



**Australian Government**

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**Department of Families, Housing,  
Community Services and Indigenous Affairs**

## **Australian Social Policy No. 7**

**Improving the lives of Australians**

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Mortality of children and parental disadvantage

Benchmarking the Indigenous sub-sample of the Longitudinal Study of Australian Children

## **Social policy notes**

Extending Australia's digital divide policy: an examination of the value of social inclusion and capital policy frameworks

Indigenous housing, family life and parental employment: a review of the literature

Government/non-government relations: the impact of contractual reporting and accountability requirements on non-government organisations under previous arrangements in the Family and Community Services portfolio



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# Major articles

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*Australian Social Policy No. 7*

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# Mortality of children and parental disadvantage

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*Peng Yu*

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*Research and Analysis Branch, Department of Families, Housing, Community Services and Indigenous Affairs<sup>1</sup>*

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## **1 Introduction**

### **Issues**

Premature death is the most adverse health outcome for children, and has a negative impact on families. Children are the future of society; therefore improving their health, and in particular reducing the risk of child mortality, will directly affect both the child's and the family's wellbeing. A reduction in child mortality will also have long-lasting effects on the future prosperity of individual children and ultimately contribute to the sustainable social and economic development of the nation.

Improving the health of children and reducing child mortality rates requires an understanding of what determines both. Understanding the underlying factors that can influence child mortality has several important implications for policy makers. These include: identifying high-risk groups within the population; effectively targeting measures to prevent fatal disease and injury; and improving responses when disease or injury occurs.

Generally, Australian children are in good health and the rate of child mortality has been falling for decades. For instance, according to the Australian Institute of Health and Welfare (AIHW), the death rates of children aged 0 to 14 years have approximately halved over the last two decades (AIHW 2006).

However, the Australian infant mortality rate in 2003 was at mid level among member countries of the Organisation for Economic Co-operation and Development (OECD), with the Australian ranking falling marginally since 1987. The health expenditure to Gross Domestic Product ratio of Australia (9.5 per cent) and health expenditure per person (\$3,855) were below the OECD weighted averages of 11.6 per cent and \$4,035. The Australian Government's 67.8 per cent contribution to total health

expenditure was also four percentage points below the OECD unweighted average in 2003 (AIHW 2006). Therefore, there is scope for learning from the policy approaches of other OECD countries that have achieved better child health outcomes.

Research shows that the incidence of disease, injury and mortality of children is not randomly distributed. Certain sectors of the population, mostly groups experiencing socioeconomic disadvantage, record significantly higher rates of child mortality. For instance, between 1999 and 2003, the mortality of Indigenous children was two to three times higher than that of other children (ABS 2007a), and children in very remote areas had a mortality rate approximately two times higher than children in major cities (AIHW 2006).

The effects of family and social environment on health are well documented, but unfortunately the current data available in Australia is still limited, and this hinders the ability to fully explain the influence of environmental factors on children's health (AIHW 2006). Most existing studies use aggregate data and their findings are commonly based on direct tabulation without controlling for other important influencing factors, so the relative importance of these influencing factors cannot be compared.

One valuable feature of the research reported in this paper is the use of the second Transgenerational Data Set (TDS2)<sup>2</sup>, a unique dataset that investigates the effects of family and social environment on child mortality at an individual level. TDS2 consists of nearly a whole birth cohort of Australian children and contains a broad range of information on parents and children, including date of birth, date of death and welfare history. This provides a good opportunity to analyse the factors influencing the premature deaths of children and to identify the leading factors.

Understanding the underlying influencing factors is also important for other reasons. There is evidence of the intergenerational transmission of disadvantage; that is, children brought up in disadvantaged families are commonly observed to be more likely to themselves experience adverse outcomes such as poor education results, poor health, high unemployment, low income and reliance on welfare (Beaulieu et al. 2001; Corak, Gustafsson & Österberg 2000; Gottschalk 1992, 1996; Maloney & Pacheco 2003; Rank & Cheng 1995). In Australia, there are relatively few studies on this issue, but some evidence of the intergenerational transmission of disadvantage exists (McCoull & Pech 2000; Pech & McCoull 1998, 2000).

One problem with current literature on this topic is that, while the premature deaths of children are significantly correlated with parental disadvantage, indicators such as unemployment and reliance on income support (IS) tend to underestimate the extent of the intergenerational transmission of disadvantage. This is because children who die prematurely never grow up to be adults who may become unemployed or receive IS.

## Findings

The research results reported in this paper show that children from disadvantaged families are at significantly higher risk of dying prematurely. Certain characteristics of their parents—such as persistently low family income, teenage motherhood, having three or more children and living in socioeconomically disadvantaged areas—are indicators of this risk.

Overall, the findings suggest that research and policy on intergenerational transmission of disadvantage should not neglect premature child deaths as a significantly adverse outcome for children. Reducing the mortality of children from disadvantaged families must be made a priority if the vicious cycle of intergenerational transmission of disadvantage is to be broken.

## Structure of paper

This paper is structured around seven sections, including this introduction as follows:

- Section 2 reviews relevant literature and proposes a conceptual framework for this study.
- Section 3 briefly introduces the data and the sample used for the research.
- Section 4 undertakes a series of descriptive analyses.
- Section 5 reports the estimation results of the logistic and duration models.
- Section 6 summarises and discusses the findings.
- Section 7 provides a conclusion.

## 2 Literature review and conceptual framework

The health of Australian children has continuously improved and child mortality rates have fallen for all age groups.

Boys' mortality rates are generally higher than those of girls. According to the Australian Bureau of Statistics (ABS), the proportion of children under 15 years with a long-term health condition decreased from 44 per cent in 2001 to 41 per cent in 2005 (ABS 2007a). From 1985 to 2005, male infant mortality rates dropped from 11.4 to 5.4 per 1,000 live births. The death rates of boys aged 1 to 4 years and aged 5 to 14 years dropped from 0.6 to 0.3 and from 0.3 to 0.1 per 1,000 population respectively; and for young men aged 15–19, death rates dropped from 1.1 to 0.5 per 1,000 population (ABS 2006a). The mortality rates of girls also halved during this period; the corresponding changes for girls in the above four age groups are respectively from 8.9 to 4.8, from 0.4 to 0.2, from 0.2 to 0.1, and from 0.4 to 0.2 (ABS 2006a).

Child mortality generally falls with age, with infants (under 1 year old) having the highest mortality rate. In 2004, infant deaths accounted for 68 per cent of all childhood deaths (children aged less than 14 years). Fifteen per cent of these deaths happened among children aged between 1 and 4 years, and the remaining 17 per cent were among children between the ages of 5 and 14 years (ABS 2007a).

### The direct causes of premature child deaths

A better understanding of the causes of death helps identify effective ways to reduce mortality and increase life expectancy. This is especially important for children, for whom most causes of death are preventable.

Table 1 lists the main causes of death for three age groups: less than 1 year, aged 1 to 14 years, and aged 15 to 24 years. Diseases and injury are the two main direct causes of premature death among Australian children, but the causes of infant deaths differ from those of older children.

The leading causes of infant deaths in 2004 included conditions originating in the perinatal period (from 5 months before birth to 1 month after birth). These were congenital malformations, deformations and chromosomal abnormalities, which accounted for 71 per cent of infant deaths (ABS 2007a). For children aged 1 to 14 years, the major causes of death were external causes (such as traffic accidents and assaults), cancer, and diseases of the nervous system (ABS 2007a). For young people aged 15 to 24 years, external causes (including traffic accidents and intentional self-harm) were also the main causes of death, accounting for more than half of all deaths in this age group (AIHW 2006). Injuries were a leading cause of child mortality and disability, and this issue was identified as a priority by the former Australian Government (AIHW 2006).

**Table 1: Selected causes and age at death**

Causes of death	Rates of deaths <sup>(a)</sup>		
	Males	Females	Persons
Total under 1 year	5.4	4.7	5.0
Certain conditions originating in the perinatal period	2.8	2.3	2.6
Congenital malformations, deformations and chromosomal abnormalities	1.2	1.2	1.2
Sudden infant death syndrome	0.4	0.3	0.3
Total 1 to 14 years	17.8	12.6	15.3
Malignant neoplasms	3.1	2.6	2.9
Diseases of the nervous system	1.7	1.6	1.7
Congenital malformations, deformations and chromosomal abnormalities	1.4	1.0	1.2
External causes of morbidity and mortality	6.6	4.2	5.4
Total 15 to 24 years	66.4	30.4	48.9
Malignant neoplasms	5.2	3.3	4.2
Mental and behavioural disorders due to psychoactive substance use			0.3
Diseases of the nervous system	2.5	1.6	2.1
External causes of morbidity and mortality	49.6	18.6	34.5

(a) Deaths per 1,000 live births for age under 1 year. Deaths per 100,000 of the estimated mid-year population for age groups 1 to 14 years and 15 to 24 years.

Source: ABS (2007b), Table 1.2, p. 11; ABS (2006b), Table 1.2, p. 11.

The incidences of diseases and injury—or, the risk factors—are not equally distributed among children: some children are more exposed to fatal diseases and injuries than others. In addition, individual families respond in different ways when their children suffer from disease or injury.

Risk factors can lead to a range of different health outcomes for children, including mortality. For instance, boys, children of younger and/or less educated mothers, and those living in crowded housing and poorer socioeconomic neighbourhoods are at higher risk of injury (Blakemore 2007). Similarly, children living in areas of socioeconomic disadvantage have significantly higher mortality rates (Draper, Turrell & Oldenburg 2004; Turrell & Mathers 2001). Between 1999 and 2003, the death rates of Indigenous children were nearly three times higher than those of non-Indigenous children in the same age groups (ABS 2007a).

Therefore, it is just as important to understand the underlying factors influencing child health and mortality as it is to discover the direct causes of their deaths.

## **Underlying factors influencing the premature deaths of children**

The health and mortality of children are influenced by various factors, including nutrition (breastfeeding and nutritional balance); physical activity; body weight (low birth weight and overweight as a child); life style (smoking and drinking); vaccination; family background (parental unemployment and socioeconomic status); and social environment (AIHW 2006).

Evidence shows that these influencing factors are interrelated. For instance, nutrition, access to medical care, the safety of the surrounding environment and the quality and stability of care can all be affected by low family income (Shore 1997). People living in areas of socioeconomic disadvantage are also more likely to be obese, to smoke and to drink alcohol at harmful levels (AIHW 2006; Turrell et al. 2006). Between 1998 and 2000, a much larger proportion of Indigenous children than non-Indigenous children were born to teenage mothers—21.7 per cent compared with 4.5 per cent (Eades 2004). Indigenous children also had significantly higher rates of premature birth and low birth weight (Zubrick et al. 2004).

Therefore, it is relevant to determine whether factors such as income and lower socioeconomic status have more significant and fundamental effects on the health and mortality of children than other issues. This is important for identifying well-targeted policy responses and long-term solutions that will improve the health and wellbeing of children and reduce their mortality rates. However, current data available in Australia is not adequate for this and a vast gap in information still exists (AIHW 2006; Patton et al. 2005). This research tries to fill this gap and enrich our knowledge of the factors that influence the mortality of Australian children by creatively using an administrative dataset of children in a half-year birth cohort.

## **The correlation between mortality and socioeconomic status and the intergenerational transmission of disadvantage**

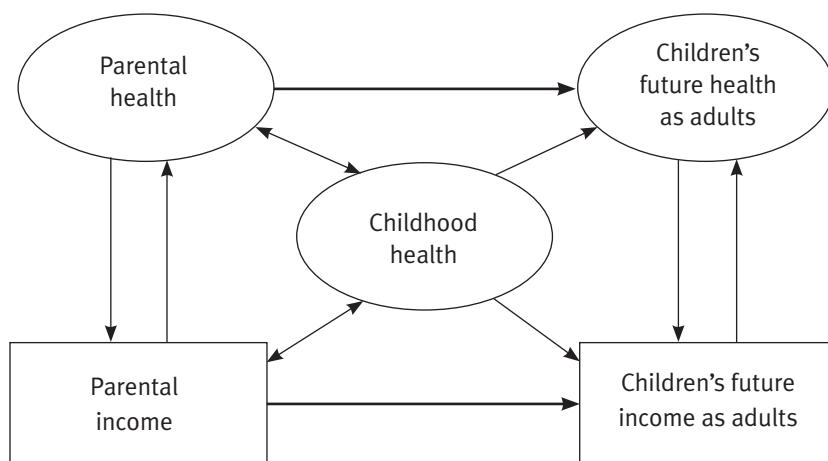
There is a growing body of literature on the intergenerational transmission of disadvantage.<sup>3</sup> Poor health outcomes, along with low education attainment, a high unemployment rate, low income, long periods of welfare reliance and overall socioeconomic status are often used as indicators of disadvantage. For adverse health outcomes, mortality is the most robust measure.

Internationally, people growing up in disadvantaged families are more likely to have adverse outcomes later in life (Beaulieu et al. 2001; Case, Fertig & Paxson 2005; Corak, Gustafsson & Österberg 2000; Gottschalk 1992, 1996; Maloney & Pacheco 2003; Rank & Cheng 1995).

In Australia, similar results were also found. For instance, using the Australian National University (ANU) ‘Negotiating the Life Course’ data, Pech and McCoull (1998) showed there is a significant correlation between levels of education attainment, employment and the receipt of IS by parents and children. Studies using the first TDS compiled by the Australian Government Department of Families and Community Services (FaCS) also found significant evidence that IS receipt is transmitted intergenerationally (McCoull & Pech 2000; Pech & McCoull 2000). But this issue has not previously been explored and this research contributes to this enquiry.

The mechanism by which disadvantage is transmitted over generations is complex. Figure 1 gives a simple demonstration of some parental income and health pathways that can affect children’s income and health.

**Figure 1: Mechanism of intergenerational transmission of income and health disadvantages**



It is well documented in the literature that, within a pooled sample, health correlates with socioeconomic status (SES); that is, a health–SES gradient exists (Case, Lubotsky & Paxson 2002; Currie & Stabile 2003). Lower SES children throughout the world generally have poorer health, either because they have more exposure to health risk factors or because their response to health problems is less effective, or for both reasons. There is also evidence that income inequalities significantly affect health and mortality (Lochner et al. 2001; Rodgers 1979; Waldmann 1992). A framework developed by Wildman (2003) suggests that if the distribution of income affects the health of individuals, any policy to equalise health outcomes that does not account for income inequalities will fail. A reverse causality from health to income may also exist (Deaton 2002).

Parental health can directly affect children's future health across generations, for example, due to the illness of a mother during pregnancy or genetic problems. Parental health can also indirectly influence children's future health in many other ways. For example, parental health conditions may affect the quality of child care, nutrition and stress levels, and the lifestyle of children. These factors have a cumulative impact over time, leading to poorer health outcomes as children reach adulthood (Currie & Stabile 2003). Poor parental health may reduce the parents' incomes (and their children's future earning capacity), and this can negatively impact on children's health into adulthood.

Low parental income can affect children's future income and health through other multiple channels. Reduced parental spending on children's education is one such intermediate factor. Case, Fertig and Paxson (2005) found evidence of the lasting effects of childhood health and economic circumstances on adult health, employment and socioeconomic status using British longitudinal data.

In reality, intergenerational transmission mechanisms may be far more complex than shown in Figure 1. For instance, it is also possible that transmitted disadvantages over generations are determined by some unobserved common factors such as living in a poor socioeconomic neighbourhood or a polluted environment. This makes it difficult to identify the main transmission mechanisms.

Recently, van den Berg, Lindeboom and Portrait (2006) analysed the effects of economic conditions early in life on an individual's mortality and found that if they used macroeconomic conditions early in life as an instrument for individual conditions, this was a crucial determinant of health and mortality in adulthood.

Another issue emerges when child mortality is considered in intergenerational studies. Premature death is the most adverse health outcome of all for children and it also precludes them from being observed in adult-based studies. Consequently, transgenerational studies on adults only reflect part of the picture of intergenerational transmission of disadvantage. If child mortality is found to correlate significantly with parental disadvantage, then other measures relevant to adults, such as low income and welfare reliance, will underestimate the extent of the impact of intergenerational transmission of disadvantage, and it can be assumed that the situation is much more serious.

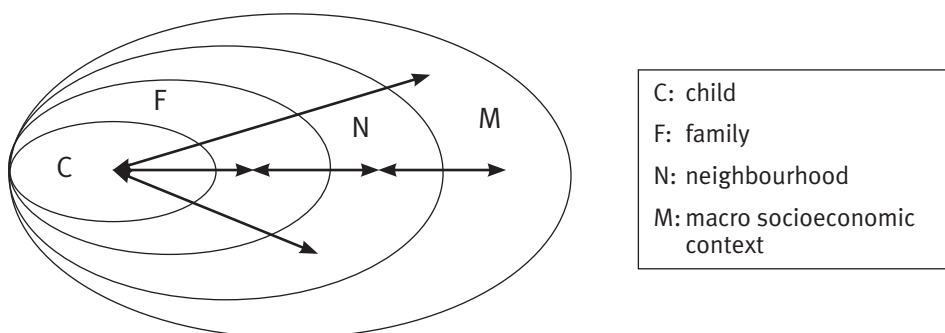
This research improves our understanding of the intergenerational transmission of disadvantage in Australia by investigating the correlation between child mortality and parental disadvantage. However, due to the limitations of this data and the complexity of the interrelationships, caution must be used when interpreting any findings on correlations as causal relationships.

## Conceptual framework

As discussed above, child mortality is influenced by interrelated factors. A simple conceptual framework (Figure 2) makes this complex issue easier to understand. The factors influencing child mortality fall into four levels:

1. children's own factors
2. family factors
3. neighbourhood factors
4. macro socioeconomic factors.

**Figure 2: Determinants of child mortality**



Individual child factors include: sex, genetic makeup, birth weight, vaccination record, physical activity and lifestyle. These factors comprise the self-protection system against disease and injury. Family factors include: family financial situation; housing; parents’ characteristics—such as age, health, education, employment status, physical activity, and caring knowledge and skills; family size and structure; and family cultural factors. Family factors are the most important influences on the health and mortality of children because they shape the children’s own factors—such as birth weight, vaccination and lifestyle. Also, broader environmental factors (outlined later in this paper) often influence the health of children through family factors.

Neighbourhood factors consist of: location; characteristics of a local population—such as income, occupation and religion; type of industry; quality of child care and schooling; and availability of and access to health services. Poor neighbourhood environments may pose major threats to children’s health and safety.

Macro socioeconomic factors cover all other influential environmental factors including: the health system—such as public health expenditure, health management and monitoring, and medical care; economic growth and prosperity; research and technology; unemployment; income inequality; welfare systems; and environmental pollution. While these factors can affect the health of much or all of the nation’s population, some groups may be more sensitive than others to changes in these factors.

These four levels of influential factors interact with each other and their relative importance changes as children grow older.

Since the focus group for this research (children in a half-a-year birth cohort) were all under 18 years at the conclusion of the sampling period, for the sake of simplicity, macro socioeconomic factors are treated as exogenous. After controlling for observed factors, the effects of other unobserved factors on child mortality are generally assumed to be random. This paper discusses the issue of unobserved factors in more detail in later sections.

This research pays particular attention to parental disadvantage and uses Indigenous status, low income, long IS duration, teenage motherhood and disability as the main indicators of such disadvantage.

## 3 Data

An ad hoc administrative dataset, TDS2<sup>4</sup>, is used in this research. TDS2 was created from Centrelink administrative records for conducting research on the intergenerational transmission of disadvantage. As a result, TDS2 has a unique characteristic: it links parents' administrative records with those of their children.

The main target group in TDS2 is a cohort of children born between 1 October 1987 and 31 March 1988 (referred to in this paper as the 'primary children'). TDS2 recorded primary children either because they received government benefits in their own right or because they were the dependants of benefit recipients. Their parents are another key group. The data also include the siblings and children of primary children, and contain detailed benefit-relevant information on all these groups for the period ending in April 2005.<sup>5</sup>

### Primary children

Table 2 provides a statistical summary of primary children in the dataset. There are 127,826 primary children in TDS2, of whom 65,522 (51.3 per cent) are boys. Up to April 2005, 653 deaths of primary children were recorded. This represents a mortality rate of 0.51 per cent.

TDS2 only contains the records of people who have received family payments and these recipients are referred to as the customer. To be classified as a customer, a person must be independent, which normally means they are old enough to support themselves and are older than 15 years of age. As a result, self records—except for date of birth, date of death and sex—are not available for most primary children who are not designated as customers in their own right. In other words, most variables are missing for primary children only registered with Centrelink as dependants. Since more than half the primary children come into this category, this paper's analysis is mainly based on information about their parents.

**Table 2: Characteristics of primary children by sex and percentage in second Transgenerational Data Set**

	Female	Male	Total
No. of observations	62,304	65,522	127,826
Characteristics (%)			
Death rates	0.43	0.59	0.51
Centrelink customer	49.85	48.58	49.20
Indigenous	3.66	3.56	3.61
Born overseas	5.25	5.13	5.19
Never on IS	64.52	66.71	65.64
Having no child	98.62	99.91	99.28
Having 1 child	1.28	0.07	0.66
Having 2 or more children	0.10	0.02	0.06
No parents ever on IS	39.32	39.13	39.23
One parent once on IS	45.59	44.74	45.16
2 or more parents once on IS	13.35	14.37	13.87
Primary parent had no IS record	42.71	42.52	42.61

Note: Parents include all family payment recipients who are parents of a primary child in TDS2. Primary parent refers to the parent who provided the longest care for the primary child. Child can be their own child or their partner’s child. The parent identities of 2,227 primary children are missing.

‘TDS2’=second Transgenerational Data Set; ‘IS’=income support.

Table 3 compares birth records in TDS2 with births registered in ABS data. The primary children in TDS2 were born between 1 October 1987 and 31 March 1988. Since 5 per cent of the primary children recorded as customers in TDS2 were born overseas, and about half of all primary children were customers, it is estimated that about 10 per cent of all primary children were born overseas.<sup>6</sup>

According to the ABS (2003a and 2004c), there were 121,707 registered births between October 1987 and March 1988. Therefore, Australian-born primary children accounted for about 94.5 per cent of all registered births during this period. As Table 3 shows, male/female sex ratios are virtually the same. TDS2 contains approximately the whole half-year birth cohort of Australian children.

One question to consider is why some children are in the total birth cohort but are not included in TDS2. Given the nature of the dataset, the best conjecture is that these children’s parents did not claim benefits for them before April 2005. These children are most likely to belong to wealthy families, with one exception, which is discussed later in this paper.

**Table 3: Comparison between births recorded in the second Transgenerational Data Set and births registered in the Australian Bureau of Statistics data**

October 1987 to March 1988	ABS	TDS2
No. of births	121,707	127,826 <sup>(a)</sup>
Sex ratio	1.052	1.052

(a) 10% born overseas.

Note: 'ABS'=Australian Bureau of Statistics; 'TDS2'=second Transgenerational Data Set.

Source: ABS (2003a; 2004c); author's calculation from TDS2.

Table 4 compares the registered infant deaths in ABS data with deaths recorded in TDS2. Since TDS2 contains death records of a single half-year birth cohort, whereas ABS data includes deaths that occurred in all cohorts in an age group within a whole year, the figures in Table 4 are not directly comparable.

There are very few deaths in TDS2 for infants aged less than one week—much less than the registered number of such deaths in the ABS data. Records in TDS2 of the deaths of infants aged between 1 and 4 weeks are also significantly less than the ABS registered deaths, although the gap is smaller. Generally, TDS2 under-recorded this category of deaths. As a child's age at death increases, the difference between TDS2 and ABS data on registered deaths diminishes.

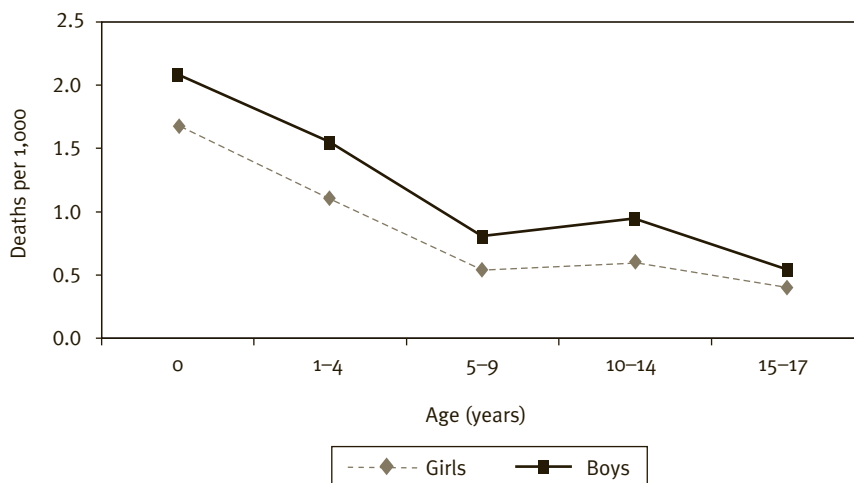
**Table 4: Comparison between death records in second Transgenerational Data Set and registered deaths in the Australian Bureau of Statistics data**

Age at death	ABS 1987 (1 year)	ABS 1988 (1 year)	TDS2 (half a year)
Under 1 day	677	722	3
1 day to under 1 week	330	341	1
1 week to under 4 weeks	243	232	22
4 weeks to under 1 year	866	837	215

Source: ABS (2003b; 2004b); author's calculation from TDS2.

Figure 3 shows the mortality of primary children in TDS2 by age group. The infant death rates of boys and girls in TDS2—around 2 per 1,000 live births—are clearly less than those in the 1988 ABS data—9.8 and 7.6 per 1,000 live births of boys and girls respectively (ABS 2004b.) However, comparable ABS figures for other age groups in TDS2 are difficult to find because the deaths in TDS2 occurred over several years (for a single birth cohort), whereas ABS data usually refers to a single year (for different birth cohorts).

**Figure 3: Mortality of primary children by age**



Source: Author’s calculations from TDS2.

It is crucial to understand the reasons for the disparities between the number of deaths recorded in TDS2 and the registered number of deaths in the ABS data. In this context, identifying which child deaths were not recorded in TDS2 will be important. As previously explained, TDS2 does not include all children born between 1 October 1987 and 31 March 1988—only those of family payment recipients. Children from wealthy families are likely to be excluded from TDS2, but this exclusion alone cannot explain such large differences between TDS2 and the ABS data, especially considering the small proportion of such children in the birth cohort, and their lower-than-average mortality risks. A better conjecture is that TDS2 under-recorded those children in the birth cohort who died between 0 and 2 months old. These children may have suffered a serious illness that kept their parents busy caring for them, and, consequently, the parents did not have chance to claim benefits for the children. TDS2 might not have recorded these children’s births either; in other words, it has no record of them.

This under-recording of deaths may not be random,<sup>7</sup> and because of the small number of total deaths in TDS2, this poses a more serious problem than the exclusion of children from wealthy families. For instance, if children from disadvantaged families are significantly more likely to die within one or two months, the analysis based on TDS2 death records will underestimate the gap in mortality risk between disadvantaged and other families. One solution for this issue is to exclude all children who died within two months. When robust tests were undertaken using samples excluding children who died within one, three or six months of birth, the key findings were qualitatively the same. The following sections discuss this issue in more detail.

In addition, the deaths of children already included in TDS2 may also be under-recorded because some children died after their parents stopped receiving government benefits and did not return to IS before the last recorded date in TDS2 (8 April 2005). This is known as a ‘right-censoring issue’, which means no data is observed after this date. This issue will be addressed by using duration models for data analysis.

## Parents<sup>8</sup>

TDS2 includes 2,227 primary children without recorded parent identities (IDs) — hence their parents cannot be identified. For the other 125,599 primary children, 152,860 parents are identified and some of these have claimed benefits for more than one primary child. Among the parents, the person who cared for a primary child the longest is recorded as the ‘primary parent’. Except for the 2,227 children without parent IDs, each primary child is associated with a primary parent. The analysis in this paper is mainly based on the primary parents, although some duration models use information from all parents in TDS2.

The characteristics of the 125,599 primary parents, and their correlation with child mortality, are discussed in detail in Section 4. Briefly, the vast majority of primary parents (more than 96 per cent) are female,<sup>9</sup> of whom two-thirds were born in Australia, and 3.17 per cent identified as Indigenous.

Surprisingly, although 41.6 per cent of the parents have individual IS records, only 40 per cent have family IS records in TDS2. This is due to another TDS2 issue: the family IS records did not start until 1993 (they were ‘left-censored’), whereas individual IS records date back to the 1960s. Therefore, in this research, parental IS experience is mainly based on individual IS records; but this is not a problem as preliminary analyses shows that using family IS records leads to similar results.

## Second Transgenerational Data Set issues and solutions

TDS2 has several outstanding advantages for this research.

1. It contains almost a whole birth cohort of Australian children.
2. It contains detailed benefit-related information about both primary children and their parents.
3. It is stored as unit record data.
4. It is longitudinal data extracted fortnightly from Centrelink administrative records. Any benefit-related events—such as changes in marital status, the birth or death of a child and changes to parental income, as well as the dates when the changes happened—are all recorded.
5. Variables in the dataset—especially key benefit-relevant variables—are generally accurate as the data is not subject to recall errors, which are common in survey data.

However, as an administrative dataset, TDS2 also has limitations that need to be taken into account when considering appropriate analytical methodologies and interpreting the research findings.

First, TDS2 has a limited number of variables and does not include information on important factors influencing mortality—such as education and neighbourhood information. As a result, it is accepted that unobserved heterogeneity is an issue. To deal with this, the SEIFA (Socio-Economic Indexes for Area) Disadvantage Index and the Australian Standard Geographic Classification (ASGC) remoteness classification<sup>10</sup> have been merged into the dataset by postcode.

Second, TDS2 only has records for Centrelink customers who receive benefits from the government. People who have never received government benefits are omitted from the dataset and no information is recorded on people after they stop receiving benefits.<sup>11</sup>

People who have never claimed government benefits are most likely to be from wealthy families. As discussed above, this group only account for a small proportion of the population of interest, so excluding them from this analysis is not a significant issue. The larger concern—that no information is recorded when people stop receiving benefits—can be easily tackled using duration models.

Third, not all deaths of children were recorded in TDS2 and because the recording of deaths is not random, the estimation based on TDS2 is biased. For example, as previously discussed, deaths within two months of birth are likely to be under-recorded in TDS2 and are also likely to be non-random. One solution for this is to exclude these deaths from the analysis and test the robustness of key findings.

Fourth, variables such as family income and the SEIFA Disadvantage Index have many missing values. In this research, if the missing values account for a significant proportion of all observations, and/or the mortality of the missing observations is significantly different from the sample mean, a separate category has been created for these missing values.

Fifth, TDS2 does not record direct causes of death. Since this paper focuses on the underlying factors that influence mortality rates, while information on direct causes of death is not essential, it is useful for interpreting results and has been drawn from other sources such as the ABS and the AIHW.

Because the solutions suggested for these issues are not totally satisfactory, various tests have been undertaken to check the robustness of key findings. These are discussed in more detail later in this paper.

## Sample

Three groups of primary children were excluded in this analysis. The first group is children whose parent's ID was missing because it is impossible to analyse the correlation between child mortality and parental disadvantage without accessing information about parents.

The second group excluded is children born overseas. It has been observed that, of all premature child deaths, the death rate of infants is the highest. As only a small proportion of foreign-born children were likely to be in Australia as infants, TDS2 may underestimate the mortality rates of these children; therefore this group was omitted from the analysis.

For the reasons discussed above, another group (children who died as infants, within two months of birth) were also excluded.

In the following sections, unless otherwise specified, the sample of primary children used for data analysis is restricted to those:

- ▶ whose parents can be identified
- ▶ who were born in Australia
- ▶ who did not die within two months of birth.

There are 119,013 primary children in the sample, 51.3 per cent of whom are boys. The mortality rate for the entire sample is 0.49 per cent; for boys it is 0.57 per cent and for girls it is 0.41 per cent.

Each primary child in the sample is associated with a primary parent. The characteristics of primary parents and their correlation with the mortality of their children are discussed in detail in the next section.

## 4 Descriptive analysis

This section undertakes a descriptive analysis of the correlations between child mortality rates and the observed characteristics of children and their primary parents. Particular attention is paid to the correlation between child mortality and several key indicators of parental disadvantage—Indigenous status, teenage motherhood, being a non-birth parent, disability, low income, long duration of IS, and living in a remote area and/or an area of socioeconomic disadvantage.

A demographic concept called ‘excess death’ is used to determine the significance of these influencing factors. Excess death is the difference between the observed number of deaths in a group and the number of deaths that would have occurred in that group if its mortality rate was the same as the rate of a reference group. In this analysis, the least disadvantaged group is usually the reference group. Estimated excess deaths are presented in Table 5.

### Indigenous status

Indigenous status in TDS2 is based on self-identification. If a customer chose to receive a family payment through the Australian Tax Office in a lump sum at the end of a financial year, the Centrelink system did not record this variable. This option would have rarely been taken up by Indigenous people unless they were in less disadvantaged circumstances. Indigenous people were not fully identified within TDS2—a common issue for most Australian datasets.

As Table 5 shows, the mortality rate of non-Indigenous children is 0.47 per cent, whereas the rate for Indigenous children<sup>12</sup> is 0.89 per cent. This means that the mortality risk of Indigenous children is 1.89 times higher than that of non-Indigenous children.

The estimated number of excess deaths for the sample is 22. This means that if the death rate of this sample could be reduced to the rate of non-Indigenous children, there would be 22 fewer observed deaths.

**Table 5: Comparison of child mortality rates between disadvantaged and less disadvantaged groups and estimated excess deaths**

Influencing factors of mortality	No. of deaths	Mortality (%)	Excess deaths	No. of obs.
Total IS duration since October 1987			<b>214 (36.8)<sup>(a)</sup></b>	
Having no IS records	159	0.31 <sup>(b)</sup>	0	51,056
2 years or less	126	0.57	58 (46.0)	21,950
3–8 years	124	0.54	52 (41.9)	23,080
9 or more years	172	0.75	101 (58.7)	22,927
Family income			<b>200 (34.4)<sup>(a)</sup></b>	
Missing	53	0.74	30 (56.6)	7,172
Low (50% of sample mean or less)	117	0.64	58 (49.6)	18,420
Middle (50 to 150%)	345	0.48	113 (32.8)	72,473
High (more than 150%)	66	0.32 <sup>(b)</sup>	0	20,948
Birth parents or not			<b>188 (32.4)<sup>(a)</sup></b>	
Not birth parents	285	0.97	188 (66.0)	29,431
Birth parents	296	0.33 <sup>(b)</sup>	0	89,582
No. of children ever cared for before primary child			<b>153 (26.3)<sup>(a)</sup></b>	
Never cared for any child before	220	0.36 <sup>(b)</sup>	0	61,868
One	197	0.59	75 (38.1)	33,195
Two or more	164	0.68	78 (47.6)	23,950
SEIFA Disadvantage Index (living area at first date of care)			<b>129 (22.2)<sup>(a)</sup></b>	
Most disadvantaged areas	207	0.61	77 (37.2)	34,195
Other areas	221	0.48	45 (20.4)	46,370
Least disadvantaged areas	136	0.38 <sup>(b)</sup>	0	35,584
Missing	17	0.59	6 (35.3)	2,864
Country of birth			<b>117 (20.1)<sup>(a)</sup></b>	
Australia	487	0.51	116 (23.8)	95,079
Overseas	94	0.39 <sup>(b)</sup>	0	23,934
Sex of children			<b>93 (16.0)<sup>(a)</sup></b>	
Boys	345	0.57	95 (27.5)	61,038
Girls	236	0.41 <sup>(b)</sup>	0	57,975
Relationship instability			<b>81 (13.9)<sup>(a)</sup></b>	
Stable (2 or less marital events)	300	0.42 <sup>(b)</sup>	0	71,894
Unstable (3 or 4 marital events)	142	0.51	26 (18.3)	27,627
Very unstable (5 or more marital events)	139	0.72	57 (41.0)	19,440
Remoteness of living area at first date of care			<b>34 (5.9)<sup>(a)</sup></b>	
Living in major cities	336	0.46 <sup>(b)</sup>	0	73,831
Living in inner/outer regions	197	0.51	18 (9.1)	38,966
Living in remote/very remote areas	24	0.67	8 (33.3)	3,563
Remoteness unknown	24	0.91	12 (50.0)	2,650
Indigenous status			<b>22 (3.8)<sup>(a)</sup></b>	
Indigenous	35	0.89	16 (45.7)	3,938
Non-Indigenous	546	0.47 <sup>(b)</sup>	0	115,075

Disability			<b>22</b>	<b>(3.8)<sup>(a)</sup></b>	
With a disability	35	0.90	17	(48.6)	3881
With no disability	546	0.47 <sup>(b)</sup>	0		115,132
Rural/urban area at first date of care			<b>22</b>	<b>(3.8)<sup>(a)</sup></b>	
Rural	70	0.58	13	(18.6)	12,151
Urban	494	0.47 <sup>(b)</sup>	0		104,000
Teenage motherhood			<b>10</b>	<b>(1.7)<sup>(a)</sup></b>	
Teenage mothers	42	0.74	15	(35.7)	5663
Not teenage mothers	539	0.48 <sup>(b)</sup>	0		113,350
Homeownership at first date of care			<b>10</b>	<b>(1.7)<sup>(a)</sup></b>	
Living in public housing	78	0.86	34	(43.6)	9065
Home owner	246	0.48 <sup>(b)</sup>	0		51,485
Missing	65	0.30	-41	(-63.1)	22,018
<b>Total</b>	<b>581</b>	<b>0.49</b>			<b>119,013</b>

(a) Estimated excess deaths for the whole sample.

(b) Mortality rates used for calculating excess deaths.

Note: Figures in parentheses are percentages of deaths, which could be reduced if mortality rates of the reference groups were applied. The factors are ordered by estimated excess deaths for the whole sample. The differences between the estimated excess deaths for the whole sample and the sum of estimated excess deaths of subgroups are due to rounding of figures in calculation.

'Obs.'=observations; 'IS'=income support; 'SEIFA Disadvantage Index'=Socio-Economic Indexes for Area Disadvantage Index.

Since Indigenous children account for only a small proportion of the sample—the number of excess deaths is only 3.8 per cent of the observed number of deaths—narrowing the gap would not make a big difference overall. However, the direct effect of excess deaths on this most disadvantaged group is significant. The number of deaths of Indigenous children could have been reduced by nearly half if they had the same death rate as non-Indigenous children.

## Country of birth

As mentioned in Section 3, the sample<sup>13</sup> excluded all overseas-born primary children, while children with overseas-born parents were included. In the sample, about 20 per cent of primary parents were born overseas.<sup>14</sup>

As Table 5 shows, children of immigrants have lower mortality rates than Australian-born children. The estimated number of excess deaths is 117 or one-fifth of the deaths of children in the sample. There could be several reasons for child mortality being lower for immigrants than for the Australian-born children and these are discussed in Section 6.

## Disability

Disability is used as a dummy variable in the study. To be eligible for the Disability Support Pension (DSP), an individual must have a medical condition that has an impairment rating of 20 points or more. This paper also used this criterion to define disability.

In the sample, approximately 3.3 per cent of children have primary parents with a disability. The mortality risk for these children is nearly twice that of other children. Again, because their proportional share of the sample is small, reducing the mortality rate of these children to the level of other children would have little effect on the overall sample. However, it would have a significant positive impact on this disadvantaged group, as the number of deaths could be reduced to half of the observed level.

## Teenage motherhood

In the study, a teenage mother describes a woman who became the primary carer of a primary child as a teenager and 5,663 women (4.8 per cent) in the sample fall into this category.<sup>15</sup>

As Table 5 shows, the mortality of children primarily cared for by teenage mothers is also significantly higher than that of other primary children (0.74 per cent compared with 0.48 per cent). The estimated number of excess deaths is small for the whole sample, but its impact is significant for children of teenage mothers.

In general, child mortality decreases as the age of the primary parent increases up to 35 years, then it rises slightly for children whose primary parents are older than 35 years.

## Birth parent

In TDS2, there is no information about the relationship between a primary parent and a primary child, but in most cases the primary parents are likely to be the child's biological parents. Since there is evidence that birth parents and non-birth parents deliver different standards of child care, resulting in a range of outcomes for children,<sup>16</sup> a variable of birth parent was derived to identify this difference.

In this paper, a birth parent is defined as a primary carer who started caring for a primary child at the child's birth.<sup>17</sup>

Although a birth parent so defined is likely to be the actual birth parent, this definition does not cover all actual birth parents. Why? In some cases, the first date of care recorded in TDS2 is not the **actual** first date; rather, it is the date the parent began to claim benefits for a primary child. An actual birth parent can be classified as a non-birth parent if their first recorded date of care in TDS2 differs from the child's date of birth.

Child mortality is nearly three times greater for children of non-birth parents than for children of birth parents (see Table 5). But for the above reasons, caution should be applied before automatically attributing observed differences in child mortality to the differences between biological birth parents and non-birth parents.

## Number of children before a primary child

TDS2 has a variable that records the total number of children associated a parent or spouse for family payment purposes. However, due to the replacement effect<sup>18</sup>, the value of this variable may be affected by the death of a primary child. To avoid this problem, the analysis generates and uses

a new variable consisting of the number of children cared for before the primary child, which is equivalent in most cases to the birth order of the primary child.

As Table 5 shows, more than half the primary children were the first child of their primary parents; their mortality rate is 0.36 per cent, compared with 0.59 per cent for second children, and 0.68 per cent for third and later children.

The estimated number of excess deaths is fairly significant. If the mortality rate of the whole sample was the same as for first children of primary parents, the number of deaths would be reduced by more than one-quarter. These effects are even larger for second or later children.

## Income support history

Due to the nature of the data, all parents in TDS2 received family payments such as Family Tax Benefit, but not all received IS (43 per cent of parents have no IS records). Families on IS experienced greater disadvantage than those who only received non-IS family payments. This is because the government benefit was their main source of income. Therefore, the incidence and duration of IS support may be a good indicator of family economic disadvantage (especially long-term).

TDS2 records both family and individual IS histories; however, family IS records are left-censored at 1993 whereas individual IS records can be traced back to the 1960s. In addition, there are inconsistencies in the family IS records and also between family and individual IS records. Therefore, in this analysis, individual records are used to derive the variables of IS incidence and duration, while family records are used for robust tests. The findings are generally consistent with each other and confirm this approach.

There are various ways to generate the variables of IS incidence and duration from different time periods in TDS2 records and these variables have differing implications.

First, they can be derived from total TDS2 IS records. This is the most straightforward method and the variables indicate the long-term economic disadvantage of primary parents. However, one issue with this method is that older people are more likely to have an IS spell and also spend longer on IS, simply because they have spent more time exposed to the system.

Second, variables can be generated from records before the birth—or the first date of care—of a primary child. Theoretically, variables derived in this way are least likely to be affected by the primary child's birth date and the identity of the child's carer, but these variables may not reflect the child's living environment. Another practical problem here is that few primary parents had IS records before the birth—or the first date of care—of a primary child.

Third, the variables can be created from records gathered before the last date of care, or records between the first and last dates of care. In this way, the variables can better reflect the actual economic situation of the child's family. However, they are also correlated with the lifespan of the child, which correlates significantly with the child's mortality risk. As a result, the true association between IS duration and child mortality may be masked by the correlation between child age and mortality. One solution is to use the proportion of time spent on IS while caring for the child, instead of the duration variable, but new issues appear.

Fourth, a fixed time window (1 October 1987 to 8 April 2005)<sup>19</sup> can be used for all sample members. In this way, the variable of IS duration is equivalent to the proportion variable, because the denominator is the same for all members. In the meantime, a dummy variable has been created to indicate whether a primary parent had IS records before 1 October 1987.

These methods have their advantages and disadvantages, and none is perfect. However, the second and the third methods appear to be the most problematic. This paper predominantly uses the fourth method because it is relatively better at reflecting the family (long-term) economic disadvantage of primary children from birth to age 17 years. The first and fourth methods generally lead to similar results. Table A1 (Appendix) compares different measures of IS duration.

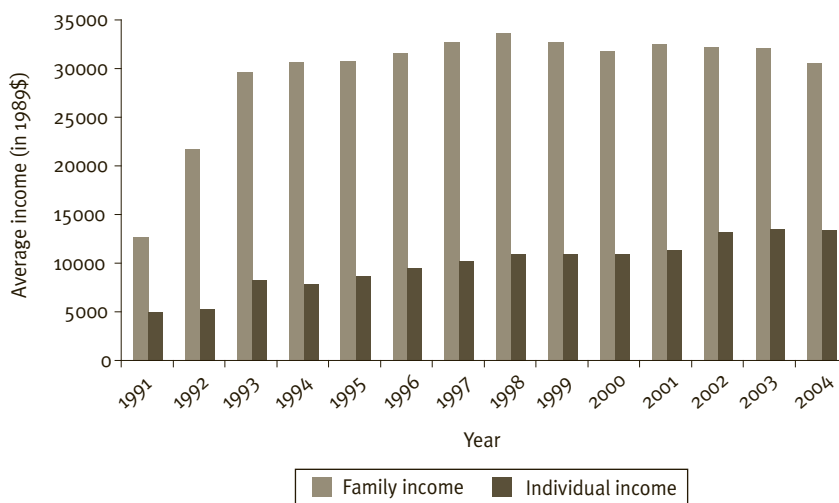
As Table 5 shows, mortality is lowest for children whose parents have had no IS records since 1987 (0.31 per cent), and it is highest for those whose parents spent nine years or more on IS between 1987 and 2005 (0.75 per cent). The estimated number of excess deaths for the sample is 214, accounting for 36.8 per cent of the number of deaths. This is the greatest of all influencing factors, and suggests that the time spent on IS is a key indicator of parental disadvantage with regard to child mortality.

## Family income

Both family income and individual income are recorded in TDS2. This research mainly uses family income, but also uses individual income for robust tests; the findings are qualitatively the same.

There are several concerns about the income variables in TDS2. First, data on incomes is only available from 1991 to 2004. Second, values are missing for more than 6 per cent of the sample. Third, even after accounting for currency deflation using the Consumer Price Index (CPI), incomes continue to trend upwards (Figure 4).

**Figure 4: Real income in second Transgenerational Data Set**



Source: Author's calculations from TDS2.

The following approach addresses these issues:

- ▶ The sample mean of family income is calculated for each year between 1991 and 2004.
- ▶ Family income is divided by the sample mean in a given year to generate a measure of relative position of family income in the sample.
- ▶ The average relative family income is calculated over all recorded years.
- ▶ The average relative family income is classified into four categories:<sup>20</sup>
  - low family income (50 per cent of sample mean or less)
  - middle family income (50 to 150 per cent of sample mean)
  - high family income (more than 150 per cent of sample mean)
  - missing.

As Table 5 shows, child mortality generally decreases as relative family income increases. Mortality rates are 0.32 per cent, 0.48 per cent, and 0.64 per cent for children from high-income, middle-income and low-income families, respectively. Children whose parental family income is categorised as missing appear to have the highest mortality, which indicates that the missing values in family income are not random. Therefore, these values are put into a separate category, rather than being dropped from this analysis.

The estimated number of excess deaths is also large (the second largest among the variables in Table 5), accounting for 34.4 per cent of deaths of the primary children in the sample. Once again, this suggests that economic factors play a significant role in child mortality.

## Relationship instability

Changes in marital status while on government benefits must be reported to Centrelink. There is a problem with TDS2's recording of marital status, however—the vast majority of people had their first marital status recorded as single, and most dates recorded for first marital status were actually dates of birth. As a result, the first record of marital status is useless. Another difficulty is that marital status can correlate with age and also change over time.

To address this, this research uses a variable of relationship instability, which is derived from the number of marital events recorded in TDS2:

- ▶ stable, if having only one or two marital events
- ▶ unstable, if having three or four marital events
- ▶ very unstable, if having more than five marital events.

One issue remains; the longer a person stays on a government benefit, the more marital events are likely to be recorded. Because of this issue, this variable is only a rough measure of relationship instability.

## Socio-Economic Indexes for Area Disadvantage Index

There is no relevant information about location and neighbourhood in TDS2, except for postcodes. To tackle this problem, in this research the SEIFA Disadvantage Index ('the Index') and the ABS remoteness classification are merged into the TDS2 postcode variable.

The Index provides rankings for a wide range of areas. It is particularly useful for this research because it focuses on low-income earners, relatively lower educational attainment, and high unemployment, which are key characteristics of living in an area of socioeconomic disadvantage.

Since people change their residential addresses from time to time, the Index is merged into TDS2 in three ways:

1. based on the first dates of care
2. based on the last dates of care
3. for all relevant dates of interest (for survival analysis).

These methods produce generally consistent results.

The Index is in continuous form. The larger the Index, the less the relative disadvantage. This paper classifies information into three categories based on the Index:

1. most disadvantaged areas (the first 30 percentiles)
2. least disadvantaged areas (the last 30 percentiles)
3. other areas (the middle 40 percentiles).

In addition, the Index is not available for 2,864 pairs of children and parents so they have been put into the missing category.

As Table 5 demonstrates, mortality rates are significantly lower for children living in areas with the least socioeconomic disadvantage (0.38 per cent) compared with those living in the most disadvantaged areas (0.61 per cent). The estimated number of excess deaths for this variable accounts for more than one fifth of the deaths of children in the sample. In addition, the areas with missing values also have high child mortality rates (0.59 per cent), suggesting that the missing values are not randomly distributed, but are more likely to occur in disadvantaged areas.<sup>21</sup>

## Remoteness

Remoteness information comes from the ABS's Australian Standard Geographic Classification Remoteness Areas classification. This puts populated localities into six classes: major cities; inner regional; outer regional; remote; very remote; and migratory areas. This information is also merged into TDS2 by postcode.

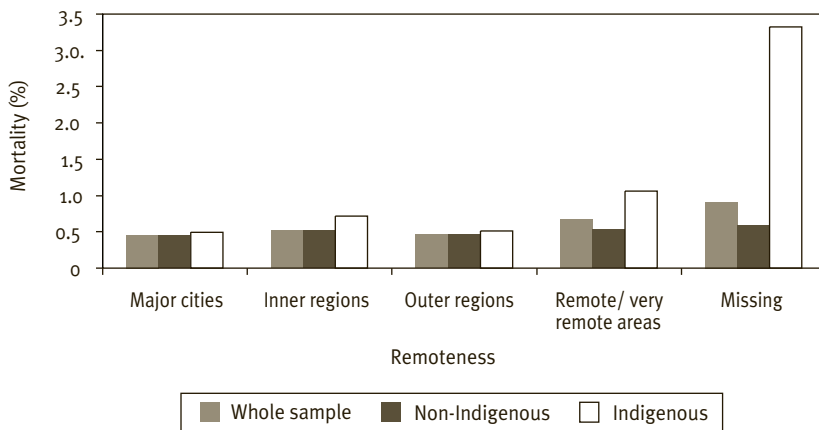
In the sample, 62 per cent of primary families lived in major cities at the first date of care, 32.7 per cent lived in inner regional or outer regional areas, and 3 per cent lived in remote or very remote areas. The classification of the remaining 2.2 per cent is unknown.

As Table 5 shows, remoteness is also found to correlate positively with child mortality. The mortality rate of children living in major cities is 0.46 per cent; 0.51 per cent in inner regional and outer regional areas; and 0.67 per cent in remote and very remote areas. The mortality rate in ‘remoteness unknown’ is 0.91 per cent.

The estimated number of excess deaths is not large for the sample, but the number of children living in remote and very remote areas accounts for one-third of all observed deaths.

Since Indigenous Australians make up a substantial proportion of rural and remote area populations, it is often difficult to tell whether the differences are due to their geographical location or their Indigenous status. From Figure 5, it seems that high child mortality rates in remote and very remote areas are mainly driven by the high mortality rates of Indigenous children. Another noteworthy point is that child mortality rates are extremely high in areas with remoteness ‘missing’, indicating that these areas are likely to be remote or very remote.

**Figure 5: Mortality of children by remoteness and Indigenous status**



Source: Author's calculations from TDS2.

Rural or urban areas and states of residence can also be identified from postcodes, but they are not emphasised much in this analysis because preliminary multivariate analyses showed that they are rarely significant. In the sample, only 10 per cent lived in rural areas, and more than 92 per cent lived in New South Wales, Victoria, Queensland, Western Australia and South Australia. The proportions are approximately the same for the first dates of care as for the last dates of care. The mortality of children is generally higher in rural areas than in urban areas, and it is higher in the Northern Territory than in the states. The Australian Capital Territory has the lowest child mortality rate.

## Sex of children

As mentioned in Section 3, there is little available information on primary children in TDS2, apart from their sex, dates of birth and dates of death.

First, child mortality rates are compared by sex. As expected, the mortality of boys (0.57 per cent) is higher than that of girls (0.41 per cent).

Second, mortality rates are compared by month of birth. All primary children in the study belong to a half-year birth cohort, so there are few age differences. However, it is interesting to examine whether different birth months are associated with different mortality rates, which could be due to seasonal factors such as weather conditions, the holiday arrangements of parents and the availability of health services. For example, direct tabulation shows children born in December have the lowest mortality rates (0.44 per cent), and children born in November and January have the highest rates (0.52 per cent). However, in multivariate analyses, birth months are generally insignificant and so this factor has largely been excluded from the analysis.

In Table 5, influencing factors are ordered by the estimated excess deaths for the sample. These factors are grouped into broad categories:

1. economic factors (IS duration and family income)
2. care-related factors (number of children before the primary child, birth parent, disability, teenage motherhood and relationship instability)
3. family background (Indigenous status and country of birth)
4. location/neighbourhood factors (SEIFA Disadvantage Index, remoteness, rural/urban areas and state/territory of residence)
5. children's own characteristics (sex).

Generally, the descriptive analyses show that disadvantaged groups have higher child mortality rates than less disadvantaged groups, and economic and care-related factors have the most significant effects.

## Correlations between the influencing factors

The factors influencing child mortality are not independent from each other. Table 6 shows the correlation matrix of the main influencing factors. Some factors are relatively highly correlated; for instance, total IS duration is highly correlated with relative family income, relationship instability, teenage motherhood and disability.

The table also shows that Indigenous status is highly correlated with remoteness, suggesting that Indigenous people are more likely to live in remote or very remote areas. They are also more likely to have other characteristics of disadvantage such as longer time spent on IS, lower family income, higher relationship instability, being a teenage mother and living in areas of socioeconomic disadvantage. These disadvantages may contribute to the higher mortality rates of Indigenous children.

Teenage mothers are likely to have spent more time on IS and have lower family income; they also tend to have more marital events recorded in TDS2 (that is, their relationships are less stable). Because of their age, it is not surprising to find they are less likely to have had any children before the primary child.

Birth parents are highly correlated with the number of children ‘ever cared for before’. This may be because of the definition of birth parent—that is, primary carers who started to ‘take care of’ (claimed family payments for) a primary child from the time of birth. If a parent had children before the primary child, he or she was more likely to be on government benefits when the child was born, and were also probably claiming family payments for the child from birth.

People with a disability tend to have received IS for longer, have a lower family income, are living in remote or very remote areas, and have unstable relationships. In general, people who receive IS for a longer period and have a lower family income, or who are living in areas of socioeconomic disadvantage, are very likely to have unstable relationships. Several location and neighbourhood variables—remoteness, SEIFA Disadvantage Index and rural or urban location—are also highly correlated, partly because they are derived from postcode records.

**Table 6: Correlation between factors influencing child mortality**

	Death of child	Indigenous	Teenage mothers	No. of children before	Disabled	Birth-parent	Relation-ship instability	IS duration	Relative family income	Remoteness	SEIFA Disadvantage index
Death of child	1.0000										
Indigenous	0.0059	1.0000									
Teenage mothers	0.0094	0.1131	1.0000								
No. of children before	0.0174	0.0682	-0.1376	1.0000							
Disabled	0.0093	0.0381	0.0040	0.0491	1.0000						
Birth-parent	0.0426	0.0184	0.0885	0.2815	-0.0009	1.0000					
Relationship instability	0.0129	0.1346	0.1808	0.0157	0.1099	0.0002	1.0000				
IS duration	0.0182	0.1758	0.2047	0.0648	0.2045	0.0326	0.5648	1.0000			
Relative family income	-0.0123	0.1411	-0.1309	-0.0756	-0.1414	0.0236	0.3344	-0.5892	1.0000		
Remoteness	0.0049	0.2392	0.0539	0.0697	0.1116	0.0272	0.0652	0.0695	0.0745	1.0000	
SEIFA Disadvantage index	-0.0106	0.1101	-0.0754	-0.0377	0.0445	0.0287	0.1077	0.1858	0.1621	0.2199	1.0000
Rural	0.0032	0.0826	0.0128	0.0544	0.0027	0.0333	0.0141	0.0257	0.0629	0.4008	0.0105

Note: Total observations=108,781. 'Missing' values are excluded.  
 'IS' = income support; 'SEIFA Disadvantage Index' = Socio-Economic Indexes for Area Disadvantage Index.

## 5 Econometric analysis

### Probability of having a primary child who died

Children from different family backgrounds have different mortality rates and economic and care-related factors play a significant role. This section uses a logistic model to estimate the effects these factors have on the mortality risk of children.

For convenience, this analysis groups the influencing factors into the five categories outlined previously:

1. family background
2. care-related factors
3. economic factors
4. location/neighbourhood factors
5. children's own characteristics.

The model takes the following general form:

$$Y^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon \quad (1)$$

where  $Y^*$  is a latent variable referring to the health conditions of children,  $X_1$  is an array of family background variables,  $X_2$  is an array of variables affecting the care of children,  $X_3$  is an array of economic variables,  $X_4$  is an array of location/neighbourhood variables,  $X_5$  is an array of variables about the characteristics of children,  $\beta_0$  is a constant term,  $\beta_1$ – $\beta_5$  are vectors of coefficients for variables in the five categories, and  $\varepsilon$  is a term of random error.

If a child's health deteriorates below a certain level, this will lead to death. That is:

$$Y = \begin{cases} 1, & \text{if } Y^* > 0 \\ 0, & \text{otherwise} \end{cases} \quad (2)$$

The estimation strategy applied starts with a group of factors in one category (baseline model), then includes more explanatory variables of other categories in stages (extension models) to check the sensitivity of the coefficients of the factors in the baseline model.

#### Family background

There are two variables in this category: Indigenous status and country of birth. These may be associated with certain family values, culture and lifestyle.

As shown in the baseline model (Table 7), when no variables are included in the model except country of birth, Indigenous status is very significant, and the probability of premature death of an Indigenous child is about 80 per cent higher than that of a non-Indigenous child. However, when more explanatory variables are included, Indigenous status becomes insignificant. This suggests that the higher mortality of Indigenous children may be mainly explained by other

aspects of parental disadvantage, such as socioeconomic disadvantage, rather than by the parents’ Indigenous status alone.

The country of birth variable has significant effects on child mortality: immigrants generally have a lower mortality rate than children born in Australia. It is noteworthy that the mortality risk for children born in the other six main English-speaking countries (Canada, Ireland, New Zealand, South Africa, the United Kingdom and the United States) is 60 to 70 per cent lower than it is for Australia-born children.

**Table 7: Estimated effects of family background on the mortality risk of children (odds ratios)**

Variables	Baseline model	Extension 1	Extension 2	Extension 3	Full model
Indigenous	1.80 (3.35)***	0.99 (0.05)	1.00 (0.02)	0.88 (0.64)	0.88 (0.64)
Country of birth					
Australia	Ref	Ref	Ref	Ref	Ref
Main English-speaking countries	0.40 (2.43)**	0.29 (3.23)***	0.29 (3.24)***	0.28 (3.28)***	0.28 (3.28)***
Other countries	0.86 (1.30)	0.72 (2.74)***	0.72 (2.77)***	0.65 (3.38)***	0.65 (3.38)***

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.  
 Absolute values of z-statics in parentheses (standard errors adjusted for clustering on parent ID).  
 In extension 1, five care-related variables (number of children cared for before primary child, teenage motherhood, disability, birth parent, relationship instability) are also included.  
 In extension 2, a dummy variable for boys is also included.  
 In extension 3, three economic variables (having IS before 1987, total IS duration since 1987, and relative family income) are also included.  
 In the full model, two location/neighbourhood variables (SEIFA Disadvantage Index and remoteness) are also included.  
 ‘SEIFA Disadvantage Index’=Socio-Economic Indexes for Area Disadvantage Index.

**Care-related factors**

Several observed factors in TDS2 may directly affect the care of a child, including teenage motherhood, the number of children cared for before the primary child, disability, being a birth parent and relationship instability.

Being cared for by a teenage mother greatly increases the probability of child death. As Table 8 shows, the mortality risk for children whose primary carers were teenage mothers at the first date of care is approximately three times higher than for other children. The effect hardly changes even when more variables are included in the model.

The number of children a parent has cared for before the primary child also has significant effects on the mortality risk of children. If a parent had one child before a primary child, the probability of death of the primary child tends to be 3.62 to 3.84 times higher than if the parent had no previous child. If the parent had two children before the primary child, the mortality risk of the primary child is even higher (4.30 to 4.64 times). However, if the parent had three or more children before the primary child, the mortality risk begins to decrease slightly. In particular, if a parent had four or

more children before the primary child, the mortality risk is approximately 2.1 to 2.4 times as high as if she or he had no other child before. This risk is lower than if the parent had fewer (one to three) children before the primary child.

The coefficient of the birth parent variable is significant and also stable with the inclusion of extra explanatory variables. Generally, the mortality risk for children cared for by their birth parents is 84 per cent lower than the risk for other children.

Parental disability is associated with a higher child mortality risk. The risk is about 45 per cent higher if primary parents have a disability. However, when economic factors (IS duration and family income) are controlled for, the effect becomes insignificant. This may be due to the definition of disability—that is, having a medical condition eligible for DSP—thus disability is highly correlated with IS duration.

Similarly, unstable parental relationships are associated with higher child mortality. The probability of death is about 40 per cent higher for a child whose parents' relationship is very unstable—that is, parents who have five or more marital events recorded in TDS2—than for a child whose parents' relationship is defined by TDS2 as stable (with one or two marital events). Again, due to the high correlation between relationship instability and economic factors, the coefficient of this variable is insignificant in Extension 3 and the Full Model, where IS duration and family income are included.

**Table 8: Estimated effects of care-related factors on mortality risk of children (odds ratios)**

Variables	Baseline model	Extension 1	Extension 2	Extension 3	Full model
Teenage motherhood	3.26 (6.70)***	3.13 (6.39)***	3.14 (6.39)***	2.82 (5.74)***	2.77 (5.64)***
No. of children before primary child					
None	Ref	Ref	Ref	Ref	Ref
1	3.84 (10.71)***	3.73 (10.44)***	3.75 (10.46)***	3.63 (10.24)***	3.62 (10.22)***
2	4.64 (10.49)***	4.51 (10.25)***	4.51 (10.25)***	4.31 (9.98)***	4.30 (9.94)***
3	4.10 (7.54)***	3.97 (7.30)**	3.98 (7.32)***	3.70 (6.89)***	3.65 (6.82)***
4 or more	2.38 (3.16)***	2.33 (3.00)***	2.34 (3.02)***	2.12 (2.65)***	2.10 (2.61)***
Disability	1.45 (2.06)**	1.44 (2.00)**	1.45 (2.02)**	1.23 (1.10)	1.22 (1.06)
Birth parent	0.17 (15.54)***	0.16 (15.65)***	0.16 (15.64)***	0.16 (15.42)***	0.16 (15.42)***
Relationship instability					
Stable	Ref	Ref	Ref	Ref	Ref
Unstable	1.11 (0.99)	1.11 (1.02)	1.11 (1.00)	0.85 (1.46)	0.85 (1.42)
Very unstable	1.41 (3.16)***	1.40 (3.06)***	1.39 (3.04)***	1.01 (0.08)	1.01 (0.10)

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.

Absolute values of z-statics in parentheses (standard errors adjusted for clustering on parent ID).

In extension 1, two family background variables (Indigenous status and country of birth) are included.

In extension 2, a dummy variable for boy is also included.

In extension 3, three economic variables (having IS before 1987, total IS duration since 1987, and relative family income) are also included.

In the full model, two location/neighbourhood variables (SEIFA Disadvantage Index and remoteness) are also included.

'IS'=income support; 'SEIFA Disadvantage Index'=Socio-Economic Indexes for Area Disadvantage Index.

## Economic factors

The model includes three variables for economic factors:

1. total IS duration since 1987
2. having IS records before 1987
3. relative family income.

Both long IS duration since 1987 and low family income are indicators of economic disadvantage, and having IS records before 1987 indicates being even more disadvantaged, given other factors are the same.

Primary parents who have been on IS since 1987—when the primary children were about to be born—usually pose significantly higher mortality risks for their children (Table 9). However, interestingly, the mortality risk does not monotonically increase with total duration on IS; instead, the correlation shows a complex pattern. Among parents with IS records since 1987, those who were on IS for between three and five years have the lowest mortality risk for their children, though the risk is still 47 to 55 per cent higher than that for parents without IS records.

The effect of family income is generally insignificant, due to its high correlation with IS duration. If IS duration is not controlled for, children of parents with higher family incomes have significantly lower mortality rates.

Having IS records before 1987 also tends to increase the mortality risk of children, but this effect is generally insignificant.

Table A2 (Appendix) compares IS history with other measures.

**Table 9: Estimated effects of economic factors on mortality risk of children (odds ratios)**

Variables	Baseline model	Extension 1	Extension 2	Extension 3	Full model
Having IS before 1987	1.49 (1.92)*	1.47 (1.83)*	1.16 (0.69)	1.16 (0.48)	1.15 (0.65)
Total IS duration since 1987					
No records	Ref	Ref	Ref	Ref	Ref
Less than 1 year	1.71 (3.39)***	1.73 (3.46)***	1.72 (3.39)***	1.72 (3.40)***	1.69 (3.28)***
1–2 years	1.89 (4.22)***	1.93 (4.30)***	1.87 (3.94)***	1.87 (3.92)***	1.83 (3.78)***
3–5 years	1.55 (2.78)***	1.55 (2.77)***	1.51 (2.43)**	1.51 (2.45)**	1.47 (2.29)**
6–8 years	1.78 (3.64)***	1.76 (3.55)***	1.67 (3.00)***	1.68 (3.02)***	1.64 (2.85)***
9–11 years	2.39 (6.02)***	2.33 (5.76)***	2.32 (5.03)***	2.34 (5.04)***	2.22 (4.72)***
12 or more years	1.86 (3.56)***	1.77 (3.25)***	1.87 (3.28)***	1.87 (3.30)***	1.78 (3.01)***
Family income					
Low	Ref	Ref	Ref	Ref	Ref
Middle	1.00 (0.00)	0.99 (0.10)	1.18 (1.31)	1.18 (1.33)	1.19 (1.37)
High	0.89 (0.64)	0.87 (0.76)	0.97 (0.19)	0.97 (0.18)	0.98 (0.11)
Missing	1.28 (1.48)	1.32 (1.66)*	1.12 (0.66)	1.13 (0.69)	1.12 (0.65)

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.

Absolute values of z-statistics in parentheses (standard errors adjusted for clustering on parent ID).

In extension 1, two family background variables (Indigenous status and country of birth) are included.

In extension 2, five care-related variables (number of children cared for before primary child, teenage motherhood, disability, birth parent, relationship instability) are also included.

In extension 3, a dummy variable for boy is also included.

In the full model, two location/neighbourhood variables (SEIFA Disadvantage Index and remoteness) are also included.

'IS'=income support; 'SEIFA Disadvantage Index'=Socio-Economic Indexes for Area Disadvantage Index.

### Location/neighbourhood factors

There are four location/neighbourhood variables derived from postcode in TDS2: the SEIFA Disadvantage Index; remoteness; rural/urban areas; and state/territory of residence. As discussed above, state/territory variables are generally insignificant, so have been excluded from the models.

Due to the long sampling window, people are likely to move and change their postcodes from time to time. There are different ways of merging the location/neighbourhood variables into TDS2; for instance, by the postcode recoded at the first or last date of care. However, different ways of merging may lead to different results.

Table 10 compares the results using the variables based on the postcodes at the first date of care, and those based on postcodes at the last date of care. The results are different but qualitatively consistent. This paper mainly reports results based on the postcodes at the first date of care.

**Table 10: Comparison of the estimated effects of location/neighbourhood factors based on postcodes at the first and the last dates of care (odds ratios)**

Variables	On first dates of care	On last dates of care	On first dates of care	On last dates of care
Remoteness				
Major cities	Ref	Ref	Ref	Ref
Inner regions	1.15 (1.40)	1.03 (0.30)		
Outer regions	1.03 (0.21)	1.20 (1.40)		
Remote areas	1.38 (1.17)	1.41 (1.18)		
Very remote areas	1.66 (1.58)	1.56 (1.31)		
Remoteness unknown	2.00 (3.26)***	1.91 (2.98)***		
SEIFA Disadvantage Index				
Most disadvantaged areas	Ref	Ref	Ref	Ref
Other areas			0.79 (2.48)**	0.88 (1.32)
Least disadvantaged areas			0.63 (4.18)***	0.80 (2.00)**
Missing			0.98 (0.08)	1.39 (1.41)

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.  
 Absolute values of z-statics in parentheses (standard errors adjusted for clustering on parent ID).  
 ‘SEIFA Disadvantage Index’=Socio-Economic Indexes for Area Disadvantage Index.

Table 11 shows the estimated odds ratios for the SEIFA Disadvantage Index and remoteness in five models (baseline model, extensions 1 to 3, and full model). Except for areas where the remoteness classification is unknown, most areas are not significantly different from the major cities in terms of child mortality, after controlling for the SEIFA Disadvantage Index.

Areas of socioeconomic disadvantage show significantly higher mortality risks. Compared with the most disadvantaged areas, the least disadvantaged areas have 26 to 36 per cent lower mortality risks, and other areas also have 15 to 22 per cent lower risks. Surprisingly, the probability of death for children in areas where the SEIFA Disadvantage Index is missing is about 65 per cent lower than in the most disadvantaged areas. However, this effect should be interpreted with caution, because the majority of areas with the SEIFA Disadvantage Index missing also have remoteness missing. The areas with remoteness missing have a 3.3 to 3.4 times higher mortality risk for children than the major cities. On balance, areas with the SEIFA Disadvantage Index and remoteness missing are likely to have higher mortality risks for children.

**Table 11: Estimated effects of location/neighbourhood factors on the mortality risk of children (odds ratios)**

Variables	Baseline model	Extension 1	Extension 2	Extension 3	Full model
Remoteness					
Major cities	Ref	Ref	Ref	Ref	Ref
Inner regions	1.11 (0.99)	1.06 (0.54)	1.00 (0.02)	1.00 (0.00)	0.97 (0.25)
Outer regions	0.95 (0.34)	0.88 (0.84)	0.84 (1.17)	0.84 (1.18)	0.84 (1.23)
Remote areas	1.27 (0.88)	1.14 (0.46)	1.04 (0.14)	1.04 (0.14)	1.05 (0.16)
Very remote areas	1.44 (1.13)	1.07 (0.20)	0.85 (0.45)	0.85 (0.44)	0.87 (0.38)
Remoteness unknown	3.41 (4.12)***	3.26 (3.92)***	3.32 (3.99)***	3.32 (4.00)***	3.30 (3.96)***
SEIFA Disadvantage Index					
Most disadvantaged areas	Ref	Ref	Ref	Ref	Ref
Other areas	0.78 (2.58)***	0.78 (2.49)**	0.81 (2.13)**	0.81 (2.14)**	0.85 (1.69)*
Least disadvantaged areas	0.64 (3.95)***	0.64 (3.84)***	0.67 (3.36)***	0.67 (3.38)***	0.74 (2.60)***
Missing	0.37 (2.80)***	0.36 (2.83)***	0.35 (2.93)***	0.35 (2.93)***	0.36 (2.85)***

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.

Absolute values of z-statics in parentheses (standard errors adjusted for clustering on parent ID).

In extension 1, two family background variables (Indigenous status and country of birth) are included.

In extension 2, five care-related variables (number of children cared for before primary child, teenage motherhood, disability, birth parent, relationship instability) are also included.

In extension 3, a dummy variable for boy is also included.

In the full model, three economic variables (having IS before 1987, total IS duration since 1987, and relative family income) are also included.

'SEIFA Disadvantage Index'=Socio-Economic Indexes for Area Disadvantage Index; 'IS'=Income Support.

## Child characteristics

Sex and birth month are the only two explanatory variables available for all primary children in the sample. Since the birth month is always insignificant in preliminary regressions, it is excluded from the final models.

Sex differences are compared in two ways. First, the model is estimated using the whole sample with a dummy variable included for boys (see Table 12). Boys appear to have significantly higher mortality risks than girls (about 40 per cent higher), and the coefficient for boys hardly changes when the extra explanatory variables are included. Second, the models are estimated with sub-samples of boys and girls, respectively. The results are reported in Table 12.

Generally, for both boys and girls, the following characteristics of primary parents are associated with significantly higher mortality risk: being born in Australia, being teenage mothers, having had children before, not being birth parents, having had IS records since 1987, and living in areas of socioeconomic disadvantage. Other variables are generally insignificant.

However, two patterns are different for boys and for girls. First, teenage motherhood seems to have larger mortality impacts on boys than on girls. Second, (differing from the risk for boys) although the factor of parents with previous children is also associated with higher mortality risks for girls, this risk tends to decrease as the number of previously-born children that the girl's primary parent has cared for increases. The difference in mortality risk is insignificant between a girl who has four or more older siblings, and a girl who is the first child of her primary parent. However, for boys with similar characteristics, this difference remains significant no matter how many siblings they have.

**Table 12: Estimated mortality risk of children by sex (odds ratios)**

Variables	Boys	Girls	Whole sample
Boy			1.39 (3.91)***
Family background			
Indigenous	0.71 (1.37)	1.22 (0.64)	0.88 (0.64)
Country of birth			
Australia	Ref	Ref	Ref
Main English-speaking countries	0.28 (2.51)**	0.28 (2.18)**	0.28 (3.28)***
Other countries	0.66 (2.53)**	0.64 (2.27)**	0.65 (3.38)***
Care factors			
Teenage motherhood	3.24 (5.08)***	2.25 (2.78)***	2.77 (5.64)***
No. of children before primary child			
None	Ref	Ref	Ref
1	3.67 (7.73)***	3.58 (6.74)***	3.62 (10.22)***
2	5.12 (8.61)***	3.32 (5.13)***	4.30 (9.94)***
3	5.01 (6.97)***	2.11 (2.12)**	3.65 (6.82)***
4 or more	2.89 (3.11)***	1.20 (0.33)	2.10 (2.61)***
Disability	1.38 (1.40)	0.98 (0.06)	1.22 (1.06)
Birth parent	0.16 (11.74)***	0.15 (10.10)***	0.16 (15.42)***
Relationship instability			
Stable	Ref	Ref	Ref
Unstable	0.78 (1.68) *	0.96 (0.24)	0.85 (1.42)
Very unstable	0.99 (0.05)	1.03 (0.15)	1.01 (0.10)
Economic factors			
Having IS before 1987	1.41 (1.41)	0.77 (0.64)	1.15 (0.65)
Total IS duration since 1987			
No records	Ref	Ref	Ref
Less than 1 year	2.01 (3.40)***	1.30 (1.01)	1.69 (3.28)***
1–2 years	1.39 (1.41)	2.46 (4.01)***	1.83 (3.78)***
3–5 years	1.62 (2.16)**	1.31 (1.03)	1.47 (2.29)**
6–8 years	1.89 (2.86)***	1.32 (1.02)	1.64 (2.85)***
9–11 years	2.45 (4.07)***	1.93 (2.46)**	2.22 (4.72)***
12 or more years	1.98 (2.73)***	1.54 (1.43)	1.78 (3.01)***
Family income			
Low	Ref	Ref	Ref
Middle	1.23 (1.28)	1.12 (0.57)	1.19 (1.37)
High	1.08 (0.31)	0.86 (0.54)	0.98 (0.11)
Missing	1.06 (0.28)	1.19 (0.63)	1.12 (0.65)

Remoteness			
Major cities	Ref	Ref	Ref
Inner regions	0.98 (0.16)	0.97 (0.18)	0.97 (0.25)
Outer regions	0.85 (0.89)	0.81 (0.87)	0.84 (1.23)
Remote areas	1.04 (0.11)	1.07 (0.17)	1.05 (0.16)
Very remote areas	1.30 (0.67)	0.38 (1.20)	0.87 (0.38)
Remoteness unknown	3.21 (3.44)***	3.40 (2.25)**	3.30 (3.96)***
SEIFA Disadvantage Index			
Most disadvantaged areas	Ref	Ref	Ref
Other areas	0.85 (1.26)	0.83 (1.15)	0.85 (1.69)*
Least disadvantaged areas	0.66 (2.67)***	0.84 (0.92)	0.74 (2.60)***
Missing	0.37 (2.48)**	0.36 (1.59)	0.36 (2.85)***
Observations	61015	57946	118961
Pseudo R2	0.0769	0.0669	0.0703

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.

Absolute values of z-statistics in parentheses (standard errors adjusted for clustering on parent ID).

'SEIFA Disadvantage Index'=Socio-Economic Indexes for Area Disadvantage Index; 'IS'=income support.

## Robust tests

Extra robust tests have been undertaken in this project.

First, continuous variables for economic factors (IS duration and family income) and the SEIFA Disadvantage Index are used instead of category variables, but the coefficients of other variables are hardly affected.

Second, children who died after the age of 10 years are excluded from the sample. Some deaths may not be recorded in TDS2 if the primary parents stopped claiming government payments and did not re-register with Centrelink to receive these payments. This kind of under-recording may be non-random; for instance, people with higher incomes may have a higher probability of leaving and not returning to welfare. This is also likely to happen when children are older. Nonetheless, the test leads to findings that are qualitatively the same.

However, there are two unsolved issues for the logistic model: right-censored data and delays in entry (different times of first claiming benefit). The duration model, which provides a better solution for these issues, is discussed below.

## Hazard of death of primary children

As administrative data, TDS2 has two outstanding issues that need to be considered for this research: (1) delayed entry—people were only observed in TDS2 when they started to claim benefits from the government; and (2) right-censoring—the deaths of children after parents left benefits were not observed. The logistic model presented in the previous section could not provide satisfactory solutions to these issues, but they can be easily tackled with a duration model.

The analyses in this section are mainly based on non-parametric (Kaplan-Meier estimator) and semi-parametric (Cox Proportional Hazard (PH) estimator) methods to allow for most flexible forms of survival and hazard functions.

A similar estimation strategy to that outlined in the previous section is applied, starting with a group of factors (baseline model) and then including more explanatory variables in stages (extensions) to check the sensitivity of the coefficients of the factors in the baseline model.

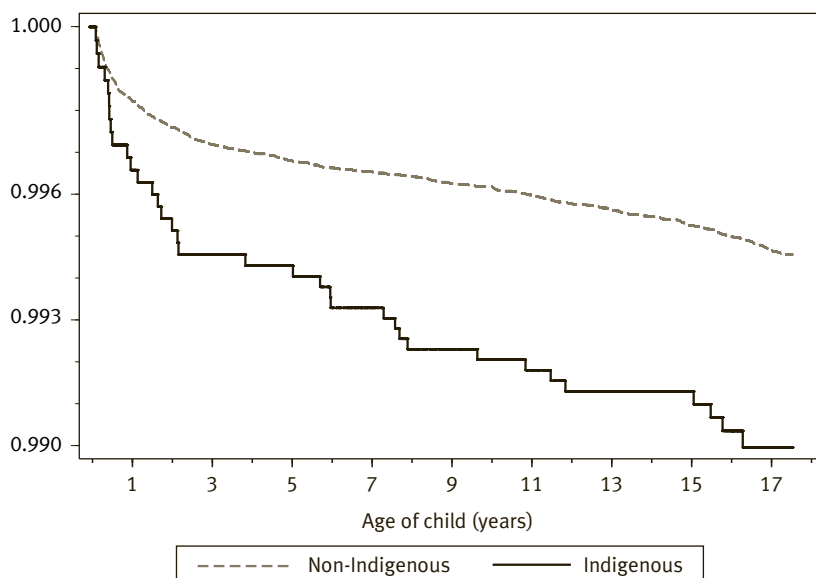
For consistency and simplicity, the variables are treated as constant over time in the results reported below, while the results of models with time-varying variables and other specifications will be discussed in robust tests.

In addition, to be consistent with the analyses in other sections, the sample is still restricted to the primary children who were not born overseas and did not die within two months after birth. Due to this restriction, the earliest entry occurs after two months from birth; this slightly changes the interpretation of the estimation results (conditional on surviving to two months).

### Family background

Figure 6 shows the estimated Kaplan-Meier survival functions of children with Indigenous and non-Indigenous parents. Indigenous children (that is, children with Indigenous parents) have a significantly lower probability of survival than non-Indigenous children.

**Figure 6: Kaplan-Meier survival estimates by Indigenous status**



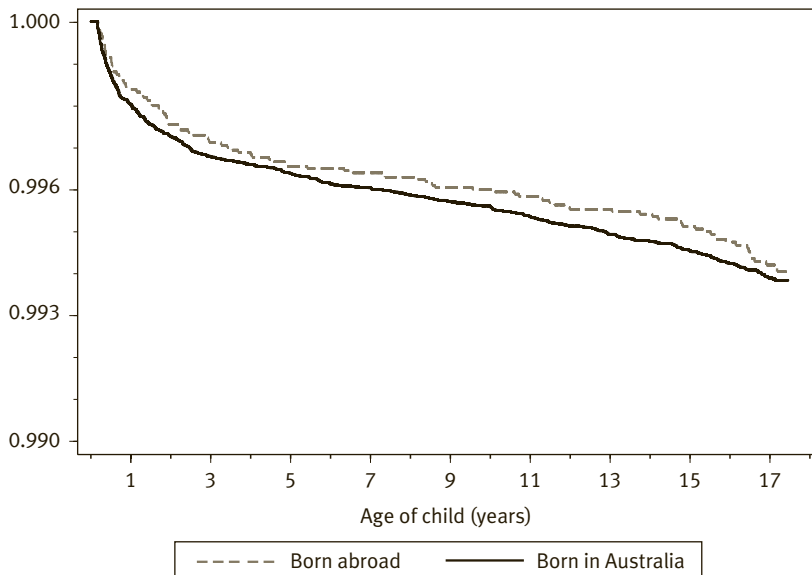
Source: Author's calculations from TDS2.

Table 13 lists the estimated hazard ratios for children from different family backgrounds, as indicated by their parents' Indigenous status and country of birth. In the baseline model—only Indigenous status and country of birth are included—Indigenous status is very significant and the hazard of premature death for an Indigenous child is about 1.9 times as high as for a non-Indigenous child.

However, when other factors are considered, Indigenous status does not have a significant effect on the results. This confirms the finding in the previous section that the high mortality of Indigenous children can be mostly explained by other disadvantages experienced by their parents, such as low socioeconomic status, rather than by their Indigenous status itself.

Figure 7 shows the Kaplan-Meier estimates of survival for children of Australian-born parents and others. Estimation results in Table 13 are generally consistent with the pattern in Figure 7. A child whose primary parent was born overseas tends to have a lower risk of death; in particular, the hazard of death is 64 per cent less for a child whose primary parent was born in one of the other six main English-speaking countries than it is for a child with an Australian-born parent. Interestingly, contrary to the result relating to Indigenous status, country of birth becomes a more significant influencing factor when the model includes additional explanatory variables.

**Figure 7: Kaplan-Meier survival estimates by country of birth**



Source: Author's calculations from TDS2.

**Table 13: Estimated effects of family background on death hazards of children (hazard ratios)**

Variables	Baseline model	Extension 1	Extension 2	Extension 3	Full model
Indigenous	1.91 (3.71)***	1.00 (0.02)	1.00 (0.02)	0.92 (0.47)	0.89 (0.61)
Country of birth					
Australia	Ref	Ref	Ref	Ref	Ref
Main English-speaking countries	0.55 (1.59)	0.37 (2.59)**	0.37 (2.59)**	0.36 (2.66)***	0.36 (2.68)***
Other countries	1.02 (0.20)	0.82 (1.65)*	0.82 (1.68)*	0.77 (2.16)**	0.75 (2.30)**

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.  
 Absolute values of z-statics in parentheses (standard errors adjusted for clustering on parent ID).  
 In extension 1, five care-related variables (number of children cared for before primary child, teenage motherhood, disability, birth parent, relationship instability) are also included.  
 In extension 2, a dummy variable for boy is also included.  
 In extension 3, three economic variables (having IS before 1987, total IS duration since 1987, and relative family income) are also included.  
 In the full model, three location/neighbourhood variables (SEIFA Disadvantage Index, remoteness, and rural/urban areas) are also included.  
 ‘SEIFA Disadvantage Index’=Socio-Economic Indexes for Area Disadvantage Index; ‘IS’=income support.

**Care-related factors**

Several factors, including teenage motherhood, disability, relationship instability, being a birth parent, and the number of children ever cared for before having the primary child, are likely to affect the quality of care that parents give to the child. Except for disability, all other factors have significant effects on the mortality risk of children (Table 14).

**Table 14: Estimated effects of care-related factors on death hazards of children (hazard ratios)**

Variables	Baseline model	Extension 1	Extension 2	Extension 3	Full model
Teenage motherhood	2.61 (5.55)***	2.53 (5.30)***	2.55 (5.34)***	2.36 (4.83)***	2.33 (4.76)***
Disability	1.41 (1.89)*	1.40 (1.83)*	1.40 (1.84)	1.21 (1.02)	1.20 (0.98)
Birth parent	0.06 (18.69)***	0.06 (18.73)***	0.06 (18.70)***	0.06 (18.49)***	0.06 (18.48)***
No. of children before primary child					
None	Ref	Ref	Ref	Ref	Ref
1	3.29 (10.18)***	3.22 (9.93)***	3.24 (9.96)***	3.17 (9.77)***	3.16 (9.75)***
2	4.12 (10.17)***	4.03 (9.93)***	4.04 (9.93)***	3.90 (9.69)***	3.89 (9.65)***
3	3.76 (7.24)***	3.65 (7.00)***	3.67 (7.02)***	3.45 (6.65)***	3.42 (6.60)***
4 or more	2.75 (3.73)***	2.70 (3.59)***	2.72 (3.62)***	2.48 (3.25)***	2.45 (3.18)***
Relationship instability					
Stable	Ref	Ref	Ref	Ref	Ref
Unstable	1.13 (1.14)	1.13 (1.21)	1.13 (1.18)	0.90 (0.95)	0.90 (0.92)
Very unstable	1.39 (3.07)***	1.39 (3.08)***	1.39 (3.03)***	1.08 (0.59)	1.08 (0.61)

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.

Absolute values of z-statistics in parentheses (standard errors adjusted for clustering on parent ID).

In extension 1, two family background variables (Indigenous status and country of birth) are included.

In extension 2, a dummy variable for boy is also included.

In extension 3, three economic variables (having IS before 1987, total IS duration since 1987, and relative family income) are also included.

In the full model, three location/neighbourhood variables (SEIFA Disadvantage Index, remoteness, and rural/urban areas) are also included.

'SEIFA Disadvantage Index'=Socio-Economic Indexes for Area Disadvantage Index; 'IS'=income support.

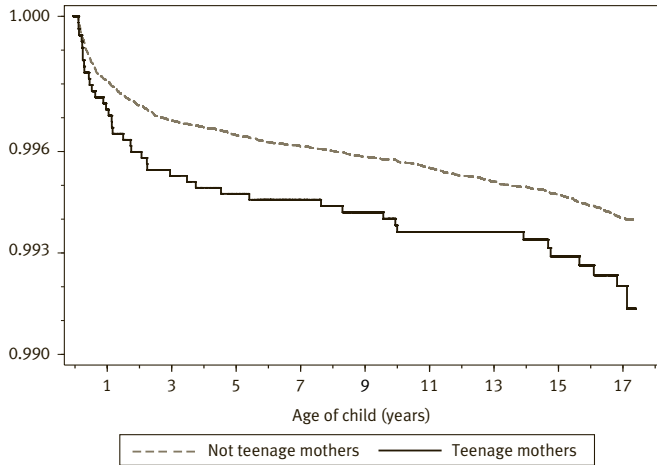
Having one, two, three, four or more children before a primary child is born increases the primary child's death hazard by approximately 2.12, 2.89, 2.42, and 1.45 times respectively (in the full model). Therefore, it seems that for an extra sibling, increase in competition for resources (including a share of family income and their parents' time) predominates over any benefits that their parents' child care experience might bring. However, when the number of children in a family is three or more, the hazards become lower; this may be because in large families, older siblings need less care and can also help parents take care of younger children.

A striking point of the results is that the variable of birth parent (taking care of a primary child from birth) is significant in all models and is associated with approximately 94 per cent lower mortality rates for children. Using a different definition of birth parent—taking care of a primary child within three (or 4, 5 or 6) months after birth—leads to qualitatively similar findings, though the difference between the birth parent and the non-birth parent is smaller.

Being cared for by a teenage mother is associated with 2.33 to 2.55 times higher hazard of premature death. Figure 8 shows the difference in estimated Kaplan-Meier survival functions between children of teenage mothers and others.

In addition, relationship instability and parental disability tend to increase the mortality risk of children; however, the effects are not significant.

**Figure 8: Kaplan-Meier survival estimates by teenage motherhood**



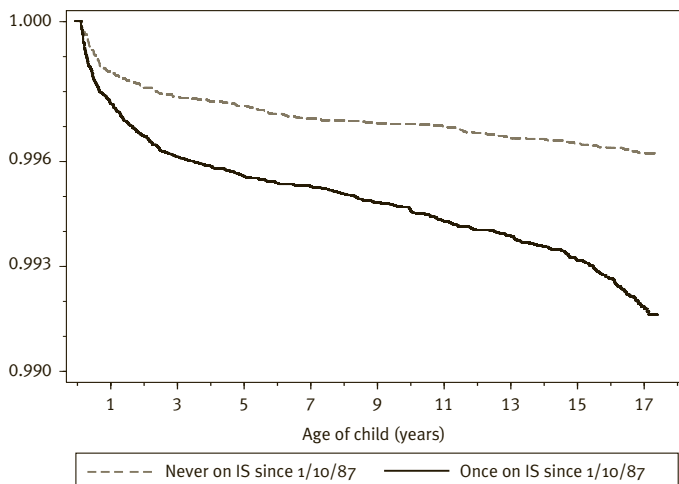
Source: Author’s calculations from TDS2.

**Economic factors**

The IS receipt variable is a good indicator of low income because, to be eligible for the support, a person has to pass rigorous income and asset tests.<sup>22</sup> Consequently, the IS duration between 1987 and 2005 factor reflects how long a primary parent was on a low income during that period, thus indicating the extent of economic disadvantage.

Figure 9 compares the estimated Kaplan-Meier survival functions for children whose primary parents had no IS records for other children since 1987. As expected, having been on IS since 1987 is associated with a significantly higher mortality risk of children.

**Figure 9: Kaplan-Meier survival estimates by income support incidence**



Note: ‘IS’=income support.

Source: Author’s calculations from TDS2.

In Table 15, IS duration since 1987 is further broken down into seven categories: the category for people with no IS records is used as the reference group. The six categories for people with IS records since 1987 contain roughly the same number of primary children (about 11,000).

**Table 15: Estimated effects of economic factors on death hazards of children (hazard ratios)**

Variables	Baseline model	Extension 1	Extension 2	Extension 3	Full model
Having IS before 1987	1.49 (1.90)*	1.46 (1.82)*	1.18 (0.77)	1.18 (0.80)	1.15 (0.66)
Total IS duration since 1987					
No records	Ref	Ref	Ref	Ref	Ref
Less than 1 year	1.69 (3.32)***	1.69 (3.32)***	1.64 (3.06)***	1.64 (3.07)***	1.63 (3.03)***
1–2 years	1.88 (4.20)***	1.89 (4.21)***	1.84 (3.82)***	1.84 (3.81)***	1.80 (3.68)***
3–5 years	1.51 (2.61)***	1.50 (2.57)***	1.40 (1.99)**	1.40 (1.99)**	1.37 (1.84)*
6–8 years	1.65 (3.14)***	1.63 (3.06)***	1.47 (2.21)**	1.48 (2.25)**	1.43 (2.06)**
9–11 years	2.12 (5.08)***	2.08 (4.88)***	1.93 (3.83)***	1.93 (3.83)***	1.85 (3.55)***
12 or more years	1.58 (2.53)**	1.53 (2.34)**	1.50 (2.06)**	1.50 (2.07)**	1.44 (1.83)*
Family income					
Low	Ref	Ref	Ref	Ref	Ref
Middle	0.89 (0.92)	0.90 (0.86)	1.04 (0.32)	1.04 (0.34)	1.06 (0.44)
High	0.81 (1.14)	0.81 (1.12)	0.88 (0.72)	0.88 (0.70)	0.90 (0.56)
Missing	1.50 (2.38)**	1.52 (2.49)**	1.24 (1.24)	1.24 (1.27)	1.24 (1.25)

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.

Absolute values of z-statics in parentheses (standard errors adjusted for clustering on parent ID).

In extension 1, two family background variables (Indigenous status and country of birth) are included.

In extension 2, five care-related variables (number of children cared for before primary child, teenage motherhood, disability, birth parent, relationship instability) are also included.

In extension 3, a dummy variable for boy is also included.

In the full model, three location/neighbourhood variables (SEIFA Disadvantage Index, remoteness, and rural/urban areas) are also included.

'SEIFA Disadvantage Index'=Socio-Economic Indexes for Area Disadvantage Index; 'IS'=income support.

Although children of people with IS records generally have a 43 to 85 per cent higher mortality risk than those whose parents have no IS records (in the full model), the death hazard for children does not monotonically increase with total IS duration. People who had been on IS for 9 to 11 years or 1 to 2 years have the highest mortality risk of children; in contrast, people who had 3 to 5 years IS duration consistently have the lowest hazard risk. The hazard ratio for these two groups is approximately 1.35 (1.85/1.37) in the full model. Interestingly, children of people who had stayed on IS for 12 years or longer since 1987 also had a relatively lower mortality risk.

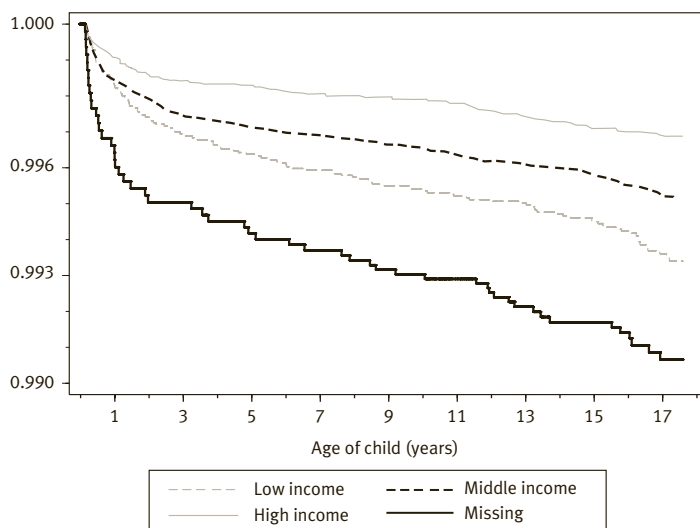
Having IS records before 1987 indicates two parental characteristics—a low income before the birth of a primary child and being older parents. The first characteristic is likely to be associated with higher mortality risks for children, but the second can reduce child mortality risks. On balance, having IS before 1987 slightly increases the mortality risk of children, but this effect is insignificant.

In addition, as shown in Figure A1 in the Appendix, contrary to the result based on IS duration since 1987, having IS between 1987 and the last date of care is associated with a higher probability of survival for children, indicating that parental IS incidence was more likely to be affected by the death of a child than the other way around. Table A3 in the Appendix compares estimated death hazards for children with different measures of IS history, where a similar conclusion can be drawn.

Overall, the results of this paper demonstrate the complexity of the correlation between parental IS experience and child mortality, and indicate that this issue needs further exploration.

As Figure 10 shows, lower family income is associated with a higher mortality risk for children, and the group with family income ‘missing’ has the highest mortality rate. However, after controlling for IS duration since 1987, the income variable generally becomes insignificant (Table 15).

**Figure 10: Kaplan-Meier survival estimates by family income**



Source: Author’s calculations from TDS2.

### Location and neighbourhood factors

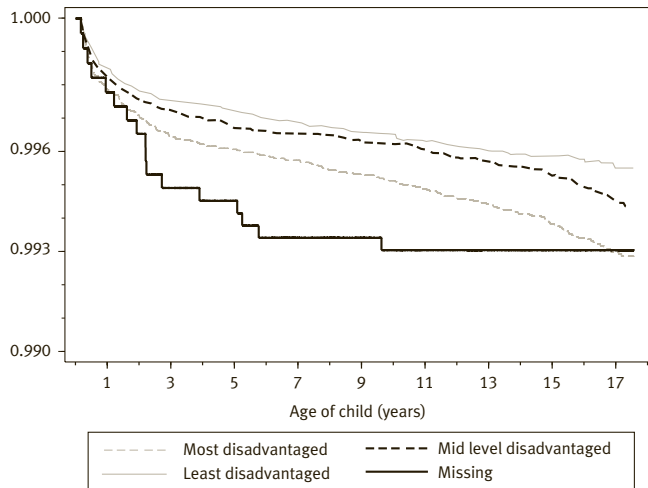
Children of people living in an area of socioeconomic disadvantage tend to have a higher mortality risk (Figure 11). Estimation results of Cox PH models generally show the same results (Table 16). Families living in the least disadvantaged areas have 25 to 36 per cent lower child mortality risks than those living in the most disadvantaged areas. Those living in ‘other’ areas have 17 to 23 per cent lower risks<sup>23</sup> than those living in the most disadvantaged areas.

However, unlike the pattern in Figure 11, families living in areas with ‘SEIFA Disadvantage Index missing’ have the lowest hazards (Table 16). This should be interpreted with the results for the missing categories of remoteness, because these categories in both variables basically refer to the same group of areas (based on the same group of postcodes). On balance, the mortality risk in the areas with ‘SEIFA Disadvantage Index missing’ does not differ significantly from the risk level in the most disadvantaged areas.

Figure 12 compares the estimated Kaplan-Meier survival functions of different remoteness categories. Remote areas (including very remote areas) and areas classified as ‘missing’ stand out, showing the lowest survival probabilities. Differences between other areas are not large. Table 16 shows that, after controlling for the SEIFA Disadvantage Index (and other variables), other remoteness categories are not significantly different from each other in terms of death hazards for children (except for the ‘missing’ category). Therefore, the high mortality risks for children living in remote or very remote areas can mostly be attributed to socioeconomic disadvantage.

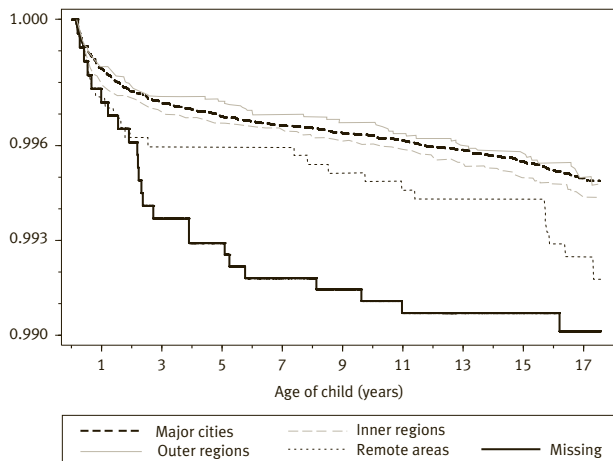
The differences between rural and urban areas are also insignificant, although death hazards are slightly higher in rural areas. State or territory of residence is excluded from the model reported here because it is always insignificant in preliminary regressions.

**Figure 11: Kaplan-Meier survival estimates by Socio-Economic Indexes for Areas index**



Source: Author’s calculations from TDS2.

**Figure 12: Kaplan-Meier survival estimates by remoteness**



Source: Author’s calculations from TDS2.

**Table 16: Estimated effects of location/neighbourhood factors on death hazards of children (hazard ratios)**

Variables	Baseline model	Extension 1	Extension 2	Extension 3	Full model
Rural areas	1.16 (1.06)	1.16 (1.04)	1.19 (1.24)	1.19 (1.21)	1.18 (1.14)
Remoteness					
Major cities	Ref	Ref	Ref	Ref	Ref
Inner regions	1.03 (0.30)	1.02 (0.18)	0.96 (0.38)	0.96 (0.35)	0.95 (0.50)
Outer regions	0.88 (0.83)	0.85 (1.08)	0.82 (1.32)	0.82 (1.33)	0.82 (1.33)
Remote areas	1.21 (0.69)	1.12 (0.39)	1.06 (0.20)	1.06 (0.21)	1.07 (0.23)
Very remote areas	1.38 (0.98)	1.03 (0.09)	0.79 (0.65)	0.79 (0.65)	0.82 (0.56)
Remoteness unknown	3.12 (3.82)***	3.06 (2.52)**	3.05 (3.79)***	3.03 (3.79)**	3.05 (3.80)***
SEIFA Disadvantage Index					
Most disadvantaged areas	Ref	Ref	Ref	Ref	Ref
Other areas	0.77 (2.72)***	0.78 (2.52)**	0.80 (2.24)**	0.80 (2.27)**	0.83 (1.87)*
Least disadvantaged areas	0.64 (3.88)***	0.66 (3.63)***	0.69 (3.13)***	0.69 (3.16)***	0.75 (2.48)**
Missing	0.48 (1.88)*	0.45 (1.97)**	0.46 (1.98)**	0.46 (1.21)	0.45 (2.00)**

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.

Absolute values of z-statics in parentheses (standard errors adjusted for clustering on parent ID).

In extension 1, two family background variables (Indigenous status and country of birth) are included.

In extension 2, five-care related variables (number of children cared for before primary child, teenage motherhood, disability, birth parent, relationship instability) are also included.

In extension 3, a dummy variable for boy is also included.

In the full model, three economic variables (having IS before 1987, total IS duration since 1987, and relative family income) are also included.

‘SEIFA Disadvantage Index’=Socio-Economic Indexes for Area Disadvantage Index; ‘IS’=income support.

### Child characteristics

Two variables for primary child characteristics are used in the regressions—sex and birth month. However, birth month is always insignificant in preliminary regressions, so it is excluded in the final model.

Three sets of estimates were used to determine the differences between boys and girls:

1. with the whole sample but including a dummy variable for boys
2. for boys only
3. for girls only.

In the first set of estimates, boys on average have a 41 per cent higher rate of death hazard than girls, and this figure is stable when extra explanatory variables are included.

Table 17 compares the results of the three sets of estimates (from the full models). Overall, the estimated effects of key variables are qualitatively similar for boys and girls, but some differences also exist.

**Table 17: Estimated hazard ratios by sex of children**

Variables	Boys	Girls	Whole sample
Boy			1.41 (4.00)***
Family background			
Indigenous	0.72 (1.29)	1.21 (0.62)	0.89 (0.61)
Country of birth			
Australia	Ref	Ref	Ref
Main English-speaking countries	0.36 (2.04)**	0.35 (1.77)*	0.36 (2.68)***
Other countries	0.76 (1.74)*	0.74 (1.56)	0.75 (2.30)**
Care factors			
Teenage motherhood	2.83 (4.51)***	1.79 (2.06)**	2.33 (4.76)***
No. of children before primary child			
None	Ref	Ref	Ref
1	3.28 (7.47)***	3.01 (6.29)***	3.16 (9.75)***
2	4.74 (8.44)***	2.93 (4.84)***	3.89 (9.65)***
3	4.71 (6.83)***	1.93 (1.91)*	3.42 (6.60)***
4 or more	3.32 (3.57)***	1.39 (0.61)	2.45 (3.18)***
Disability	1.35 (1.32)	0.97 (0.08)	1.20 (0.98)
Birth parent	0.06 (13.75)***	0.05 (12.49)***	0.06 (18.48)***
Relationship instability			
Stable	Ref	Ref	Ref
Unstable	0.82 (1.27)	1.01 (0.08)	0.90 (0.92)
Very unstable	1.06 (0.40)	1.08 (0.38)	1.08 (0.61)
Economic factors			
Having IS before 1987	1.44 (1.50)	0.76 (0.66)	1.16 (0.72)
Total IS duration since 1987			
No records	Ref	Ref	Ref
Less than 1 year	1.90 (3.10)***	1.27 (0.92)	1.62 (2.98)***
1–2 years	1.36 (1.36)	2.41 (3.91)***	1.80 (3.68)***
3–5 years	1.48 (1.75)*	1.24 (0.84)	1.37 (1.85)*
6–8 years	1.73 (2.44)**	1.10 (0.34)	1.44 (2.09)**
9–11 years	2.03 (3.15)***	1.62 (1.78)*	1.85 (3.57)***
12 or more years	1.63 (1.89)*	1.22 (0.65)	1.44 (1.85)*
Family income			
Low	Ref	Ref	Ref
Middle	1.11 (0.65)	0.97 (0.13)	1.05 (0.42)
High	0.99 (0.04)	0.79 (0.83)	0.90 (0.58)
Missing	1.18 (0.74)	1.31 (1.01)	1.24 (1.26)
Remoteness			
Major cities	Ref	Ref	Ref
Inner regions	0.98 (0.14)	0.89 (0.63)	0.95 (0.50)
Outer regions	0.84 (0.89)	0.77 (1.04)	0.82 (0.56)
Remote areas	1.09 (0.22)	1.04 (0.10)	1.07 (0.23)
Very remote areas	1.25 (0.56)	0.33 (1.31)	0.82 (1.33)
Remoteness unknown	2.94 (3.39)***	3.17 (2.11)**	3.05 (3.80)***
SEIFA Disadvantage Index			
Most disadvantaged areas	Ref	Ref	Ref
Other areas	0.84 (1.41)	0.82 (1.26)	0.83 (1.87)*
Least disadvantaged areas	0.67 (2.60)***	0.85 (0.85)	0.75 (2.48)**
Missing	0.42 (1.92)*	0.52 (0.92)	0.45 (2.00)**
Rural areas	1.09 (0.48)	1.34 (1.25)	1.18 (1.14)
No. of observations	61,005	57,937	118,942

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.

Absolute values of z-statistics in parentheses (standard errors adjusted for clustering on parent ID).

'SEIFA Disadvantage Index'=Socio-Economic Indexes for Area Disadvantage Index; 'IS'=income support.

A significantly higher mortality risk was found for both boys and girls whose parents had the following characteristics: being a teenage mother, having already had a child or children, not being the birth parent, having IS records since 1987, and living in areas of socioeconomic disadvantage.

The differences between boys and girls include:

1. Parental country of birth is significant for boys but generally insignificant for girls.
2. Teenage motherhood shows bigger impacts on boys than on girls.
3. For girls, parents with three or more previous children are not significantly different from parents with no previous child; however, for boys the differences are significant.
4. Unlike for boys, the mortality risks for girls are not significantly different between different parental IS durations, except that the category of IS duration between one and two years is associated with significantly (2.41 times) higher hazards of death than the reference group—having no IS records since 1987.

### **Robust tests**

Robust tests were undertaken similar to those shown in the previous section. Some category variables, such as IS duration, family income and SEIFA Disadvantage Index, are replaced with continuous variables and their quadratic forms: the coefficients of other variables change little. Additional tests are undertaken as follows, particularly for duration models.

First, up to this point, the variables in the duration models have been treated as constant. This is not a big issue when the sampling window is relatively short: however, observations in TDS2 spanned more than 15 years (from 1991 or earlier, up to 2005) and some variables such as marital status, number of children and home address are likely to change during that period. One robust test uses the last, instead of the first, records of some time-varying variables, such as remoteness and SEIFA Disadvantage Index. Another, and better, choice is to directly incorporate time-varying variables in the duration model.

Second, apart from information on primary parents, TDS2 contains information about other parents who claimed family payments for the primary children during the sampling period. This information is used in some models for robust tests.

Third, a piecewise constant method is also applied for estimation. The main findings are generally consistent in all these tests.

Overall, the estimation results of duration models generally confirm the findings outlined in the earlier section, which used a logistic model.

## 6 Summary and discussion of findings

This section summarises and discusses key research findings. It is noteworthy that a large majority of the observable findings are statistically significant.

### **1. The rate of premature death of Indigenous children (0.89 per cent) is nearly double that of non-Indigenous children (0.47 per cent).**

This finding further confirms that Indigenous children in Australia suffer higher mortality rates than other children. It is important to examine why this is so.

Previous studies have shown that Indigenous children are more likely to have low birth weight—13 per cent compared with 6 per cent for non-Indigenous children in 2000–02 (Laws & Sullivan 2005); be less physically active and have poorer nutrition—leading to obesity and diabetes; live in overcrowded housing; and have unsafe drinking water and inadequate waste disposal (AIHW 2006). Most Indigenous people live in remote and very remote areas, where the incidence of smoking and drinking alcohol in hazardous quantities is much more common than in other areas in Australia (AIHW 2005). These factors lead to significantly higher health risks for Indigenous children, and at least partly explain their higher mortality rates.

An interesting discovery arising from this research is that after considering other factors, the difference in mortality risk between Indigenous and non-Indigenous children becomes insignificant. This result suggests that the higher mortality rates of Indigenous children may principally be explained by other family disadvantages, such as low socioeconomic status, rather than by their Indigenous status only.

### **2. Children of immigrants generally have a lower mortality rate (0.39 per cent) than other children (0.51 per cent).**

Even after controlling for other factors, this conclusion still holds, and is consistent with findings in other studies (such as AIHW 2006).

A 2006 AIHW study principally attributes this finding to two selection effects: self-selection (usually migrants are both physically and economically able to immigrate); and government selection (eligibility criteria such as health and education are generally associated with better health of parents and their children). Some research (Fennelly 2005, cited in AIHW 2006) finds that the difference between immigrants and other groups may diminish as immigrants stay longer in Australia.

This paper proposes two suppositions that may explain these results:

- Survival of the fittest—immigrants tend to choose the most favourable place to migrate, and if they find the first place they choose to live unsuitable, they are likely to move elsewhere.
- Lack of social capital on first arrival means immigrants place more value on their family members (especially their children) because they are their most important social network in a new country. Also, the desire to better their children's living conditions can be the main reason for choosing to immigrate.

### **3 Low income and long IS duration are associated with a significantly higher mortality risk for children.**

The mortality rate of children from low-income families—whose income is 50 per cent of the sample mean or less—is 0.64 per cent, which is twice as high as that of children from high-income families—whose income is more than 150 per cent of the sample mean at 0.32 per cent. The mortality of children whose parents have received IS for nine years or more since 1987 is 0.75 per cent, compared with 0.31 per cent for children whose parents did not receive IS during the same period. Since low family income is a key eligibility criterion for receiving IS, it is not surprising that after controlling for IS duration the income variable becomes insignificant.

Low family income inevitably constrains household budgets. It has the potential to reduce spending on nutritious food, medical care and housing; increases financial stress; and affects the quality and stability of child care. This has negative impacts on children's health.

However, receiving IS has two opposite effects on mortality risks for children. First, the increase in family income enables parents to stay at home with their children, and this tends to reduce the mortality rate. Second, IS also indicates unemployment or underemployment, low income and probably poor health, which are all likely to be associated with a higher child mortality.

The estimation results generally show a positive correlation between long-term economic disadvantage and child mortality; however, the non-linearity and complexity of the correlation are also evident. One point to note is that parental IS incidence is more likely to be a consequence of the death of a child, rather than a cause, because estimation results show that dummy variables for present and past IS receipt are both associated with lower death hazards for a child. This issue deserves further exploration.

### **4 Birth parents' children have a significantly lower mortality rate than others (0.33 per cent versus 0.97 per cent).**

This paper defines a birth parent as a person who started caring for a primary child from the child's time of birth. As discussed earlier, this definition may put some actual birth parents into the category of non-birth parents. Using a slightly different definition of birth parent, such as 'people who started taking care of a primary child within three or five months after a child's birth', does not qualitatively change the result. The result is not sensitive to controlling for other variables in the model.

Since child mortality is significantly higher at a younger age, especially within the first month, the children of birth parents should be subject to higher mortality risks. However, this research shows an opposite result and this suggests that more important counter-factors, such as the higher quality of child care delivered by birth parents, tend to reduce the risk of child mortality. There is evidence in the literature that children living with stepmothers are less likely to pay routine visits to a doctor or have access to regular medical care (Case & Paxson 2001).

**5 Teenage mothers' children are significantly more likely to have a higher mortality rate than others (0.74 per cent versus 0.48 per cent).**

Estimation results from both logistic and duration models show that teenage motherhood is associated with 2.3 to 3.3 times higher mortality risks for their primary children. Including extra variables in the model does not significantly change these results. The reasons are complex and include biological and socioeconomic influences. Some overseas studies show that children of teenage mothers are more likely to have low birth weights and other health problems, and are thus subject to higher mortality risks (Hofferth 1987 and references therein). Teenage mothers also tend to be less educated and have lower incomes, which inversely relate to child mortality (Hofferth 1987). Teenage mothers have relatively poor knowledge, skill and experience of child care. An association between young mothers and high injury risks for children has been found in Australia (Blakemore 2007).

**6 Parents who have cared for previous children are associated with significantly higher mortality risks for a primary child.**

In the research sample, the mortality of children whose parents had never before cared for other children is 0.36 per cent, compared with 0.59 per cent for children of parents who had previously cared for a child and 0.68 per cent for children of parents who had previously cared for two or more children.

The number of children a parent cared for before a primary child has two opposite effects on mortality risks for the primary child. First, having cared for other children before increases parental knowledge, skill and experience, and thus tends to reduce the mortality risk for the primary child. Second, having more siblings means more competition for family resources, including income and parental time; and a smaller share of care resources implies a higher mortality risk.

The estimation results show that the second effect—competition for care resources—may dominate. Boys are more likely to be affected by the number of other siblings than girls, probably because boys need more attentive care.

**7 Parental disability and relationship instability are associated with higher child mortality risks.**

This paper defines disability as a medical condition that renders a parent eligible for the DSP. People with a disability may have more time to care for their children, but their disability may also limit their ability to do so. It may also be associated with poorer health of their children if a disability is genetic. On balance, disability has a negative effect on children's health. The mortality rate of children whose parents have a disability (0.90 per cent) is nearly double the rate of other children in the sample (0.47 per cent).

The stability of parental relationships also affects the quality and stability of their child care. Patton et al. (2005) show that rates of diagnosable mental or behavioural disorders in the children of lone parent and blended families (that is, families formed by second marriages) were twice as high as for other families.

In the sample of TDS2, people whose relationship was unstable (having five or more marital events recorded in TDS2) have a child mortality rate of 0.72 per cent, compared with 0.42 per cent for those whose relationship was stable (having one or two marital events recorded in TDS2). However, the overall effects of parental disability and relationship instability are not significant after controlling for other factors.

### **8 Child mortality rates differ significantly between the most and least socioeconomically disadvantaged neighbourhoods.**

The neighbourhood environment may have some influence on the health and mortality of children in its own right and, if other factors remain the same, children living in a poor neighbourhood may be subject to higher health risks and have less access to quality health services. This research finds some evidence to substantiate this notion.

This paper uses the SEIFA Disadvantage Index, remoteness and rural/urban area to capture several neighbourhood characteristics. The SEIFA Disadvantage Index is a comprehensive measure of the relative socioeconomic disadvantage of neighbourhoods, which focuses on low-income earners, relatively lower educational attainment, and high unemployment.

In the TDS2 sample, the mortality of children in the most disadvantaged areas (up to the 30<sup>th</sup> percentile of the SEIFA Disadvantage Index) is 0.61 per cent, compared with 0.38 per cent in the least disadvantaged areas (the top 30 percentiles of the SEIFA Disadvantage Index). The estimation results of both logistic and duration models confirm this pattern.

This finding is consistent with other Australian studies, such as AIHW (2006), which report that infant death rates and childhood death rates in the most disadvantaged areas are significantly higher than in the least disadvantaged areas. Injury is a leading cause of child mortality (AIHW 2006), and higher injury risks are found for children living in neighbourhoods with heavy traffic, and in those reported by parents as being less liveable and less desirable (Blakemore 2007). A study by Patton et al. (2005) also shows that poorer families are more likely to report that their neighbourhoods feel unsafe at least some of the time.

As commonly observed in the literature (AIHW 2005; Garnaut et al. 2001, cited in AIHW 2006), remote, very remote and rural areas are associated with higher child mortality. In the sample of TDS2, the mortality of children in remote or very remote areas is 0.91 per cent, nearly twice as high as that of children in major cities (0.46 per cent). Rural areas also have a higher child mortality rate (0.58 per cent) than urban areas (0.47 per cent). However, this research finds that after controlling for the SEIFA Disadvantage Index and other factors, the difference in child mortality between remoteness categories and between rural and urban areas becomes insignificant. This indicates that higher child mortality in rural and remote areas may be largely explained by the socioeconomic disadvantage of people living in these areas.

## 7 Conclusion

In summary, this paper's results generally suggest that the risk of premature death (before the age of 18 years) is significantly higher for children from disadvantaged families, as indicated by several characteristics of the primary carer. These include: low income (especially persistently low income), Indigenous status, teenage motherhood, living in areas of socioeconomic disadvantage, and having three or more children in the family. The influencing factors are interrelated, and economic and care-related factors are particularly important.

While death is the worst health outcome for children; there are some other less severe health outcomes such as chronic illness, which this study did not observe. These less severe health outcomes also lower children's quality of life and affect their productivity and resilience when they grow up. The significant correlation between higher death rates and parental disadvantage implies potential correlations between poorer child health conditions and parental disadvantage. In combination, this indicates that the intergenerational transmission of disadvantage exists in Australia. To break this cycle of disadvantage, high priority must be given to reducing the mortality rates of children from disadvantaged families, and improving their overall health.

Due to the limitations of the data, and the complex interrelationships between child mortality and its underlying influencing factors, the correlations in this paper can not be interpreted as causal relationships. However, this should not hinder the application of these findings to future policy making, as both family socioeconomic disadvantage and child mortality are important public policy issues.

Finding an effective response to these complex issues is not simple or straightforward. Multiple, well-targeted policies are needed to simultaneously tackle the dual problems of child health and mortality, and socioeconomic disadvantage.

## Endnotes

- 1 This paper uses data constructed for an Australian Research Council (ARC) Linkage project, Intergenerational Transmission of Dependence on Income Support: Patterns, Causation and Implications for Australian Social Policy, which is jointly funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA). The opinions, findings, comments, analysis and views expressed in this paper are exclusively those of the author and should not be attributed to the ARC. They do not necessarily represent the views of the Minister for FaHCSIA or the department, nor should they be taken in any way as expressions of Australian Government policy.
- 2 The second Transgenerational Data Set is a unique administrative dataset managed by FaHCSIA.
- 3 See Cobb-Clark and Gorgens (2004) and Penman (2007) for a review of literature on intergenerational transmission of disadvantage.
- 4 For detailed background information on the data, refer to Breunig et al. (2007).

- 5 Income data is only available between 1991 and 2005, while most other variables can be dated to before 1991. For instance, in TDS2 records there are at least 5,000 parents whose first IS spells started and ended before 1990.
- 6 In 2002, 8.1 per cent of resident children aged 0 to 14 years and 9.6 per cent of resident young people aged 0 to 19 years were born overseas (ABS 2004a).
- 7 For example, births to parents currently on benefits are likely to be reported to Centrelink sooner than births to parents not on benefits.
- 8 In TDS2, parents refer to people who claimed a family payment for the primary children. These people are not necessarily the children's birth parents; they can be grandparents, older siblings or other guardians.
- 9 There are 61 parents with sex missing. Among them, 21 have individual IS records, and 18 have family IS records.
- 10 For details regarding the SEIFA Disadvantage Index and Australian Standard Geographical Classification (ASGC) remoteness classification, refer to the Australian Bureau of Statistics at <[www.abs.gov.au](http://www.abs.gov.au)>.
- 11 One exception is that limited information on dependants, such as date of birth, date of death and sex, is provided by their guardians and is also recorded in the dataset.
- 12 In TDS2, some parents of primary children identified as Indigenous are not themselves Indigenous; there are also some children of Indigenous people who are not themselves identified as Indigenous. In this paper, the term 'Indigenous children' refers to the children of Indigenous people.
- 13 It should be noted that not all children born overseas were excluded, because the country of birth was unknown for at least half the primary children (non-customers). In general, the children of immigrants are more likely to be born overseas than other children; this may also help to explain the lower mortality of children for immigrants in the sample.
- 14 Among all primary parents in the clean sample, approximately 3 per cent primary parents were born in six main English-speaking countries—Canada, Ireland, New Zealand, South Africa, the United States and the United Kingdom—and 17 per cent were born in other countries. The mortality rate for children of parents born in the six main English-speaking countries above is 0.2 per cent, compared with 0.43 per cent for the children of parents born in other countries.
- 15 According to the Australian Bureau of Statistics (1994), in 1988, 5.6 per cent of babies were born to teenage mothers.
- 16 For instance, Case and Paxon (2001) argue that stepmothers are not good substitutes for birth mothers.
- 17 Redefining a birth parent as a primary carer who started to care for a primary child within six months of the child's birth makes little difference to the main findings.
- 18 Families with high child mortality tend to have more children than their ideal number in order to reach the desired number of surviving children.

- 19 The current version of TDS2 was extracted on 8 April 2005. Within this paper, both ‘time since 1987’ and ‘time between 1987 and 2005’ refer to the same period of time—1 October 1987 to 8 April 2005.
- 20 Continuous variables of family income and its quadratic form are also used in some preliminary analyses, and the coefficients of other variables are hardly affected.
- 21 In the following cases, the SEIFA Disadvantage Index and remoteness are likely to be missing: (1) an overseas address is recorded (an individual is temporarily living overseas); (2) a post office box rather than home address is recorded; (3) the postcode recorded is not listed in the ABS postcode concordances for the SEIFA Disadvantage Index and remoteness classification; (4) the postcode is not recorded. The first three cases account for the vast majority of the missing values. Those postcodes that can be linked with a physical location are mostly located in remote or very remote areas.
- 22 For details of income and asset tests, refer to Centrelink web site at <www.centrelink.gov.au>.
- 23 Excluding people living in remote or very remote areas, and those with remoteness missing from the sample, does not affect the main findings.

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## Appendix

**Table A1 Mortality rates by different measures of income support history**

	No. of deaths	Mortality (%)	Excess deaths	No. of obs.
Total	581	0.49		119,013
Total IS duration since 1 October 1987			214 (36.8) <sup>(a)</sup>	
Having no IS records	159	0.31 <sup>(b)</sup>		51,056
Having IS records	425	0.62		68,226
2 years or less on IS	126	0.57	58 (46.0)	21,950
3–8 years on IS	124	0.54	52 (41.9)	23,080
9 or more years on IS	175	0.75	101 (58.7)	23,196
Total IS duration in TDS2			214 (36.8) <sup>(a)</sup>	
Having no IS records	159	0.31 <sup>(b)</sup>		51,031
Having IS records	419	0.62		67,713
2 years or less on IS	126	0.57	58 (46.0)	21,940
3–8 years on IS	121	0.53	50 (41.3)	22,846
9 or more years on IS	172	0.75	101 (58.7)	22,927
Proportion of time on IS while caring for a primary child				
Having no IS records	417	0.80		52,065
Having IS records	164	0.24		66,948
19% or less	50	0.23		22,062
19%–54%	50	0.23		22,221
54% or more	64	0.28		22,665
Proportion of time on IS between 1 October 1987 and last date of care				
Having no IS records	410	0.79		51,639
Having IS records	171	0.25		67,374
18% or less	60	0.26		23,220
18%–52%	62	0.26		23,567
52% or more	49	0.24		20,587

- (a) Estimated excess deaths for the whole sample and percentages of deaths, which could be reduced if mortality rates of the reference groups were applied.
- (b) Reference group mortality rates used for calculating excess deaths. The differences between the estimated excess deaths for the whole sample and the sum of estimated excess deaths of sub-groups are due to rounding of figures in calculation.

Note: 'Obs.'=observations; 'IS'=income support; 'TDS2'=second Transgenerational Data Set.

**Table A2: Estimated mortality risks by different measures of income support history (logistic model, odds ratios)**

	(1)	(2)	(3)	(4)
Having IS before 1987	1.15 (0.65)			
Total IS duration since 1 October 1987				
Having no IS records	Ref			
Having IS records				
Less than 1 year on IS	1.69 (3.28)***			
1–2 years or less on IS	1.83 (3.78)***			
3–8 years on IS	1.47 (2.29)**			
9–11 years on IS	1.64 (2.85)***			
12 years or longer on IS	1.78 (3.01)***			
Total IS duration in TDS2				
Having no IS records		Ref		
Having IS records				
Less than 1 year on IS		1.69 (3.28)***		
1–2 years or less on IS		1.84 (3.80)***		
3–8 years on IS		1.46 (2.21)**		
9–11 years on IS		1.65 (2.90)***		
12 years or longer on IS		2.28 (4.88)***		
IS incidence while caring for a primary child				
Having IS records			0.14 (10.93)***	
Proportion of time on IS (%)			0.98 (4.28)***	
IS incidence between 1 October 1987 and last date of care				
Having IS records				0.22 (9.25)***
Proportion of time on IS (%)				0.97 (6.83)***

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level. Absolute values of z-statics in parentheses (standard errors adjusted for clustering on parent ID). Other variables controlled for include: Indigenous status, country of birth, relative family income, number of children cared for before primary child, teenage motherhood, disability, birth parent, relationship instability, a dummy variable of boy, SEIFA Disadvantage Index, and remoteness. 'IS'=income support; 'TDS2'=second Transgenerational Data Set; 'SEIFA Disadvantage Index'=Socio-Economic Indexes for Area Disadvantage Index.

**Table A3: Estimated death hazards by different measures of income support history (Cox PH model, hazard ratios)**

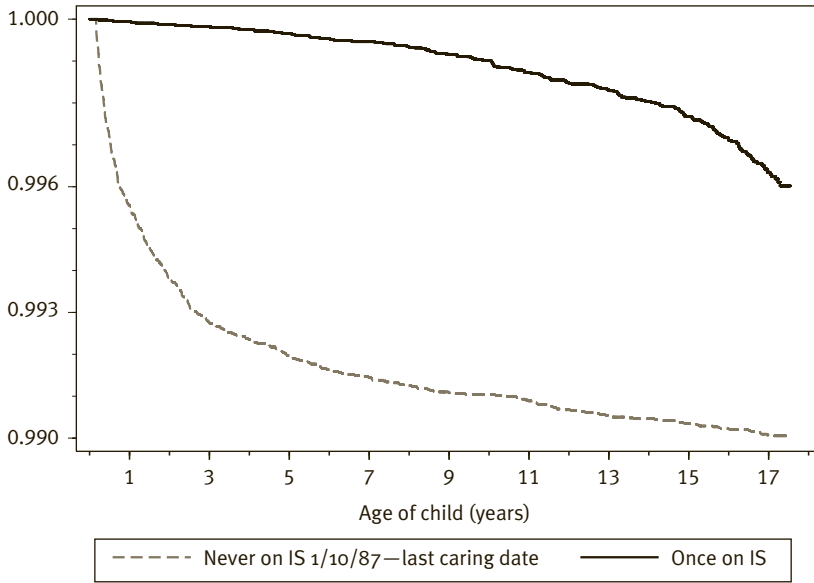
	(1)	(2)	(3)	(4)
Having IS before 1987	1.20 (0.88)			
Total IS duration since 1 October 1987				
Having no IS records	Ref			
Having IS records				
Less than 1 year on IS	2.03 (4.30)***			
1–2 years or less on IS	2.19 (4.77)***			
3–8 years on IS	1.59 (2.68)***			
9–11 years on IS	1.59 (2.63)***			
12 years or longer on IS	1.97 (3.91)***			
Total IS duration in TDS2				
Having no IS records		Ref		
Having IS records				
Less than 1 year on IS		2.03 (4.32)***		
1–2 years or less on IS		2.20 (4.81)***		
3–8 years on IS		1.58 (2.65)***		
9–11 years on IS		1.61 (2.71)***		
12 years or longer on IS		2.04 (4.10)***		
IS incidence while caring for a primary child				
Having IS records			0.13 (10.35)***	
Proportion of time on IS (%)			0.98 (5.01)***	
IS incidence before last date of care				
Having IS records				0.24 (8.14)***
Proportion of time on IS (%)				0.97 (8.36)***

Note: \*significant at 10% level; \*\*significant at 5% level; \*\*\*significant at 1% level.

Absolute values of z-statics in parentheses (standard errors adjusted for clustering on parent ID). Other variables controlled for include: Indigenous status, country of birth, relative family income, number of children cared before primary child, teenage motherhood, disability, birth parent, relationship instability, a dummy variable of boy, SEIFA Disadvantage Index, and remoteness.

'SEIFA Disadvantage Index'=Socio-Economic Indexes for Area Disadvantage Index; 'IS'=income support; 'TDS2'=second Transgenerational Data Set.

**Figure A1** Kaplan-Meier survival estimates by parental income support receipt between 1 October 1987 and the last dates of care



Source: Author's calculations from TDS2.

# Benchmarking the Indigenous sub-sample of the Longitudinal Study of Australian Children

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## 1 Introduction

The Longitudinal Study of Australian Children (LSAC) attempts to provide comprehensive, national longitudinal data that inform government policy about child care, early childhood education and schooling, parenting and family relationships, and health; and identify opportunities for early intervention and prevention strategies. The underlying conceptual framework used for designing LSAC was based upon a model of ecological contexts that shape a child's pathways (Bronfenbrenner 1979). That is, the implicit model underlying the survey depicts how the family, school and neighbourhood impact upon a child's early years, and this is situated within a wider social, economic, political and cultural setting.

LSAC focuses on collecting data over time for two cohorts: approximately 5,000 infants born between March 2003 and February 2004 and a similar number of children born between March 1999 and February 2000. LSAC Wave 1 collected data on 412 Indigenous children. As the sample was not stratified by Indigenous and non-Indigenous children, it may not be representative of Australian Indigenous children. While LSAC was not explicitly designed to provide reliable information on Indigenous children, the paucity of credible data meant that it was important to consider the extent to which its Indigenous sub-sample could validly be used by policy makers. This paper benchmarks the LSAC data against other Indigenous datasets to examine whether LSAC is representative of Australian Indigenous children.<sup>1</sup>

Obviously LSAC data provide some information about Indigenous children, but there were several reasons for expecting that this information would provide an inadequate basis for an informed policy to address disadvantage experienced by Indigenous children. First, and most importantly, relevant questions may have been omitted from the LSAC questionnaires that were critical to understanding the unique situation and development of Indigenous children. Second, the LSAC survey instruments may not have been entirely appropriate and hence may not maximise the information content about Indigenous children. This issue was important because the cultural sensitivity of the questionnaires and methodology should be valued in its own right. However, policy makers should also value having an appropriate survey instrument because it would

maximise response rates and minimise non-sampling error—an unavoidable part of all data collections (Biddle & Hunter 2006). Non-sampling error includes problems in coverage, response, non-response, data processing, estimation and analysis. This paper has a considerable focus on non-sampling issues arising from coverage, response and non-response to the LSAC questionnaire.

While such issues may seem rather abstract, there are several practical reasons to be particularly concerned about the Indigenous sub-sample of LSAC. It is possible that the sampling frame of LSAC contained systematic biases in the way it sampled Indigenous families. If this is the case, then analysts would need to exercise caution in drawing inferences about the representativeness of the sample. The source of any such bias might arise from the way in which the sample was drawn or the geographic unit used for stratification of the sample.

Another important practical issue that needs to be considered is that the small number of Indigenous respondents in LSAC could lead to an unacceptably high sampling error, and hence the resulting estimates might be unreliable.

This paper does not necessarily represent a criticism of the LSAC study for its intended purpose. Rather, the argument critically examines whether LSAC data can be extended beyond the original intentions of the designers of the survey to provide some insights for an underresearched and important segment of the Australian population—Indigenous children.

In order to gain some insight into the processes driving the representativeness of the Indigenous sub-sample in relation to the underlying population, census data is used to examine the geographic composition areas involved in each stage of the design of LSAC—for example, by comparing outcomes for mothers and fathers of similar-aged children. The reliability of the Indigenous estimates derived from the LSAC are then benchmarked against the 2002 National Aboriginal and Torres Strait Islander Social Survey (NATSISS) data before the concluding section recapitulates the main findings and implications of this paper.

## 2 Sample design of LSAC

LSAC was designed using geographic information provided by the Health Insurance Commission (HIC). This reflected the practical necessity of finding a reasonably accurate source of information on infants and 4 year olds that had more or less comprehensive coverage. The disadvantage of this design was that it committed LSAC to the use of postcodes as the geographic basis of the survey. While most postcodes have a reasonably homogenous resident population, and hence could be argued to be a geographic measure with some merit, it is a tricky spatial measure to work with because it is difficult to ensure clarity and continuity of boundaries through time. Postcodes are an administrative unit with boundaries that arguably exist most cogently in the minds of Australia Post staff. The Australian Bureau of Statistics (ABS) have made a concerted effort to regularise the boundaries of residential postcodes by designing postal areas that are built up from one of the smallest well-defined geographic unit for data, the Census Collection District. Also, the existence of ‘administrative’ postcodes (for example, those that consist entirely of post office boxes) tends to complicate matters because the spatial dimensions of such postcodes are not always clear. There

were 2,435 postal areas at the time of the 2001 Census—this was substantially fewer than the number nominated in the HIC dataset. Most of the difference was driven by postcodes that were ‘administrative’ postcodes.

The sample design was developed in collaboration with the LSAC Consortium’s Sampling Design Team, which comprised members with statistical and practical sample design experience in the social sciences (Soloff, Lawrence & Johnstone 2005). A clustered design, based on postcodes, was chosen as it facilitated reasonably cost-effective face-to-face interviewing and allowed community-level effects to be measured and analysed. There was also extensive discussion with stakeholders about the optimal composition of the sample.

The Design Team considered whether children with particular characteristics should be oversampled (for example, children from Indigenous or culturally diverse families or children with disabilities). However, a major strength of a study like LSAC is the large and nationally representative nature of its sample. Also, it was argued that oversampling small subgroups of the population tends to give only limited improvement in the statistical precision of the aggregated estimates (Soloff, Lawrence & Johnstone 2005).

While a significant increase in the numbers sampled in such subgroups could have increased the statistical precision of the low prevalence estimates, it may not have been an efficient use of the sample. It was therefore concluded that more intensive studies of subgroups would be better conducted as separate studies, perhaps nested within or linked to LSAC (Nicholson, Sanson & the LSAC Research Consortium 2003).

With facilitation by the Australian Government Department of Family and Community Services (FACS, an antecedent of the Department of Families, Housing, Community Services and Indigenous Affairs, FaHCSIA), the HIC agreed that the LSAC sample could be selected from the Medicare database. The major advantage of the Medicare enrolment database over any other available sampling frame was that both cohorts of children could be directly identified from this source, through use of the date of birth field on the database. This was a cost-efficient search method for finding the target population as it meant that selected families could be contacted using a personal pre-approach letter, rather than cold-calling.

Soloff, Lawrence and Johnstone (2005) outlined the full details of the LSAC sample design. The essential focus of the survey design was on the early years of children’s lives, and therefore defined ‘the child’ as the sampling unit of interest. The sample was intended to be representative of all Australian children (citizens, permanent residents and applicants for permanent residency) in each of the two selected age cohorts, thus allowing the assessment of developmental outcomes from infancy until middle childhood.

The primary sample units were postcodes, or groups of postcodes. A two-stage clustered design was employed—first selecting postcodes and then selecting children—thus allowing the analysis of children within communities. The designers of LSAC considered it important to find an appropriate balance between the number of postcodes included in the study, and the number of children selected within a postcode (that is, the cluster size). Sufficient postcodes needed to be chosen across Australia to help ensure the representativeness of the sample and to help minimise

sampling error, but there also needed to be sufficient children selected within each postcode for operational efficiency and to allow for analysis of community-level effects. Having considered the approach taken in other studies, and weighing up the statistical, analytical and operational implications of different cluster sizes, it was decided that, in general, a (final) cluster size of around 20 children per cohort per postcode was desirable (Soloff, Lawrence & Johnstone 2005).

Stratification was used for the purposes of producing population estimates and to ensure proportional geographic representation for states/territories and capital city statistical division/rest of state areas. Postcodes were selected by the Australian Institute of Family Studies (AIFS) and further stratified into two groups by size—postcodes that had at least the minimum number of children that needed to be selected (about 75 per cent of postcodes), and postcodes that had less than that amount.<sup>2</sup> This stratification left substantial scope for unmeasured regional characteristics to affect behavioural estimates based on LSAC. Population estimates might have been broadly consistent, but detailed disaggregation of such estimates might have been misleading. Children in both cohorts were selected from the same 311 postcodes.

The selection process started with a random selection of a number of postcodes, then a random selection of a number of in-scope children within each selected postcode was made using HIC data.<sup>3</sup> Children were selected with approximately equal chance of selection for each child (about one in 25). In an attempt to avoid excessive data collection costs, some remote and other postcodes were excluded from the design, and the population estimates needed to be adjusted accordingly.<sup>4</sup>

The LSAC sample was broadly representative of all Australian children, with the notable exception of children living in remote areas. About 40 per cent of children in remote areas were not given a chance of selection, and these children were not used in the population estimates produced from LSAC data. Indigenous children were disproportionately affected by these exclusions, especially in the Northern Territory, and Indigenous communities in remote areas were explicitly excluded. Hence extreme caution should be exercised when analysing the remote Indigenous sub-sample of LSAC.

Several other groups of children were not given a chance of selection, or were excluded after selection:

- ▶ children living in postcodes with fewer than six of the target population, where the postcode was not amalgamated with an adjacent postcode (about 1–2 per cent of children in each cohort)
- ▶ children in families where another child in the family was selected for the main sample (less than 1 per cent)
- ▶ children with the same (or similar) name to a child (born after 1 March 1999) listed on the National Death Index (approximately 3 per cent in each cohort).

In contrast to the remote area exclusions, these three exclusions were not considered to impact on the representativeness of the sample and hence were included in the population estimates (Soloff, Lawrence & Johnstone 2005).

The selection of children and corresponding fieldwork occurred in four phases. This was done to enable sample selection of children born across all months of the calendar year, to attempt to reduce the age range of children at interview, and also because some of the target population had not been born at the time of the first phase selection.

Soloff, Lawrence and Johnstone (2005) also document that about 7 per cent of LSAC's target cohorts had a post office box as the contact address. The proportion of families who used post office box numbers was particularly high in the Northern Territory (about 30 per cent). For these families to be interviewed, a residential address needed to be obtained.

### 3 The analysis of weighting and non-response of LSAC data: the role of Indigenous status

Having collected the data it was then necessary to process it. Soloff et al. (2006) outlined this process and provided details of how the weights were constructed to allow population estimates to be made. Their paper also provided a validation of the weighting procedure and a detailed analysis of non-response to LSAC. This section summarises the main results from Soloff et al. (2006) with a particular emphasis on the specific issues relevant for the Indigenous population.

In general, the weighting procedure improved the estimation of population proportions, bringing the LSAC and census estimates closer together in some cases. However, the target cohorts' Indigenous status produced estimates that were less accurate when weighted (that is, the weighted estimates were further away from the population estimates in the census than were the unweighted estimates). This observation was also true for mother's country of birth for the infant cohort and for mother's country of birth and the number of people in the home for the 4 year-old cohort.

**Table 1: Final Wave 1 response**

	Infant		Child	
	n	%	n	%
Mail-out sample	8,921	100.0	9,893	100.0
<b>Recruited sample</b>	<b>5,107</b>	<b>57.2</b>	<b>4,983</b>	<b>50.4</b>
Sample loss:				
Refusals:				
<i>HIC opt-out</i>	2,909	32.6	3710	37.5
<i>I-view 1800 line</i>	1,398	15.7	1587	16.0
<i>Interviewer</i>	335	3.8	398	4.0
<i>Interviewer</i>	1,111	12.5	1423	14.4
Non-contacts	970	10.9	1502	15.2

Note: The subcategories of refusals do not add up to the total number of refusals because only the main categories are listed in this table.

Source: Soloff, Lawrence & Johnstone 2005, Table 14.

Table 1 reports the total response rate for LSAC, which was calculated as the proportion of families who were recruited to the study out of those who were sent a letter by HIC. Note that selectivity in the non-response to LSAC arose from either refusals or non-contacts. In view of the high rates of Indigenous mobility identified in Taylor (1997), non-contacts may be particularly important. For example, people who move frequently are more likely to be ‘non-contacts’ as HIC databases may not have up-to-date address details.

In order to identify which demographic variables were important in determining non-response, Soloff et al. (2006) used a number of variables for comparison of LSAC estimates with census data. The population estimates of these variables for infants and 4 year-old children were obtained from the 2001 Census and these were compared to the responses from the LSAC Parent 1 interview. Characteristics that were compared were:

- ▶ lone versus couple family – family type
- ▶ birthplace of parents
- ▶ language spoken at home
- ▶ level of school completion of parents
- ▶ family size
- ▶ gender of reference child
- ▶ Indigenous status
- ▶ nature of occupancy.

Soloff et al. (2006) used a multivariate analysis to quantify the factors associated with non-response to LSAC. The Poisson regression technique modelled the LSAC response rate measured at the postcode level against attributes of a postcode, based on 2001 Census data.

‘Mother speaking a language other than English in the home’ and ‘mother having completed Year 12’ emerged as the major influences on response rate for both cohorts. For this reason it was decided to use these variables to weight the sample. Indigenous status was not significantly associated with overall response rates. At face value, this finding may give some analysts confidence to use the Indigenous sub-sample of LSAC. However, the complexity of the LSAC sample design, combined with the fact that Indigenous status was highly correlated with educational attainment of the mother, meant that this conclusion should be treated with caution.

Soloff et al. (2006) also modelled three different types of non-response identified in Table 1 by postcode (again using a multivariate Poisson framework). There was little evidence of a systematic association of the various types of non-response with Indigenous status. It is argued that whatever association there may have been between non-response and the proportion of Indigenous people in an area could have been due to unmeasured regional characteristics (that is, amenity or general socioeconomic status of an area that was not captured by other variables).

As the size of the non-response biases identified was relatively small (considering the overall level of non-response), Soloff et al. (2006) argued that the use of a weighting strategy to adjust for potential non-response bias was likely to address any biases in the sample—that is, the weighted LSAC estimates were likely to be representative of the overall population. However, this conclusion may need to be qualified, especially for the Indigenous sub-sample. The rest of this paper explores some potential qualifications.

## 4 Unpacking the implications of the sample design for Indigenous sub-sample of LSAC

The approach adopted in this section is to examine whether there were any significant systematic statistical differences between areas selected and utilised at various stages of the survey design and data collection processes. This section identifies issues that people analysing LSAC's Indigenous data need to be aware of, and specifies at what stage (if any) these issues might arise.

The sample design of LSAC was complex by necessity. One way to unpack the implications of the sample design for the Indigenous sub-sample of LSAC is to examine the census characteristics of areas focused on at various stages of the process. The first stage of the sample design excluded particular postcodes where the cost of data collection was deemed to be too high. The second stage involved selecting particular postcodes that fell within the sampling frame. The third and final stage of the process that was considered was the census characteristics of the postcodes in which respondents to Wave 1 of LSAC resided (compared to the census characteristics of postcodes of the other people who were selected in the second stage of the survey design). Note that while the geographic boundaries for ABS postal areas were used in the following analysis, the LSAC convention of referring to such areas as postcodes has been adopted for the sake of simplicity.

Cross-tabulations from the 2001 Census for the groups of postcodes at each stage of the survey design process were purchased from the ABS. Given that the focus of LSAC was on infants and 4 year olds, it was intended to use this data to describe the distribution of such children in Indigenous and non-Indigenous households. The other variables examined include: the education of the mother, family composition where children from the cohorts examined were present, the incidence of large households, and renting of dwellings. Parental education is recognised as a protective factor in child development. Lone parent families are considered to be likely to have less interaction between parent and child, while large households are likely to have complex developmental environments that are more dynamic and less stable than those in smaller families. Similarly, living in rental property may indicate that there is less control over residential conditions for child development.

In Soloff et al. (2006), the education of the parent was proxied by whether an adult had completed Year 12. However, this paper focuses on the parent's completion of Year 10, as Year 12 completion is relatively uncommon among the Indigenous population (Biddle, Hunter & Schwab 2004). The ABS provided data for the number of adult females and males living in families with infants and 4 year olds, but only the results for adult females were considered—not only did they produce

similar results to those for adult males, there was good reason to expect that mother's education was likely to be extremely important for child development (Caldwell 1994). Large households were proxied by whether there were more than five people living in a dwelling.

## **Were excluded postcodes different from postcodes included in the sampling frame?**

The LSAC sample deliberately excluded certain areas from being surveyed. Consequently, it would be useful to know whether the groups of people who were excluded from participating in the survey were systematically different from the people who had a chance of participating.

The list of postcodes provided by AIFS identified 1,841 postcodes that potentially could be included in the LSAC sample and 871 postcodes that were excluded from the sampling frame.<sup>5</sup> The areas that fell outside the sample frame would be those that had no children in the target population when the sample was initially being designed. Given that the 2001 Census was collected about two years before the LSAC data, the existence of some children in the census data probably reflected geographic mobility of families. However, it may have also reflected the different coverage of census and HIC data—individuals are legally obligated to participate in the census whereas HIC data is an administrative data set where it is more difficult to ensure that coverage is complete and up-to-date, especially for the Indigenous population. Keys Young (1997) estimated that a significant number of Indigenous Australians did not effectively have a current Medicare card (for example, had never been enrolled or whose enrolment had expired due to the failure to provide adequate identification). Systematic regional variations in the quality of HIC data may be an important factor in explaining the adequacy of the Indigenous sub-sample of LSAC.<sup>6</sup>

**Table 2: The process of excluding postcodes in the LSAC sample design, 2001**

	Broad remoteness classification		
	Major cities of Australia	Regional (inner or outer)	Remote or very remote
<b>Postcodes identified as in sampling frame</b>			
Number of infants (aged 0) in Indigenous households	4,904	4,775	554
All infants (aged 0) in Indigenous households (%)	3.3	7.5	22.3
Number of children (aged 4) in Indigenous households	3,336	4,531	558
All children (aged 4) in Indigenous households (%)	2.1	6.1	20.4
Adult females who had completed at least Year 10, Indigenous households (%)	68.4	73.2	68.0
Adult females who had completed at least Year 10, non-Indigenous households (%)	91.2	91.0	94.0
Adult females in couple (vs lone parent) families, Indigenous households (%)	63.2	63.9	67.0
Adult females in couple (vs lone parent) families, non-Indigenous households (%)	87.1	84.8	91.5
Indigenous households with 5 or more residents (%)	20.2	24.4	30.8
Non-Indigenous households with 5 or more residents (%)	10.4	10.0	9.9
Indigenous households in a rental occupancy (%)	59.5	60.4	68.3
Non-Indigenous households in a rental occupancy (%)	27.5	25.4	35.0
<b>Postcodes explicitly excluded from sampling frame</b>			
Number of infants (aged 0) in Indigenous households	0	172	1,969
All infants (aged 0) in Indigenous households (%)	0.0	6.8	70.9
Number of children (aged 4) in Indigenous households	3	198	2,161
All children (aged 4) in Indigenous households (%)	11.1	6.4	69.3
Adult females who had completed at least Year 10, Indigenous households (%)	100.0	79.2	55.0
Adult females who had completed at least Year 10, non-Indigenous households (%)	87.5	91.8	93.7
Adult females in couple (vs lone parent) families, Indigenous households (%)	n.a.	68.2	71.5
Adult females in couple (vs lone parent) families, non-Indigenous households (%)	91.7	90.7	91.8
Indigenous households with 5 or more residents (%)	23.1	31.9	46.4
Non-Indigenous households with 5 or more residents (%)	16.5	10.3	8.6
Indigenous households in a rental occupancy (%)	46.2	55.8	80.0
Non-Indigenous households in a rental occupancy (%)	28.3	20.3	32.9

Note: There were less than 10 of the target population living in postal areas that fell outside the sampling frame in most of the above categories except for non-Indigenous populations living in regional areas. The data for adults only refers to individuals living in families that include either infants (aged 0) or 4 year-old children.  
n.a. not available

Source: Customised cross-tabulations from the 2001 Census, ABS.

Table 2 reports the main census cross-tabulations, which examined the broad differences between the potential sample and excluded postcodes. The first thing to note is that all categories of postcodes within the sampling frame had a greater proportion of infants in Indigenous households than the overall incidence of Indigenous people in the total Australian population (just over 2 per cent). This was easily accounted for by the fact that Indigenous mothers had a substantially higher fertility rate than was evident in the rest of the population (Taylor 1997). Another salient fact about the demography of Indigenous Australians, identified in Taylor (1997), was that the proportion of Indigenous people in an area increased as the region became more remote. Table 2 confirms that this was also the case for the target population of LSAC.

This observation was also borne out in postcodes explicitly excluded from the sampling frame. However, the number of Indigenous children in excluded areas in major cities was negligible. Indeed, the number for both infants and 4 year olds was so small that it was in the range that the ABS confidentialises reported cells (randomly) as being either zero or three. Clearly, the excluded postcodes in major cities were not missing many children from the target cohorts. The numbers in the target cohorts in regional areas were somewhat larger, but the size of the cohorts was insignificant when compared to similar areas that were identified as being within the sampling frame.

However, a substantial number of the target cohorts were missed in remote or very remote areas. Indeed, the target cohorts of Indigenous children in excluded areas was almost four times the size of analogous areas that were identified as being within the sample. This was not unexpected, given that many Indigenous communities in remote areas were specifically excluded in the LSAC sample design. However, the main consequence was that it was difficult to generalise about Indigenous children in remote areas given that the majority of the target cohort had no chance of being sampled.

Notwithstanding such caveats, it was still worth exploring whether there were significant differences in the characteristics of individuals and households in excluded areas compared to areas that fell within the sampling frame.

In regional Australia, Indigenous households in excluded postcodes were sometimes more advantaged than analogous areas within the sampling frame. For example, adult females in excluded postcodes in regional Australia were 6.0 percentage points more likely to have completed Year 10 (79.2 per cent compared to 73.2 per cent). Adult females in Indigenous households in excluded areas were also 4.3 percentage points more likely to be in couple parent families, as opposed to lone parent families with children in the target cohort (68.2 per cent and 63.9 per cent respectively). However, Indigenous households in excluded postcodes may also have experienced disruptive family environments as they were 7.5 percentage points more likely to be large, compared to the sampling frame postcodes (31.9 per cent and 24.4 per cent). Given that they were also 4.6 percentage points more likely to be in rental accommodation (55.8 per cent and 60.4 per cent respectively), it was not possible to detect any strong biases in the process of excluding particular postcodes in regional areas.

For non-Indigenous households in regional Australia, excluded postcodes had similar differentials in census characteristics for the incidence of couple families in the target population and rental accommodation. However, non-Indigenous households in excluded postcodes were not substantially different from analogous households in postcodes that fell within the sampling frame for the other characteristics (that is, for completion of Year 10 and incidence of large households). Given that there was no systematic tendency toward disadvantage of Indigenous households and non-Indigenous households in the areas excluded from the sampling frame in regional areas, it seems reasonable to assume that there was not a major problem in this aspect of sample design, at least for regional areas.

It was not possible to make a similar generalisation for remote areas, as the differentials between excluded postcodes and those within the LSAC sampling frame were substantially larger for Indigenous households, but not for non-Indigenous households. For example, female adults in Indigenous households were 13 percentage points more likely to have completed Year 10 in the sampling frame (68.0 per cent compared to 55.0 per cent). The differential in the incidence of large Indigenous households was even greater (46.4 per cent and 30.8 per cent in excluded and framework postcodes respectively). There was also a large differential in rental accommodation between the two sets of postcodes in remote areas, but this could have been explained by the unique tenancy arrangements in many discrete Indigenous communities. These stylised facts seem to confirm that extreme caution should be applied to using the LSAC sample to describe the pathways of Indigenous children in remote areas.

Selectivity in the areas excluded from LSAC was a much less prominent issue for the non-Indigenous population. The number of exclusions in remote areas was in line with reasonable expectations about the LSAC's sample design. That is, there was a bias towards non-Indigenous populations in remote areas that was probably explained by the decision to not survey large areas and to exclude remote communities.

## **Unpacking the process of selecting postcodes of potential (and actual) respondents**

Having identified the potential postcodes, the next stage of the sample design involved the selection of potential respondents identified in the HIC database. Of the postcodes identified as being within the sampling frame, 424 postcodes included people who were selected and participated in Wave 1.<sup>7</sup> The remaining 1,423 postcodes did not include potential respondents.<sup>8</sup>

All these postcodes included children in the target cohorts that had moved into the area at the time of their interview, but were not originally selected from these postcode areas using the HIC database. While the LSAC team tried to find families in the selected areas, there were sometimes no leads for potential respondents. Once the target cohorts (that is, potential respondents) had been selected, LSAC would follow them anywhere in Australia.<sup>9</sup>

**Table 3: The process of selection postcodes for Wave 1, 2001**

	Broad remoteness classification		
	Major cities of Australia	Regional (inner or outer)	Remote or very remote
<b>Postcodes selected as Wave 1</b>			
Number of infants (aged 0) in Indigenous households	2,057	2,096	291
All infants (aged 0) in Indigenous households (%)	3.3	9.2	32.7
Number of children (aged 4) in Indigenous households	1,502	1,841	298
All children (aged 4) in Indigenous households (%)	2.2	7.1	30.9
Adult females who had completed at least Year 10, Indigenous households (%)	68.8	62.7	64.3
Adult females who had completed at least Year 10, non-Indigenous households (%)	90.4	91.1	93.6
Adult females in couple (vs lone parent) families, Indigenous households (%)	63.5	62.7	65.0
Adult females in couple (vs lone parent) families, non-Indigenous households (%)	86.2	84.2	93.1
Indigenous households with 5 or more residents (%)	21.5	25.0	34.2
Non-Indigenous households with 5 or more residents (%)	11.2	9.6	10.3
Indigenous households in a rental occupancy (%)	59.1	63.3	70.8
Non-Indigenous households in a rental occupancy (%)	26.7	27.7	39.6
<b>Postcodes identified as in sampling frame, but not selected in Wave 1</b>			
Number of infants (aged 0) in Indigenous households	2,847	2,744	352
All infants (aged 0) in Indigenous households (%)	3.3	6.7	20.7
Number of children (aged 4) in Indigenous households	1,834	2,749	369
All children (aged 4) in Indigenous households (%)	2.0	5.6	19.5
Adult females who had completed at least Year 10, Indigenous households (%)	68.1	63.9	68.8
Adult females who had completed at least Year 10, non-Indigenous households (%)	91.8	91.0	93.5
Adult females in couple (vs lone parent) families, Indigenous households (%)	62.9	64.8	66.8
Adult females in couple (vs lone parent) families, non-Indigenous households (%)	87.8	85.1	90.6
Indigenous households with 5 or more residents (%)	19.3	24.4	31.5
Non-Indigenous households with 5 or more residents (%)	9.9	10.2	9.7
Indigenous households in a rental occupancy (%)	59.8	58.6	69.5
Non-Indigenous households in a rental occupancy (%)	28.0	24.1	32.7

Note: The data for adults only refers to individuals living in families that include either infants (aged 0) or 4 year-old children.

Source: Customised cross-tabulations from the 2001 Census, ABS.

The fact that postcodes in the sampling frame were identifiably different from those used in the process of selection and the response to LSAC interviews further rationalised the decision to split the census analysis of postcodes into a three-stage process (since the postcode partitions were not mutually exclusive). The sample design, sample selection and response phases were conceptually distinct and different in practice.

Table 3 explores whether there were any systematic differences in census characteristics between areas that were selected to participate in LSAC from other areas that were in scope, but were not selected to participate in Wave 1. By examining geographic differences in census characteristics, it was possible to gain a further appreciation of the processes that might have made the LSAC Indigenous sub-sample unrepresentative of the Indigenous population (or indeed the general population).

In contrast to the results for excluded versus included postcodes, there were a substantial and relatively even number of children in the target population for selected and non-selected postcodes across the three categories of the broad remoteness classification. Again, the composition of the target population tended to become more Indigenous as the level of remoteness increased. The areas outside major cities that had residents who were selected to participate in LSAC tended to have relatively more Indigenous children in the target cohorts than areas that had no residents who were selected to participate in LSAC. This tendency was particularly evident in remote postcodes, where almost one-third of the respective target cohorts in selected areas lived in Indigenous households. The analogous figure for non-selected remote postcodes was around one-fifth of the target cohorts living in Indigenous households. Therefore, while the sampling frame tended to include less Indigenous children in the target population than excluded postcodes in remote areas, the process of selection seemed to favour Indigenous children slightly.

The difference in the level of female education in selected and non-selected postcodes was not large in non-Indigenous households for any of the three categories of areas. Other than remote areas, the educational differential was also not substantial for Indigenous households. In remote areas, adult females in Indigenous households in selected postcodes were 4.5 percentage points less likely to have completed Year 10 than non-selected postcodes (64.3 per cent and 68.8 per cent respectively).

The only other differences of a similar magnitude between the census characteristics of selected postcodes and non-selected postcodes were for the rental accommodation variable. Outside major cities, Indigenous and non-Indigenous households in selected postcodes had a higher incidence of residing in rented occupancy than other areas. The greatest differential between selected and non-selected postcodes within LSAC's scope was for non-Indigenous households in the remote category (39.6 per cent in rented accommodation compared to 32.7 per cent in non-selected areas).

To recapitulate, the main message from Table 3 is that there were not large systematic differences in the geographic characteristics of selected postcodes relative to other potential postcodes. Where there was a substantial difference in census data, the differences were basically in the same direction for Indigenous and non-Indigenous households. The most noteworthy exception to this rule was in remote areas where the completion of Year 10 was substantially less likely for Indigenous households in selected postcodes relative to other areas, but there was no real difference between postcode groups for non-Indigenous households.

The postcodes of people responding to the Wave 1 questionnaire were not always identical to the postcodes selected for the Wave 1 sample (referred to in Table 3). The final respondents from Wave 1 of LSAC came from 309 different postcodes (that is, those that had equivalent census data for ABS postal areas). There were 116 postcodes that had been selected for Wave 1 that had no respondents living in them when the LSAC interviews were completed. Table 4 contrasts the geographic characteristics for the selected Wave 1 postcodes that included respondents ('responding' postcodes) to the selected Wave 1 postcodes that had no respondents living in them. The shorthand term 'non-responding' postcode is used to refer to the latter group.

Table 4 shows that there were many more children in the target cohorts in responding postcodes relative to non-responding postcodes—even proportionately more than would be expected given the larger number of responding postcodes noted above.

The proportion of the target cohorts who lived in Indigenous households again increased as the remoteness of the area increased. However, Indigenous composition of the target cohort was not substantially different in responding and non-responding postcodes except in remote areas. For example, the proportion of 4 year olds who lived in Indigenous households was almost 50 percentage points less in responding remote postcodes (23.0 per cent compared to 71.3 per cent in non-responding remote postcodes). This provides some evidence that responses were more likely from 'less Indigenous' remote areas. If this translated into selectivity bias in the sample, then it would provide an additional rationale for being exceptionally cautious in trying to draw inferences for the remote Indigenous population from the LSAC sub-sample (even in the most qualified and circumscribed manner).

**Table 4: Postcodes with people who responded to LSAC, conditioned by whether a postcode was selected and whether responded for Wave 1**

	Broad remoteness classification		
	Major cities of Australia	Regional (inner or outer)	Remote or very remote
<b>Selected and responding to Wave 1</b>			
Number of infants (aged 0) in Indigenous households	1,658	1,605	198
All infants (aged 0) in Indigenous households (%)	3.4	9.0	26.4
Number of children (aged 4) in Indigenous households	1,296	1,361	186
All children (aged 4) in Indigenous households (%)	2.4	6.7	23.0
Adult females who had at least completed Year 10, Indigenous households (%)	69.5	62.1	66.3
Adult females who had at least completed Year 10, non-Indigenous households (%)	90.1	91.0	95.1
Adult females in couple (vs lone parent) families, Indigenous households (%)	62.8	62.8	67.7
Adult females in couple (vs lone parent) families, non-Indigenous households (%)	85.8	84.0	93.6
Indigenous households with 5 or more residents (%)	22.1	24.1	29.3
Non-Indigenous households with 5 or more residents (%)	11.6	9.6	10.6
Indigenous households in a rental occupancy (%)	58.7	63.9	66.9
Non-Indigenous households in a rental occupancy (%)	26.2	28.1	42.0
<b>Selected but not responding to Wave 1</b>			
Number of infants (aged 0) in Indigenous households	399	491	93
All infants (aged 0) in Indigenous households (%)	3.0	10.1	66.4
Number of children (aged 4) in Indigenous households	206	480	112
All children (aged 4) in Indigenous households (%)	1.4	8.3	71.3
Adult females who had at least completed Year 10, Indigenous households (%)	65.8	74.5	60.7
Adult females who had at least completed Year 10, non-Indigenous households (%)	91.5	91.2	86.4
Adult females in couple (vs lone parent) families, Indigenous households (%)	67.7	62.4	60.4
Adult females in couple (vs lone parent) families, non-Indigenous households (%)	87.8	85.0	89.8
Indigenous households with 5 or more residents (%)	18.4	28.2	42.7
Non-Indigenous households with 5 or more residents (%)	9.9	9.7	9.0
Indigenous households in a rental occupancy (%)	60.9	61.4	77.7
Non-Indigenous households in a rental occupancy (%)	28.4	26.2	28.4

Note: The data for adults only refer to individuals living in families that include either infants (aged 0) or 4 year-old children.

Source: Customised cross-tabulations from the 2001 Census, ABS.

This conclusion was reinforced when the other census characteristics for responding and non-responding postcodes were contrasted. Indigenous households in responding postcodes were 5.6 percentage points more likely to have adult females completing at least Year 10; 7.3 percentage points more likely to have couple families with children in the target cohort; and 13.4 percentage points less likely to be large households with five or more residents.<sup>10</sup> If the difference in census characteristics translated into selective responses to the LSAC questionnaire, then this would obviously have affected the representativeness of the sample and would mean that less disadvantaged Indigenous people in remote areas would have responded.

This note of caution for remote areas is also relevant for non-Indigenous households. Adult females in such households in responding postcodes were, relative to non-responding postcodes, 8.7 percentage points more likely to have completed Year 10, and 3.8 percentage points more likely to be in a couple with children in the target cohorts. This again raises the spectre of selectivity in responses for remote LSAC data—this time the potential for non-Indigenous respondents having been drawn from areas that experienced fewer disadvantages. It was clearly important to benchmark selected LSAC responses against representative data from another survey.

## 5 Comparing outcomes in LSAC with the 2002 NATSISS

Having illustrated the potential importance of unmeasured regional biases involved in the sample, this section of the paper contrasts the LSAC results with a nationally representative omnibus social survey of Indigenous Australians, the 2002 NATSISS. All surveys were subject to sampling variability and hence it was vitally important that measures of reliability of estimates were provided. Accordingly, standard errors were calculated for each estimate provided in the text to ensure that all differences could be discussed in terms of their statistical significance. NATSISS uses a finer level of stratification than LSAC (that is, Collection Districts compared to postcodes) and hence provides useful information as to how representative the LSAC data is with respect to the Indigenous population estimates.

The census analysis in the previous section was constrained by the complexities of the cross-level analysis that combined individual, family and household characteristics. Such issues were exacerbated when using Confidentialised Unit Record File (CURF) data for the NATSISS. Even though the ABS has made an extended CURF available on a Remote Access Data Laboratory (RADL), analysts were confined to highly structured categories for many variables and this constrained the sorts of comparisons that could be made. The main issue arose when identifying the families with children in the target group. The NATSISS only had information on households that included dependants who were aged less than 5 years and did not provide detailed information about the target cohorts identified in LSAC. In spite of this, this external survey provided reasonably robust benchmarks for individuals, families and households where there were young children present. Given that the NATSISS only collected detailed information about the adult population, the benchmarks were confined to the information relevant for the parents covered by LSAC (that is, educational attainment to Year 10, the incidence of couple families among the families who have young dependants, the proportion of adults who lived in large

households with five or more residents, and proportion of adults in families with dependent children who lived in a rented dwelling).

Standard errors were estimated using a ‘jack-knife’ methodology and the replicate weights provided by the ABS and the AIFS.<sup>11</sup> The sampling error was reported as standard error to facilitate the comparison of significant differences between the LSAC estimates and the other survey benchmarks (see the numbers in parentheses in Table 5). Table 5 presents the benchmarks for mothers and fathers aged 15 and over, by broad remoteness classification, with the last line of each panel indicating the unweighted number of observations in the respective surveys.

Overall, there were only a relatively small number of Indigenous mothers and fathers with children in the target cohorts. For example, there were only 65, 182 and 53 Indigenous LSAC mothers respectively in major cities, regional areas and remote areas. There were even fewer Indigenous LSAC fathers, with 37, 104 and 30 fathers residing in major cities, regional areas and remote areas respectively. With such small numbers, the sampling error for this population was likely to be relatively large—especially in remote areas and in major cities.

**Table 5: LSAC estimates and NATSISS benchmarks for Indigenous mothers and fathers aged 15 years and over by remoteness**

	Broad remoteness classification					
	Major cities		Regional		Remote	
	LSAC	NATSISS	LSAC	NATSISS	LSAC	NATSISS
<b>Mothers</b>						
Educational attainment to Year 10 or higher	79.6	80.8	74.5	76.1	64.4	58.6
	(5.4)	(3.5)	(3.4)	(2.3)	(10.8)	(3.5)
Couple families	66.4	37.5	63.1	54.1	67.6	62.8
	(6.9)	(5.2)	(5.0)	(3.3)	(4.4)	(4.2)
More than 5 residents in household	52.9	41.6	53.8	53.4	59.1	78.5
	(6.0)	(5.4)	(4.9)	(3.0)	(4.1)	(2.3)
Renting	76.7	81.2	75.3	78.1	80.4	95.9
	(5.2)	(4.2)	(4.6)	(3.4)	(6.7)	(1.0)
Unweighted number of observations	65	225	182	633	53	914
<b>Fathers</b>						
Educational attainment to Year 10 or higher	66.2	68.6	78.7	57.9	59.8	55.8
	(8.2)	(10.1)	(4.5)	(3.9)	(13.2)	(2.8)
Couple families	100.0	81.7	98.1	86.6	97.5	89.8
	(0.0)	(6.2)	(1.2)	(3.1)	(2.7)	(1.8)
More than 5 residents in household	47.4	53.8	55.0	50.4	68.4	79.6
	(9.1)	(8.7)	(5.7)	(4.0)	(7.4)	(2.3)
Renting	57.3	77.8	69.3	70.1	83.2	94.3
	(8.4)	(5.5)	(5.1)	(4.1)	(6.6)	(1.7)
Unweighted number of observations	37	117	104	384	30	567

Note: There were subtle differences in the populations for the LSAC and 2002 NATSISS. The LSAC sample focused on mothers and fathers with children who were infants (0 years old) and 4 years old. The NATSISS sample also focused on mothers and fathers but the sub-sample could only be constrained to look at households where there were children aged between zero and 4 years old. However, it was possible to constrain the NATSISS sub-sample further to better align with the LSAC sample by excluding mothers and fathers in large multiple family households with no younger dependants. There were 104 mothers and 97 fathers whose remoteness of residence was missing on the LSAC data set, of whom three mothers and no fathers were Indigenous.

Source: Customised cross-tabulations from LSAC and author's calculations.

Despite the relatively small size of the respective sub-samples, there were some significant differences between some of the estimates for LSAC and NATSISS, but these differences were often not that substantial. For example, the proportion of mothers who had completed Year 10 or higher was not significantly different between LSAC and NATSISS in any of the three broad remoteness categories. While the LSAC estimates were rather variable (for example, standard errors of 10.8 percentage points in remote areas), the LSAC point estimates were within two standard errors of the NATSISS estimates.

Among the survey estimates for fathers, the only significant difference between the survey estimates was in regional Australia where fathers were 20.8 percentage points more likely to have completed at least Year 10 in LSAC—a significant difference using the weighted average of standard errors from the respective surveys.

The LSAC estimates of the proportion of parents who were in a couple relationship (as opposed to being a lone parent) were uniformly higher than those for NATSISS. On balance, these differences were not substantial and probably reflected the inability to refine the omnibus survey estimates so that they were comparable in any precise manner with those for LSAC.

There may have been more comparable information in the survey estimates of the incidence of large households with five or more residents. In general, there were no significant differences between LSAC and NATSISS estimates—the possible exception being for mothers in remote areas. However, given the tendency for the postcodes in the LSAC sampling frame to have smaller households, and responding areas in LSAC to have fewer large households, this result was probably explained by non-sampling error in remote areas.

In summary, the analysis of the differences between LSAC and NATSISS estimates yielded very mixed results. In a sense this enhanced confidence in LSAC since there was little evidence of systematic differences between those estimates and these attempts to construct comparable benchmarks. Given the small number of Indigenous fathers in LSAC, more weight was given to the differences evident for Indigenous mothers. The major concern for the Indigenous sub-sample of LSAC is that the remote observations were biased towards small households. While the other differences between LSAC and NATSISS in remote areas tended not to be significant, they were consistent with a claim that LSAC remote responses come from relatively advantaged families.<sup>12</sup> Hence it is difficult to be entirely confident that LSAC's Indigenous sample was not selective and unrepresentative of the general life pathway issues facing Indigenous people in remote areas.

## 6 Conclusion

Soloff, Lawrence and Johnstone (2005) described the sample design requirements specified by FaCS when LSAC was originally being conceived. Oversampling of subpopulations was not required and hence it is reasonable to assume that FACS (and FaHCSIA) did not intend LSAC to focus on Indigenous issues. This paper has explored the extent to which LSAC data can be used to draw inferences about Indigenous children and their families. The census analysis in this paper focused on unmeasured regional characteristics of underlying populations at various stages of the sample selection and response. It can be viewed as a supplement to the analysis of Soloff et al. (2006), which provided an analysis of the individual and regional factors underlying selective non-response to LSAC.

One of the most important aspects of the LSAC sample design was that a substantial number of infants and children in very remote locations were excluded because they were in postcodes that had few children in scope. The exclusions embodied in LSAC's survey design will, by definition, make the remote sample biased against particular groups of Indigenous children, and hence extreme caution would need to be used when examining such estimates.

It will not be sufficient just to exclude out-of-scope areas from the population estimates because, as this paper has shown, LSAC's Indigenous sub-sample is likely to have been selective. Hence the value of including this remote sub-sample within the sample behavioural analysis must be questioned, irrespective of the conditionality of any statements made. Unmeasured regional characteristics would probably dominate the behavioural insights for remote areas, and hence it would be advisable to ignore LSAC's remote Indigenous sub-sample altogether. While the Indigenous sub-sample in metropolitan areas may have some minor residual issues regarding the representativeness of the data, I would argue that it is possible to make some aggregate inferences about the target Indigenous population in-scope in non-remote areas. Indeed, it seems that the first wave data would permit separate inferences about Indigenous children in metropolitan and regional areas (that is, after taking into account the reliability of such data as measured by the sampling error).

The analysis in this paper supports the proposition that LSAC could provide some limited insights into the dynamics of Indigenous child development outside remote areas, especially in regional Australia. If the LSAC data is examined in any detail, the limited number of Indigenous cohorts in the first wave means that some policy questions cannot be addressed because this would require a 'cutting of the cake' into excessively small pieces. For example, policy questions in relation to child care, which only affects a small fraction of the Indigenous sub-sample. The issue of small sample size is likely to be exacerbated over time with the attrition of the sample, which would make it increasingly difficult to identify any trends in such variables. Sample attrition means that longitudinal analysis about Indigenous infants and children will become less reliable over time.

Nicholson, Sanson & the LSAC Research Consortium (2003) also concluded that more intensive studies of subgroups were better conducted as separate studies, perhaps nested within or linked to LSAC. For example, they argue that it would not constitute an efficient use of the LSAC sample to increase the Indigenous sub-sample so that reasonably accurate statements could be made. Such sentiments boiled down to a justifiable concern with sampling error and the trade-offs entailed in getting more accurate estimates. This paper supplements such arguments with an emphasis on reducing non-sampling errors in LSAC's coverage.

Such concerns led to the development by FaHCSIA of the Longitudinal Study of Indigenous Children (LSIC) which will collect a similar set of data to that contained in LSAC. The 2007 Federal Budget stated:

The Australian Government will conduct a targeted longitudinal survey twice a year from 2008 to 2011. The survey will collect data on Indigenous babies under 12 months and four to five year old Indigenous children from 1650 families in 11 areas covering urban, regional and remote communities.

While LSIC is not a nationally representative sample, the questionnaires and survey methodology are specifically designed for the Indigenous population. Consequently, the information on child functioning from LSIC is less likely to suffer from non-sampling error than the Indigenous sub-sample of LSAC—that is, there are likely to be fewer errors arising from potentially uninformative questions asked in an inappropriate manner for the Indigenous context. This paper has highlighted the potential for non-sampling errors arising from the coverage of the LSAC's

Indigenous sub-sample—however, survey methods and contents also need to be relevant for Indigenous contexts to ensure that policy makers have a solid foundation for their policy initiatives. Despite the manifest strengths of LSIC’s approach, the fact that it is confined to 11 sites means that the resulting analysis cannot be generalised to the Indigenous population at large. Hence the LSAC Indigenous sub-sample could be argued to have at least one advantage in that it could be used for making tentative statements about the relevant populations in regional areas (and possibly metropolitan areas).

To recapitulate, LSAC’s Indigenous sub-sample from remote areas lacks credibility and should not be used. Another important message is that the small numbers of Wave 1 LSAC respondents combined with the substantial attrition rates for subsequent waves would make it difficult to draw reliable inferences for any longitudinal analysis of LSAC data from non-remote areas. Of course, it is crucial that all estimates derived using the Indigenous sub-sample must report standard errors as a measure of the underlying sampling error.

## Endnotes

- 1 While Soloff, Lawrence and Johnstone (2005, p. 28) show that the total LSAC sample is broadly representative of the target groups, there is some residual concern about the sample being biased to highly educated parents. There is also evidence that LSAC underrepresents children from New South Wales, single parent families, larger households, low-income groups and families with a non-English speaking mother.
- 2 Postcodes were selected with probability proportional to size selection where possible, and with equal probability for small population postcodes. For postcodes with at least the minimum number of children, probability proportional to size selection was used; for the other postcodes, equal probability selection was used. Postcodes were allocated to a stratum using the following process:
  - (1) All postcodes in a HIC March 2003 statistical extract were matched to the Australia Post file of all postcodes. This identified which postcodes were residential and which were post office box or large volume receiver (LVR).
  - (2) All residential postcodes were then assigned to a state and to Capital City Statistical Division/Rest of State (met/exmet) using the postcode to statistical local area (SLA) concordance, as at June 2002. Mismatches were resolved through consultation with the ABS. For the purposes of this design, the postcode was matched to the SLA that contained the greatest proportion of the population in that postcode, as indicated in the concordance.
  - (3) Non-residential postcodes were manually assigned to met or exmet.
- 3 For postcodes with at least the minimum sample size, the children were listed in date of birth order within a postcode, with any children from the same multiple birth event to be grouped together. The required number of children was selected by taking a random start and then applying a skip interval through the list. For postcodes with less than the minimum number of children, all children were selected.

For families with more than one target child, only one child per family was included in the sample selection process. This included cases of multiple birth, as well as families with both an infant and a 4–5 year old. If children were listed on multiple Medicare cards, then they were selected on the basis of the card where there was the most recent Medicare activity. If there was no recent activity, the card with an adult female was selected. If there was no adult female on either card, then the primary card was selected.

- 4 To enable the sample selection process to include children from areas with a low target population, whilst balancing the practical costs of data collection, a number of postcodes with very few children from the target populations were combined into ‘postcode areas’. The following approach was used:
  - (1) In metropolitan areas, residential postcodes with small numbers of children were combined with adjacent postcodes. This was a manual process. As far as possible, postcodes of similar Socio-Economic Indexes for Areas (SEIFA) and within the same statistical local area (SLA) were combined. This was done for 118 postcodes and resulted in 51 combined postcode areas.
  - (2) In non-metropolitan areas, where it was sensible to do so, residential postcodes with small numbers of children were also combined with adjacent postcodes. This was done for 44 postcodes and resulted in 16 combined postcode areas.
  - (3) Non-residential postcodes with (an estimated) 10 or more children in the target population were combined with an appropriate residential postcode. This was also a manual process and resulted in 123 post office postcodes being combined into 54 combined postcode areas.
- 5 The coding of the unit record LSAC data embodies a number of reasonable judgements about the location of postcode data provided by the HIC. For example, postcodes that consist solely of post office boxes were allocated (by AIFS) to the geographic area where the post office was located. Note that another 53 postcodes existed at the time of the 2001 Census, but were neither identified in the LSAC sampling frame nor explicitly excluded. For the sake of completeness, the ABS cross-tabulations were also purchased for these areas to get some appreciation for the areas that apparently were not taken into account. The numbers of infants and children in such areas were very small and could justifiably be ignored.
- 6 The Commonwealth Grants Commission (2001, Table A6-1, p. 151) surveyed studies that assess data quality and found that the proportion of Indigenous people correctly identified in hospital records ranged between 44 per cent and 100 per cent, depending on the jurisdiction.
- 7 The final Wave 1 respondents initially lived in 313 HIC postcodes (of the 329 HIC postcodes selected), but at the time of response had spread out to 426 postcodes (as opposed to ABS postal areas). These were in effect the postcodes selected, but they only mapped into 424 postcodes for which ABS had usual resident data. This process of dispersion or mobility may make the process of selection appear less selective than it would have been if the respondents stayed in their original postcodes.
- 8 Observant readers will note that 424 and 1,423 adds up to 1,847 postcodes, six more postcodes than was indicated in the previous section. It should be noted that seven postcodes contained

children selected to be part of LSAC, even though the postcodes were not part of the original LSAC sampling frame. These anomalous areas include: two postcodes from the Western Districts Grazing Country in Victoria (3294 and 3301), one postcode a couple of hundred kilometres upstream from Mildura along the Murray River (3583), Hamilton Island on the Great Barrier Reef (4803), a postcode covering a substantial part of Central Cape York Peninsula (4871), and two postcodes a couple of hundred kilometres east of Perth. These seven ‘additional’ postcodes either had fewer than 20 of the target cohort or were in the original list of excluded remote postcodes. However, one of those postcodes did not exist in 2001 and hence the postcode partition used in this section was consistent with the number of potential postcodes described above.

- 9 Seven postcodes were included in the geographic analysis of Tables 3 and 4, but were not used in Table 2 because they were not initially in the sample. Only the mobility of families identified by the HIC data brought these postcodes into scope of the survey.
- 10 There was also a 10.8 percentage point differential between responding and non-responding postcodes in the incidence of rental accommodation in remote areas. However, it was relatively difficult to draw a firm conclusion on this observation given the lack of diversity of Indigenous-specific tenure types—such diversity was especially apparent within remote areas (Sanders 2005).
- 11 The jack-knife technique entails a data-dependent way of consistently estimating standard errors that take into account the complex sample design (Lohr 1999; Wolter 1985). However, it still only takes into account sampling error and consequently it does not take into account non-sampling error.
- 12 For example, this pattern may arise from patterns of Medicare registration and hence may be built in to the sampling frame. While this is a plausible explanation, it should be acknowledged that it is hard to find a statistically significant systematic pattern in the usage of health services by income status for Indigenous Australians (Gray, Hunter & Taylor 2004).

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# Social Policy Notes

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*Australian Social Policy No. 7*

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# Extending Australia's digital divide policy: an examination of the value of social inclusion and social capital policy frameworks

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## 1 Introduction

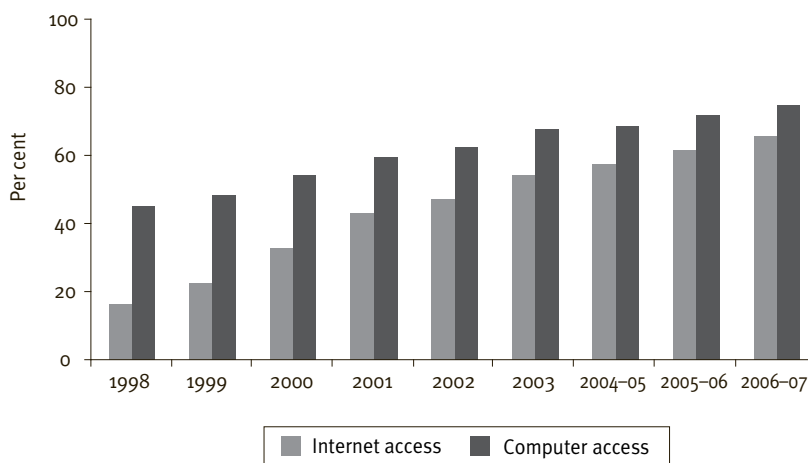
When digital divide policies were first developed, they were established under the rubric of much larger information society and knowledge economy policy visions, which set out that, as tradable commodities, 'information' and 'knowledge' were increasingly the drivers of economic growth (ed. Webster 2002). While a whole host of social, cultural and economic benefits of information and communication technology (ICT) access were often imagined within early digital divide policies, without high levels of internet dispersion and with limited access quality, these benefits tended to be futuristic or based on the experiences of internet 'early adopters': an elite minority. Following a decade of internet dispersion, user rates are now close to or exceed 75 per cent in many countries, including Australia<sup>1</sup> (ABS 2007a). This puts policy makers in a much better position to examine the benefits internet users are actually enjoying and how policy can interact with and better capitalise on these benefits.

In this paper, we argue that the network society thesis extends the information/knowledge society credo by providing a way to understand and value new forms of internet participation. Within the network society thesis, social capital and social inclusion can be understood as two frameworks that can be used by policymakers to define the social benefits of internet participation and focus funding and initiatives on ensuring these benefits are strengthened and are more equally dispersed. While this paper explores the development of the policy concept of social inclusion, we define it here as a coordinated affirmative response to the complex system of problems that are known as social exclusion. Social capital refers to a person's relationships, connections and social ties with trusted others such as family, friends and peers. Both concepts present new opportunities for excluded individuals or groups to participate in social, cultural, economic and/or political processes. While both social inclusion and social capital have been used as a way to value ICT use in Australia and elsewhere for some time, this paper posits both frameworks within the current Australian policy context.

## 2 The digital divide in Australia

The Australian Bureau of Statistics (ABS) has monitored technology access and use in Australia since 1996 and has reported on developments through their annual *Household use of information technology* report. The latest report indicates that household computer and internet access has steadily increased in Australia since this time (see Figure 1).

**Figure 1: Household computer and internet access, 1998–2007 (%)**



Source: Australian Bureau of Statistics 2007, *Household use of information technology, Australia, 2006–07*, Canberra.

The 2006–07 ABS report found that 64 per cent of Australian households had home internet access and 73 per cent owned a computer. The number of households with broadband access in 2006–07 had more than doubled from 2004–05, with over half (68 per cent) of all households with internet access through a broadband connection. As with previous years, the percentage of households with home computer and internet access continued to be higher for households with children under 15 years of age, households in the highest income quintile, and households in metropolitan areas and major cities (ABS 2006; ABS 2007a).

The annual ABS *Household use of information technology* reports are useful in terms of providing up-to-date data on household internet access, as well as some information on internet use and non-use. However, this survey is limited in terms of its scope. The socioeconomic determinants considered in these reports are limited: the impact of important variables such as ethnicity (including Indigenous status), geography, disability and education are not always examined. Further, as a general population survey, the report is unable to map ‘pockets’ of low access across the country or measure access disparities both across and within the states. Instead, the richest picture of internet access inequalities in Australia emerges from national household census data.

In 2001, the ABS Australian national household census included a series of questions to assess computer and internet use for the first time. The analysis of this data, published in *Australia online: how Australians are using computers and the internet* (Lloyd & Bill 2001), was the first real attempt to consider a comprehensive range of socioeconomic and geographic factors that may be impacting upon access to computers and the internet in Australia. The report found that use of computers and the internet tended to increase with income and educational qualifications, and decrease with age. People from Indigenous or non-English speaking backgrounds, those born in southern and eastern Europe, the elderly, and those not in the labour force were more likely to be unconnected to the internet. Those living in metropolitan areas were more likely to use computers and the internet than those living outside of these areas, and a small gender gap was also identified with women slightly less likely than men to use computers and internet in the home (Lloyd & Bill 2004). The report was the first ABS publication to use the term 'digital divide' and this term was defined as 'the degree of exclusion from the information society', (Lloyd & Bill 2004, p. 1). The report stipulated a need to address this exclusion:

Use of the Internet is rapidly becoming an increasingly common and critical part of commerce, education and social participation. Groups that do not have the opportunity to participate in the services provided by new telecommunications technology will be increasingly disadvantaged socially and economically. (Lloyd & Bill, p. v)

In line with international trends, the next census sought to focus on household internet access rather than individual computer and internet use. The 2006 census questionnaire asked households if they had access to the internet and if so, what type of access (broadband, dial-up, wireless, other or unknown). The ABS (2007b) report based on this data, *Patterns of internet access in Australia*, revealed that, despite increases in internet access for all groups, very little had changed in terms of the nature of internet access disparities<sup>2</sup>. In 2001, 35 per cent of Australians had accessed the internet from home the week prior to the census. In 2006, 63 per cent of all households had access to the internet with 40 per cent connected through broadband. The only gap identified in the 2001 census data report that had been resolved was that pertaining to women; in 2006, women aged between 25 to 54 years had greater access to the internet at home and to broadband than their male counterparts, but less access when aged 55 years and over. The study also investigated access for those with a disability and found these people to also be significantly less likely to have access to the internet and to broadband in the home.

Some of the starkest inequalities identified include:

1. **Indigenous Australians** were 69 per cent less likely than non-Indigenous people to have any internet connection and were about half as likely to have broadband access.
2. **Geography** continued to impact on household internet connectivity. For example, 66 per cent of dwellings in major cities have access to the internet, compared to 42 per cent for very remote Australia (see Table 1 below).
3. **Educational attainment** influenced overall and broadband internet access. For example, when controlling for other factors, persons with postgraduate qualifications had about 3.9 times the likelihood of having broadband compared with those without these qualifications. People with certificate level qualifications were about 1.2 times more likely to have access to any internet than those without.

- 4. Income** was considered the single largest determinant of internet access and broadband, with results showing that higher income increased the likelihood of a person having any internet connection. When all other variables were held constant, the likelihood of having any internet access for persons with the equivalised household income of \$1,000 to \$1,999 per week were about 2.7 times more than those earning less than \$1–\$599 per week.
- 5. Disability:** only 28 per cent of people requiring assistance with core activities had broadband access, in comparison with 48 per cent for people not needing assistance.
- 6. Single parent households** with dependent children under 15 years had 77 per cent internet and 52 per cent broadband access compared with 92 per cent and 68 per cent respectively for comparable dual parent households.

**Table 1: Broadband access rates by region (per cent)**

Geographic area	Internet access	Broadband access
Major cities	66	46
Inner regional	56	32
Outer regional	52	27
Remote	53	28
Very remote	42	24

While it is disappointing that Australia’s digital divide persists, this in itself is not surprising (compare with Selwyn 2004). Studies across the globe have repeatedly underscored that access disparities continue to exist within and among most, if not all, countries in relation to income, education, ethnicity and geography (Bauer, Berne & Maitland 2002; Chen & Wellman 2005; International Telecommunications Union 2000). The 2001 and 2006 census data support an extremely detailed picture of Australia’s access inequality. Regression analysis and statistical mapping at the detailed level of postcodes has enabled socioeconomic, ethnic and geographical determinants of low access to be very clearly identified. It is important that future digital divide initiatives overtly respond to this analysis, while a policy framework should set targets to reduce the gaps identified.

In the following sections, we examine how the Australian government has responded to the technology access disparities identified by the 2001 *Australia Online* report and we suggest how Australian policy might better respond to 2006 census data.

### 3 Australian digital divide policy 1995–2007

The first significant national digital divide policy intervention in Australia was announced by the Coalition government in 1996 before the release of any detailed statistical reports on the Australian digital divide. *Networking the Nation* (NTN) aspired to enhance telecommunications infrastructure and services; increase access to, and promote use of, services available through telecommunications networks; and reduce disparities in access to such services and facilities. A total of \$351 million was allocated to 762 projects across regional, rural and remote Australia

during 1997–2004 using funds allocated from the sale of the national telecommunications carrier, Telstra (DCITA 2006b).

Very few academic or independent studies have critically assessed the NTN program's impact comprehensively. However, the initiative did receive some criticism as an inadequate response to the Australian digital divide (Daly 2007; Consumers Telecommunications Network 2002) that did not operate from an informed needs assessment (van Vuuren 2007).<sup>3</sup> At the same time, the Regional Telecommunications Inquiry reported that by 2002 **all** Australians were able to access at least a dial-up Internet Service Provider (ISP) for the cost of a local untimed call and at equitable charges. This was partly due to the establishment of ISPs through the NTN program. The report also identified the 'moving target' of the digital divide by acknowledging that, 'dial-up technology is [now] becoming inadequate to meet the service needs of users' (DCITA 2002a, p. 130). Thus, access quality (broadband) needed to be added to the digital divide policy agenda.

NTN was followed by the 2004 *Co-ordinated communications infrastructure fund*, which committed \$23.7 million in funding to encourage health, education and other sectors of public interest to maximise opportunities for improved broadband access and services in rural, regional and remote Australia. In addition, two larger initiatives announced in 2005: the establishment of a \$2 billion *Communications fund* comprised of money from the sale of Telstra that would be used 'to future-proof telecommunications services in rural, regional and remote Australia' and *Connect Australia* with a commitment of \$1.1 billion over three years to rollout broadband to people living in regional, rural and remote areas, extend mobile phone coverage, build new regional communications networks and set up telecommunications services for remote Indigenous communities (DCITA 2007, 2008a; Coonan 2005). Two more government initiatives specifically focused on the infrastructure needs of Indigenous communities. The 2002 *Telecommunications action plan for remote Indigenous communities*, pledged \$8.3 million over three years, and telecommunications access funding included the 2006 *Backing Indigenous ability* with funds of \$36.6 million that sought to redress low levels of telecommunications access and access quality in Indigenous communities (DCITA 2002b; DCITA 2008b). These initiatives were largely informed by ABS data and the Regional Telecommunications Inquiry (2002), which identified that, while overall access disparities appeared to be closing in many areas, access quality (broadband) remained highly stratified between urban and non-urban Australia and between Indigenous and non-Indigenous Australians.<sup>4</sup>

While telecommunications infrastructure is a vital issue in terms of addressing the 'supply-side' issues of the digital divide, it has been argued that the Australian government has remained too singularly focused on broadband rollout 'in the bush' at the cost of addressing more complex 'demand-side' (social and economic) barriers such as low income, a lack of technological skills and support, and a lack of relevant and appropriate content. These demand-side issues will continue to inhibit household ICT uptake and use even when the appropriate infrastructure is made available (Daley 2002; Holloway 2003; Goggin 2003a, 2003b).

To be fair, some Australian government infrastructure initiatives have gone beyond only discussing the issue of broadband rollout. For example, the current *Australian broadband blueprint* acknowledges that there are three 'vital layers' to further extending Australia's adoption and equitable access to broadband: infrastructure; content and services; and effective use. The

document pledges that the national government will work with the states to coordinate and strengthen the technical infrastructure for broadband, but no such promise is made for content, training and support services or for effective use (DCITA 2005a, pp. 44–53).

The November 2007 election in Australia of a new Labor government suggests that some changes are likely to be made to policies relating to broadband and internet. During the 2007 election period, Australia's poor broadband quality became a fairly significant election policy issue (Hoy 2007). The Labor Party announced *A broadband future for Australia* in March 2007. This policy pledged an additional \$2.7 billion to the existing two billion dollar *Communications Fund* to build an optical fibre network that the Labor Party claimed would reach 98 out of 100 households in Australia and offer speeds over 40 times greater than the current average (Rudd, Conroy & Tanner 2007; Hoy 2007).

Broadband policies are obviously crucial to addressing Australia's poor internet access quality. In a recent study by the Organisation for Economic Co-operation and Development (OECD), Australia ranked well (third) in terms of overall internet dispersion, but ranked 23rd out of 32 developed countries for broadband cost and second last for download speed (OECD 2007). However, policy debates about broadband during the recent election did not constitute a comprehensive strategy for addressing the digital divide. The only other policy with a digital divide focus promised by the new Labor government also focused only on the issue of technology access. During their election campaign, the Labor government pledged \$2.3 billion to provide significant tax rebates for low-income parents of school-aged children who purchase computers and internet connections (Franklin 2007; ALP 2007b; Australian Coalition Government 2007). While this policy may go some way to addressing income-related demand-side barriers to internet connectivity, there was no evidence provided by the Labor Party to show that this plan would benefit those least able or likely to purchase home computers and the internet. Nor was there any mention of how the proposal would support more equitable benefits of use.

One of the most difficult things about assessing the impact of Australian digital divide policy is that both policies and initiatives have been implemented by local, state and national governments as well as third sector organisations. The Online Communications Council (OCC) is the Australian body charged with ensuring that Australian ICT policies are cohesive and complementary across the three tiers of government. The OCC meets once annually and membership comprises the Australian Government Minister for Communications, Information Technology and the Arts, the Australian Government Special Minister of State, a senior Minister from each state and territory government and the Australian Local Government Association. Third sector organisations and research bodies are not included as members.

While the OCC may play an important role in terms of ICT policy rollout in Australia, it does not have any formal rights and responsibilities as a council. Rather than setting the digital divide policy agenda, the OCC's annual meeting tends to be concerned with reviewing a broad range of national ICT-related policies—both proposed and in place—with the aim of ensuring the relevant state ministers are aware of and understand them, and are willing to collaborate (OCC 2007). In 2002, the OCC made a recommendation that a national 'Digital divide forum' be established in Australia that would include the three tiers of government as well as representatives from research and non-government bodies (Online Council of Australia 2002); however, the recommendation was never implemented.

Without a strategic national body and framework to connect local, state and national digital divide policies and practices, overall investments and progress are very difficult to assess. Without a body with a specific mandate to ensure that policies are adaptive to changing needs, cohesive and complementary across the states and most importantly, are effective, digital divide policies will remain fragmented. At the national level, policy appears to be almost solely focused on supply-side issues of infrastructure. At the state and local level there is neither a coherent framework to guide initiatives which attempt to address 'demand-side issues', nor is there any documentation or exchange of experiences to assess how approaches differ across the states. This sort of knowledge exchange and policy coherence will become even more important as we begin to learn about the social value of new forms of internet use.

## 4 New patterns of internet use

Academic debates have long emphasised that the 'digital divide' is about more than the provision of access to technology. Different demographics ICT needs, capabilities and skills need to be better understood if they can be married with realistic social policy goals (Mansell 2002; Warschauer 2003; Nakamura 2004; Chen & Wellman 2005; Norris 2001).

When digital divide policies were first developed, they were established under the rubric of much larger information society and knowledge economy policy visions that set out that 'information' and 'knowledge' were the new drivers of economic growth (ed. Webster 2002). While a host of social, cultural and economic benefits of ICT access were often imagined within these early policies, without very high levels of internet use and with limited access quality, these benefits were perceived or experienced only by the internet 'early adopters'. Having now achieved ubiquitous internet access in Australia, we are in a much better position to examine what benefits users are enjoying and then to assess how policy can interact with and better capitalise on these benefits.

To date there has been no longitudinal statistically significant study carried out in Australia that has considered nuanced changes in internet use.<sup>5</sup> The last ABS *Household use of information technology* report considered simplistic categorisations of use: 'personal/private'; 'work/business'; 'study/educational'; 'voluntary/community' and 'other' (ABS 2006). This information will not provide a picture of evolving internet use (or non-use) patterns and does not explore the social benefits of internet use.<sup>6</sup>

Recently, the ABS released a report, *The social impact of ICT: a proposed framework for identifying indicators* (De 2007a), which identified the need to measure the social impacts of ICTs in Australia. The report stated that, 'Policies relating to impact of technology generally focus on the economic impacts such as effects on productivity' and cited Roberts' (2007) assessment that these benefits are measurable and are generally well defined and understood in Australia (De 2007a, p. 1). The ABS report emphasised that far less was known about the everyday uses of ICT, which can impact on a range of issues 'such as education, teleworking, health, service delivery, virtual communication between communities, digital divide, globalisation and even democracy' (De 2007a, p. 1). The report proposed that a conceptual framework be established to measure the social impacts of ICTs in Australia and to inform government policy.<sup>7</sup>

Elsewhere, statistical research is already playing an important role in developing ICT policy and discourse. In the United Kingdom (UK), the bi-annual *Oxford Internet Surveys*<sup>8</sup> have become well-cited studies reporting on British citizens' changing use of the internet and a range of studies have been funded by the UK communications regulator—OfCom—including *UK children go online*<sup>9</sup> and the *Media literacy audit*.<sup>10</sup> In the United States (US), the *Pew internet and American life project*<sup>11</sup> has been conducting nationally representative surveys that monitor evolving uses of the internet across sociodemographic categories since 1999. Also, the *Digital future project*<sup>12</sup> at the Annenberg School, in the University of Southern California, has conducted a longitudinal annual internet use survey since 2000. The US Pew studies provide the most comprehensive data on a broad range of **social benefits** that internet use offers, specifically in relation to social inclusion and social capital.

The 2004 Pew study, *Internet penetration and impact* (Fallows 2004) found that 88 per cent of online Americans felt that the internet played a role in their daily routine and nearly all internet users conducted some of their ordinary day-to-day activities online, from mundane tasks to social arrangements to personal recreation. Over time, internet users have reported increasing positive impacts of their internet use in areas including hobbies and interests, shopping, work, employment, and health care information (Madden 2006). Impressively, almost half of all of internet users in the US (45 per cent) say that the internet has helped them make big decisions or negotiate their way through major episodes over their lives in the previous two years (Horrigan & Rainie 2006).

In *The strength of internet ties* (Boase et al. 2006), Pew researchers find that internet use provided online Americans with 'a path to resources, such as access to people who may have the right information to help deal with a health or medical issue or to confront a financial issue' (p. ii). These results indicated that those connected to the internet were more likely to seek assistance on health, education, employment and financial issues, and for nearly one-third of those surveyed, the internet had played a 'crucial' or 'important' role in helping them sort through their options on at least one of these issues. This 2006 figure had increased one-third since 2002 suggesting that internet use **increasingly** enhances opportunities for social support. The report also found the social network of internet users to be significantly larger than non-users.

In addition to this international research data that provides clear evidence of the social value of internet use (see also Crump 2006; Hick 2006), there is a small but growing body of empirical work in Australia that is highly relevant. While the ABS data on households' use of technology is limited, some qualitative studies have explored how people use the internet in projects intended to address social inclusion. For example, one Australian study of a wired-community initiative that sought to address the digital divide in a Victorian residential housing estate suggested that internet use may have more benefits in terms of educating individuals rather than building a traditional notion of 'community' (Meredyth, Ewing & Thomas 2004; Meredyth et al. 2002; Hopkins 2005). However, in another study Fernback found that, 'inner-city residents find ICTs to be a key element in neighbourhood and community revitalization' (Fernback 2005, p. 482). Together, these studies suggest that it is not an 'either/or' equation: ICT use can have a positive impact on an individual's social inclusion and on a community's collective social capital. Fernback, as well as others in an Australian context (Foth & Podkalicka 2007; Arnold, Gibbs & Wright 2003), argue that the identification and measurement of impacts depend on the definition of suitable performance indicators as well as the purpose and context of ICT use.

The new Australian government is yet to take a clear position on how they understand the value and significance of changing patterns of ICT use and usefulness in policy terms. One way to progress public debate on this issue is to discuss how the internet offers new opportunities to interact with economic, social and cultural resources and institutions. This is a topic firmly inscribed in the network society thesis.

## 5 Valuing new patterns of internet use: the network society thesis

The central idea of the network society thesis is that contemporary social, political and economic practices, institutions and relationships are organised through and around network structures (Barney 2004; Castells 2000). The network society thesis is a useful tool to understand new forms of internet use because it connects with and then extends the concept of the information society, which was taken up widely by both national governments and global institutions since the 1990s and was the political impetus for early digital divide policy.

The concept of the information society establishes that information flows have accelerated and that these flows have an economic value. The network society thesis extends this concept by interrogating the ways in which information flows are constructed and operate (through a network model). Thus this thesis provides room for a discussion about the ways in which participation and power become (re)structured, not only in economic terms, but also within social and cultural domains.

The word ‘network’ describes a structural condition whereby distinct points (often called ‘nodes’) are related to another by connections (often called ‘ties’) that are typically multiple, intersecting and often redundant. A network exists where many nodes (peoples, firms, computers) are linked to many other nodes, usually by many ties which cross the ties connecting other node. (Barney 2004, p. 2)

Castells (2001) found that three core factors were brought together to establish the current transition to a new societal structure based around networks. First, economic agendas strived for the globalisation of capital, production and trade and thus for management flexibility. Second, societal processes were mobilised by demands that privileged individual freedom and open communication; and third, technological advances in computing and telecommunications enabled, supported and developed this process.

While the human use of networks for information sharing has a long history, networks have been given a ‘new life’ through the proliferation and use of the internet (Wellman 2001; Castells 2001). Networks provide extraordinary advantages as organising tools because of their ‘inherent flexibility and adaptability’—both ‘critical features’ for survival in today’s rapidly changing globalised environment (Castells 2001, p. 1).

The idea of ICTs propelling both the social and economic use of networks is not an entirely ‘new’ or independent phenomenon. The role of modern communications media can be traced to the period after the first World War when electronic media such as the telegraph and telephone first made it possible to communicate in real time across vast distances and thus ‘helped to shrink

geographical space and speed up time to the point of spontaneity' (Hjarvard 2002, p. 69). This process was further accelerated with the development of technologies such as the television and radio. However, the most significant and rapid impulsion of this process today is a result of the development of the internet as a tool for one-to-one, one-to-many and many-to-many information and communication exchange in both synchronous and asynchronous time. Castells (2001) found that where Marshall McLuhan claimed the Gutenberg printing press created the 'Gutenberg galaxy' that defined modernity and social development we have now entered a 'new world of communication' in the 'internet galaxy' (Castells 2001, p. 3).

The network society has both positive and negative repercussions for citizens, communities and nations. Depending on the nature of each network, network components (the nodes, the ties and the flows that move between them) can be centralised, decentralised or distributed; hierarchical or horizontal; bounded or boundless; finite or proliferating; accessible or inaccessible; inclusive or exclusive; intensive or expansive; and interactive or non-interactive (Barney 2004). In *The rise of the network society*, Castells forecasted that, 'inside the networks, new possibilities are relentlessly created—outside the networks, survival is increasingly difficult' (Castells 2000, p. 187).

At this relatively early stage of the development of the internet and of ICT-mediated networks, it may be too early to make claims of a complete transformation in the way society functions, but we can say, at least in affluent societies like Australia, that ICTs like the internet now 'form the necessary infrastructure of everyday life' and that these ICTs are increasingly used to build, grow and sustain networks (Barney 2004, p. 178). In a society where principal economic, political and social activities are organised or mediated by networks, inclusion and exclusion, and power and powerlessness, become a function of both access to networks and control over flows within them (Barney 2004).

It is within this understanding of the network society thesis that we now examine two frameworks that provide policy makers with a way of valuing new online participation and of intervening in inequalities of use. The first—social inclusion—provides a way to address the online needs of specific disadvantaged groups and the second—social capital—offers a framework through which policy can provide all citizens with online opportunities to collectively build social, cultural and economic capital.

## 6 Digital divide policy and a social inclusion framework

The concept of social exclusion was first developed in policy terms in France in the mid 1970s by the Chirac government to define social categories of people who were unprotected under the government's social insurance system (de Haan 2001; de Haan 1999; Silver 1994). In the 1980s, under Mitterand's socialist government in France, the concept was transformed into a new model of anti-exclusion social policies. Since this time the concept has become enshrined in the UK and the wider European Union (EU) through dedicated policy units; albeit with different philosophical foundations, objectives, targets and performance measurements.

As a policy concept, social exclusion/inclusion has supported the debate about what it means to be excluded from society and how different political and social structures should address this

in a consistent way. While different definitions and applications of social exclusion have been developed in the UK and in other EU countries, two central principles are generally shared. First, social exclusion is defined as being **multi-dimensional**. That is, social exclusion is understood as something that can happen in the economic, cultural, social and political spheres and people may be excluded from different things at the same time (de Haan 2001). Second, the concept puts a focus on the **processes** that cause deprivation and exclusion (Jones & Smyth 1999; de Haan 1999). For example, governments may exclude particular groups from legal rights; landlords might exclude people from access to land; or minorities can be excluded from expressing their identities by the law, the mass media, or schools (de Haan 2001). People can be excluded by different groups, often at the same time.

It is the emphasis on these two factors that distinguish the social exclusion academic and policy literature from that on poverty and deprivation. By opening up debate about the many ways in which people are excluded from participation in society, the concept has successfully been used to contribute to **context-specific analysis** of what Sen (2000) refers to as the 'root causes of deprivation'. The multi-dimensional and historical aspects of the social exclusion framework analysis also support complementary and integrated policies that cut across sectors including health, housing, employment and education.

It has been argued that, in a similar way, the concept of digital inclusion can be used to extend the notion of the digital divide away from a singular focus on technology access and towards a focus on the way technology access **and use** can impact on different forms of deprivation and disadvantage (Warschauer 2003).

In the UK, social inclusion has been used for some years to develop a concept of digital inclusion. For instance, in 2004, a committee of government, research and non-government agencies argued the need for a governmental 'Digital Inclusion Unit' and outlined the issues and specific sociodemographic categories that would need to be considered in designing a comprehensive national digital inclusion strategy (Bradbrook & Fisher 2004). The UK government subsequently published the report *Inclusion through innovation* in 2005 and funded a Digital Inclusion Team to implement the report's recommendations. The Digital Inclusion Team defines digital inclusion as: 'The use of technology either directly or indirectly to improve the lives and life chances of **disadvantaged** people and the places in which they live' (Digital Inclusion Team 2007).

The concept of digital inclusion has provided EU researchers, policy makers and civil society organisations with the opportunity to engage in an ongoing debate about what the term means, why it is important and how it should be addressed. Two national digital inclusion strategies have now been created in Scotland: the most recent goes well beyond issues of infrastructure and access to stress specific social needs and to articulate policy goals, initiatives, targets and timelines (Scottish Executive 2006). In England, healthy debate continues in academic, government and civil society sectors about how national digital inclusion strategies should be financed, monitored and structured (Social Exclusion Unit 2005; Selwyn & Facer 2007; Fresh Minds 2007; Bradbrook & Fisher 2004; Livingstone & Helsper 2007).

It is likely that one reason that the Australian government has not yet adopted the concept of 'digital inclusion' is that the recently defeated but long-serving Coalition government had never

used the concept of social exclusion/inclusion in key policy frameworks (Saunders 2003). However, the incumbent Labor-led Australian government put the concept of social inclusion firmly on their policy agenda during the 2007 election campaign. Their policy document, *An Australian social inclusion agenda* (ALP 2007a), stated:

Social exclusion is the outcome of people or communities suffering from a range of problems such as unemployment, low incomes, poor housing, crime, poor health and disability and family breakdown. In combination, these problems can result in cycles of poverty, spanning generations and geographical regions ... Labor's social inclusion agenda aims to launch a new era of governance to mainstream the task of building social inclusion so that all Australians can share in our nation's prosperity. (ALP 2007a, pp. 1–3)

The recent creation of a social inclusion portfolio, and the appointment of the Deputy Prime Minister as the Minister for this portfolio, further emphasised that the new Australian government will be developing this policy concept. If the Australian government follows the UK policy path, social inclusion will also be used to develop a policy concept of digital inclusion.

There has been very little Australian academic research that has explored the use of the concept of social exclusion in an Australian context. One key exception is Peter Saunders (2003) who analysed the relevance of the evolving UK, France and EU concept of social exclusion and concluded that the international literature offered 'some valuable new insights' for Australian policy makers (p. 9). An alternative view was expressed by a different Peter Saunders (same name but clearly very different political views<sup>13</sup>) and Kayoko Tsumori (2002) who both attacked the social exclusion concept in an article in *Policy* claiming that it 'can mean almost anything and can be applied to almost anybody' while it simultaneously 'signifies victimhood' (p. 32).

To identify somebody as 'poor' is to leave open the question of responsibility and fault; to identify them as 'excluded' is to pre-empt it ... So who is to blame for excluding people? The familiar culprits are in the frame—the government, the rich and 'society' in general. Social exclusion is something that is caused by 'society', must be rectified by government, and that will be paid for by increased taxation on higher income earners. (Saunders & Tsumori 2002, p. 36)

The discourse of social exclusion is clearly the centrepiece of Saunders and Tsumori's article but as Peace (2001) explained, for better or for worse, the concept of social exclusion has undergone a complex linguistic shift since its introduction in France that now affects what policy makers tend to 'do' with the concept. Through a semantic process of nominalisation, 'excluded' as an active verb (for example, 'he excluded her from ...') became a passive verb (for example, 'social exclusion affects their life chances of ...'). In this process of nominalisation, agency disappeared— whoever is doing the 'thing' is rendered abstract or invisible and the action itself becomes a 'thing' in its own right (Peace 2001, p. 21). This is an unfortunate shift in the use of the social exclusion concept because understanding the 'root causes of deprivation' is not about assigning blame, but rather recognising the historical causes for a situation so that they can be acknowledged, understood and then (hopefully) addressed. We would argue that a 'strong' use of the social exclusion concept will not shy away from identifying the multiple and linked root causes of that exclusion.

The only significant work on measuring social exclusion in Australia has been carried out by the Social Policy Research Centre at the University of New South Wales (Saunders, Naidoo & Griffiths 2007). The centre's *Left out and missing out* research project compared survey data from 2,700 adult Australians drawn at random from the federal electoral roll and an additional 700 clients of community sector welfare services. Drawing from influential UK research, the survey developed indicators for poverty, deprivation and social exclusion to investigate the degree of overlap between the three concepts in the Australian population.

The research findings indicate that the three concepts affect different groups in the population and remain significantly distinct and independent. The report recommends that Australian policy makers should consider the use of these three different concepts and their respective indicators to develop a broader Australian specific measurement for social disadvantage.

Despite not taking up the policy concept of social exclusion, a discussion of digital inclusion appeared on the Department of Communications, Information Technology and the Arts (DCITA) website well before the 2007 election:

Current research indicates that the 'digital divide' is best understood as part of a socio-economic context and related to the issue of social exclusion. As such, solutions need to go beyond technology. Furthering digital inclusion will require a detailed understanding of the relationships between information, people and technology. (DCITA, p. 2006a)

While this statement appears promising, if the concept of digital inclusion is to be progressed by the new Australian government, it will first need to be clearly defined and a policy framework and targets established. In the UK, the concept of digital inclusion is embedded within the broader policy concept of social inclusion in order to ensure ICT policies are integrated with broader cross-sector social policy goals. In Australia, the recent announcement of a policy focus on social inclusion suggests that this sort of policy integration may be possible. From the perspective of understanding the social impact of ICTs, the key question that will need to be answered is: how does the adoption or use of ICT, or barriers to it, affect the social inclusion of people, or of particular subgroups of the population?

## 7 Digital divide policy and a social capital framework

In recent times, the concept of social capital has started to be popularised in a variety of policy contexts, as a way to acknowledge, appreciate and support the impact of extra-market, in-kind reciprocal actions of people on the basis of social ties and connections (for a comprehensive review see Cavaye 2004). Although the concept can arguably be traced back to earlier ideas and works, Pierre Bourdieu presented the first seminal conceptualisation of social capital when he broadened the notion of capital to include non-financial forms such as social, cultural and symbolic capital (Bourdieu 1986). He defined social capital as 'the aggregate of the actual or potential resources, which are linked to possession of a durable network of more or less institutionalised relationships of mutual acquaintance and recognition' (Bourdieu 1986, p. 249). The increasing ubiquity of the internet and related ICTs impacts on the way social relationships and social networks are created, mediated and maintained. If a majority of people communicate and connect online, this in turn impacts on the way they accumulate social capital.

In policy terms, social capital is a way to more broadly value internet use at both a community and an individual level—not just for defined disadvantaged groups. However, some of the conventional policy interpretations divert from the original concept. Some commentators subscribe to a purist's collective and communitarian understanding of society (Etzioni 1995; de Tocqueville 2000) rather than a more contemporary, broader definition that takes other views into account, such as, for example, networked individualism (DeFilippis, Fisher & Shragge 2006; Wellman 2001; Spriggs & Allen 2005). The latter recognises the value of what Bourdieu termed 'less institutionalised relationships', that is, the informal, transitory and everyday nature of personal social networks. Yet, some policy interpretations of social capital are prone to turn a blind eye to the new patterns of internet use outlined above and are therefore unable to appreciate them and the notion of networked individualism adequately.

One of the most influential political positions is claimed by Putnam (2000). He used statistical data analysis and anecdotal evidence to argue that the spirit of community and civic engagement is declining and on the brink of collapse and that members of (the US) society have increasingly become disconnected from one another, which leads to a loss of social capital. This image of society's condition is somewhat ironic insofar as society has never been so well connected through means of the internet and other network ICTs as it is now.

Looking at traditional expressions of community, Putnam (2000) rightly argued that community and social relationships are losing importance or even vanishing. In fact, he acknowledged a shift in community and social relationships away from local anchors and towards the internet that has the potential to revive social capital. He concluded that:

... the Internet will not automatically offset the decline in more conventional forms of social capital, but that it has that potential. In fact, it is hard to imagine solving our contemporary civic dilemmas without computer-mediated communication. (Putnam 2000, p. 180)

People are starting to realise the opportunities that the internet, mobile phones and other electronic tools provide for a seamless transition between global and local networks, online and offline communication and collective and networked interaction (Foth & Hearn 2007). Putnam (2000) used conventional sources of statistical data about community—memberships of political parties, volunteer organisations and church attendance—to suggest a disappearance of community. We argue that by examining new patterns of internet use and adopting a holistic perspective, new forms and expressions of community and social formations can be taken into consideration.

One example of an arguably new social formation is Watters' (2003) conceptualisation of 'urban tribes'—social clusters of under 35 year-old urban dwellers. They represent a social network, a 'swarming' group of friends who live in the same city and who are connected through a meshwork of 'strong' and 'weak' network ties. The face-to-face interaction between members of urban tribes is supplemented by the use of new media and ICT applications. Watters' analysis of urban tribes provides further evidence for the shifting quality of community formations in urban settings towards social networks. Several writers (Florida 2003; Fischer 2005; Sobel 2002; Uslaner 2000; Watters 2003; Wellman 2001) critique Putnam's (2000) narrow interpretation of social capital. Watters argues that:

... social capital comes from much more fluid and informal (yet potentially quite close and intricate) connections between people. Social capital could as easily accrue among a tight group of friends yet still have an effect on the community at large. (Watters 2003, p. 116)

We therefore argue that a successful digital divide policy approach requires a social capital framework, which recognises that community assets include not only the formal skills of individuals and the tangible associations and institutions in a given locality, but also the informal proximity-based social clusters and intangible networks of ‘weak-tie’ relationships that people build and maintain through new media and network ICTs. A greater understanding is required about how these tacit and soft assets can be elicited, connected, networked and harnessed to become ‘smart’ assets in the service of both social and economic innovation in both metropolitan and non-metropolitan areas in Australia.

Optimistic and pessimistic positions have been postulated to explain the new manifestations of community and society in a networked world. Putnam’s (2000) dramatic picture of a collapse of community is set against historic reports that contain similar protests and objections as far back as ancient times (Arnold 2003). This evidence suggests that the notion that the purely philanthropic and altruistic view of community has often been maintained by a minority of society—it has not been a mainstream idea. Arnold (2003) pointed out that ‘community is dynamic, and much angst is no doubt driven by nostalgia that fails to recognize the strengths of contemporary communities and the changing forms of contemporary communities’ (Arnold 2003, p. 78).

Furthermore, social capital can be a ‘double-edged sword’. According to Portes (1998), an increase in social capital can lead to exclusion of outsiders, excess claims on group members, restrictions on individual freedom and downward levelling norms. Both Florida (2003), referring to a city or region, and Watters (2003), referring to social networks of friends, claim that social capital may also lead to high barriers of entry and can thus be counterproductive in ensuring permeability and sustainability in communities:

The high social capital communities showed a strong preference for ‘social isolation’ and ‘security and stability’ and grew the least—their defining attribute being a ‘close the gates’ mentality. The low social capital communities had the highest rates of diversity and population growth. (Florida 2003, p. 15)

In recent years, the Australian government has made at least one significant attempt to broaden the debate about how digital divide policy might be progressed by identifying the way social capital can support social policy goals. In 2005, DCITA simultaneously released two discussion papers: *The role of ICT in building communities and social capital* and *Information and communication technology transforming the nonprofit sector* (DCITA 2005c; DCITA 2005b) The former argued—in line with other studies (eds Huysman & Wulf 2004; Gaved & Anderson 2006)—that:

... as the use and impact of ICT increases, so does the prospect that ICT can play a role in shaping the nature of community development and contributing to the building of social capital.

This report represented a valuable and significant attempt to support a public discussion about the ways ICTs can be used to support and strengthen communities in Australia, while the latter report considered the value and challenges ICTs provide for the country's third sector organisations.

These reports were followed by a DCITA commissioned *Report on a model for a national nonprofit ICT coalition*, published in 2007. The report outlined a model for a 'national, networked, project-orientated organisation' that would 'link the nonprofit sector into policy debates about the potential of technology to impact Australia's social, environmental and economic development' (CISA 2007). If adequately resourced, the proposed *ICT nonprofit coalition* would have provided an important opportunity for the Australian government to move digital divide policy beyond supply-side infrastructure needs and towards a discussion regarding the ways in which new patterns of internet use could be married with social policy, structures and initiatives.

If the Australia government is to embrace an understanding of the social benefits of ICTs based on a social capital framework, the key question that will need to be answered is: how does the adoption or use of ICT, or barriers to it, affect the social capital of people, or of particular subgroups of the population? The ABS have developed a social capital framework and measurement indicators that could be used to inform the development of indicators to assess this policy issue (see De 2007).

## 8 Conclusion: from digital divide to digital inclusion

Like Manuel Castells and Darin Barney, we do not advocate for the naturalisation of the network society because, increasingly, commercial interests, national government policy and global institutions regulate, impact and change network dynamics. Policies and regulations can and will continue to have both positive and negative repercussions for the citizens, social movements and organisations that operate through networks and are impacted by them. The key point is that the network society offers new opportunities for both inclusion and exclusion in social, economic, political and cultural domains. A prerequisite for inclusion is access, but the use and exploitation of networks also requires specific skills, literacies, information and knowledge. These need to be accompanied by structural policies and programs that enable and support inclusive networks and thus create an inclusive networked society. The application of **both** social inclusion and social capital policy frameworks offers the Australian government a valuable opportunity to extend our understanding of the digital divide away from a narrow focus on issues of access and towards a broader understanding of the way the internet and other ICTs can be used to increase and strengthen socially beneficial forms of online participation within the network society.

## Endnotes

- 1 The ABS found that in 2006–07, 69 per cent of Australians over the age of 15 years had used the internet from any site. The use figure for young people aged 8–15 years not included in this study is likely to be considerably higher. The figure of 75 per cent comes from Internet World Stats (2007).
- 2 It is important to note that the 2001 census and the 2006 census are not directly comparable, because in 2001, the census asked each member of the household if they had used computers or the internet in the home and in other locations the week before the census while the 2006 census asked households if they had the internet at home and what kind of access (broadband, dial-up, wireless and other). The ABS 2006 census report cited ensures a close comparable match with the 2001 Census internet question by assuming use at home by individuals equates to dwelling internet access. With technologies such as mobile Broadband not being in existence in 2001, this assumption is considered to be realistic. The same gaps that applied to households cited here also applied to individuals (ABS 2007b).
- 3 It should also be noted that the government did release its own evaluation report of NTN following some criticism that they had not done so (for example, see Shauder et al: 2005, p. 18). This evaluation can be found at [http://archive.dcita.gov.au/2006/06/networking\\_the\\_nation](http://archive.dcita.gov.au/2006/06/networking_the_nation).
- 4 This list includes key significant national government initiatives that have been explicitly focused on addressing the digital divide in Australia since NTN. Several other smaller and related initiatives may have been implemented over the years.
- 5 The Institute for Social Research at Swinburne University, Melbourne conducted an internet use survey in 2007, which is expected to provide some valuable insights into the way Australians are using the internet. This research project is part of the World Internet Project. See [www.worldinternetproject.net/](http://www.worldinternetproject.net/).
- 6 In recent years, the ABS has produced or collected a range of statistics that relate to social impacts of ICT use but none of these are comprehensive and they have not been sustained to ensure longitudinal analysis. For example, De (2007) notes that: the ABS labour force statistics measure employment of ICT skilled personnel by industry; the 2006 Time Use Survey provided estimates for the proportion of time Australians spent on ICT related activities, the Household Expenditure Survey (2003–04) collected information on expenditure on ICT goods and services and asks respondents to indicate if they had ordered goods or services using the Internet; the 2006 Children's participation in Culture and Leisure Activities survey provided information on how children use the Internet; the annual HUIT survey provides information on the proportion of population purchasing goods and services over the internet and the types of things they buy; and the General Social Survey (GSS) has collected information on teleworking, as well as on use of email or telephone to contact family and friends. De (2007) also noted the need for a clear framework for measuring social impacts of ICTs and recommended ways of achieving this.
- 7 In recognition of this, the ABS acknowledge a gap in their ability to provide statistical information about the social impacts of ICT and in this light they propose that the concepts of wellbeing and of social capital may both offer useful frameworks for measuring and assessing the social benefits of ICT and the ways in which these benefits are dispersed (see De 2007).

- 8 <<http://www.oii.ox.ac.uk/microsites/oxis/>>.
- 9 <<http://www.lse.ac.uk/collections/children-go-online/>>.
- 10 <[http://www.ofcom.org.uk/advice/media\\_literacy/](http://www.ofcom.org.uk/advice/media_literacy/)>.
- 11 <<http://www.pewinternet.org/>>.
- 12 <<http://www.digitalcenter.org/>>.
- 13 The first Peter Saunders mentioned here is a Professor at the Social Policy Research Centre at the University of NSW (<<http://www.sprc.unsw.edu.au>>) while the second is Director of Social Policy Programmes at the policy think-tank, The Centre for Independent Studies (<<http://www.cis.org.au>>).

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# Indigenous housing, family life and parental employment: a review of the literature

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*Robyn Penman*

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## 1 Introduction

This paper explores the relationships between the physical realities of Indigenous housing, the social and cultural realities of the householders' family life, and the economic realities of work and employment. From a policy point of view, the review addresses two key questions. First, how does housing impact on Indigenous work and family life? Second, how does the nature of work and family life impact on housing?

The research literature was reviewed to consolidate what is known about the three dimensions of Indigenous family life, housing and economic matters. From this review it was apparent that the policy questions had to be located in a framework of understanding that took Indigenous cultural issues and the impact of remoteness into direct account. Being Indigenous, and the cultural way of life implicated, has varying and complex relationships with the physical realm of housing and with the economic realm of work and employment.

The paper develops a picture of these different realms that clearly indicates a very tangled web of factors running through them. It is concluded there is no simple cause-effect solutions for such complex problems and that the approaches and strategies developed under the concept of 'social exclusion' offer an appropriate policy path, especially when these approaches are applied at the local, community level.

The then Department of Employment and Workplace Relations (DEWR) commissioned the Indigenous housing literature review on which this paper is based. I would like to thank the staff for their help in developing the paper and in encouraging its publication. I would also like to make it clear that all policy implications and conclusions were not part of the original commissioned paper and that they reflect my own position, not necessarily that of DEWR.

## 2 Indigenous family life

### Household composition and dynamics

#### Indigenous understandings of families and households

The very first step in understanding Indigenous family life is to recognise that the composition and structure of Indigenous families is often markedly different from mainstream, Anglo-Celtic ones (Ross 1999). The differences have significant implications for housing and work matters.

The importance of understanding Indigenous views of families and households was made most strikingly by Morphy (2004) in her observation of census data being collected in a remote Indigenous outstation community. She started by observing that the principles according to which the Anglo-Celtic kinship system is constructed differ so markedly from the principles underlying the local Indigenous system that it is not possible to translate concepts between them. The census, nevertheless, tries to do so. Morphy illustrated the consequences with reference to the Indigenous kin category 'M'. People had been told that 'M' meant mother and so that is how it was often translated by the census enumerators, whereas the person could have been, to use Anglo-Celtic terms, a mother, a daughter-in-law, a nephew's wife, a great granddaughter-in-law, or a brother's great granddaughter-in-law (Morphy 2004). In other words, Indigenous and non-Indigenous kin categories do not have precise cross-cultural equivalence.

The other important point is the extent of the kinship system and how it works. In the Anglo-Celtic system people are rarely kin before they marry. A marriage brings together two previously unrelated kindred who only have the husband and wife in common. In marked contrast in the local Indigenous system described by Morphy (2004), marriage does not create bonds; it simply reinforces and reaffirms already existing kin relationships. Thus, a woman could (loosely) describe a man as her cousin, but the more important fact within the system is that they belong to the category of (potential) mother-in-law and (potential) son-in-law.

People stay within existing kin systems and relate with each other in such a way as to continually reinforce the system. The Indigenous kinship system has more categories and many more different types of relations than the Anglo-Celtic system that further act to shore up the system. As Morphy (2004, p. 10) says, 'In the local Indigenous universe, everyone is kin'. And, in the same Indigenous universe, Indigenous households cover all those who identify as being Indigenous.

Indigenous kin live together and relate in much more flexible and varying ways than those living a mainstream Anglo-Celtic life. This mainstream understanding of families is reflected in the Australian Bureau of Statistics' (ABS) definition of a household: a group of people who live and eat together in a single dwelling and as a single unit in the sense that they have common housekeeping arrangements (Hunter, Kennedy & Smith 2003). But Indigenous households who make common provision for food and the like are often spread over more than one dwelling, just as Indigenous residents in the one dwelling may sleep there but eat elsewhere (Daly & Smith 1999). The idea of a single physical dwelling providing a satisfactory base for delineating Indigenous households is not commensurate with the Indigenous way of living with kin.

Implicit in the ABS's definition of household is a nuclear family structure. The household is predicated on a couple relationship, a lone parent–child relationship, or other blood relationship (ABS 2001). According to the ABS, if the household does not consist of this core unit, then it is simply a 'group' household. Many Indigenous households do not contain a nuclear family and some may not even have 'blood relations' present, yet 'group household' does not do justice to the complexity and kin relatedness of Indigenous households. Most importantly, the notion of a 'group household' fails to recognise that the Indigenous way of relating favours lineages, not nuclear families (Collard et al. 1994; Morphy 2004). So, households will nearly always contain kin, in a broad Indigenous sense, but not necessarily married/de facto couples or children with their parent/s.

### **Complex and varying compositions**

Mainstream understandings of families and households are simply incommensurate with Indigenous family life (Finlayson & Auld 1999; Henry & Smith 2002). Nevertheless, it is still possible in certain instances to take the dwelling as a loose unit of analysis, provided it is recognised that: dwellings do not necessarily contain a family as the non-Indigenous understanding would have it; can actually contain many families; the one family can be spread across dwellings; and dwelling composition is not static.

Indigenous households with children living in them have diverse structures. The Western Australian Aboriginal child health survey (Zubrick et al. 2004) found that only 31 per cent were of a nuclear family type, with two parents and their children. There were also sole-mother households (22 per cent), 'blended' families (11 per cent), sole-mother within an extended family (11 per cent), and two parents with extended families (7 per cent). It is also important to note that, nationally, the proportion of sole-parent to other family types is about twice as large amongst Indigenous people as amongst non-Indigenous people (Daly & Smith 2003) and they have more children to support than do non-Indigenous sole parents (Daly & Smith 1999). In addition, Indigenous households are much less likely than other households to have exactly two adults in them (Hunter, Kennedy & Biddle 2002). Indeed, the analysis by Hunter, Kennedy and Biddle (2002) shows that Indigenous people are disproportionately concentrated in households with three or more adults. More than one-third of Indigenous people live in such households compared with less than one-sixth of the non-Indigenous population.

The above data make it clear that the nuclear family is not the norm. Far more typical is the Indigenous household with a small, multi-family, multi-generational core of kin with a highly mobile fringe of transient relations (Kubota 1992; Ross 1991; ed. Smith 2000). In some ways, the Indigenous household contemporarily located in a western-style house, is a microcosm of what more customarily would have been spread around a much larger area and divided into various 'camps'.

## **Accounting for the dynamics**

### **Mobility**

Mobility and the resultant high visitor numbers for households is a common feature of Indigenous living. For example, in Musharbash's (2000) study of the remote community of Yuendumu, she found that an average of 21.9 persons stayed in a designated dwelling on any one night over a

fortnight. This consisted of 13.7 adults (over age 16) and 6.8 children. Over that same fortnight, there were a total of 27 different adults and 15 different children sleeping at the house, with a core of 11 people there over the full fortnight.

The study of the Kuranda community over three survey periods provides some further insights into the dimensions of mobility (Henry & Smith 2002). First, mobility in that community was mainly circular or short-distanced, with the people moving along a familiar 'kin trail', from one kin household to the next. Second, mobility was also very common. Between two survey periods in 2001 and 2002, one out of every two persons in the community had moved. Third, mobility was not confined to adults. In the Kuranda study, as many children as adults had moved between the two survey periods. In all cases, the children had moved to other households within their kinship network.

The mobility patterns identified in the Kuranda study occur in other Indigenous communities throughout Australia. For example, Taylor (1996) documented that circular and mainly short-distanced travel lines were common for other Indigenous groups. Memmott, Long and Thomson (2006), in their study of settlements in the Mt Isa district, also identified a pattern of high mobility within a largely localised area. Collard et al. (1994) writing about Indigenous people in Western Australia, described this type of movement as a 'run' that covered each kinship group's distinct territory. Collard et al. (1994) also made an important point about urban dwellers, that it is a myth that urban culture is antithetical to kinship systems because urban dwellers have just adapted to it in different ways.

There is no doubt that this pattern of high, localised mobility reflects a cultural preference to 'live extendedly' and, for children, to express individual autonomy from an early age. But there are also other factors at work. Henry and Smith's (2002) work showed that mobility also results from the lack of adequate housing, poverty and destitution. Musharbash (2000) noted for the Yuendumu community that access to resources, the availability and quality of housing, overcrowding, family conflict, the impact of death, and 'normal' kin visiting patterns all contributed to mobility. Additionally, research by Cooper and Morris (2005) on Indigenous women in rural and urban areas showed mobility arising from the need to avoid alcohol and drug abuse, sexual abuse and family violence.

As Musharbash (2000) pointed out, the motivators for moving are many and complex, such that they overlap in their operation as causal factors and as outcomes. This, in turn, further compounds the need to be mobile. Regardless of the reasons for mobility, though, it is important to bear in mind the consequences for households. The patterns of mobility discussed above contribute substantially to changing household composition, with dynamic cycles of expansion, contraction, disintegration and reformation (ed. Smith 2000). In other words, households are not constant in size, structure or cohesion; they are very flexible and vary constantly (Ross 1991).

### **Reciprocity and the 'moral economy'**

Sharing and caring is a core value at the heart of Indigenous culture (Collard et al. 1994; Peterson 1993; Schwab 1995). This value underpins the process of demand sharing in relation to resource distribution that is the key by which the domestic economies of Indigenous households function.

In his exploration of what this Indigenous sharing means, Schwab (1995) identified a core set of principles that make up what he called a calculus of reciprocity. Sharing is the norm among Indigenous kin and those in the kinship network see it as totally reasonable to expect the sharing of shelter, food, cash and other resources across the network. Given the reasonableness of the expectation, it is just as reasonable to demand that the sharing actually be done.

However, while the sharing is propelled by demand, it is constrained by a delicate balance about what is right to demand and to refuse. If a demand is denied, there are significant social implications, as well as material ones. To deny a demand is to deny the kinship right underlying such a demand and thus to deny the authenticity of the kin relation. As Schwab (1995, p. 13) noted in this regard, '[t]his is a grave decision few Aboriginal people will make lightly', particularly if they anticipate that they may want to call on the denied party in the future. Because the decision is so grave, when kin demand that resources be shared they are unlikely to be refused.

Reciprocity is a core element in the structure of households, families and Indigenous communities as a whole. Reciprocity is at the heart of each kinship system and acts to structure not only private relations but economic, social and political relations. In considering this structuring process, Martin (2006) described the work of Peterson and his idea of an Indigenous 'moral economy'. According to Peterson, in pre-colonial times, the activities involved in acquiring a livelihood were embedded in kin relations. Production was nearly always linked with consumption through obligations and commitments to kin. However, once Indigenous people entered the mainstream cash economy, primarily through the welfare system, Peterson argued that the Indigenous moral economy, with its obligations and commitments to kin, focused more and more on circulation and consumption. In this contemporary Indigenous 'moral economy', resources are allocated for the reproduction of social relations rather than invested in profit maximisation and any obvious immediate personal benefit. It is important to note that housing is one of the many resources that form a part of this moral economy and that kin, therefore, have a right to demand the use of housing.

## 3 Housing & Indigenous communities

### The importance of remoteness

From the 2006 Census, the ABS estimated that there were 517,200 Australians who identified themselves as being Aboriginal and/or Torres Strait Islander peoples. This was 2.5 per cent of the total Australian population (ABS 2007a). But the Indigenous part of the total population was spread in a very distinct pattern and there were substantial geographic differences in density and spread.

The ABS (2007a) makes a five-fold distinction in terms of remoteness from a major urban centre. Table 1 shows the distribution of the Indigenous population across the five regions of Australia.

**Table 1: Distribution of Indigenous population, 2006**

Region	No.	%
Major city	160,332	31
Inner regional	113,784	22
Outer regional	118,956	23
Remote	41,376	8
Very remote	82,752	16
Australia	517,200	100

Source: Australian Bureau of Statistics (ABS) 2007, *Population characteristics, Aboriginal and Torres Strait Islanders*, ABS, Canberra.

What is significant about this distinction based on remoteness is that while there were more Indigenous people living in major cities, they were a much smaller proportion of the total population than those living in the cities. The Indigenous proportion of the total population increased with geographic remoteness (ABS 2007a).

In line with this increase in the Indigenous proportion of the population with remoteness was the increase in the number of discrete Indigenous communities in remote to very remote areas. A discrete Indigenous community is one inhabited predominantly by Indigenous people with community-owned or managed housing and/or infrastructure.

## Types of communities

### Discrete communities

In 2006, there were 1,187 discrete communities with a total population of 92,960 (18 per cent of the total Indigenous population) and 94 per cent of these communities were in remote or very remote areas. Two-thirds of the discrete communities had less than 50 people in them, but the remaining one-third contained the bulk of the Indigenous population living in discrete communities (ABS 2007b).

Memmott and Moran (2001) distinguished between three different types of discrete Indigenous communities or, as they called them, settlements. This distinction is of importance when considering housing issues because of the different facilities available, access to services and actual remoteness. On the other hand, most of the statistical data do not distinguish between these three types. The first type of settlement discussed below—discrete and separate—covers the greater proportion of discrete settlements and most of the main housing data are discussed under this heading. Additional statistical information for the other two types of discrete settlements is included in the relevant sections.

#### *Discrete and geographically separated*

The majority of discrete and geographically separate settlements are located in remote to very remote areas and it is well recognised that the housing stock in these remote Indigenous communities is simply not adequate. Disturbingly, the housing stock is likely to be even more inadequate in the future, as the Indigenous population increases (Altman, Linkhorn & Clarke 2005).

The inadequacy of the housing stock was reflected in the results from the 2006 Community Housing and Infrastructure Needs Survey (CHINS) as reported by the ABS (ABS 2007b). This survey found 4,039 people occupied temporary dwellings in discrete Indigenous communities, including tin sheds, caravans, humpies and other makeshift shelters. The same survey also found that there were 106 communities with no permanent dwellings.

The inadequacy of the housing stock was also reflected in the degree of overcrowding. In 2004–05, 25 per cent of Indigenous people aged 15 years and over lived in overcrowded housing. Overcrowding in Indigenous households increased with degree of remoteness, such that in very remote regions, 63.4 per cent of the Indigenous population lived in overcrowded households (SCRGSP 2007). In this instance, ‘overcrowding’ was assessed as the need for two or more bedrooms to accommodate the house-dwellers.

Most of the houses in discrete Indigenous communities are rented and they are provided through community housing organisations. Indigenous community housing offers the lowest rents. For example, over 80 per cent of Indigenous Housing Organisations in very remote areas reported an average rental income per dwelling of below \$50 per week (ABS 2007b). These low rents reflect the fact that many of the dwellings are in remote areas and were built with government grant monies (AIHW 2005) rather than by private developers.

Along with an inadequate supply of housing in Indigenous communities, there are major problems with maintaining the existing housing stock and related services. For example, Memmott and Moran (2001) stated that the cost of servicing the settlements in the Northern Territory had been calculated as representing 45 per cent of the total national cost of servicing discrete Indigenous communities. As a further example, Hall and Berry (2006) calculated that \$705 million would be required to bring all Indigenous community-owned dwellings in very remote and remote areas up to a proper standard. And, Ove Arup and Partners (1999) estimated that some \$66 million per annum is required to adequately operate and maintain essential services of water, sewerage and power in discrete Indigenous communities.

Poor and dilapidated housing stock contributes to significant problems with environmental health in discrete Indigenous communities. The Steering Committee for the Review of Government Service Provision (SCRGSP) (2007) reported a number of environment problems directly impacting on health in Indigenous communities. In many instances these problems arose because of the lack of functioning ‘health hardware’, such as toilets, drains, showers, taps, lights, and kitchens (Groome & Pholeros 1997; Pholeros 2003).

The Australian Institute of Health & Welfare (AIHW) has developed an indicator of the functionality of health hardware in Indigenous houses based on the Fixing Houses for Better Health program (McPeake & Pholeros 2006). In the first survey and fix of houses in the program, it was found that 41 per cent of dwellings scored less than 25 per cent OK in relation to their ability to meet the 11 critical healthy living practices (AIHW 2007).

SCRGSP (2007) provided indicators of the outcomes of environmental problems—disease and death rates directly attributable to environmental health. They found that Indigenous people had higher hospitalisation rates than non-Indigenous people for all diseases associated with poor

environmental health. They also found, in the four jurisdictions for which data were available, that death rates from diseases associated with poor environmental health were much higher for Indigenous people (between 112.7 and 230.4 deaths per 100,000) than for non-Indigenous people (between 25.1 and 39.6 deaths per 100,000).

It is important to note that research (Groome & Pholeros 1997; Pholeros 2003) clearly shows that the main reason for poor performance of health hardware is not vandalism but poor initial construction and lack of routine maintenance. Maintenance is, in fact, a big issue in remote communities. Scally (2003) also argued that much of the failure of housing stock and physical infrastructure arises from inadequate designs and constructions. In particular, there is a failure to assess the local conditions and then build buildings that the community are actually able to afford and can maintain with what is usually an unskilled local workforce. The local workforce is, in fact, Indigenous people with little education and training in house maintenance.

On the other hand, discrete Indigenous communities in remote regions are those where customary practices are most likely to be followed. These customary activities in these settlements involve a range of kinship and spiritual practices as well as traditional domiciliary behaviours that have direct impact on housing. In particular, there is a requirement within these communities to cope with the customary obligations to share accommodation and sustenance with kin and thus with the concomitant regular influx of visitors (Memmott & Moran, 2001). This, of course, places even further pressure on an already inadequate housing stock and infrastructure.

### *Discrete urban settlements*

Discrete urban settlements usually consist of an enclave or precinct within a rural town or regional city. The 2006 CHINS identified 75 discrete settlements in 'non-remote' areas (ABS 2007b). However, Memmott and Moran (2001) argued there were probably far more that had not been identified because of their inconspicuous size and their failure to register for funding programs.

'The Block' in Redfern and the settlement at La Perouse are probably two of the better-known discrete urban settlements within a metropolis. In both instances, these areas are characterised as having a conglomerate of residential housing blocks with infrastructure services, such as electricity and water, supplied by the local authorities.

In other regional and rural areas, discrete urban settlements have developed as town camps. Alice Springs town camps are a good example of such urban settlements and the latest information on these camps is contained in the Alice Springs Town Camps Task Force report (2006).

From the time of its establishment in 1872, there have always been permanent camps in and around Alice Springs, and these traditional camps were the genesis of many of the current ones. However, it was not until the mid-1970s in the Alice that town camps were officially recognised as permanent living areas and basic essential services were gradually provided; although it must be noted that these were federally funded, not locally supported.

Today, town camps in Alice Springs are small communities mainly made up of members of the same language group, and they tend to be in locations that correspond to the direction closest to their traditional country. In all, there are 17 town camps, 15 with formal leases and two without leases. Research undertaken in 2005 by the Tangentyere Council (the organisation that manages all the camps) suggested there were between 1,765 and 2,065 permanent residents in the camps, with a service population (that included visitors) of 3,000 (Foster et al. 2005).

The housing stock available in town camps is inadequate and run down. There are 191 houses available for the estimated 1,765 to up to 3,000 people. The Tangentyere mobility survey (Foster et al. 2005) estimated occupancy rates to be between 8.5 to 12.6 people per house in town camps, with 20 per cent of the people living in houses with 10 or more people per house. It was also reported by the Taskforce (2006) that community facilities such as ablution blocks were frequently occupied by visitors.

The demand on the town camps can be accounted for, in part, by the paucity of alternative and affordable housing in Alice Springs. The waiting list for public housing is at least three years long and private sector housing very limited and unaffordable for many Aboriginal people. As an example, the Taskforce report (2006) noted that the market rentals for one and two bedroom units were between 90 per cent and 103 per cent of the average weekly income for Aboriginal people who were not employed or not in the labour force.

Perhaps because of the demand for housing and regardless of the poor standards of stock and infrastructure available in town camps, there is also considerable diversity within and between camps. As the Taskforce (2006) noted, some town camp residents were 'highly urbanised'; they held jobs, paid rent, and sent their children to school. Others lacked the skills, resources and/or experience to understand the social rules and expectations of town life.

### *Outlying discrete settlements*

Outlying discrete settlements are typically outstations of small family-based housing, often located on traditional country or homelands. The settlements are inherently remote and can be located in some of the most isolated areas in Australia. Outstation occupancy levels fluctuate with the seasonal access and the availability of transport and other resources. Many of the outstations have the most primitive form of housing, with self-built dwellings constructed within the limited resources available to the group (Memmott & Moran 2001).

Even though these makeshift dwellings may be seen as deficient by western standards of desirable living (Memmott 1996), they are likely to be far more culturally appropriate to the Indigenous people living in them—having been designed and equipped by them.

Memmott and Moran (2001) additionally noted that the pastoral station could be considered part of this category, because an increasing number have been bought by Indigenous corporations. However, while they share the problems of remoteness with outstations, these enterprises were more likely to be economically orientated than traditionally based.

## **Dispersed settlements**

### *Dispersed settlement in urban centres*

According to Memmott and Moran's (2001) typology, an urban centre is defined as a settlement with an Indigenous population over 1,000 and a total population over 5,000. There were 39 such urban centres in Australia and about 46 per cent of the Indigenous population live in them (Memmott & Moran 2001).

The Indigenous housing in these communities is a mixture of community, public and private rental as well as some home ownership. For example, ABS data (cited in Sanders 2005) showed that 38 per cent of the Indigenous population in major cities own or were purchasing their home, 29 per cent were in private rental and 24 per cent in public housing. A similar pattern was reflected in inner regional areas. However, regardless of type of housing and socioeconomic status, there was still a tendency for Indigenous people in these centres to be segregated together and for them to be in the low socioeconomic suburbs (Sanders 2005).

### *Dispersed residence in rural centres*

A high proportion of Indigenous people also live in smaller rural towns, run by mainstream local government. Housing is mainly rental housing run by an Indigenous housing or state government organisation. Even though the residences may be dispersed, many of the people still practice the customary behaviours related to households that are encountered in the remote communities (Memmott & Moran 2001).

## **Assessing the Indigenous housing situation**

### **Inadequacy of housing supply**

It is well recognised that Indigenous people do not have the same levels of access to affordable and secure housing as non-Indigenous people (ABS 2001). Even though access by Indigenous people to mainstream public housing has increased in the past four years (Flatau & Cooper 2005) and more dwellings have become available (Hall & Berry 2006), there is still a significant supply gap. The Standing Committee on Indigenous Housing estimated that the unmet need for Indigenous dwellings would rise to approximately 18,000 in 2009, comprising a need for 7,600 more dwellings in remote Australia and 10,400 more in urban Australia (Hall & Berry 2006). The consequences of the inadequate numbers of dwellings available for Indigenous Australians can be seen in the data on homelessness and overcrowding discussed below.

### *Homelessness*

Memmott et al. (2003) pointed out that within Indigenous culture homelessness takes on different meanings from non-Indigenous cultural interpretations. In particular, they noted that homelessness may not necessarily equate to a lack of accommodation. A person may have a sense of home and belonging to a place without having any conventional accommodation. Such a position certainly fits in the pre-contact Aboriginal cultural frame and continues today, especially

in outlying settlements. On the other hand, the research of Cooper and Morris (2005) showed that for Indigenous women, having only transient and insecure accommodation did not mean they were homeless. They only saw themselves as being homeless when they were 'roofless'.

The ABS (2005) also recognised the difficulty of both defining and gathering data on Indigenous homelessness. Nevertheless, the bureau still collects data. In the 2001 Census, 7,526 Indigenous people were classified as homeless. Given an estimated Indigenous population of 458,500 in 2001, this number of homeless constituted 1.6 per cent of the Indigenous population. Nevertheless, the rate of homelessness for Indigenous Australians was still high—3.5 times higher than the rate for non-Indigenous Australians—and it was higher in the remotest areas of the Northern Territory and South Australia than elsewhere (ABS 2005).

The ABS (2005) also used a service delivery definition, where homelessness was measured in terms of who was eligible for assistance from programs in support of the homeless. In 2003–04 financial year, 15,400 Indigenous people received help from the Supported Accommodation Assistance Program (SAAP).

Neutze, Sanders and Jones (2000) developed yet another indicator of homelessness. They measured homelessness in terms of the housing needs of people living in improvised dwellings, hostels, night shelters and refuges. They estimated that there were an additional 5,799 bedrooms needed Australia-wide to accommodate the homeless. Eighty-eight percent of these bedrooms were needed in rural areas, especially in the Northern Territory.

It is hard to untangle cultural factors, associated with normal mobility patterns and lower values on physical housing, from statistical data on homelessness. Nevertheless, the evidence suggests that many Indigenous people are without permanent accommodation and would prefer not to be. And there is every indication that homelessness is a greater problem in rural areas than urban.

### *Overcrowding*

In the conventional non-Indigenous definition, overcrowding is measured on the basis of the number of people in the household and the number of bedrooms available to them. Using the ABS standard, SCRGSP (2007) found that 25 per cent of Indigenous people over 15 years of age lived in overcrowded housing. Overcrowding was most common in very remote areas where 63.4 per cent of Indigenous people lived in overcrowded households (SCRGSP 2007).

From 2001 Census data, it was also found that overcrowding in housing varied with housing tenure. Indigenous households that rented from community or cooperative housing organisations had the highest proportion of residents who were overcrowded. The least overcrowding occurred in homes that were being purchased (ABS 2005).

Further data from Neutze, Sanders and Jones (2000) confirm that overcrowding is a problem in Indigenous households and more so in rural than urban areas, especially in the Northern Territory. More recent data from ABS (2004), using the 2002 National Aboriginal and Torres Strait Islander Social Survey (NATSISS), similarly confirmed the pattern of overcrowding being more prevalent in remote areas, with 52 per cent of people living in dwellings that required at least one extra bedroom (a different standard than above).

Discrepancies between data sets described above can be explained, in part, by the ways the data were collected and the fact that the concept of ‘overcrowding’ is as culturally complex as that of ‘homelessness’. In particular, Memmott et al. (2003) argued that crowding must not be defined by density measures alone. For Indigenous people, living densely can be as important as living extendedly. Crowding is a negative experience when it becomes stressful to the participants, not simply when there are not enough bedrooms according to non-Indigenous density standards.

The 2002 NATSISS asked about stress and its relationship with overcrowding. In that survey, 40 per cent of those living in remote areas found overcrowding at home was stressful. In other words, while over 50 per cent (using the 2002 NATSISS) of Indigenous people lived in crowded conditions according to non-Indigenous standards, only 40 per cent found such overcrowding stressful. Nevertheless that 40 per cent was still significant. It indicated that despite a preference for living densely, a substantial minority of Indigenous were stressed by the crowding. Earlier work by Ross (1991) suggested that the stress arose from unwelcome individuals or behaviour, not just the number of people.

Where crowding is stressful, forced mobility and potential homelessness is a likely result. This was demonstrated in the work of Cooper and Morris (2005) where they noted that overcrowding could exacerbate family violence and sexual abuse, often leading to women and/or their children leaving home.

### **Physical infrastructure**

While dense living may not always be perceived as a problem, it becomes so when the housing is physically inappropriate and the infrastructure is unable to support the household numbers—comprising both permanent household members and visitors. If nothing else, the sheer number of visitors using crowded dwellings is likely to exacerbate the normal wear and tear on housing (Memmott, Long & Thompson 2006).

Findings from recent surveys indicate that the housing conditions are generally not good. In the 2002 NATSISS (ABS 2004), 40 per cent of Indigenous people said they were living in a dwelling that had structural problems (58 per cent in remote and 32 per cent in non-remote areas). In the 2006 CHINS survey, 69 per cent of Indigenous Housing Organisation dwellings were reported as needing minor or no repair, 23 per cent were in need of major repair and 7 per cent in need of replacement; the more remote the location, the more dwellings were in need of major repair (ABS 2007b).

### **Tenure and affordability**

While it may be ‘white’ Australia’s dream to own a home on a quarter-acre block, this dream does not match the realities of the lives of many Indigenous people, especially those living in remote areas and in discrete Indigenous settlements.

### *Tenure*

Data from the 2001 Census showed that only 32 per cent of Indigenous households own or are purchasing their home, compared with 71 per cent of other households. In addition, 24 per cent of Indigenous households were in private rental and 21 per cent in public, compared with 18 per cent and 5 per cent respectively of other households. But the Indigenous household tenure profile changed markedly from the cities and regional areas to remote and very remote regions. Home ownership dropped to 7 per cent and private rentals to 3 per cent in very remote regions. In contrast, community rentals went from 2 per cent in the major cities to 61 per cent in very remote regions (Sanders 2005).

In the main, Indigenous households are rental households. Indigenous households are also likely to have shorter tenancy duration and more likely to be served termination and final eviction notices than non-Indigenous households (Flatau & Cooper 2005). As such, Indigenous housing tenure is often very unreliable.

### *Costs*

Despite the low rents for community owned and public housing, this expense can still be a financial burden to many low-income Indigenous people.

From the 1999 Australian Housing Survey, it was found that more than one-quarter of Indigenous households spent more than one-quarter of their income on housing compared with just under one-fifth of non-Indigenous households (ABS 2001). The 2003–04 housing indicator data suggest that this is higher (AIHW 2005). This report found that 43 per cent of Indigenous households spent one-quarter or more of their income on rent.

Neutze, Sanders and Jones (2000) took a different approach to affordability of housing. They looked at income left for housing after other basic needs had been met in accord with the Henderson Poverty Line. When this was done, it was shown that all Indigenous renters have an affordability deficit. However, it was also shown that the deficit was higher for urban dwellers, who are mainly private renters, than for rural or remote dwellers. In other words, while the demand for housing may be higher in rural and remote regions, the need for affordable housing is higher in urban regions.

The fact that all Indigenous households who were renting had a housing affordability deficit has an important implication. As Neutze, Sanders and Jones (2000) pointed out, there is a general principle in housing that one way to overcome affordability problems is to live in overcrowded conditions, with many people contributing to household and other costs—as is the case with many Indigenous households already.

In addition to rental cost, the cost of maintenance and house upkeep also needs to be taken into account. In most instances, the cost of maintenance is borne by the renting agency, but these organisations are experiencing increasing difficulties in funding maintenance costs. In general, the 1990s saw all housing authorities move from a small to moderate operating surpluses into deficits (Hall & Berry 2004). Because of this deficit, both state and Indigenous community housing organisations are increasingly unable to maintain their housing stock. It has become what Hall

and Berry (2006) call a 'ruinous cycle': insufficient revenue (because of low-income rents) leads to inadequate maintenance and housing management, which results in poorer quality stock, lower proportions of potential rents, which ensures further deterioration of the stock and so on. The upshot of this 'ruinous cycle' is that not only does the supply of housing fall short of the need, but the quality of housing for Indigenous people becomes increasingly inadequate in what are already very poor conditions.

### **Cultural appropriateness**

Two core elements of Indigenous culture have significant bearing on housing and living conditions. First, the culture of Indigenous Australians is grounded in a relationship with its physical and spatial environment. Second, the culture is communitarian, rather than individualistic. Both of these elements lead to home being designated as a place, not an individual dwelling, and with the cluster of buildings (formerly the campsite) being the focal point for the family or kin group (Burke 2004).

Both Burke (2004) and Memmott (2003a) point to the long history of failure to provide and design housing for Indigenous people that recognises their communal life and sense of place. Instead, most housing is provided out of conventional mainstream stock, which is based on non-Indigenous family needs.

In an assessment of housing design for the Tangentyere Council (Alice Springs region), Morel & Ross (1993) identified a number of features of Indigenous life and their relationship to housing that needed to be considered. Most importantly, they stressed that housing is far more than providing shelter and practical facilities: a house has cultural, social and economic consequences for an Indigenous community and the individuals involved.

For example, spatial relationships between houses or shelters are very important in a number of different ways (Keys 2000; Memmott 2003a; Morel & Ross 1993). First, the distance between shelters reflects the closeness or distance of relationships between members of a camp. In particular, spatial relationships are critical to managing a culturally specified 'avoidance relationship' (Fantin 2003; Ross 1991). In both instances, the wrong sort of housing that throws the wrong kin together, or living too close, generates social stress.

Second, there are traditional needs for different types of living spaces over the life cycle. Traditionally a community would consist of married people's camps and single men's and women's camps. The latter were kept as far apart as possible and access was largely gender-restricted. The contemporary, western housing cannot accommodate this separation, nor does it respect the tradition.

The response to death of a householder also has a significant impact on housing (Morel & Ross 1993; Ross 1991). It is traditional that the relatives of a deceased person abandon the dead person's dwelling and move some distance away to 'sorry camps'. Traditionally, the dead person's dwelling would also be burnt. But, with modern housing stock in remote centres, it is more likely the dead person's house will be vacated for a period or swapped with another household.

There is less literature on the housing needs of urban Indigenous people. However, the plans described for the Pemulwuy Redevelopment Project in Redfern (James, Pitts & Kombumerri 2003) indicated a need to account for high visitor flows and movement between households as well as outdoor living. In other words, the issue of cultural appropriateness also has merit in urban settings.

Many more features of the inappropriateness of western-style housing for Indigenous people have been described (ed. Memmott 2003b). However, the key point is that western-style housing fails to accommodate a number of important cultural needs and that this failure can impact negatively on social and physical life in communities—often quite profoundly (Reser 1979; Ross 1991).

## 4 Economic realities

### Household incomes and costs

In considering Indigenous incomes, it is necessary to recognise that they are harder to characterise and less stable than non-Indigenous incomes (Hunter, Kennedy & Smith 2003). These characteristics are in keeping with the operation of demand sharing and mobility within and between households.

Despite the ‘slippery’ nature of Indigenous income, a number of different measures show Indigenous Australians are the most disadvantaged and poorest sector of Australian society (SCRGSP 2007). According to Hunter (1999), the depth of disadvantage is such that Indigenous Australians rank well below poor non-Indigenous Australians. As he put it: ‘Australia contains three “nations”, the rich, the poor and Indigenous Australian’s’ (Hunter 1999, p. vii).

One indication of this disadvantage is the level of labour force participation. In 2003, the labour force participation rate for Indigenous people aged 15 years and over (50.4 per cent) was lower than that for non-Indigenous (62.6 per cent) in the same age range (SCRGSP 2003). However, the latter figure included Indigenous people working in the Community Development Employment Project (CDEP) scheme (to be discussed later). When CDEP participation was excluded, labour force participation for Indigenous people dropped to 31.4 per cent of the Indigenous population aged 15 years and over.

There were significant geographic differences in the labour force participation rate for Indigenous people. Forty-four per cent of all Indigenous people aged 15 years and over living in major cities were employed. This dropped to 36 and 33 per cent for inner and outer regional areas, respectively, and then to 14 per cent for those in very remote areas (Sanders 2005).

Because of lower rates of participation in the labour force, Indigenous people are much more likely to be living in households where either no-one works or only one person is employed (Hunter, Kennedy & Biddle 2002). As such, many Indigenous households are dependent on various forms of welfare payments for their major or sole form of income, along with whatever CDEP or paid work monies can be generated.

The value of large (albeit overcrowded) households becomes more obvious when income levels for the whole household are considered. Despite the significant geographic differences in labour force participation, these differences almost disappear when considering household incomes. Income per Indigenous households is much more consistent across the geographic regions than individual income or employment levels because household size increases with remoteness. Census data from 2001 showed that across all geographic regions, about half of the Indigenous households had an income under \$800 per week. However, these household income levels were still considerably lower than non-Indigenous households in all geographic areas (Sanders 2005).

It is in these circumstances that demand sharing plays a pivotal role of distributing limited resources across the household or linked households. As Daly and Smith (2000) noted, the case studies of Yuendumu and Kuranda showed the significance of the network of kin and linked households for the economic survival of the communities and for the care of the children. The case studies also showed how many households operated on a fortnightly boom-to-bust cycle (Finlayson & Auld 1999).

However, adult members of Indigenous households do not necessarily share resources equally, nor do they all contribute to the domestic costs within a particular household (Daly & Smith 1999). Mobility and its resultant high visitor rate has had a significant impact on household economies, often taxing limited resources without contributing to costs. This is especially so when transients are unemployed young adults. This lack of contribution from many transient kin members has an impact on, amongst other things, the paying of rent.

Regular payment of rent is a problem in many Indigenous communities, especially those in remote regions and with community-managed housing (Burke 2004). One solution has been to shift the responsibility for paying rent from the head tenant to all members of the community, with the levying of a common poll tax, regardless of which household they are living in (Sanders 2005).

Mobility and the nature of extended child care in Indigenous families also create income problems. The primary care giver for any one child in a particular household is not necessarily a biological parent (Daly, Henry & Smith 2002). However, as Page (2000) has noted, the requirements for family assistance payments do not accommodate the high mobility of Indigenous children and the concomitant change of carer/parent. Because of the early autonomy accorded Indigenous children, Indigenous families and carers see the family assistance payments as 'kid's money', not the money of the carer/family (Page 2000). On the other hand, the fact that this payment is based on a non-Indigenous conception of nuclear families means that the assistance can go to the parent/s who may not be the carers. As a consequence of this mismatch, households caring for children, often for indefinite periods of time, may not be the ones receiving the 'kid's money'.

Given the ever-changing size of Indigenous households, their typical reliance on welfare payments, and the fact that family groupings and domestic units are not necessarily sharing the same home, it is often not possible for households to even conceive of a budget, let alone apply one (Finlayson & Auld 1999). As Schwab (1995, p. 15) noted, household expenditure is often highly contingent and unpredictable: 'a complex yet subtle calculus is employed on a daily basis as individuals decide which expenses require immediate attention and which can be deferred'.

Despite the unpredictable patterns of spending, it is known that Indigenous households spend a greater proportion of their income on food than all Australian households. For example, in Yuendumu, those 90 per cent receiving welfare or CDEP spent 80 per cent of their welfare money on food (Musharbash 2000). This higher food expenditure reflects, in part, the cost of transporting and storing food in the rural and remote regions of Australia and the fact that only one store is available in many communities. Indigenous households also incur considerable expenses for transport, again a feature of the regions in which they live and their kinship visiting needs (Memmott, Long & Thompson 2006; Smith 1991, cited in Finlayson & Auld 1999). When rent is added to these expenses, there clearly is not much, if any, household money left.

## Work in Indigenous society

### Understandings of work

In a general sense, work occurs when effort is applied in the doing of things. In the mainstream, non-Indigenous society, when work is done away from home, it is typically work that attracts remuneration and people are classified as 'employed'. But when work is done at home, it is typically seen as domestic unpaid work and valued less accordingly. Some of the non-Indigenous values implicit in the valorisation of outside, paid work are reflected in the Steering Committee for the Review of Government Service Provision's report on Indigenous disadvantage:

Labour force participation and unemployment have been chosen as headline indicators because of the importance of participation in employment to overall wellbeing, particularly in terms of remuneration, opportunity for self development and interaction with people outside the home. (SCRGSP 2003, p. 3.18)

The literature reviewed for this paper suggests that Indigenous culture does not place such importance on participation in paid employment, or on the need for self-development and interaction with people outside the home. The latter two values, in particular, would seem almost antithetical to the central importance of the sustenance of kin networks in the lives of Indigenous people.

In Schwab's (1995) detailed analysis of the 'calculus of reciprocity', he recognised that, for many Indigenous Australians, the social and financial support of kin is a far more predictable resource than the labour market. In particular, a job or a training program that required moving away from kin would be seen as a high-risk proposition for many Indigenous people. Schwab concluded: 'participation in labour market programs ... is a complex social decision not merely a question of economic opportunity' (1995, p. 16).

However, even if migration did take place to more developed labour markets in major urban areas, there appear to be few employment opportunities for Indigenous people in the more urban areas (Biddle & Hunter 2005). Indeed, Taylor (Megalogenis 2006) confirmed at a recent meeting of federal, state and territory Indigenous affairs ministers that, over the past decade, Indigenous people living in urban areas had not improved their lot at all. Moreover, as Biddle and Hunter (2005) noted, an ABS monograph showed that labour market discrimination cannot be discounted as a major factor underlying Indigenous employment disadvantage whether it be in metropolitan, provincial or remote Australia.

In all, the labour market for Indigenous people is far more limited than that for non-Indigenous Australians. On the other hand, as Altman (2005) showed, non-market activities still play an important role in contemporary Indigenous life, especially in remote communities. He described what he called ‘the Indigenous hybrid economy’ in which there are three major sectors that overlap in complex ways—the state, the customary and the market.

### **Customary work**

Recent data from the NATSISS in 2002 showed that the customary sector is alive and well, at least in discrete Indigenous communities, mainly in the very remote regions of Australia (ABS 2004). As Altman (2005) noted, 82 per cent of adults in discrete Indigenous communities hunted and fished in the three months preceding the survey and 20 per cent participated in paid or unpaid cultural activity.

Altman (2005) also noted that over 90 per cent of participants in the CDEP scheme were able to meet their cultural responsibilities. This scheme employs Indigenous people to undertake work, training, community activities, or establish enterprises. CDEP has been in operation for 30 years. In remote regions, CDEP accounts for nearly three-quarters of Indigenous employment (Altman, Gray & Levitus 2005). In this regard, CDEP has offered an important alternative working venue for many Indigenous people and one more in keeping with customary activities.

The significant point to be drawn from Altman’s (2005) and Altman, Gray and Levitus’ (2005) papers is that there is work undertaken in Indigenous communities that is not necessarily recognised as work in the mainstream economy. And as Collard et al. (1994) noted, it is not recognised as such because of the absence of non-Indigenous indicators: ‘Aboriginal culture is perceived to be inferior because it is not concerned with material wealth, permanence, employment status and ownership’ (p. 6).

Much of the non-market, customary work in very remote regions could be described as of the hunter–gatherer form. However, equally as much in all regions of Australia, the work could be described as cultural and kin maintenance work—work that, if seen at all in mainstream society, is of the same order as unpaid domestic work or voluntary community work.

It is important to bear in mind that this unpaid kin and community care work may not be trivial. Kin maintenance can be very time consuming and stressful when it involves managing family dysfunction of any form, and this is as true for non-Indigenous as it is for Indigenous people. But when the often broad-scale family dysfunction in Indigenous communities is considered, it is easy to see that the crisis management aspect of kin maintenance can be time consuming and impact on a person’s availability for paid work.

Even when not addressing the crisis aspects of kin maintenance, many Indigenous people engage in voluntary work for their community. For example, Henry and Daly (2001) found that there was significant voluntary work done in the Kuranda community. Over half of the key reference persons (representing households) they interviewed did some form of voluntary work. For one-third of these reference persons, this work was child-related voluntary work and for over half, it was voluntary work for a community organisation.

A lot of this voluntary or unpaid domestic work centred on child care. As Daly, Henry and Smith (2002) observed for the Kuranda community, approximately three-quarters of the households surveyed had children other than their own biological children in residence and being cared for. These 'caretaker' relatives were usually senior female kin who made an enormous social and economic contribution to the households, through their child care. Hammill (2001) made similar observations about the role of 'grannies' as caretaker relatives at Cherbourg.

The literature was searched for evidence of other gender-specific unpaid work, especially evidence of the form usually employed when discussing labour division and time use in non-Indigenous households. There is an abundance of research on gender roles with regard to cultural activities, such as the creation of art works and dance, and to traditional practices, such as the passing on of spiritual knowledge and law. But there is a curious dearth of information about ordinary 'domestic' matters. It is not clear who does what within Indigenous households in terms of gendered division of labour or, indeed, even what types of labour occur.

However, there is one observation that is suggestive and worthy of further exploration in this regard: that whatever customary gender-specific roles may have existed, they have changed. Haebich (2004) in particular, argued that this change was brought about through the initiatives of assimilation policy. The central focus for that policy was changing Indigenous women and there was encouragement to help Indigenous mothers create the 'suburban Aboriginal nuclear household'. As a consequence, there was a role shift from the Indigenous male to the female in contemporary society to such an extent that some writers suggest Indigenous men have been marginalised (Atkinson & Pearse 2001).

These observations point to Indigenous women as potentially playing a greater role in the unpaid work of kin and community care than Indigenous men. However, given the nature of these unpaid activities, it is not the household that is the site of unpaid labour, as is typically the case in the Anglo-Celtic house, but the community or kin network. And, once again, these activities, and the site of them, are likely to occur more frequently in remote and in discrete Indigenous communities than in urban regions.

## 5 What are the implications for policy?

### **A tangled web of cause and effect**

The data presented in this paper clearly show that Indigenous Australians have the poorest quality housing of all Australians and an inadequate supply of housing, accompanied by substantial environmental health problems. This is especially the case amongst discrete communities, in town camps and in remote communities generally.

The nature of Indigenous family life and culture impacts in many different ways on their housing as does the cultural inappropriateness of the houses themselves. The western-style housing typically provided for Indigenous people is incommensurate with their extended way of life and with their management of kin relationships. It is also inappropriate in terms of their reliance on, and use of, their spatial and physical environment. Again, this has more impact in remote and discrete communities where customary practices continue.

Nevertheless, the management of kin relationships and the demands of these obligations cut across geographical regions and can apply in urban areas as well. And it is this application of demand sharing and reciprocity amongst kin that places a further burden on housing. Even though Indigenous people exhibit a preference for living densely, normal crowding can all too often extend to overcrowding in houses built for nuclear families and where houses with functioning health hardware are in short supply. This, in turn, stresses the housing stock and physical infrastructure even further, as well as contributing to psychological stress of the occupants.

In considering the economic realities, the evidence also shows that Indigenous people, as a people, are the most disadvantaged on any number of measures, not just housing (SCRGSP 2007). Indeed, they are so disadvantaged that Indigenous Australians rank well below poor non-Indigenous Australians (Hunter 1999). In considering this disadvantage, a further series of tangled links are exposed between housing, family life and employment.

In the first instance, the very creation of permanent settlements with fixed housing was based, amongst other reasons, on the assumption that the Indigenous inhabitants would be engaged in economic endeavours to support permanent settlements. Thirty years ago, O'Connell (1979, p. 119) pointed out that 'the first task is to find out what these people can do for a living, then plan housing accordingly'. This injunction would seem to have been ignored when considering the number of permanent communities in remote areas with no economic base or labour market. Yet, as Schwab (1995) has observed, for Indigenous people, the social and financial support of kin in the community is far more preferable—perhaps culturally essential—than moving away from country to find work.

Second, it was noted that the stress of living in crowded and impoverished circumstances is one important motivator for encouraging mobility. People move to find acceptable living conditions and this consequentially redistributes the resource allocation amongst kin. This is not only a cultural imperative but also an economic one amongst resource-strapped families. Even though this movement is usually along local kin lines and thus is kept to a region, it still has consequences for the capacity to be employed in a 'steady' job.

The sheer size of the households and the number of dependents can also impact on employability. Hunter (1999) has shown that the more dependents there are per adult, the less the ability to participate in the labour market. Earlier, in Section 2, it was noted that Indigenous households have a greater child dependency burden than non-Indigenous households. It was also noted that Indigenous households have a higher proportion of lone-parent families with a higher number of dependents than other lone, non-Indigenous parents. Given these circumstances it is easy to see how the ability to participate in paid work would be limited for many Indigenous parents, especially in the absence of pre-school and child care facilities in many communities.

Life in Indigenous households impacts on the employability of residents in many different ways: through the often inadequate physical living conditions and the harsh economic realities of few employment opportunities and general disadvantage that are in turn compounded by the chaotic order of Indigenous people living extendedly and densely. This impact appears to be most pronounced in discrete Indigenous communities and remote areas.

From even the briefest foray into the issues exposed in this paper it becomes clear that there is a very tangled web that binds all three dimensions: physical housing; cultural and family life; and economic realities. The question remains whether it is possible or even desirable to attempt to untangle this web into a sequence of cause and effect.

Certainly, there is a belief in much of current social housing policy that good housing, including that acquired through government assistance, has positive social, cultural, psychological and economic outcomes for individuals. Such a belief presumes a causal relationship: where an improvement in people's housing situations will, for example, improve health and wellbeing.

Mullins, Western and Broadbent (2001) and Mullins and Western (2001) have reviewed the international literature and raised doubts about this simple causative assumption. Mullins, Western and Broadbent (2001) assert that there is a need for caution in claiming a causal link between housing and non-housing outcomes. While these outcomes may co-relate, they can be just as well explained by the nature of the people living in the house than the house itself. Or, using the arguments cited in this paper, the relationships between housing and health could also be attributable to the inappropriateness of the housing for the people (Pholeros 2003).

In their review, Mullins, Western and Broadbent (2001) found evidence for links between housing and crime, housing and education, housing and health, and housing and poverty. There is not, however, evidence that any one of these factors is the cause or effect of the other/s. Indeed, the very nature of the issues involved would suggest that there is no simple cause and effect. As I have attempted to show in this paper, the relationships between housing, family life and economic realities are so interwoven they defy simple disentanglement. Policy needs to recognise and address this entanglement.

## **Joined-up problems need joined-up solutions**

The tangled web of poor housing, chaotic family life and impoverished economic realities provides a classic example of a complex social problem that requires a complex solution. Simply improving the physical quality of housing stock is no more an answer to the Indigenous disadvantage than is creating jobs out of nowhere. The problem needs to be conceived as a complex interaction of factors, where the physical and economic realms act as both causes and consequences, particularly when played through the Indigenous cultural frame.

The policies, programs and practices arising from the drive to ameliorate social exclusion in Europe, the United Kingdom (UK) and, more recently, in Australia (specifically South Australia and Victoria) offer a way forward in dealing with joined-up problems like those described in this paper. The Social Exclusion Task Force in the UK describes social exclusion as being:

... driven by a complex interplay of demographic, economic, social and behavioural factors that are linked and mutually reinforcing. For some people these drivers can combine to create a fast moving and vicious cycle into exclusion. The process is cumulative—the longer one is exposed to these exclusionary processes, the worse the consequences. (Social Exclusion Unit 2003, p. 1)

Arthurson and Jacobs (2004) considered the value of using the idea of social exclusion for housing policy issues in Australia. They concluded from their review that housing policy needs to address a range of areas including education, health, welfare and employment. They argued that the main value of the concept of social exclusion was found at the level of implementation, in promoting joined-up policy responses that recognised the complexity and interrelated nature of housing and inequality.

The idea of joined-up solutions has been extensively developed in social exclusion policies in Europe and the UK (Social Exclusion Unit 2004) and, more recently, in South Australia (Cappo 2002). Essentially, joined-up solutions mean that local authorities, health services, job centres, local communities, public agencies, voluntary and private sector organisations work together to provide services that benefit the socially excluded in an integrated way (Europa 2008). In other words, it has been found that complex, joined-up problems reflecting social exclusion need to be approached in a complex, joined-up way. The idea of a joined-up solution for the problems associated with poor quality housing and impoverished economic realities in Indigenous communities would seem most appropriate for dealing with the tangled web of factors described in this paper.

## A community focus

Joined-up approaches are best applied at the local, community level, especially when dealing with complex matters of social exclusion. Estivill (2003), in reviewing what has worked in the European context, identified a local or community strategic focus as a key factor in successful policy implementation. In the Australian context, Nicholson (2007) has also advocated attention to place or community in the development of social exclusion initiatives.

This local, community focus allows the specific problems of the community to be addressed in localised ways that suit that community. A local, community focus also maximises the possibility of active participation by the community and thus enhances the potential for 'ownership' of the solutions.

Focusing on the community is very much in keeping with the nature of Indigenous culture and family life. It is neither the family nor the household that is the functional unit in Indigenous life, but the community of kin and those in the reciprocal moral economy. Therefore, it is the community that should be the focus for the joined-up approach, not the individuals in the community.

Green and Zappala (2000) discuss the notion of place management as a model for the delivery of local community services that can directly address the severe problems of disadvantage experienced in Indigenous communities. This approach has been employed successfully in the Victorian Government's Neighbourhood Renewal initiative (Department of Human Services 2005) that is concerned with improving employment, learning and local economic activity along with enhancing housing, safety, health and wellbeing.

The concerns addressed by the Neighbourhood Renewal initiative reflect the same concerns identified in this paper for Indigenous communities and the lessons learnt from that initiative could be applied to deal with the joined-up problems identified in this paper.

## 6 Conclusions

This paper has reviewed research and policy papers on Indigenous life from three domains—the cultural, the physical and the economic. The purpose was threefold: to explore the relationships between the different domains and their various impacts on each other, to demonstrate the importance of taking a complex view using a cultural lens, and to consider the implications for policy.

There are a number of features of Indigenous family life and culture that are in stark contrast to that of other Australians' family life and the Anglo-Celtic culture underlying it. In particular, Indigenous families are usually larger and have more complex kin relationships; their households have varying compositions over time; family members can be spread over more than one household; and mobility is a fact of life. Underlying this family structure is the core cultural principle of reciprocity: a principle that ensures that limited resources are distributed, kin relationships are reinforced, and that there is some order to the seeming chaos of everyday life.

When it comes to the physical realm of housing and related environmental infrastructure, the evidence indicates that Indigenous people do not have the same level of access to affordable and secure housing as non-Indigenous people and, amongst other things, this has led to greater numbers of homeless and more overcrowding. The problems associated with inadequate housing supply and poor stock increase with remoteness. In remote and very remote areas, housing stock is simply inadequate: some communities have no permanent dwellings; many had makeshift shelters; and overcrowding is the norm. There are also significant health problems arising from the poor and dilapidated housing stock and environmental infrastructure.

When the issues of housing are considered with an Indigenous cultural lens the physical problems take on a new light. In the first instance, evidence points to the inappropriateness of western-style housing to many different cultural needs: from the large, mobile and changing household compositions through complex relationship management, to space and place management over the life cycle. Evidence further shows that the inappropriateness of western-style housing impacts negatively on social and physical life in communities.

Indigenous people are similarly disadvantaged in the economic realm. Evidence was cited to indicate that they are, in fact, the poorest of all groups in Australia. They have a lower labour force participation rate, they are more likely to live in jobless households and many are solely dependent on welfare payments. These characteristics occur in greater numbers with increasing remoteness. With increasing remoteness there are also less job opportunities but a concomitant increase in non labour-market activities. The evidence indicated that customary activity, kin care and other voluntary work is common in Indigenous communities.

The economic realities of Indigenous life are interwoven with the physical and the cultural. Given the pressure on households, the poor housing quality, the overcrowding and the health problems arising from poor 'health hardware', it is easy to comprehend how these would all interfere with the work-readiness of Indigenous household members. The importance of the principle of reciprocity to family life also means that moving away from kin for job opportunities becomes a high-risk venture.

There can be little doubt that all of these domains—the cultural, the physical and the economic—interact. Moreover, evidence indicates that no one element can be seen as the cause or the effect for the others. They defy disentanglement. Recognising this becomes a policy challenge that is best met by adopting a social exclusion approach to the problems. Under the rubric of social exclusion, the problems become joined-up problems that call for joined-up solutions. They also become problems best addressed at the local or community level.

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# Government/non-government relations: the impact of contractual reporting and accountability requirements on non-government organisations under previous arrangements in the Family and Community Services portfolio

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Abridged summary with update by FaHCSIA

## 1 Introduction

This article is an abridged version of a more detailed research report commissioned by the Australian Government Department of Family and Community Services (FaCS) in 2002. The two-part study investigated the impact on non-government organisations of contracting arrangements introduced for the first time in the mid-1990s. It was undertaken by the Social Policy Research Centre (SPRC) at the University of New South Wales for (then) FaCS.

After the research had been completed, responsibility for a number of the programs selected for this study was moved from FaCS as a result of machinery of government changes following the 2004 Federal election. Machinery of government changes arising from the 2007 election further changed portfolio responsibilities, including the return of some of these programs to the Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) portfolio.

This series of program responsibility changes, as well as improvements made to some previously problematic aspects of program administration, mean that the program environment that existed at the time of the research has also altered. Notwithstanding this, the most recent changes to program arrangements following the 2007 election, along with the Government's emphasis on social inclusion, provide a timely opportunity to release the results of this research. FaHCSIA intends to introduce a new performance framework for service providers in 2008, which makes this

social policy note particularly relevant—both as a useful evaluation of past practices and in regard to consulting the community sector during policy development.

The article begins with a description of how the research was conducted, followed by a brief report on the results of the research, then a discussion of the findings and a summary of areas for reform. The appendix provides a description of changes that have occurred in the program environment since the study was undertaken, and some of the major concerns raised by respondents are also addressed in light of recent developments within FaHCSIA.

## The SPRC study

The study was undertaken in 2002–03 and aimed to examine the following research questions:

- ▶ What type of reporting requirements do organisations have and what impact have these requirements had on the organisations?
- ▶ Is the administration of the contracts by FaCS effective and efficient?
- ▶ How do funded services feel about the reporting and accountability requirements of FaCS contracts?
- ▶ What broader effects have the changed reporting and accountability requirements had on the community services sector?
- ▶ What type of future reforms do respondents support?

A mail questionnaire, developed in consultation with FaCS, was piloted and distributed to 1,800 randomly selected contracted organisations. The random sample was generated from the FaCS vendor database, inclusive of the 10 program areas administered by the department—including the Stronger Families and Communities initiative; Emergency Relief Program; Job Placement, Employment and Training (JPET) Program; Green Corps; Youth Activities Services (YAS), Reconnect, Disability Employment Program, Child Care programs, Family Relationships Service programs and other miscellaneous programs (mainly resourcing programs).

Responses were received from 623 organisations, representing a response rate of approximately one-third—a good response for a self-administered mail questionnaire. It was acknowledged that the findings were not fully representative of the views of all FaCS contractors, nor of organisations providing services on behalf of other government agencies. However, the study captured the experiences of many organisations traditionally absent from questionnaire research, including Aboriginal and Torres Strait Islander agencies, small rural agencies and those reliant mainly on volunteers.

The study makes a valuable contribution to existing knowledge, although caution should be exercised in drawing conclusions beyond the respondents to this study. The diversity of respondent experiences and views did enable exploration of why organisations had such different reactions to the contracting reforms. Some organisations appeared to be largely unaffected by the changed funding environment, while others were adversely affected, and a third group of organisations viewed contracting as an opportunity.

## The respondent organisations

The responses provided insight into the experiences of a diverse range of organisations, from very large (over \$3 million annual income) to very small (less than \$100,000 annual income). The organisations provided services in a range of settings and to a range of communities. The study group included large city-based services with hundreds of volunteers, Aboriginal and Torres Strait Islander organisations providing services in remote locations and for-profit child care providers. Respondent organisations represented a good spread of those providing services in rural, regional and remote locations.

Each of the former FaCS program areas was included in the sample, and 170 respondent organisations (27 per cent) had received funding under more than one FaCS funding program.

Less than 10 per cent of the organisations employed more than 50 full-time staff; the median number of full-time employees for all organisations was four. Nearly one-third of respondent organisations employed at least two part-time staff; the median number of part-time employees for all organisations was five. Over two-thirds of respondent organisations had less than 10 volunteers; the median number of volunteers for all organisations was seven.

Ten per cent of respondents were operating on a for-profit basis. Forty per cent of respondent organisations had an annual income of less than \$250,000 while another quarter had annual income in excess of \$1 million. Over half of the respondent organisations had entered into two or more contracts or agreements with government agencies over the preceding 12 months. Nearly one-fifth had signed five or more contracts in the preceding year.

Over half of the respondents provided services beyond metropolitan settings, although many organisations gave more than one response to this question, suggesting that they had large catchment areas. Ten per cent of organisations had specific population targets such as Aboriginal and Torres Strait Islander communities, non-English speaking communities or specific gender clients.

The individuals responsible for reporting and accountability for the respondent organisations were highly skilled and experienced and usually had tertiary qualifications as well as long periods of employment within their agency.

## Results

### **Contractual reporting and accountability requirements**

The study explored the impact of contractual reporting and accountability requirements from a number of perspectives: the type of reporting; the frequency of reporting; the staff hours allocated to reporting; and similarities between reporting requirements between programs.

Contracted organisations providing personal and social support services and employment and training services were found to have had more onerous reporting and accountability requirements than those funded through other FaCS programs. Less than two-thirds of the respondent organisations were required to provide performance reports, mostly on a half-yearly or yearly

basis. Just over half of the respondents were asked to provide financial data, once again on a yearly basis. As the production of yearly accounts was a requirement for most organisations with formal structures (both for-profit and not-for-profit organisations), this did not usually require additional work, although the accounts needed to be presented in specific formats.

Just over half the respondents were asked to provide client data reports, although on a more frequent basis than other reports. Just over one-third of respondents were asked to provide work plans, mainly on a yearly basis. The collection and reporting of client data required the greatest allocation of staff resources. More than one-quarter of respondents allocated in excess of eight days per month to the collection and reporting of client data. This was considerably more than the resourcing required to meet other forms of reporting requirements.

In all types of reporting requirements, the larger the organisation, the greater the time allocated to the task. This finding suggested a positive relationship between grants received and reporting requirements, which allayed some of the concerns of the sector in relation to the 'swamping' of small organisations by accountability requirements (Nyland 1993, pp. 134–36).

There appeared to be no difference in reporting requirements between organisations in different locations, which indicated that the department administered grants in a consistent way throughout the country.

### **Impact on functioning of contracted organisations**

In general, the study showed that the increased accountability requirements had a mixed impact on the functioning of contracted agencies. In most cases it made little difference, which suggested that the data collected through reporting requirements was primarily meeting the needs of the department and of limited relevance to the management of services. Reporting was viewed as an obligation by most contracted organisations rather than a tool with which to genuinely engage in quality improvement. Respondents viewed reporting requirements as improving the functioning of their organisations only in relation to public accountability and documenting their work. The reforms appeared to have had limited success in achieving their desired goal of significantly improving operations. It was suggested that greater dialogue and consultation with peak organisations and individual organisations may have been required to achieve these goals.

Just over one-quarter of respondent organisations said that the reporting requirements had improved their planning and targeting. From a service delivery perspective, it was disappointing that the reporting requirements had limited positive impact on the planning and targeting of services. In theory, the reporting requirements provided information for services to better understand their client groups and identify gaps—allowing them to develop strategies to address service gaps—but this did not occur.

Ten per cent of respondent organisations reported that the changed funding arrangements hindered efficient use of resources and the focus on clients. Because these were two of the key drivers behind the reforms, this was an important finding. The hope held out by McDonald (1999) that the changes would improve internal systems of management and control, including the functioning of boards and committees, also appears to have been unrealised. These research

findings supported the concerns expressed by the House of Representatives Standing Committee on Family and Community Affairs (1998, pp. 56, 58–60) about the uncoordinated approach to monitoring within the community services sector.

Approximately 60 per cent of responding organisations received funding from more than one government agency. In only a minority of cases the client data, financial reporting and performance reporting requirements of various programs were ‘exactly the same’. Financial reporting requirements were more likely to be at least ‘similar’ between programs than client data or performance reporting. Child care providers had the least diversity in reporting requirements, whereas organisations funded under Reconnect, Youth Activities Services and Stronger Families programs indicated the greatest diversity in reporting requirements. The larger organisations, which were more likely to have a multiplicity of reporting requirements, also indicated the greatest diversity of reporting requirements.

### *Organisational stress*

The study examined how contracting affected organisational stress and found that the fact that FaCS changed reporting and accountability requirements was a major contributor to organisational stress. As respondent organisations became more familiar with reporting requirements, achieved agreed outcomes, and successfully negotiated new contracts, organisational stress levels reduced. For example, the level of stress in contracted organisations that indicated they were ‘very stressed’ at the time that the changes were introduced decreased by 50 per cent by the time the changes had been fully implemented.

Only a small minority of organisations were initially comfortable with the changed funding environment and contracting arrangements. Nearly three out of 10 respondent organisations remained stressed about the changed funding environment. Multiple-funded organisations reported the highest levels of stress.

Organisations that administered JPET services revealed an interesting insight into the relationship between reporting and organisational stress. These organisations reported a relatively high reporting burden because one-third were required to lodge quarterly financial reports and 43 per cent of organisations had allocated in excess of eight days per month to the collection of client data to meet this demand. Despite this situation, these organisations reported one of the lowest levels of stress.

Organisational stress was also associated with concerns about the cultural assumptions embedded in the new approach to funding community services under outcome-based contracts. The data suggested that a perception of being ‘encouraged to compete rather than to collaborate with other agencies’ contributed to greater organisational stress. The experience of being required to be ‘more accountable to the department than to our community’ also significantly affected organisational stress levels. While reporting requirements were accepted as a reality, concern persisted among respondent organisations about the appropriateness of a contracting relationship with the department for the delivery of community services.

## **Impact of FaCS administration and payment processes**

The majority of organisations had a positive opinion about the administrative aspects of the contract between service providers and the department. Nearly three-quarters of respondent organisations rated the contract as ‘good’ or ‘very good’ in relation to the payment mechanism, use of plain language and adherence to privacy legislation.

The major areas of concern for organisations were about how the contracts affected the relations between the funding body and the service provider, particularly in regard to recognition of independence and organisational autonomy, and clarity about rights of non-government organisations. Also, some organisations expressed concern about the level of funding and the type of reporting requirements. Aboriginal and Torres Strait Islander organisations and those providing services under the Disability Employment Program were particularly sensitive about these issues. However, small organisations did not indicate any particular concern about the level of funding and reporting requirements, which suggested that program requirements were more likely to determine a particular response than organisational size.

Technological needs remained very high for most organisations, although this was particularly the case for medium-sized organisations with fewer resources to set up IT systems to cope with the new reporting requirements. These organisations’ technological capacity had difficulty supporting this growth. This situation presented a capacity-building opportunity for the department, particularly in relation to improved communication and information technology.

## **Impact on relations with government and organisational role**

There was considerable goodwill towards establishing a more productive relationship with the department. The results of this study indicate that the effect of the contractual funding arrangements on relations with the department was complex. In many cases, contractual funding arrangements did not have the adverse effect anticipated in the literature. Despite concern about the impact of the purchaser/provider model on collaborative needs-identification, most organisations remained able to participate in the policy development process.

Concern in the literature about the reduction of advocacy services was also not supported by the study’s findings. The vast majority of respondent organisations reported that their ability to advocate for disadvantaged people had not been impaired by the new funding arrangements. Importantly, given the concerns expressed in the literature about the impact of contracting on peak organisations, organisations involved in ‘policy, service support and development’ reported that their advocacy capacity was unimpaired. In addition, two-thirds of respondent organisations believed they had not been diverted from their vision and purpose by the new contractual arrangements.

As a result of the new funding arrangements, nearly half of the organisations reported that they were more accountable to the department than to the community. According to the vast majority of respondent organisations, the role of all parties involved in the purchaser/provider model was not clarified. Many respondent organisations were ambivalent about the likelihood of being funded for preventative or developmental work and could not decide whether the new arrangements

encouraged them to compete or to collaborate with each other. There was considerable criticism of the lack of feedback received from the department following submission of reports. Respondents also expressed concern about the utility of the information generated by accountability measures.

The study found that contracted organisations wanted stronger relations with the department. In general, they sought closer cooperation with departmental officers. Some expressed the view that relations had deteriorated in the period preceding the survey and these organisations requested more departmental support. Nearly two-thirds of respondent organisations indicated a desire to receive informal advice and support from the department and to be provided with contact details of an identified staff person. Organisations funded to provide youth services expressed the strongest desire for closer relations with the department. The majority of respondent organisations providing Emergency Relief services were satisfied with relations at the time of the survey.

## 2 Discussion

This discussion highlights what is known from the research, explores what this might mean for government and non-government relations, and identifies new research questions for investigation.

The study examined one aspect of the complex relations between government and non-government organisations—contractual reporting and accountability requirements—and challenged some assumptions and reform objectives related to the impact of contracting, the purchaser/provider split and competition policy. The ‘reporting burden’ of these changes—including cost, time, frequency and relevance of the reporting framework—was a key issue for the research, and a diversity of experience emerged from the findings, shaped by program type.

Organisations that participated in this study provided insight into the range of experiences encountered by agencies delivering FaCS programs following reforms to funding arrangements and reporting requirements in the mid-1990s. The study found that because organisational type and funding program characteristics strongly influenced experience, the findings cannot be generalised to all organisations funded by FaCS or to the community sector as a whole. Despite this limitation, the findings provide important insights into the experiences of organisations in the shift from grant-based funding to contracting arrangements.

### *Complexity of the community sector*

The responding organisations reflected the multiplicity and complexity of the community sector in many ways. They ranged in size, with some employing over 3,000 full-time staff and others not employing any full-time staff. Two-thirds of organisations were small-to-medium sized organisations with annual incomes less than \$1 million. The strong participation by rural, regional and remote organisations in the research provided a good opportunity to explore the impact of geography on organisational experiences.

While the majority of organisations had access to volunteers, few had access to large numbers of voluntary staff. The median number of volunteers was seven per organisation. Some of these volunteers were involved in organisational management rather than service delivery functions. The vast majority of organisations were operating on a not-for-profit basis, despite concerns about the

increasing 'marketisation' of community services. However, for-profit organisations (approximately 10 per cent of respondents) were not limited to the provision of child care services. They provided services under all other program areas except Emergency Relief, Youth Activities Services (YAS) and Reconnect.

One of the most important findings of the research, in terms of the profile of key personnel in organisations that provided services on behalf of FaCS, was the substantial experience and expertise among the respondent individuals. Despite sector-wide job insecurity and poor salary levels, these respondent organisations had attracted and maintained highly experienced and qualified managerial staff. Over half of respondents had been employed in their current job in excess of four years and 40 per cent had been employed in the sector for more than 10 years. This longevity challenges claims of a staffing crisis, at least in managerial positions. Respondents were also a highly qualified group, with 42 per cent having a tertiary degree and a further 24 per cent having postgraduate management or business qualifications.

The complexity of the funding environment in which contracted organisations operated was reflected in information gathered about program type. Over one-quarter of the organisations were funded to provide services under more than one FaCS program. Many organisations had been 'mixing and matching', for example, providing Child Care programs and JPET and Stronger Families services within the same catchment area. Responses from organisations funded to provide services under more than one FaCS program indicated that the reporting requirements of the various FaCS programs were 'substantially different'. Not surprisingly, those most affected by internal FaCS reporting differences supported reforms to standardise program reporting requirements.

Nearly six out of 10 organisations surveyed had two or more contracts or agreements with different government agencies, mostly for 'newer' programs. In contrast, over two-thirds of providers for 'older' FaCS programs dealt exclusively with the department and this shaped their experience of reporting and accountability requirements. For example, very few of the organisations funded to provide services under 'older' FaCS programs indicated high levels of stress or expressed concern about the impact of accountability requirements.

At the time of this study, most organisations (85 per cent) had been required to provide annual financial reports on their funding. This is a standard requirement for incorporated bodies or businesses, therefore no additional 'burden' was created. Six out of 10 organisations were required to provide reports on performance, either on a half yearly or yearly basis. Just over one-half were required to provide client data and only 39 per cent were required to provide work plans.

Both within-program differences and between-program differences were evident in the findings. For example, among the organisations funded to provide services under YAS, the following proportions were required to report on performance monthly (14 per cent), quarterly (23 per cent), six-monthly (36 per cent) and yearly (41 per cent). (Totals to more than 100 per cent, as multiple reporting requirements possible.) These differences reflected the department's tailoring of contracts to specific situations. However, such diversity of requirements created additional complexity for the department in terms of the information received about program activities. Streamlining of requirements warranted further investigation by the department. This finding supported the concerns about the poor management of contracts and the poor ability of government agencies to use the information they required providers to collect.

### *Differences in requirements of 'new' and 'old' FaCS programs*

The study identified a concentration of reporting burden among organisations funded to provide 'new' departmental programs. For example, while only 59 per cent of all responding organisations were asked to provide any form of client data, 60 per cent of those funded to provide Reconnect services were required to provide monthly client data. Interestingly, organisations providing services under 'newer' programs were generally more positive about the impact of reporting on the functioning of their organisations. Perhaps the nature and quality of the information gathered under these programs was internally more useful than that required by other programs.

Those providing services under the Disability Employment Program reported high levels of organisational stress and 'reporting burden', particularly in relation to client data requirements. Over one-third of these organisations had allocated in excess of eight days per month to the collection and reporting of client data, even though they were only required to provide data reports yearly. Further analysis revealed that other elements of the reforms contributed to these stress levels, such as the philosophical assumptions embedded in the shift to contracting and the changed funding environment.

The marked differences in the experiences of organisations funded to provide 'older' versus 'newer' programs was one of the major findings of the study.

Organisations funded under 'traditional' FaCS programs—such as Emergency Relief and Child Care—reported lower levels of accountability requirements and less difficulty adjusting to the changed funding environment. Also, a number of child care providers received broadband funding on a recurrent basis and were not required to enter into yearly contracts or agreements for this funding. In fact, some child care providers had entered into a contract for another FaCS program, which was not their primary role, but had experienced no change to the reporting requirements for their major source of funding. In contrast, organisations funded under the Family Relationships Program experienced considerable stress, which could have been attributed to anxiety about future change and financial stress caused by the lack of increases to core funding.

### *Unexpected findings*

One of the unexpected findings of the study was that organisations funded under the Emergency Relief (ER) program did not appear to experience difficulty with the new reporting and accountability requirements. It had been assumed that their reliance on volunteers and the limited funds available for their administration would cause these organisations to respond negatively to the reforms. However, the study consistently found ER providers to have fewer problems with the reforms than organisations funded by other programs. When examined further, the results showed that two-thirds of ER providers that responded to the survey had only signed one contract or agreement with the government in the last 12 months.

This finding suggested that ER providers were usually small, stand-alone organisations. In addition, these organisations were not required to provide work plans, client data or performance reporting, and most only provided annual financial reports. A lack of concern about the reforms and the low levels of organisational stress reported by these organisations were understandable given these circumstances.

The results also identified a lack of interest among these organisations in changing the way they operated. This was reflected in the fact that ER providers were not keen to improve their information technology resources or build a stronger support relationship with the department. From a departmental perspective, these findings implied that reforms to the way these organisations provided services could be problematic and that facilitating cultural change in the absence of a clear need for change could be very difficult.

### *Location*

Location played little or no part in respondent organisations' experiences, which allayed concerns about the impact of the changed funding environment on non-metropolitan organisations. There were generally few response differences by location, although organisations funded to provide services in remote locations were more likely to report concerns about the reforms than other organisations. Geographic isolation from training and seminar opportunities, networks and the department were expected to increase the difficulties faced by non-metropolitan organisations. However, these factors did not emerge as concerns in the results, which could have reflected improved access to information technology. Other explanations included that departmental administration may not have been affected by geography, or the department could have responded appropriately to geographic differences.

### *Multiple reporting requirements*

While most organisations that had multiple reporting requirements under various funding programs reported the greatest level of stress, multiple-funded child care providers were the exception. This indicated a degree of similarity between reporting requirements in this program type. While six out of 10 organisations had multiple reporting requirements, larger organisations experienced greater differences between requirements. This finding supported the earlier work of Barber and Eardley (2002), which documented the difficulties that reporting requirements created for large multiple-funded organisations. This study's contribution to this body of work was that smaller organisations coped reasonably well with more demanding reporting requirements.

Some of the concerns about contracting and its impact on smaller organisations were unsubstantiated by this research. However, most respondent organisations funded to provide services in rural settings had either administered child care or emergency relief services, which suggests that this finding could have reflected program type rather than geography. At the time of the study, neither child care nor ER providers had an active community development role, making them more readily adaptable to contractual arrangements.

### *Fears that traditional social capital role would be lost*

When this research was undertaken, the literature review identified significant and ongoing concern among community service organisations about how contracting would affect their traditional 'social capital' or 'community development' role. The study results contradicted this expectation. In theory, the purchaser/provider split enables the funder (government) to 'steer' and design programs without consulting the provider or 'vested interests' (non-government). Under this

model, services should be purchased at the best ‘market price’. The literature discussed the fear among community organisations that an illogical collection of programs would be provided in a bid by organisations to maintain funding and staffing levels, and that this would erode the autonomy, purpose and vision of community organisations.

However, more than half of respondents to this study reported that their organisation continued to provide input into analysis of community needs and development of policies. Even more respondents said that their organisation continued to advocate for disadvantaged people under the new model. The study also found that a phenomenon called ‘mission drift’ had not affected respondents, with two-thirds disagreeing with the statement ‘we have been diverted from our vision and purpose’. These findings could be seen as positive indications of the health and vitality of the not-for-profit sector and the maturity of its relationship with government.

On the other hand, the study found widespread concern about the impact of the changed funding environment on the sector as a whole. This included the perception that the changed funding environment had led to an increasing gap between community needs and service provision; a lack of response to emerging needs; a reduction in overall funding; and the loss of small services with a corresponding growth of large centralised services.

In general, respondent organisations reported few positive outcomes from the changed funding environment at a broad sector level. Perceptions about the impact on the broader sector were juxtaposed with the experiences of individual organisations. This disjuncture could be explored further, with a focus on the fact that stress levels among respondent organisations appeared to be associated with bigger picture cultural changes embedded in contracting, rather than a reaction to new reporting requirements. A possible explanation was that peak organisations had highlighted the worst potential pitfalls of contracting and contributed to a sense of a sector in crisis. In addition, uneven departmental management of the change process may have contributed to a sense of unease and anxiety among contracted organisations, even when this unease was not supported by their own experience.

At the time of this research, the re-establishment of trust between government agencies and not-for-profit sector organisations was a major challenge flowing from the changed funding environment.

### 3 Summary

This research found that the effect of reporting and accountability requirements on community service providers was more complex than either the literature or the sector advocacy agencies had estimated. In general, most organisations had adapted well to the changed funding environment and concerns about reporting requirements were fewer than expected and not as important as a range of other issues. Most respondents recognised the need for accountability processes, although there was some disagreement about the form this should take. The findings revealed a belief among organisations that the difficulties some not-for-profit organisations experienced with the changed funding environment arose from the difficulty of ‘measuring’ aspects of their work. Poor government administration and the fear and uncertainty created by the changes were also viewed as contributing to the transitional problems.

From a reform perspective, however, the study found little evidence to suggest that changes had achieved their goals. While there was acknowledgement that the reporting and accountability requirements had improved public accountability, the reforms had not achieved a greater focus on client services or increased efficiency. In fact, most organisations felt the reforms had ‘made little difference’ to their organisation’s management and operation. This lack of enhancement of planning, targeting and governance was a major shortcoming of the reform outcomes.

Survey results indicated a strong association between organisational stress levels and specific experiences including: being required to compete rather than collaborate; inability to meet community needs; and a sense that overall funding had decreased. While most organisations had adapted well to the changed funding environment, significant levels of stress remained within the sector. The results showed that although the level of organisational stress had halved since the reform process commenced, only 15 per cent of organisations were comfortable or very comfortable with the changed funding environment.

As well as the increased reporting burden, some organisations reacted negatively to the political philosophy behind the contracting for services. The researchers concluded that the ‘clash between the strongly held collaborative values of workers in community organisations and the ethos of competition inherent in government reforms’ was a significant contributor to organisational stress.

At the time of this study, several peak organisations had advocated for some form of formal agreement similar to the ‘United Kingdom Compact’ to shape the future relationship between the government and not-for-profit sectors. A formal agreement with shared values and principles might reassure not-for-profit organisations that the department was committed to addressing social disadvantage. However, this was not seen as the highest reform priority among respondent organisations, even though some respondents thought that a formal agreement might have alleviated organisational stress about cultural change.

The department was encouraged to implement a capacity-building approach to its relations with contracted organisations and build on the goodwill and desire among respondent organisations to work more closely with the department. For example, respondent organisations placed great importance on improving their technological capacity, a role actively undertaken by governments in Canada and New South Wales by adopting a capacity-building framework.

The limited success of funding reform in the key area of governance reported in this study could imply that improvements in this area require a cooperative capacity-building approach rather than an adversarial contractual approach. Consultation with non-government agencies about outcome and performance measures might also improve service delivery. For example, the type of data collected could enhance service management if organisations were consulted about maximising data utility. Under the contractual model, outcome measures had been imposed on organisations with limited success.

Finally, the involvement of for-profit organisations under a social coalition model posed some unexpected challenges for the department. This study showed that for-profit providers under most FaCS program areas were less concerned about the changed funding environment, possibly due to being more familiar with contracting regimes. However, this type of organisation was also

less interested in stronger relations with government. Unlike not-for-profit organisations, these providers did not necessarily see themselves as ‘policy partners’ in solving community problems and this could create challenges for the department in terms of collaborative policy development with for-profit providers.

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## Appendix

There have been a number of changes in the program environment within FaHCSIA since this study was undertaken. A significant number of areas across FaHCSIA have been involved with improving program management across the portfolio in the last three years, with a focus on being able to effectively report outcomes for the department.

FaHCSIA established the Program Operations Group (POG) in May 2006 to lead reform and drive many of the required improvements to the way FaHCSIA does its business in providing funding to community-based organisations.

The primary focus of the reforms was on more consistent processes in program management. Another focus was on the capacity of the community services sector to deliver FaHCSIA's programs and the department's ability to develop effective program design and service delivery solutions.

Towards this, POG has contributed to simplifying the complex appropriation arrangements into a more coherent structure by reducing the appropriations to a simplified program structure with associated program logic development and clarity. In improving funding agreement practices, the department introduced standardised terms and conditions in funding agreements to better align accountability with the value of the agreement and developed a capital funding policy. FaHCSIA now provides ongoing long form funding agreement training to program and funding agreement managers.

The recent development of the FaHCSIA integrated performance framework will over time reduce reporting load on service providers.

The framework will reduce the current number of performance indicators to a standard suite of indicators and will enable reporting at the corporate, program management and service delivery level. Using the same consistent, robust performance indicators over the life of a project or for ongoing services will assist programs measure trends, determine whether levels of performance have been met and assist with setting best practice benchmarks. This will include extending online processes and ensuring that only the information that is required and used is collated.

Funding agreements are currently being reviewed to assess for unnecessary administrative burden and to be written in plain language. The department is aiming to reduce the number of organisations that have multiple funding agreements and to increase the use of multi-schedule agreements.

The department has progressed well in implementing a consistent and accountable program management model. It will further draw on best practice in program management to effectively and efficiently deliver outcomes for the department and the Australian Government.

<b>Program</b>	<b>Moved in 2004</b>	<b>Post-2004 portfolio</b>	<b>Moved in 2007</b>	<b>Post-2007 portfolio</b>
Stronger Families and Communities initiative	No	Department of Families, Community Services and Indigenous Affairs	Yes—child care elements only	Department of Education, Employment and Workplace Relations
Emergency Relief Program	No	Department of Families, Community Services and Indigenous Affairs	No	Department of Families, Housing, Community Services and Indigenous Affairs
Job Placement, Employment and Training Program	Yes	Department of Employment and Workplace Relations		Department of Education, Employment and Workplace Relations
Green Corps	Yes	Department of Employment and Workplace Relations		Department of Education, Employment and Workplace Relations
Youth Activities Services	No Name changed to YouthLinx	Department of Families, Community Services and Indigenous Affairs	Yes	Department of Education, Employment and Workplace Relations
Reconnect	No	Department of Families, Community Services and Indigenous Affairs	No	Department of Families, Housing, Community Services and Indigenous Affairs
Disability Employment Program	No Name changed to Employment Assistance for People with a Disability Program	Department of Families, Community Services and Indigenous Affairs	No	Department of Families, Housing, Community Services and Indigenous Affairs
Child Care programs	No	Department of Families, Community Services and Indigenous Affairs	Yes	Department of Education, Employment and Workplace Relations
Family Relationships Service programs	No	Department of Families, Community Services and Indigenous Affairs	No	Department of Families, Housing, Community Services and Indigenous Affairs



# Guidelines for contributors

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