do not reflect in-country variability.

Narrowing the concept of vulnerability to only one measurable outcome, such as mortality rate due to data limitations is criticized by Nelson et al. (2010a). For the purpose of generating measurable vulnerability indices from the theoretical concepts, they divide the literature on the concept of vulnerability into three groups including: hazard/impact assessment, entitlements approach and socio-ecological approach. They include both the start-point and end-point views of vulnerability into the first group of approaches, criticizing their limitations and inability to capture a comprehensive view of vulnerability. Socio-ecological approach, despite providing a comprehensive theoretical definition of vulnerability, is criticized in their work for the difficulty of translating these concepts into measurable variables that can inform policy (Nelson et al., 2010a). What they find to be a more comprehensive approach to vulnerability is the entitlements approach, focusing on the influence of politics, institutions and culture on adaptive capacity of individuals. However, the approach they choose to apply in their assessment of vulnerability of rural Australian communities is rural livelihoods analysis, which, they propose, overcomes the downplaying of the hazard or risk in the entitlements approach (Nelson et al., 2010a). In their subsequent work on the assessment of vulnerability in rural Australian communities, they combine risk assessment with the assessment of adaptive capacity using the rural livelihoods approach, incorporating the study of five capitals including: human, social, natural, physical and financial capitals, measured by a range of indicators (Nelson et al., 2010b). The households with a greater diversity of livelihood assets, that are able to substitute one asset with another at times of stress, are considered to have higher adaptive capacity than those with less diversity. Vulnerable areas, then, are identified by overlapping high exposure areas with low adaptive capacity areas. Nelson et al (2010b) suggest that this approach is able to offer the social policy pathways for constructive solutions, as opposed to hazard/impact approach where modelling leads to erroneous conclusions. The livelihood approach has also been previously used in African settings, where the composite index of Livelihood Vulnerability Index incorporated a set of components measuring the socio-demographic profile, livelihood
strategies, social networks, health, food, water availability, natural disasters and climate variability, each comprised of a number of indicators and sub-components (Hahn, et al., 2009). However in this study livelihood vulnerability index is calculated at the household level rather than at the community level as in the Australian case.

**Social construction of vulnerability**

Adger and Kelly (1999) distinguish between individual and collective vulnerability and propose to include in the assessment of social vulnerability the analysis of the material sources of entitlements at the individual level, the distribution of these entitlements at the community level, and the institutional context within which these entitlements are formed. At the individual level, vulnerability can be determined by access to resources, diversity of income sources, and the social status of the individuals or households; meanwhile at the community level, vulnerability is determined by the institutional and market structures, and it can be exacerbated by climate change impact. The framework proposed by Adger and Kelly (1999) is composed of indicators of poverty, measured by income; inequality, measured by the distribution of assets in the community; and institutional adaptation, through studying institutions. However, they advise that these indicators are not proposed as a direct measure of vulnerability, but rather to show the social construction of vulnerability and the dynamic aspect of it.

The social construction of climate change vulnerability is further developed in Wolf’s (2011) work where she discusses the social processes of climate change adaptation, focusing on the context-specific aspect of it. Wolf (2011) argues that vulnerable groups are not representative of developing countries only as most of the literature on climate change indicates, offering four dimensions of local context that shape vulnerability both in developed and developing countries. These dimensions include: perception of vulnerability and impacts, cognitive and behavioural aspect, social and institutional aspect, and values. In this context, Wolf (2011) suggests that the socio-demographic and economic background of individuals and groups define their perceptions and attitudes towards climate change, which in its turn determines their behaviour and adaptive response. The individual action towards adaptation to climate change on the other hand is also affected by the institutional and social context, and social capital, which determines their ability to act collectively. And finally, Wolf (2011) suggests that values, taking the role of standards, guide the decisions and choices made at each level of climate change adaptation.

Incorporating into the climate change adaptation framework the concept of social capital, comprising of norms and networks enabling individuals to act collectively, is also proposed by Adger (2003) and Pelling and High (2005). Adger (2003) argues that adaptive capacity depends on the ability to act collectively, and adaptation strategies on the social acceptability of available options and the institutional constrains on adaptation. When the vertical social links become stronger between civil society and the state, the emerging cooperative social capital helps the process of adaptation to climate change; however, when the state fails to respond and provide support during environmental hazards, social capital takes over the supportive role of the state. The latter function of social capital is the one that, if left out from vulnerability assessments, will affect the predictions of future adaptation models and risk assessment, underestimating the ability of the social groups to cope with climate change impacts. Peeling and High (2005), on the other hand, advocate a deeper understanding of social capital in climate change adaptation research, with a specific focus on informal social networks that are often left out from the studies of climate change adaptation. They argue that social capital can increase our understanding of the social factors underlying the adaptive capacity of individuals and groups.
While each of the approaches discussed above focuses on a different component of vulnerability assessment, it is worth noting that they do not necessarily contradict each other. Contributing to the start-point view of climate change vulnerability, the main message across these studies is that current socio-economic disadvantage faced by individuals and social groups make them less able to cope with existing social and environmental stress and that changing climate will further exacerbate social deprivation among them. The difference between these studies, on the other hand, is the measures and indices used for the assessment of vulnerabilities. It can be argued, however, that social vulnerability is a multidimensional concept, highly dependent on the local context, incorporating various factors of social disadvantage and their complex interrelationships, measuring which is further complicated by the data availability.

**Social vulnerability and social exclusion**

Adding to the discussion on social disadvantage as a measure of vulnerability, it has been suggested that the concept of social exclusion can help developing a framework for measuring social vulnerability and adaptive capacity (Stanley, 2009). Having originated in the European research mostly for policy purposes, the concept of social exclusion has also received a lot of attention among the Australian researchers studying poverty and social disadvantage. Understanding the differences and relationships between poverty, deprivation and disadvantage has been the focus of most of this research. Sen (2000), summarizing and discussing the origin and use of the concept in the literature, suggests that the concept of social exclusion does not compete with the concept of poverty as the literature suggests, but rather adds to it when poverty is considered as deprivation of capabilities (Sen, 2000). Saunders, et al. (2007), on the other hand, argue that poverty, deprivation and exclusion are three distinct concepts overlapping to a great extent that together define social disadvantage. In their work poverty is defined as the lack of economic resources, deprivation is the enforced lack of socially perceived necessities, and social exclusion is the inability of a person to participate in the key social activities and access services (Saunders et al. 2007). In both works, however, social exclusion is conceived as a broader concept in contrast to poverty and deprivation. Saunders, et al (2007) also stress the importance of the role of institutional structures and the community and family context in understanding social exclusion which is not covered by the term of poverty.

There have been numerous studies measuring social exclusion in the UK, Europe and Australia (e.g. Saunders, et al., 2007; Scutella, et al., 2009). The framework of social exclusion often includes various socio-economic dimensions that allow assessment of the level of individuals’ participation and involvement in the social and economic life, and access to different community services. Summarizing various approaches to the measurement of social exclusion in the literature it can be observed that many of them include the dimensions of material poverty and economic participation, such as: Consumption exclusion and Production exclusion in UK CASE approach (Saunders, et al., 2007), Impoverishment and Labour market Exclusion in the approach by PSE team in UK (Saunders, et al., 2007), Material wellbeing and Participation in production sphere in the European Union approach (Stewart, 2002), Economic exclusion in the Australian CUPSE approach (Saunders, et al. 2007), and Material Resources and Employment in another approached used in Australia by Scutella, et al. (2009).

Although it has been established that material wellbeing is not a comprehensive measure of deprivation of an individual, economic factors are still significant predictors of individual’s participation in social and economic activities. Various measures of poverty rate, income, employment status and assets are among the most commonly used indicators for measuring the economic dimension of social exclusion.
Among other dimensions in the framework of social exclusion varying across the different approaches mentioned above are social and service participation, measured by various indicators of human and social capital. Level of education, literacy, skills, health status, social networks and participation in various political, social and community activities are often used as indicators of the social dimension in the assessment of social exclusion. Some of the studies also include the availability of various social and community services to individuals for a more detailed assessment of individual’s exclusion from fully participating in the key social activities of the society.

The framework of social exclusion is often employed to comprehensively measure the level of social deprivation at a local level and to identify the most disadvantaged areas in the countries or regions. For the purpose of our study the framework of social exclusion is used to identify the local governmental areas in South Australia that struggle the most in the current socio-economic situation and are likely to be at most risk of being affected by the negative impact of climate change. The Local Governmental Area (LGA) is used as the spatial unit of study: This was preferred over a number of possibilities for delineating communities in the Australian context. Ideally it would be preferable to define the study areas as distinct communities of interest. This however was not possible in the present study since in itself it would take considerable primary research. Moreover, few secondary data would be available for such units. LGAs are useful not only because standard data collections mostly have data available for them but especially because they are the level of government closest to communities and potentially able to initiate policies and programmes to mitigate the effects of social exclusion.
SOCIAL EXCLUSION IN SOUTH AUSTRALIA

The discussion in the previous chapter has shown that identifying climate ‘hotspots’ in South Australia at the local level is complex: on the one hand, high resolution climate change data is difficult to obtain; and even if available, identifying the areas that will be affected the greatest is not an easy task due to the small scale of differences in the predicted temperature rise and rainfall decrease across the local areas. On the other hand, social theory suggests that vulnerability of the population to climate change depends more on the socio-demographic differences of various population groups within the local areas rather than on the climate context (Adger and Kelly, 1999; Wolf, 2011; Schmidhuber and Tubiello, 2007).

Following the discussion on using the framework of social exclusion as a measure of social vulnerability to climate change, this chapter presents the variables used to operationalize the framework of social exclusion for this project. It must be noted however, that there is a gap between the conceptual dimensions of exclusion and our ability to operationalize them in quantitative measures. The latter is to some extent determined by the available data. While the definition and framework of social exclusion varies from study to study, there is a list of common indicators and dimensions used in the European and Australian studies (Saunders, et al, 2007, Stewart, 2002). While some of the indicators may represent only one dimension of social inclusion, other indicators can be more complex and fit into more than one dimension. Indicators such as low income for example is indicative of economic dimension, while low education level, proportion of disabled and single parent households may represent both social and economic dimensions of social exclusion. Based on the 2011 Census data, the following sections present a description and the distribution of the various dimensions and indicators of disadvantage used in this project. Although the choice of variables is limited to ABS Census, the data are consistent for all of Australia, providing the chance to replicate the assessment of social exclusion for other regions of Australia using the same set of indicators and the same methodology.

Low income

The level of income is among the most commonly used indicators of social exclusion (Stewart, 2002, Scutella et al., 2009; ASIB, 2012). The level of income is a measure of material wellbeing, defining the household’s ability to participate in various social and economic activities. The increased economic stress associated with the growing utility costs due to changing climate will affect the most the households with lower levels of income. Not only households already struggling under current economic situation will be unable to adapt to the growing costs of utilities, but also the households just above the poverty line will find themselves unable to cope with the growing economic stress. It should be noted however, that income is not a perfect measure of economic wellbeing in the Australian context. There also needs to be a consideration of wealth. Most older people have low incomes but many have significant wealth and assets. Hence, we need to be careful in the interpretation of this variable.

Figure 10 shows the percent of households with less than $600 weekly income by LGAs in SA. The distribution of low-income households is presented in quintiles indicated by different colours on the map, so that the light yellow colour shows the lower 20 percent and the dark red colour shows the top 20 percent of LGAs with low-income households. On average the proportion of low-income households in South Australia was about 39 percent in 2011, however, many LGAs, particularly in rural areas have much higher concentration of low-income households.
Figure 10: SA proportion of households with less than $600 weekly income at LGA level in 2011

More than half of the households in certain LGAs, such as those in the far north-west region, Yorke Peninsula, and in the Murray and Mallee region, reported less than $600 weekly income in 2011. Moreover, many of the LGAs in SA have seen an increase in the proportion of low-income households between 2006 and 2011 Censuses, which is indicated with a black dot on the map. In Metropolitan Adelaide there is a striking pattern of contrast between the northern-western suburbs and the eastern-southern suburbs. The former are characterised by many low socio-economic status, low income households while those in the east are generally better off. While there are of course exceptions, there is a striking socio-economic divide in the city.

**Unemployment rate**

The rate of unemployment is another indicator of poverty and social exclusion in Australia. Scutella, et al. (2009) suggest that, although unemployment is a key determinant of income, it is considered as an indicator of employment exclusion and not as a part of material wellbeing, due to its importance to social inclusion beyond its financial benefits.

The percent of unemployed population looking for part-time or full-time job by LGA in 2011 is presented on Figure 11. The rate of unemployment is especially high in Adelaide Metropolitan area and several far rural regions, where the percent of population looking for part-time or full time job exceeds the average of South Australia. Again there is a contrast in evidence between the western and eastern parts of the city. When compared to the 2006 rate of unemployment in the state it can be observed that in majority of LGAs the percent of unemployed population has grown in the last 5 years.
Human capital, including individual's level of education, literacy and skills is among the most prominent measures of social exclusion. It defines individual's level of participation in education and training (ASIB, 2012). In the context of climate change vulnerability, it particularly defines individuals' exposure to unemployment risk among other risks. Individuals with lower level of education and skills for example are less likely to be adaptable when the employment conditions change under climate change.
As an indicator of low human capital, Figure 12 shows the percent of SA population 18 years and older with less than 12 years of education and not attending school in 2011. Although the proportion of population with low levels of education has not increased in the majority of LGAs since 2006, the levels of education are not promising across the state. There is a clear distinction between the Adelaide metropolitan area and most of the rest of the state. The percent of population with low levels of education is the lowest around Adelaide region, ranging between 14 and 44%. Meanwhile, the absolute majority of population in most of the rural regions report less than 12 years of education. In Australia education differentials are influenced by age. Younger people have stayed at school longer than older people. This largely explains the lack of an east-west difference in Adelaide in the population finishing Year 12. However, if the percentage of adults with University degree is compared, there is a stark contrast between the west and the east (ABS, 2003).

**Private and public renters**

The statistics on public housing represents the poor sectors of the population, who may already be struggling with the current economic situation. Persons in public housing have lower incomes than people in other tenures (NHSC, 2012). This reflects the fact that public housing in Australia has increasingly become associated with welfare (NHSC, 2012) Often representing sub-standard living conditions, public housing is little likely to have energy efficiency measures, which can help reduce energy use under warming climate conditions. Although slightly better off, private renters also mainly represent lower-income households who cannot afford to buy property. Low-income families in the rental market are also likely to be over-represented in the low-quality rental housings with little investment in energy efficiency. The tenants of public and private housing are likely to be among those the most affected by the warming climate and the associated rising energy costs.

In Australia public housing has changed in its foundation substantially in recent decades. In early post-war years public housing was not only a large share of the housing stocks but young people of all income levels often began their housing careers in public housing and many middle as well as low income workers occupied this type of housing. However, it has become more and more “welfare” oriented so that its dominant tenants are disadvantaged and older populations. Hence it is increasingly an effective indicator of disadvantage.

The percent of households in public housing in SA in 2011 is presented on Figure 13. The highest percent of population living in public housing has been reported in Anangu Pitjantjatjara and Maralinga Tjarutja LGAs, where about 59 and 48 percent of population respectively where living in public housing according to 2011 Census. Higher proportion of public housing tenants is also observed around Adelaide Metropolitan area, where higher than SA average percent of population has reported to reside in public housing. Compared to 2006 Census, the proportion of public housing tenants has grown only in a few of LGAs (marked with a black dot on the map), which is likely to be explained by the reduction in the stocks of public housing.
In Australia there has long been a strong correlation between renting and disadvantage (ABS 2011a, 2012a). Figure 14 presents the percent of households in the private rental market. Compared to the public housing, the private rental market has grown both in metropolitan and rural areas since 2006. Figure 14 shows that the proportion of renting households is especially high in the Adelaide Metropolitan area and mostly in the

Figure 13: SA proportion of population in public housing at LGA level in 2011

Figure 14: SA proportion of households in private rental market in 2011
Fleurieu region, where between 16 and 43 percent of population lives in privately rented homes.

**Aged population**

Certain population groups are at higher risk of being socially isolated from the rest of the society due to their socio-demographic and economic situation. Aged population, 65 and over, is among these groups. Poor health, decreased mobility and possibly low economic status can prevent the aged population from fully participating in the socio-economic life of the society. The increasing number of hot days and warm nights due to climate change (Garnaut, 2008) are expected to increase health related issues among them. This is especially concerning for Australia, as it has one of the highest rates of growth of the older population in the world (Hugo, et al., 2008). South Australia’s population is more aged than the rest of the nation, and this pattern is projected to continue until 2051 (Hugo et al., 2008). Moreover, a significant increase in older population has been observed in the coastal areas of SA and Australia in general (Hugo et al., 2008).

Figure 15 presents the map of the distribution of the aged population of 65 years and older across LGAs of South Australia in 2011. The map shows that the older population is concentrated in Yorke and Mid-North, Fleurieu regions and some of the coastal areas of Limestone and Murray and Mallee regions. Up to 35 percent of the population is 65 years and older in these areas, where extreme weather events are more likely to affect the population due to climate change. More importantly, the size of the elderly population has been growing across all South Australia since 2006.

![Figure 15: SA proportion of population 65 years and older at LGA level in 2011](image-url)
Population that needs assistance with core activities and population providing unpaid assistance

Individuals with limited ability to perform daily activities are among the most isolated population groups in the society as they face extra challenges to many services and products available to others (ASIB, 2008). A study of disability in South Australia (ASIB, 2008)
2011a) showed that in 2009 there were 336,000 South Australians living with disability and that they experience a high level of exclusion from the mainstream society and economy of the State. It also showed that disability incidence is greater among Aboriginal, non-metropolitan, unemployed and older people, low income, CALD groups, and western suburbs. The proportion of the population providing unpaid assistance is also indicative of the level of need in disability assistance in the area. It also represents the part of the population with limited ability and resources to participate in the socio-economic life of the society.

Thus Figure 16 presents the percent of SA population that needs assistance with core activities by LGA in 2011 and F shows the percent of SA population that provides unpaid assistance. It can be observed that the proportion of the population that needs assistance with core activities is high in the Yorke and Mid-North, Fleurieu and Northern Adelaide regions, where up to 10 percent of population reported some kind of disability. The geospatial distribution of the population providing unpaid assistance is mostly comparable to that of the disabled population in South Australia. In addition, the percent of caregivers is also high in the Eastern Adelaide region and Mid-Murray. Within Adelaide there is a strong correlation between age and the proportion of population who are caregivers. However, a Government of SA study (ASIB, 2011a) found that of the 84 percent of the population needing assistance with daily activities 14 percent didn’t get that assistance. Carers were overwhelmingly family members and they had poorer work-force outcomes than non-carers.

**Single parent households**

Among the subgroups of population at significantly higher risk of social exclusion are single parent households (Scutella, et al., 2009). They are likely to be among the low-income population, often dependent on government allowances. Single parent households are among the disadvantaged population groups that are already struggling under the current economic situation and have restricted access to various socio-economic activities. These households are likely to be among the first to be affected by the increasing economic tension under climate change.

Figure 10 shows the distribution of single parent households across South Australia. The lowest percent of single parent households, about 5 to 10 percent is observed in Eyre and Mid-North regions. Meanwhile, the highest concentration of single parent households is observed in the LGAs of Whyalla, Port Augusta, Port Pirie, Renmark, Murray Bridge and the LGAs in Northern Adelaide region, where the proportion of single parent households is three times bigger than in the lowest areas. Within Adelaide there is a strong East-West contrast again in evidence. There are strong concentrations in suburbs with significant stocks of public housing since single mothers have priority in gaining access to that housing.
The Aboriginal population is substantially disadvantaged in Australia. Table 1 compares them to the total population and it is apparent that they differ significantly. In addition to the economic disadvantages, Indigenous groups are also socially isolated from the rest of the society due to language and cultural differences. This isolation can restrict their access to climate related information and knowledge on adaptation mechanisms available to the rest of the population. Despite various governmental initiatives to integrate indigenous population into the life of the society, their participation in various social and economic activities remains strictly limited.

Figure 11 presents the percent of Indigenous population at the LGAs in SA. The absolute majority (about 85 percent) of the population in the far north of SA belong to the Indigenous population group. However, many LGAs in the Yorke and Mid-North and Northern Adelaide regions, as well as around Renmark and Murray Bridge also have larger proportion of Indigenous population, where the percent of people belonging to the Aboriginal and Torres Strait Islander population is higher than the SA average of 1.9 percent. The Aboriginal population is more strongly concentrated outside of Adelaide than the non-Aboriginals and within Adelaide they are strongly concentrated in low cost housing areas in the north, west and south.
Figure 11: SA percent of Aboriginal and/or Torres Strait Islander population at LGA level in 2011

Table 1: Characteristics of the Aboriginal/TSI and total Australian populations

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total Australian population</th>
<th>Aboriginal/TSI population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expectation of Life at Birth (m), 2005-07</td>
<td>78.5</td>
<td>67.2</td>
</tr>
<tr>
<td>Expectation of Life at Birth (f), 2005-07</td>
<td>82.4</td>
<td>72.9</td>
</tr>
<tr>
<td>Infant Mortality Rate, 2009-11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSW</td>
<td>4.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Qld</td>
<td>5.1</td>
<td>8.4</td>
</tr>
<tr>
<td>SA</td>
<td>3.4</td>
<td>5.4</td>
</tr>
<tr>
<td>WA</td>
<td>3.3</td>
<td>7.0</td>
</tr>
<tr>
<td>NT</td>
<td>7.3</td>
<td>13.0</td>
</tr>
<tr>
<td>Total Fertility Rate, 2011</td>
<td>1.884</td>
<td>2.740</td>
</tr>
<tr>
<td>% in Capital Cities, 2011</td>
<td>64.5</td>
<td>32.3</td>
</tr>
<tr>
<td>% Aged less than 15, 2011</td>
<td>19.3</td>
<td>35.9</td>
</tr>
<tr>
<td>% Aged 65 plus years</td>
<td>14.0</td>
<td>3.8</td>
</tr>
<tr>
<td>% Unemployed, 2011</td>
<td>5.6</td>
<td>17.1</td>
</tr>
<tr>
<td>% Living in Rental Accom, 2011</td>
<td>28.5</td>
<td>66.5</td>
</tr>
<tr>
<td>% With Post School Education</td>
<td>46.3</td>
<td>26.4</td>
</tr>
<tr>
<td>% Employed in Professional Occupations</td>
<td>21.7</td>
<td>13.6</td>
</tr>
<tr>
<td>Growth Rate 2006-11</td>
<td>1.61</td>
<td>3.80</td>
</tr>
<tr>
<td>% in Low Income categories, 2011</td>
<td>28.1</td>
<td>41.5</td>
</tr>
</tbody>
</table>


**Newly arrived migrants**

Migrant population, especially from non-English speaking countries is also considered to be at high risk of social exclusion (Scutella, et al, 2009). On the one hand, lack of local language and culture among the newly arrived migrants can act as barriers for fully integrating into the local communities and limit the availability of information to them. Inadequate knowledge of the available services and lack of extended social networks, on the other hand, may limit their participation in the local socio-economic activities. Unfamiliarity with the local environment, in addition, can create many challenges for the recent migrants in the current weather conditions, which may exacerbate in the future under climate change. Therefore, it is important to incorporate the size of the recent immigrant population into the assessment of the level of social exclusion as a measure of social vulnerability to climate change.

The proportion of the recently arrived population has grown since 2006. Newly arrived migrants are mostly concentrated around the Adelaide Metropolitan area where up to 20 percent of the population has reported to have recently arrived. Among other popular destinations for the newly arrived migrants are the eastern areas of Limestone Coast region and around Murray Bridge (Figure 12).

Interpretation of this variable is made more complicated by the substantial difference, which exist between different migrant categories. New arrivals, who enter Australia under the refuge-humanitarian category have low incomes, high unemployment, low work-force participation, low levels of home ownership and are overrepresented among the disadvantaged population (Hugo, et al, 2011). However, the majority of immigrants arriving under skilled category are better off on average than the Australian born.
Figure 12: SA percent of newly arrived population (2005-2011) at LGA level in 2011

Ability to speak English

Another measure of human capital, one of the dimensions of social exclusion, along with education and skills is the ability to speak English (Scutella, et al., 2009). As discussed in the previous section, lack of ability to speak English may prevent individuals from full integration and participation in the society. It is a barrier to employment, education and social capital, affecting their ability to fight against economic exclusion. It is a barrier to information, knowledge and networking limiting their ability to be adaptable in the fast changing socio-economic environment. Ability to speak English is particularly relevant to the Indigenous and migrant population, who are likely to be disadvantaged in more than one area of social life.

Figure 13 shows the distribution of the SA population in 2011 with poor or no knowledge of English language at LGA level. The high percentage of population lacking English knowledge in the far north-western areas is indicative of the large Aboriginal population in that area. The large proportion of population with poor or no English knowledge in Adelaide Metro area represents not only the relatively larger aboriginal population, but also the large migrant population which was shown in the previous section to be concentrated in this area.
Among other factors affecting individuals’ ability to fully participate in the society is their mobility (Stanley, 2010). The availability of various socio-economic services to the population, especially in far rural areas may be highly dependent on their ability to be mobile. Therefore, the lack of car ownership can define the availability of the social services to the households, as well as their connectedness with their social network and the rest of the society. Mobility is also among the most important mechanisms that will be necessary for effective adaptation to the changing climate. In Australia, owning a car is especially important for the households residing outside of cities where there is little public transportation available.

The percent of households in SA not owning a car is presented on Figure 14. Western and Eastern Adelaide regions, as well as Playford area has among the highest concentration of households with no car. The high concentration of the lack of car ownership is especially concerning for the Far North, and the far rural areas in the Mid-North region, where not only the availability of services is limited and the distances are considerably farther, but due to lack of adequate infrastructure may also be hard to reach. It is also notable, that the percent of households with no car has grown mostly in the rural areas out of Adelaide region since 2006 (Figure 14).
Internet connection availability

Internet access is an indicator of the social domain of social exclusion, which could be viewed as the defining dimension (Scutella, et al., 2009), defines individual’s ability to connect and interact to a larger network of people, as well as availability of information sources on various social services and activities. Figure 15 presents the percent of SA households with no internet connection in 2011. As has been discussed by Hugo (2001) there is a clear divide between metropolitan city centre and non-metropolitan areas. The percent of households not having internet access is the lowest in the Adelaide Metropolitan area. Meanwhile, the rural areas in Yorke and mid-North, Murray and Mallee regions, and some of Eyre region have among the highest proportion of household not having internet connection. In Maralinga Tjarutja and Anangu Pitjantjatjara Indigenous areas not only more than 75 percent of the population lacks internet access, but also this percent has grown in the last 5 years.

Volunteering

Volunteering is a measure of civic participation defining the level of social exclusion at a community level (Scutella, et al., 2009). Higher level of volunteer participation in the community indicates higher degree of social inclusion in the population and vice versa. Figure 16 shows the percent of population doing volunteer work at LGA level. Thus, the darker colours on the map indicate lower level of volunteer participation defining higher degree of social exclusion. It can be observed that the percent of population reporting volunteer participation is high overall. However, in the Far North and West, as well as in the Adelaide area volunteer participation is not as widespread. Only about 8-19 percent of population report doing any volunteer work in these regions, compared to up to 48 percent in rural areas of Eyre and Mid-North regions. The black dots on this map indicate a decrease in the percent of volunteers in the population compared to 2006, and they show that the proportion of volunteer population has decreased throughout South Australia.
Figure 15: SA percent of households with no internet connection at LGA level in 2011

Figure 16: SA percent of population undertaking volunteer work at LGA level in 2011
Composite index of social exclusion

The methods for construction of a composite measure of social exclusion vary from study to study (Scutella, et al., 2009). To build a composite index of social exclusion at LGA level we use the characteristics of LGAs discussed above from Census 2011 data. For each characteristic we create an indicator of social exclusion by dividing the list of LGAs into quintiles depending on the score of the LGA. If the LGA score is in the lowest quintile it is given a value of 1 for that variable, if it is in the top fifth, then it is given a value of 5. The same mechanism is applied to all variables, except for ‘volunteering’: as lower percent of volunteers defines higher level of social exclusion in the LGA, the lowest fifth is given the value of 5 and the highest fifth is given a value of 1. The sum of all the indicators for each LGA is calculated to generate the composite index of social exclusion, which can vary from 17 (if the LGA falls within the first quintile for all 17 variables) to 85 (if the LGA falls within the fifth quintile for all variables). Thus, the composite index should not be considered as an absolute gauge, but rather as a comparative measure of social exclusion in South Australia, where a higher value of the composite index defines higher level of social exclusion in the LGA, and a lower value defines lower level of social exclusion in the LGA. Although separate indicators can show in which areas are certain types of disadvantages concentrated, the composite index allows identifying the areas where there is accumulation of various types of disadvantages making it particularly vulnerable to external stressors such as extreme weather events and changing socio-economic environment due to climate change.

Figure 17 presents the spatial distribution of the Social Exclusion Index at LGA level in South Australia. The average score of the index for South Australia is 49. The top quintile of the LGAs marked with the darkest colour on the map represents mostly the areas that score above SA average. Among them are the Anangu Pitjantjatjara lands of the Far North region, northern parts of the Yorke region, Renmark and its surrounding areas, as well as Northern Adelaide region. The ‘hotspots’ of social exclusion, the top five highest scoring LGAs are: Murray Bridge, Playford, Port Pirie City and Districts, Berri and Barmera, and Port Adelaide Enfield, which have a value of 58 and above, marked on the map with a black dot. These areas represent coastal urban and rural, as well as in-land rural and urban areas, showing that increased vulnerability can be observed in diverse geographic and social settings.

The patterns depicted in Figure 17 are consistent with other analyses of disadvantage in South Australia (e.g. Pink, 2008; Glover et al, 2010). For example, considerable overlap can be detected between the composite index of social exclusion and the Index of Relative Socio-Economic Disadvantage (IRSD) for areas developed by ABS, despite major differences in the process of index construction (Pink, 2008). Although the list of variables is quite similar, the PCA method used by ABS is based on the data at Collection District level for all of Australia. However, the areas having the lowest score of IRSD (relative high disadvantage) match to some degree to the areas having the highest level of social exclusion. Areas such as Port Adelaide Enfield, Port Pirie, Playford and Murray Bridge for example, appear in the top ten LGAs on both lists. Moreover, 14 out of top 20 LGAs on both lists match, although in somewhat different order. Hence the index would seem to be a robust indicator of the relative extent of disadvantage in local governmental areas. Another observation from the analysis presented is that there is a great deal of overlap in the spatial patterns observed for the various separate indicators. Together they present a consistent picture of high levels of disadvantage in north-western Adelaide, some regional cities and some rural area
which have experienced severe economic setbacks due largely to drought, especially in Riverland.

Figure 17: The distribution of Composite Index of Social Exclusion at LGA level in South Australia in 2011
SURVEY RESULTS

Following the secondary data analysis which helped identify the areas with the highest level of social vulnerability in South Australia, we are next turning to the analysis of primary data to study social vulnerability of disadvantaged groups at the household level. This chapter starts with the discussion of the survey sample and procedure, followed by the description of the distribution of selected sample characteristics and the findings from the bivariate analysis.

Introduction

Survey sample and data collection

In order to study the vulnerability of disadvantaged groups in diverse settings, three South Australian study sites from the areas with the highest index of social exclusion were selected to represent differing environmental and social settings, as well as to provide an adequate pool for sampling various disadvantaged groups. Thus, Port Pirie was chosen as an industrial regional urban centre, Port Adelaide Enfield was selected as a highly disadvantaged metropolitan setting, and Berri-Barmera was selected to represent agriculturally based rural in-land settings.

Primary data collection from households was conducted by Truscott Research using Computer Assisted Telephone Interviews (CATI) between May-July of 2012. A commercially available list of residential telephone listings (including mobile telephone numbers) matching the selected local governmental areas was used as a sampling frame. A random selection of 2000 numbers for each LGA was selected using the random function in Microsoft Access. The survey sampling software used by Truscott Research – The Survey System - also randomises the calling order of the selected numbers and sets up a routine for calling and recalling numbers.

The final sample included 601 households in Port Adelaide Enfield, 602 in Port Pirie and 601 in Berri/Barmera, out of which 36 interviews were incomplete (20, 15 and 1 interviews in each LGA respectively). Data were collected from 6 disadvantaged groups, the sample size of each targeted to be proportional to the size of these groups in the general population of the LGAs, with oversampling of the smallest disadvantaged groups for the purpose of sound statistical analyses. Thus, it should be stressed that the sample size and sampling procedure used in the survey were not meant to produce LGA or state-level representative sample of disadvantaged households, but rather to afford sound statistical comparisons between the different categories of disadvantaged households.

The survey employed a hierarchical sampling procedure. The respondents were asked whether anyone of the age 18 and over in their household belonged to any disadvantaged group in the following hierarchical order: 1. Indigenous; 2. Foreign born (migrant); 3. Single Parent; 4. Aged or Disabled; 5. Unemployed; 6. Private renter or Public housing tenant; and 7. None of these (control). Considering the high possibility of overlapping between the types of disadvantage, respondents were asked to identify where their households had more than one disadvantaged group represented. However, the first disadvantaged group mentioned was considered as the main type of disadvantage for that household. Once the number of households in a certain category reached the sample quota, they were asked whether or not they belonged to any other group. If the household did not belong to any disadvantaged group, they were surveyed as a control group until the quota for this group was reached. If the household did not meet the above criteria, the call was terminated. The distribution of the sample by...
disadvantage categories and by selected characteristics is presented in the following section.

The survey instrument was piloted prior to the survey early in May, 2012. The final instrument was adjusted accordingly for improved clarity and effectiveness of questions. The final survey questionnaire consisted of various multiple choice and open ended questions, divided into several modules, including: 1. Views on current household issues and climate change; 2. Managing heat waves; 3. Health and Social Inclusion; 4. Economic Inclusion; and 5. Demographic characteristics (see Appendix 1 for the copy of the survey questionnaire). The data was entered and cleaned using SPSS software.

**Distribution of the sample by selected characteristics**

The distribution of the first choice of disadvantage group by LGA is presented graphically on

**Figure 18.** The disadvantage groups are presented as exclusive categories, so that the number of respondents in all groups sums up to 100 percent for each LGA.
The distribution of the disadvantaged groups is quite similar in all three study sites. As can be seen from Figure 18, Indigenous are the smallest group in the sample in all LGAs (about 4% on average), followed by single parent households and foreign born (about 8 and 9% respectively). The percent of aged/disabled is about the same in Port Adelaide Enfield and Berri/Barmera samples (about 20 percent); however, their proportion is slightly smaller in Port Pirie sample (about 14 percent). The latter also has a smaller subsample of Unemployed category, compared to other two study sites. The Private renter or public housing tenant group is the largest group in Port Pirie and Berri/Barmera samples (about 35% and 25% respectively), and is among the largest groups in port Adelaide Enfield, comprising about one fifth of the sample. The proportion of the households, that did not identify their household members to belong to any of the disadvantaged groups, does not vary largely between the three study sites.
areas and comprises about 17 percent overall.
Figure 18: The distribution of sample by LGA and by the type of disadvantage group based on the first choice of respondents
Figure 19: The distribution of disadvantaged groups by LGA based on multiple choice of group

Impact of Climate Change on Disadvantaged Groups
However, it is important to consider respondents’ identification with multiple disadvantages, since the picture is different.

**Port Adelaide Enfield**

- Indigenous Australian: 47%
- Foreign born: 17%
- Single parent: 26%
- Aged or disabled: 10%
- Unemployed: 9%
- Renter/public hous. tenant: 5%
- None of these: 4%

**Berri/Barmera**

- Indigenous Australian: 25%
- Foreign born: 17%
- Single parent: 26%
- Aged or disabled: 10%
- Unemployed: 9%
- Renter/public hous. tenant: 5%
- None of these: 4%

Figure 19 presents the distribution of the disadvantaged groups according to the multiple choice of the respondents. Therefore, the sum of all groups exceeds 100 percent. It can be observed that slightly less than half of the respondents in Port Adelaide Enfield and Berri/Barmera, and the majority in Port Pirie have identified one of their household members to belong to the aged/disabled group.
Although slightly different between the LGAs, about one quarter of the overall households identified with the private renter/public housing tenant group. Households with a foreign-born member consisted about 20 percent of the overall sample, while belonging to single parent and unemployed groups reported about 10 percent of the respondents.
It is also important to understand which disadvantaged groups are more likely to report more than one type of disadvantage. As shown on Figure 20, only about 37 percent of all the disadvantaged households identify with more than one group. However, there is a large variation between the different disadvantaged groups. Private renters and public housing tenants are the most likely to report multiple disadvantages (about 74 percent), followed by Indigenous Australian households, about 69 percent of which report more than one type of disadvantage. More than half of the foreign-born, unemployed and single parent households also report multiple disadvantages (about 57, 57 and 59 percent respectively). The lowest percent of households identifying with multiple disadvantages is among the households with aged/disabled members, among which only about 45 percent report another type of disadvantage. These results reflect the findings from the Social Inclusion in Australia report (ASIB, 2012), where Households in the private rental market and public housing were found to be more likely to have 3 and more disadvantages, than households purchasing or owning their house. Interestingly, there has also been observed an increase in the proportion of migrants from non-English speaking countries with 3 and more disadvantages between 2006 and 2010 (ASIB, 2012).

The initial description of the sample shows that dividing disadvantaged population into separate categories cannot provide a full understanding of social exclusion risks. Due to a great amount of overlap between them, underprivileged households often find themselves deprived in several socio-economic areas simultaneously (ASIB, 2012). Meanwhile the report on Social Inclusion in Australia has shown that people with multiple disadvantages are highly likely to live in most disadvantaged localities and that this likelihood has increased from 45 percent in 2006 to about 53 percent in 2010 (ASIB, 2012).

Therefore in order to identify population groups most vulnerable to social exclusion we need to take into account the complexity and interrelatedness of different types of disadvantage. Thus, the analyses of the data will use the distribution of disadvantaged groups based on multiple choice answers rather than on the first choice of

**Figure 20: The distribution of disadvantaged groups by single vs. multiple disadvantage**

It is also important to understand which disadvantaged groups are more likely to report more than one type of disadvantage. As shown on Figure 20, only about 37 percent of all the disadvantaged households identify with more than one group. However, there is a large variation between the different disadvantaged groups. Private renters and public housing tenants are the most likely to report multiple disadvantages (about 74 percent), followed by Indigenous Australian households, about 69 percent of which report more than one type of disadvantage. More than half of the foreign-born, unemployed and single parent households also report multiple disadvantages (about 57, 57 and 59 percent respectively). The lowest percent of households identifying with multiple disadvantages is among the households with aged/disabled members, among which only about 45 percent report another type of disadvantage. These results reflect the findings from the Social Inclusion in Australia report (ASIB, 2012), where Households in the private rental market and public housing were found to be more likely to have 3 and more disadvantages, than households purchasing or owning their house. Interestingly, there has also been observed an increase in the proportion of migrants from non-English speaking countries with 3 and more disadvantages between 2006 and 2010 (ASIB, 2012).

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Therefore in order to identify population groups most vulnerable to social exclusion we need to take into account the complexity and interrelatedness of different types of disadvantage. Thus, the analyses of the data will use the distribution of disadvantaged groups based on multiple choice answers rather than on the first choice of
disadvantage category, as well as differentiate the results by single vs. multiple disadvantage categories.

Among other sample descriptives it is interesting to note the differences in household composition by type of disadvantage. Figure 21 shows the percent of households that do not have any children under 16 years old and the average number of children per household among those that do, distributed by disadvantage type. Figure 22 shows the percent of households that are composed of one adult member only and the average number of adult members in the households with more than one adult. We can see that except for Indigenous and single parent households, more than 60 percent of households in all other groups do not have children under 16, the highest percent of which (about 88 percent) is observed among the households in aged/disabled category (Figure 21). Aged/disabled households are also less likely to be living in homes with more than one adult. It is important to note that in 2010 people living alone were found to be most likely to have multiple disadvantages compared to all other types of households (ASIB, 2012). The average number of children is the highest among indigenous households, where about 60 percent of households have more than 2 children on average. Although a higher percent of single parent households live with children under 16, the average number of children per household is lower than among indigenous households. Over half of single parent households are also not likely to share it with another adult, although among those that do share, about half live with more than two other adults. It can be observed that just above 10 percent of households with no disadvantages has one adult member, which is the lowest percent among all groups (Figure 22). Moreover, the average number of adults in households with more than one is among the highest. However, the majority of them are not likely to have children under 16.

Migrant and unemployed households are also less likely to be living in single-adult households compared to other disadvantaged groups. They are also less likely to have children under 16 years old. Households in public housing and in private rental market are the least likely to share the house with more than one adult, and the majority of those that do, are likely to share it with only one more adult. They are also among the households less likely to have children under 16 living with them. However, the average number of children in the renting households that have children is about 2, indicating that the majority of households with children have two and more.
Figure 21: Percent of households with no children under 16 and average number of children among those that do by disadvantage category

Figure 22: Percent of households with one adult and average number of adults in households with more than one by disadvantage category

Overall, the respondents in aged/disabled and renting groups are the most likely to be living alone, where about 40 and 43 percent reported no children under 16 and no other adults to be living in the same household. Roughly one quarter of migrant households and one fifth of Indigenous and unemployed households are also living without children and other adults. The lowest proportion of respondents living alone is reported among single parent households and those that do not identify themselves with any disadvantage group.
DIMENSIONS OF DISADVANTAGE IN SOUTH AUSTRALIA

Economic exclusion and disadvantage

The economic dimension of social exclusion defines the household’s current economic status in the society and their ability to participate in socio-economic activities. But most importantly economic status is a crucial factor in identifying households’ ability to adapt effectively to the fast changing environmental and socio-economic conditions. One of the most commonly used indicators of economic status is the level of income. The respondents were asked what their household’s fortnightly earnings were before tax and were given a choice of 5 categories of income levels. Figure 23 presents the distribution of household fortnightly income, grouped into 3 categories by disadvantage group. The presented three categories of income levels are: less than $800, between $800-$2000, and more than $2000. The distribution of the household income by disadvantaged groups shows that fortnightly earnings are not uniform across the households with different disadvantages, and not surprisingly, the contrast is quite high between the households belonging to the disadvantaged groups and the control group.

Figure 23: The distribution of household fortnightly income by disadvantage categories

As expected, the households in the control group enjoy better economic conditions than any of the disadvantaged groups. Compared to all other groups, households with no disadvantage have by far the highest percent of high-earners (about 33% earn more than $2000 a fortnight) and the lowest percent of low-earners (about 9 % earn less than $800/fortnight) (Figure 23). Although the data limits our ability to adjust income by the number of household members, we can see from the previous discussion that the majority of respondents in the control group do not live with children under 16 years old, however they are likely to share the household with other adults.

The results of the survey show that, following the control group, the percent of highest earners is the largest among migrant households compared to other disadvantaged groups. Slightly more than one fifth of the migrant households reported more than $2000 fortnightly income, while the percent of the households in the lowest income category was about 27, which is among the lowest compared to other disadvantaged groups. The distribution of household earnings among unemployed category is similar to that of the migrant group; however slightly lower percent of households are among
the top earners (about 16 percent) and 3 percent more households earn less than $800 per fortnight, compared to migrants.

The percent of households in the bottom income category is the lowest among single parent households, compared to other disadvantaged groups, where only about a quarter of households have less than $800 income per fortnight. However, the percent of high earners is not too big: the majority of single parent households fall within the middle category, earning between $800 and $2000 per fortnight. The distribution of income levels must be interpreted with consideration of household composition, which cannot be directly adjusted here due to data limitations. However, we can see from the data that single parent households are the most likely among all groups to be living with children under 16 years old, and the majority of them (about 53 percent) do not share their household with another adult.

![Figure 24: The distribution of households’ main source of income by disadvantage categories](image)

Lowest income is most often reported by the households in the aged/disabled and renter groups, compared to other disadvantaged groups. About 47 percent of aged/disabled households and about 46 percent of renting households report income of less than $800 per fortnight. The proportion of high earners is also the lowest among aged/disabled group, where only about 4 percent of households earn more than $2000 in two weeks. Although three times higher than that of aged/disabled group, the percent of high earners is not very large among renting households either, where only about 9 percent report more than $2000 income. Despite the lower income levels, the material wellbeing of the aged/disabled households may be better off than that of single parent or renting households when adjusted for household composition, as the aged are much less likely to live with children under 16 and more likely to live alone, than others.

The data on the income levels shows that about one third of Indigenous households earn less than $800/fortnight and the percent of high-earners are among the lowest compared to other disadvantaged groups (about 9 percent). This does not put them at the bottom of material wellbeing scale, however it is important to note that the majority of Indigenous households (about 57 percent) live with children under 16 years old, and among them the average number of children is the highest compared to their
counterparts in all other groups. In addition, about 65 percent of indigenous respondents report to be living in households shared with other adult members.

Along with the extensive differences in the level of household income, there are considerable differences in the main source of income between the households with no disadvantages and those in the disadvantaged categories. Figure 24 shows that the main source of income for the absolute majority of households in the control group is employment and investment income or superannuation, while the percent of those relying on the government is very small (about 6 percent). In contrast, the main source of income for the majority of disadvantaged households is government benefit or government pension. So, employment is the main source of household income for about 47 percent of single parent households and about 45 percent of migrant households, which is the highest among the disadvantaged groups.

Meanwhile, more than 60 percent of the households in the Indigenous category and about 70 percent of households in public housing or privately renting rely on governmental support. More than half of unemployed and single parent households also report government benefits and government pensions to be their main source of income. The households with an aged or disabled member are mainly dependent on the government support as well. Very few report superannuation or investment income to provide their living.

Along with the information on the level of household income, the survey collected data on several other economic characteristics of the households, such as information on their ability to obtain money in case of emergency, satisfaction with current economic situation and economic hardships faced by the households. The respondents were asked whether they could get hold of $2000 in case of emergency, and were given a choice of answers including: yes, could draw upon savings; yes, could borrow from friends/family or take a loan; and no, could not get it. Along with high income levels, the households in the control group are the most likely to be able to find $2000 in emergency (Figure 25). About 70 percent can draw upon their savings and another 20 percent of them think they can take a loan or borrow it from friends/family. Migrant and Aged/disabled households are also highly likely to get hold of $2000 in emergency. More than half of these households have enough savings for that, and another 20 percent can borrow it from bank or social networks. Much smaller proportion of unemployed households (about 37 percent) can find $2000 in savings, but about 32 percent can obtain it from bank or friends in emergency. About the same proportion of single parent households and renters have access to $2000 in emergency, but slightly higher percent of renters are able to draw upon their savings for that reason, compared to single parent households. Aboriginal households are the most underprivileged in regards to finding money in case of emergency. Only about 40 percent of them might be able to get hold of that much money, 30 percent of which will only be able to borrow it from friends or take a loan from the bank.

Interestingly there are also some differences in the ability to find emergency money between the study sites. Households in Port Adelaide Enfield are more disadvantaged in this regard, compared to other two sites. Although the percent of those who are able to borrow it does not differ much between the areas, the percent of households able to draw upon savings is about 49, compared to 59 percent of those in Port Pirie and 56 percent in Berri/Barmera. This may suggest that urban-based disadvantaged households have a wider and more intense support network to draw upon in an emergency than those living in non-metropolitan areas. Certainly, they have greater access to formal support systems.
Figure 25: The proportion of households that have $2000 in savings or can borrow from bank or social network in case of emergency by the disadvantage category

In contrast, the average satisfaction with the current economic situation and the percent of households reporting no economic difficulties are very close across the three LGAs. Slightly higher percent report economic difficulties such as falling behind with the rent, going without food and selling something for money in Port Adelaide Enfield, compared to the other two LGAs, however the differences are not large.

The differences in satisfaction with current economic situation and the experience of economic hardship are more prominent between different types of disadvantage. Respondents were asked whether they were very dissatisfied, dissatisfied, neutral, satisfied and very satisfied with their current economic situation. Figure 26 shows the distribution of households that are very satisfied or satisfied with their current situation. The majority, about 72% of the households in the control group report satisfaction with their current economic situation, which is the highest percent of households compared to all other categories. The high level of satisfaction in this group is probably explained by better material wellbeing reflected in their fortnightly earnings and savings. The level of satisfaction with their economic status is also high among migrants and the age/disabled group, among which about 63 percent are satisfied with their situation. The example of aged/disabled group shows that the level of income alone is not enough to assess the risk of economic exclusion. Despite their low income levels, the aged/disabled households find their economic situation quite satisfactory. Lower level of satisfaction with their economic situation is observed among renting households and unemployed, among which the percent is 48 and 41 respectively. The lowest percent of satisfied households is detected among Indigenous and single parent households, where about 37 and 36 percent of households find their economic situation satisfactory.
For a comprehensive understanding of the economic standing of the households, the respondents were asked whether they experienced a series of events during the previous year due to money shortage. The list of the events and the distribution of households reporting experiencing each of the events by disadvantage group are presented on Table 2. The first row of the table shows the percent of households that did not report experiencing any economic difficulty in the last year by disadvantage groups. About three quarters of the households in the overall sample have not experienced any economic difficulties. However, when we look at the distribution of those by disadvantage categories, the differences are striking. Lack of economic difficulties are reported by about 86 percent of the households in the control group, which is the highest percent reported by all groups and is about 3 times higher than the proportion of Indigenous households not having any economic difficulties. Single parent households are doing slightly better than Indigenous households, however only about 44 percent of them report no experience of economic hardship in the previous year. The majority of the households in the rest of the disadvantaged groups also didn’t experience any events due to money shortage, although the proportions among them range from 56 to 78 percent (Table 2).

Among those who have reported experience with any kind of economic difficulty the most commonly mentioned problem faced by the households in all groups is the inability to keep up with bills. Reported by about 51 percent of Indigenous households and about 40 percent of single parent households, paying the bills was a problem for only about 9 percent of the households in the control group. Among other most common problems faced by the households in the control group was keeping up with their social network. Other problems related to the challenges of maintaining everyday life were not as common among the households with no disadvantages.

This dimension of disadvantage is of particular relevance to the present study. An important dimension of increasing pressure on consumer in Australia in recent years has been more rapid increase in power and water utility bills than average income. Continuation or exacerbation of these trends through climate change will create extra hardship among the disadvantaged.
Households in the migrant and aged/disabled groups are also doing comparatively better than households in other disadvantaged groups. These groups are also less likely to struggle with everyday challenges, such as providing food and paying rent. However, along with difficulty paying the bills, going out with friends has been mentioned among the main problems by about 12 percent of aged/disabled households and about 10 percent of migrant households.

More than twice as much of the households among unemployed and public housing tenant/private renting group have difficulty keeping up with their social networks, compared to migrants and aged/disabled. However, between 10-20 percent of these households also had to wear worn-out clothes and had difficulty finding transportation for attending an important event. Moreover, about 13 percent of public housing tenants or private renters and about 18 percent of the unemployed had to ask welfare agency for support during the last year.

These findings also have particular relevance when considering the impact of climate change. Accessibility to enable ready and frequent contact with services, formal and informal networks is of critical importance to the entire population but especially those with economic problems. However, it is precisely the latter group that have the greatest physical accessibility problems again reflecting the multidimensionality of disadvantage. This factor is especially significant in non-metropolitan areas.

Table 2: The distribution of households reporting economic difficulties

<table>
<thead>
<tr>
<th>Economic difficulties</th>
<th>Disadvantaged group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Indigenous</td>
</tr>
<tr>
<td>No economic difficulty</td>
<td>31.4%</td>
</tr>
<tr>
<td>Gone without food</td>
<td>28.6%</td>
</tr>
<tr>
<td>Gone behind rent</td>
<td>35.7%</td>
</tr>
<tr>
<td>Moved because of rent</td>
<td>5.7%</td>
</tr>
<tr>
<td>Couldn't keep up with the bills</td>
<td>51.4%</td>
</tr>
<tr>
<td>Had to sell something</td>
<td>15.7%</td>
</tr>
<tr>
<td>Had to ask welfare agency for support</td>
<td>40.0%</td>
</tr>
<tr>
<td>Wore bad clothes</td>
<td>22.9%</td>
</tr>
<tr>
<td>Couldn't go out with friends</td>
<td>27.1%</td>
</tr>
<tr>
<td>Couldn't go to an event</td>
<td>21.4%</td>
</tr>
<tr>
<td>Couldn't get a transport to an important event</td>
<td>32.9%</td>
</tr>
<tr>
<td>Total number</td>
<td>70</td>
</tr>
</tbody>
</table>

*Note: In table 2, the total number of the survey sample is less than the sum of all disadvantaged groups presented in the table, as the division of groups is based on multiple choices of the respondents.*
This percent is even higher among the single parent and Indigenous households. About 40 percent of the latter had to turn to welfare agency, and another 36 percent of them struggle with rent. Almost one in three households among the Indigenous said that had to go without food due to money shortage, which is by far the highest percent among all groups. Everyday struggles like these are not uncommon among single parent households either, although the percent of households having experienced these problems are not as high as among Aboriginal households. It is also noteworthy that not only larger proportion of Indigenous and single parent households report having experienced difficulties during the last year, but also the average number of problems listed is also higher on average among them, compared to other groups. Figure 27 shows the average number of reported problems among those who reported any economic difficulties by disadvantage category. It can be observed that the average number of problems listed by the households in the Indigenous category is above 4, while the average number for the control group is about 2. The households in the unemployed, single parent and renter categories also report higher number of problems on average compared to migrant and aged/disabled households. Interestingly, a higher number of problems on average has been reported by the households in Port Adelaide Enfield (3.2), compared to the 2.8 in Berri/Barmera and 2.5 in Port Pirie.

Figure 27: Average number of reported problems among those who reported any economic difficulties by disadvantage category

In addition to the economic difficulties faced by the households during the previous 12 months, the respondents were asked to identify the challenges their household currently has. From a list of socio-economic and environmental issues (see Question 1.1 on questionnaire, Appendix 1) they were asked to indicate the level of agreement or disagreement whether each of the listed items were current challenges to their household. The items that the respondents agree or strongly agree with are considered to be current challenges.
The most common that more than three quarters of all groups indicate is utility costs, such as electricity, water, etc (Table 3, a). Again, as indicated earlier, this is of particular concern given the strong association between increased environmental pressure and power and water costs. The smallest percent of those is found among the aged/disabled group (about 76 percent) and the highest percent among the Indigenous households (about 90 percent). Even the majority of households with no disadvantages agree that current utility costs are big challenge to the households. The second biggest challenge for all the households is current cost of food. It is especially concerning for the single parent and unemployed households, where about 77 percent identify it as a challenge, followed by Indigenous and renting households (about 74 and 71 percent correspondingly). This is of particular concern since it is so basic to the very survival of the households.

Table 3: The distribution of household economic challenges by a) disadvantage category and b) by LGA and single vs. multiple disadvantages

<table>
<thead>
<tr>
<th>a)</th>
<th>Indigenous %</th>
<th>Migrant %</th>
<th>Single Parent %</th>
<th>Aged/ Disabled %</th>
<th>Unemployed %</th>
<th>Renter %</th>
<th>Control %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job security</td>
<td>41</td>
<td>37</td>
<td>45</td>
<td>18</td>
<td>62</td>
<td>38</td>
<td>32</td>
</tr>
<tr>
<td>Housing costs</td>
<td>67</td>
<td>52</td>
<td>66</td>
<td>44</td>
<td>59</td>
<td>59</td>
<td>41</td>
</tr>
<tr>
<td>Transport costs</td>
<td>67</td>
<td>61</td>
<td>68</td>
<td>55</td>
<td>67</td>
<td>58</td>
<td>58</td>
</tr>
<tr>
<td>Utility costs</td>
<td>90</td>
<td>82</td>
<td>81</td>
<td>76</td>
<td>82</td>
<td>83</td>
<td>80</td>
</tr>
<tr>
<td>Food costs</td>
<td>74</td>
<td>64</td>
<td>77</td>
<td>69</td>
<td>77</td>
<td>71</td>
<td>63</td>
</tr>
</tbody>
</table>

*Note: The percent is calculated for the valid cases only. A large number of missing cases appear for this item especially among aged/disabled, migrant and renter groups, to whom the item was considered as not applicable during data collection.

<table>
<thead>
<tr>
<th>b)</th>
<th>By area</th>
<th>By disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Port Pirie %</td>
<td>Port Adelaide Enfield %</td>
</tr>
<tr>
<td>Job security</td>
<td>27.6</td>
<td>35.2</td>
</tr>
<tr>
<td>Housing costs</td>
<td>45.5</td>
<td>50.7</td>
</tr>
<tr>
<td>Transport. costs</td>
<td>59.2</td>
<td>53.7</td>
</tr>
<tr>
<td>Utility costs</td>
<td>81.3</td>
<td>78.9</td>
</tr>
<tr>
<td>(energy, water etc)</td>
<td>67.8</td>
<td>67.6</td>
</tr>
</tbody>
</table>

The most common that more than three quarters of all groups indicate is utility costs, such as electricity, water, etc (Table 3, a). Again, as indicated earlier, this is of particular concern given the strong association between increased environmental pressure and power and water costs. The smallest percent of those is found among the aged/disabled group (about 76 percent) and the highest percent among the Indigenous households (about 90 percent). Even the majority of households with no disadvantages agree that current utility costs are big challenge to the households. The second biggest challenge for all the households is current cost of food. It is especially concerning for the single parent and unemployed households, where about 77 percent identify it as a challenge,
followed by Indigenous and renting households (about 74 and 71 percent correspondingly). This is of particular concern since it is so basic to the very survival of the households.

The majority of households also identify transportation costs among their current challenges, more often indicated by the households in Indigenous, single parent and unemployed groups, and least often by the aged/disabled households. About twenty percent more households in the Indigenous and single parent categories are struggling with current housing costs, compared to the households with no disadvantages and those in the aged/disabled category. Given the high proportion in public housing this is a concern. Not surprisingly, disproportionately higher percent of unemployed households indicate job security among their current challenges, where almost twice as much households deal with job security issues as in the control group. Although not as common as other economic challenges, job security is a problem for more than 40 percent of Indigenous and single parent households as well.

There are also some differences in the distribution of the various household challenges between the three study areas. It can be observed that the percent of households struggling with food and utility costs are not so different between the three LGAs (Table 3, b). However, job security for example is more of a challenge for the households in Berri/Barmera and Port Adelaide Enfield, than in Port Pirie. A higher percent of households in Berri/Barmera and Port Pirie find transportation costs challenging, compared to Port Adelaide Enfield, showing the particular importance of the accessibility of services in non-metropolitan areas. Housing costs seem to be more concerning in Port Adelaide Enfield and Berri/Barmera than in Port Pirie, although the differences in the percent of households recognizing it as a challenge are not very large.

In summary, the findings regarding economic exclusion show that, as could be expected, the households with any type of disadvantage live in disproportionately worse economic conditions than those without any disadvantages. In addition, they are more likely to depend on Governmental support than households with no disadvantage. However, the analysis shows that among the different types of disadvantages the nature of the economic situation varies considerably. Households in the aged/disabled category, despite lower income levels, are more satisfied with their current economic situation, are more likely to have savings for emergency situations and less likely to have experienced various economic difficulties in the previous year. They are also the least likely to face various economic challenges compared to other disadvantaged groups. This reflects the fact that in Australia there is a substantial provision of support for elderly people and that in recent decades their representation among Australia’s poor has declined (Hugo, et al., 2008) Migrant households can also be placed high on the scale of economic wellbeing, compared to other disadvantaged groups, as they enjoy higher income levels and more savings, experience fewer economic problems, and in general are more satisfied with their current economic situation than others. This reflects the fact that it is important to differentiate between different types of migrants when examining disadvantage in Australia. Refugee-humanitarian entrants are at considerably greater risk. At the bottom of the economic wellbeing scale can probably be placed Indigenous and single parent households. They report the lowest income levels, and are more likely to face economic difficulties due to money shortage, which explains their low satisfaction with their economic situation. Therefore, the risk of economic exclusion can be considered higher among Indigenous and single parent households, while the migrant and aged/disabled groups are at lower risk of exclusion from the economic life under the current circumstances, compared to other disadvantaged groups. The economic impact of climate change is likely to be most
evident on the households with higher risk of economic exclusion as their resilience to economic stress is already compromised under the current situation.

**Economic exclusion and multiple disadvantages**

The results of the analysis of the economic dimension also reveal that considerable differences exist not only between various types of disadvantages, but also between the households that report only one type of disadvantage and those that identify themselves with more than one disadvantaged category. The following section discusses the outcomes of economic dimension for single vs. multiple disadvantaged households. Households with single disadvantage report better economic conditions than those with multiple disadvantages, and both of these groups face much worse economic conditions than households with no disadvantage. Only about half of the households with multiple disadvantages report satisfaction with their current economic conditions, which is by 10 percent less than that of single disadvantage households and by 20 percent less than that of the control group (Figure 28). The differences in satisfaction levels between these groups can be explained by the differences in income levels and in the level of economic hardship faced by the households.

![Figure 28: Percent of households satisfied with their current economic situation by single vs. multiple disadvantage categories](image)

Substantial differences can be observed in the distribution of fortnightly incomes between the households with single, multiple and no disadvantages, which is graphically presented on Figure 29. While the proportion of households in the lowest income category is only about 9 percent among those with no disadvantages, their percent is more than three times higher among the households with single disadvantage. There are 1.5 times as many households reporting less than $800 income per fortnight among those with multiple disadvantages as there are among single disadvantaged households. Although the proportion of households reporting between $800-2000 income is about the same between all three categories, the same cannot be said for the high earning households. Only about 7 percent of households in the multiple disadvantage category report more than $2000 income per fortnight, which is two times lower than among the households in the single disadvantage category and is contrasted to the 33 percent of households in the control group.
Figure 29: The distribution of household fortnightly earnings by single vs. multiple disadvantage categories

The distribution of the income levels across these groups is a reflection of the main sources of income. Almost 91 percent of the households with no disadvantages rely on employment and investment as their main source of income (Figure 30). At the same time, about half of the households in the single disadvantage category rely on employment or investment income, and the other half on governmental support. The majority of the households with multiple disadvantages depend on government benefits and pensions, and only one fifth of them have income from employment or investment/superannuation.

The differences between single/multiple disadvantaged households are also reflected in their ability to obtain money in case of emergency. About 90 percent of households with no disadvantages are confident they can find $2000 in case of emergency, about 70 percent of which have it in their savings (Figure 31). About ten percent less households among single disadvantage group can obtain that money, and the proportion of those who can draw upon their savings is about 60 percent. In contrast, only about 37 percent of households with multiple disadvantages have $2000 in savings, which they can use in emergency, and only another 25 percent of them can borrow it from bank or their networks, leaving about 40 percent of households with multiple disadvantages unable to obtain $2000 in case of emergency.
Facing economic hardships is also more widely spread among multiple disadvantage households than among those identifying with single disadvantage or no disadvantage at all. Economic difficulties are not reported by 86 percent of households with no disadvantage; however, this percent is much lower among households that identify with one or multiple disadvantages (78 and 62 percent respectively) (Table 4). Among the most often reported hardships by all the three groups are: keeping up with the bills, going out with friends and wearing worn-out clothes. However, while the percent of those who couldn't keep up with their bills was about 9 percent among household with no disadvantages, more than 20 percent of households with multiple disadvantages struggle with their bills. And if only about 5 percent of households in the control group were not able to go out with friends due to money shortage, almost 20 percent of households with multiple disadvantages had the same trouble. However, what is most concerning, about one in ten households in the latter category had difficulty affording food and paying rent, while twice as less households have the same difficulties among the single disadvantage households and only about 2 percent of households in the control group report to have experienced similar economic problems.
The distribution of challenges faced by the households with single vs. multiple disadvantages on

Table 3(b) also shows the risks of economic exclusion are higher among the households with multiple disadvantages than among those with only one, and the latter category of households are at higher risk than those without any disadvantages. Thus much higher percent of households with multiple disadvantages are challenged with all the listed economic issues, compared to single disadvantage and no disadvantage households. Single disadvantage households are also more likely to report various challenges than the control group, except for transportation costs and utility costs. This exception may be explained by the fact that single disadvantage category is mostly composed of the aged/disabled households who are less likely to find the costs of transportation and utilities challenging, probably due to lower use.

Table 4: The distribution of households reporting economic difficulties by single vs. multiple disadvantage category

<table>
<thead>
<tr>
<th>Economic difficulties</th>
<th>No disadvantage</th>
<th>Single disadvantage</th>
<th>Multiple disadvantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No economic difficulty</td>
<td>86.1</td>
<td>77.9</td>
<td>62.1</td>
</tr>
<tr>
<td>Gone without food</td>
<td>1.7</td>
<td>4.6</td>
<td>9.5</td>
</tr>
<tr>
<td>Gone behind rent</td>
<td>2.3</td>
<td>4.7</td>
<td>9.1</td>
</tr>
<tr>
<td>Moved because of rent</td>
<td>0.3</td>
<td>1.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Couldn’t keep up with the bills</td>
<td>8.6</td>
<td>12.2</td>
<td>21.8</td>
</tr>
<tr>
<td>Had to sell something for money</td>
<td>1.0</td>
<td>4.5</td>
<td>7.4</td>
</tr>
<tr>
<td>Had to ask welfare agency for support</td>
<td>2.0</td>
<td>4.7</td>
<td>13.2</td>
</tr>
<tr>
<td>Wore bad clothes</td>
<td>4.3</td>
<td>7.0</td>
<td>14.7</td>
</tr>
<tr>
<td>Couldn’t go out with friends</td>
<td>5.0</td>
<td>10.9</td>
<td>19.5</td>
</tr>
<tr>
<td>Couldn’t go to an event</td>
<td>2.0</td>
<td>4.3</td>
<td>8.0</td>
</tr>
<tr>
<td>Couldn’t get a transport to an event</td>
<td>1.7</td>
<td>5.4</td>
<td>11.3</td>
</tr>
</tbody>
</table>

Earlier discussion in this chapter showed that certain disadvantaged groups, such as Indigenous, single parent and renting households, are more likely to have reported more than one type of disadvantage than others. We also found these households to be at higher risk of economic exclusion, as they score very low on various measures of economic wellbeing, compared to the rest. It cannot be denied that increased risk among the households with multiple disadvantages is likely to be associated with the fact that disadvantaged households with increased exclusion risks are more likely to be disadvantaged in more than one area. On the other hand, there is also a possibility that multiple disadvantages add to the risk of economic exclusion among the households that are already at increased risk. More detailed multivariate analyses will be able to provide more understanding on the associations between various types of disadvantages, cumulative disadvantage and risk of exclusion.

The important point here is to indicate to the complexity and multidisciplinarity of disadvantage and exclusion in the Australian context. It highlights the necessity of developing policies and programmes which recognize and effectively intervene to address this complexity.
Social support among disadvantaged groups

The next dimension most often used in the assessment of the level of social exclusion is the social domain, or the level of social support and participation in social activities and services of the individual or the household. This is of particular significance since it is an important dimension of the extent to which people suffering disadvantage are able to assess formal and informal support systems to assist them to cope with and/or overcome the effects of the disadvantage. In considering this issue it is important to recognize the extent to which disadvantaged groups have access to both formal and informal support systems. We firstly address the often neglected area of informal support.

To measure the level of social support, the households participating in the survey were asked how frequently their neighbours or friends helped them with a series of tasks, including:

- helping around the house,
- lending household items or equipments,
- assistance with shopping,
- looking after children or other family members,
- lending money,
- looking after the house or pet while the respondent was away, and
- help with transportation.

About one third of all the households reported that they haven’t received help with any of these items, and the proportion did not vary widely across different groups: from 28 percent among the households in the control group, to about 33 percent among renting households (Figure 32). Interestingly, the percent of those who did not receive any social support varies between the study areas. The practice of social support seems to be less widespread in Port Adelaide Enfield, where about 37 percent of households reported receiving no help on any item, compared to 26 and 28 percent of those in Port Pirie and Berri/Barmera respectively. This suggests weaker social connections in the communities in larger cities, than in smaller towns or rural areas. However, it also reflects greater access to formal support systems in metropolitan areas. Is must not be interpreted that disadvantaged groups in non-metropolitan Australia are able to cope better because of greater access to informal support.

When we look at the proportion of households who have never asked anyone for help, we can see that the highest percent of households that have not asked anyone for help are observed among the single parent households, followed by Indigenous and privately renting households and public housing tenants, despite having worse economic standing compared to other disadvantaged groups. The differences in the percent of households with lack of social support are less apparent between households with single and multiple disadvantages, but it is slightly higher compared to that of no disadvantage group.
Figure 32: The percent of households who have not asked for and have not received help from friends or neighbours on any of the listed social support items, by disadvantage category

Thus far we have examined whether or not the sample have ever asked for or received support. However, the nature, intensity, frequency, adequacy and effectiveness of that support are important. Along with identifying the types of disadvantaged households lacking any social support, it is also important to understand if there are differences in the levels of social support received by the households across different disadvantaged categories. However, the assessment of support received by the households is not straightforward as the concept of social support is difficult to measure numerically. Abstract concepts like this are possible to measure using scales constructed based on a series of indicators. Therefore, we can create a scale of social support based on the series of questions asking about the frequency and type of support the households get from their friends and neighbours.

To construct the scale of social support, the response categories of each item is assigned a score from 0 to 3, so that if the household had never received a certain type of support it is assigned a score of 0, if received occasional help with that item, then assigned a score of 1, a score of 2 if usually received that support, and 3 if always does. The scores of each item are then summed for each respondent to create a score of social support. Since there are 7 items, the scale of social support may range from 0 (no support at all) to 21 (highest level of support). However, those who have not received any support on any item (have a score of 0) are not included in the comparison in order to identify the differences in the level of support received by the households across disadvantaged categories for those who have received at least some support.

Figure 33 shows the average household score of social support by disadvantaged category. Although, the upper limit of social support scale is 21, the average scores of social support are very low. The reason behind the low scores is the fact that the majority of households report receiving only occasional help with very few items. The most frequently reported type of support among all disadvantaged groups is help looking after the house or pet when the respondent was away, while the least frequently reported type of support is monetary help. As can be seen on Figure 33, the average score of social support among the households that received at least some
support is the highest among indigenous and single parent households. Meanwhile, migrant households and those that do not identify with any type of disadvantage score the lowest on the social support scale. So, while the percent of households who did not receive any support is about the same across all disadvantaged households, the level of support varies between them for the households that report receiving some support. And despite the fact that indigenous and single parent households are the least likely to ask for help from their friends and neighbours, those who do ask receive the highest level of social support compared to other disadvantaged groups.

The findings here are of particular interest from a policy perspective. More than a quarter of the sample has never received informal support and among those who have that support is generally very limited. This points to firstly the need for formal support systems to compensate but also to potential measures to encourage and facilitate access to informal systems.

![Figure 33: Average household score of social support by disadvantage category](image)

**Social participation among disadvantaged groups**

An often neglected dimension of social wellbeing is the importance of social participation. This is not only a mechanism for being able to access support and help but also is of fundamental significance to emotional wellbeing. To assess the level of social participation, the respondents were asked how often they participated in a series of activities in the last 12 months. The list of activities included:

- Public meetings
- Political party activities
- Parties in their community
- Neighbourhood or community groups
- Volunteer work
- Talked to neighbours about issues that concern them.

The results of the survey show that about 15 percent of all households have not participated in any of the above activities in the last 12 months. However, the level of participation is not the same across different disadvantaged groups (Figure 34). About one in three households belonging to the Indigenous group have not participated in any activity in the last 12 month, which is by far the highest percent among all groups. Renting households and those with an unemployed member are among those least
likely to have participated in social activities during the last year. Migrants have the lowest percent of households reporting no social participation among all disadvantaged groups; however their percent is slightly higher than that of control group, where only about one in ten households report no participation in social events.

Similar to social support, the percent of households reporting no social participation varies widely between Port Adelaide Enfield and the other two study areas. About 22 percent of households in Port Adelaide Enfield did not participate in social events in the previous year, which is twice as much as in Port Pirie and Berri/Barmera areas. The percent of households not participating in social events is the same in single and multiple disadvantage categories comprising about 15 percent of the households. However, social participation is slightly more common among households with no disadvantages, where about 5 percent less households report no social participation compared to single and multiple disadvantaged households.

Figure 34: Percent of households that have not participated in any social activity in the previous 12 months by disadvantage category

To measure the level of social participation across different groups a scale of social participation has been constructed in the same way as in case of social support. The answer categories for each item (never, occasionally, usually and always) have been assigned values from 0 to 3, and the sum of scores of all items for each respondent has been calculated to obtain the score of social participation.

The average household score of social participation by disadvantage category is presented on Figure 35. The averages are calculated only for the households with some social participation in the last 12 months. Although the scale of social participation has a score of maximum 18, the average household participation scores do not exceed a value of 5. It is again explained by occasional, rather than often participation in a few number of activities.

The highest level of social participation is observed among the households in the control category. The households without disadvantages, who reported at least some participation in social activities in the previous year, score 5 on average on the scale of social participation. Although the proportion of Indigenous households reporting any type of participation is the lowest among all disadvantaged groups, the average level of participation among them is the second highest among all groups. The level of social participation is also slightly higher among migrant and aged/disabled groups. The
lowest level of participation is observed among single parent households, where the average households score of social participation is about 3.7.

![Figure 35: Average household score of social participation by disadvantage category](image)

The distribution of the average participation score by study area shows that Port Adelaide Enfield not only has the largest proportion of households not participating in any activities, but also the level of engagement is the lowest (about 3.8) among those who take part in social events, compared to Port Pirie and Berri/Barmera (about 4.7 each). Again, there is a metropolitan/non-metropolitan contrast with the group in the city having significantly lower levels of social connectedness. The level of participation does not vary largely between the socially active households of single and multiple disadvantage categories. However, both of them have slightly lower level of participation than the control group (4.4 and 4.1 compared to 5).

When we look at the types of social activities most likely to be reported by all households interesting patterns arise. The overall participation is higher in public meetings and neighbourhood groups (the latter far more likely to be reported by households without disadvantages than among disadvantaged households). However, the frequency of participation in these activities is more likely to be occasional than on a regular basis. Volunteering and discussion of concerning issues on the other hand, is more likely to be reported as a part of usual social life of the households, but less often as an occasional incidence compared to participation in public meetings. Political activities, along with community parties, are among the least common social events in which households are likely to take part.

**Access to formal support services among disadvantaged groups**

Another element of social domain in the assessment of social exclusion of the households is the availability and access to various social services. The survey collected information about their accessibility to health services. The respondents were asked whether they were able to see a doctor last time they were ill, and if no, what was the reason. The majority of respondents reported that they were able to see a doctor when they needed one. However, there are small differences by disadvantage category and by study area. As Figure 36 shows, the percent of households able to see a doctor was the lowest among Indigenous households, followed by public housing tenants and private renters (87 and 92 percent respectively). About 94 percent of other
disadvantaged households were able to see a doctor when needed. Across all groups, most often mentioned reason for not being able to see a doctor was inability to get an appointment right away (reported by about 7 percent of Indigenous, and by 4-5 percent of households in other groups). Among other barriers were financing and transportation problems preventing the respondents from seeing a doctor when needed.

Interestingly, there are also some differences in the percent of people able to see a doctor by LGA. The access to health care services seems to be better in Port Pirie compared to other study sites, where about 96 percent of respondents reported being able to see a doctor when ill, which is by 2 percent higher than in Port Adelaide Enfield (Figure 36). On the other hand, Berri/Barmera has the highest percent of households not able to see a doctor, the majority of which had difficulty getting an appointment. This points to the particular issue of non-metropolitan areas outside of regional cities being able to access formal support services. The comparison of households with single vs. multiple disadvantages does not reveal any noticeable differences in the availability of or barriers to the health care services between the two groups.

![Figure 36: The percent of households able to see a doctor when ill by disadvantage category and by LGA](image)

Although the distribution of measures of social support and participation reveal some interesting variations between different disadvantaged groups, it is hard to assess the average level of social connectedness for each group. While one group may have a higher level of social support than others, it may display a lower level of social participation and vice versa. For example, the households in the Indigenous group receive a higher level of social support, but they are less likely to participate in social activities. But those that do participate in more activities than households in some other groups. Similarly, while the households with no disadvantages receive among the lowest levels of social support compared to other groups, they have the highest level of social participation at the same time. Migrant households receive less social support from friends and neighbours, but are more active in participating in various social activities.
events, while single parent households on contrary report higher level of social support but lower of participation in various activities.

The take-home message is however, that disadvantaged groups have lower level of social connectedness than the control group. The level of connectedness is not different between the subgroups, but all of them can rely on social networks to help them cope with disadvantage to a limited extent. The use of formal support system, on the other hand, is less of an issue for most of the households as shows the case of availability of health care services in our study. Although slightly less common among Indigenous households, the majority have reported no issues accessing health services when necessary.

Knowledge and attitudes of climate change among disadvantaged groups

Some of the literature suggests that population vulnerability to climate change is strongly influenced by the awareness of and attitudes toward climate change (Wolf, 2011). In the survey of disadvantaged households data on respondents' knowledge and attitudes towards climate change have been collected. Along with some economic challenges, the respondents were asked whether heat waves, floods and climate change are current challenges for their household. The positive responses have been grouped by the type of disadvantage the households identified with, by cumulative disadvantages and by area. Floods are not considered as a challenge to the household as often as heat waves and climate change among all groups. This is a reflection of the lower historical incidence of flooding in South Australia, than in eastern states which are more vulnerable to this hazard especially in coastal areas. However, there are small differences in the percent of those who identify floods as current challenges between different disadvantage groups (Figure 37). Indigenous households are the most likely to think that floods are a current problem for them, followed by households with an unemployed member (about 15% and 12% respectively). Meanwhile, their percent is the lowest among the households in the control group, although the difference is not very large.

Heat waves, on the other hand, are not uncommon in South Australia: the number of days above 35°C in Adelaide was 17 in 2008, which is projected to increase twofold by 2070 (Garnaut, 2008). Households in the private rental market and in public housing, along with migrant households are among the most likely to agree that heat waves are a big problem for their household. Households in the control group have the lowest proportion of those that agree they have difficulty dealing with the heat waves, although the difference between control group and migrant and renting group is only about 10 percent. What is more interesting, however, is the difference in the proportion of households in each group that identify heat waves as problems, and think of climate change issues. Although about 60 percent of migrants and renters think of heat waves as challenges, less than half of them think that they are facing climate change issues. The percent of Indigenous households recognizing climate change and heat waves as current household challenges are about 52 and 59 percent correspondingly. Aged and disabled households are the least likely to think they have climate change issues, although more than 57 percent of them struggle with heat waves. Interestingly, the households in the control group are more likely to think of climate change as an issue rather than of heat waves. The comparison of the study sites shows that slightly higher percent of households in Port Pirie list floods and heat waves among their household challenges than in the other two areas. The percent of households that think of climate change as a challenge is the highest in Port Pirie, followed by Port Adelaide Enfield.
The comparison of household challenges by cumulative disadvantage also reveals some variation. Households with multiple disadvantages are the most likely to find heat waves and floods challenging, followed by single disadvantage households. However, the percent of households considering climate change as a challenge is the highest in the control group and the lowest in the single disadvantage group (53 and 45 percent respectively).

Turning to the explicit issue of perceptions and attitudes toward climate change the households were asked the level of their agreement with the following series of statements regarding climate change: they are well informed about the causes and consequences of climate change; and they are well informed about how to respond to climate change.

Figure 37: The percent of households considering climate change, heat waves and floods as current challenges of their household by disadvantage category

Knowledge of climate change

The large proportion of households in all groups think they are well informed about the causes and consequences of climate change, however much lower percent think they know how to respond to it. Figure 38 shows the distribution of households that think they are well informed on climate change causes, consequences and how to respond by disadvantage category. It can be observed that about three quarters of households in the control and migrant groups think they are well informed about climate change causes and consequences, which is the highest percent among all groups. In relation to them, the proportion of those who think they are well informed on how to respond to climate change is lower by about 15 percent among migrant households and by about 20 percent in the control group. The lowest percent of households considering that they are informed on climate change is observed among the public housing tenants and privately renting households, where about 68 percent think they know about the causes and consequences, and only about half think they know how to respond.
Figure 38: The percent of households that consider they are well informed about the causes and consequences of climate change, and how to respond to it by disadvantage category

Although the percent of households considering they are well informed on how to respond to climate change is about the same across all study areas, the percent of households thinking they know about the causes and consequences of climate change are slightly lower in Port Adelaide Enfield in relation to the other two LGAs (67 vs. 73 percent respectively). The proportion of households thinking they are well informed on climate change does not vary considerably across different groups of cumulative disadvantages.

Attitudes toward climate change

The list of statements on climate change in the survey also included arguments regarding the causes of climate change and responses to it. The respondents were asked whether they strongly agree, agree, neither agree nor disagree, disagree or strongly disagree with the following statements:

- Human activities are influencing changes in climate,
- Climate change will occur over time, but we don’t have to think about it now,
- Climate change is a current issue that will personally affect me,
- Doing something about climate change is important,
- I would like to be doing more about climate change.

The percent of households that have responded positively, i.e. agree and strongly agree to the statements above (except for the second statement, where disagreement is considered positive) have been grouped by disadvantage category in Table 5. Interestingly, the percent of households considering that human actions are affecting climate change is higher than the percent of those who think they are well informed about the causes of climate change across all groups, except for migrant and aged/disabled group. Thus, the majority of households in all groups agree that climate change is affected by human actions, the highest proportion of which is observed among the single parent households (about 77 percent) and the lowest is among the aged/disabled households (63 percent). The level of disagreement with the claim that climate change will occur over time, but we don’t need to think about it now, is very high overall, however, the percent of those who think that they are going to be personally affected by it is lower. The largest difference between the two is observed...
among the aged/disabled households, where about 63 percent disagree that we don’t need to think about climate change now, however, only about 50 percent think they are going to be affected by climate change, which is the lowest percent among all groups. Similarly, the percent of those who agree that it is important to do something about climate change is much higher than the percent of those who are willing to do something about it personally across all groups. Indigenous households seem to be the most proactive about climate change, as they have the highest percent of households who think it is important to and who are willing to do something about climate change.

The attitudes toward climate change are fairly similar across the three study areas. A few differences that can be observed are between Berri/Barmera and Port Adelaide Enfield. About 7 percent less households in Berri/Barmera think that human

Table 5: Percent of households agreeing with various statements on climate change by disadvantage category

<table>
<thead>
<tr>
<th></th>
<th>Indigenous %</th>
<th>Migrant %</th>
<th>Single/Parent %</th>
<th>Aged/Disabled %</th>
<th>Unemployed %</th>
<th>Renter %</th>
<th>Control %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human influence</td>
<td>75.7</td>
<td>71.7</td>
<td>76.5</td>
<td>63.0</td>
<td>71.8</td>
<td>73.5</td>
<td>75.2</td>
</tr>
<tr>
<td>Don’t need to think about CC now (reversed)</td>
<td>78.6</td>
<td>71.2</td>
<td>76.0</td>
<td>62.8</td>
<td>79.3</td>
<td>67.6</td>
<td>74.8</td>
</tr>
<tr>
<td>CC is a current issue, will affect me personally</td>
<td>72.9</td>
<td>60.2</td>
<td>72.7</td>
<td>50.1</td>
<td>66.0</td>
<td>63.0</td>
<td>63.3</td>
</tr>
<tr>
<td>Important to do smth.</td>
<td>87.1</td>
<td>82.5</td>
<td>87.4</td>
<td>78.8</td>
<td>84.0</td>
<td>84.8</td>
<td>85.4</td>
</tr>
<tr>
<td>Want to do smth.</td>
<td>77.1</td>
<td>63.6</td>
<td>72.1</td>
<td>57.6</td>
<td>72.9</td>
<td>68.5</td>
<td>67.6</td>
</tr>
</tbody>
</table>

actions are affecting climate change, that they are going to be personally affected by it and that they are willing to do something for climate change, than in Port Adelaide Enfield. Port Pirie also scores higher on these items than Berri/Barmera, but the differences are much smaller. Single vs. multiple disadvantage categories of households are very similar in the level of their awareness and attitudes toward climate change. However, they both score lower than the households without disadvantages.

**Perceptions of climate change impact**

To measure the perceptions of climate change, the respondents were also asked to assess the likelihood and the nature of possible impact of climate change on their households’ health and wellbeing, water availability, electricity use and ability to pay for electricity. The answers were grouped into three categories representing likely negative impact, unlikely or no real impact, and likely positive impact for each item. The results are presented separately for each item by disadvantage category on Figure 39. The first graph shows by disadvantage category the percent of households that think climate change is likely to have a positive impact on their households’ health and wellness, is likely to have negative impact on it, and is not likely to have any impact or the impact is not going to be significant. The second graph shows the same for impact of climate change on the water available to the household, the third graph presents the same for the impact on the amount of electricity that household uses, and the last one refers to the impact on the households’ ability to pay for electricity bills.
Overall, the perception of the impact of climate change among all households is that it is going to negatively affect various aspects of their life. However, the proportion of respondents that think climate change is not likely to have any impact on various aspects of their households’ life is also large. Although slightly higher among the households without disadvantages and those in the aged/disabled group, about 13 percent of households overall find that climate change is not likely to have any real impact on any aspect of their life. Some 15 percent of households on average think that climate change is likely to have a positive impact on their households’ wellbeing and availability of resources. According to the survey results, the most concerning for the households is the negative effect of climate change on households’ use of electricity and their ability to pay for it. About 70 percent of Indigenous households think that climate change is likely to have a negative impact on their use of and ability to pay for electricity, which is the highest percent relative to other groups. Indigenous households are also among the ones most likely to consider the negative impact of climate change on their health and wellbeing as well as water availability as a likely outcome. Meanwhile, the likely negative effect of climate change in each area of their life is the least likely to be recognized by the aged/disabled group. Interestingly, households in the aged/disabled group thinking that climate change will not have a significant impact are most likely to think so for their health and wellbeing than for any other area of their life.

Among other groups, unemployed households are most likely to acknowledge the negative effect of climate change on their ability to pay the electricity bills rather than on other aspects, while migrant households are more likely to accept the negative effect on water availability. For single parent, unemployed and renting households, climate change is more likely to have negative impact on electricity use and bills and water availability than on their health and wellbeing.

When comparing the assessment of the likelihood and nature of climate change on various aspects of household life by study sites, it can be observed that except for water availability, a larger percent of households in Port Adelaide Enfield are likely to believe that climate change will have negative impact on every aspect of their household life, compared to Port Pirie and Berri/Barmera.

**Perception of adaptive capacity**

The respondents of the survey were also asked to assess their ability to adapt to the impact of climate change on various aspects of their households’ life (See Question 1.5, Appendix 1). The results are grouped by disadvantage category on Table 6. The findings on the self-assessed adaptive capacity vary slightly depending on the aspect of household life in question. For example, far more than half of the households in the control group think it will be easy to adapt to the impact of climate change for all aspects except for the ability to pay for electricity. However, in all areas households with no disadvantages are the most likely to think the adaptation will be easy compared to the disadvantaged groups. Moreover, the differences between the control group and some of the disadvantaged group are very large. For instance, only about 24 percent of households with no disadvantages think it will be difficult to adapt to the impact of climate change on their households’ health and wellbeing, while their proportion is twice as much among the Indigenous and single parent households.

Interestingly, a higher percent of households think it will be difficult, rather than easy to adjust to the impact of climate change to their health and wellbeing among Indigenous and single parent households, while the opposite is true for migrant, aged/disabled, unemployed and control groups. The percent of households who think it will be easy to adjust also exceeds the percent of those who think it will be difficult among
aged/disabled households and those in the control group for the impact of water availability. However, the majority of all disadvantaged households think that adaptation will not be easy in the areas of electricity usage and costs, with Indigenous and single parent groups having the highest percent of households that think so. It must be noted that the proportion of households unsure whether it will be easy or difficult to adapt to the impact of climate change is not very small, particularly among the Indigenous households. The households in general are less doubtful about their ability to adapt to the changes in electricity use and costs, rather than about water availability and health and wellbeing.

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<th>Single Parent</th>
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</table>
Figure 39: Households’ assessment of the likelihood and nature of climate change impact by disadvantage category
Table 6: Distribution of the self-assessed ability to adapt to the impact of climate change by disadvantage category

<table>
<thead>
<tr>
<th></th>
<th>Indigenous %</th>
<th>Migrant %</th>
<th>Single Parent %</th>
<th>Aged/Disabled %</th>
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<td>Easy</td>
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<tr>
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</table>

When looking at the self-assessed adaptive capacity of the households with various levels of cumulative disadvantages, it is obvious that households with multiple disadvantages are considerably more likely to think that adaptation will be difficult in all 4 areas than the households with single disadvantage, while the households with no disadvantages are less likely to think so than those in the single disadvantage group.

Summarizing the findings on the perceptions and attitudes of climate change it can be concluded that overall, the majority of respondents think they are well informed about climate change, although there is less confidence about having information on how to respond to it than what the causes and consequences of climate change are. Even more respondents agree that human actions are affecting climate change and it is important to do something about it. However, not as many of the respondents think that they are going to experience the impact of climate change personally which is reflected in lower percent of households recognizing climate change among their household challenges and the likelihood of it affecting various aspects of their household life. Even fewer are eager to act in response to climate change, which is probably due to the fact that many of them think adapting to the impact of climate change is going to be easy for them.

The findings also reveal some variations among the disadvantaged groups. The level of awareness of the climate change impact is higher among the Indigenous households, who are not only among those most likely to think of climate change as
one of their household problems, highly likely to negatively affect their households’ wellbeing and availability of resources, but also do not assess their ability to adapt to this impact to be very high. Single parent households are similar to Indigenous households in their attitudes and assessment of risks of climate change impact. In contrast, despite higher levels of climate change awareness, households without disadvantages are among the ones least likely to think their households' wellbeing is going to be highly affected by climate change, at the same time most likely to think that adaptation will be an easy process for them. Another contrast is presented by the aged/disabled households, among who are likely to consider themselves well-informed about climate change, but not as likely to think that climate change is caused by human actions and that it is a current issue affecting them personally. Perhaps due to this attitude to climate change, aged/disabled households are not as likely to evaluate the risks of their households being affected by climate change very high and to consider adapting to it difficult, as other disadvantaged groups.

Managing heat waves

In South Australia one of the most visible impacts of climate change has been an increase in the duration of warm spells (Figure 5) and the number of hot nights (Figure 5: Average warm spell duration 1960-2011 (Source: Australian Bureau of Meteorology) ) and the occurrence of them, and impact of these extreme events has been widely reported and discussed in the media and experienced by the respondents. Therefore, to further understand vulnerability and adaptive capacity of the population to climate change it is important to study the impact of the current extreme weather events on the population and the ways it copes with these events. The survey on the disadvantaged groups collected data on respondents’ previous experience with the heat waves, defined here as five or more days over the temperatures of 35 degrees. Heat waves are not foreign to South Australia, which is why about 99 percent of the respondents said they had experienced them before and for a large part of the households they have been quite challenging. Although slightly lower among migrants (about 97 percent), the percent of households with previous experience of heat waves does not vary largely across different categories of disadvantage.

However, the consequences of the heat waves and the ways households manage them vary considerably between the disadvantaged groups. As the most direct outcome of the heat wave on the population, the respondents were asked whether they had faced any health issues rising from prolonged high temperatures. The percent of households, where the heat waves led to a major health problem for one of the household members is especially high among Indigenous and single parent households, as well as households in the private rental market and in public housing. About one third of Indigenous households and more than a quarter of single parent households reported facing health issues related to heatwaves (Figure 40). Meanwhile only about 8 percent of households without disadvantages had the same experience, which is only half as much as that of other disadvantaged groups. The list of health issues rising from heat waves mentioned by the respondents varied from breathing problems, asthma and blood pressure issues, to dehydration and exhaustion.

Considerable differences exist not only between various disadvantage groups, but also across various levels of cumulative disadvantages. The percent of households reporting heat related health issues is about 22 percent among multiple disadvantage households, which is 1.5 times higher in relation to single disadvantage households, which in its turn is twice as much as in the control group. Small differences exist between the three study sites as well. The percent of households experiencing health
issues created by heat waves are higher in Port Pirie (17%), followed by Port Adelaide Enfield (16%), than in Berri/Barmera (14%).

For better understanding of the increased susceptibility of certain disadvantaged groups to heat waves, we need to look at the methods they use to cope with them. The mechanisms for coping with the heat waves can be divided into short-term and long-term methods. The short-term methods include the ways households manage heat waves when they occur. Long-term mechanisms include the ways households prepare to decrease the impact of heat-waves in the future. The survey instrument included questions on both short and long term mechanisms of coping with heat waves. For the long term coping methods, the respondents were asked whether their house is insulated and whether or not they had an audit of their households’ electricity use for the potential energy savings. To study how the households manage heat waves in the short term, the respondents were asked about the type of cooling device they own, whether or not they choose to use it during the heat waves, and if not, what are the barriers preventing them from use of their cooling device.

The percent of households who reported having an audit on their electricity use is not large overall. Between 20 and 27 percent of disadvantaged households reported having had an audit, among which Indigenous households were the most likely to have had one, followed by aged/disabled households. Single parent households were the least likely to have had an audit among disadvantaged groups, meanwhile the households without any disadvantages were the least likely among all to report having one. The differences between households with multiple disadvantages and single disadvantage in regard to having had an audit are almost non-existent. More variation exists between the three study areas. About one third of households in Port Adelaide Enfield had an audit for their electricity use, which is comparable to about 19 and 17 percent of that in Berri/Barmera and Port Pirie.

Considerably higher percent of households are likely to have their house insulated than to have had an audit. However, the differences in the percent of those with insulated houses between the disadvantaged groups are much larger than in case of auditing. About 93 percent of households without disadvantages live in an insulated house, which is the highest percent among all groups, explaining their lower need for having an audit of their electricity use (Figure 41). Relative to other disadvantaged groups,
migrant and aged/disabled households are more likely to live in insulated houses. The least likely to live in insulated houses are renting households, followed by Indigenous and single parent households. It must be noted, however, that these households are also the least likely to know whether their houses are insulated or not.

Figure 41: The percent of households living in insulated vs. not insulated houses by disadvantage category

Unawareness of their house energy efficiency is also twice as common among multiple disadvantage households relative to single disadvantage households. Moreover, the percent of households living in less energy efficient houses is considerably higher in the multiple-, than in single-disadvantage households, and even higher compared to households with no disadvantages (16, 9 and 6 percent correspondingly).

The results of the short-term mechanisms of coping with heat waves show that the absolute majority of households are equipped to manage the heat waves, although slight differences exist between various categories of disadvantage. Figure 42 shows the percent of households that own an air-conditioner (A/C) and of those that choose to use it during the heat waves. The rest of the households not having an A/C use a fan as a cooling device, however due to its little effectiveness during heat waves and insignificant energy consumption, it is not included in the analysis. Thus, it can be observed on the graph that having an A/C is the least common among Indigenous households, and about 92 percent of them reported having one. Owning an A/C is the most common in the control group, where almost every household reported having one. However, the distribution of the A/C use by disadvantage category shows more variation between the groups than the ownership of it. While all the households owning an A/C in the Indigenous category (where the A/C ownership is the least common) choose to switch on their device during heat waves, the use of their device is less common among other disadvantaged groups. The percent of households who choose to use their A/C is lower by 3-4 percent among migrant, single parent, aged/disabled and unemployed households than the percent of those who own one in each category. The largest gap between A/C ownership and use exists among households in the private rental market and in public housing, where about 93 percent of households reported having an A/C, out of which 6 percent do not turn on their device during heat waves. The comparison of the cumulative disadvantages does not reveal significant differences between single and multiple disadvantage households. Although slightly higher percent of single disadvantage households own an A/C, the proportion of those that choose to turn it on during heat waves is about the same in both groups.
Impact of Climate Change on Disadvantaged Groups

Impact of Climate Change on Disadvantaged Groups

Figure 42: The percent of households owning an air-conditioner and the percent of those who use it during heat waves by disadvantage category

Among the most often mentioned barriers to A/C use is the intention to save on electricity bill and the ability to tolerate heat. Thus, about 20 percent of respondents not using their A/C during heat waves reported that they can simply tolerate the heat, while about 40 percent need to save on electricity bill at the same time. However, more than 30 percent of these households don’t use their A/C only because they want to save on their bills. Among other barriers respondents mentioned having a faulty device, not knowing how to use it, and less frequently, not having permission from the landlord to use the device. Due to small number of households not using an A/C, the distribution of barriers has not been divided by disadvantage category.

In summary, the findings on the capability of households to manage heat waves have shown that households with disadvantages are not coping as well as households without disadvantages. Households without disadvantages are better equipped to cope with heat waves both on short- and longer-terms, as they are far more likely to live in energy efficient houses and more likely to have a cooling device and use it during heat waves. This advantage is reflected in the lower proportion of them reporting heat-related health issues compared to all other groups. Households with disadvantages, on the other hand, have lower resistance to the heat waves both on short and long-term, however the level of their capability to cope with heat waves varies across different groups.

Indigenous, single parent and renting households are the least equipped to cope with heat waves on the long term, as they are least likely to live in insulated houses. However, a higher percent of them having had an audit on their electricity use shows that they are more proactive in looking for ways to save on electricity use. In addition, households in these groups also show lower capability to manage the heat waves on the short term. The lowest percent of households owning air-conditioner and using them during heat waves has been observed among these households, although the differences between them and other disadvantaged groups are not very large. The lower ability to cope with heat waves in short and long term among Indigenous, single
parent and renting households is reflected in disproportionately higher percent of households experiencing heat-related health issues during heat waves.

Summary of bivariate results: socio-economic characteristics of disadvantaged groups

This chapter presents the results of bivariate analysis of various aspects of social exclusion among disadvantaged groups and their perceptions of climate vulnerability. It gives an understanding of the main socio-economic differences between various disadvantaged groups, as well as the different perceptions of climate vulnerability across them. The findings have showed that the overall risk of social exclusion is disproportionately higher among the households with disadvantages than among those without them. The contrast between disadvantaged and non-disadvantaged households is especially strong in regard to economic exclusion, which was measured through the level and main source of household income, household savings, satisfaction with their current economic situation, and economic difficulties faced by the households on everyday basis. Households without disadvantage score better on each of the measures than disadvantaged households. More importantly, the risk of economic exclusion varies largely between different types of disadvantage. At the top of economic wellbeing scale are aged/disabled households, followed by migrant households, showing lower risk of economic exclusion than other disadvantaged groups. At the bottom of economic wellbeing scale, on the other hand, are Indigenous and single parent households, who consistently score low on various measures of economic wellbeing, compared to other disadvantaged groups. They are also among the households more likely to report more than one type of disadvantage, which adds to their risk of economic exclusion.

The overall level of social connectedness is low across all groups of households, although some differences can be observed between them. It is also clear from the analysis that the greater degree of social exclusion among the disadvantaged groups is not in any way compensated for by high level of access to formal and informal support systems. The level of social participation is the highest among the households without disadvantages. They not only are more likely to participate in various social activities, but are also likely to participate in more social activities than disadvantaged groups. Lower level of social exclusion among the households without disadvantages is also reflected in the informal social support received by the households. Although the amount of support received by them is lower compared to disadvantaged households, they are equally likely to receive social support than the latter. Among the disadvantaged households, the groups at higher risk of economic exclusion receive more social support from their informal social networks then those doing better on the economic dimension. Thus, Indigenous and single parent families receive more social support compared to other disadvantaged groups, while aged/disabled and migrant households report receiving the lowest levels of social support. When considering social participation, however, indigenous households are the least likely to show participation in any social activities. Meanwhile, single parent households, who were similar to Indigenous group in their economic standing and the level of received social support, show higher level of social participation. The level of social participation is also low among unemployed and renting households. Thus it can be assumed that the higher risk of economic exclusion among the most underprivileged is in some degree balanced out by social connectedness to informal social networks.

The households in the Indigenous, single parent and renting groups that are found to have higher risk of economic exclusion, also show more concern about the negative impacts of climate change on their household’s life. This concern is expressed both in their capacity to adapt to the long term impact of climate change on their households.
wellbeing, as well as in their ability to resist the short-term effects of climate change, such as heat-waves. Least concerned about the impact of climate change are the households without disadvantages and those with aged/disabled member. However, if the lack of concern among the former group may be due to better socio-economic standing and better capacity to adapt to climate change, the latter group of households seem to have less awareness of the potential consequences of climate change on their households.

Bivariate analysis however does not allow us to examine the complex inter-relationships between various aspects of social exclusion and climate change vulnerability. The next chapter presents the results of multivariate analysis, studying the effects of different factors comprising the concept of social exclusion and climate change attitudes on the level of perceived vulnerability and adaptability to climate change. It will allow us to understand the net effect of various socio-economic factors on vulnerability and identify the factors that are the significant predictors of vulnerability and adaptive capacity of disadvantaged groups.
DISADVANTAGE, SOCIAL EXCLUSION AND CLIMATE CHANGE: MULTIVARIATE ANALYSIS OF CLIMATE VULNERABILITY AMONG DISADVANTAGED GROUPS

This chapter presents the analysis of the survey data using multivariate methods of analysis, to explore and understand the associations between social exclusion and climate vulnerability among disadvantaged groups, and to identify which dimensions of social exclusion are more significant predictors of the level of climate vulnerability and adaptive capacity. First, we present the methodology and the construction of various variables measuring different dimensions of social exclusion, climate vulnerability and adaptive capacity. Next, we present the results of the analysis and discuss their implications for social policy.

Methodology

Vulnerability to climate change

It was discussed earlier in Chapter 3, that there is no single and correct way to measure vulnerability. It varies from study to study, depending among other things on the vulnerable system, scale, valued attribute and the hazard. Representing the level of vulnerability for any system through a single variable is very difficult and would not be efficient as well. To explore vulnerability of disadvantaged groups to climate impact at household level we employ four different outcomes: perception of vulnerability to climate impact; perception of vulnerability to extreme weather; perception of climate change as a household challenge; and perception of heatwave as a household challenge. Rather than measuring the level of vulnerability based on a definition from an external point of view, all of these variables represent perception of climate vulnerability from the household’s perspective.

Perception of vulnerability to climate impact is a compound scale constructed on a number of variables in the survey data measuring the perceptions of the likelihood and of likely nature of the climate impact on a number of aspects of household life, including: health and wellbeing; water availability; electricity use; and ability to cover electricity bill. The response categories for the likelihood of climate impact on each item were: has already been affected by it, highly likely, likely, not sure, unlikely and highly unlikely. For the likely nature of climate impact on each category, the response categories included: large positive impact, small positive impact, no real impact, small negative impact, large negative impact. As climate vulnerability reflects the negative impact of climate change, for each aspect of household life the scale of negative impact was calculated. So, if the household’s perception of climate impact on health and wellbeing is highly likely and largely negative, the level of perceived vulnerability would be the highest, while if the perception of the impact is not likely or no real impact is expected, or any likelihood of positive impact is expected, then the level of perceived vulnerability would be the lowest. Thus, the scores for each of four aspects of household life are presented in the matrix on Table 7 and can be interpreted as follows:

- Unsure, highly unlikely, or unlikely, regardless of the perceived nature of impact is given a value of 0;
- Small positive impact, large positive impact, or no real impact, regardless of the degree of likelihood is given a value of 0;
- Likely small negative impact is given a value of 1;
- Likely large negative impact is given a value of 2;
- Highly likely small negative impact is given a value of 2; and
- Highly likely large negative impact is given a value of 3.
Table 7: Matrix of scores for response categories on the likelihood and nature of climate impact on each aspect of household life

<table>
<thead>
<tr>
<th>Likelihood of impact</th>
<th>Nature of impact</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No real impact</td>
<td>Small negative</td>
<td>Large negative</td>
</tr>
<tr>
<td>Not likely, unsure</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Likely</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Highly likely</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

The composite scale of climate impact is then constructed by summing up the scores of climate impact on four aspects of household life. Therefore, the possible score of climate impact scale can range between 0 and 12, where the lower values indicate lower perceived vulnerability, and higher values indicate higher vulnerability. To assure reliability of the scale we test for internal consistency between the variables using Chronbach’s alpha, which indicates to what degree a set of variables measure the same unidimensional construct. A higher value of Chronbach’s alpha indicates a higher consistency; however any value below 0.6 indicates poor or unacceptable consistency, while values between 0.6 and 0.7 are questionable, and any value above 0.7 is considered acceptable and strong. The Chronbach’s alpha for the four items in the climate impact scale is 0.82, which indicates that the scale has a good internal consistency. The distribution of the scale shows that it is right-skewed, which means that the number of cases having lower scores is larger than the number of cases having higher scores. To address this, the method used for the analysis of this outcome is negative binomial regression, which is usually used for modelling overdispersed count variables.

The three other measures of perceived climate vulnerability are dichotomous variables with values of 1 or 0: the measure of vulnerability to extreme weather is whether any of the household members had experienced a health issue due to heat waves (coded as 1), or had no such experience (coded as 0); the outcome for perception of climate change as a challenge is 1 if climate change is mentioned among household challenges, and 0 if otherwise; and similarly, the outcome for perception of heatwave as a challenge is given a value of 1 if heatwave is considered a household challenge, and 0 if otherwise. The method of analysis for these outcomes is logistic regression, modelling the probability that the outcome variable has a value of 1.

To study the associations between vulnerability, disadvantage and social exclusion, the analysis of all four outcomes uses the same set of main predictors which can be divided into two groups, describing the type of disadvantage and the level of social exclusion. Type of disadvantage, on the one hand, is measured through a series of dummy variables showing the categories of disadvantage groups: Indigenous, Migrant, Single Parent, Aged/Disabled, Unemployed, Renter or Control. If the household belongs to a certain category, the value is one, and 0, if it does not. Control group is used as a reference category. On the other hand, the analysis looks at the effect of multiple disadvantages on the outcome variables. Three dummy variables represent multiple disadvantages: no disadvantage (which is the reference category), single disadvantage, and multiple disadvantages.
The level of social exclusion is measured through a series of variables which can be divided into economic dimension and social dimension. Economic dimension of social exclusion includes the following measures: fortnightly household income (measured through a series of dummy variables: less than 800AUD (the reference category); between AUD800-2000; and AUD2000 and above); ability to obtain $2000 in emergency (measured through dummy variables: cannot get $2000 (the reference category); can get $2000 from friends or bank, has $2000 in savings); whether or not the household finds its financial situation satisfactory (coded 1, if yes, and 0 if no); and a scale of economic hardship. The scale of economic hardship is constructed from a series of questions asking about experiencing various economic hardships during the last 12 months (see Question 4.1.4 in Appendix 1 for the full list of hardships). If the respondent answered positively to any item, it was given a value of one, and 0 otherwise. The sum of all answers was added to construct the scale of economic hardship for each respondent, which could range from 0 to 10. The Chronbach’s alpha for this scale is 0.82, which indicates that the level of internal consistency is good.

The social dimension of social exclusion includes measures of social participation, level of received social support, and access to formal social support. The first one is measured through a composite scale constructed on six questions asking about the frequency of participation in a number of social activities (See Question 3.5 in Appendix 1 for the list of activities). The response for each item was scored the following way: never=0, occasionally=1, usually=2, and always=3. The sum of scores for all items was added to obtain the scale of social participation. The Chronbach’s alpha for this item is 0.65, which makes the internal consistency of the scale questionable. However, factor analysis shows that the scale could not be improved by dropping any of the items or scoring the item responses any differently.

The level of social support received by the household is also measured through a composite scale, based on 7 items of social support in the questionnaire (See Question 3.4 in Appendix 1). It is constructed in a similar way to social participation as the response categories are the same. Social support questions also include an answer that household never asked for help, which is considered equal to never receiving the help. The internal consistency of this scale is acceptable, as indicated by the value of 0.73 of Chronbach’s alpha. To measure the access to formal social support we use the question in the survey ‘whether or not the respondent was able to see a doctor when they needed one’ as a proxy. It is a dichotomous variable, coded 1 if they could see a doctor, and coded 0 if otherwise.

In the analysis of vulnerabilities to climate impact we also include climate awareness among the main predictors. The literature discussed in Chapter 3 showed that social vulnerability can be strongly associated with the knowledge and attitudes toward climate change. It is more so important to include climate awareness in our analysis, as the outcomes of vulnerability are subjective measures from the point of view of the respondents and may be highly associated with their awareness of climate change. Climate awareness is measured through a composite scale based on a number of questions asking the respondents their level of agreement with various climate statements, such as ‘Human activities are causing climate change’ or ‘I am well informed about the causes and consequences of climate change’ (See Question 1.2 in Appendix 1 for the full list of statements). The response categories for each item (Except for the statement ‘Climate change will occur over time, but we don’t have to think about it now’) were scored the following way:

- Strongly agree =2
- Agree=1
- Neither agree nor disagree=0
- Disagree=-1
- Strongly disagree=-2.
The excepted item was scored in reverse order, as it shows less awareness of climate change issues. The values for all items were summed to obtain the score of climate awareness for each respondent. A higher value of the scale signifies better awareness and lower value less awareness of climate change issues. The analysis of the internal consistency of the scale showed that it is reliable (Chronbach’s alpha=0.73).

The analysis also includes a few household and LGA level controls. Household level controls include the number of adults and number of children living in the household. These are important controls in relation to household income, as it could not be adjusted by household composition, due data limitations. Although the questionnaire included other personal characteristics of the respondents, they are not included in the statistical models as the unit of analysis is the household. The models also control for the LGA, which can control for any unobserved differences between the samples in each study site, and the socio-economic and geographic differences between these locations.

**Perceived adaptive capacity**

As was the case of climate vulnerability, adaptive capacity is an intricate concept hard to measure numerically. However, to understand the level of difficulty disadvantaged groups will have in adapting to climate change, we look at the subjective perceptions of adaptive capacity from the household’s point of view. To measure perceived adaptive capacity we use a composite scale, constructed on a series of questions asking the respondents how easy or difficult it would be for them to adapt to the impact of climate change on various aspects of their household’s life (See Question 1.5, in Appendix 1). For each item, the responses were coded the following way: very difficult=2, difficult=1, and not sure, easy, or very easy=0. The sum of scores for all four items constitutes the scale of adaptive capacity, ranging between 0-8, where a higher score means more difficulty adapting (i.e. lower adaptive capacity) and a lower score indicates less difficulty adapting (i.e. higher adaptive capacity). The internal consistency of this scale shows that it has a good reliability (Chronbach’s alpha is 0.84). The method of analysis used for this outcome is negative binomial regression, which is the preferred method for variables with skewed distribution, as was the case with the outcome of perceived vulnerability to climate impact.

The analysis has been conducted using GENMOD procedure in SAS software for the negative binomial regression analysis, and LOGISTIC procedure for logistic regression analysis. To explore whether the associations between disadvantage and climate vulnerability and adaptation can be explained by the level of social exclusion, and which dimensions of social exclusion are stronger predictors of climate vulnerability, we first model the effect of disadvantage on the outcome variables in a baseline model, and then gradually add various groups of predictors. Eventually, all predictors are added to the analysis simultaneously in the final full model. For each outcome, the effect of disadvantage category is modelled separately from multiple disadvantages, and also tested in the same model to control whether the effect of disadvantage category on the outcome is affected by accumulation of disadvantages.

**Results of multivariate analysis**

**Perceptions of climate impact**

The results of the negative binomial regression modelling the effect of disadvantage, and social exclusion on vulnerability to climate impact are presented in Table 8. The presented coefficients show for a one unit change in the predictor variable, the expected change in the logs of vulnerability score. Thus positive coefficient signifies an increased vulnerability, while negative coefficient indicates lower vulnerability. Model 1
on the table presents the results of the baseline model, where only disadvantaged categories are included. It can be observed, that compared to households without disadvantages, belonging to indigenous, single parent and renting groups increases the log of expected score of vulnerability; however the effects are only marginally significant. Meanwhile, belonging to aged/disabled group decreases the logs of expected vulnerability score by about 0.2 and it is highly significant.

However, when the measures of economic dimension of social exclusion are added in Model 2, we see that the increased vulnerability (although only marginally significant) of certain disadvantaged groups can be explained by economic exclusion. Better economic conditions, such as satisfaction with financial situation and having $2000 in savings for emergencies are negatively associated with perceived vulnerability, while higher values of economic hardship scale are associated with increased perception vulnerability. An exception is the effect of household income, which shows that higher income levels are associated with increased level of perceived vulnerability. This might be due to the fact that aged households are likely to be represented in the lowest income category, although have lower perceptions of vulnerability. On the other hand it could be a limitation of the data, as household income cannot be adjusted by household composition.

The social dimension of social exclusion is added to the baseline model in Model 3. It shows that increased level of perceived vulnerability among disadvantaged groups might be partially explained by social support and participation, although there is no conclusive evidence to support that. We can only see that the marginally significant positive effect of belonging to indigenous group disappears when social dimension is added to the model, and the strong negative association between aged/disabled group and the outcome variable becomes marginally significant. However, when the social dimension is controlled for, belonging to renter group shows increased level of perceived vulnerability statistically significant at p<.05 level. Among the measures of the social dimension of social exclusion, only access to formal support shows significant association with perceived vulnerability, which is negative direction, meaning that those with access to formal care have lower level of perceived vulnerability.

When climate awareness is added to the baseline model, we can see that the advantage of aged/disabled group disappears, showing that this advantage of perceived vulnerability is likely to be explained by the knowledge and attitudes toward climate change.

The final model includes all the predictors of social exclusion. It shows that controlling for social dimension and climate awareness, the measures of economic exclusion still show strong association with perceived vulnerability. Similarly, effect of access to formal support systems shows strong association with perceived vulnerability, controlling for all other factors. The effect of climate awareness on the outcome variable is modified the least when controlling for various aspects of social exclusion, signifying its consistent predictive power on the level of perceived vulnerability.

Using multidimensional aspect of disadvantage (multiple, vs. single disadvantage) rather than various categories of it does not show any significant impact on the level of perceived vulnerability neither in a baseline model, nor when controlling for any other factors (not showed in the table). It also does not add any explanatory power to the model when we control for multiple disadvantages along with the categories of disadvantaged groups.
Table 8: Results of Negative Binomial Regression of the level of perceived vulnerability to climate impact

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.251</td>
<td>1.023</td>
<td>1.114</td>
<td>0.440</td>
<td>0.870</td>
</tr>
<tr>
<td><strong>Disadvantage category</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Control (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indigenous</td>
<td>0.242</td>
<td><strong>0.012</strong></td>
<td>0.169</td>
<td>0.111</td>
<td>-0.083</td>
</tr>
<tr>
<td>Migrant</td>
<td>0.083</td>
<td>0.073</td>
<td>0.069</td>
<td>0.051</td>
<td>0.065</td>
</tr>
<tr>
<td>Single parent</td>
<td>0.185</td>
<td>-0.054</td>
<td>0.159</td>
<td>0.063</td>
<td>-0.065</td>
</tr>
<tr>
<td>Aged/disabled</td>
<td>-0.214</td>
<td>-0.121</td>
<td>-0.130</td>
<td>-0.048</td>
<td>-0.030</td>
</tr>
<tr>
<td>Unemployed</td>
<td>0.124</td>
<td>0.013</td>
<td>0.135</td>
<td>0.117</td>
<td>0.038</td>
</tr>
<tr>
<td>Renter</td>
<td>0.124</td>
<td><strong>0.070</strong></td>
<td>0.153</td>
<td>0.120</td>
<td>0.045</td>
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<td><strong>HH fortnightly income</strong></td>
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<td>Less than $800 (ref.)</td>
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<tr>
<td>$800-2000</td>
<td>0.273</td>
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<td>0.247</td>
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<td>$2000 and more</td>
<td>0.312</td>
<td><strong>0.009</strong></td>
<td></td>
<td></td>
<td>0.211</td>
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<td><strong>Emergency money</strong></td>
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</tr>
<tr>
<td>Can’t get $2000 (ref.)</td>
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<td></td>
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</tr>
<tr>
<td>Can borrow $2000</td>
<td>-0.066</td>
<td></td>
<td>-0.124</td>
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</tr>
<tr>
<td>Have $2000 in savings</td>
<td>-0.183</td>
<td>-0.066</td>
<td>-0.263</td>
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<td></td>
</tr>
<tr>
<td><strong>Satisfied with financial situation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>-0.169</td>
<td></td>
<td>-0.116</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Scale of economic hardship</strong></td>
<td>0.082</td>
<td>0.065</td>
<td>0.021</td>
<td>0.014</td>
<td></td>
</tr>
<tr>
<td><strong>Scale of social participation</strong></td>
<td></td>
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<td><strong>Study site</strong></td>
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</tr>
<tr>
<td>Port Pirie (ref.)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Adelaide</td>
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<td>0.048</td>
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</table>

Note: Significance levels - **p<0.01; *p<0.05; +p<0.1. (ref.) – Reference category
Vulnerability to extreme weather

The results of logistic regression analysis modelling the effect of disadvantage and social exclusion on the likelihood of facing health issues due to extreme weather are presented on Table 9. The results are presented in odds ratios, where a value above 1 shows a positive association between the predictor and the outcome, and a value below 1, shows a negative association between the two.

When not controlling for other factors, the baseline model shows that compared to the control group, Indigenous households are 2.8 times more likely, single parent households are 2.2 times more likely, renters are 1.6 times more likely and aged/disabled group are 1.5 times more likely to have faced health issues due to extreme weather, and these are statistically significant at p<.001 level. However, when the economic dimension of social exclusion is added to the model, we can see that the increased vulnerability of these groups to extreme weather, except for the aged/disabled group, is explained by the measures of economic exclusion. Besides the measure of household income, the measures of economic exclusion show significant impact on vulnerability to extreme weather. Satisfaction with financial situation and ability to obtain $2000 in emergency have a significant negative impact, while the scale of economic hardship has a significant positive impact on the outcome. In fact, each unit increase on the hardship scale increases the odds of facing health issues due to the heat by about 20%.

The social dimension of social exclusion and climate knowledge when added to the baseline model, do not explain the increased vulnerability of disadvantaged groups to extreme weather. The measures of social exclusion actually are not significant predictors of vulnerability to extreme weather. Climate awareness on the other hand, has a strong positive association with the outcome, controlling for other factors. On the one hand, it is likely that those more aware of climate change issues are more likely to link their health problems to extreme weather. On the other hand, it is also likely that experience of health issues makes individuals more climate aware. Due to the limitations of the cross-sectional data, the direction of this association cannot be tested.

The full model shows, that economic exclusion and climate awareness are the strongest predictors of vulnerability to extreme weather. Moreover, economic exclusion explains most of the variation in vulnerability to climate change across various disadvantaged groups. However, even controlling for all other factors, belonging to aged/disabled group increases the odds of facing health issues in extreme weather by about 75 percent. This is surely explained by the lower resilience to heat associated with age and disability. Controlling for multiple disadvantages along with disadvantage categories does not add much to the model.

The analysis using multiple disadvantages instead of disadvantage categories (Table 10) reveals similar results for the measures of economic and social dimensions of social exclusion, as well as climate awareness. However, the most important outcome in this model is that the significant positive association between multiple disadvantage categories and the outcome is not strongly affected by the measures of social exclusion. Having multiple disadvantages, compared to household without disadvantages, increases the odds of facing health issues in extreme weather by about 2.3 times (p<.01), controlling for all other variables, including the measures of economic and social dimensions of social exclusion.
Table 9: Results of Logistic Regression Analysis of vulnerability to extreme weather (in odds ratios): with disadvantage categories

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
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<td>0.12</td>
<td>0.06</td>
<td>0.15</td>
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<td>Control (ref.)</td>
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<tr>
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<td>2.80</td>
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<td>1.64</td>
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<tr>
<td>Migrant</td>
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<td>1.27</td>
<td>1.37</td>
<td>1.18</td>
<td>1.30</td>
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<td>1.32</td>
<td>1.84</td>
<td>1.66</td>
<td>1.13</td>
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<tr>
<td>Aged/disabled</td>
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<td>1.64</td>
<td>1.66</td>
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<td>1.75</td>
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<td>0.77</td>
<td>1.06</td>
<td>1.14</td>
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<td>Renter</td>
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<td>1.74</td>
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<td>Less than $800 (ref.)</td>
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<td>0.95</td>
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<tr>
<td>$2000 and more</td>
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<tr>
<td>Emergency money</td>
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</tr>
<tr>
<td>Can’t get $2000 (ref.)</td>
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<tr>
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<tr>
<td>Satisfied with financial situation</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>No (ref.)</td>
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<td>0.60</td>
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<td>Scale of social participation</td>
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<tr>
<td>Didn’t see a doctor (ref.)</td>
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<tr>
<td>Saw a doctor</td>
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</tr>
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<td>Port Pirie (ref.)</td>
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</tr>
<tr>
<td>Adelaide</td>
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<td>0.80</td>
<td>0.90</td>
<td>0.79</td>
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</tr>
<tr>
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<td>0.78</td>
<td>0.85</td>
<td>0.85</td>
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<td>1435</td>
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Note: Significance levels - **p<0.01; *p<0.05; +p<0.1. (ref.) – Reference category
Table 10: Results of Logistic Regression Analysis of vulnerability to extreme weather (in odds ratios): with multiple disadvantages

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<th>Model 1</th>
<th>Model 2</th>
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<tr>
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<td>0.83</td>
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<tr>
<td>Emergency money</td>
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<tr>
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<tr>
<td>Satisfied with financial situation</td>
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<tr>
<td>Didn’t see a doctor (ref.)</td>
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</tr>
<tr>
<td>Saw a doctor</td>
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<td>0.94</td>
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<tr>
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<td>Number of adults in the household</td>
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<tr>
<td>Port Pirie (ref.)</td>
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<td>0.84</td>
<td>0.84</td>
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<tr>
<td>Number of cases</td>
<td>1768</td>
<td>1617</td>
<td>1435</td>
<td>1546</td>
<td>1379</td>
</tr>
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<td>1213</td>
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</table>

Note: Significance levels - **p<0.01; *p<0.05; +p<0.1. (ref.) – Reference category
Perception of climate change as a household challenge

The results of the logistic regression modelling the effects of disadvantage, social exclusion and climate awareness on the likelihood of considering climate change as a household challenge are presented on Table 11. The coefficients are presented in odds ratios.

The baseline model shows that belonging to a disadvantaged category, except for aged/disabled group, does not have a significant impact on the outcome variable. Belonging to aged/disabled category, compared to the control group, is negatively associated with the odds of considering climate change a household challenge. The economic dimension of social exclusion also has a small predictive power for this outcome; however it seems to explain the negative impact of the aged/disabled category. Among the economic variables, satisfaction with the financial situation significantly decreases the odds of considering climate change as a challenge.

The social dimension of social exclusion when added to the model shows that only the level of received support is a significant predictor of this outcome. However, the direction of the impact is positive showing that increased amount of support received is associated with increased odds of considering climate change a household challenge. The reason behind this might be that the scale of social support is more likely to be measuring the level of need for support, rather than the social connectedness of the households to their networks.

Meanwhile, climate awareness shows a strong positive impact, increasing the odds of considering climate change a household challenge by about 20 percent (p<.001). The full model shows that when controlling for the full set of measures of social exclusion, single parent households have significantly lower odds of considering climate change a household challenge, compared to the control group.

Using multiple disadvantage categories instead of types of disadvantage groups (Table 12) shows similar results for these outcomes. Having single or multiple disadvantages, compared to households with none, does not affect their perception of climate change as a challenge to their household.

Interestingly, however, when multiple disadvantages are controlled in the same model with various disadvantage types, the results reveal significant effects of disadvantage types, controlling for social exclusion. So, when controlling for single vs. multiple disadvantages, belonging to migrant, aged/disabled, and renting households increases the odds of considering climate change as a challenge, controlling for social exclusion and climate awareness. The impact of single and multiple disadvantages (compared to no disadvantage) on the other hand, are negative on the odds of considering climate change a household challenge.
Table 11: Results of Logistic Regression Analysis of perceiving climate change as a household challenge (in odds ratios): with disadvantage categories and type

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
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<td>1.00</td>
<td>1.09</td>
<td>2.14    *</td>
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<td>Single parent</td>
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<td>1.69    +</td>
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<td>Renter</td>
<td>1.11</td>
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<td>1.20</td>
<td>1.11</td>
<td>1.09</td>
<td>1.99    *</td>
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<tr>
<td>Less than $800 (ref.)</td>
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<td>+</td>
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<td>$2000 and more</td>
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<tr>
<td>Can’t get $2000 (ref.)</td>
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<tr>
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<td>1883</td>
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Note: Significance levels - **p<0.01; *p<0.05; +p<0.1. (ref.) – Reference category
Impact of Climate Change on Disadvantaged Groups

Table 12: Results of Logistic Regression Analysis of perceiving climate change as a household challenge (in odds ratios): with multiple disadvantages

<table>
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<tr>
<th></th>
<th>Model 1</th>
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<th>Model 4</th>
<th>Model 5</th>
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<td>Less than $800 (ref.)</td>
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<tr>
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<tr>
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<td>Didn’t see a doctor (ref.)</td>
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<tr>
<td>Saw a doctor</td>
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<td>0.92</td>
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<td><strong>Scale of climate awareness</strong></td>
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Note: Significance levels - **p<0.01; *p<0.05; +p<0.1. (ref.) – Reference category

**Perception of heatwave as a challenge**

The results of the logistic analysis modelling the effects of disadvantage, social exclusion and climate awareness on the likelihood of considering heatwaves as a household challenge are presented in Table 13. The baseline model shows, that when not controlling for other factors, migrant and renting households have significantly higher odds of considering heatwaves among their household challenges, compared to...
the control group. When the measures of economic exclusion are added to the baseline model the significant effect of renter group disappears, although the significant positive effect of migrant group is not affected. Among economic factors, ability to find $2000 in emergency has a significant negative effect and the level of economic hardship has a significant positive effect on the odds of considering heatwaves a household challenge.

Among the social factors, access to formal social support system is the only significant predictor of this outcome, and it also affects the significant effect of renter group. Climate awareness, when added to the baseline model shows a strong positive effect on the outcome. Interestingly, when controlling for the climate awareness, the effect of belonging to the aged/disabled group shows significant positive effect on the odds of considering heatwaves a household challenge. This means, when the level of climate awareness is held constant aged/disabled group of households have higher odds of considering heatwaves a household challenge than the control group. The effect of belonging to migrant group is not affected by any of the factors added to the model.

The final model shows that the security of being able to obtain $2000 in emergency and having access to formal social support system significantly decreases the odds of considering heatwaves among their household challenges. However, social exclusion and climate awareness do not explain the significant positive impact belonging to migrant group has on the odds of considering heatwaves a household challenge.

When using multiple disadvantage categories instead of types of disadvantages (Table 14), we can see that having both single and multiple disadvantages, compared to having none, significantly increases the odds of considering heatwaves a household challenge. However, compared to the previous model, the effect of multiple disadvantages remains after adding the economic and social dimensions of exclusion, and climate awareness to the model separately. When the factors are added together in the final model, the effect of multiple disadvantages on the outcome disappears. It shows that the level of social exclusion in its complete format explains the effect of multiple disadvantages on this outcome.
Table 13: Results of Logistic Regression Analysis of perceiving heat waves as household challenge (in odds ratios): with disadvantage categories

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
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<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
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<td>1.33 *</td>
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Note: Significance levels - **p<0.01; *p<0.05; +p<0.1. (ref.) – Reference category
Table 14: Results of Logistic Regression Analysis of perceiving heat waves as household challenge (in odds ratios): with multiple disadvantages

<table>
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<td></td>
<td>1.03</td>
<td></td>
<td>1.01</td>
<td></td>
</tr>
<tr>
<td>Access to formal support</td>
<td></td>
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</tr>
<tr>
<td>Didn't see a doctor (ref.)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Saw a doctor</td>
<td>0.49</td>
<td>**</td>
<td>0.54</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Scale of climate awareness</td>
<td></td>
<td>1.07</td>
<td>**</td>
<td>1.08</td>
<td>**</td>
</tr>
<tr>
<td>Number of adults in the household</td>
<td>1.11</td>
<td>1.11</td>
<td>1.05</td>
<td>1.08</td>
<td></td>
</tr>
<tr>
<td>Number of children in the household</td>
<td>0.91</td>
<td>+ 0.95</td>
<td>0.90 +</td>
<td>0.87 *</td>
<td></td>
</tr>
<tr>
<td>Study site</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port Pirie (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adelaide</td>
<td>0.83</td>
<td>0.84</td>
<td>0.88</td>
<td>0.77</td>
<td>+</td>
</tr>
<tr>
<td>Berri</td>
<td>0.89</td>
<td>0.88</td>
<td>1.01</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Number of cases</td>
<td>1768</td>
<td>1617</td>
<td>1435</td>
<td>1546</td>
<td>1379</td>
</tr>
<tr>
<td>-2 Log Likelihood</td>
<td>2418</td>
<td>2186</td>
<td>1957</td>
<td>2067</td>
<td>1811</td>
</tr>
</tbody>
</table>

Note: Significance levels - **p<0.01; *p<0.05; +p<0.1. (ref.) – Reference category
Perception of adaptive capacity

The effect of disadvantage, social exclusion and climate awareness on the perception of difficulty of adaptation to climate change has been modelled using negative binomial regression, and the results are presented in Table 15. In the baseline model, where the effect of disadvantage type is modelled without controlling for other factors, we can see that compared to the control group, belonging to Indigenous, migrant, single parent and renting group significantly increase the logs of adaptation difficulty scale.

To test whether the disadvantage of these groups in regard to adaptation is due to economic exclusion, we add the variables measuring the economic dimension of social exclusion in the following model. The results show, that except for the effect of migrant group, the significant association of belonging to other disadvantaged groups with the outcome can be mostly explained by economic exclusion. Although the level of household income does not have a significant effect, the findings show that having $2000 for emergencies, and satisfaction with their economic situation are negatively associated with the scale of difficulty of adaptation. On the other hand, each unit increase on the scale of economic hardship increases the logs of adaptation difficulty score.

The mediating effect of social dimension on the association between disadvantage category and the outcome is tested in the following model. The findings show that the effect of belonging to migrant and indigenous group on the outcome can be explained by social connectedness. However, the higher logs of difficulty of adaptation score among single parent and renting groups persist after controlling for the social dimension. Among the measures of the social dimension of social exclusion access to formal support systems and social participation scale are negatively associated with the outcome, although the effect of social participation is not statistically significant. The effect of social support scale, on the other hand, has a significant positive effect on the scale of adaptation difficulty. Again, this might be explained by the fact that the scale of social support is more likely to be measuring the level of need for support, rather than the social connectedness of the households to their networks.

When climate change awareness is added to the baseline model, we find a significant positive association with the outcome. An increase on the scale of climate awareness increases the logs of adaptation difficulty score. And while it seems to also explain partially the positive association between belonging to Indigenous and migrant group with the outcome variable, the significant positive associations between belonging to single parent and renter group and the outcome still persist. Interestingly, however, when we control for climate awareness the effect of belonging to the aged/disabled groups on the scale of adaptation difficulty becomes statistically significant, showing a strong positive association between the two.

The complete picture of the associations between disadvantage, social exclusion and adaptive capacity appear when we look at the full model. We find that when the level of social exclusion is controlled for in its complexity and completeness, the only significant difference between the control group and disadvantaged groups in their effect on the scale of adaptation difficulty, exists among the households in the aged/disabled group. Thus, when all other socio-economic characteristics and climate awareness are held constant, belonging to the aged/disabled group vs. control group significantly increases the logs of adaptation difficulty score. It is important to note, that the significance impact of economic dimension, social dimension and climate awareness on the outcome remain when included in the full model, showing that each aspect of social exclusion is a significant predictor of adaptive capacity.
Table 15: Results of Negative Binomial Regression of the level of perceived difficulty of adaptation: with disadvantage categories

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.715</td>
<td>0.897</td>
<td>0.863</td>
<td>0.331</td>
</tr>
<tr>
<td><strong>Disadvantage category</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indigenous</td>
<td>0.338 **</td>
<td>0.066</td>
<td>0.241</td>
<td>+</td>
</tr>
<tr>
<td>Migrant</td>
<td>0.150 *</td>
<td>0.125 **</td>
<td>0.114</td>
<td>0.083</td>
</tr>
<tr>
<td>Single parent</td>
<td>0.316 **</td>
<td>0.091</td>
<td>0.232 **</td>
<td>0.219</td>
</tr>
<tr>
<td>Aged/disabled</td>
<td>0.074</td>
<td>0.106</td>
<td>+</td>
<td>0.097</td>
</tr>
<tr>
<td>Unemployed</td>
<td>0.143</td>
<td>+</td>
<td>-0.017</td>
<td>0.105</td>
</tr>
<tr>
<td>Renter</td>
<td>0.164 **</td>
<td>0.018</td>
<td>0.169 **</td>
<td>0.149</td>
</tr>
<tr>
<td><strong>HH fortnightly income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $800 (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$800-2000</td>
<td>0.029</td>
<td></td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>$2000 and more</td>
<td>0.097</td>
<td></td>
<td>0.035</td>
<td></td>
</tr>
<tr>
<td><strong>Emergency money</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can’t get $2000 (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can borrow $2000</td>
<td>-0.055</td>
<td></td>
<td>-0.057</td>
<td></td>
</tr>
<tr>
<td>Have $2000 in savings</td>
<td>-0.301 **</td>
<td></td>
<td>-0.302 **</td>
<td></td>
</tr>
<tr>
<td><strong>Satisfied with financial situation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>-0.310 **</td>
<td></td>
<td>-0.277 **</td>
<td></td>
</tr>
<tr>
<td><strong>Scale of economic hardship</strong></td>
<td>0.060 **</td>
<td></td>
<td>0.048 **</td>
<td></td>
</tr>
<tr>
<td><strong>Scale of social participation</strong></td>
<td></td>
<td>-0.017</td>
<td></td>
<td>-0.011</td>
</tr>
<tr>
<td><strong>Scale of social support</strong></td>
<td></td>
<td></td>
<td>0.030 **</td>
<td></td>
</tr>
<tr>
<td><strong>Access to formal support</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Didn’t see a doctor (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saw a doctor</td>
<td>-0.395 **</td>
<td></td>
<td>-0.311 **</td>
<td></td>
</tr>
<tr>
<td><strong>Scale of climate awareness</strong></td>
<td>0.043 **</td>
<td></td>
<td>0.044 **</td>
<td></td>
</tr>
<tr>
<td><strong>Number of adults in the household</strong></td>
<td>0.041</td>
<td>0.061</td>
<td>+</td>
<td>0.023</td>
</tr>
<tr>
<td><strong>Number of children in the household</strong></td>
<td>0.029</td>
<td>0.073</td>
<td>*</td>
<td>0.061</td>
</tr>
<tr>
<td><strong>Study site</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port Pirie (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adelaide</td>
<td>0.145</td>
<td>0.128</td>
<td>+</td>
<td>0.214 **</td>
</tr>
<tr>
<td>Berri</td>
<td>0.040</td>
<td>0.015</td>
<td>0.120</td>
<td>0.043</td>
</tr>
<tr>
<td>Dispersion</td>
<td>0.645</td>
<td>0.492</td>
<td>0.599</td>
<td>0.541</td>
</tr>
<tr>
<td><strong>Number of cases</strong></td>
<td>1604</td>
<td>1496</td>
<td>1338</td>
<td>1435</td>
</tr>
<tr>
<td>Pearson Chi square</td>
<td>1283</td>
<td>1348</td>
<td>1105</td>
<td>1277</td>
</tr>
</tbody>
</table>

Note: Significance levels - **p<0.01; *p<0.05; +p<0.1. (ref.) – Reference category
Table 16: Results of Negative Binomial Regression of the level of perceived difficulty of adaptation: with multiple disadvantages

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
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<td>0.796</td>
<td>0.763</td>
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<td>0.920</td>
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<td>Disadvantage type</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No disadvantage (ref.)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single disadvantage</td>
<td>0.262</td>
<td>**0.183</td>
<td>0.222</td>
<td>**0.278</td>
<td>**0.149</td>
</tr>
<tr>
<td>Multiple disadvantage</td>
<td>0.425</td>
<td>**0.228</td>
<td>**0.402</td>
<td>**0.428</td>
<td>**0.220</td>
</tr>
<tr>
<td>HH fortnightly income</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Less than $800 (ref.)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$800-2000</td>
<td>0.029</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>$2000 and more</td>
<td>0.109</td>
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<td></td>
<td></td>
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<tr>
<td>Emergency money</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Can’t get $2000 (ref.)</td>
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<td></td>
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</tr>
<tr>
<td>Can borrow $2000</td>
<td>-0.052</td>
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<td></td>
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</tr>
<tr>
<td>Have $2000 in savings</td>
<td>-0.295</td>
<td>**</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Satisfied with financial situation</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>-0.295</td>
<td>**</td>
<td>-0.263</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Scale of economic hardship</td>
<td>0.056</td>
<td>**</td>
<td></td>
<td></td>
<td>0.040</td>
</tr>
<tr>
<td>Scale of social participation</td>
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<td>-0.010</td>
</tr>
<tr>
<td>Scale of social support</td>
<td>0.033</td>
<td>**</td>
<td></td>
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<td>0.021</td>
</tr>
<tr>
<td>Access to formal support</td>
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<tr>
<td>Didn’t see a doctor (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saw a doctor</td>
<td>-0.405</td>
<td>**</td>
<td>-0.312</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Scale of climate awareness</td>
<td>0.045</td>
<td>**</td>
<td>0.044</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Number of adults in the household</td>
<td>0.046</td>
<td>0.064</td>
<td>0.024</td>
<td>0.027</td>
<td></td>
</tr>
<tr>
<td>Number of children in the household</td>
<td>0.028</td>
<td>0.100</td>
<td>**0.079</td>
<td>**0.010</td>
<td></td>
</tr>
<tr>
<td>Study site</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port Pirie (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adelaide</td>
<td>0.152</td>
<td>**</td>
<td>0.140</td>
<td>0.213</td>
<td>**0.164</td>
</tr>
<tr>
<td>Berri</td>
<td>0.049</td>
<td>0.028</td>
<td>0.123</td>
<td>+</td>
<td>0.041</td>
</tr>
<tr>
<td>Dispersion</td>
<td>0.656</td>
<td>0.492</td>
<td>0.598</td>
<td>0.538</td>
<td>0.448</td>
</tr>
<tr>
<td>Number of cases</td>
<td>1604</td>
<td>1496</td>
<td>1338</td>
<td>1435</td>
<td>1289</td>
</tr>
<tr>
<td>Pearson Chi square</td>
<td>1271</td>
<td>1346</td>
<td>1107</td>
<td>1286</td>
<td>1235</td>
</tr>
</tbody>
</table>

Note: Significance levels - **p<0.01; *p<0.05; +p<0.1. (ref.) – Reference category
Controlling for multiple disadvantages along with disadvantage types does not add any explanatory power to the analysis. However, when we use multiple disadvantages instead of disadvantage type (Table 16), the results are mostly comparable with the previous model. Both single and multiple disadvantages have significant positive impact on the outcome when compared to no disadvantage in the baseline model, and both of these effects persist when either of the dimensions (economic and social) of social exclusion is added to the analysis. They also do not change greatly when we control for the climate awareness separately. However, when we control for all the dimensions simultaneously in the full model, we find that those with multiple disadvantages, compared to households without disadvantages have significantly higher logs of adaptation difficulty score. Meanwhile the effect of single disadvantage is not statistically significant when controlling for the complete set of social exclusion variables and climate awareness. It means, that the differences between single disadvantage and no disadvantage households in their impact on the scale of perceived adaptation difficulty is likely to be explained by the level of social exclusion and climate awareness. However, there are differences between multiple disadvantage and no disadvantage households in regard to their perceived level of adaptation difficulty that could not be explained by the level of social exclusion in this analysis, despite the strong predictive power of social exclusion variables in the model.

**Summary of multivariate analysis**

This chapter has discussed the methods and results of the multivariate analysis, looking at the complex interrelationships between disadvantage, social exclusion and climate vulnerability and adaptation. As measures of vulnerability and adaptation, the study used the subjective perceptions of households of their level of vulnerability to climate change and extreme weather events, and the level of their ability to adapt to climate impact.

Our findings showed that the level of social exclusion can mostly explain the increased perception of vulnerability and lower adaptive capacity of certain disadvantaged groups to the impact of climate change and of the extreme weather. However, some groups might display increased vulnerability that cannot be explained through social exclusion or climate awareness, such as increased vulnerability of aged/disabled households to the health effects of extreme weather, migrants’ increased perception of heatwaves as a challenge, or single parent households’ increased perceptions of climate change as a challenge.

Despite the inconsistency in the results of multiple disadvantage analysis, there is some evidence that having multiple disadvantages may increase the perceptions of vulnerability and difficulty of adaptation that cannot be explained by the level of social exclusion. The results do not provide any evidence that there are consistent differences between the three study sites. This is likely to be explained by the high level of social exclusion observed equally in all three areas. Some of the limitations of the study certainly cannot be overlooked. We cannot claim that the variables selected for the assessment of social exclusion are the perfect measures of this concept. However, they provide us with some consistent results showing the strong impact of economic exclusion and social connectedness on the perceptions of climate vulnerability and adaptive capacity.
The statistical analysis of the survey data showed which socio-economic factors are responsible for the increased vulnerability of disadvantaged groups to climate change. However, to get a deeper understanding of vulnerabilities, behavioural changes, and barriers preventing disadvantaged households from adapting to the changing climate, the study collected qualitative data through in-depth interviews. To understand issues of vulnerability and adaptive capacity from household and institutional point of view, in-depth interviews were conducted not only with disadvantaged households selected from the survey participants, but also with a number of stakeholders from various governmental and non-governmental organizations working with disadvantaged population in the three South Australian sites included in the survey. This chapter firstly presents the results of the thematic analysis of the in-depth interviews with households, followed by the discussion of the main themes raised during stakeholder interviews.

**Household views**

The subset of survey respondents willing to participate in follow-up face-to-face in-depth interviews (n = 1046) were categorised by the area they lived in and the type(s) of vulnerability or disadvantage they experienced based on their responses to the CATI. The recruitment of interview participants was conducted in two waves. During Wave One all survey respondents who reported experiencing three or more types of disadvantage were contacted. Wave Two participants were selected based on one or two types of disadvantage, focusing on ensuring a representative sample, both in terms of regions and types of disadvantage.

A total of 57 in-depth householder interviews were completed (Berri/Barmera LGA: 20 households; Port Pirie LGA: 17 households; Port Adelaide/Enfield LGA: 20 households). Interviews took place in the second half of 2012, between September and end of December. Each interview was conducted in the participants’ local community at a time and place that was convenient to the interviewee. More than 60 percent of the interviewees elected to be interviewed at home or their place of business, while the others preferred to meet in a public place, such as a coffee shop. The interviews took between 40 and 90 minutes to complete and were recorded with the interviewee’s permission. These interviews focused on collecting more qualitative information and expanded in more depth on the topics covered in the survey. It focused on more personal experiences and life stories of households dealing with climate related events and social inclusion/exclusion (see Appendix 2 for the copy of in-depth interview guide).

A cross-thematic analysis approach was used to analyse the interview recordings. Initially the research team devised a list of key themes to focus on in the interview recordings, based on the themes in the interview questions. Due to time and budget constraints interviews were not fully transcribed, however each interview recording was replayed by at least two researchers with details relating to these key themes recorded, including transcribing relevant quotes. This was possible in part, because the same team that had conducted the interviews carried out the analysis. Transcripts of the key points from each interview were then compiled and explored extensively by the research team for a cross thematic analysis. Six main themes drawn from these interviews will be discussed here: vulnerabilities, resilience, individual adaptation practices, motivations for adaptation practices, barriers to adaptation, and householder views on institutional change and governance.
Vulnerabilities

All interview participants could be described as being vulnerable to experiences of extreme weather events and/or the rising cost of living. In fact, most participants faced several types of disadvantage and vulnerability. Even those participants who considered themselves in a relatively good position imparted a sense of vulnerability, as seen here with 'Kym' (migrant, recently unemployed, Port Pirie LGA): ‘Even with both my husband and I working...I mean we are not poor, but also we don’t have the best of everything...but even then with both of us working we were really living from pay to pay...and now my contract has finished so we are going to have to tighten our belts even more.’ ‘Roberta’ (aged, migrant, Port Adelaide/Enfield LGA) also commented that although they are managing their costs at present, her husband is retiring at the end of the year and their ability to cope with costs after his retirement remain to be seen: ‘Now it doesn’t worry us, if we want to buy something we’ll go and buy it...but come the end of the year it will be different.’

Those interview participants with health issues could be described as being the most vulnerable in two ways. For some health issues were directly affected by the heat and/or extreme cold therefore household heating and cooling needed to be carefully controlled. For example ‘Sharon’ (aged, renting, Berri/Barmera LGA) has Multiple Sclerosis (MS) and is wheelchair bound. Her MS is aggravated by the heat, and she explained that 28 degrees is around about the ‘cut off point’ when she begins to struggle. Exposure to any temperatures above this means she cannot do anything for herself and has difficulty breathing. ‘So come summer time, I’m stuck inside with an air conditioner going, I don’t have an option on that.’ ‘Dave’ (disability, renter, unemployed, Port Adelaide/Enfield LGA) has a back injury and nerve injury that requires him to keep his body at a constant temperature, therefore in winter he often has the heater on 20 hours per day. Because he is so affected by the temperature this has greatly reduced the amount of time he spends outdoors, which has been very difficult for his social life, causing him some depression issues. ‘When you isolate yourself, your confidence sort of ebbs and flows out the wrong way.’

Another example of this is ‘Kim’ (renter, single parent, Berri/Barmera LGA) who has a daughter with cerebral palsy and epilepsy and extreme heat can cause her to have seizures. Therefore they have to stay indoors during hot weather and turn the air conditioner on. ‘Kim’ comments on how much of their lives are affected by the weather: ‘So much depends on the weather, to where we can go, to what we can do, if it’s too hot we can’t go places’. For other participants who did not necessarily have specific health conditions they described periods of extreme heat as an added stressor in their lives. For example ‘Anna’ (migrant, aged, Port Adelaide/Enfield LGA) talked about being affected by the heat.

‘If the temperature reaches about 37 degrees or above I become useless, I have no energy to do things when it starts to get this hot.... I don’t sleep well in the heat and I don’t feel like eating much. It’s mainly because of the lack of sleep and I have a history of depression – so when I lack sleep and start to feel lethargic this leads to feelings of depression. I can get very irritable and short tempered.’

‘June’ (migrant, aged, disability, Port Adelaide/Enfield) suffers from chronic fatigue syndrome and also finds that extreme heat causes her symptoms to worsen and she has less energy than usual.

For some participants health issues also meant that they were on a fixed income such as a disability pension. Thus while the health issue per se may not be influenced by
changes in the weather, living on a fixed income added to the vulnerability of the participant to rising costs in living and often meant they were unable to make adaptations to their living environments to cope with periods of extreme heat. The multiple dimensions of exclusion combine to make many of those interviewed highly vulnerable to the negative effects of climate change. This added stressor in times of high energy use (such as during heat waves and days of extreme heat) also applied to other participants on fixed incomes who were more vulnerable to the heat, such as older community members on aged pensions and families with small children on low incomes.

A few participants described how their homes were located in areas that made them feel particularly vulnerable to extreme weather events. This reflects the fact that poorer groups often are forced to locate in the least desirable and most vulnerable areas. This is common in studies of vulnerability to climate change impacts across the world. Several interview participants described how their properties were subject to occasional flooding and storm damage and others described their sense of vulnerability to bush fire risk. ‘Barbara’ (migrant, Berri/Barmera LGA) lives on 20 acres of bushland, surrounded by similar properties. She described living on an isolated bush block and this location making her feel vulnerable to bushfires as a result. She feels that bushfires in particular are a constant underlying stressor. ‘We just heard about the fires in Port Lincoln recently and you think to yourself....’oh here we go again, it’s starting’. For others location meant that they were totally reliant on rain water and as one participant said ‘We have big rain water tanks, but if you don’t get any rain...’ (‘Linda’, aged, unemployed Port Pirie LGA).

For many participants, particularly those on fixed incomes, rising electricity costs was the biggest concern:

‘We have actually tried to cut back [on how much electricity we use] but we’re paying more’ (Anna: migrant, aged Port Adelaide/Enfield LGA)

‘The cost of utilities is the killer...because we are on a pension’
(Patty: aged, Port Pirie LGA)

‘Arlene’ (aged, migrant, unemployed, Berri/Barmera LGA) is a typical example of how the rising cost of electricity has impacted significantly on her family life, not only in terms of adaptations but also in terms of underlying stress and worry. ‘Arlene’ has a lot of illness in her immediate family and while this is not impacted on directly by extreme weather events it does contribute to her lack of finances, with her husband and herself having given up their business in recent years because of his poor health and her need to care for him. This has caused Arlene a lot of underlying stress and worry, and an inability to have the financial resources for other things like rising electricity prices has added to her concerns. ‘Arlene’ expressed extreme distress about the rising cost of electricity:

‘To the point where I have contacted the ombudsman, I have had all our appliances checked, we had the metre tested, we put in solar hot water, I have even (for the last six months) cooked all our meals on the wood stove and switched the electric cooker off, put the electric kettle in the cupboard and don’t use it, we have no electric blankets, no electric clocks, we don’t use the air conditioner – we did all these things trying to keep our power costs down and our bill still went up, it nearly doubled. That’s when I said to them [the electricity provider] I just can’t pay this – we are pensioners. So now we are on a plan to pay some off every fortnight but even that is not covering our usage. We
read the metre daily and my husband worked out how much we need to pay a fortnight just to cover our usage. Now we have made even more dramatic changes to how we live – like we have cut down the number of times we use the washing machine every week, we don’t switch lights on unless we have to...because now I am thinking about that fortnightly payment, it is just about all of my pension just for electricity. I think I’ll die owing the electricity company money.’

All of the above vulnerabilities in addition to the rising cost of living led many participants to discuss a sense of underlying stress in their lives. ‘Kym’ (migrant, unemployed, Port Pire LGA) explained that the rising cost of living did not really affect her family’s physical health at all but did perhaps affect their mental health a little bit: ‘at different times my hours have been cut in the past and we have had to do it a bit tougher...and that daily grind of not having enough gets you down a bit.’ ‘Barbara’ (migrant, Berri/Barmera LGA) and ‘Marg’ (migrant, renter, Port Pirie LGA) both talked about the stress of managing a family on one wage and trying to cope with the rising cost of living.

For Aboriginal group vulnerability to extreme heat is exacerbated when one considers the implications of other barriers, such as the rising cost of electricity and the need for air-conditioning (see Cost of Living). ‘Sarah’ for example, has several medical conditions, diabetes, arthritis and hernia. ‘Sarah’ repeatedly stresses that the heat doesn’t bother her as she personally likes it; however, having a hernia (combined with being overweight) causes her to develop a bad rash which persists throughout the hot weather. Apart from having medication to cope with it, ‘Sarah’ explained that she would seek relief by swimming in the river on hot days. Due to her hernia ‘Sarah’ said she would struggle to make her own way down to the river as she has great difficulty walking; however as she doesn’t live alone she is able to count on someone to take her down to the river is she needs to. She recognises that she is fortunate in this instance as those who are isolated (particularly the older ones who aren’t as mobile) may not have the support they need in hot weather; ‘if they don’t have family that comes in every day, people aren’t going to know...’

In addition to health issues, many Indigenous people have other disadvantages, which often include being on a low income. This double disadvantage, as ‘Kerry’ explains, makes it difficult for her to purchase healthy foods, which are more expensive but more suited to her diabetic condition.

‘They recommend that diabetics have certain brands of bread, they say ‘that’s terrific bread’ and I say ‘yeah, but it’s $3.50 per loaf, you cannot afford it.’ My daughter came home and she’s just becoming a diabetic and she said ‘get this margarine’ but it’s $7.00 a tub. I can’t afford $7.00 a tub...it’s the most expensive food about, your diabetic food. And there are a hell of a lot of diabetics around.’ (‘Kerry’, Aboriginal, Aged)

Hence, it is important that when it comes to extreme weather, it is imperative that we do not disregard the fact that (more often than not), Indigenous Australians have multiple disadvantages, which would make them more vulnerable.

Many interview participants could be described as having multiple disadvantages. For example, a participant with a fixed income, ageing, in poor health and a private renter is limited in the types of adaptations they are physically and/or financially able to make to their immediate home environment and day to day lifestyle practices. For some participants multiple disadvantages clearly impacted on their ability to adapt to both
weather extremes and the rising costs of living. As ‘June’ (migrant, aged, disability, Port Adelaide/Enfield) comments, some people just do not have the ability to make changes even if they wanted to, stating: ‘I can afford to do that but it really bothers me that it isn’t so for a lot of people. I still feel like I have enough leeway that I can make choices.’ This will now be discussed in more detail in terms of resilience.

In summary, the in-depth interviews with excluded groups revealed both an understanding of, and a deep concern with, the effects of climate change. It is clear that social exclusion and disadvantage exacerbate vulnerability to the effects of climate change in the three study areas.

**Resilience**

When considering the information from the face-to-face interviews, resilience, in terms of adaptation both to extremes in weather and perceived rising costs of living, could be described in terms of the following five parameters:

- Life experiences and a life philosophy of frugality or simple living
- Health – both physical and mental
- Financial wealth,
- Social connectedness and information sources, and
- Positive or negative attitudes

Many participants spoke about living within their means and being frugal with resources. Others spoke of ‘just using common sense’ in terms of extreme heat and using resources such as water and electricity. These participants did not see this approach as a new adaptation to deal with difficult circumstances but instead considered it a natural way of life. For some, such as ‘Jenny’ (aged, migrant, Port Adelaide/Enfield LGA) this had been a part of her upbringing; as Jenny explained: ‘we are frugal with water and electricity by nature because we were both raised that way’. Jenny and her husband described a lot of environmentally friendly and cost saving behaviours but this is just second nature to Jenny, it is how they have always lived their lives. Other participants expressed similar views:

“We don’t live beyond our means so it is not an issue....In our case we get a limited income and we have to use it wisely”. (Sharon, aged, renter, Berri/Barmera LGA)

“I think it’s not the right thing to over use whatever it may be, whether it’s fuel or power or air...turn it off.” ‘Jim’ (migrant, aged, Berri/Barmera LGA)

“I go around switching lights off and saving energy wherever possible...I have always been like that, I have lived in this home since I was 7 years old and grew up with my grandmother who raised me to be very frugal as we did not have a lot of money.” (‘Bonnie’, aged, migrant, Port Adelaide/Enfield LGA)

Overall participants gave a wide variety of opinions as to whether or not they felt the weather had changed or if average temperatures were different now. Most participants based their opinions on their own personal experiences, not on science or media reports; although a few did base their opinions on a combination of both experiences.
and science. Older participants in particular often discussed coping with extreme heat in terms of their previous experiences of weather as children. For some this meant that they felt summer temperatures today are not as extreme as when they were growing up. While others felt that average temperatures were about the same but they reflected on the fact they when they were growing up houses did not have air conditioning or fans to alleviate discomfort during heat waves. For example ‘Linda’ (unemployed, Port Pirie LGA) who is not sure if the extended heat waves are any worse now, ‘I remember extended heat waves as a child and ...well... maybe I just felt them more then because people didn’t have air-conditioning and fans to cope with them like they do now’.

Other participants, like ‘Pam’ (aged, Port Pirie LGA) were also unsure if heat waves and days of extreme heat had got worse or if they just felt worse now that they were older; ‘we are used to the heat ... we have always lived in very hot places. However I do think the average temperature is a couple of degrees higher now or maybe I’m just getting older and notice it more now. Either way, we don’t mind the heat’. As with the participants who saw living frugally as just a way of life, for most of these participants extreme heat and heat waves were also considered ‘just a part of life’ and any lifestyle adaptations were considered common sense, something they had always done. ‘John’ (aged, migrant, Berri/Barmera LGA) feels people who live in the country rely more on life experience and on other people with similar experiences in the local area rather than formalised sources or government departments to get through trying times. ‘The fact is, we in the country, you’ve got to look after yourself. We haven’t got too many [government] departments....none of us go to departments, we’ll go to the people on the land.’

While long term philosophical approaches to living a simple, frugal life or coping with changes in temperature can mean that certain people in the community will naturally be more resilient to change, there are certain external events that impact on resilience, such as health and finances. A more detailed discussion on both of these factors, and their impacts on adaptations and motivations to adapt, will be provided in the following section on adaptations. However, it was noted that those interview participants who appeared in good health and/or with sufficient financial reserves were more likely to talk positively about the types of adaptations they could make to mitigate future changes in weather and rises in costs of living. One couple, (‘Bonnie’ aged, migrant) living on a semi rural property in the Port Pirie LGA, have made a lot of adaptations around their home. They were partly self-funded retirees whose children had recently moved out of the family home; reducing their household bills. The couple have solar panels, extensive shading and verandas and 100,000 litres of rainwater retention on site. They had to be mindful of spending, now they were on a fixed income, but had the capacity to make choices that were very sustainable. Furthermore, they were very well connected in the local community through various groups and activities and this evidently influenced their awareness of information available to them and global environmental issues. The resilience of their situation became apparent throughout the interview as a result of compounding factors such as the environment they lived in, their physical and mental health, their finances, and their community connectedness.

Ironically, there were one or two examples where having better financial reserves meant that participants were less likely to have made changes to their lifestyles, or that the changes they had made meant they were able to maintain lifestyle choices rather than adapt behaviours. For example ‘Jackie’ (aged, Berri/Barmera LGA), who could be

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1 For most participants concepts of science around climate change was limited to what had been described in popular media such as television, radio and newspapers. As such widely varying versions of the ‘science’ behind climate change were offered and are not expanded on here.
described as being in a very comfortable financial situation and has recently installed more than $25,000 worth of solar panels on her family home. ‘Jackie’ described how this did originally make a big difference to their electricity bill but she also explained that they have now actually increased their energy consumption because “now that we have the solar panels we can relax a bit about how we use things like the air conditioning”. Or this observation from ‘Becky’ (single mother, renter, Port Adelaide/Enfield LGA) who says she thinks that people who have a lot of money tend not to think about the sorts of cost saving (and thus environmentally friendly) measures she had described her own family as making, whereas people like herself who have always lived on a low income tend to be more conscious of the little things they can do.

Social connectedness appeared to have two key effects on interview participants’ sense of resilience: as an indicator of support and as a means of access to information. In terms of levels of support, participants discussed how well supported they felt by others and how much they felt they could offer support to others.

Interview participants generally spoke of finding information on ideas for adapting behaviours and home environments from both formal and informal sources. For example when participants were asked where they had got their information about installing solar panels they usually described multiple sources: a first step was often asking family, friends, neighbours or work colleagues about their experiences; and this was usually then explored further by using the internet and/or speaking to professional installers for their advice. ‘Kendall’ (single, Port Pirie LGA) describes how this mix of formal and informal information sources worked for her: ‘More informal sources-originally. Just conversations in staff rooms, with different people across the fence...I listen to ABC radio a lot...I guess I do hear a lot of information that way as well, that make me think about things I didn’t know about. Sometimes you get things in the post like, from the council, but not a lot.’

‘Iris’ (migrant, aged, unemployed, Port Adelaide/Enfield LGA) explained that she learned about the potential benefits of solar panels, costs and rebates through her social networks at the retirement village where she lives. She decided to install solar panels along with 10 other residents in the village. Some older interview participants described how younger family members would source the information for them and assist them in making decisions about what course of action to take. For example ‘Edith’ (aged, migrant, Port Adelaide/Enfield LGA) suggested that there is a lack of information for people about how to make changes, ‘There are so many things available to us that we don’t know about’. Her son has helped her look online for information around making more energy efficient decisions and ways to save money; they found out that she could save some money as a pensioner, for example a rebate for some maintenance costs.

Others discussed receiving conflicting information, or finding the information they sourced independently confusing and hard to understand. Participants also described how they would then share their own experiences and information with others. ‘Edith’ suggested that there could be some sort of program, perhaps council operated, once a month that could serve to better inform people. For example she feels the carbon tax was not well explained, she thinks people are seeing an increase in their electricity bills and blaming this on the carbon tax.

Participants cited local councils and government departments (such as Centrelink) as their most likely formal sources of information, particularly in terms of household adaptations and potential rebates and concessions. However opinions about these sources varied widely; for example some participants described good information they have received from their local council while others in the same council district felt that
they had not received any information from their council. Participants also mentioned receiving tips and ideas on potential adaptations from media sources such as the television, radio and newspapers at different times. As ‘Anna’ (aged, migrant, Port Adelaide) explained ‘I was always careful, but we were never informed enough like we are now...like I didn’t know that by leaving the [power point] switches on they’d still draw power. Didn’t know that until we started hearing it on the radio and in the paper and all of that. After I got informed, I started doing it.’

Other information was often found in ad-hoc ways. For example ‘Barbara’ (migrant, Berri/Barmera LGA) described an ‘energy kit’ she had accidently discovered, and subsequently borrowed, from the local library which enabled her to check the energy output of her appliances at home and offered tips on energy saving adaptations she could make around the home; but no one else interviewed in this council district mentioned this freely available pack (including service providers and other stakeholders). Some participants discussed knowing about certain rebates and concessions they were entitled to while others explained that they had no idea what concessions they might be entitled to or where they would go to source such information. For others they felt that many rebates and concessions were often only available for a limited time, thus they would receive outdated information from both informal and/or formal sources. This added to the confusion of sourcing good information. Finding and sharing good information was clearly one way of ensuring interview participants felt more resilient to rising costs of living and coping with extreme weather conditions. However, clear consistent information was not always described as easy to find.

Overall it appeared that attitude made a big difference to a participant’s sense of resilience. Those with a good attitude and who felt they were able to cope with the stressors and pressures in daily life were more likely to talk positively about the adaptations that they had made, or were intending to make, to their lives. They were also more likely to suggest the individuals could make a difference to the environment and climate change. Those who felt that things were too hard and/or that individuals can’t make a difference appeared more limited in their approaches to adaptations in both households and lifestyles. ‘Cathy,’ a single mother on a pension in the Port Adelaide/Enfield LGA for example, thinks that one of the main problems is convincing people to take small steps to make a difference. ‘Even if it is just one small thing in their house, if everybody did a small thing it would make a difference’ and ‘Cathy’ thinks that too many people think that small thing isn’t worth it. With that attitude in mind she had undertaken many adaptations, despite being a renter on a limited income; she certainly saw the value in growing her own food, putting up with a bit of heat, watering less and changing other gardening practices to make small differences.

For some, such as ‘Arlene’ (aged, migrant, unemployed Berri/Barmera LGA), who was making a lot of adaptations and described very resilient behaviour despite facing particular adversity and multiple disadvantages at the time of the interview, this sense of resilience was ascribed to living in a rural environment: ‘Country people tend to be very self-sufficient, you do learn to be more practical about living...you recycle water, grow a lot of your own fruit and veg, we have chickens for eggs and so on, you help each other out ...that’s how it is in the country’. This was also reflected by ‘Pearl’, ‘...coming from a farm, with the water, we had so many droughts it wasn’t funny, so the first thing I did when I moved in was put in the rain water tanks’ (Pearl, aged, disability, renter, Port Adelaide/Enfield LGA).

For others, a positive resilient attitude was about considering ‘the bigger picture’. For example ‘Kym’ (migrant, recently unemployed, Port Pirie LGA) discusses how the changes she and her family have made are both about ensuring they manage
financially as a family, but also that they ‘do the right thing’ for the environment: ‘I like to think that I am already doing my bit, but I suppose everyone could do more.... my concern is a little broader than just about me, but our catalyst for change is definitely that we want to get by as a family unit.’

In putting together the findings of the qualitative research on vulnerability and resilience the following points emerge:

- Respondents are showing resilience in coping with the limited impacts of climate change they have already experienced.
- However, there are real concerns that any exacerbation of these impacts will greatly strain their resources and ability to cope.

**Adaptation Practices**

Interview participants were asked to describe what kinds of things they did to cope in times of extreme weather (excessive heat waves, storms, flooding, winter cold etc.) and any adaptation practices to combat perceived rising costs of living. The strongest message from the household interviews was that, regardless of views or beliefs on climate change, all interview participants were making adaptations to their immediate environment or daily lifestyle practices in response to changes in the weather and/or the rising cost of living. Two main forms of adaptation were noted in the interviews with householders. Participants described larger, often structural, household changes such as installing solar panels or rainwater tanks, re-planting gardens or buying new appliances and so forth. They also discussed smaller lifestyle changes such as recycling household grey water or turning off lights and appliances.

**Household Changes**

Larger household changes included quite substantial financial investments in items such as solar panels, rain-water tanks, pergolas and verandas. Many interview participants had already installed solar panels, some talked about their intention to do so in the future while others said they would install solar panels if they were able to (see barriers to adaptation for further discussion on this point). Only a small number of participants said they had no desire to install solar panels, generally because the return on the investment was considered not worth it – for some this was associated with their advanced age and for others it was because they were considering moving in the near future.

The majority of participants had rainwater tanks, or were considering the installation of rainwater tanks. Some participants discussed already having a rainwater tank but had intentions to install additional rainwater tanks. For some rural interview participants rain water was their main source of water and for other, older participants, using rain water was seen as ‘something they had always done’. Rain water was particularly used by many participants as a way of maintaining their gardens, although some participants discussed having rain water plumbed to their house. ‘Cynthia’ (aged, renter, widow, Port Adelaide LGA) described her frustration with the fact that capturing household rainwater is not as common practice as it has been historically, she expressed a great concern that ‘when there is a whole lot of rain, it all runs down the gutters and is wasted.’ ‘Cynthia’ believes that people should recycle more water and comments that: ‘years ago no one had mains water everyone managed their own water and had lots of rainwater tanks.’

Another common household change was adaptations made to gardens around homes. Most interview participants discussed making changes to their gardens by reducing or removing lawned spaces and subsequently increasing paved or gravel areas;
replanting gardens with natives and other drought tolerant plants; and/or incorporating modernised watering systems (including some plumbing grey water from the house onto the garden spaces). For many the catalyst for these changes had been the water restrictions in South Australia in previous years. ‘Martha’ (aged, unemployed, Berri/Barmera LGA) for example has noticed that people around the area have changed their water use habits as a result of ongoing restrictions in previous years. As Harry and his wife Pamela explain, ‘We used to have a lot more lawn... put a lot of pavers in... done away with the lawn out the front to save water.’ (‘Harry’, migrant and aged, Port Pirie LGA). ‘And he’s going to some more to cut the water down. Especially, when water restrictions were on, we were really battling there.’ (‘Pamela’, migrant, aged, Port Pirie LGA).

‘Kendall’ (single, Port Pirie LGA) also shared experiences of changes to the garden as a result of drought and rising water prices:

‘I’ve had to change a lot of plants to ones that are a lot harder...heat and the drought did affect me but I just had to adapt to that...I’ve got rid of a lot of lawn, used to have masses of lawn...it’s gravel down the back and a lot more garden, used to be a (lawn) tennis court down the back but that’s all gone now...you couldn’t afford to water it.’

Other household changes included erecting pergolas and verandas around houses to increase shaded areas on the outsides of homes, installing window coverings (external and internal) to block out the sun and control heat, planting trees for shade strategically around the home, installing more efficient heating and cooling systems to save energy (including ceiling fans as an alternative to using air conditioning), changing appliances to more energy efficient models, and increasing the amount of insulation in homes.

‘Craig’ (single, aged, renter, Berri/Barmera LGA) recently replaced an old air conditioner that wasn’t very efficient for a newer one. He also bought a smaller refrigerator and feels he is making efforts to conserve energy and downsize on unnecessary appliances where possible. While ‘Jeff’ (aged, migrant, Berri/Barmera LGA) says increasing water bills made him more aware of how much water he was using for different things like washing: he discovered his washing machine uses a lot of water so he is researching new machines that use less water as one way to save.

‘Kathy’ (renter, Housing Trust, single parent, Berri/Barmera LGA) also realised how much water her washing machine used when she received a notice in the mail during water restriction period saying her usage was too high. She has since replaced her washing machine with a front-loading machine.

Indigenous householder exhibited different ways of adaptation, which are not dissimilar from the general population. ‘Kerry’, for example has changed her gardening practices, removing the lawn on her property (let the lawn die) and adding natives and succulents to her garden to deal with the drought: ‘I get a bit angry sometimes about having to let the garden go, but you can’t afford it all: water, electricity and food. Bloody hell, that seems to go up every time you go shopping.’ (‘Kerry’, Aboriginal, Aged) ‘Sarah’ also described some changes she had made that were in keeping with other interview participants: including some modifications to her home which included installing solar panels to help with rising electricity costs, installing insulation in the roof of the house and installing a rain water tank (largely due to her preference for untreated water).

Most participants discussed having carried out multiple household changes but for many participants these household changes had occurred over time. As one participant described: ‘We just try to do practical things to make it [the home] better where-ever
possible...each year we are making some progress, making some changes.’ (‘Karen’, migrant and unemployed, Port Pirie LGA).

**Lifestyle Changes**

As described earlier, some adaptations were more about small changes to lifestyle and daily habits. Some of the changes described related to coping with changes in the weather while others were in response to the increased cost of living. In terms of extreme weather events most participants talked about the need to cope with extreme heat (and heat waves) and a lack of water as the main priorities in South Australia.

In terms of combating issues of water, participants discussed things such as taking shorter showers or showering less frequently, watering the garden less often and at different times (e.g.: at night rather than during the day) and collecting household grey water from showers, the washing machine and the kitchen sink to use in the garden. Measures to deal with extreme heat included things often described by participants as ‘common sense’ such as shutting up the house early in the day, making sure all activities and errands were taken care of early or late in the day to avoid going out in the heat, having showers and using fans and air conditioners to stay cool. Participants however, also talked about delaying the use of air conditioners until necessary on hot days; relying more on fans and staying inside as a cost saving measure.

‘Jane’ (aged, migrant, Berri/Barmera LGA) tries to manage keeping her home at a comfortable temperature while keeping costs affordable as a pensioner:

‘Because I’m on a government pension, you have to work out what is best for you. That way I can save a little bit by turning things off for awhile. Same with the heating. I’ll have the heating on for a couple hours in the morning when I get up and then I’ll usually leave it off for the rest of the day’.

While ‘Bonnie’ (aged, migrant, Port Adelaide/Enfield LGA) mentions that they have purchased a fan for every room of their home so they can avoid switching their air conditioning on unless it’s absolutely essential: ‘We put all ceiling fans all through the house so we wouldn’t have to run the air conditioner, put them in all the bedrooms...on those ‘in-between’ days where it’s not hot enough but hot enough to (need the fans) to be comfortable’ (‘Patrick’, single, Port Pirie LGA). Similarly ‘Iris’ (migrant, aged, unemployed, Port Adelaide/Enfield LGA) delays turning on the air conditioner or heater as long as she can: ‘The longer I can manage without, I do. I don’t put it on until I really feel uncomfortable. I’m in a fortunate position where I can manage it, but I am conscious of trying to be economical with it.’

Others talked about using air conditioned public spaces such as libraries, pubs and shopping centres on hot days, or going to a friend or relative’s air conditioned home to keep cool in order to stay cool but reduce their energy costs. ‘Kim’ (renter, single parent, Berri/Barmera LGA) says that on hot days she will go visit a friend’s house who has an excellent air conditioner. She says the friends is not in good health so visiting him on hot days is a good way to check in on him but also benefits her because she can socialise with him and stay cool.

These are also common practices among the Aboriginal households. ‘Sarah’ (Aboriginal) commented that sitting by the river is seen as a good way to cool down; this is a practice for her personally and in the Indigenous culture group as a whole:
‘A lot of the really old fellas if they can get around a bit, they head straight to the river, under the shade of a tree...because down there it is cooler. They can’t stay in the house because it is too hot. If they’re close enough to be able to walk or they can drive a car...which 90 percent of them can’t anyway...’

We also attempted to ascertain if these practices were in traditional or specific to Aboriginal practices. ‘Kerry’ says:

‘A lot of people just go to the river. Get out of the house and catch that breeze and a bit of fishing and that...I’m not really traditional. Mum was an original descendent but we never....but a lot of people go to the river still, they just get out.’

Some participants felt that the heat was not an issue for them and they generally did not mind hot days and did not need to overuse things like air conditioning. Others suggested they freely used their air conditioning as needed on hot days. As one participant described:

‘If they say it is going to be hot, I prepare for it. The worst one I think was last year in the summer, we had four days at 45 degrees, and man that’s hot, believe me. All you can do is stay inside with the air conditioning going. That’s what the ambulance guys said “get inside, shut the curtains, make the place as dark as you can and sit by your air conditioner”... that’s all you can do. As soon as you walk outside, it nearly chokes you.’ (‘Martin’, aged, renter, Berri/Barmera LGA).

‘Gerri’ (aged, Berri/Barmera LGA) also prioritises keeping her home a comfortable temperature and does not hesitate to use the air conditioning on hot days saying: ‘You just pay for the running costs. You have to have it.’

There were many examples of small lifestyle changes given, related to reducing the cost of living, with saving electricity costs clearly the biggest priority. Participants discussed using energy saving globes, turning off lights and appliances when not in use, using electrical appliances during off peak periods, ‘thinking twice’ or delaying putting on heating or cooling, using extra layers of clothes or rugs instead of turning on the heating in winter, using portable meters to check the power usage of appliances, and avoiding use of some appliances (such as clothes dryers and oiled filled column heaters) that were considered high energy users.

A number of participants discussed having received a free energy audit from their electricity provider. ‘Cathy’ (migrant, single, renter, Port Adelaide/Enfield LGA) recently had an audit done and describes how it made her more conscious of what appliances consume too much energy so she knows what to concentrate on switching off: ‘The energy company installed switches so that when the television is turned off it turns other connected appliances (like the DVD player) off from standby,’ ‘Roger’ (aged, renter, single, migrant Berri/Barmera LGA) says the increasing cost of power has made him more aware of his power usage, explaining that he had always thought about shutting power off at the power points but: ‘...it wasn’t until the past few years with electricity costs creeping up that I actually have done it because I just had to.’

**The Rising Cost of living**

One of the findings of the survey analysed in earlier chapters was that one of the major ways in which climate change was impacting upon disadvantaged groups was through greatly increased pricing of utilities, especially power and water. Social exclusion meant that they increasingly fear being unable to meet these costs. Participants in the
qualitative survey were also asked to comment on any perceived rises in the cost of living and adaptations they may have made to cope with these rises. Most participants agreed that they had noticed rises in both food costs and fuel costs in recent years; however the majority of participants had not made significant changes to their shopping or daily activities as a result. Some discussed small changes such as shopping more for specials and cheaper brands; buying fruit and vegetables in season that were cheaper; reducing the amount of meat that they consumed, or trying to waste less food. For example, ‘Jim’ (renter, aged, migrant, Port Adelaide/Enfield LGA) has noticed the ever increasing prices of groceries and has altered the way that he buys; he acknowledges that he can’t buy everything he wants because he is on a limited income; he has now got into the habit of the buying mostly home brand products. These participants generally did not think that their changes had impacted on their health and well being in any way.

A surprising number of participants also talked about growing some of their own fruit and vegetables as a means of supplementing their food bills. Some rural participants also described keeping poultry for meat and eggs and a culture of swapping produce with neighbours and friends when they could. A small number of participants had made more significant compromises to their food purchases and for some this was in response to having to cope with larger utility bills. Of this group some suggested that this was having an impact on their health and well being. For example ‘Donna’ (migrant, renter, Berri/Barmera LGA) is on a fixed income and has a health condition that requires her to keep her home at a comfortable temperature, which requires her using the air conditioning often which in turn leads to higher power bills. As a result she has had to cut costs somewhere and her food choices and thereby her health has suffered. ‘Donna’ now skips breakfast to save on food costs and finds it difficult to buy healthier foods because they cost more: ‘all the good food that I’ve got to try and buy, with the less sugar and all that, that is more expensive.....it is easier and cheaper to eat crap, and takeaways and all that sort of stuff than it is to go to the shop and buy all the fresh produce and the healthier stuff for me...’ ‘Dave’ (disability, renter, unemployed, Port Adelaide/Enfield LGA) also says his diet and health have suffered due to increasing costs of living, which have forced him to change the type of food he buys: ‘[Because of] increasing bills I’ve had to change my eating habits. We eat a lot more pastas and filling things, that unfortunately tend to be carbohydrates rather than things like salads...I have put on an awful lot of weight.’

Similarly, participants commented on the increasing cost of fuel in recent years but most participants said this had not influenced their behaviours around using their cars. This was particularly true for rural participants where other options, such as public transport, were non-existent or very poor. Some participants noted small incremental ways they had made changes to their driving behaviours, such as filling up cars when petrol was discounted; ensuring that tasks and errands were combined into one trip in the car instead of making several trips; using public transport more where it was available; reducing recreational driving; and converting cars to run on gas or diesel to save money. A small number of rural participants suggested that they no longer made frequent trips to Adelaide because of the cost of fuel and they felt that this had impacted on their well being because they saw less of their family and friends as a result. ‘Gerri’ (aged, Berri/Barmera LGA) for example used to make an annual trip interstate by car or bus to visit her children and grandchildren but she says fuel costs have forced her to reduce her visits.

With regards to coping with rising costs of living, it was acknowledged by Aboriginal members ‘Kerry’ and ‘Sarah’ that Government schemes were very important for the Indigenous, particularly those with chronic medical conditions. ‘Kerry’ (who has diabetes and asthma) mentioned the ‘Close the Gap’ program for Indigenous people, a
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program, in effect since July 2010, for any Indigenous person on a pension, which entitles them low cost or free prescription medication. She talked about how rising costs of living have affected her but being able to obtain her medication for free has really helped her financially:

‘Closing the Gap is paid for by the government so if you have too much medication, and you can’t afford it all, Indigenous people can go and get ‘CTG’ to help them pay for the medications... because I’m a ‘Close the Gap’ person I don’t have to pay for my prescriptions so that was a blessing...used to cost between $86 - $100 something [for the prescription medication she requires] back when I was working, but that [cost] is completely gone now. If they didn’t have Close the Gap I’d be stuffed.’  (‘Sarah’, Aboriginal, Aged)

When it comes to keeping up with bills, Aboriginal householder interview participants discussed how the different methods they used to cope. ‘Kerry’ for example manages her bills through Centrelink (Centrepay) and has fortnightly deductions from her pension directed into her various accounts (for utilities and rent). ‘Sarah’ on the other hand is more disciplined and transfers money through BPay into her various accounts. These methods assist them in helping them budget their income better thus avoiding having to face huge bills. While it is difficult to determine whether this is a common practice, one can see that formal schemes in place such as ‘Centrepay’ are useful for those who users who are aware of their existence. This leads to consideration of availability of information and levels of social inclusion and their implications for resilience.

‘Kerry’ feels that information about schemes such as ‘Centrepay’ didn’t seem to be common knowledge. When asked how she found information, ‘Kerry’ said her proactive nature meant she tended to pick up relevant information wherever she goes and then passes it onto the people and groups she is involved with.

‘I’m very inquisitive, I love information. I’ll pick up pamphlets... and I try to pass it on to my sisters and brothers and that. I just pick up stuff all the time... they [councils, services] give out information every now and then but it’s not enough I don’t think, not regular. I pick up the pamphlets here now on the Elder mob. Because I think our people, Aboriginal people, need to know what they are entitled to...it is simple information that is not out to people. I go to our chronic disease group or women’s group or whatever and I give that information to the people.’  (‘Kerry’, Aboriginal, Aged)

‘Sarah’ also mentioned a lot about the need to increase access to information access, however she felt most of the time the issue laid with ‘people in positions of power’ (stakeholders such as doctors, government officials) who use language or terminology which can be too complex for many. ‘Kerry’ is an example of how having a pro-active attitude is important. In some other cases, the community aspect can help increase resilience.

‘Sarah’ explains that in the Indigenous culture things are done in quite a communal fashion with different family members, community members and service providers ‘in on it’, but in order to get help or information to someone in need things have to be communicated in the right tone and through the right channels in a culturally appropriate manner. She gives the example of an older Aboriginal man who had an issue with his prostate but was reluctant to seek help due to this concept of ‘shame job’ (see Barriers). Eventually, a younger family member had to approach him seeking
advice about his own (fake) prostate issue, resulting in the Elder taking responsibility and bringing the younger family member to the doctor. In this process, the elder family member would have admitted that he also had a similar issue and unbeknownst to him, the younger family member had already arranged for a doctor to check out the elder family member. This takes away the shame of the elder family member admitting he had a problem as it appears he only inadvertently found out about his issue while helping the younger family member.

‘I guess it’s called reverse psychology. You got to talk to them in a way that it is like they are coming up with the ideas and they are putting it across to you and you go “oh yeah, fantastic, why didn’t we think of that”...that makes them feel big and important.’ (‘Sarah’, Aboriginal, Aged)

Some participants talked about ‘tradeoffs’ - areas of their lives where they were willing to make compromises on how they lived and other areas where they were willing to pay in order to do what they wanted or needed to do. For example, one participant, ‘Kerry’ (single parent, Port Pirie LGA) described many household and lifestyle changes she had been willing to make in order to reduce her energy consumption but explained that she liked taking long showers and enjoyed having a nice, lush garden and therefore was willing to pay extra for those things. Or ‘Betty’ (aged, migrant, Port Pirie LGA) who suggested that if necessary, her husband and she would consider being more frugal about household purchases like new furniture or clothes but would not give up watering the garden because that is so important to them. Another participant, Jane (unemployed, renter, Port Pirie LGA), described how she always tracked their spending on food over the year and felt that in the last couple of years this had increased by more than $4,000 per annum. However, she had not made any changes to their shopping and eating habits, partly because her daughter had several allergies and Jane was therefore careful about what products they ate and partly because she felt it was important their family ate a healthy diet, regardless of the cost.

Overall, every interview participant described several kinds of adaptation behaviours. While for most participants these were new behaviours in recent years borne directly out of a need to reduce their cost of living or in response to environmental changes, others described these behaviours as ‘common sense’ or suggested that they had always led frugal, simple lives that incorporated these types of adaptations. This report will now turn to examine more closely the motivations behind adaptation behaviours.

**Motivations**

Interview participants described two main motivators for the adaptations they made to their homes and lifestyles. Saving money on living costs, in particular utilities was clearly the main driver for adaptations to behaviours. However, participants also discussed environmental motives that have triggered changes in their behaviour in certain areas. A few participants described ‘top down’ measures that had led to them changing behaviours, chiefly around water as a result of the water restrictions that had been in place in South Australia in recent years.

Most interview participants commented on the dramatic rises they had experienced in their utility bills (particularly electricity) in recent years and saving money on utilities was of most concern for those interview participants on a fixed income.

For a considerable number of participants the installation or desire for installation, of solar panels was driven by a desire for reduced energy bills; not as an environmental measure. The response by participant ‘Julie’ (aged, migrant, Berri/Barmera LGA) sums
up the sentiment of many when it came to the reason for installing solar panels: ‘Well I suppose it does help that [the environment] but my biggest concern was to try and keep the electricity cost down.’ Similarly ‘Rhonda’ (aged, Port Adelaide/Enfield LGA) states of her decision to install solar panels ‘I wasn’t really thinking of the environment, it was more about cost.’

In fact, only a few interview participants discussed solar panels in terms of an environmental measure. ‘Kym’ (unemployed, migrant, Port Pirie LGA) a pro-active environmentalist finishing a science degree was one of the few participants who commented on the role of her solar panels as a environmental measure, although her primary motivation for installing solar panels was still to reduce their electricity bill: ‘We put up solar panels this year, but I’m not sure how much of a difference it is going to make to the bills yet, but it gives us that warm fuzzy feeling that we are doing something.’ ‘Iris’ (migrant, aged, unemployed, Port Adelaide/Enfield LGA) also explains that regardless of the economic benefit she ‘feels good’ about having installed solar panels: ‘Well intellectually I think it must have been a good thing. Actually I couldn’t tell you in hard cash but I just feel it’s been better, but no I can’t give the evidence for it.’ ‘Dave’ (disability, renter, unemployed, Port Adelaide/Enfield LGA) similarly explains his feelings around trying to conserve power: ‘I don’t know if it’s costing me more or not, but I feel better about using my candles than increasing my carbon footprint.’

Other interview participants, who expressed strong anti-climate change views during the interview, had installed solar panels purely because they were seen as a cost saving measure. Interestingly, many participants discussed solar power as an environmental measure at the larger societal scale, such as specific government, planning and industry measures but not at the individual household level (see further discussion on this under governance and institutional change).

For those participants who expressed an interest in installing solar panels in the future or an inability to consider solar panels at all, lack of finances to do so or residing in a private rental property or public housing where they were powerless to make those choices were the main deciding factors. As ‘Jim’ (aged, migrant, Berri/Barmera LGA) explained, the only reason he could put solar panels on his home was because he could access superannuation funds to do so: ‘if you’ve got the money, you do it ...whereas fifty percent of the people don’t have the money.’

Participants described many small, incremental changes in behaviour that they hoped were going to make a difference to their power bills; such as using energy saving globes, turning off lights and appliances, extra layers of clothes in winter instead of heating, and using fans instead of air conditioners. As ‘Barbara’ (migrant, Berri/Barmera LGA) explained: ‘I hope all these small changes over the past year or so will start to make a difference to our bills ... we’ve been trying really hard.’

While saving electricity appeared to be strongly linked to saving money, saving water had a much stronger link to environmental altruism – ‘doing something for the planet’ and ‘saving the Murray’ were common themes. As ‘Anna’ (migrant, aged, Port Adelaide LGA) described: ‘I’m not just worried about paying for it [water], I’m worried about the way the planet goes...because with all these [weather] extremes we’re going to need more and more [water] aren’t we.’ For many participants saving water was associated with acknowledging that they lived in a very dry state that had a long history of significant water issues; many felt they have always been careful with water because of this. This was particularly apparent when considering the number of water saving adaptations private renters and public housing tenants made despite the fact that most did not pay for their water consumption. ‘Cathy’ (migrant, single, renter, Port Adelaide/Enfield LGA) who doesn’t pay for her water bills expressed frustration at the
fact that she has to maintain a lawn for her landlord, she strongly believes that people need to change their attitudes about having a green lawn in south Australia: ‘It’s a real problem in my opinion!’ ‘Cathy’ says if her garden were actually her own she would adapt it to be more native, but as a renter she doesn’t want to invest her own money in doing this because there is always a chance she might have to move; instead she makes efforts to minimise her watering.

Opinions about saving water were strongest for those participants from rural areas, and most noticeable in the attitudes and comments of those participants from the Berri/Barmera LGA (located on the River Murray) where the issues with the management of the River Murray and water allocations for surrounding farmers and fruit growers were topical, relevant issues everyone could identify with. As ‘Arlene’ (migrant, aged, unemployed, Berri/Barmera LGA) explained, their local community had lived with a lot of severe water restrictions over the recent years and most people were very conscious of the issues with the River Murray so they were particularly mindful of how they used their water.

‘The dropping of the water levels in the Murray has affected the whole area and we’ve noticed the impact on the fruit blocks and businesses as well as the increased salinity in the water and in the soil. At times the salinity levels in the irrigation water have been so high we haven’t been able to use it on our fruit trees and plants. At one stage we couldn’t even use it for the ducks and chickens!’

‘Alan’ (renter, aged, Berri/Barmera LGA) also discusses through his life history of living on a farm how they are used to the difficulties associated with periods of drought and they are used to saving water. When they lived on the farm they would do things like save the water from their showers to use for the garden. These habits has translated into their current practices, now they use a bucket in the sink when doing dishes so they can reuse that water on the garden, and they have a hose that collects household water for use on the garden. They have always been taught to save water growing up so that has been a habit that has stayed with them.

Concern about the environment was more prevalent among the Aboriginal households. Interviews with them suggest that generally the Indigenous community had the fairly common view that the environment is suffering and to a large extent, ‘white man’ is to blame:

‘Quite often you hear the Elders when they’re sitting and talking saying “Oh these bloody goonya fellas they don’t know what they’re doing, they’re killing the river.” …but it’s true. When the Aboriginal people lived in Australia they didn’t rape the land, they didn’t rape the river…’

(‘Sarah’, Aboriginal, Aged)

‘Kerry’ (Aboriginal, householder, aged), when asked if she believed in climate change said ‘Oh yeah. Something has to be going on for the world to be the way it is now.’ ‘Kerry’ was also distressed during times of drought which she related to her ‘being Aboriginal’. Given their heritage, being distressed with the climate is something which could be more common with other members in the Indigenous community. ‘The drought was wicked. I didn’t think it would affect me you know, but it did. You just think of the river dying…very depressing…being Aboriginal, you worry about the land.’

(‘Kerry’, Aboriginal, aged)

Several participants described how ‘top down’ water restrictions in recent years in South Australia had changed their habits motivating them to make long term changes to their lifestyle behaviours, garden designs and use of water. ‘Ray’ (aged, renter,
single, migrant Berri/Barmera LGA) has noticed that people have changed their habits around using water as a result of water restrictions that were in place during years of drought. ‘I think we’re pretty good [about saving water], I think most people are, I think they had to...People haven’t gone back to their old ways [of using more water] and it’s a good thing, because most of our water comes out of the river.’

It was during this period that many participants had made extensive changes to their gardens, letting lawns die and replacing them with paving or gravel, and changing the types of plants they grew. ‘Becky’ (single mother, renter, Port Adelaide/Enfield LGA) described her disappointment at the lifting of the water restrictions because she felt that top down imposed water restrictions had made a marked improvement on everyone’s behaviour concerning water use and that now the restrictions were lifted it was sending a message to the community that water conservation no longer mattered. Several people also discussed the concept of ‘social surveillance’ that had occurred within communities during the water restrictions; where neighbours and other community members would make observations and comment on who was not following the water restriction guidelines.

Overall, interview participants showed high levels of motivation to make changes to their lifestyles and environments. However, it was clear that while some motivations (particularly around water use) were associated with environmental concerns many adaptations were motivated purely by economic concerns. The latter points to the fact which is clear in the survey responses that the effects of climate change are especially severe among excluded groups who lack the economic and social resources to adapt effectively to them. The next section turns to an examination of the barriers which the sub-groups perceive exist to them making effective adaptation to climate change impacts.

**Barriers to Adaptation**

Barriers to adaptation were less clearly delineated and for some participants there was a lot of complexity to their lack of adaptation. For example, ‘Donna’ (migrant, renter, Berri/Barmera LGA) has a physical disability (Lymphodemia) that leaves her housebound much of the time and requires maintaining her home at a fairly even temperature year round; this meant extensive periods at home with the air conditioning or heating on. ‘Donna’ explains that the size of her leg can swell up to four times its normal size during hot days, however, her reluctance to leave the house is not just health related, ‘Summer’s the worst time with the pain and discomfort as you’re not able to wear jeans and you’re not able to wear skirts or dresses cause you don’t like people looking at your leg.’

Donna’s disability also means she is on a fixed income in the form of a pension which makes paying these higher energy costs more difficult. In addition she is living in public housing and as a non-home owner does not have the option (or the finances) to explore alternative sources of energy such as solar panels. Donna says she would ideally like to put blinds up outside to help deal with the hot weather, but at the moment she cannot afford quality blinds so has not put these in yet. There are additional things she would also like to do to improve her home, like add insulation to the ceiling but is restricted by the Housing Trust rules and financially on what she is able to do. Solar panels would be good but this is way out of her reach financially. Also the Housing Trust has told her that when she leaves she would need to take the solar panels down and she is not physically capable of that. Thus the barriers to Donna making sustainable adaptations to alleviate the rising cost of energy are financial, health related, institutional (as a public housing tenant), and to some extent social as well.
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Economic barriers were clearly a factor as to whether installation of solar panels was an option for reducing energy costs. Solar panels were considered by most participants as a significant investment and for some participants the cost of installation was prohibitive, although the concept was appealing. For others the cost was a disincentive only in terms of the length of time for a return on their investment; thus some participants explained that they had considered solar panels as an option but once they realised the length of time it would take to recoup the cost of installation they did not consider it a worthy investment. For some participants this was because they were older and for others this was because they were considering moving in the near future. Other participants discussed the reduction in up-front rebates to install solar panels and the reduced rate on feed-in tariffs, the price paid to energy returned to the grid (quoted by one participant as dropping from 56 cents per kilowatt to 16 cents per kilowatt) as strong financial disincentives for considering solar power. These last points about rebates and tariffs can also be viewed as institutional barriers to adaptation. ‘Harry’ (migrant, aged, Port Adelaide/Enfield LGA) described how at the time that he installed solar panels, the breakeven point where they would pay themselves off was expected to be four or five years. He thought that seemed like a really good deal, however he recognises that now it is much higher and that he can understand why people would be less inclined to make the investment now when the return (feed-in tariff rate) is nowhere near as good.

Other institutional barriers included limitations to the number of solar panels allowed per dwelling, with some participants suggesting that they would install more solar panels if they were allowed. One participant, ‘Barbara’ (migrant, Berri/Barmera LGA) and her family had recently installed a large, commercial bank of solar panels on their 20 acre property as a financial investment. They had been pleased with the results of this investment (while noting that they had ‘got in at the right time’ and were receiving a good feed-in tariff rate) and had considered also putting solar panels on their home, located on the same property. However current regulations do not permit them to have both, despite Barbara and her husband seeing one as a commercial venture and the other as an adaptation measure to reduce their home energy consumption. ‘Kym’ (unemployed, migrant, Port Pirie LGA) faced a similar dilemma when she realised that the maximum number of solar panels allowed on their home was not going to reduce their energy bills as much as they had hoped (mainly due to a drop in the feed-in tariff rate). ‘Kym’ was now exploring the option of installing wind turbines on their ten acre property as a supplementary adaptation to hopefully reduce their energy bills to zero.

Institutional barriers also existed for private renters and public housing tenants who faced considerable restrictions on the kinds of adaptations they could make to their living environment. The main restrictions noted in interviews related to the installation of rain water tanks and solar panels. ‘Jim’ (renter, aged, migrant, Port Adelaide/Enfield LGA) expressed a keen desire to put up solar panels at his own expense on his public housing unit; he describes his frustration with approaching the Housing Trust about the matter:

‘There are things that I think they [the Housing Trust] could do more of....instead of all these silly programs they do...they should be putting things on people’s houses like solar panels, doing something so that we get a return back for it and it’s helping us at the same time, but unfortunately they don’t believe in things like that. I asked them [the Housing Trust] can I put them [solar panels] on, and they said no, even if I wanted to pay for them myself, because that would get the ball rolling and everyone would want them.’
Craig’ (single, aged, renter, Berri/Barmera LGA) also described impeding constraints faced as a Housing Trust tenant; he states ‘if the Housing Trust provided more support I might make a few changes like pulling the tree out the back to improve the quality of the rainwater, or maybe installing solar panels.’ Others commented on different adaptations they would make to the structural design of their living environment, given the choice, by constructing wider verandas and/or shaded pergolas. Some participants also commented on having to reluctantly use more water than they would like maintain existing gardens in rental properties.

Despite these institutional barriers described by private renters and public housing tenants this group of interview participants also provided many examples of where they had made positive adaptations to their living environments. Examples were given of tenants installing or upgrading air conditioning, installing fans, blinds and/or heavy curtains to control room temperatures, erecting car ports, and re-planting gardens with drought tolerant plants. In addition to this private renters and public housing tenants were just as likely to comment on lifestyle adaptations they had made as were home owners. For example ‘Cathy’ (migrant, single, renter, Port Adelaide/Enfield LGA) worked very hard when first she moved in to her rental property to convince her landlord to allow the installation of a dual flush toilet. The landlord agreed to this because at the time there was a rebate available of $150.

All interview participants were asked about where they sourced information in order to make the adaptations they had discussed. While information sources are discussed more fully under ‘Resilience’ it must be noted that for some information sources could be considered a barrier to adaptation. For some, this was simply a lack of information and not being sure where to go to source good information; for others it was simply having the wrong information. A good example of this is ‘Betty’ from Port Pirie (aged, migrant) whose husband is involved in the National Resources Management board locally. Through this group they have received some very helpful information about appropriate native plant options for the local climate; however she doesn’t think this information is easy to access for the everyday householder.... ‘Most garden shows on television are not promoting garden options suitable for the climate in South Australia and there is a lack of South Australian oriented climate information, from people who know what they are talking about.’

Lack of information or poor understanding of information was an issue for some in the Aboriginal community as well. This was highlighted by ‘Sarah,’ who felt that telling someone they had diabetes without clearly explaining to them what the illness was about, its ramifications and the required medications and treatments was an issue. Patients needed to help in understanding why they needed to change their diet rather than be given a health foods list for their condition without understanding the reasons for it. ‘Sarah’ also felt that more often than not, stakeholders did not take into account complex individual situations.

‘Telling someone to buy healthier foods is no good if that food is more expensive and they can’t afford it...this just leads them to feel less empowered and more ashamed.’ (‘Sarah’, Aboriginal, Aged)

2 It is noted that Housing Trust tenants are receiving either mixed messages or not getting the full picture when it comes to their rights in making alterations to the house. As ‘Pearl’ says, “At the start, we weren’t allowed to get them (solar panels). Housing Trust wouldn’t allow them up on the roof...it was a lot of paperwork, put it that way.” (Pearl, aged, disability, renter, Port Adelaide/Enfield LGA)
This would lead to some Aboriginals not understanding their situation and resulting in them feeling like they were being ‘talked down to’, which hinders efforts to pass on any helpful or useful information.

‘If people could be spoken to, civilly, in a way that they can understand, not spoke at or talked down to. If they were spoken to and could learn…and these doctors talk to them in way that they are human, then there wouldn’t be the amount of problems that there is today’. (‘Sarah’, Aboriginal, Aged)

‘Sarah’ also highlighted how discrimination and a lack of appreciation of the complexities surrounding Aboriginals can only cause further shame. She mentions often how some stakeholders would suggest to overweight individuals (who were struggling to pay their electricity bills) that they should cut back on food. To an extent, ‘Sarah’ links their buying of cheaper (and unhealthier) foods to higher costs of living. She also feels that stressors about issues such as paying their bills would cause them to turn to types of food and drink that may further contribute to their weight issues and perpetuate the vicious cycle; thus causing shame and further inaction. Sarah depicts the situation as a negative cycle: Struggle to pay bills → Stress → Poor eating → Health issues → Disengagement from work/life → Lower income → Struggle to pay bills...

‘Sarah’ suggests that in order to get information across or to inspire change, it is necessary first in the Indigenous culture, to become friends with the person, grow trust and understanding before giving any advice.

‘That’s what they have to start doing first. Learning about the cultures, and understanding more. And then…and only then…will they be able to understand…get to be friends with them and have cuppas with them and all that first, whether it be with the women or with the men…get to know them. Start being a friend first, colleague later or doctor, nurse whatever…comes later, become a friend first. Then you can go that little bit more. It takes time. It might take a long time. But in the end you’ll get there.’ (‘Sarah’, Aboriginal, Aged)

Several participants also discussed the lack of clarity with information or having received conflicting information; particularly around installation of solar panels and understanding what rebates and tariffs they were eligible to receive, or that they might have heard about certain rebates and government grants however the time frame was limited and/or poorly publicised so they missed out. Some participants on fixed pension incomes (aged or disability) were also unclear about what kinds of discounts they were entitled to. Messages about conserving resources should also be more consistent as ‘Martha’ (aged, unemployed Berri/Barmera LGA) suggests. Martha commented on fact that information about saving water, ‘saving the Murray’ comes and goes in waves depending on recent weather and climate events; in times of restrictions they hear the message about saving water all the time but then don’t hear this message in non-drought periods. Martha comments: ‘Shouldn’t there be a consistent message about saving water all the time?’

From the qualitative interviews there was a clear message that the existing sources of information to help people adapt to climate change were largely not effective in getting through to disadvantaged groups. Clearly much of this information has a “middle class” orientation and the messages often do not reach, are not relevant to and have little effect on these groups. This is certainly the case for Aboriginal groups but it also applies more widely. One of the dimensions of social exclusion in this context is that

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disadvantaged groups are “excluded” from getting access to information to assist them to adapt to climate change.

**Individual Perspectives of Institutional Change and Governance**

Interview participants were asked at the end of the interview if they felt there were more things that ‘ordinary individuals like us’ could do to make a difference. This prompted both a discussion about what individuals can do but also opened the discussion wider to incorporate views on climate change and also opinions about the ‘bigger picture’ of governance and institutional responses.

In fact, there were no real consistent views about climate change and/or changes in weather patterns. Some participants suggested it was cooler now, with less intense (or shorter) heat waves than in the past; some felt the summers were much hotter with more intense heatwaves and days of extreme heat. Others felt the summers were more humid, or that there were more storm bursts, and some suggested the weather has always been the same. However, regardless of belief in climate change, almost all participants discussed adaptations they had made to their living environments and behaviours. For some mainly in response to the rising cost of living and for others a combination of cost of living and environmental concern.

Participants’ views on the power of individual contributions were, in part, dependent on their views of climate change and environmental change. Those participants that expressed a strong belief in climate change were more likely to agree that small changes at the individual level would make a difference at the global level. For example ‘Alison’ (aged, migrant, renter, Port Adelaide/Enfield LGA) who thinks that climate change is a big issue and strongly believes there is more that individuals can do, like recycling, using public transport, and saving water and electricity. Others firmly believed that climate change was not happening at all, or it was happening but as a part of a natural climatic cycle and that as such individuals could make little difference. Interestingly some of these ‘anti-climate change’ participants did think individuals could, and should, make a difference but more in terms of lessening the demand for limited resources rather than influencing climate change. In this light some participants also offered suggestions for things that could be done at an institutional or societal level to put less pressure on the planet and make perhaps reduce the demand on natural resources.

Participants described two kinds of desired institutional changes. One line of thought was about the government, other institutions and industry providing a ‘stronger message’ to the general public. ‘Dave’ (disability, renter, unemployed, Port Adelaide/Enfield LGA) for example remembers the scare tactics that were used by the Australian government when the HIV/AIDS epidemic first appeared and he thinks the same approach should be used for the environment. ‘Dave’ thinks people are not worried enough about the problems with the environment and we really need to wake up and do something about it.

This included suggestions for better information, stronger regulations, higher taxes in order to curb ‘bad’ behaviours, and better legislation to encourage sustainable building, planning and industry practices. As ‘Becky’ (single mother, renter, Port Adelaide/Enfield LGA) explained: ‘a lot of the information that is distributed about environmental issues is more about options and could in fact have a much stronger message...I think that we are a bit soft on the environment message.’ Others, like ‘Anna’ (aged, migrant, Port Adelaide/Enfield LGA) agreed and talked about a better message to help people make a difference. ‘Anna’ feels ‘a lot of people probably aren’t educated enough about how to cope with changing environment so they are making changes in electricity use and
water and so on more to save money than to help the environment’. Or ‘Betty’ (aged, migrant, Port Pirie LGA) who feels that what is needed is a stronger national message about some issues; ‘Betty’ uses the example of plastic bag legislation in South Australia and says that if this was done at a national level ‘people would think it was worthwhile doing’.

In terms of stronger planning and building regulations, several participants suggested that planning regulations should make solar panels and rain water tanks mandatory for all new buildings and that stronger legislation was needed around the use of sustainable building materials and ‘green’ design (for example building must have eaves and wide verandas as passive energy saving designs or grey water recycling). ‘Will’ (renter, single, aged, Port Adelaide/Enfield LGA) discussed at length how contemporary building design (both housing and public buildings) have evolved to rely completely on air conditioning for cooling and heating compared to the older buildings. ‘Alison’ (aged, migrant, renter, Port Adelaide/Enfield) described Australia’s need to follow the example of European cities and move towards more medium and high density living with people living in apartments as a way of reducing our impact on the land and encouraging more people to use public transport.

The other key institutional change a large number of participants discussed was government initiatives to have all public building incorporating solar panels to ‘set an example’ to the rest of the community and also to contribute energy back to the grid. For example ‘Dave’ (disability, renter, unemployed, Port Adelaide/Enfield LGA) felt that people, as individuals, should ‘definitely do more’ to help the environment. He suggested small changes everyone could make, like recycling and using less electricity; however he also thinks larger scale changes need to be made in Australia stating; ‘The outback should be full of solar panels and wind farms.’

Others, such as ‘Linda’ (unemployed, Port Pirie LGA), felt that all public buildings should also have rain water tanks to support their own water use. Participants also suggested other ways that the government and industry could be more proactive about new, environmentally friendly technologies. For example, ‘Eddy’ (renter, aged, migrant, Berri/Barmera LGA) commented on current national policy suggesting that the carbon prices ‘were a good start to combating climate change’; but Eddy also believes ‘more should be done at the state and national level in terms of supporting the growth of solar and wind farms to reduce our reliance on coal’. A view shared by ‘Kym’ (migrant, recently unemployed, Port Pirie LGA) who was aware of some new innovative environmental initiatives in her region but suggested that local government was often too conservative and only interested in mining and manufacturing and therefore did not support these opportunities. While ‘Linda’ (unemployed, Port Pirie LGA) suggested that manufacturers should be assisting people to make good choices for the environment and provide good options: ‘if manufacturers start thinking more carefully about what they are providing it makes the choices easier for people as well.

Participant ‘June’ (migrant, aged, disability, Port Adelaide/Enfield) expresses her view that a cohesive effort between individuals, government and industry is required for making real change:

‘I think people could have a huge impact on the issues...but I don’t think we can boil it down to being a matter of... people hold the whole key, in the end it’s going to have to be a really cohesive effort – people, government, and industry. I’ve got some hope for things like carbon taxes...I’d also like to see a lot of support for things like alternative think tanking and getting ideas trialled, getting points put in for electric cars and stuff like that...’
Thus, for many participants, change and adaptation was just as much about change at the societal and governance level as it was about change at the individual level.

**Stakeholder views**

A database of available community services were collated using websites, local key informants and local press for each of the three study regions. This database included community service providers, local councils, government service providers such as housing, transport and health, community groups and community centres, and social organisations. A selection of key community organisations were then targeted for recruitment, ensuring that an overall breadth in the types of services provided were represented across the three regions. Stakeholder interviews were conducted with two local councils, Housing SA, Aboriginal Housing, Family Services SA councillors, Centrelink, two Community Centres, Aboriginal health workers, two not-for-profit service providers (multiple services provided including emergency housing, Aboriginal services, counselling, financial programs, in-home personal care services) and aged care service providers.

In total eleven services (3 in Port Adelaide, 4 in Berri/Barmera and 5 in Port Pirie) with a total of 17 service providers were interviewed. These stakeholders were recruited with the intent to get an organisational level perspective on the barriers clients face related to weather and rising costs of living, the adaptations they make and perceptions on vulnerability and resilience of different groups. The service provider interviews also provided the opportunity to explore what changes if any were being made at an organisational level to adapt to extreme weather, rising costs and environmental changes. For the full list of topics discussed with the stakeholders please refer to Appendix 3. The interview process and analysis methods are similar to household interviews, discussed in the previous section. The results of the cross-thematic analysis of the responses from service providers are discussed under three broad headings: vulnerabilities, adaptations and resilience.

**Vulnerabilities of disadvantaged groups**

Service providers were asked to describe how the clients they serve are affected by extreme weather and the strategies clients use to cope with extreme weather. There were different views on how clients are affected and therefore how they adapt, based on their vulnerabilities. Stakeholders were also asked how their clients, most of whom are disadvantaged and on limited incomes, cope with increasing cost of living; some of which are directly affected by weather (e.g. power usage).

**Vulnerabilities to weather**

Service providers found that the extreme weather affected their clients in different ways depending on the individual and the type of disadvantage they have. However, it was clear that their disadvantage exacerbated the negative effects of climate change and compromised their ability to cope with the change. For example dehydration in the heat was noted as an issue for young parents who were not well informed about keeping their babies hydrated in hot weather: ‘I find a lot of babies are dehydrated when I come to their house... because they don’t realise they have to keep their fluids up or try and keep them cool.” (‘Jenny’, NGO)

Dehydration was also an issue for young people who would consume unhealthy energy drinks rather than water to hydrate leading to health and behavioural problems (‘Jenny’, NGO). Another group viewed as vulnerable by some stakeholders was frail older people. Older people were seen to be impacted significantly by extreme weather because: ‘their bodies are less able to cope then a younger fitter person. Many of our
clients have dementia, this causes real challenges in terms of getting across to them that on a hot day they need to wear appropriate clothing, not go out into the garden, and keep hydrated.’ (‘Harriet’, NGO)

Stakeholders from other aged care services also agreed that the frail-old and those with complex health issues are most vulnerable to extreme heat. ‘Josephine’ discusses the physical impact hot weather has on her clients. They would get “zonked out” and also risk dehydration which along with increased perspiration can result in urinary tract infections.

‘Josephine’ from an Aged Care facility notes the difficulties that are sometimes associated with getting older people to drink enough fluids, thus leaving them vulnerable to dehydration: ‘... as you get older it gets harder and some because it’s incontinence, they don’t want to drink as they don’t want to have to go to toilet. And [be]cause it’s harder for them to get around, that’s another reason’.

The older members, along with babies of the Aboriginal community were also identified by ‘Erin’ to be more vulnerable; which is not dissimilar from the general population. Periods of extreme weather can take its toll on older groups and babies with incidences of dehydration. ‘Erin’ notes that the Aboriginal population exhibit a number of health or health related issues. They include smoking, diabetes, lower life expectancy and incarceration.

‘The amount of mothers who smoke it well above National averages, and that is the same for most Aboriginal communities. The incidence of diabetes within Aboriginal communities is rife, absolutely disgusting actually, and some of this can be prevented. I think they live 10 years less than the non-Aboriginal population, the incidence of incarceration non-Aboriginal to Aboriginal is probably 80 percent Aboriginal in some places. So yeah, there is a lot not going for them.’ (‘Erin’, Community Health Services)

Coping with extreme heat can also be more difficult for people with different health conditions. Those who have existing medical conditions, such as diabetes and kidney disease, were seen to be at risk, particularly with rates of such chronic conditions being high within the Aboriginal community. ‘Erin’ describes the issues for people with kidney disease during hot days:

‘We let people know to drink water. We don’t have anyone on renal dialysis at the moment but that can be a big problem because you can only drink so much, they have to have air conditioning...they can only maybe have 500mL of fluid a day...you’ve got to make sure they have air conditioning.’ (‘Erin’, Community Health Services)

People with anger management and alcohol or substance abuse problems were also identified as vulnerable groups in terms of extreme weather. Periods of extreme heat were noted by service providers as a time when tempers flare more easily and there are sometimes much higher rates of domestic violence and also alcohol and substance abuse.

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Josephine is the CEO of the Aged care residential facility and has been there for 9 months at time of interview. She previously worked at another residential aged care facility in the Riverland for 17 years.
“Behaviourally, I think the weather affects my clients...their inability to cope...I think aggression and domestic violence increases in heat waves...We have a lot of DV issues in Port Pirie as well, I wouldn’t be lying to say it probably doubles or even triples...DV is greater over summer than in winter.” (‘Jenny’, NGO)

“Temper do flare a little bit more. You notice people saying families have had a fight. Drinking probably spikes a little bit...but with the alcohol, the violence hits in a little bit.” (‘Lisa’, NGO, Indigenous Support Services)

Social isolation is an additional vulnerability that can be amplified in periods of extreme weather. One of the main coping strategies people use, and are advised to use, to deal with extreme weather is to stay indoors. This can intensify feelings of social isolation and also increase power usage, contributing to an ongoing cycle of disadvantage. For example ‘Harriet’ (NGO) states: ‘there are some clients with chronic illnesses where they have no choice but to keep themselves at a certain temperature. Being isolated in your own home because of the heat can be very distressful, even if all it means is that you can no longer take a daily walk that can significantly impact on someone’s well-being.’

This strategy to avoid the heat by seeking refuge in air conditioned buildings was also mentioned as a problem by one of the rural NGOs where clients who have a gambling problem seek refuge from the heat in hotels with poker machines. ‘The gambling probably peaks then (during summer) because they’ll probably stay in the hotel where it’s cool.’ (Lisa - NGO). Also on the topic of people going to the pub on hot days and potentially using the opportunity to use the poker machines one stakeholder states: ‘That’s probably quite true; but our clients won’t disclose that to us...but I dare say they will be.’ (‘Steve’, State Government Service)

‘Trish’ from a Local Government community centre, mentioned some ‘downsides’ to the use of public spaces to stay cool. Their organisation has observed children are sometimes left unattended at the public library on hot days where they stay from open to close, because families see public services such as libraries as a safe place for children and a relief from the hot weather. As ‘Trish’ explains:

‘We have had people go to the library to seek air conditioning for long periods...and it has caused some issues where there are children and young people who are not necessarily cared for, whether their parents are working or parents are home, during the day when we would expect them to be at school. They are arriving when the library opens and staying until the library closes, on their own.’

A few stakeholders also described some fundamental issues with clients not understanding how to cope in different types of extreme weather, especially people with mental health problems or new immigrant arrivals who are not used to dealing with Australian weather conditions: “There are some families that continually...their children present these issues. Or even just sitting out in the hot sun and not realising it’s detrimental to child development and safety”. (‘Jenny’, NGO)

**Vulnerabilities to rising costs**

‘Erin’ notes that many in the Indigenous community are vulnerable during hot periods as they do not run their air conditioners. She notes that they either can’t afford to purchase an air conditioning unit; they can’t afford to pay for the installation fee, and/or can’t afford to operate the air conditioning due to high electricity costs. She feels that as most in the Aboriginal community in Berri are living in Housing SA homes and live
on a fixed income, they would struggle to meet their costs. Further, as there are often other costs that have to be attended to first, paying off electricity bills would often be down the priority list.

Several of the above issues relating to rising costs of living are common among those from lower socio-economic background and not unique to Aboriginals, however there are some distinct elements. ‘Erin’ mentions that some of the Indigenous community are homeless by choice as they don’t want to be tied to paying rent and bills associated with living in a home; this can mean they are more vulnerable because they are out of the jurisdiction of some service provider groups.

\[\text{’We do have a group of homeless who live down by the river. Usually ‘Life without Barriers’ takes them on when it comes to the hot weather and goes to check on them. A lot of these people the choice is to be down there, they don’t want to be housed which is where we have a problem. Interviewer – ’do you find there is a problem with this group when it gets really hot since they don’t have a roof over their head?’}’

‘Erin’ – ‘A lot of them don’t go out in the midday sun. As long as they keep their water up and stay in the shade, don’t go out until it cools down. ...a lot of these people don’t want to live in houses and part of that is because of the cost of rent, the cost of electricity and just being able to cope with it, they can’t.’

(‘Erin’, Community Health Services)

Many interviewees also mention a high degree of communal decision making and sharing of resources within the extended family groups within the Aboriginal population. For example, ‘Erin’ mentioned that generally family members know which house to go to when they need to find a place with air conditioning; however when it comes time to pay the bills ‘Erin’ suggested that the same people who used the air conditioning do not always reciprocate the kindness.

\[\text{’They’re all [members of the Indigenous community] ‘related’. Even if they’re not, they are. So they have it worked out to a fine T of where they can go to meet their needs and it would be very unusual for them to be turned away. Unless they have been [gestures to imply drinking alcohol] then some houses will turn them away.’} (‘Erin’, Community Health Services)

‘Lara’ from an Aboriginal Family support service also explained that it is often difficult for clients to manage their power bills because they live with extended family who will turn on lights and air conditioning despite others’ best efforts to conserve energy and keep costs low. While the communal nature of Indigenous Australians in working together to get through difficult situations can be seen as a great asset to this group (see Resilience); it can also have a ‘downside’, like the fact that many Indigenous family members or multiple families often live together in the same house which can cause problems:

\[\text{’A lot of them it’s not so much there are only a couple of people living in a house...you can have a family plus a family plus a family living there as well. When we look at the situation we find that if one person gets sick, everybody gets sick...it [having so many people live together] doesn’t work well for us in health, it really doesn’t...if you’ve got extra people living in your house and you haven’t told Housing SA you will go for fraud at the end of it...you can lose your house. It can be trouble finding sufficient housing. The housing list here is really tight at the moment. We can have}\]
people on Priority 1 [highest level] and it can still take months depending on where they want to live. You can have maybe 10 people living in a house...but because some of them move around...moving from this house to that house...what they call 'couch surfing'. Our homeless numbers here are pretty high, but if we added the couch surfing population we’d probably have really high numbers.’

(‘Erin’, Community Health Services)

Nonetheless, it is important not to discount the role of community and family support within the Aboriginal population when it comes to being resilient during periods of extreme weather. From a stakeholder point of view, the close knit Aboriginal community also has its advantages when it comes to service provision. As ‘Erin’ explains:

‘The Aboriginal community works very well together and everybody knows everybody’s business, so my staff can find me someone at the drop of a hat if I need to know what is happening with someone. We’ve normally got a link in straight away, which is good....all my staff are local which is good [she has 10 Aboriginal workers on staff] if someone moves into the district they know, if someone moves out of the district they know. It works well from my point of view.’ (‘Erin’, Community Health Services)

‘Steve’ (from a State government department) describes how the community mindedness of the Aboriginal population can help them in dealing with the cost of living:

‘That’s the way the Indigenous people work. They deal with things a bit different from to how...if you’ve got the money this week, it’s your responsibility to make sure we’ve got food on the table and I’ll be feeding you next week and I’ll be driving you here and taking you there. That’s a pretty standard general rule of thumb for Indigenous people, very sorta community minded I suppose within their own groups.’ (‘Steve’ State Government services)

However, managing bills is not always a priority for Aboriginals. ‘Erin’ feels that this is an area which comes down to education. Despite advising and giving them planning and preventative strategies to avoid situations such as large/overdue bills to the point that they [the service providers] “turn blue in the face”, they [the Aboriginals] still wouldn’t listen until circumstances become very difficult.

‘What it boils down to is we can educate as much as we want but people only take things on board when it actually becomes a problem. This is something that I find very frustrating...until it becomes an issue, people don’t want to listen...so we go through ‘let’s prevent it’ and then we go through now we have to solve it because we haven’t prevented it.’ (‘Erin’, Community Health Services)

‘Erin’ feels that their attempts to mitigate potential situations were often futile and their role would be at crisis stage (such as a large electricity bill) which would then need to be dealt with. It is important to note that the above examples shouldn’t be considered unique to the Indigenous group, as they are not dissimilar from lower socio-economic groups from the general population.

Newly arrived migrants were identified as a particularly vulnerable group in terms of dealing with costs related to power usage and also at a disadvantage in terms of access to information. This group have not had the experience of understanding
Australian electricity costs, how to conserve power and use it efficiently, or which power companies to use.

“Some of the new arrivals in particular can run up enormous power bills, not understanding how it works, not being familiar with that system” ('Luke', Local Government community centre).

‘Luke’ goes on to explain new arrivals are not provided with enough information about how to conserve energy and alternatives to using electricity when the weather gets too hot or cold.

For new immigrant arrival groups language can also be a barrier to understanding, for example ‘Trish’ from a Local Government community centre said there were devices available from the library that people could borrow and use to measure the amount of power different things use and therefore reduce power usage and bills: ‘this could be a worthwhile tool for some but I think it would be too difficult to use, especially those without good English language skills, and those who conceptually don’t understand the value of this.’

It was also noted by some stakeholders that new arrivals do not get the message about conserving water or fire risk like longer term residents who have heard these messages for years.

‘You add in a language barrier and you got absolutely no chance of being connected to the community. How the information is distributed on the radio, on the newspapers, word of mouth, walking on the street and seeing a poster or flyer on how to make your house fire ready. And coming from an area that might not have that, barren areas...they have no concept of how quickly a fire can spread and at what rate and that the danger can escalate” ('Miranda’, Local Council).

Lack of information or poor understanding of information was an issue for some in the Aboriginal community as well. ‘Erin’ gave the example that many of her clients who had diabetes thought that they simply required a course of medication without realising that it was a chronic condition which required ongoing medication/treatment. They were also often unaware of the severity of the disease which ‘Erin’ feels can be addressed if patients were sat down and told what the consequences were (e.g. loss of limbs), which might promote more healthy actions/attention to the issue.

One of the barriers stakeholders suggested disadvantaged groups often faced is related to housing. They may be living in housing that is not in good condition, has poor insulation, or non-existent (or inefficient) heating and cooling systems. This leads to both increased discomfort in extreme weather and/or increased utilities cost if homes are kept at a comfortable temperature. For some clients houses do not have air conditioning or have air conditioning systems that don’t work well and they can’t afford to get them fixed if they break down. For example ‘Amy’ from an NGO in Port Pirie states: ‘The biggest problem for these young people...most of them are on the welfare system...they might have an air conditioner but if that buggers up, that or a heater, they can’t afford to get it fixed.’

Similarly, ‘Harriet’ (NGO) states that people on low incomes and on pensions do not have homes well equipped to deal with extreme weather: ‘Many people in these situations have very basic housing and a low income so they really cannot set their house up to cope well with the heat. ....Many clients have air-conditioning but are often too worried about the cost of electricity to use it.’
On topic of heat waves and visits to their client's homes: “We have a lot of our clients who have accommodation through [another service provider]... and there’s no heating or cooling at any of their housing, which makes it difficult for the clients. and they find quirky ways to cool down.” (‘Jenny’, NGO)

Adaptations

Extreme heat was most commonly mentioned by service providers as a weather event affecting well-being. However ‘Lara’, a counsellor for a rural support service noted that for her clients the cold weather was more of an issue than the heat:

‘Winter is worse than summer... because people need to be able to afford heat in order to cope with the cold, whereas in summer there is usually something that can be done to cool down...have a cold shower, jump in the river.’

Stakeholders noted that the strategy clients often use to escape the heat is finding a cooler place to go, for example to air conditioned shopping centres, swimming pools, the beach, the river, library, a friend’s house to use their air conditioning, or service provider organisations where buildings are air conditioned.

‘People go to the library or the local pubs to just sit and wait out the heat’ (‘Luke’, Local Government community centre).

‘I mean a lot of the time we will have clients come and sit in our general reception area just to keep cool’ (‘Tanya’, NGO).

Some different coping strategies were noted across different disadvantaged groups. For example (as a generalisation) it was noted by some stakeholders that younger people and Indigenous people tended to use swimming, going to the river or beach as a way to deal with the heat; while older people were more inclined to go to shopping centres or indoor air-conditioned venues.

‘The Indigenous guys will gravitate to the River...this is just what you see around the town...Elderly people or people with disabilities, they will be around the mall or plaza, spending all day doing their shopping...hanging around. Sometimes you see people sitting in there, sitting in the chairs in the mall, just escaping the heat or the cold really. The younger guys will gravitate to places, mates, friends with air-conditioners...’ (‘Steve’, State Government service)

‘I consider we have a fairly good town pool, a lot of the youth go there on the weekend... and it would be great and a lot the kids who go there are from lower socio economic households.’ (‘Tanya’, NGO)

‘If you went to the shopping centres on really really hot day, the older people are all out around Wendy’s, where the ice-creams are...and they’re just sitting there talking...It’s obvious, people will talk about it, maybe about 40 people, others might be shopping and other might come and go but you see them.’ (‘Josephine’, Aged Care Facility)

Service providers also noted that clients would make ‘common sense’ adaptations to their homes to cope with the heat like pulling down the blinds to keep rooms dark and cool; similar to the strategies noted in general householder interviews.

The most noticeable factor in rising costs of living for clients, as observed by service providers, was increasing power bills. Different strategies for coping with rising bills
were noted. Many of the clients served are on a fixed income, where their finances are already highly managed. Some people were described as simply putting aside more money on a fortnightly basis to go towards electricity bills in order to handle rising costs, while others just did not make paying their bills a priority or came up with short term solutions like changing electricity companies when they could not pay their bill or having another householder put the bill in their name (‘Steve’, State Government Service; ‘Miranda’, Local Government and ‘Tanya’, NGO). This was described as often leading to big problems with accumulation of debt and people falling further and further behind with their finances.

‘Amy’ from a rural NGO also observed that food choices are affected by cost, and diets are adapted accordingly: ‘They have problems with the eating habits as it is not cheap to eat healthy...’ However, unhealthy eating habits are also strongly related lifestyle and they were they were brought up: ‘a lot of them haven’t been brought up on healthy foods... to eat healthy is not part of their lifestyle.’

Organisational level adaptations

Stakeholders also discussed some adaptations made to deal with weather, rising costs and changing environmental conditions at the organisational level. Some of these adaptations are programs passed on to clients directly while others are higher level changes in infrastructure or general operations policies and practices.

Programs offered/policies related to coping with weather

Some service providers have weather policies in place that have an impact on both clients and staff. For example at one NGO organisation, it was explained that services are affected in the hot weather with their hot weather policy restricting staff from making visits to clients homes in extreme heat; however the office itself remains open. This organisation will also call clients living in their homes on extreme weather days and remind them of steps they can take to stay cool. They encourage clients to use air conditioning and fans in order to stay comfortable and urge them not to worry about the cost, explaining they will help them manage these costs when the time comes to pay bills.

‘A couple of years ago, there was a little information sheet produced...we were asked to make sure all of our clients received them...and to give them a phone call to make sure they’re okay.’ (‘Kim’, NGO)

“Kim’ and I are both managers so what we have to do in heat waves is also look after our staff. There was one time we said staff weren’t allowed to go out, it was too hot to go out...when it’s 38 or 39, 40, when you have 5 or 6 of these days you’re just melting away.’ (‘Tanya’, NGO)

Aged care facilities have adaptation practices in place to cope with extreme weather, most notably hot weather, as their clients are particularly vulnerable at these times. Service providers at one aged care facility noted that during hot periods the challenge was to prevent dehydration among their clients; they also make sure that their clients wear fewer and lighter clothes (e.g., tops with no sleeves) and use cold flannels and cold packs to keep them cool. A similar strategy was used at another aged care facility where they would be more vigilant in making sure their clients had enough to drink. All these measures were part of their hot weather policy which would be implemented as soon as there was a heat wave. If there are power failures, of if the air conditioners break down, electric fans were brought out and clients would be moved around the facility, to cooler parts of the buildings. Meals would also be moved from one dining area to another.
More independent clients were also advised to cancel their appointments and to stay indoors on hot days; however it was noted that those who were more mobile might disregard that advice and still go out. It was noted that this was also a particularly difficult policy procedure for a lot of the clients who were originally from fruit blocks or farms and who are used to being outside. However, this group of more active and alert clients were also seen to be a little more resilient and requiring less supervised care. ‘Josephine’ (NGO Aged Care facility) also raised the issue of water shortages from her previous position in the Riverland at the time of the drought. She explained that they had to buy water (to fill tanks) to make sure there was sufficient water for drinking, showers and toilets within the facility. They also suggested to clients that they reduce the number (or length) of showers during this and no longer used the sprinklers in the garden, letting it die. ‘Josephine’ explained that even the native plants died, which underlined the severity of the heat and drought.

‘During the drought, our biggest concern was water and having to pump in water, getting water bought in. That’s to do with the extreme weather change, I know it’s not uncommon...there’s pictures of the Riverland before the damming where the river was totally dry and people would picnic in the middle of it..... I don’t think its new, I think its cyclic, but the effect on places like ours, there is not enough water for drinking, for toilets, for showering, and then also having not only the cost of getting the water in but also looking at how much we use water at certain times, whether we use it for hygiene and whether we used it on the garden. So those are the effects on the organisation and also on the people.

Some organisations help clients cope with the heat by offering facilities and programs that provide refuge from the weather. For example a community centre in Port Adelaide offers a swimming program in the summer months. There are however some issues associated with these programs as ‘Tanya’ (Local Government) explained; the community swimming pool at their centre is used by some as a cheap form of childcare: ‘We have outdoor pools that are open December to March, although there is a cost to attend, it is inexpensive, about $4 per day for individual entry...if you’ve got four kids it is under $20 and literally they are there all day, from open to close....this puts a bit of a strain on the lifeguards and staff over there.’

The impact of weather on client’s well-being was also raised as an important issue. ‘Lara’, a counsellor with a rural support service, mentioned that the issue of weather has come up at recent meetings with other service providers in the area. ‘There is a lot of networking with other service providers...I went to a meeting the other day and that [the weather] was brought up...now that it is going to get hotter we’ve got to look out for different things happening...’

Programs offered/experiences related to power costs/cost of living

Several stakeholders interviewed (Community Centre’s and Families SA) mentioned that community members will often come to them as a first point of contact when dealing with electricity bills they do not understand or are out of their reach in paying. Although this is not necessarily their role they try to assist when possible but refer clients to other organisations who help them deal with managing costs of living. The need for more information about understanding power bills is more apparent for some disadvantaged groups, such as new immigrant arrivals (as described in the ‘vulnerabilities’ section).

Some organisations (State Government Family Service) do offer a wide range of pamphlets about how to save on electricity and water costs. In addition they described
how they carry out home visits to help clients identify how they might be able to save on energy costs. One community centre in Port Adelaide runs workshops and courses to teach people about managing their bills and saving money, but says that unfortunately is it often not the most disadvantaged or the most in need of this advice who attend these courses. One Aboriginal support services explained how some clients are referred to a financial counsellor to help them manage their bills if they are out of control, and that this has become more of an issue with rising costs of power.

‘With rising utilities combined with their gambling, they’ve got themselves in such a crisis mode, we’ve had to get them to finance counsellors and try and get their utilities bills, payments.’ (‘Lara’ – NGO Aboriginal Support Service)

Large scale, long-term changes in response to changing weather conditions and rising costs are also being made by some organisations. One aged care facility has noted that rising costs of electricity are a big issue for them at an organisation level. During summer, there were times of extreme strain placed on electricity due to the heat and increased demand for air conditioning which does see the increase of power bills over summer.

‘The biggest thing for us is the cost factor, that’s our bigger struggle now.’

‘There’s always a lot more power used during heat waves, during the summer anyway, but definitely during heatwaves because the air cons are going continuously.’

‘Running air conditioners are very expensive, if you are running them continuously, bills just go up a huge amount over summer.’

One NGO, for example, is going through a process to renovate and build new homes that are better designed and therefore better equipped to handle changing climates and be a more comfortable and affordable residence for low income tenants. Things like solar hot water, more energy efficient design, homes oriented in a northerly direction and eaves on all buildings are some of the design principles being implemented. Housing SA in Port Pirie also noted that their new housing stock must meet the local building regulations so that all new homes are built above the flood plain level.

**Environmental awareness**

Only one service provider organisation interviewed mentioned any effort to promote ‘green awareness’ to clients. This community centre in Port Adelaide has run a number of programs to try and pass the message along to the community about environmental awareness and ‘reduce/reuse’ as a way to help with costs and to help the environment. For example a ‘reuse/recycle’ event was held where community members were encouraged to bring old items of clothing to exchange with others, but it was suggested that the recycling and environmental message is not something that resonated with people:

‘We found that the recycling/reusing message did not get across. We also invited agencies to set up information stalls...some of the energy companies were there as well, but the uptake of that information was really of very little interest, people were interested in the stuff, grabbing free stuff...the agencies were disappointed in the lack of interest.’
‘I think it [environmental awareness] would need to be targeted about the immediate benefits for them and how it would alleviate some of those other costs.’

‘Information about dealing with climate change, helping the environment needs to be given not in a lecture tone, but a more communal approach....yet on the other hand because this is not a priority message for disadvantaged groups they may not take action until certain measures are mandatory.’ (‘Trish’ - Local Government community centre)

Another, more successful, ‘green’ activity offered by this community centre is a community garden where people can meet and share food and learn about growing different fruits and vegetables. There has been a good use of this community garden as a meeting place and a place to receive, share and learn about food.

There were several comments from stakeholders stating that climate change or environmental messages were not a personal focus for their clients, who tend to have more immediate pressing issues to deal with. For example ‘Amy’ from a rural NGO: ‘All these wider and fundamental issues need to be looked at before bringing in climate issues.’ ‘Harriet’ (NGO) also states that while there may be information out there for people to access about things like how to cope with extreme weather in terms of managing their own health, or maintaining their home or bills; ‘...for people who are disadvantaged it is low on their list of priorities to look in to long term solutions.....If you are if you are elderly or a carer for someone, your whole life becomes about those immediate issues and everything else falls by the wayside, those people have even less incentive or just capacity to keep up with changing rebates and global climate issues.’

‘Harriet’ (NGO) also said that messages to the public about making changes in order to live more sustainably are inconsistent and always changing, and people have to work really hard to find out the correct and current information. She also uses the example of changing rebates for solar panels as a disincentive, as a result people just become frustrated that they might not get as much in return for installing solar panels as someone else did a year ago: ‘Like anything, until we get the right information that we know we can trust (because no one seems to agree on anything), how can we sort through it all?’

‘Erin’ feels that the debate on the reality of climate change confuses many, however she seems to acknowledge that extended periods of extreme heat does make people think about climate change.

‘So this about climate change, I honestly don’t think a lot of people pay much attention to it until you get lots of hot days and then they think ‘oh, maybe it is’...it is also very controversial where you have people saying this is happening and other people saying it is not happening. So that just confuses the issue.’ (‘Erin’, Community Health Services)

‘Harriet’ also believes that messages about climate change and what that means need to be more consistent in order for people to understand and take action: ‘When you see one person on television stating that climate change is a hoax, and then the next day someone says it’s the end of the world; it’s pretty hard as a non scientific person, for anybody, to work out the reality of what’s true and what’s not.'
Resilience

Service providers mentioned several disadvantaged groups as showing resilience to weather, changing climate and rising costs of living. While disadvantage makes them more vulnerable, they also have qualities that help to make them more resilient. These groups were:

Younger People

Younger people were seen to be more resilient in terms of health, and also were seen to be more resourceful in finding places they could go when it was hot; friend’s houses to ‘hang out’ at to escape the weather (‘Miranda’, Local Council).

‘Although they might not have the luxury of air-con, or if they can’t afford to run them, they will find other ways to cope. They would go to shopping centres, go to the beach or to a mate’s place when it gets hot.’ (‘Amy’, NGO)

‘But you actually find they (young people) become very creative and do a lot of car pooling and things like that as well. They become very creative and innovative on how they get around those issues as well.’ (‘Miranda’, Local Council)

There were also examples given by stakeholders of young people banding together to deal with rising costs and pay bills, which is both good and bad.

‘With these young people there might a group of four or five who will use their payments and go....”and see you ‘cos you get paid today, and you’re gonna help me out and someone else out and someone else out. Then you’ll come to me when it’s my payday cause I’m gonna pay you back.” So they’ve got a little bit of a resourceful thing happening here which I don’t think is a real good thing cause it makes them think “Well you know what, I can cope on this and not have to strive to get out there and see what else is out there”. They’re very resourceful and they’ve had to be’ (Amy- NGO).

Older People

Older people were seen to be more resilient (but also more vulnerable if they are frail, not cognitively aware or socially isolated) with weather and rises in cost due to life experiences dealing with different weather conditions and also more resilient toward rising costs because, as a generalisation, they are more frugal and accustomed to managing their bills carefully. For example ‘Trish’, from a local government community centre states: ‘Older people are probably the best equipped to deal with making changes due to the weather. As a generalisation, their lifestyle of conserving energy and resources is something many have done all their lives.’

‘Luke’, a stakeholder at a community centre also thinks older community members would also be: ‘more or less used to the weather... they just had to cope with extreme heat and flooding in the area and so forth’. He feels this gives older people a certain degree of resilience to extreme weather events now.

People ‘off the land’

People ‘off the land’, for example farmers, Indigenous persons, people who have had life histories that are more connected with the rural areas
and the outdoor are considered more accustomed to dealing with the variations in weather and tend to use ‘common sense’ coping strategies, like staying out of the sun in the heat or cooling off with a cold shower. (‘Josephine’, Aged Care Facility)

These practices as are more prevalent among the Indigenous community. When asked if the Aboriginal community had any particular practices or strategies when it comes to dealing to hot weather, it was noted by some stakeholders that younger people and Indigenous people tended to use swimming, going to the river or beach as a way to deal with the heat; while older people were more inclined to go to shopping centres or indoor air-conditioned venues.

‘The Indigenous guys will gravitate to the river...this is just what you see around the town...Elderly people or people with disabilities, they will be around the mall or plaza, spending all day doing their shopping...hanging around. Sometimes you see people sitting in there, sitting in the chairs in the mall, just escaping the heat or the cold really. The younger guys will gravitate to places, mates, friends with air-conditioners...’ (‘Steve’, State Government service).

‘I don’t know if you follow the culture and that...they deal with it a lot better. They would be the people that would make sure that during the heat of the day if they’re anywhere they’ll meet under a tree, down the river front. If they’re at anyone’s house they are at a house that is kept closed when the heat starts then opened up in the evening when it cools down. You’ve got to know the right thing to do.’ (‘Erin’- Community Health Services)

‘Erin’ notes that some of these practices are probably a little more common with the older generation:

‘They cope a lot better, that can even be some of our older ones, cope better than the younger ones because they are following more traditional ways of doing things. Like you know going under tree branches to find shade or catch a breeze. You’ll find most of the oldies will know this. You won’t find them sitting out in the sun having a game of cricket...but the younger ones will bounce back quicker.’ (‘Erin’- Community Health Services)

People on a fixed income
Lisa, a service provider at an Aboriginal Family support services has found people on fixed income in some cases more resilient to rising costs of living: ‘...because they are on low income and have had to manage their money and be aware of rising costs they have learned to budget quite well.’

Migrants and people from different cultural groups
Stakeholders at two local government community centres in Port Adelaide observed that while migrants and people from different cultural groups face some barriers, there are qualities that make them more resilient in other ways. They tend to have extensive family and social networks, and be involved in more culturally relevant groups with these groups often a good source of information exchange. Tightly knit social, cultural and extended family groups also tend to help each other out when needed with things like paying bills.
This was mentioned in reference to the Indigenous community where extended family is relied upon to help socially and financially. However, this in turn can have negative repercussions, for example ‘Lara’ from an Aboriginal Family support services explained that it is often difficult for clients to manage their power bills because they live with extended family who will turn on lights and air conditioning despite others’ best efforts to conserve energy and keep costs low: This was re-iterated by ‘Steve’:

‘That’s the way the Indigenous people work. They deal with things a bit different from to how...if you’ve got the money this week, it’s your responsibility to make sure we’ve got food on the table and I’ll be feeding you next week and I’ll be driving you here and taking you there. That’s a pretty standard general rule of thumb for Indigenous people, very sorta community minded I suppose within their own groups.’ (‘Steve’ State Government services)

**Socially connected**

Luke, from a community centre thought social isolation is what made people the most vulnerable, and conversely those who were more socially active had greater resilience and were more likely to make changes. ‘People more likely to take an active part in making changes are more likely to be the more active community members, those who are better connected. The ones who get out there and share ideas and learn from each other.’

**Summary of qualitative interviews**

Qualitative interviews with households and service providers have presented the life stories of day-to-day adaptations that disadvantaged households make to deal with the changing climate and its consequences. The reappearing messages across households with different types of disadvantages show that the hardships faced by them due to changing climate are not very different, and the solutions they find are also alike. The most important message that could be taken from this discussion is that households dealing with multiple disadvantages are likely to be among the most vulnerable to climate change impact.

Both disadvantaged household members and stakeholders working with them agree that one of the biggest issues rising from extreme weather events is associated with their health. This is especially concerning for those with pre-existing health problems. Vulnerability to the direct impact of extreme weather is also more prominent for those living in more disadvantaged conditions, such as locations prone to bushfires and floods, and public/rental housing with poor insulation.

Along with vulnerabilities to the direct impact of extreme weather, many of the householders and stakeholders also recognize the indirect consequences of changing climate, such as rising costs of living, underlying stress of dealing with the changing environment, and social isolation. Aboriginal community, low-income families and those with health issues seem to be especially vulnerable to the increasing costs of living, as they are least able to deal with the financial difficulties or make changes to their lifestyle and environment to adapt to the increasing costs.

However, both the stakeholders as well as disadvantaged householders have shown that certain characteristics make some of the disadvantaged groups more resilient to climate change impact than other more privileged population groups might be. Using cooler public spaces during hot weather and avoid turning on air-conditioning, living within their means, being more economical in their use of available resources are all small adjustments to the everyday life that makes economically less privileged...
population more resilient and better equipped to adapt to changing environment. So creativity and more flexibility makes younger members of low-income population more resilient; life experience and better preparedness makes older people more resilient; being better accustomed to the environment makes Indigenous and country people more resilient; and better social connections make migrants and cultural groups more resilient. Meanwhile those with better means may continue their lifestyle as before, willing to pay the increased costs for it while they can.

Although driven mostly by financial reasons, rather than environmental awareness, many have made more significant changes to their environment to decrease the direct and indirect impacts of climate change. Home improvements, such as installing solar panels and water tanks, changing household appliances for more efficient ones, are some of adaptations that disadvantaged households are likely to make if they can afford them. However, along with financial and physical difficulties, a number of barriers exist that prevent them from taking more long-term adaptive actions. Households in the private rental market and public housing point out a few institutional barriers that need to be addressed for better adaptation in the future: restriction on the number of solar panels that could be installed, public housing rules that restrict installation of solar panels and water tanks, regulations to water the lawn areas of rental properties are among the problems mentioned by them.

However, there are more universal barriers, such as information barrier, mentioned by other disadvantaged groups as well. While stakeholders complain about not being able to educate and send a message to these groups about better ways to deal with extreme weather and climate change, disadvantaged groups complain about the lack of consistent information. Among the reasons for most of this miscommunication between the service providers and receivers have been mentioned language and cultural barriers by both sides, as well as lack of personalized information tailored specially for the disadvantaged groups, who are dealing with many other daily stressors and may not consider climate change to be relevant to them. Members of disadvantaged households think, that a stronger message to the public, mandatory improvements to public housing and new structures for better energy efficiency, are among the institutional changes that need to be made for better adaptation to climate change, because individual behavioural changes are not sufficient enough.

It is apparent, especially from the qualitative study that socially excluded groups in the study are should not be depicted as “positive victims” of the effects of social change and that there are many examples where they have shown agency, resilience and innovation in adapting to it. However, they clearly are highly constrained in this by the various dimensions of disadvantage which they experience.
CONCLUSION AND POLICY IMPLICATIONS

Introduction

In Australia the impending effects of climate change and the widening gap between economically and socially advantaged and disadvantaged groups are both issues of widespread national government and community concern (Markus, 2012). However, the relationship between the two remains little investigated. Nevertheless there is an emerging concern in the international climate change literature that the negative effects of climate change will be disproportionately experienced by those who are economically and socially disadvantaged (Hugo [ed.], 2013). This study has sought to contribute in this area by adding to the small body of empirical knowledge of the vulnerability and adaptive capacity of disadvantaged groups in Australia in the face of impending adverse impacts of climate change. In this chapter we will summarise the findings of the study and distil the lessons for policy in this area.

The social inclusion context

The Australian Government’s vision of socially inclusive society is one where all people feel valued, their differences are respected, and their basic needs are met so they can live in dignity (ASIB, 2012). At the core of the social inclusion philosophy is the understanding that although ultimately citizens are responsible for their own lives and everyone has a duty to work hard and make a go of it; not everyone starts with the same advantages and some people face setbacks or crises in their lives that can result in them being left behind. The concept of social inclusion is the process of being shut out from the social, economic, political and cultural systems, which contribute to the integration of a person in the community.

An important dimension of social inclusion is that it includes dimensions of disadvantage beyond poverty and lack of financial capital. Also central to social inclusion is the recognition that social problems are interrelated and any response to ameliorate these social problems too must be interrelated. For example, close to 5 percent of the Australian population experiences multiple disadvantage which includes low income and assets, low skills, difficulties keeping a job, housing stress, poor health, lack of access to services, substance abuse, mental illness, disability, family violence or a combination of these problems. In Australia, members of the Aboriginal community, the homeless, people with disability or those struck by family breakdowns and the long term unemployed have all be identified at risk of disadvantage. Humanitarian migrants have also been identified as persons at risk of disadvantage (ASIB, 2011b).

In 2002, the Labour Government in South Australia drew upon the experience of the UK government which had created a Social Exclusion Department that reported directly to the Prime Minister and was mandated to assist the disadvantaged but they were also pioneering work on ‘joined up government’. ‘Joined up’ government was a revolutionary new way of ensuring that government departments came together in a creative and innovative way to deliver results to social problems among the most vulnerable members of society. Whereas under traditional models of service delivery, access to services were fragmented, for example, a youth at risk would be catered for under different government departments such as educational services, child protection services, employment services, the juvenile court system, drug and alcohol services and housing services, many times without any real assistance. This ‘third way of government’ differed from the traditional models of service delivery as the services all
came under one umbrella to serve the individual as opposed to the individual navigating through a maze of services and programs in order to get assistance. This model also eliminates the duplication of services and it offers a more targeted approach to assisting the vulnerable and was adopted by the South Australian Government (South Australian Social Inclusion Board, 2009).

In 2008, social inclusion as a policy framework was adopted nationally and since then the Australian Government has had a vision to ensure that it creates a socially inclusive society. The core aims of the Australian Social Inclusion Agenda are to reduce disadvantage by ensuring that there is funding and service delivery that promotes equitable access to universal benefits and services for all Australians. This includes making sure that investments are made more intensively for those at risk of experiencing disadvantage. The Social Inclusion Agenda also aims at increasing the social, civic and economic participation of all by ensuring that everyone has the skills and support they need to participate actively in the labour market and their communities. A third aim of Social Inclusion Agenda is to promote the active involvement of the entire community in identifying the needs and shaping services of the community (ASIB, 2011b).

There are three dimensions that have been identified as characterising social exclusion in Australia (Australian Social Inclusion Board, 2010) and these are of particular relevance to the present study:

- Disadvantage is *multidimensional* with disadvantage in one area (e.g. health) having ramifications for disadvantage in others.
- There are important *locational* aspects of disadvantage whereby people with disadvantages concentrate in particular areas, which may have characteristics which can exacerbate that disadvantage.
- Disadvantage is often *intergenerational*.

Although Australia has recorded high rates of economic growth and low unemployment relative to other OECD countries in recent years, and has been less impacted by the Global Financial Crisis, inequality remains an important issue. Whiteford (2011) has summarized long-term trends in inequality and warns that interpretation of the data is difficult. Nevertheless, as Figure 43 indicates there has been a general upward trend in the Gini Coefficient over the last three decades. The Gini Coefficient is a widely accepted measure of income inequality. It varies between zero (perfect equality) and one (perfect inequality). The coefficient has increased from 0.27 in 1981-82 to 0.328 in 2009-10. Whiteford (2011, 3) has summarized the complexity of the situation as follows:

"In Australia as a whole, it is certainly true that the rich have become richer. The best-off 20 per cent of households now enjoy real incomes 67 per cent higher than comparable groups in the mid 1990s, and they receive just over 40 per cent of total household income, compared to 38 per cent in the mid 1990. But while the overall income share of the rest of the population has fallen, real disposable incomes have risen – by between 46 per cent for the poorest 20 per cent of households and nearly 50 per cent for the median household. So the rich have become richer – but so has everyone else.

It's worth remembering that this is a picture of what has happened to groups of people. Plenty of individuals and families are worse off now than they were in the past, because they have retired, become unemployed, divorced or separated, or become sick or disabled. Other individuals have
become better off as they have moved into work, been promoted in their jobs or have developed businesses. All that the figures tell us is that even if individuals have experienced these risks or these benefits, groups of individuals are financially better off, than comparable groups in the past.”

Figure 43: Trends in income inequality (Gini coefficient) in Australia, 1981–82 to 2009-10


The ABS (2012a) has recently shown that the “disparity between people in low economic resource households and the rest of the population is even more pronounced when it comes to wealth. The average equivalised net worth of people in households with low economic resources in 2009-10 ($53,500) was one tenth of the average across other households ($509,800). After adjusting for inflation, the net worth of low economic resource households had not increased significantly since 2003-04, while the average net worth across all other households had increased by 29%.” Their analysis argues that the display in both income and wealth between those in low economic resource households and the rest of the population has widened over the six years to 2009-10. Moreover, they identify a number of groups which are over-represented among the “low economic resource” population, including:

- one parent households;
- aged persons, especially those living alone;
- unemployed persons;
- persons renting public housing.

The Australian Social Inclusion Board (2010) has brought together a wide range of data and concludes that despite a long period of prolonged economic growth there remain significant levels of social exclusion especially among sub-groups and in particular geographical areas. In that argument however, there is little discussion of the contemporary and potential future effects of environmental change on social inclusion.

**Major findings**

In Australia the body of knowledge of likely scenarios of climate change impact over the next few decades has increased significantly in both its robustness and level of detail. The Climate Commission’s (2011) report on *The Critical Decade: Climate Science, Risks and Responses* summarises the evidence and projection scenarios,
which are based on them and indicates certainty and urgency of the reality of climate change in Australia. There has been less advance, however, in tracing the complex interrelationships between these scenarios on the one hand and socioeconomic change on the other.

It is undeniable that Australia is experiencing long term changes in climate involving higher surface air and sea-surface temperatures, more hot extremes and fewer cold extremes and increased sea levels. While there is some uncertainty about the rate of change, it does seem clear that these changes will continue. The effects of climate change are not distributed evenly across the continent and will be felt more in some areas, than others. Moreover, the impact of climate change is felt more by some members in the community than other because:

- they have little choice in deciding where they live so that they are disproportionately concentrated in areas at high risk of negative environmental impacts;
- they have less economic resources which mean that they are less able to fund adaptive responses to environmental change either in anticipation of such change in the future, or in response to actual impacts; and
- they are less able to mobilize government and other resources in response to environmental change because of low levels of information, connections and power.

The case study of three contrasting communities in South Australia captured on here has demonstrated that all three of these dimensions of exclusion and disadvantage are relevant and work to exacerbate the adverse effects of environmental change for particular groups. One of the key dimensions of social exclusion in Australia as voiced by the Australian Social Inclusion Board (2011b, 6): “different kinds of disadvantage—lower incomes, poorer housing, poorer health, lower education attainment, higher unemployment and higher crime rates—tend to coincide for individuals and families in a relatively small number of particular places and that these concentrations of disadvantage tend to persist over time. The issues facing people living in locations of concentrated disadvantage can also be compounded by the characteristics of the places themselves, for example through poor local infrastructure.”

There are clear spatial dimensions to social exclusion in Australia and this study has attempted to capture some aspects of this disadvantage by selecting its case studies to reflect three types of areas characterized by “locational disadvantage” in Australia. It is usually neglected in the discussion of locational disadvantage in Australia that one dimension of that disadvantage often is an environmental factor such as a greater exposure to the risk of negative effects of climate change. Accordingly, the three study areas in this study not only have significant concentration of particular sub groups that experience disadvantage but also are at higher risks of environmental impact than many others.

The three case study areas in no way can be claimed to be statistically representative of the Australian population. Nevertheless, they are typical examples of areas in which most Australians live their lives. Table ... compares the areas with Australia on a number of demographic, economic and social characteristics.

**Port Adelaide Enfield.** No single area can be fully representative of the two thirds of Australians that live in major metropolitan areas. Nevertheless, Port Adelaide Enfield has the typical characteristics of the extensive areas of low socio-economic status, middle and outer suburban, low and medium density housing in Australia’s capital cities. As Table 17 indicates, compared to Australia as a whole, it has a high
Percentage of its population in low incomes, a high proportion in public housing an older population, a higher proportion born in CALD nations and a high proportion of single parent families. These are all characteristics of low socio-economic areas in Australian major cities. These are also areas which tend to have less environmental amenity than other parts of the large cities and can be more exposed to environmental impacts such as flooding, heat island effects and disaster events.

Table 17: Characteristics of Pt Adelaide Enfield, Berri-Barmera, Pt. Pirie and Australia 2011

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total Australian Population</th>
<th>Pt. Adelaide Enfield</th>
<th>Berri/Barmera</th>
<th>Port Pirie City and Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population 2011</td>
<td>215077719</td>
<td>112817</td>
<td>10582</td>
<td>17333</td>
</tr>
<tr>
<td>Population 2006</td>
<td>19855287</td>
<td>102930</td>
<td>10930</td>
<td>17140</td>
</tr>
<tr>
<td>Population increase 2006-2011</td>
<td>1652432</td>
<td>9887</td>
<td>-354</td>
<td>193</td>
</tr>
<tr>
<td>% Aged less than 15 years</td>
<td>19.3</td>
<td>17.2</td>
<td>19.8</td>
<td>20.0</td>
</tr>
<tr>
<td>% Aged 65 and plus years</td>
<td>14.0</td>
<td>15.0</td>
<td>17.7</td>
<td>19.0</td>
</tr>
<tr>
<td>% Overseas-born</td>
<td>26.1</td>
<td>32.3</td>
<td>12.6</td>
<td>7.9</td>
</tr>
<tr>
<td>% Mainly English speaking countries</td>
<td>9.4</td>
<td>7.1</td>
<td>4.8</td>
<td>4.1</td>
</tr>
<tr>
<td>% Mainly non-English speaking countries</td>
<td>16.6</td>
<td>25.2</td>
<td>7.8</td>
<td>3.8</td>
</tr>
<tr>
<td>% Low Individual income (&lt;$299 pw)</td>
<td>28.1</td>
<td>30.7</td>
<td>30.5</td>
<td>33.0</td>
</tr>
<tr>
<td>% High individual income ($1,500 &amp; more pw)</td>
<td>13.8</td>
<td>7.8</td>
<td>5.3</td>
<td>7.1</td>
</tr>
<tr>
<td>% Own home</td>
<td>32.4</td>
<td>27.5</td>
<td>34.1</td>
<td>35.3</td>
</tr>
<tr>
<td>% Rental -public housing</td>
<td>13.8</td>
<td>32.8</td>
<td>23.2</td>
<td>34.7</td>
</tr>
<tr>
<td>% Single parent families</td>
<td>15.9</td>
<td>20.8</td>
<td>18.2</td>
<td>18.5</td>
</tr>
<tr>
<td>% Living alone</td>
<td>22.7</td>
<td>29.8</td>
<td>27.5</td>
<td>30.6</td>
</tr>
<tr>
<td>% Aboriginal population</td>
<td>2.5</td>
<td>2.4</td>
<td>4.3</td>
<td>2.9</td>
</tr>
<tr>
<td>Av household size</td>
<td>2.6</td>
<td>2.4</td>
<td>2.3</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Source: ABS 2011 Census

**Port Pirie.** Regional cities are also an important element in the Australian settlement system and will be subject to varying degrees of impact for future climate change (Hugo, 2011). These cities vary considerably in their structure, function and locational characteristics. However, one important type of such cities are those which have an industrial base (e.g. Whyalla, Geelong, Wollongong, Broken Hill, Kalgoorlie, Newcastle). Port Pirie is such an industrial city although it does have some central place functions serving the surrounding agricultural based rural communities. Table 17 shows that low income groups are overrepresented compared to Australia as a whole, as are the older population, single parent families and Aboriginal population. Again, this is evidence that these cities tend to have a higher proportion of their population who are disadvantaged than Australia as a whole. As with other regional cities where the economic base is heavily reliant upon manufacturing or mining processing activity, there tends to be a high representation of unemployed, low-income, Aboriginal, aged
and disabled communities. Risk of flooding, both coastal and riverine is characteristic of many such centres.

Berri/Barmera. Berri/Barmera is a community located on the River Murray and includes both irrigation intensive and dryland agricultural areas. It is a strongly agriculturally based economy and like other communities in the Murray-Darling Basin suffered considerable economic downturn in the last decade as a result of prolonged drought and reduction of allocations of water for irrigated agriculture. There is an overrepresentation of low-income, Aboriginal, migrant, aged, unemployed and disabled populations. Berri/Barmera cannot be seen as representing the full diversity of Australian rural areas. Nevertheless, it is indicative of rural communities that have suffered substantially as a result of environmental change.

An analysis of the climate context and findings of models of climate change in South Australia in Chapter 2 has shown that these three study areas are among the areas most at risk of being impacted by climate change over the next two decades. These effects include:

- flooding due to sea level rise and increased storm surge in Port Adelaide Enfield and Port Pirie;
- decreased rainfall across the entire area which will affect irrigation agriculture in Berri/Barmera, but also water availability in Metropolitan Adelaide and Port Pirie;
- increase in temperature, the number of very hot days and longer and more frequent hot spells will impact each area.

The concept of vulnerability is central to considerations of the impact of climate change. It is clear that there are differences between individuals, groups and areas in their ability to cope with and adapt to climate change. The effect of climate change is not only a function of the nature and severity of the impact but the vulnerability of the people and areas it affects. The assessment and measurement of vulnerability in population has hence become a major focus of both academic and policy related work in this area and there is a great deal of contestation about the operationalization of the concept. This study adapted an approach of developing a measure of social exclusion as a way of measuring social vulnerability and adaptive capacity (Stanley, 2009).

The measurement of social exclusion is a much contested area and the availability of relevant data in the Australian context is limited (ASIB, 2010; 86-7). In developing an approach to measure social exclusion in South Australia using secondary data Chapter Four of this study sought to:

- represent each of the major dimensions of social inclusion;
- use data which are available across all of Australia for local Governmental areas, so that the study is replicable, so it relies entirely on ABS 2011 Population Census Data;
- develop a measure which is clearly interpretable to the wide community.

Accordingly, a measure which indicates the following census derived variables is developed:

- Low income
- Unemployment
- Education level
- Household tenure – public or private rental
- Disability
- Aged population
- Single parent households
- Indigenous population
- Newly arrived population
- Ability to speak English
- Car ownership
- Internet connection availability
- Volunteering

A composite index of social exclusion at LGA level was derived which when mapped provided a pattern which was consistent with other studies and wider knowledge of disadvantage in South Australia.

The three study areas fell within the most socially excluded classification and results of a survey in these areas of most disadvantaged groups and a control group are utilised in Chapter Five to provide greater depth of understanding of the nature and implications of disadvantage. Some of the main findings include:

**Characteristics of social exclusion**

There is a considerable overlapping among the various sub groups so that multiple disadvantage is common. One dimension of disadvantage can interact with other dimensions to exacerbate vulnerability to exogenous shocks like climate change. Considering separate sub groups can only provide a limited understanding of the risks associated with social exclusion. The complexity and inter-relatedness of disadvantage needs to be taken into account in developing interventions.

The economic dimension of disadvantage is of crucial significance in identifying household’s ability to adapt effectively to fast changing environmental and socio-economic conditions. We need better ways of measuring economic resources than income questions. It is also important to consider wealth and sources of income. Economic resources are not the only important dimensions of disadvantage. People’s power to access informal and formal support systems is crucial.

There is often an assumption that low means and lack of economic resources are compensated for by poorer groups having significant social capital which allow them to access support through their friends and community. Yet the survey indicated that these resources are highly limited to the disadvantaged groups in the study area.

The study provided evidence that the greatest source of economic difficulty experienced by the disadvantaged groups related to an increasing inability to keep up with the bills, especially those related to power, water utility bills. The latter are clearly impacted by environment and climate change and are very much the “sharp end” of climate change, which is already beginning to impact heavily on disadvantaged groups.

Social networks are crucial to the maintenance and development of social capital but it was interesting in the survey that respondents were finding it increasingly difficult to maintain their social networks. These findings also have particular relevance when considering the impact of climate change. Accessibility to enable ready and frequent contact with services, formal and informal networks is of crucial importance to the entire population but especially those with economic problems. However, it is precisely

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4 These included Aboriginal, migrant, aged, disabled, unemployed, public housing tenants and renters, and single parent families.
the latter group that have the greatest physical accessibility problems again reflecting the multidisciplinarity of disadvantage. This factor is especially significant in non-metropolitan areas.

There was great difficulty experienced in both the survey and qualitative parts of the study in gaining full participation of Aboriginal respondents. Nevertheless, it is apparent that this group experience especially severe disadvantage, which generally limits their ability to access information, services and resources to allow them to cope effectively with economic, social and environmental shocks.

There was some evidence of the particular issues, which disadvantaged people living in non-metropolitan areas experience. It is clear, that respondents in Berri/Barmera and Port Pirie found transportation accessibility to be greater than those in Port Adelaide Enfield. Accessibility is an issue for all who are socially excluded and it reduces their ability to access resources both informal and formal and is a major barrier to effectively adapting to shocks.

Table 18: South Australia: Characteristics of selected regions, 2006 and 2011

<table>
<thead>
<tr>
<th>Region and Characteristics</th>
<th>2006</th>
<th>2011</th>
<th>% Change 2006-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Adelaide Enfield LGA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median Family Income</td>
<td>1009</td>
<td>1221</td>
<td>21.0</td>
</tr>
<tr>
<td>Median mortgage repayment ($/monthly)</td>
<td>1083</td>
<td>1600</td>
<td>47.7</td>
</tr>
<tr>
<td>Median rent ($/weekly)</td>
<td>145</td>
<td>220</td>
<td>51.7</td>
</tr>
<tr>
<td>% Unemployed</td>
<td>7.0</td>
<td>6.5</td>
<td>-7.1</td>
</tr>
<tr>
<td>Port Pirie City &amp; Districts LGA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median Family Income</td>
<td>886</td>
<td>1006</td>
<td>13.5</td>
</tr>
<tr>
<td>Median mortgage repayment ($/monthly)</td>
<td>650</td>
<td>1000</td>
<td>53.8</td>
</tr>
<tr>
<td>Median rent ($/weekly)</td>
<td>110</td>
<td>150</td>
<td>36.4</td>
</tr>
<tr>
<td>% Unemployed</td>
<td>9.9</td>
<td>7.3</td>
<td>-26.3</td>
</tr>
<tr>
<td>Berri and Barmera LGA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median Family Income</td>
<td>1000</td>
<td>997</td>
<td>-0.3</td>
</tr>
<tr>
<td>Median mortgage repayment ($/monthly)</td>
<td>867</td>
<td>1083</td>
<td>24.9</td>
</tr>
<tr>
<td>Median rent ($/weekly)</td>
<td>122</td>
<td>150</td>
<td>23.0</td>
</tr>
<tr>
<td>% Unemployed</td>
<td>6.5</td>
<td>7.4</td>
<td>13.8</td>
</tr>
<tr>
<td>Greater Adelaide Capital City</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median Family Income</td>
<td>1154</td>
<td>1403</td>
<td>21.6</td>
</tr>
<tr>
<td>Median mortgage repayment ($/monthly)</td>
<td>1083</td>
<td>1545</td>
<td>42.7</td>
</tr>
<tr>
<td>Median rent ($/weekly)</td>
<td>165</td>
<td>250</td>
<td>51.5</td>
</tr>
<tr>
<td>% Unemployed</td>
<td>5.2</td>
<td>5.9</td>
<td>13.5</td>
</tr>
<tr>
<td>Total South Australia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median Family Income</td>
<td>1114</td>
<td>1330</td>
<td>19.4</td>
</tr>
<tr>
<td>Median mortgage repayment ($/monthly)</td>
<td>1018</td>
<td>1500</td>
<td>47.3</td>
</tr>
<tr>
<td>Median rent ($/weekly)</td>
<td>150</td>
<td>220</td>
<td>46.7</td>
</tr>
<tr>
<td>% Unemployed</td>
<td>5.3</td>
<td>5.8</td>
<td>9.4</td>
</tr>
</tbody>
</table>

Source: ABS 2006 and 2011 Censuses
Housing is a major element in disadvantage since it greatly influences the day-to-day lives of people. Moreover, socially excluded groups usually spend more time in their homes than other groups so the effect is amplified. Housing influences the ability of people to cope with environmental changes such as increases in the number of very hot days. Declining housing affordability has been identified as a major trend in Australia (National Housing Supply Council, 2012) and Table 18 demonstrates how mortgages and rents have increased much more than incomes in the study areas over recent years.

Certain disadvantaged groups, such as Indigenous, single parent and renting households, are more likely to have reported more than one type of disadvantage than others. We also found these households to be at higher risk of economic exclusion, as they score very low on various measures of economic wellbeing, compared to the rest. It is possible, that relatively higher risk of economic exclusion among certain types of disadvantaged households is due to the fact that they are more likely to be disadvantaged in more than one area.

The level of social support and participation in social activities and services of the individual or household is an important dimension of the extent to which people suffering disadvantage are able to access formal and informal support systems to assist them to cope with and/or overcome the effects of the disadvantage. A third of respondents indicated that they do not receive any assistance with:

- help around the house,
- lending household items or equipments,
- assistance with shopping,
- looking after children or other family members,
- lending money,
- looking after the house or pet while the respondent was away, and
- help with transportation.

Gaining access to social support is less widespread in Port Adelaide Enfield, where about 37 percent of households reported receiving no help on any item, compared to 26 and 28 percent of those in Port Pirie and Berri/Barmera respectively. This suggests weaker social connections in the communities in larger cities, than in smaller towns or rural areas. However, it also reflects greater access to formal support systems in metropolitan areas. Is must not be interpreted that disadvantaged groups in non-metropolitan Australia are able to cope better because of greater access to informal support. Similar differences were also observed for social participation.

Disadvantaged groups have lower levels of social connectedness and accessibility to services than the control group.

**Knowledge, perceptions and attitudes to climate change**

The study areas have little experience of flooding so that the main sensitivity was increased extreme heat events and water shortages, although floods were also mentioned. With respect to heat waves all the disadvantaged groups had greater difficulty coping than the control group. Households with multiple disadvantages are especially likely to find heat and floods a challenge.

An interesting finding is that while each of the disadvantaged groups consider environmental issues such as increasing heat waves as a challenge, less than half of them consider them climate change issues.
A significant majority of respondents believe that they are well informed about the causes and consequences of climate change, but much lower percent think they know how to respond to it. There is a strong agreement that human activities have affected climate change.

Despite the high level of acceptance of the overall reality of climate change, around 28 percent of households believe that it will not impact on their lives or it will impact positively. Hence there is still a considerable task in information provision to disadvantaged groups.

Most concerning for disadvantaged households is the negative effect on their use of utilities, especially electricity, and their ability to pay for them. This is the case for all groups but especially Aboriginal, aged, single parents and unemployed.

All disadvantaged groups have a higher proportion than the control group who believe they will have difficulty adapting to climate change. While a significant proportion think it will be difficult to adjust to the impact on their health and wellbeing, most emphasise the problems of electricity usage and costs. Again, multiple disadvantage households feel they will have the greatest difficulty.

All disadvantaged households had experienced the negative effects of extended heatwaves and high proportions had faced health issues as a result. They used an array of ways of coping with and adapting to prolonged heat.

Unawareness of house energy efficiency was twice as great among the disadvantaged as among the control group. Ownership of air-conditioning is less among the disadvantaged but 20 percent of those owners indicated they didn't use it during heatwaves because of cost.

Disadvantaged households are not coping nearly as well as the control households with heatwaves.

**The relationship between social exclusion and climate change**

A multivariate analysis of the complex interrelationships between disadvantage, social exclusion, climate vulnerability and adaptation was carried out.

Findings showed that the level of social exclusion can mostly explain the increased perception vulnerability and lower adaptive capacity of certain disadvantaged groups to the impact of climate change and of extreme weather. However, for some groups increased vulnerability cannot be explained as well through social exclusion or climate awareness. This was the case for increased vulnerability of aged/disabled household to the health effects of extreme weather, migrants' increased perception of heatwaves as a challenge and or single parent households' increased perceptions of climate change as a challenge. There are factors in addition to social exclusion which explain their greater vulnerability.

Despite the inconsistency in the results of multiple disadvantage analysis, there is some evidence that having multiple disadvantages may increase the perceptions of vulnerability and difficulty of adaptation that cannot be explained by the level of social exclusion.

Some of the limitations of the study certainly cannot be overlooked. We cannot claim that the variables selected for the assessment of social exclusion are the perfect
measures of this concept. However, they provide us with some consistent results showing the strong impact of economic exclusion and social connectedness on the perceptions of climate vulnerability and adaptive capacity.

Additional insights into the relationship between social exclusion and the effects of climate change beyond those revealed by the analysis of census and survey data were obtained through in-depth discussions through interviews with the disadvantaged groups in the three areas and key stakeholders.

The qualitative discussions revealed a strong feeling of vulnerability among disadvantaged groups with respect to the effects of extreme weather events and the rising cost of living. This was especially marked among those with health issues which clearly exacerbated concerns and which interacted with other dimensions of disadvantage like low income, low levels of accessibility and the fact that many felt they were forced to live in areas more susceptible to the negative effects of environmental change and events.

In summary, the in-depth interviews with excluded groups revealed both an understanding of, and a deep concern with, the effects of climate change. It is clear that social exclusion and disadvantage exacerbate vulnerability to the effects of climate change in the three study areas.

The in-depth interviews indicated that, especially in the non-metropolitan areas, considerable ingenuity and resilience was being demonstrated in adapting to environmental change. However, this was tempered by a deep, widely expressed concern that people’s resources and ability to cope were being stretched and exacerbation of these impacts could mean that this resilience will not be sufficient to offset its effects.

A focus of the in-depth interviews was on the information which respondents were able to source about climate and environmental change, ways of coping with it and the services and institutions which people can access to assist in adaptation. While there was considerable variation between individuals there were some consistent themes:

- Most of the information was obtained informally and from media.
- Among formal sources, local government was the major source of information although a few mentioned Centrelink. There doesn’t appear to be much accessing information from federal and state government departments.
- There was some concern among respondents about the nature of information they were able to access from formal sources which many found to be conflicting, confusing, out of date, too complex and of little relevance to their situation (e.g. among Aboriginal groups).

The discussions about information not only pointed to the lack of relevant information about climate change, adaptation, mechanisms, as well as rebates and concessions which are available but also in the way that information is made available. From the qualitative interviews there was a clear message that the existing sources of information to help people adapt to climate change were largely not effective in getting through to disadvantaged groups. Clearly much of this information has a ‘middle class’ orientation and the messages often do not reach, are not relevant to and have little effect on these groups. This is certainly the case for Aboriginal groups but it also applies more widely. One of the dimensions of social exclusion in this context is that disadvantaged groups are ‘excluded’ from getting access to information to assist them to adapt to climate change.
One of the strongest messages emerging from the household interviews was that regardless of views or beliefs on climate change, all interview participants were making adaptations to their immediate environment or daily lifestyle practices in response to changes in the weather and/or the rising cost of living. Two main forms of adaptation were noted in the interviews with householders. Some participants described larger, often structural, household changes such as installing solar panels or rainwater tanks, re-planting gardens or buying new appliances and so forth. They also discussed smaller lifestyle changes such as recycling household grey water or turning off lights and appliances. It was these adaptive changes in behaviour which were dominant since disadvantaged groups often lacked the resources to make the larger structural changes even if they considered them needed or desirable.

Changes in behaviour as a response to environmental change is not only the major form of adaptation reported by disadvantaged groups. There was a high level of motivation among them to make those changes. Undoubtedly there is a major impact of limited economic resources in making changes so that electricity and water costs, for example, are minimised in the climate of rapidly rising prices. However, there also was an underlying sentiment that it was ‘the right thing to do’. This points to the potential of being able to build on such sentiments, not just among disadvantaged groups to bring about major shifts in the level of resource consumption and the way in which the environment is used in Australia.

The stakeholder interviews also provided some clear insights into the situation of disadvantaged groups in the three study areas and how they are being affected, and are likely to be affected in the future, by climate change. The overwhelming message was that disadvantage substantially exacerbated the negative impacts of climate change and effectively compromised their ability to cope with that change.

One factor that was stressed is that some dimensions of social exclusion are especially important in increasing vulnerability to the impacts of climate change. For example, the social isolation of many disadvantaged people can be a major barrier to effective adaptation.

The stakeholders also underlined the growing impacts of the rising price of utilities, both in exacerbating their disadvantage by using money that otherwise would be used for food or other living costs but also preventing them undertaking some strategies to cope with environmental events such as using air-conditioning during heatwaves. Many examples of both of these dimensions were given by stakeholder respondents.

The stakeholders also stressed the importance of community and family support in coping with severe environmental elements. Disadvantaged groups lacking these support systems were extremely vulnerable.

The stakeholders also made comment on the information issue. While stakeholders complain about not being able to educate and send a message to these groups about better ways to deal with extreme weather and climate change, disadvantaged groups complain about the lack of consistent information. The reasons for this miscommunication between service providers and receivers include language and cultural barriers by both sides, as well as lack of personalized information tailored specially for the disadvantaged groups, who are dealing with many other daily stressors and may not consider climate change to be relevant to them. Members of disadvantaged households think, that a stronger message to the public, mandatory improvements to public housing and new structures for better energy efficiency, are among the institutional changes that need to be made for better adaptation to climate change, because individual behavioural changes are not sufficient.
It is apparent, especially from the qualitative study that socially excluded groups in the study should not be depicted as ‘positive victims’ of the effects of social change and that there are many examples where they have shown agency, resilience and innovation in adapting to it. However, they clearly are highly constrained in this by the various dimensions of disadvantage which they experience.

**Policy Implications**

**Introduction**

Knowledge of current and likely future climate change at a national level in Australia is robust and convincing. However, we know less about how the impact will vary between different regions and communities on the one hand and on different subgroups in the population on the other. The findings of this study are in agreement with evidence from elsewhere in the world (e.g. IPCC, 2007; Capetola, 2008; Hardon & Pandiella, 2009; Bohle et al., 1994) that socially excluded and disadvantaged groups are:

- More vulnerable than other groups to the negative impacts of climate change.
- Their ability to adapt effectively to those changes is compromised by aspects of their disadvantage, especially limited economic resources, powerlessness and lack of social connectedness.

There is general agreement that climate change impacts are inevitable and that there is no alternative to introducing adaptation measures to address these impacts (Stern, 2006). While individuals and groups have crucial roles to play in this policy intervention at local, state, national and international levels of government will be necessary. It is the argument of this paper that an important element in this intervention to facilitate adaptation to climate change must be considerations of social justice and social inclusion.

Policy and program interventions to facilitate adaptation to climate change are of two types (Brisley et al., 2012, 4):

- Building adaptive capacity – creating the information, supportive social structures and governance as a foundation for delivering action.
- Delivering adaptation actions – actions that either help to reduce vulnerability to climate risks or exploit opportunities.

It is argued here that a social inclusion lens needs to be applied in both of these areas for the following reasons:

- There can be no doubt that social exclusion and social disadvantage put certain groups at greater risk of being negatively affected by climate change than others.
- Moreover, their ability to adapt to that change is compromised by their disadvantage.
- Climate change impacts, if not addressed, will lead to widening of the gap between the disadvantaged and the rest of the population.

**Principles for a Socially Just Adaptation to Climate Change**

Having accepted that there is an important social inclusion dimension to effective adaptation to climate change, it is useful at the outset to put forward a basic framework for the application of the social inclusion lens to consider adaptation interventions for climate change. The following principles have been modified from a study in the United
Kingdom which investigated how social justice issues can be incorporated into local adaptation to climate change approaches (Brisley et al., 2012, 5). It is argued here that they provide a valuable checklist of the tasks that need to be undertaken to ensure that adaptation interventions are fully inclusive of disadvantaged groups.

- Take into account current and likely future climate change impacts.
- Understand the factors contributing to vulnerability.
- Identify the distribution of vulnerable groups likely to be affected and how this changes over time.
- Involve these communities in developing and delivering plans and activities related to adaptation and supporting community resilience.
- Assess the potential adverse implications of climate change for vulnerable groups and identify targeted adaptation activities for them.
- Develop responses which build adaptive capacity, support adaptation actions and consider both physical infrastructure and service delivery.
- Have awareness of the trade-offs that arise in striving to achieve socially just adaptation and minimising the negative effects on vulnerable communities.
- Considering and assessing all adaptation options to ensure that the most beneficial to all groups is taken forward.

With these principles in mind the remainder of this section attempts to distil out of the findings of the study the main implications for policy.

**Embedding Climate Change in the Social Inclusion Agenda**

In Australia the last decade both climate change and social inclusion have emerged as important issues of political, community and media concern. The Scanlon Foundation survey (Markus, 2012) of the most widely held issues over the years 2010 and 2012 are shown in Figure 44. In all three years, economic issues which incorporate issues of poverty and inequality have been the major single issue of concern and it has increased. Environment including climate change issues have varied between 11 and 18 percent of respondents. The two issues of social inclusion and climate change have both been the target of strong government initiatives at all three levels of government, especially at the national level. However, these initiatives have almost entirely been undertaken separately from each other and not taken cognisance of the important linkages between them. It is important that social inclusion elements be injected into climate change adaptation strategies not only at national level but also state and local levels. It needs to be recognised that the severity of the impact of negative climate change effects do not fall equally across regions or subgroups in the people living in those areas. Such agencies have the major responsibility for mounting adaptation initiatives and it is important that these activities are undertaken within the framework of the principles outlined in the previous section.
However, it is equally important to include a consciousness of the effects of climate and environmental change in the social inclusion agenda. For example, the Australian Social Inclusion Board’s (2012, 18-22) Monitoring and Reporting Framework does not include any reference or variables which relate to environment. An important consideration would appear to be a need to include a measure of \textit{environmental vulnerability}. This would need some work but it is clearly important. It is necessary to not just recognise that social exclusion increases vulnerability to the effects of climate change. In fact, environmental vulnerability can be seen as \textit{part of social disadvantage}. It is one of the ways in which the lives of people are worsened and their ability to participate fully in Australian society is compromised. Moreover, Brisley et al. (2012, 8) argue that environmental vulnerability considerations need to be part of social inclusion initiatives. They suggest that it is important:

‘that organisations working with vulnerable groups, such as older people, children, people with health problems and those who may struggle to adapt to climate change or who live in high-risk buildings and locations, ensure that just adaptation is built into their risk and resilience planning. It is equally important that, as far as possible, service users are involved in the development of plans, policies and practices’.

There is an important argument to be made that climate change adaptation considerations need to be embedded across a range of government and non-government agencies and departments concerned with service planning and delivery. Moreover, there is a need for closer coordination and collaboration across agencies in this respect.

\textbf{The Importance of the Local Community}

A strong message which came through from both the quantitative and qualitative analysis in this study is that effective adaptation to climate change is strongly influenced by local factors and that this is especially the case for disadvantaged...
groups. While the economic resources available to people in disadvantaged communities is clearly a major barrier to successful adaptation, there are a number of local elements which can make or break successful adaptation. These include:

- The extent of social connectedness – the extent to which people feel that there is a network of family, friends and community that they can rely on as a source of appropriate information and advice, social and economic support and providing a sense of belonging and participation.

- The disadvantaged are much less mobile than other groups, are more restricted to their immediate environments and have fewer linkages outside the local community.

- There is overwhelming evidence that actions to deal with environmental change impacts but also in building resilience and adaptive capacity to cope with and adapt to that change need to be tailored to local circumstances if they are to be most effective.

- Local environmental circumstances may strongly influence exposure to risk and the disadvantaged are disproportionately located in less desirable locations which often have elevated risk of negative environmental effects.

There are a number of important policy messages here, including:

- The importance of empowering and providing support for local bodies including local and regional government, local non-government organisations, community organisations and businesses in climate change adaptation.

- Ensuring that state and federal policies have sufficient flexibility to take into account variations in both local environmental circumstances but also in the mix of disadvantaged groups and their specific needs.

- The importance of engaging local communities and especially the disadvantaged and their advocates in service and support planning and delivery. The disadvantaged perceive that they lack the power to influence decision making at any level and their engagement can not only help in gaining wider engagement in these activities but lead to those activities being better suited to local needs and hence more cost effective.

- It is of critical importance that social inclusion considerations are given a prominent position in the Adaptation Plans being developed by local governments to facilitate adaptation to climate change effects. All local governments should have such a Local Adaptation Plan and be supported to undertake those in a way that is socially inclusive of all groups in the local community. Social justice is not often given priority in adaptation planning at any level (Brisley et al., 2012, 37).

The overall necessity of strengthening local communities is of basic importance to responding effectively to climate change effects. Stanley et al. (2009, 41) argue the following are key elements needed to strengthen communities:

- Strong local community ownership of community strengthening projects.
- Strong local leadership.
- Participation by ‘hard to reach’ and diverse members of the community.
- Clearly defined and agreed upon goals.
- Tangible outcomes for communities.
- Well-functioning partnerships.
- Adequate resources in the form of grants, infrastructure, information and skill development opportunities.
- Skilled project workers.
- Movement to a scaled up approach which is mainstreamed.

The Special Case of the Aboriginal Population

One of the limitations of the present study is that despite going to extraordinary lengths of engagement with Aboriginal elders and communities we feel that we did not get fully below the surface in understanding fully the challenges which this important group face in relation to climate change. The findings clearly showed that they are not only among the most socially excluded groups in the three study areas but that their vulnerability to the negative effects of climate change is greater than for many other groups. There are clearly here, however, important cultural as well as economic and social dimensions to their disadvantage. These cultural considerations require greater research involving the Aboriginal communities themselves. Enough was seen in the quantitative and qualitative analysis undertaken here, however, to indicate that specific initiatives are likely to be required to resource, bolster and facilitate the adaptive processes in those communities in both metropolitan and non-metropolitan contexts. For this group, as much as any included in the study, it was apparent that adaptation to climate change effects was not only compromised by limited economic resources but also by:

- Lack of access to relevant information which is provided in a meaningful and accessible way.
- Lack of access to social support systems, especially in metropolitan areas.
- Lack of access to relevant formal services.
- Low levels of accessibility.
- High incidence of multiple disadvantage and a greater impact of poor health in exacerbating social exclusion than any other groups.

An initiative on assisting Aboriginal adaptation to climate change is clearly an important and urgent priority.

The Role of Information

Information has an important role to play in adaptation to climate change in a number of ways:

- Providing people with an understanding of the nature and potential impacts of climate change so they can be motivated to take the actions needed to minimise its negative effects.
- Providing people with the basis for taking initiatives or allowing behaviour in anticipation of future negative effects of climate change.
- Providing people with a knowledge which allows them to access subsidies and other resources which will allow them to take actions to adapt to climate change.

The study has shown that the wide media coverage of the climate change issue has ensured that there is widespread recognition of environment change as an important issue which is influencing people’s lives and is likely to be even more important in the future. However, there were also a number of clear indications that the
information being accessed by disadvantaged groups is far from ideal in terms of its being able to help them adapt to climate change. In particular:

- Information accessed from official sources is limited but it also is often not seen as useful by respondents. This is both in terms of its content and the way in which it is presented.
- Much of the information is accessed from media and informal sources and often is confusing, contradictory and of limited utility to the distinctive local situation.

There is then a clear role for better communication of information to support different groups, especially the disadvantaged, to adapt effectively to current and impending impacts of climate change. It is clear that ‘one size fits all’ approaches to communication are doomed to failure in the context of disadvantaged groups. Information messages need to be appropriate to the perceived needs of particular subgroups and a more segmented approach to information dissemination which takes this into account is needed. The next section argues that the groups studied indeed have shown a high level of readiness to change their behaviour in response to environmental change impacts. However, they are lacking in appropriate information to assist them in changing that behaviour.

**Adaptation: Behaviour Change vs. Other Initiatives**

One of the strong messages from the study is that disadvantaged groups in the study area should not be depicted as ‘passive victims’ of the negative effects of climate change. Certainly one of the defining features of their social exclusion is a feeling of powerlessness and the study found that they felt they had very limited opportunity to influence decisions which shaped their daily lives. Nevertheless, there was widespread evidence across each of the disadvantaged groups that, while there had been very limited expenditure on solar panels, tanks and other adjustments which require a significant overlay of funds, there had in fact been significant change in lifestyle procedures and day to day behaviour in line with more sustainable practices. To be sure this has been strongly influenced by the soaring prices of utilities, especially power and water bills so that economic necessity has played a role. Nevertheless it was apparent, especially in the qualitative work that these changes in behaviour – water use, electricity use etc. – have in part been in response to an increased appreciation of the necessity of making these changes if they and the community are to move toward a more sustainable future.

The policy implication here is clear and also not just for disadvantaged groups. There is a widespread understanding of the realities of environmental change, pressure on scarce resources like water and that there has been an excessive and unsustainable reliance in the past on engineering solutions to dealing with these pressures. The respondents were both motivated and able to make changes in their lifestyle and behaviour toward more sustainable practices. Clearly, governments at all levels need to recognise this and be more prepared on the one hand to give communities complete information to enable them to make better decisions about lifestyle and behaviour. There is a need to respect the community more in this respect. However, it is not just about providing information. Governments also need to assist people in making those lifestyle and behaviour choices with appropriate assistance programs. This is especially the case with disadvantaged groups who are much more limited in the resources available to them to facilitate making such choices.
Building Up Wider Resilience

There can be no doubt that the higher levels of vulnerability among disadvantaged groups with respect to the effects of climate change compared with the rest of the community are part of a wider vulnerability which makes them more at risk of experiencing negative effects of other shocks – economic downturns, personal tragedies etc. Hence part of the answer in a policy sense must be the support of wider initiatives to overcome disadvantage, to empower disadvantaged groups, to increase the economic resources available to them, to increase their social connectedness and sensitise all government and non-government activity to their needs. Building up this wider resilience must be a central part of any strategy to develop a more effective adaptive response to climate change.

What needs to be emphasised here is the fact that environmental effects threaten to jeopardise the effects of wider policies and programs intended to reduce social exclusion in Australia. This is because, as has been demonstrated here, environmental changes and climate change is already exacerbating and worsening the situation of the disadvantaged population. This makes it especially imperative that all strategies and initiatives designed to both assist in building up capacity to adapt to environmental change as well as delivery of actions to adapt to such change need to be undertaken with a full appreciation of what is needed for those initiatives to be effective among excluded groups. This may mean tweaking or modifying those initiatives so that they are accessible to, and eventually benefit, all groups in the community including those who are most disadvantaged. This means moving away from the generic, ‘one size fits all’ approach in such programs. It may mean that particular incentives or supports are made available to disadvantaged subpopulations in order to ensure that they do get access to these initiatives. If disadvantaged groups are disenfranchised from being involved in these climate change adaptation initiatives it is likely that those initiatives will exacerbate inequality rather than reduce it.

The Importance of Social Support

It is recognised that a part of social exclusion is that some groups have less social capital than others and that this can mean that they have less access to informal support and information systems which can help them deal with shocks to their lives. This dimension was certainly in evidence in the three study areas where among disadvantaged groups their ability to cope with environmental change was compromised not only by their limited economic resources or their ability to call upon appropriate formal services but also their lack of social participation and social networks to help them cope. As Stanley et al. (2009, 42) point out:

‘The development of social capital and the ability to draw on community strengths is important in the ability to adapt to climate change. Social capital brings with it a responsibility to gain access to resources and enhance wellbeing’.

The policy implications here are twofold. In the first place this situation needs to be recognised when undertaking adaptation initiatives so that special steps may need to be taken to ensure that disadvantaged groups do get access to them. Secondly, we need to look at wider concerns of whether or not steps can be taken to facilitate disadvantaged people being able to participate socially more intensively and develop their social networks.

Stanley et al. (2009, 42) argue that there is a need for developing synergy between the state, community and civil society in order to develop social capital and strong communities.
The Issue of Utilities

One of the strongest findings of the study, both the quantitative and qualitative elements, relates to the fact that increasing prices for utilities, especially power and water, in recent years have been the highly visible face of climate and environmental change to disadvantaged groups. They have undoubtedly exacerbated hardship and exclusion among these groups. On the one hand they have had to cut back on using them so that they suffer significant discomfort by not being able to use air-conditioning on extremely hot days. On the other they are sacrificing other aspects of their lives to meet utility costs. As part of the nation’s Social Inclusion Agenda, it is imperative that the costs of utilities to the disadvantaged be addressed. Undoubtedly the strategy of more rational costing of resources like water and electricity are needed as a wider societal initiative to become more sustainable. However, such strategies, if they do not have a safety net for the disadvantaged will widen the gap between haves and have-nots to an unprecedented level.

A Role for the NGO and Community Sector

The local nature of the effects of climate change and the necessity to consider local factors in adaptation, especially in relation to disadvantaged groups, was emphasised earlier. An important ingredient in facilitating local intervention is the involvement of community and non-governmental organisations. The engagement of these organisations to work effectively with federal, state and local governments to enhance the adaptive capacity of disadvantaged groups is an important priority. Stanley et al. (2009, 53) argues that these groups need to be funded to facilitate adaptation for those at risk of social exclusion.
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Impact of Climate Change on Disadvantaged Groups


APPENDIX 1

IMPACT OF CLIMATE CHANGE ON DISADVANTAGED GROUPS: ISSUES AND INTERVENTIONS: SURVEY QUESTIONNAIRE

INTRODUCTION TEXT

[A]

Hello, my name is...........and I'm calling on behalf of the University of Adelaide. We are conducting important research into community perceptions of climate change and how changes in our climate might affect different communities in Australia. The results of this survey are intended to inform how government and other organizations plan for the future in your area. Could I please speak to someone in your household who owns the property or is responsible for the lease?

We are looking for feedback from various subgroups in the community. Do you or any members of your household over the age of 18 belong to any of the following groups: [code according to the following hierarchy]

Indigenous Australian
Foreign born (migrant)
Single parent
Aged or disabled
Unemployed
Private renter or public housing tenant

[once the number of persons for a certain category has reached its quota, check if they belong to any other category, if not terminate the phone call]

[If no to all of the above– add to control group. Once the quota for the control group participants have been reached – terminate phone call].

[IF PERSON SPEAKING, GO TO B]

[IF PERSON UNAVAILABLE, GET FIRST NAME AND ARRANGE CALL-BACK]

[IF DIFFERENT PERSON COMES TO PHONE, RETURN TO A]:

[B]

We are interested in your views. The questions take about 10 minutes. Have you got time now?

[IF YES, GO TO C]

[IF NO, MAKE A TIME TO CALL BACK]

[C]

I can assure you that information you give will remain confidential. The answers from all people interviewed will be gathered together and presented in a report. No individual answers will be passed on. Of course, you are free to stop the interview at any time. For training purposes, the interview may be monitored by my supervisor.

[IF REFUSED, THANK AND TERMINATE]
1. YOUR VIEWS ON HOUSEHOLD ISSUES AND CLIMATE CHANGE

1.1. The items listed below may or may not be current challenges to your household. Please indicate your level of agreement or disagreement about whether the item is a current challenge to your household.

[READ OPTIONS. SINGLE RESPONSE]

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree
- Not stated/ Unsure [DON’T READ]
- Not applicable [DON’T READ]

1.1.1. Job security
1.1.2. Heat waves (> 5 days over 35 degrees C)
1.1.3. Floods
1.1.4. Health
1.1.5. Crime
1.1.6. Climate change
1.1.7. Housing costs
1.1.8. Transportation costs
1.1.9. Energy costs
1.1.10. Food costs
1.1.11. Other (please specify)
1.2. There has been a lot of discussion in the community about climate change in recent times. For each of the statements about climate change I am going to read out, can you please tell me whether you strongly agree, agree, disagree or strongly disagree.

[READ OPTIONS. SINGLE RESPONSE:]

<table>
<thead>
<tr>
<th>Option</th>
<th>Code</th>
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<tbody>
<tr>
<td>Strongly Agree</td>
<td>1</td>
</tr>
<tr>
<td>Agree</td>
<td>2</td>
</tr>
<tr>
<td>Neither Agree nor Disagree</td>
<td>3</td>
</tr>
<tr>
<td>Disagree</td>
<td>4</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>5</td>
</tr>
<tr>
<td>Not stated/ Unsure</td>
<td>6</td>
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</table>

1.2.1. Human activities are influencing changes in climate
1.2.2. Climate change will occur over time, but we don’t have to think about it now
1.2.3. Climate change is a current issue that will personally affect me.
1.2.4. I am well informed about the causes and consequences of climate change
1.2.5. I am well informed about how to respond to climate change
1.2.6. Doing something about climate change is important
1.2.7. I would like to be doing more about climate change
1.3. How likely do you think the following aspects of your life will be affected by climate change?

[READ OPTIONS. SINGLE RESPONSE]

Highly likely 1
Likely 2
Not sure 3
Unlikely 4
Highly unlikely 5
It has already been affected by it 6
Not relevant 7
Not stated/ Unsure [DON’T READ] 8

1.3.1. Your household’s health and well-being
1.3.2. The amount of water available to your household
1.3.3. The amount of electricity your household uses in the home
1.3.4. Your household’s ability to pay the electricity bill

1.4. What is the likely nature of the potential impacts of climate change on the following aspects of your life?

[READ OPTIONS. SINGLE RESPONSE]

Large positive impact 1
Small positive impact 2
No real impact 3
Small negative impact 4
Large negative impact 5
Not relevant 6

1.4.1. Your household’s health and well-being
1.4.2. The amount of water available to your household
1.4.3. The amount of electricity your household uses in the home
1.4.4. Your household’s ability to pay the electricity bill
1.5. How easy or difficult do you think it would be for you to adapt to climate change in each of the following areas

[READ OPTIONS. SINGLE RESPONSE]

Very easy 1
Easy 2
Not sure 3
Difficult 4
Very difficult 5
Not relevant 6

1.5.1. Your household’s health and well-being
1.5.2. The amount of water available to your household
1.5.3. The amount of electricity your household uses in the home
1.5.4. Your household’s ability to pay the electricity bill
2. MANAGING HEAT WAVES

Scientists predict that heat waves, defined as five or more days over the temperature of 35 degrees, are likely to be more frequent as a result of climate change. The following questions ask you about your current response to heat waves.

2.1. Have you experienced a heat wave? [If no, go to section 3]
   - Yes
   - No

2.2. Have heat waves led to major health problems for you personally?
   - Yes
   - No

2.3. If yes, what types of problems?

2.4. Have heat waves led to major health problems for a member of your household?
   - Yes
   - No

2.5. If yes, what types of problems? .....................................

2.6. Have you taken the following actions to manage the effects of heat waves in your household?

   [READ OPTIONS. SINGLE RESPONSE:
   - Yes
   - No
   - Not stated/ Unsure [DON'T READ]
   - Not applicable [DON'T READ]

   2.6.1. Purchased an air-conditioner for the home
   2.6.2. Taken action to insulate the home
   2.6.3. Left the home during the heat wave
   2.6.4. Other actions [specify]

2.7. Have you had an audit of your household energy use to identify potential for energy savings?
   - Yes
   - No

2.8. If so, has it been helpful?
   - Yes
   - No
   - Don’t know

2.9. Is your home insulated?
   - Yes
   - No
   - Don’t know
2.10. **Do you have an air-conditioned in your home?**

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<tr>
<td>No</td>
<td>2</td>
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2.11. **If not, do you have some other cooling device installed such as a fan? [If yes – ask them to state major device]**

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<tbody>
<tr>
<td>Yes [what is the major device?]</td>
<td>1</td>
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<tr>
<td>No</td>
<td>2</td>
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</table>

2.12. **Do you choose to switch on your cooling devices during a heat wave?**

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<tbody>
<tr>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
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2.13. **If no, to what extent do the following factors influence your decision not to use them?**

[READ OPTIONS. SINGLE RESPONSE:]

<p>| | |</p>
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<tbody>
<tr>
<td>Strongly Agree</td>
<td>1</td>
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<tr>
<td>Agree</td>
<td>2</td>
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<tr>
<td>Not sure</td>
<td>3</td>
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<tr>
<td>Disagree</td>
<td>4</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>5</td>
</tr>
<tr>
<td>Not stated/ Unsure [DON’T READ]</td>
<td>6</td>
</tr>
<tr>
<td>Not applicable</td>
<td>7</td>
</tr>
</tbody>
</table>

2.13.1. To save on the electricity bill

2.13.2. My cooling device is faulty

2.13.3. I don’t know how to use the device correctly

2.13.4. My landlord won’t assist or allow

2.13.5. I am able to tolerate heat waves
HEALTH AND SOCIAL INCLUSION

2.14. In general, would you say your health is:
[READ OPTIONS. SINGLE RESPONSE]
Excellent 1
Very good 2
Good 3
Fair 4
Poor 5

2.15. Do you need assistance with everyday activities?
[READ OPTIONS. SINGLE RESPONSE]
Never 1
Occasionally 2
Usually 3
Always 4

2.16. Last time you were ill and needed a doctor, were you able to see one?
[READ OPTIONS. SINGLE RESPONSE]
Yes 1
No, I didn’t find transportation 2
No, I didn’t have the finances 3
No, couldn’t get an appointment 4
Other [specify] 5
2.17.  **How frequently do your neighbours or friends help you with the following tasks:**

[READ OPTIONS. SINGLE RESPONSE]

<table>
<thead>
<tr>
<th>Option</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>1</td>
</tr>
<tr>
<td>Occasionally</td>
<td>2</td>
</tr>
<tr>
<td>Usually</td>
<td>3</td>
</tr>
<tr>
<td>Always</td>
<td>4</td>
</tr>
<tr>
<td>I have never asked my neighbours or friends</td>
<td>5</td>
</tr>
<tr>
<td>Not applicable [Don’t read]</td>
<td>6</td>
</tr>
</tbody>
</table>

2.17.1. Helped around the house
2.17.2. Lent or gave household items or equipment
2.17.3. Assisted with shopping
2.17.4. Looked after children or other family members
2.17.5. Lent or gave you money
2.17.6. Looked after your house or pet while you were away
2.17.7. Provided transport

2.18.  **In the last 12 months, how often have you participated in the following:**

[READ OPTIONS. SINGLE RESPONSE]

<table>
<thead>
<tr>
<th>Option</th>
<th>Number</th>
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<tbody>
<tr>
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<td>Occasionally</td>
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<tr>
<td>Usually</td>
<td>3</td>
</tr>
<tr>
<td>Always</td>
<td>4</td>
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2.18.1. Public meetings
2.18.2. Political party activities
2.18.3. Parties in your community
2.18.4. Neighbourhood or community groups
2.18.5. Volunteer work
2.18.6. Talked to your neighbours about issues that concerned you
The items listed below are intended to measure your current economic situation.

2.19. **How satisfied are you with your current financial situation?**
- Very dissatisfied: 1
- Dissatisfied: 2
- Neutral: 3
- Satisfied: 4
- Very satisfied: 5

2.20. **What are your household’s approximate fortnightly earnings before tax?**
- $1-800: 1
- $801-1200: 2
- $1201-1600: 3
- $1601-2000: 4
- >$2000: 5
- Refused: 6

2.21. **If you have an emergency, could you get a hold of $2,000 in a week?**

[READ OPTIONS. SINGLE RESPONSE]
- Yes, I could draw upon my savings: 1
- Yes, I could take a loan from a bank or place it on my credit card: 2
- Yes, I could borrow from a friend or family member: 3
- No: 4
- Don’t know: 5

2.22. **Have you experienced any of the following events in the last year due to a shortage of money?** [circle if yes]
- Gone without food when hungry: 1
- Got behind with rent or mortgage: 2
- Moved house because rent/mortgage was too high: 3
- Couldn’t keep up with utility bills: 4
- Had to pawn or sell something or borrow money from a money lender: 5
- Had to ask a welfare agency for assistance: 6
- Wore bad fitting or worn out clothes: 7
- Couldn’t go out with friends and pay one’s way: 8
- Unable to attend a wedding or a funeral: 9
- Couldn’t get to an important event due to a lack of transport: 10
INFORMATION ABOUT YOU

Finally, just a couple more questions about you and your household, so that we can understand how different people have answered these questions.

2.23. What year were you born? (year)
2.24. How many years have you lived in X Council Area? [record years]
2.25. What is your family status?
   Married or living together 1
   Single 2
   Share household 3
2.26. How many children under 16 years live in your household?
   1 1
   2 2
   3 3
   4 4
   5 5
   Other [please specify] 6
2.27. How many people over 16 years live in your household?
   1 1
   2 2
   3 3
   4 4
   5 5
   Other [please specify] 6
2.28. Were you born in Australia?
   Yes (Go To 5.1.9) 1
   No 2
2.29. If no, in which country were you born?

........................................
2.30. How long have you lived in Australia if yes?
   Less than one year 1
   Number of years ........................................
   Other [specify]
2.31. **Do you own your home or are you renting?**
- I own my home outright 1
- I own my home with a mortgage 2
- I am a private renter 3
- I am a public housing tenant 4
- Other [specify] 5

2.32. **What is the highest level of education that you have completed?**
- Primary school 1
- Part or all of high school 2
- TAFE course 3
- A university degree 4
- A postgraduate degree 5
- Other 6

2.33. **What is your employment status?**
- Working full time paid employment (35 or more hours per week) 1
- Working part time paid employment (less than 35 hours per week) 2
- Self employed (35 or more hours per week) 3
- Self-employed (less than 35 hours per week) 4
- Casual employment 5
- Other form of paid employment 6
- Not currently in paid employment and not seeking work 7
- Not currently in paid employment but actively seeking work 8
- Unable to work because of a disability 9
- Retired 10

2.34. **What is the main source of your household income?**
- Employment income 1
- Superannuation/investment income 2
- Government benefit 3
- Government pension 4
- Other [specify] 5

2.35. **Are you currently studying?**
- Yes, studying full time 1
- Yes, studying part time 2
- No, I am not currently undertaking formal study 3
[RECORD GENDER OF RESPONDENT]
Male 1
Female 2

[RECORD SUBURB FOR NUMBER DIALLED]

THANK YOU AND FOLLOW UP

Many thanks for participating in this survey. The results will be published at the end of this year.

Would you be interested in taking part in a follow up interview about your ideas on how planners might be able to respond to some of the issues raised in the survey? If so, can you please provide your telephone number and email address.

Telephone number .................................
Email address........................................................

Would you like to have a copy of the summary of the results?
Yes
No

If yes, please provide email address.
Email address..............................................

If no email, postal address.........
APPENDIX 2

Impact of Climate Change in Disadvantaged Groups: Issues and Interventions

Household in-depth interview guide

Household challenges:
Could you describe what are the main difficulties that your household has to deal with on everyday basis? How do you manage those? What could help you overcome those? How would you describe the economic standing of your household? How has it changed in the last few years? How is it different/same compared to other households in this community?

Social inclusion:
How well are you connected to the local community? What kind of activities do you usually participate in? Do you have many friends among your neighbours/community members? How often do you communicate with them (if not often, what is the reason)? When was the last time you met with your friends, and what was the occasion? What do you usually discuss with your friends?
How often do you receive help from friends/relatives? What do they usually help you with? Do you help your friends/relatives often? How do you usually help them?
How would you describe the availability/accessibility of different social services in your community, such as schools, child-care, aged-care and health-care facilities, transportation, financial services, housing, etc.? What are the main barriers?

Climate Change:
What do you know about climate change? Could you tell about the last time you heard about/discussed climate change (when, where and with who)? Do you think there should be more information available and discussed about climate change and why so?
Do you think climate change is affecting you personally at present in any way? If so, how?
Do you think climate change is going to impact on you and/or your family in the future in any way? If so, how?
Do you think individuals, ordinary people like us, should do more to help prevent climate change? What kinds of things do you think people like us can do to make a difference? Have you done/Are you ready to do anything that might help prevent climate change?
What kinds of strategies do you think ordinary people like us can make to help adjust to climate change?
Have you made any changes in your day to day activities to help alleviate climate change? What kind of changes? Are you anticipating making other changes in the future? If so, how?
Thinking about things like rising utility or energy costs, like water, gas and electricity, and rising housing costs and so forth... have you had to make any adaptations to your lifestyle in recent years to meet these needs? What kinds of changes?
Have you noticed any rise in the cost of fuel or other transport costs in recent years? Has this impacted on the types of activities you do on a day to day basis? If so in what ways have you made changes?
Have you noticed any rises in the cost of food in recent years? Has this impacted on your health or lifestyle in any way? What kinds of changes have you made?

Heat wave
Have you experienced a heatwave before? How did you manage it? Did it have any impact on the health and wellbeing of anyone in your household? If so, how?
Have you ever been informed how to best manage heat waves and what to do to avoid them? Have you ever been informed how to make your home more resistant to heat waves? When and how did you get this information? Have you modified your home to make it more resistant to heat waves in the future? If so, how? If not, are you going to/can you do anything?
APPENDIX 3

Impact of climate change on disadvantaged groups: Issues and Interventions

Stakeholder interview guide

Could you please describe what your agency’s role is in the community? Which disadvantaged groups is it involved with and how? What is your position within this agency and what is your role? [TAKE NOTES OF THE AGE AND SEX OF THE RESPONDENT]

In your opinion how has the low income population in this area changed in the last 5 years?

In your opinion which population subgroups in this area are disadvantaged/socially excluded, i.e. are the least able to fully participate in the main social and economic activities of the society? Why?

Which part of the population is considered ‘poor’; why? To what extent are the ‘poor’ people locals vs. incomers?

How big was the impact of economic crisis in the area? Which groups were hit the hardest? Why?

To what extent is the local population informed on climate change issues: causes, consequences, responses? Which population groups are the most/least informed? Why?

In your opinion which disadvantaged subgroups are the most vulnerable to climate change impact (heat waves, drought, floods, economic impact, etc)? Why?

Which disadvantaged groups are likely to take actions to better manage climate effects (e.g. take actions to manage heat waves, assess flood risks in order to move, etc.)

Which population groups will be able to adapt most and least successfully to the negative impact of climate change and why?

In your opinion, what can be done to increase social inclusion of disadvantaged groups?

What sorts of things are needed to assist poorer groups cope with potential impacts of climate change? What can be done to increase the resilience of disadvantaged groups to the negative impacts of climate change?

Who are the main stakeholders in the area working with disadvantaged/socially excluded groups: governmental organizations, NGOs, other agencies?

Which of the stakeholders do you think has the most prominent role in helping disadvantaged groups to increase resilience to the negative impact of climate change?

Which of these agencies do you usually work with?
APPENDIX 4

Map of National Resource Management (NRM) Regions in South Australia
