

# Resilient communities

**Socio-demographic factors  
associated with lower than  
expected rates of child  
protection reporting in small  
areas in NSW**



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## EXECUTIVE SUMMARY

There are a wide range of societal influences that may be associated with incidence of child abuse and neglect. This report examines the relationship between child protection referral rates and socio-demographic factors using an area-based regression approach. The concept of resilient communities and factors associated with lower than expected child protection referral rates are also examined. This analysis builds on a previous report "*Child protection reports in context*" prepared in February 2007 and published on the DoCS website.

Multivariate linear regression found that child protection referral rates were independently positively associated with the following variables:

- proportion of children and young people aged 0-17 years living in single parent families
- proportion of low income (< \$500 per week) families with children
- proportion of families with children where at least one parent was Indigenous
- proportion of families with children where no parent progressed beyond Year 11 at school
- urban location.

The results of this study highlighted the phenomena of "resilient" communities – that is, local government areas (LGAs) that have lower than predicted child protection referral rates.

A range of factors were identified that could possibly explain an area's resilience including community cohesion and social character, level of services and support networks, economic disadvantage, drug and alcohol availability and instability. However, the study was unable to identify a single factor or set of factors that contributed to resilience across all LGAs.

Importantly the study identified that some LGAs were classified as resilient due to factors such as under-reporting and the LGA having high reporting thresholds rather than due to protective factors.

## INTRODUCTION

A wide range of sociological research has investigated the effect of external factors on child development. The factors that have been found to affect the risk of child maltreatment can be grouped into three broad categories:

- *Child factors* – these include personality factors, chronic or serious illness, disability, age, ethnicity, child aggression and behaviour problems (Goldman et al, 2003; Watson, 1996)
- *Parental/family factors* – including domestic violence, substance abuse, single parent family structure, social isolation and lack of support, low parent education levels, unemployment, low income and low levels of parenting skill (Goldman et al, 2003; Watson, 1996; Salmelainen, 1996)
- *Neighbourhood / local community factors* – including lack of support and social isolation, lack of services, dangerous and/or violent neighbourhood and disadvantage (Goldman et al, 2003; Coulton et al, 2007; Edwards, 2005).

This report examines the relationship between child protection referral rates and socio-demographic factors using an area-based regression approach. The concept of resilient communities and factors associated with lower than expected child protection referral rates are also examined. This analysis builds on a previous report "*Child protection reports in context*" prepared in February 2007 and published on the DoCS website.<sup>1</sup> As with the previous analysis, this cross-sectional analysis measures association but does not imply causality.

The child protection data used in this report has been sourced from the 2004/05 and 2005/06 Key Information and Directory System (KiDS) Annual Statistical Extracts. The demographic and social indicators have been sourced from the 2006 Census of Population and Housing, the NSW Bureau of Crime Statistics and Research, and NSW Health.

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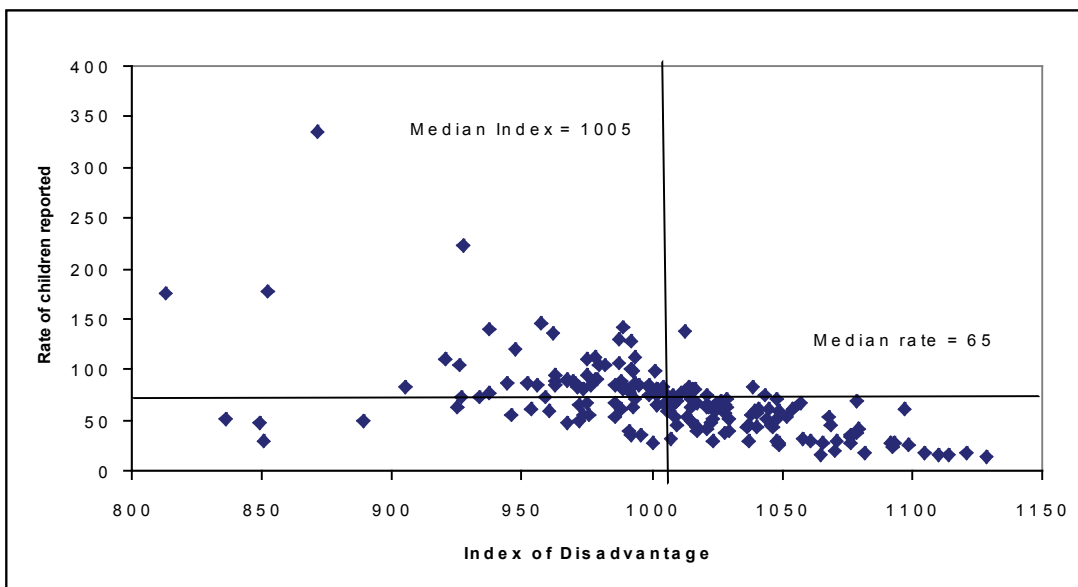
<sup>1</sup> [http://www.community.nsw.gov.au/research\\_centre/statistical\\_reports.html](http://www.community.nsw.gov.au/research_centre/statistical_reports.html)

## SECTION 1: Relationship of child protection reporting and referral rates with socio-demographic and other factors

This section summarises the relationship between child protection reporting and referral rates with socio-demographic and other factors. The detailed results of this analysis can be found in Appendix A.

Figure 1 shows that low child reporting rates are associated with areas of relatively higher socio-economic advantage (measured using a customised Index of Disadvantage)<sup>2</sup>. The LGAs with relatively higher socio-economic status (Index values greater than the median of 1005) and low child reporting rates (less than the median rate of 65) are contained in the lower right-hand quadrant of the graph. There are also many LGAs with high reporting rates and relatively low socio-economic status (top left-hand quadrant). Unexpectedly, there are some LGAs with low child reporting rates and low relative socio-economic status (bottom left-hand quadrant).

**Figure 1: Correlation of rate of children reported with 2001 Index of Disadvantage ( $r = -0.591$ )**



As outlined in the Introduction, there are a range of factors that may be associated with the rates of children and young people that are reported to DoCS for abuse or neglect and referred to a Community Service Centre/Joint Investigation Team (CSC/JIRT) for secondary assessment. Multivariate linear regression can be used to test the effect of a number of explanatory variables and arrive at a model that incorporates only those variables that have an independently significant effect on the dependent variable.

Using this process the variables that were found to be independently positively associated with child protection referral rates<sup>3</sup> were:

- proportion of children and young people aged 0-17 years living in single parent families
- proportion of low income (< \$500 per week) families with children
- proportion of families with children where at least one parent was Indigenous
- proportion of families with children where no parent progressed beyond Year 11 at school
- urban location.

<sup>2</sup> Following the 2001 Census of Population and Housing, DoCS obtained a customised spatial index from the ABS. This Index of Disadvantage is methodologically similar to the Socio-Economic Index for Areas (SEIFA) which ranks geographic areas in terms of relative social disadvantage. However, the underlying social and economic variables in the customised Index of Disadvantage relate to families with dependent children aged 0-17 years rather than to the whole population as used in SEIFA. Higher Index numbers represent areas of relatively higher socio-economic status.

<sup>3</sup> Number of children and young people reported to the DoCS Helpline and subsequently referred to a CSC or JIRT for secondary assessment as a proportion of the total number of children and young people resident in that area, multiplied by 1,000.

The four socio-demographic variables (i.e. excluding the geographic variable urban location) in the final model are also highly correlated with each other. It is reasonable to say that these variables in combination provide a measurement of the underlying socio-economic status of an area. The high explanatory power of the final model also indicates that NSW is strongly segmented by geographic area in terms of socio-economic status. Thus we can say that high child protection referral rates are associated with socio-economic disadvantage.

It is important to note that while this model measures association it does not imply causality.

## SECTION 2: Resilient communities – socio-demographic factors associated with lower than expected rates of child protection reporting in small areas in NSW

### Selection of “resilient” communities

The regression model in Section 1 can be expressed as a multivariate equation (see Appendix A) which describes numerically the effect of each variable on the estimated child protection referral rate.

Using this equation the predicted child protection referral rates were calculated and compared to the actual rate to identify those LGAs that appear to be ‘against the trend’ or ‘resilient’. These resilient LGAs are those where the actual child protection referral rate is substantially lower than that predicted using the model. For the purposes of this analysis an LGA was classified as resilient if the percentage difference between the predicted and actual rates was less than or equal to -20%<sup>4</sup>.

Using this method, 32 (or 21%) of the 153 LGAs in NSW were classified as resilient. These areas are of interest as they could share characteristics that protect them against high rates of child abuse and neglect and therefore contribute to resilience.

Resilient LGAs were located in all DoCS regions except for Metro West (see Table 1). Metro Central, Metro South West and Western regions had the greatest proportions of their LGAs classified as resilient (29.6%, 28.6% and 25.5% respectively). Almost a quarter of rural LGAs were found to be resilient while 18.7% of urban LGAs were found to be resilient.

**Table 1: Resilient and non-resilient LGAs by DoCS region and urban/rural split**

	Resilient		Non-resilient		Total	
	No.	%	No.	%	No.	%
DoCS region						
Hunter	1	9.1	10	90.9	11	100.0
Metro Central	8	29.6	19	70.4	27	100.0
Metro South West	2	28.6	5	71.4	7	100.0
Metro West	0	0.0	8	100.0	8	100.0
Northern	4	14.3	24	85.7	28	100.0
Southern	3	17.6	14	82.4	17	100.0
Western	14	25.5	41	74.5	55	100.0
Rural	18	23.1	60	76.9	78	100.0
Urban	14	18.7	61	81.3	75	100.0
<b>Total</b>	<b>32</b>	<b>20.9</b>	<b>121</b>	<b>79.1</b>	<b>153</b>	<b>100.0</b>

Note: Urban LGAs are defined as those in Sydney, Newcastle, Wollongong or large country towns (e.g. Armidale, Tamworth, Wagga Wagga).

### Review of possible explanatory factors for “resilience”

#### Regional Directors

Feedback was sought from DoCS Regional Directors on factors that could explain or influence resilience in those LGAs in their region classified as resilient. Feedback from the regions suggested a range of possible factors which could be broadly grouped into three main categories – social cohesiveness, support services and other. Some of the factors go at least some way in explaining community resilience while others indicate that a community’s lower than expected level of reporting may be due to factors other than resilience.

<sup>4</sup> In some cases LGAs may be classified as “resilient” due to a numerical effect (or “artefact”). This occurs when the actual rate, the predicted rate and the difference between them are relatively small, but the percentage difference is large. For example, an actual rate of 9 and a predicted rate of 12 results in a percentage difference of -33.3%.

**Social cohesiveness** – a number of regions suggested factors relating to community ‘togetherness’ and unity as being influential on resilience. These included:

- stable communities
- many generations of families remaining in their communities and existence of family support networks
- family support networks through long associations with land owners
- high levels of trust between individuals, neighbours and families
- active progress associations
- pride in community, community working together, support for local voluntary agencies
- strong support for local community based services such as surf club, community centre, markets etc
- well organized and modern business community
- pro-active council, strong community development sector
- social networking factors such as strong sporting associations, clubs etc.

**Support services** – there were a number of explanations around support services and resilience. One explanation was that effective services lead to higher resilience and lower reporting. In contrast it was also suggested that a lack of support services may also lead to low reporting as children are not coming into contact with mandatory reporters and the number of reports may also be influenced by the “perceived capacity of the CSC to respond”. These communities, while having lower than expected levels of reporting, are not necessarily resilient. Specific comments included:

- community services are connected and interlinked
- well established network of DV services, good service linkages, good access to quality early childhood services
- funded children services
- provisioned well with services ⇒ early intervention occurs at a stage before reports are made
- limited number of support and related services ⇒ less contact with mandatory reporters and therefore fewer reports
- perceived capacity of CSC to respond ⇒ fewer reports.

**Other factors** – a number of other factors were suggested as explaining resilience and included:

- high income levels
- hidden wealth factors
- high level of one parent working full-time and the other working part-time
- older parents who access and engage with services on a voluntary basis
- homogenous population
- ability to negotiate transport from fringe suburbs.

In addition, a number of regions indicated that the communities may not in fact be resilient but that other factors are causing lower than expected levels of reporting. These include:

- small town syndrome where people are less likely to want to report on neighbours, friends or family
- community spread over a large geographic areas ⇒ geographic and social isolation
- care of children by extended family meaning that these children do not come into contact with mandatory reporters prior to school.



### Literature scan

A brief literature scan was undertaken to identify factors that have been hypothesised to contribute to community resilience. The literature scan focused on research at the community/neighbourhood level looking at associations between aspects of the community and levels of child abuse, crime and health; and community strength.

Factors that were identified as impacting on levels of child abuse, crime and health included:

- *Impoverishment/economic disadvantage, instability and child care burden*<sup>5</sup> – Coulton et al (1995) found that higher levels of these factors were associated with higher child maltreatment rates. In a replica study Ernst (2001) found that economic disadvantage and instability were positively associated with child maltreatment rates. Both studies found that instability had a greater influence in areas with less impoverishment. Korbin et al (1998) examined these factors by ethnicity and found that while higher levels of impoverishment were associated with higher levels of child maltreatment in both African American and European American communities, the effect was weaker in African American families. Instability and child care burden were positively associated with child maltreatment in European American communities but not in African American communities.
- *Collective efficacy/social capital*<sup>6</sup> – Garbarino and Kostelny (1992) undertook interviews with community leaders in a high risk and a low risk area and found that the low risk area had a more positive outlook, had more services, strong formal and informal social networks and strong political leadership. In contrast the high risk area had a depressed tone, residents knew little about the services available, there was little evidence of a support network and the sense of belonging was not strong.

Vinson et al (1996), in a study of two collection districts in Western Sydney, found that the area with lower rates of child abuse had higher levels of interaction across social support networks.

Gracia and Musitu (2002) examined the link between social isolation and child maltreatment in the Columbian and Spanish context and found that abusive parents are less connected to their community, have lower levels of community involvement and have more negative attitudes towards their community than non-abusive parents.

Collective efficacy and social cohesion have also been shown to be associated with lower levels of crime in disadvantaged areas (Hirshfield and Bowers, 1997), lower rates of violence (Sampson and Raudenbush, 1997) and better physical health (Browning and Cagney, 2002).

- *Availability of alcohol and drugs* – controlling for a range of socio-demographic variables, Freisthlet (2004) and Freisthlet et al (2005) found that the density of bars and drug related incidents was positively associated with the rates of child maltreatment. These studies found that there was not a significant relationship between the child maltreatment rates and the density of restaurants or off-premise alcohol outlets.
- *Levels of reporting* – In a Spanish study Gracia and Herrero (2006) found that high levels of perceived neighbourhood social disorder were associated with a lower willingness to report child maltreatment.

### Comparison of socio-demographic variables in resilient and non-resilient LGAs

Based on the factors identified in the literature and in feedback from the regions, socio-demographic data was sourced to test whether there were any significant differences between resilient and non-resilient LGAs. Given the regression model found that urban location was a significant predictor of the child protection referral rates, this analysis was undertaken for all LGAs in NSW, for those LGAs classified as urban and for those classified as rural. Independent sample t-tests were used to test for significant differences. An assumption of the independent samples t-test is that the populations are both normally distributed. Data transformations (using natural log or square root) were required for some of the variables to achieve more normal distributions.

<sup>5</sup> Impoverishment/economic disadvantage is measured by indicators such as poverty rate, unemployment rate, proportion of female headed households with children, proportion of African American population and population loss. Instability indicators include the proportion of households that had moved in the previous one and five years, the proportion of households in residence less than 10 years and the proportion of vacant housing units. Child care burden is measured by the proportion of residents aged greater than 65, the child/adult ratio and the adult male/female ratio.

<sup>6</sup> The definitions of collective efficacy and social cohesion vary across studies and include i) relatively high levels of interaction between residents and a strong sense of community ii) informal social control (ability of the group to regulate its members according to desired principles), social cohesion and trust iii) mutual trust and solidarity, and expectations for action (informal social control). Indicators include likelihood to intervene, willingness to help neighbours, trust within the community, whether people share similar values, participation in formal and voluntary organisations, friendship and acquaintance networks and low levels of juvenile disturbance.

A range of variables were tested including three indicators of social cohesiveness and social capital available from the 2006 Census of Population and Housing:

- proportion of the population born in non-English speaking countries
- proportion of the adult population that volunteer
- proportion of the population living at the same address one and five years ago.

Due to the limited availability, geographic level and coverage of measures on social cohesiveness and social capital, data on other factors such as social networking, existence of family and other support networks, mutual trust, willingness to help neighbours and hidden wealth factors were unavailable.

Table 2 shows only those variables where significant differences between resilient and non-resilient LGAs were observed.

Overall, significant differences between resilient and non-resilient LGAs were observed for the:

- proportion of dwellings rented from the State Housing Authority (square root transformed)
- rate of domestic violence related assault (log transformed)
- rate of smoking attributed hospital separations (log transformed).

In all cases the average proportion or rate was lower for resilient LGAs than for non-resilient LGAs.

For urban LGAs, significant differences were observed for the:

- proportion of the 0-17 year population with a profound disability
- proportion of the population that is Indigenous (log transformed)
- percentage change in the population between 2001 and 2006
- proportion of families where at least one parent was Indigenous (log transformed)
- proportion of dwellings rented from the State Housing Authority (square root transformed)
- rate of domestic violence related assault (log transformed).

In all cases (except percentage change in population) the resilient LGAs had a lower average proportion or rate than the non-resilient LGAs. Resilient LGAs had a higher average percentage change in population than did non-resilient LGAs.

For rural LGAs, significant differences were observed for the:

- proportion of population aged 65 years or more
- proportion of rented dwellings
- rate of domestic violence related assault (log transformed).

The resilient LGAs had on average a greater proportion of people aged 65 years or more than the non-resilient LGAs. On average, the proportion of rented dwellings and the rate of domestic violence related assault was lower in resilient LGAs than in non-resilient LGAs.

**Table 2: Significance of selected socio-economic variables**

Variable	LGAs - p values		
	All	Urban	Rural
% of population aged 65 years or more	-	-	0.021
% of population identified as Indigenous (log transformed)	-	0.016	-
% of 0-17 year population with a profound or severe disability	-	0.005	-
% of dwellings that are rented	-	-	0.050
% of dwellings that are rented from the State Housing Authority (square root transformed)	0.006	0.032	-
% of families with children where at least one parent is Indigenous (log transformed)	-	0.017	-
% change in the 0-17 year population between 2001 and 2006	-	0.035	-
Rate of domestic violence related assault (log transformed)	0.001	0.008	0.009
Rate of smoking attributed hospital separations (log transformed)	0.048	-	-

Other variables tested but found to be not significantly different for resilient and non-resilient LGAs included:

- proportion of the population aged 0-17 years
- unemployment and participation rates
- proportion of population living at the same address one and five years previously
- proportion of the population born in non-English speaking countries
- population density
- proportion of the population with no religion
- proportion of the adult population that volunteer
- ratio of children to adults
- ratio of adult men to women
- rate of alcohol attributed hospital separations.

### **Multivariate analysis**

The previous section found that there were significant differences between resilient and non-resilient LGAs for a range of socio-demographic variables (see Table 2) and that these differed depending on whether the LGAs were rural or urban. It is of interest to see the impact of these variables on the model in terms of the factors that remain significant and whether the model's explanatory power increases.

The multiple linear regression model presented in Section 1 and Appendix A found that, in NSW, child protection referral rates are significantly associated with the following five factors:

- proportion of children and young people aged 0-17 years living in single parent families
- proportion of low income (< \$500 per week) families with children
- proportion of families with children where at least one parent was Indigenous
- proportion of families with children where no parent progressed beyond Year 11 at school
- urban location.

The R-squared value, which measures how much of the variation in the data is explained by the regression, is a very high 87.5%. That is, 87.5% of the total variation between LGAs in the child protection referral is explained by these five variables.

### ***Effect of voluntary work and persons born in non-English speaking countries***

To explore whether other social factors are associated with child protection referral rates, the following two variables were added to the model:

- percentage adults who spent time doing voluntary work
- percentage of persons born in non-English speaking countries

Both of these variables describe an aspect of the social character of an area.

Adding these two additional variables to the original model results in four independently significant factors (see Table 3):

- proportion of low income families with children
- proportion of families with children where at least one parent is Indigenous
- proportion of adults who spent time doing voluntary work
- proportion of persons born in non-English speaking countries

The first two factors have a strong positive association with child protection referral rates while the second two have a strong negative association with child protection referral rates. The R-squared value for this model is a high 87.6% which makes it of equivalent power to the previous model.

**Table 3: Alternative regression model– variables that are independently associated with child protection referral rates in NSW LGAs**

Variable	Description	Coefficient	p-value
-	Constant	49.761	-
LIFRATE	Percentage of low income families	2.937	<0.001
INDFRATE	Percentage of families where at least one parent is Indigenous	2.223	<0.001
NESB	Percentage born in non-English speaking countries	-0.772	<0.001
VOLRATE	Percentage of adults that volunteer	-1.345	<0.001

R-squared = 87.6%

The original model indicates that child protection referral rates are associated with socio-economic disadvantage. This alternative model advances evidence that the social character of an area is negatively associated with child protection referral rates – that is, the higher the social character of an area the lower the child protection referral rate.

The negative association between the rate of volunteering, an indicator of a community's social cohesion, and child protection referral rates indicates that social cohesion may have a protective effect on a community.

There are potentially many possible explanations for the negative association between child protection referral rates and concentrations of people born in non-English speaking countries. These may include, but are not limited to, possible under-reporting, good support networks, and the tendency for this population not to use formal child care thus limiting contact with mandatory reporters. Figure A7 in Appendix A also shows that there are very low non-English speaking background populations in some rural LGAs that have high child protection referral rates, and this may also be a factor.

#### *Effect of state housing, domestic violence related assaults and smoking related hospital admissions*

Table 2 above shows that there were significant differences between resilient and non-resilient LGAs for the following factors:

- proportion of dwellings rented from the State Housing Authority (square root transformed)
- the rate of domestic violence related assault (log transformed)
- the rate of smoking attributed hospital separations (log transformed).

Adding these variables (non-transformed variables) into the original model results in the rate of domestic violence assaults being significant ( $p=0.000$ ) while the proportion rented from State Housing is marginally significant ( $p=0.053$ ). The urban variable becomes non-significant and the rate of smoking attributed hospital separations is non-significant. The R-squared is slightly higher at 89.9% (see Table 4).

**Table 4: Alternative regression model– variables that are independently associated with child protection referral rates in NSW LGAs**

Variable	Description	Coefficient	p-value
-	Constant	-8.527	0.033
SPFRATE	Percentage of children and young people aged 0-17 years living in single parent families	1.127	<0.001
LIFRATE	Percentage of low income families	0.927	0.019
INDFRATE	Percentage of families where at least one parent is Indigenous	1.433	<0.001
PY11RATE	Percentage of low education families	0.336	0.001
DVRASS	Rate of domestic violence assaults	0.015	<0.001
STATE HOUSING	Proportion of dwellings rented from State Housing Authority	0.851	0.053

R-squared = 89.9%

The initial model indicates that child protection referral rates are associated with socio-economic disadvantage. This model incorporates other measures of socio-economic disadvantage and finds that these are also associated with child protection referral rates.

### Urban versus rural LGAs

Following the same process for both urban and rural LGAs and comparing the resulting regression models (see Tables 5 and 6) shows that:

- in both models (as in the original model) the following variables are positively associated with the child protection referral rate:
  - proportion of children and young people aged 0-17 years living in single parent families
  - proportion of low income (< \$500 per week) families with children
  - proportion of families with children where at least one parent was Indigenous
- additionally, the rate of domestic violence assaults is positively associated with child protection referral rates in both the models
- for the urban LGAs, the percentage change in the 0-17 population between 2001 and 2006 is positively associated with child protection referral rates while the proportion of the 0-17 population with a profound or severe disability is negatively associated
- for the rural LGAs the proportion of dwellings that are rented are positively associated with child protection referral rates
- compared to the original model, the variable for low education families becomes non-significant in both models.

**Table 5: Alternative regression model– variables that are independently associated with child protection referral rates in urban NSW LGAs**

Variable	Description	Coefficient	p-value
-	Constant	-13.703	<0.001
SPFRATE	Percentage of children and young people aged 0-17 years living in single parent families	1.187	0.001
LIFRATE	Percentage of low income families	0.905	0.023
INDFRATE	Percentage of families where at least one parent is Indigenous	1.494	<0.001
DVRASS	Rate of domestic violence assaults	0.036	<0.001
POPLN CHANGE	Percentage change in the 0-17 year population between 2001 and 2006	8.965	0.001
DISABILITY	Proportion of 0-17 population with a profound or severe disability	-0.306	0.034

R-squared = 92.6%

**Table 6: Alternative regression model– variables that are independently associated with child protection referral rates in rural NSW LGAs**

Variable	Description	Coefficient	p-value
-	Constant	-13.339	0.189
SPFRATE	Percentage of children and young people aged 0-17 years living in single parent families	0.770	0.049
LIFRATE	Percentage of low income families	1.330	0.038
INDFRATE	Percentage of families where at least one parent is Indigenous	1.133	0.000
DVRASS	Rate of domestic violence assaults	0.014	<0.001
RENTED	Proportion of dwellings that are rented	1.215	0.001

R-squared = 90.1%

The explanatory power of both models is high with the R-squared values being 92.6% and 90.1% for urban and rural respectively.

## DoCS funded services available at the LGA level

The availability of support services may also affect the resilience of a community. The range and number of funded services available in LGAs was examined using a service mapping process that was undertaken by Service Funding Strategy in response to a request from the Special Commission of Inquiry into Child Protection Services in NSW.

A range of information was available as part of the service mapping. This included the:

- project name and organisation
- project location (region, CSC, postcode, network and LGA)
- total project funding.

This analysis examined the number of services and the total funding at the LGA level. For the number of services both the total number and the rate per 1,000 population aged 0-17 years were used. Similarly both the total funding and funding per 0-17 year population were used.

The data was analysed for all 152 LGAs (excludes Unincorporated NSW) together to get an overall picture of the services available. Resilient and non-resilient LGAs were then examined to determine the differences and similarities between the groups.

### *All LGAs*

The number of services in the 152 LGAs in NSW ranged from zero to 140. The average number of services in an LGA was 24 and the median was 15. As a rate per 1,000 population aged 0-17 years the number of services ranged from zero to 20. The mean and median rates were 3 services per 1,000 population aged 0-17 years.

The level of funding also differed across the 152 LGAs, ranging from zero to \$50.6 million. The average amount of funding in an LGA was \$3.0 million while the median was \$1.2. As a rate per population, the level of funding ranged from zero to \$2,562. The mean rate was \$288 per person aged 0-17 years while the median was lower at \$212.

### *Resilient versus non-resilient LGAs*

Table 7 shows that for resilient LGAs the minimum number of services was while the maximum was 94. The mean number of services was 13 and the median was 8. Non-resilient LGAs have a wider range (from zero to 140), and a higher mean (27) and median (17).

A similar pattern is observed for the number of services per 1,000 persons aged 0-17 years. The range for resilient LGAs is less than that of non-resilient LGAs (6.3 compared to 19.7) as is the mean (2.7 compared to 3.3). The medians are the same for resilient and non-resilient LGAs at 2.6 services per 1,000 persons aged 0-17 years.

A Mann-Whitney U test was used to determine whether there was a significant difference between resilient and non-resilient LGAs in the numbers of services per 1,000 population aged 0-17 years. The Mann-Witney test was used because the data are not normally distributed and the number of resilient LGAs was relatively small at 32. This test indicated that the difference between the two groups was not significantly different with a p-value of 0.294 (this is consistent with using a two sample t-test on log transformed data  $p=0.123$ ).

For resilient LGAs the level of funding ranged from \$73,021 to \$10.6 million with a mean of \$1.1 million and a median of \$0.6. Again non-resilient LGAs had a wider range, a higher mean and a higher median. A similar pattern is observed for the level of funding per population.

A Mann-Whitney U test was again used to determine whether there was a significant difference between resilient and non-resilient LGAs in the level of funding per person aged 0-17 years. This test indicated that the difference between the two groups was significantly different with a p-value of 0.004 (this is consistent with using a two sample t-test on log transformed data  $p=0.005$ ).

**Table 7: DoCS funded services by resilient and non-resilient LGAs**

		Min.	Max.	Mean	Median
Number of services	Resilient	1	94	12.8	8.0
	Non-resilient	0	140	27.0	17.0
Services per 1,000 population 0-17 years	Resilient	0.6	6.8	2.6	2.6
	Non-resilient	0	19.7	3.3	2.6
Total funding (\$m)	Resilient	0.1	10.6	1.1	0.6
	Non-resilient	0	50.6	3.5	1.5
Funding per person aged 0-17 years (\$)	Resilient	40.8	339.9	173.7	148.3
	Non-resilient	0	2562.0	318.8	224.6

Given that, on average, the non-resilient LGAs were found to have a significantly higher funding rate than resilient LGAs, service funding alone does not explain the difference between resilient and non-resilient LGAs. It may be that because of the additional funding they receive, these LGAs are more resilient than they would be without funding. Alternatively, as they are less resilient they are likely to require a higher level of services.

### Case Studies

To gain further insight into the concept of resilience, an in-depth analysis was undertaken on a small number of resilient and non-resilient LGAs in NSW. These case studies involved consultation with the relevant CSC staff about possible factors that could be contributing to resilience in a particular LGA. Child protection, socio-demographic and funded services data were also examined as part of the case studies.

Pairs of resilient and non-resilient LGAs were selected from three regions:

- two comparative LGAs located in Metro South East, both with high proportions of people born in non-English speaking countries
- two LGAs in the Western region, both with high proportions of Indigenous people
- two LGAs in the Southern region, adjacent to one another

### Case Study One – Metro South West region

Table 8 shows selected child protection data for the resilient and non-resilient LGAs in Metro South West. Compared to the non-resilient LGA, the resilient LGA had a significantly lower proportion of reported children aged less than one year and a significantly greater proportion aged 5-11 years. A significantly greater proportion of children in the resilient LGA were reported by police while a significantly smaller proportion was reported by Health. In terms of reported issues, the resilient and non-resilient LGAs were similar – although the resilient LGA had a significantly greater proportion of children reported with neglect.

**Table 8: Selected child protection data for case study 1**

	Resilient	Non-resilient
Actual child protection referral rate	39.6	42.2
Predicted child protection referral rate	58.8	47.9
Percentage difference	-48.4	-13.4
% of children reported aged <1 year	8.5	11.7
% of children reported aged 1-4 years	24.6	25.5
% of children reported aged 5-11 years	39.0	35.6
% of children reported aged 12-17 years	25.6	25.0
% of children reported by Police	57.6	52.1
% of children reported by Health	19.9	25.6
% of children reported by Education	18.2	18.2
% of children reported with physical abuse	31.6	32.9
% of children reported with sexual abuse	9.6	8.8
% of children reported with psychological abuse	51.2	52.3
% of children reported with neglect	23.8	21.5
% of children reported with domestic violence issues	50.8	51.2
% of children reported with carer issues	53.1	55.0
% of children reported with carer drug and alcohol issues	15.9	16.3
% of children reported with carer mental health issues	17.2	17.3

Table 9 shows that the age structures for the 0-17 year population are similar in the resilient and non-resilient LGAs. Compared to the non-resilient LGA, the resilient LGA has significantly greater proportions of people born in non-English speaking countries and living in the same LGA one and five years ago. However, the resilient LGA also has significantly higher proportions of low income families and families where no parent has a post-school qualification.

During the consultation, the main points of difference between the resilient and non-resilient were around the diversity of the population, involvement in community events and formal supports and networks.

While both LGAs have large populations from non-English speaking backgrounds, the population in the resilient LGA is more diverse than that in the non-resilient LGA. The people living in the resilient LGA value this diversity, with people of different backgrounds having a lot to do with each other and being prepared to seek out information about the different cultures.

The level of community involvement in multi-cultural events is high in the resilient LGA, with the council placing significant emphasis on coordination activity to ensure interaction between the cultures. The difference between cultures is seen as a strength and an attraction between the disparate segments of the community.

In the resilient LGA there are strong partnerships between the CSC and other resources in the area. These formal partnerships/networks have been well established and maintained over a long period of time resulting in a comprehensive service. While partnerships are established in the non-resilient LGA, they are not as well-developed as those in the resilient LGA.



**Table 9: Selected socio-demographic data for case study 1**

	Resilient	Non-resilient
Total population (as at 2006)	179,891	170,488
% aged 0-17 years	26.2	26.3
% of 0-17 year population aged <1 year	5.0	5.7
% of 0-17 year population aged 1-4 years	20.5	22.6
% of 0-17 year population aged 5-11 years	39.0	38.4
% of 0-17 year population aged 12-17 years	35.5	33.2
% of population that are Indigenous	0.6	0.7
% of population that were born in non-English speaking countries	48.8	32.1
% families with children aged <15, dependent students	75.1	70.7
% of these that are low income	16.0	12.2
% of these that have all parents with no post school qualifications	53.9	43.4
% of these that have all parents unemployed	3.2	2.0
% of these that have at least one parent Indigenous	0.9	1.1
% of these that have parents who only completed year 11 or lower	46.7	40.8
% of population with a profound disability	5.2	4.9
% of population aged 15+ that volunteer	7.5	10.4
% of persons living in same LGA one year ago	89.2	86.9
% of persons living in same LGA 5 years ago	76.0	71.8

### Case Study Two – Western region

Table 10 compares the proportions of reported children in the resilient and non-resilient LGA across various characteristics. While there are some differences between the LGAs, none of these differences are significant.

The age structure of the resilient and non-resilient LGAs is similar (see Table 11). While the non-resilient LGA has a greater proportion aged 1-4 years and a smaller proportion aged 12-17 years, these differences are not significant. Both LGAs have high proportions of Indigenous persons and low proportions of people born in non-English speaking countries. The resilient LGA has higher proportions of 'disadvantaged' families than the non-resilient LGA but only the difference for low income families is significant.

**Table 10: Selected child protection data for case study 2**

	Resilient	Non-resilient
Actual child protection referral rate	97.5	104.8
Predicted child protection referral rate	125.6	108.7
Percentage difference	-28.8	-3.7
% of children reported aged <1 year	8.3	5.9
% of children reported aged 1-4 years	22.5	22.5
% of children reported aged 5-11 years	39.4	41.1
% of children reported aged 12-17 years	27.0	26.3
% of children reported by Police	57.4	58.4
% of children reported by Health	21.8	18.1
% of children reported by Education	22.1	17.7
% of children reported with physical abuse	38.4	44.1
% of children reported with sexual abuse	17.6	16.9
% of children reported with psychological abuse	54.3	57.2
% of children reported with neglect	26.6	23.7
% of children reported with domestic violence issues	43.9	37.7
% of children reported with carer issues	59.5	54.7
% of children reported with carer drug and alcohol issues	31.1	32.2
% of children reported with carer mental health issues	12.8	17.4

**Table 11: Selected socio-demographic data for case study 2**

	Resilient	Non-resilient
Total population (as at 2006)	8,122	6,512
% aged 0-17 years	27.6	27.6
% of 0-17 year population aged <1 year	5.2	5.1
% of 0-17 year population aged 1-4 years	19.8	23.0
% of 0-17 year population aged 5-11 years	40.5	41.1
% of 0-17 year population aged 12-17 years	34.5	30.7
% of population that are Indigenous	15.3	15.8
% of population that were born in non-English speaking countries	2.1	1.1
% families with children aged <15, dependent students	57.9	59.5
% of these that are low income	17.9	12.6
% of these that have all parents with no post school qualifications	41.4	39.5
% of these that have all parents unemployed	4.0	2.6
% of these that have at least one parent Indigenous	26.3	24.9
% of these that have parents who only completed year 11 or lower	52.8	49.8
% of population with a profound disability	5.8	3.7
% of population aged 15+ that volunteer	24.8	26.3
% of persons living in same LGA one year ago	89.6	89.3
% of persons living in same LGA 5 years ago	75.9	77.0

During the consultation, the main points of difference between the two LGAs related to the social character of the community and possible under-reporting.

The non-resilient LGA is a smaller, more integrated community that has a strong connection to farming while the resilient LGA has quite separate town and farming communities. The resilient LGA has a less integrated, close-knit and supportive community. It was seen to have more drug issues, greater disparity between the advantaged and disadvantaged, be more negative and overall, be a less desirable place to live than the non-resilient LGA.

It is thought that there is under-reporting from mandatory reporters in the resilient LGA which could explain its apparent resilience.

### Case Study Three – Southern region

Table 12 shows that the resilient LGA has a smaller proportion of reported children aged less than one year and a greater proportion aged 12-17 years than the non-resilient LGA. However, these differences are not significant. The proportion of children reported by the police is significantly greater in the non-resilient LGA as is the proportion reported with sexual abuse, psychological abuse and neglect.

The age structures of the 0-17 year population are not significantly different for the resilient and non-resilient LGAs (see Table 13). The non-resilient LGA has a significantly greater proportion of low income families and families where no parent has a post school qualification while the resilient LGA has a significantly higher proportion of the adult population that volunteer.

**Table 12: Selected child protection data for case study 3**

	Resilient	Non-resilient
Actual child protection referral rate	25.0	57.8
Predicted child protection referral rate	39.0	61.0
Percentage difference	-55.9	-5.6
% of children reported aged <1 year	4.6	7.9
% of children reported aged 1-4 years	19.2	20.9
% of children reported aged 5-11 years	37.7	38.2
% of children reported aged 12-17 years	37.7	31.8
% of children reported by Police	30.5	40.6
% of children reported by Health	31.1	25.9
% of children reported by Education	34.4	30.0
% of children reported with physical abuse	32.5	35.8
% of children reported with sexual abuse	25.2	16.9
% of children reported with psychological abuse	47.0	56.0
% of children reported with neglect	12.6	21.6
% of children reported with domestic violence issues	34.4	40.7
% of children reported with carer issues	49.7	51.9
% of children reported with carer drug and alcohol issues	25.2	25.4
% of children reported with carer mental health issues	17.9	19.1

**Table 13: Selected socio-demographic data for case study 3**

	<b>Resilient</b>	<b>Non-resilient</b>
Total population (as at 2006)	18,985	60,334
% aged 0-17 years	24.1	27.5
% of 0-17 year population aged <1 year	3.7	5.0
% of 0-17 year population aged 1-4 years	17.2	20.3
% of 0-17 year population aged 5-11 years	37.7	40.6
% of 0-17 year population aged 12-17 years	41.4	34.2
% of population that are Indigenous	1.2	2.3
% of population that were born in non-English speaking countries	4.0	9.7
% families with children aged <15, dependent students	58.8	65.8
% of these that are low income	5.5	9.2
% of these that have all parents with no post school qualifications	17.6	34.6
% of these that have all parents unemployed	1.4	2.7
% of these that have at least one parent Indigenous	2.2	4.0
% of these that have parents who only completed year 11 or lower	38.9	57.1
% of population with a profound disability	4.5	4.8
% of population aged 15+ that volunteer	25.9	13.3
% of persons living in same LGA one year ago	89.9	90.4
% of persons living in same LGA 5 years ago	75.8	78.5

During the consultation, it was noted that the LGAs are vastly different in terms of population size – the resilient LGA is much smaller and physically defined with one ‘community’ only. This and the older retiree population of the resilient population, is thought to lead to an increased sense of identity, increased ownership and more social connectedness.

The resilient LGA is relatively affluent compared to the non-resilient LGA. The non-resilient LGA has a greater proportion of people living in public housing resulting in less ownership and a decreased sense of belonging to the community.

The services provided in the two LGAs differ with the resilient LGA activities being more ‘socially’ orientated while the non-resilient LGA activities are more targeted to specific issues such as drug and alcohol use. This is reflected in the types of requests for emergency access to cash – in the resilient LGA previously approved requests included school trips and petrol while in the non-resilient LGA funding would be for the basic necessities such as electricity, rent and food. The non-resilient LGA has also experienced a fairly large population growth which has placed increased pressure on the service system.

## CONCLUSION AND DISCUSSION

This analysis examined the relationship between child protection referral rates and socio-economic factors at the LGA level and found that:

- Low child protection reporting rates are associated with areas of low socio-economic disadvantage
- Child protection referral rates are positively associated with the:
  - o proportion of children living in single parent families
  - o proportion of low income families with children
  - o proportion of families with children where at least one parent is Indigenous
  - o proportion of families with children where no parent has progressed beyond year 11 at school
  - o urban location.

Resilient LGAs were identified as those where the actual rates of children and young people referred to a CSC/JIRT for secondary assessment were substantially lower than that predicted using the regression model. Around one in five LGAs in NSW were found to be resilient using this criterion.

A range of methods, including consultation with Regional Directors, a scan of the literature, case studies and comparison of resilient and non-resilient LGAs, were used to identify a range of factors that could possibly explain an area's resilience. These factors included community cohesion and social character, level of services and support networks (both formal and informal), drug and alcohol availability, economic disadvantage, and instability. Under-reporting and higher reporting thresholds were also highlighted as factors that may be causing apparent resilience in an LGA.

However, the study was unable to identify a particular factor or set of factors that contributed to resilience across all LGAs. Rather the factors and the nature of the factors impacting on resilience differed across the areas highlighting the importance of reviewing the characteristics of areas individually rather than just in aggregated form.

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## APPENDIX A – Detailed analysis of the relationship between child protection reporting and referral rates and other factors

### The Index of Disadvantage (DoCS SEIFA)

Following the 2001 Census of Population and Housing, DoCS obtained a customised spatial index called the Index of Disadvantage from the ABS. The Index of Disadvantage is methodologically similar to the Socio-Economic Index for Areas (SEIFA) which ranks geographic areas in terms of relative social disadvantage.

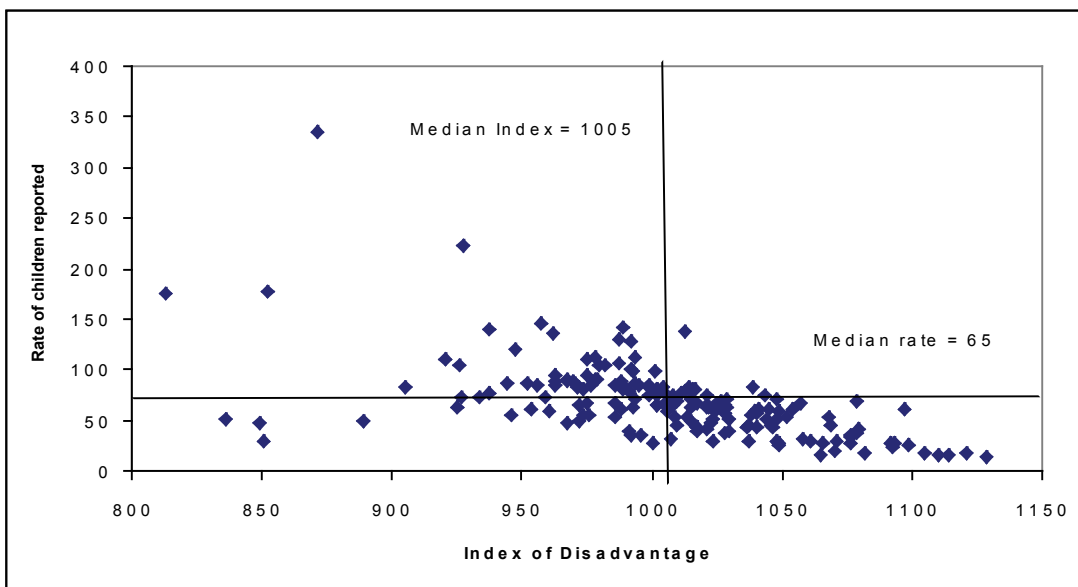
The Index of Disadvantage is calculated in a similar way to SEIFA using Principal Components Analysis. However, the underlying social and economic variables in the customised Index relate to families with dependent children aged 0-17 years rather than to the whole population as used in the SEIFA. Higher Index numbers represent areas of higher socio-economic status.

Figure A1 shows the association between the rate of children reported (i.e. the number of children and young people reported during 2004/05 expressed as a rate per 1,000 population aged 0-17 years) and the Index of Disadvantage ranking, using Local Government Areas (LGAs) as the base geographic unit.

Overall there is a clear pattern showing that low child reporting rates are associated with areas of relatively higher socio-economic advantage. The Pearson's correlation coefficient, measuring the association between the rate of children reported and the Index of Disadvantage, is -0.591 and indicates a strong negative correlation.

The LGAs with relatively higher socio-economic status (Index values greater than the median of 1005) and low child reporting rates (less than the median rate of 65) are contained in the lower right-hand quadrant of the graph. There are also many LGAs with high reporting rates and relatively low relative socio-economic status (top left-hand quadrant). Unexpectedly, there are some LGAs with low child reporting rates and low relative socio-economic status (bottom left-hand quadrant).

**Figure A1: Correlation of rate of children reported with 2001 Index of Disadvantage (r = -0.591)**

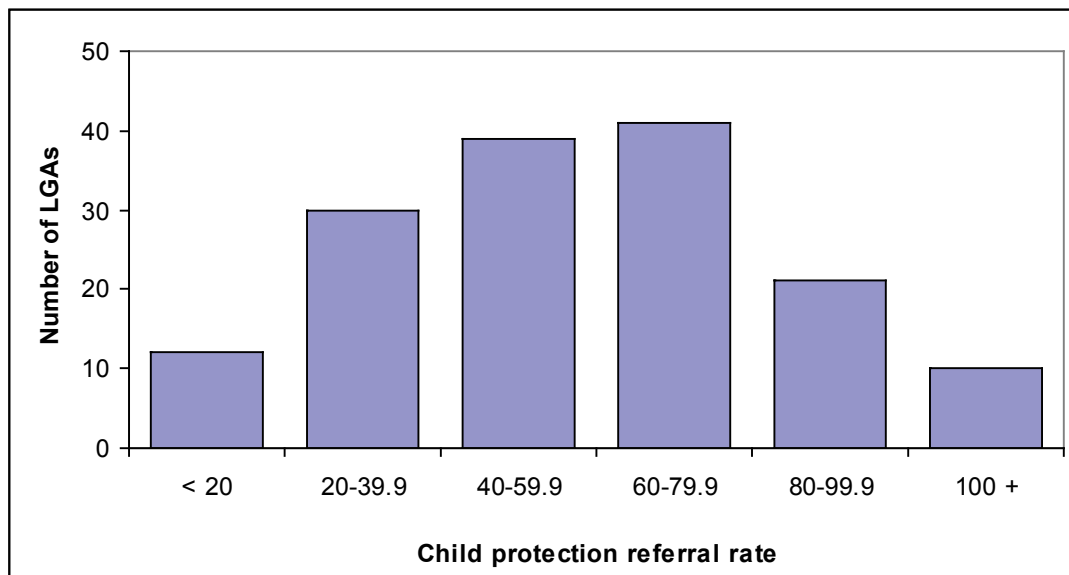


### Calculation of child and young person protection referral rates

The following analysis uses child protection reports for 2005/06 and Census data from 2006. The primary measure used in this analysis is the child and young person (aged 0-17 years) annual referral rate, which is a refinement of the earlier "reporting rate".

Those reports received at the Helpline and not referred have been excluded from the analysis as they are likely to represent a lower level of seriousness.

The median child protection referral rate for NSW LGAs for 2005/06 was 58.4 per 1,000 population aged 0-17, with a range of 9.8 to 245.1. Figure A2 shows the distribution of child protection referral rates across NSW LGAs.

**Figure A2: Distribution of 2005/06 child protection referral rates across NSW LGAs**

### Demographic and social data series that may be associated with levels of child abuse and neglect

There are a large number of societal influences that may be associated with the incidence of children who are reported to DoCS for abuse or neglect. Some of these can be represented by statistical series that are available at small area level within NSW.

The previous analysis (Nivison-Smith, 2007) analysed a number of these influences and found strong positive associations between child protection referral rates and the proportion of the population that is Indigenous, the proportion of children in single parent families the proportion of adults with no post-school qualifications, and the proportion of adults receiving income support (excluding age pensions).

Based on factors cited in the literature and availability of new 2006 Census data, the data series in Table A1 were selected as variables that could be strongly associated with child protection referral rates. These variables are mostly different from those used in the previous analysis and focus on families with children where available and appropriate.

**Table A1: Demographic and social variables selected for analysis**

Variable	Description
URBAN	Indicates LGA in urban Sydney, Newcastle, Wollongong or large country town (e.g. Armidale, Tamworth, Wagga Wagga)
SPFRATE	Percentage of total children and young people aged 0-17 years who are living within single parent families
LIFRATE	Low income families (<\$500 per week) with children as a percentage of all families with children
NQUALRATE	Families with children where no parent has a post-school qualification as a percentage of all families with children
NOEMRATE	Families with children where no parent is employed as a percentage of all families with children
INDFRATE	Families with children where at least one parent is Indigenous as a percentage of all families with children
PY11RATE	Families with children where no parent progressed beyond Year 11 as a percentage of all families with children
MOV5YR	Percentage of people living in a different dwelling than 5 years previous
NESB	Percentage of population born in non-English speaking (NES) countries
VOLRATE	Percentage of adult population who volunteer
CCRATE	Percentage of adult population who give unpaid childcare
UDWRATE	Percentage of adult population who do >5 hours of unpaid domestic work

Data source: ABS 2006 Census of Population and Housing



The first eight variables listed are geographic, demographic and social indicators that are well established as indicators of societal advantage and disadvantage. The percentage of the population born in non-English speaking countries has been included as it is a strong indicator of the multicultural nature of an area. The percentage of the adult population who volunteer, the percentage of the adult population who give unpaid childcare and the percentage of the adult population who do greater than five hours of unpaid domestic work per week have been included as they have the potential to indicate the social character of an area (these three variables were not available previous to the 2006 Census of Population and Housing).

In addition to the variables listed above, this analysis considers other factors that are known to be associated with societal disadvantage. The three variables shown in Table A2 have been used. These were not included in the previous analysis.

**Table A2: Other indicators of social disadvantage selected for analysis**

Variable	Description
DVRASS	Rate per 100,000 population of domestic violence related assault by LGA, 2005/06
ALCHOS	Alcohol attributed hospital separations (standardised separation ratio) by LGA, 2003/04 to 2004/05
SMOHOS	Smoking attributed hospital separations (standardised separation ratio) by LGA, 2003/04 to 2004/05

Data sources: NSW Bureau of Crime Statistics and Research (BOCSAR) and NSW Health

### Strength of association between child protection referral rates and potential explanatory (independent) variables

The univariate association between the child protection referral rate and other variables can be measured by calculating correlation coefficients. Table A3 shows that there are strong positive associations between the child protection referral rate and the first six socio-demographic variables. This result is expected. Interestingly though, there is a strong negative correlation between the child protection referral rate and the proportion of the population born in non-English speaking countries.

The variables related to volunteering, childcare and unpaid domestic work are not significantly correlated with the child protection referral rate. Conversely the variables related to domestic violence related assault and health risk factors are strongly correlated with the child protection referral rate.

**Table A3: Correlation (Pearson's r) between child protection referral rates and other variables**

Variable	Description	Correlation	p-value
SPFRATE	Percentage of children and young people living in single parent families	0.715	< 0.001
LIFRATE	Percentage of low income families	0.741	< 0.001
NQUALRATE	Percentage of low qualification families	0.658	< 0.001
NOEMRATE	Percentage of families where no parent is employed	0.682	< 0.001
INDFRATE	Percentage of families where at least one parent is Indigenous	0.885	< 0.001
PY11RATE	Percentage of low education families	0.598	< 0.001
MOV5YR	Percentage of people living in different dwelling than 5 years previously	-0.185	0.022
NESB	Percentage of population born in non-English speaking countries	-0.389	< 0.001
VOLRATE	Percentage of adults who volunteer	0.099	0.221
CCRATE	Percentage of adults who give unpaid childcare	-0.069	0.399
UDWRATE	Percentage of adults who do >5 hours unpaid domestic work per week	0.015	0.857
DVRASS	Domestic violence related assault rate	0.816	< 0.001
ALCHOS	Alcohol attributed hospital separations	0.693	< 0.001
SMOHOS	Smoking attributed hospital separations	0.530	< 0.001

Note: 1) The variable "Urban" is not included here as it is a binary (0-1) variable and not suitable for correlation  
2) p-values of less than 0.05 indicate a statistically significant association.

The following scatter graphs illustrate the relationship between the child protection referral rate and selected socio-demographic variables. Figure A3 shows a strong positive relationship between the child protection referral rate and the proportion of children and young people who are living in single parent families. The correlation coefficient is a high 0.715.

**Figure A3: Scatter graph of the relationship between the child protection referral rate and the proportion of children and young people living in single parent families (r=0.715)**

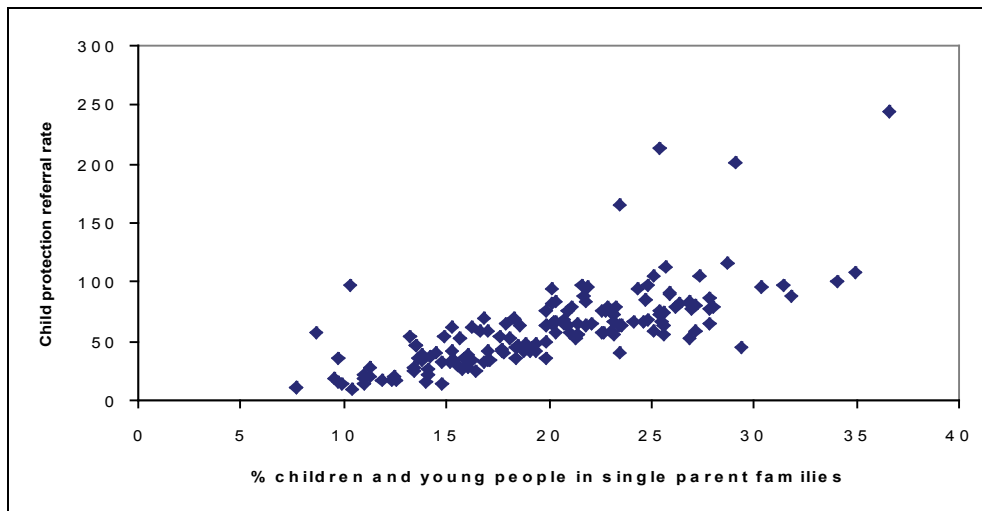


Figure A4 shows a strong positive relationship between the child protection referral rate and the proportion of families with low income.

**Figure A4: Scatter graph of the relationship between the child protection referral rate and the proportion of low income families (r=0.741)**

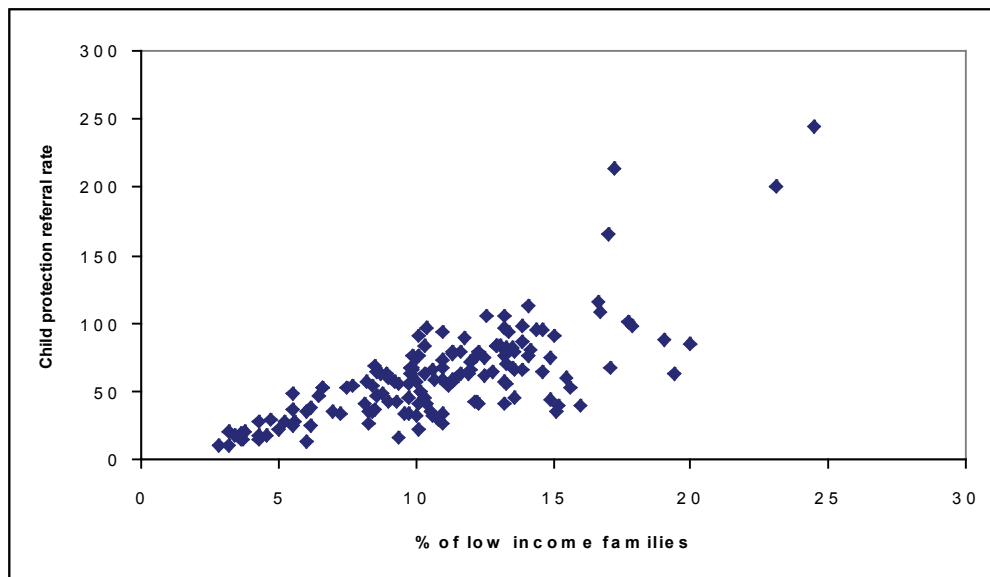


Figure A5 shows that there is no visually apparent relationship between the child protection referral rate and the proportion of "recent movers" (i.e. those people who have lived in their current dwelling for less than 5 years). The Pearson's correlation coefficient of -0.185 indicates that there is a small negative correlation between these two variables. However, this may be strongly influenced by a small number of high outliers.

**Figure A5: Scatter graph of the relationship between the child protection referral rate and the proportion of people who have lived in their current dwelling less than 5 years ( $r=-0.185$ )**

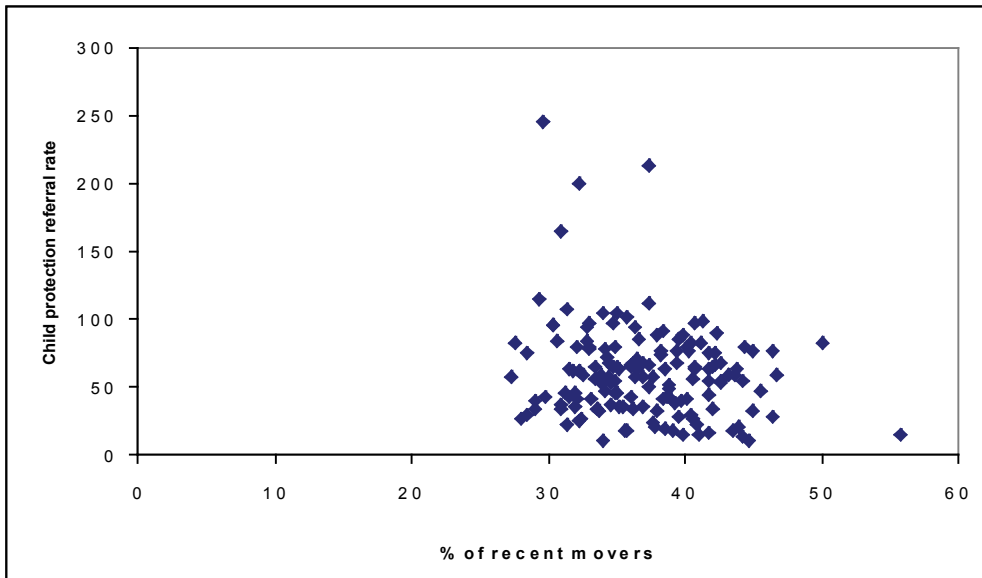


Figure A6 shows a strong positive relationship between the child protection referral rate and the proportion of families where at least one parent is Indigenous. The high outliers in the top right-hand quadrant represent rural LGAs with high Indigenous populations.

**Figure A6: Scatter graph of the relationship between the child protection referral rate and the proportion of families where at least one parent is Indigenous ( $r=0.885$ )**

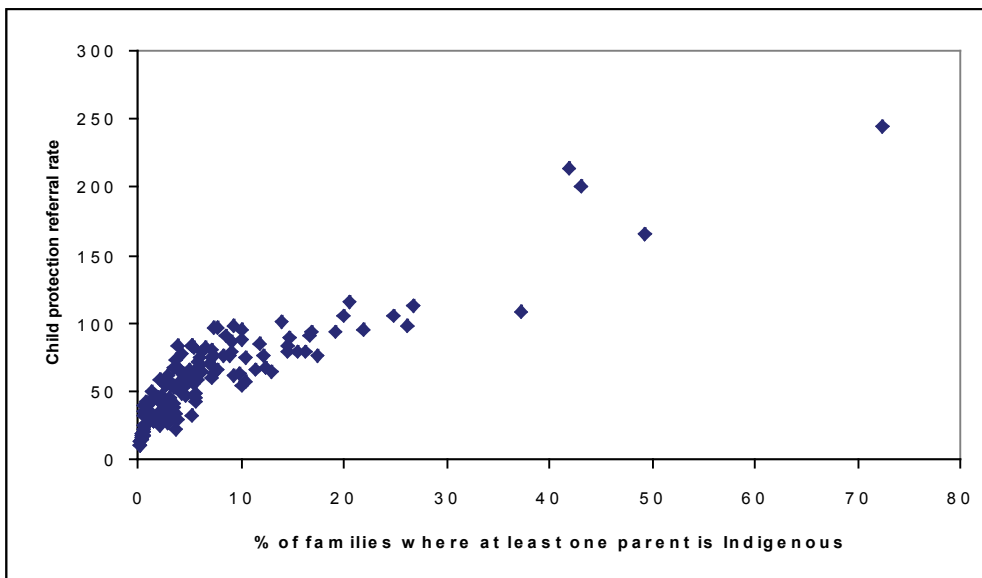


Figure A7 shows that there is a weak negative relationship between the child protection referral rate and the proportion of people born in non-English speaking countries. The negative correlation between these two variables may be strongly affected by a small number of LGAs with high referral rates and low proportions of people born in non-English speaking countries (top left hand quadrant of scatter graph).

**Figure A7: Scatter graph of relationship between the child and young person referral rate and the proportion of people born in non-English speaking countries ( $r=-0.389$ )**

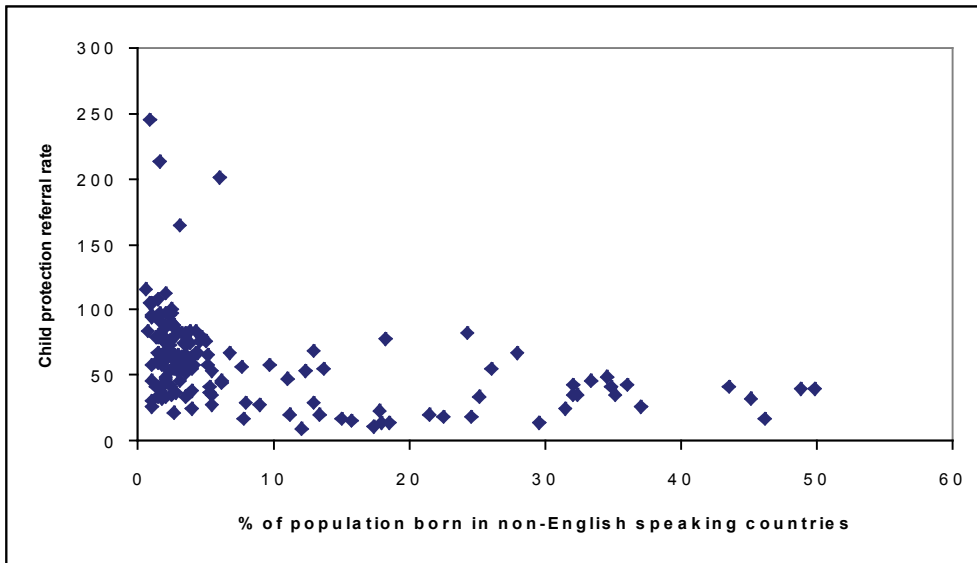
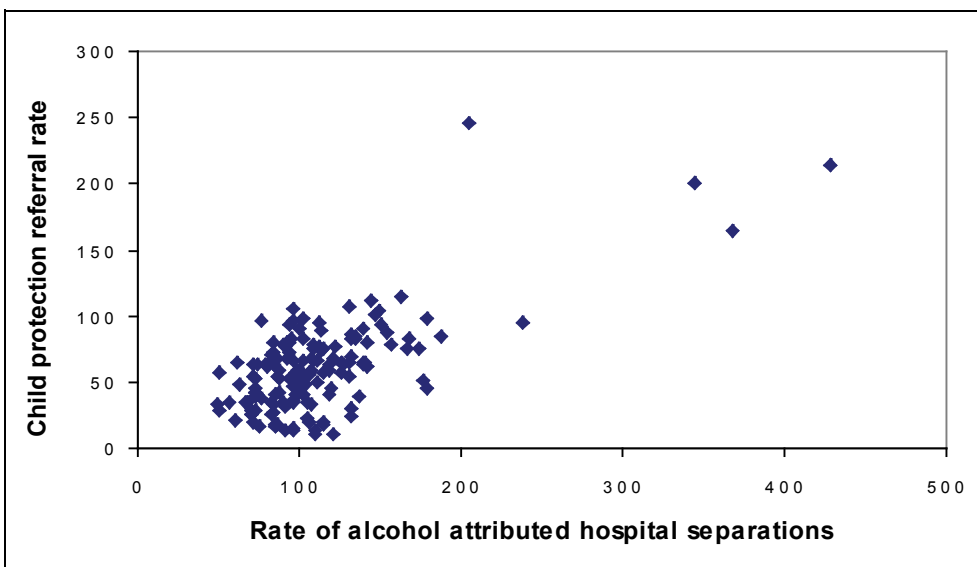


Figure A8 shows the relationship between the child protection referral rate and the rate of alcohol attributed hospital separations. There is a strong positive correlation between these two variables, but again this may be largely related to a small number of high outliers (top right-hand quadrant) exerting an undue influence.

**Figure A8: Scatter graph of relationship between the child protection referral rate and the rate of alcohol attributed hospital separations ( $r=0.693$ )**



### Internal correlations between explanatory variables

Since all of these variables have been selected as possibly being associated with social and economic disadvantage, it would be expected that there would be internal correlations between them. Table A4 confirms that there are a large number of significant correlations ( $p<0.05$ ) between these variables.

The demographic and social variables are almost all highly correlated with each other as would be expected but there are relatively few significant correlations between the "social character" variables (volunteering, childcare, unpaid domestic work) and the other listed variables. The variable that indicates the percentage of people who have lived in their dwellings less than five years is negatively correlated with several other variables. The proportion of people born in non-English speaking countries is also significantly negatively correlated with all other listed explanatory variables.

Highly correlated variables can affect the process of multivariate analysis in an adverse way. The pairs of variables that are highly correlated were carefully monitored in the subsequent multivariate analysis to ensure that they did not lead to spurious results.

**Table A4: Significant correlations between potential explanatory variables**

VARIABLE	LIFRATE	NQUALRATE	NOEMRATE	INDFRATE	PY11RATE	MOV5YR	NESB
SPFRATE	0.711	0.544	0.827	0.563	0.602		-0.288
LIFRATE		0.781	0.740	0.630	0.670	-0.323	-0.272
NQUALRATE			0.592	0.566	0.795	-0.495	-0.227
NOEMRATE				0.578	0.628		-0.306
INDFRATE					0.438	-0.238	-0.350
PY11RATE						-0.379	-0.611
NESB							
VOLRATE						-0.325	
CCRATE							
DVRASS						-0.202	
ALCHOS							
SMOHOS						-0.417	

VARIABLE	VOLRATE	CCRATE	UDWRATE	DVRASS	ALCHOS	SMOHOS
SPFRATE				0.421	0.385	0.396
LIFRATE	0.229	-0.204		0.520	0.509	0.508
NQUALRATE				0.498	0.411	0.628
NOEMRATE				0.514	0.475	0.439
INDFRATE	0.159			0.840	0.694	0.525
PY11RATE	0.286	0.266	0.468	0.347	0.249	0.566
NESB	-0.697	-0.393	-0.751	-0.198	-0.186	-0.415
VOLRATE		0.221	0.658			0.335
CCRATE			0.582		-0.227	
DVRASS					0.798	0.335
ALCHOS						0.466
SMOHOS						

### Multivariate linear regression models

Multivariate linear regression can be used to test the effect of a number of explanatory variables and arrive at a model which incorporates only those that have an independently significant effect on the dependent variable.

A multivariate linear regression was carried out using those variables found to be significant in the correlation analysis. All of the independent variables listed in Table A4 were included with the exception of the three "social character" variables. The selected independent variables were incorporated into a multiple linear regression model, then progressively removed by a process of backward elimination. Table A5 displays the final model.

**Table A5: Final multivariate linear regression model – variables that are independently associated with child protection referral rates in NSW LGAs**

Variable	Description	Coefficient	p-value
-	Constant	-9.700	-
SPFRATE	Percentage of children and young people aged 0-17 years living in single parent families	0.850	0.005
LIFRATE	Percentage of low income families	1.300	0.005
INDFRATE	Percentage of families where at least one parent is Indigenous	2.410	<0.001
PY11RATE	Percentage of low education families	0.416	<0.001
URBAN	Location: city or large town	6.089	0.030

R-squared = 87.5%

The R-squared value, which measures how much of the variation in the data is explained by the regression, is a very high 87.5%. This means that 87.5% of the total variation between LGAs in the rate of children and young people referred to a CSC/JIRT for secondary assessment is explained by the five variables – only 12.5% of the geographical variation in the referral rate remains unexplained. Diagnostic tests indicate that the required assumptions of normality have been met.

The model can be expressed as an equation:

Estimated child protection referral rate =  $-9.700 + \text{SPFRATE} \times 0.850 + \text{LIFRATE} \times 1.300 + \text{INDFRATE} \times 2.410 + \text{PY11RATE} \times 0.416 + \text{URBAN} \times 6.089$

The coefficients indicate the magnitude of the effect of each variable. For example, each percentage point increase in the proportion of children and young people aged 0-17 living in one parent families predicts an increase of 0.850 in the child protection referral rate.

### Interpretation of regression model

The final multivariate model indicates that child and young person referral rates are independently associated with high proportions of children and young people living in one parent families, high proportions of low income families, high proportions of Indigenous families, high proportions of low education families and urban location.

The four socio-demographic variables in the final model are also highly correlated with each other. It is reasonable to say that these variables in combination provide a measurement of the underlying socio-economic status of an area. The high R-squared value of the final model also indicates that NSW is strongly segmented by geographic area in terms of socio-economic status. Thus we can say that high child protection referral rates are associated with socio-economic disadvantage.

The initial analysis showed a negative association between the proportion of people born in non-English speaking countries and child protection referral rates. There are also strong negative associations between the proportion of people born in non-English speaking countries and all of the other socio-demographic variables. Thus it appears that on average, geographic areas with high concentrations of people born in non-English speaking countries are not socially disadvantaged.

There was no association between child protection referral rates and the “social character” variables (percentage of adults who volunteer, or are involved in unpaid childcare, or do more than 5 hours per week of unpaid domestic work) which may indicate that these variables define social character in a different way to the socio-demographic indicators used.

The variables measuring domestic violence related assault, smoking related illness and alcohol related illness were strongly correlated with child protection referral rates and also with the other socio-demographic variables. However, in the multivariate analysis, none of these three factors retained their significance in the presence of the other independent variables. On the basis of these results it could be argued that child abuse and neglect, domestic violence and health risk behaviours are all manifestations of socio-economic disadvantage.

## Alternative regression models

Since the variable measuring proportions of Indigenous families exerts such a powerful effect on the model, it is instructive to consider variations of the model treating this aspect in different ways.

Table A6 summarises and compares four alternative models:

- the 'core' model which encompasses all LGAs and includes the Indigenous variable,
- a model which encompasses all LGAs but omits the Indigenous variable,
- a model which encompasses only those LGAs with high ( $\geq 5\%$ ) proportions of Indigenous families and includes the Indigenous variable, and
- a model which encompasses only those LGAs with low ( $< 5\%$ ) proportions of Indigenous families and omits the Indigenous variable.

The variables representing single parent families, low income families, and low education or qualification families have a significant positive effect in three out of four of the models.

**Table A6: Comparison of models with alternative geographic and population bases**

Variable	All areas (n=153) With Indigenous variable	
	Coefficient	p-value
Constant	-9.700	-
Percentage of families where at least one parent is Indigenous	2.410	<0.001
Percentage of children and young people aged 0-17 years living in single parent families	0.850	0.005
Percentage of low income families	1.300	0.005
Percentage of low education families	0.416	<0.001
Percentage of low qualification families	-	-
Location: city or large town	6.089	0.030

R-squared=87.5

Variable	All areas (n=153) Without Indigenous variable	
	Coefficient	p-value
Constant	-40.600	-
Percentage of families where at least one parent is Indigenous	-	-
Percentage of children and young people aged 0-17 years living in single parent families	2.291	<0.001
Percentage of low income families	2.611	0.002
Percentage of low education families	-	-
Percentage of low qualification families	0.790	0.007
Location: city or large town	-	-

R-squared=69.3%

**Table A6: Comparison of models with alternative geographic and population bases (contd.)**

Variable	Areas of high Indigenous population (n=73) With Indigenous variable	
	Coefficient	p-value
Constant	19.157	-
Percentage of families where at least one parent is Indigenous	2.383	<0.001
Percentage of children and young people aged 0-17 years living in single parent families	-	-
Percentage of low income families	2.313	0.001
Percentage of low education families	-	-
Percentage of low qualification families	-	-
Location: city or large town	10.306	0.013

R-squared=83.1%

Variable	Areas of low Indigenous population (n=80) Without Indigenous variable	
	Coefficient	p-value
Constant	-11.987	
Percentage of families where at least one parent is Indigenous	-	-
Percentage of children and young people aged 0-17 years living in single parent families	2.064	<0.001
Percentage of low income families	-	-
Percentage of low education families	0.455	<0.001
Percentage of low qualification families	-	-
Location: city or large town	-	-

R-squared=69.3%