Does location also matter? A spatial analysis of social achievements of young South Australians

Oluwatomi Esther Adejoro (nee Awodeyi)

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Disclaimer

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A spatial analysis of social achievements of young South Australians

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Geographical Information Systems

Department of Physical Geography and Ecosystem Science,

Lund University

Supervisor

David E. Tenenbaum, Senior Lecturer

Department of Physical Geography and Ecosystem Science

Lund University

Dedication

To the memory of my late father Dr. John Olusegun Awodeyi (1945-2008)

To my mother Mrs. Aderonke Awodeyi

To my husband and mentor Toyin Adejoro

To my siblings Tola, Seun and Funke

To my children Ayo, Gbemi and Fiyin

Abstract

There are spatial elements and factors in every social activity. Physical environment in particular and its characteristics has a significant effect in the social decisions and outcomes of a location and of the residents of disadvantaged areas. These spatial elements and factors have been the main focus in many researches and studies about young people's socio-economic statuses and achievements. The importance of spatial dimension can never be overestimated and to explore this importance, this study tries to understand the spatial patterns and locational factors affecting social achievements for young adults in South Australia, located in Australia. Geographical indices such as Socioeconomic Index for Area - Index of Relative Socio-Economic Disadvantage (SEIFA-IRSD), Accessibility and Remoteness Index of Australia (ARIA) and Distance to the nearest higher institution of learning (DTI) were all derived using GIS.

These variables were all combined and analysed in a multiple logistic regression model to investigate and understand their effect on four key social outcomes – Employment, Qualification, Year 12 completion and independent living status. Results of the study show that on the overall, SEIFA-IRSD is the best estimator for employment, year 12 and qualification outcomes and ARIA is the best estimator for independent living, however, DTI is a moderately effective estimator for all four outcomes.

These indices proved to be significant determinants to social achievements for young people and point to the presence of important geographical patterns within the study area. Location does have a strong effect on the social status of young Australians.

Key terms: Spatial patterns, spatial determinant, social achievement determinants, GIS, South Australia

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Acronyms

ABS	Australian Bureau of Statistics
ADA	Australian Data Archive
AISR	Australian Institute of Social Research
ANU	Australian National University
ARIA	Accessibility and Remoteness Index of Australia
ASGC	Australian Standard Geographical Classification
DET	Department of Education and Training
DTI	Distance to nearest Tertiary Institution
GIS	Geographical Information Systems
GISCA	National Centre for the Social Applications of GIS
LGA	Local Government Areas
LSAY	Longitudinal Survey of Australian Youths
NCVER	National Centre for Vocational Education Research
OYSA	South Australian Office for Youth
SA	South Australia
SEIFA	Socio-Economic Index for Area
SEIFA-IRSD	Socio-Economic Index for Area - Index of Relative Socio-Economic Disadvantage
SES	Socio-economic Status
SLA	Statistical Local Area
SR	Statistical Region
USA	United States of America

Chapter 1 – Introduction

1.1 Introduction

This study is conducted in the context of current Australian government initiatives on youth empowerment and helping young people to achieve their potential. Being either in full-time education or work, or a combination of both – in other words, being fully engaged in society – is a good indicator that a young person is on the right track (NCVER 2011). Young people require specific policy attention because they must navigate many of life's crucial transitions in a short time (World Bank 2007). Young people are a heterogeneous group that can be described by a range of identity variables including class, gender, socio-economic status, ethnicity and cultural norms and values (Roche et al. 2008).

These diverse categorizations have important consequences for the collation and analysis of data relating to youth issues, as well as policy development and evaluation of programs directed at young people.

As of July 2009, 15 to 24 year olds made up 17.4 per cent of South Australia's labour force. They are critical to the economic and social development of the state (ABS 2009). While young people and their families make decisions in relation to the immediate challenges and opportunities presented to them, public policy is critical to determining the development of young people's human capital and their potential as key agents for social change, economic development and technological innovation. Being from a less advantaged environment does not have to determine a young person's destiny.

To address some of these issues, there are a wide range of data being collected by research organisations to track young people as they move from school into further study, work and other destinations. Visualization allows for key information in important datasets to be located rapidly via visual reporting – maps, graphs etc. This study uses GIS tools together with a large longitudinal data set to investigate the spatial distribution of social activities of

young people, and also how geographic location of usual residence may be one of the key factors that can determine a youth's future social achievement.

1.2 Research scope and objectives

In an attempt to establish the importance of the nature of residential location in determining the social-economic achievement of young people, this study aims to explore the spatial determinants affecting the level of social achievement of South Australian youths using GIS. Specifically, this study aims to use GIS as an analytical tool to:

- Provide a summary spatial snapshot of the distribution of youths in South Australia (age 15 to 24 years) by sex, indigenous status and other relevant demographics using the Australian census data

- Map each youth (using their addresses) to their geographic areas / Statistical Areas (SA); and classify and summarize their achievements into the following existing indexes using the Australian Statistical Geography Standard (ASGS), a geographical framework developed by the Australian Bureau of Statistics (ABS).

  o Accessibility Remoteness Index for Australia (ARIA)

  o Socioeconomic Index For Area - Index of Relative Socio-Economic Disadvantage (SEIFA-IRSD)

- Propose and derive a <u>new</u> index of the distance to the nearest tertiary institutions for each youth using school location data from the SA Department of Education and Training (DET)

  o Distance to the nearest tertiary institution (DTI)

- Research into the relationships between each geographical index (SEIFA-IRSD, ARIA and DTI) and social achievement indicators. Social achievements will be measured by the following indicators

  o Employment status: Employed (full-time/part-time)/Not Employed

- o Education: Whether completed year 12, in a tertiary study or completed a qualification

- o Social: Whether living in own home

- Compare the social achievements of South Australian youths in each geographical index with the aggregated State and National averages for youth employment and education achievements.

This study compares the geographical indices (SEIFA-IRSD, ARIA and the proposed DTI) that summarise different aspects of living condition, and may contribute to social achievements (education, employment and social) in youths in an effort to identify index levels where youths are likely to be at high risk of failing socially. Differences in sex, language background and indigenous status will be controlled for in the comparisons, as these are issues that should also be considered as potential influences when comparing differences in social attainment.

The study attempts to answer the following questions:

- Can the social achievement of youth be estimated by their scores in the aforementioned indices? Are there any relationships/correlations between each social achievement indicator (education, employment and social) and any of the geographical indices? If 'yes', are the relationships positive or negative?

- Which of the three indices has the strongest relationship with each of the social achievement indicators? Will the newly derived index (DTI) show stronger relationships with achievement in any of the indicators?

- At what levels of each of the indices should policy makers take action?

- How do youths living in South Australia with different scores on the geographical indices compare with the aggregated State and National averages?

1.3 Data

In order to explore the spatial patterns in young people's socio-economic achievements, longitudinal data describing their youthful years must be used. The primary source for this study is the Longitudinal Survey of Australian Youths (LSAY) data, currently in the custody of the Australian Data Archive (ADA) at the Australian National University (ANU). The LSAY data contains background information about young people in Australia. Collected since 1995 with a national sample of 13 000 Year 9 students, LSAY focuses on capturing the key socio-economic outcomes for young Australians during their journey from when they turn 15 years old to their mid-20s and tracks the details of their experiences during their transition years from school to further education, employment and socio-economic destinations. The LSAY randomly samples students in school so they represent all Australian students. These students are surveyed initially through LSAY tests and questionnaires, and then longitudinally through annual telephone interviews and mails. Data relating to employment, education, health, finance along with many other key socially related variables and attitudes to these are collected. (www.lsay.edu.au)

Data from the cohort who were first contacted as 15 year-olds at school in 2003, and were in their early twenties in 2011, will be used in this study.

Base on the framework for this study, a geographic information system (GIS) will be set-up to integrate collected data and perform appropriate analysis as well as layer mapped data to produce detailed descriptions of conditions and relationships among spatial variables. Collected data was mapped to visualize the spatial distribution of youths in South Australia (based on their place of usual residence) and their demographics and socio-economic statuses.

The main attribute of this study is the extraction of different maps using the data. The maps explain the results visually and aid the identification of the geographic patterns in the social-economic statuses of South Australian youth.

1.4 Justification

Whether or not the education, employment and social situations of youths in South Australia are influenced by where they live and how these youths compare with the State-wide and Nationally aggregated averages in social achievements is clearly an important issue for policy makers.

This is an important and significant study particularly because over the years there has been a continuous debate about the best ways of providing a range of pathways for young people to succeed in work and life. Social achievements of youths can be measured by their education, employment and social statuses.

Results of this study could provide valuable information to South Australian state policy planners and local education providers regarding the spatial determinants of youth achievements and help them make policy decisions that youths need to reach positive achievements. It will be of great benefit to policy makers if the LSAY data can be used to research into the geographic and demographic information describing South Australian youths and their relationships with their social achievement in education and employment by 25 years of age using 5-year data (2006-2010). This information can help to provide insight into geographical areas that are lacking certain components, or where the current situation requires improvement.

This research will also support the geographical information science field by demonstrating the study as one of the ways GIS can aid socio-economic research.

Chapter 2 – Background

2.1 Who are young South Australians?

There seem to be no single definition of 'youths' or 'young people', or how they differ from adults or children. Different sources have different definitions - for example, young people are defined by:

- the United Nations (2007) as those aged between 15 and 25
- the Commonwealth Secretariat (2008) as those aged between 15 and 29
- the Australian Government as those aged between 12 and 25 years (Garcia de Heer 2008)
- the South Australian Office for Youth (OYSA) as those aged between 12 and 25 years

In reality, young people are a heterogeneous group further described by a range of identity variables including class, gender, socio-economic status, ethnicity and cultural norms and values (Roche *et al* 2008).

This thesis will refer to 'young South Australians' or 'South Australian youths' as those aged between 12 to 25 years living in South Australia in order to align with the South Australian Office for Youth and Australian Government definition. Some facts about young South Australians:

- As at June 2011, there were 307,585 young people aged between 12 and 25 living in South Australia. Young people comprise approximately 19 per cent of the State's total population (ABS 2011).
- The majority of young South Australians live in metropolitan Adelaide. In 2006, young people aged between 15 and 24, comprised 26 per cent of all people leaving the country's inland areas. Young people move to metropolitan areas primarily to access education and employment opportunities (OYSA 2010).
- In July 2009, 15 to 24 year olds made up 17.4 per cent of South Australia's labour force. They are critical to the economic and social development of the state (ABS 2009)[2].

2.2 Measuring the social achievements of young people

The years between 12 and 25 are a period of rapid growth as young people experience significant emotional, social, physical, psychological, and cognitive developmental changes. It is during this time that young people are required to accept increased personal responsibility for their lives, and gain independence as they transition from childhood through adolescence and on into adulthood (OYSA 2010). From a social environmental perspective, young adulthood is a critical period of the lifecycle to study and intervene on health issues, and is a life stage where family patterns and lifestyles are not created but also concreted. Young adults develop their own family unit and social environments both within and outside the home. There are transitions from school to further studies, such as vocational education or university, and movement into the workforce (Raffe 2009).

Individual socio-economic status of youths can be measured through a number of variables such as marital status, family structure, education, household income, housing tenure and property value (Howard 2011). A research report developed by the Australian Institute of Social Research (AISR) at the University of Adelaide, on behalf of the OYSA, highlights the following key issues as being of significance for young people:

- Education and training
- Employment status and skills
- Road safety
- Environmental issues
- Standard of living and housing affordability
- Participation in civic and community life
- Health issues – physical and mental
- Age-based and culturally-based discrimination and abuse
- Accessible and affordable transport
- Family relationships and friendships
- Bullying and emotional abuse, body image, drugs and alcohol, safety and wellbeing

- Vulnerability to poverty, and youth justice

(AISR 2009)

This research will focus on the analysing social achievements of youths in terms of employment, education and housing arrangement and affordability.

2.2.1 Employment status

How important is 'employment status' in determining whether a young person has 'arrived'? A study by the Economic Development Board of Australia concluded that paid employment is central to social inclusion, providing opportunities to develop skills and confidence while reducing income inequalities. Social inclusion is vital to economic development, helping to ensure a supply of suitably skilled labour (EDB 2009). The South Australian Government has incorporated young people's employment into its South Australian Strategic Plan (SASP) through several targets relating to growing prosperity (AISR 2009).

A Harvard anthropologist and past Professor of Sociology and Public Affairs, Katherine Newman, also endorses youth employment as a measure of achievement. In her publication in 1996, Newman conducted research into the employment experiences of Harlem youths (Newman 1996). She deduced that even though many of young adults were earning low salaries in low level, dead-end "McJobs," the experiences of being employed had a lot of advantages, some of these hidden.

> *"Despite the fact that these jobs were tiring, boring, and stressful, poorly compensated, stigmatized, and offered limited opportunities for advancement, the youths persevered because of a strong work ethic and a desire to develop and sustain an identity as someone who works. Further, these jobs allowed the teens to contribute to the survival of their poverty level households, leading to increased self-esteem and pride. Some youths were motivated by these low-end jobs to save part of their earnings for future educational and job training opportunities, essentially turning a dead-end job into a stepping stone for a career. Newman also found that participation in an employment setting shifted the youths' reference group away from out-of-school peers, into the workplace, and onto employed adult role models." (Quotation*

One key message from these various research studies is that for young people, decent and prospective employment is an important step in the journey of transition to adulthood. It provides a means for self-reliance, independence, better life, better choice or advancement in education and training. Thus employment is essential to the social development of young people, and to describing the progress of that development.

2.2.2 Education and training attainment

Research has shown that when young people successfully complete Year 12 or its equivalent, their future prospects of health, social status and employment are greatly increased (Koen and Duigan 2008). Students who do not complete Year 12 are at much higher risk of labour market exclusion (Boese and Scutella 2006). Lack of education and work experience are specifically associated with long-term disadvantage, including chronic unemployment and underemployment, a shorter working life, lower income and an increased likelihood of ending up in poor quality jobs with few opportunities for career development (Marsh and Perkins 2006).

In South Australia, the State Government has acknowledged the importance of education and training for its young population through various state targets related to the objective of expanding opportunity. In recent years, the State Government has committed to re-establishing South Australia is the national leader in school retention rates, a benchmark that the state had achieved in the early 1990s (Government of South Australia 2009).

2.2.3 Housing arrangement and affordability

One of the first steps on the pathway to adulthood for many young people is the transition from living at home with one's parents and/or other family members to living outside the family home, whether by oneself, in a

shared house, or in some other form of accommodation (Hillman and Marks 2002). Past research has indicated that markers such as full-time employment, moving out of the family home, home ownership and marriage remain important milestones on the road to independence and adulthood (Fleming and Marks 1998; Kilmartin 2000; Stone 1998; Strachan 1995).

Christabel Young, a researcher focussed on young people, concluded that leaving home represents one of the several events during transition from childhood. Young people who had been living in non-metropolitan areas were more likely to leave home at earlier ages than were those who were located in metropolitan areas, as were those who had left school at younger ages (Young 1987).

Another researcher, Kilmartin (2000), concluded that purchasing one's own home is another important transition for young people, not only because it reduces the chances of moving back into the parental home, but also because it remains a highly desirable sign that they have almost completed their journey towards adulthood.

2.3 Locational factors that are important for social achievements

2.3.1 Socio-economic status (SES)

There is a strong correlation between the Socio-economic Status (SES) of the area in which a young person lives and the likelihood of them being in fulltime education or work at age 19 (ABS 2006 cited in Lamb and Mason 2008). It is becoming quite common to apply a measure of SES for a given area as a variable when researching the status of the residents of that area (Bernard et al. 2007). SES is often investigated and assessed using a combination of factors to derive an index of disadvantage such as the Socio Economic Indexes for Areas (SEIFA). This is commonly derived from the census data (ABS 2003). The studies which have had the appropriate data and used this methodology have reported an effect of neighbourhood SES which persists after controlling for individual factors (Chen and Paterson 2006; Oliver and Hayes 2008).

An ABS study of 15-19 year olds between 1999 and 2008 showed that 29.2 per cent of young people in the most disadvantaged areas are in full-time education compared with 56.4 per cent of their peers living in the most advantaged areas. Fewer than one in five 19 year olds living in high SES areas are either unemployed, in part-time work, or not in the labour force, and not studying full-time (ABS 2006 cited in Lamb and Mason 2008).

Researchers Bell, Schuurman and Hayes, in their journal paper, stated that the most reliable on source for areal estimation of population SES is the national census. They highlighted that researchers often rely on the national census for socio-economic information about the population because these datasets are freely available (or available at a low cost), broadly representative of all political jurisdictions, and contain a number of variables reflective of an individual's or area's socio-economic position relative to the surrounding population (Bell et al. 2007).

2.3.2 Remoteness

Research work carried out by Christabel Young (1987) also suggested that location plays an important role in young people's transition into adulthood. Differences in the rate at which cohorts of young people leave the parental home to strike out on their own are affected by the environment in which they find themselves at the time of their decision. Young deduced that the likelihood of leaving home was influenced strongly by socio-demographic factors, such as coming from a non-metropolitan area, which increased the likelihood of this transition occurring.

The pattern for young people living in rural areas is one of lower participation in education at all levels, and of lower overall achievement than their urban counterparts (White and Wyn 2008). A report on Australian higher education by researchers (James et al. 1999) showed that:

> *"university students from rural and isolated backgrounds comprised 19.2 per cent of the total student population in 1997, a participation share dramatically below the equity reference point of 28.8 per cent derived from 1996 equity data".*

2.3.3 Proximity

In an earlier study conducted in the United States of America (USA) by the famous scholar Vincent Tinto (1973), the effect of proximity on school attendance rates was strongly considered and it was found that majority of the affected students were those disadvantaged by proximity to a college. Similarly, another scholar, Roweton (1994), interviewed students and one of the consistent and persistent responses pointed to proximity as the key factor in deciding whether to attend college or not. Roweton's findings were based on self-reported feedbacks from affected students while Tinto findings were based on whether there was a college in the students' community regardless of the distance to the students' home or school. Daun-Barnett and Affolter-Caine (2005) concluded on Tinto and Roweton's study that:

> *"Clearly the problem is more complex than proximity, but it is an important factor to consider at a time when we know the*

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students less likely to attend college are from lower SES backgrounds and more frequently are underrepresented minority students. The limitation of these prior methods is that they lacked uniform and reliable methods to quantify proximity to college. This limitation is particularly misleading because in a large metropolitan area it is possible to be characterized as living in close proximity because colleges are present, when in fact, distance is still very much an issue. GIS allows for a more precise treatment of proximity as an actual measure of distance from a high school or place of residence (depending upon the data)".

2.3.4 Summary

As seen above, various researchers have tried to analyse the effect of location on social outcomes for young people. SES, remoteness and proximity have been studied to determine how they affect the lives of youths. As already discussed in Chapter 1, this study aims to look further into these locational factors in more depth by thinking spatially, analysing and comparing three spatial indices derived from these factors that may help to reliably understand which factor is most accurate in estimating how successful a young person will be given his environmental circumstances.

2.4 GIS and spatial information in addressing geographically-related questions in social science research

A geographical information system can be described as a computer-based system that can be used to collect, store, modify, analyse and present spatially referenced data (Poole 1995a). In other words, location information is linked to non-spatial data, commonly referred to as attributes (Brodnig and Mayer-Schonberger 2000). GIS has the powerful ability to use the address information to map individual data record, such as employment or education outcomes of a person to a latitude-longitude position and then to a map (Cooke and Maxfield 1967; Drummond 1995). Displaying trends visually and spatially through maps can greatly have an effect on public opinion (de Lepper Scholten et al 1995). This makes GIS a powerful and convincing tool, and the society is gradually leaning more on GIS spatial abilities for important decision making (Jeffress 2001). Research has shown that one of the most important factors in the research of social science is the influence of the neighbourhood and geographic characteristics on people's attitudes or behaviours (Kwan 2012).

Most of the social problems in the society are as a result of a combination of various social, environmental, economic and behavioural factors and social scientists are now approaching solutions to these problems by analysing these factors to figure out a pattern which may explain and prevent foreseeable problems. Spatial analyses of these factors in a geo-referenced dataset can help to improve the result of such approach. Some examples are the analysis of incidence of crime in the urban areas and the analysis of the decline in fertility in third world areas (O'Sullivan and Unwin 2002). Goodchild and Janelle concluded that:

> The advent of geographic information systems (GIS) has enabled an explosion of interest in and ability to study the spatial patterns of behaviour. GIS not only makes it possible to store in digital form vast amounts of spatial data, it makes possible statistical analysis, modelling, and visual display of geographical data. It provides a powerful new tool that has stimulated new and exciting social science research using geographical concepts and data. At last, long-held but unverified hypotheses about the importance of locational and spatial variables can be tested. We are at the dawn of a revolution in a spatially oriented social science (Goodchild and Janelle 2004).

This review of various literatures however reveals that research that investigates the spatial differences in the social achievements of youths such as academic excellence and being employed is quite limited. Spatial analysis of youth's achievements is concerned with the description and understanding of spatial variations in the levels of development in young people of similar age group. Geographical information system approaches are becoming increasingly popular, and in this type of research, they will allow the use of modern computing in the modelling and mapping of social achievements and environmental relationships. Different environments have different characteristics such as distance to key places, presence or absence of built environmental features and infrastructures e.g. schools, office buildings, roads, transportation facilities – if present, these may be unequally distributed throughout the landscape. These differences can contribute significantly to the analysis of social achievements.

Chapter 3 – Methodology

As reviewed in the literature, different environments can have different characteristics which can contribute to the variance found in the level of youth development. If such variance is observed, we need to investigate further to better understand what it is about a certain place that contributes to the high or low level of development. By linking spatial data with social outcomes information about the youths who live in these environments, we might be able explain some of the variance in a spatial manner.

3.1   The study area – South Australia

South Australia (abbreviated as SA) is a state in Australia and it is located in the southern central part of the country. It covers 983,482 square kilometres in total land area and is the fourth largest out of eight states and territories of Australia. At 30 June 2011, the estimated resident population of South Australia was approximately 1.6 million people, which represented 7.4% of the total Australian population - 49.3% of these were male while 50.7% were female. 1.9% of the population were made up by people from the Aboriginal and Torres Strait Islander. Youths (15-24 years old) form 13% of South Australia population and this distribution is similar for the whole of Australia (Table 3.2).

The capital of South Australia is Adelaide - the fifth largest city in Australia. Adelaide is subdivided into four main metropolitan regions – Northern Adelaide Region, Southern Adelaide Region, Eastern Adelaide Region and Western Adelaide Region (See Figures 3.3 to 3.7). The rest of South Australia is divided into two main country regions – Northern Western country region and Southern Eastern country region (See Figures 3.8 to 3.9).

About 79% of the state's population – approximately 1.26 million - live within or around Adelaide's metropolitan areas including the major regional cities (Murray Bridge, Whyalla, Port Pirie, Port Augusta, Port Lincoln and Mount Gambier). The rest of the population are located in rural areas which are dominated by agriculture and mining (ABS 2011).

Table 3.1: Some census figures describing South Australia

Population	**1,596,572**
Median age	39
Families	**430,250**
Average children per family	1.8
Private dwellings	**727,676**
Average people per household	2.4
Median weekly household income	$1,044
Median monthly mortgage repayments	$1,500
Median weekly rent	$220
Average motor vehicles per dwelling	1.7

Source: ABS 2011 Census

Table 3.2: People - demographics and education in South Australia as compared with the whole of Australia

Population	South Australia	%	Australia	%
Total	1,596,572	-	21,507,717	-
Male	787,218	49.3	10,634,013	49.4
Female	809,354	50.7	10,873,704	50.6

Indigenous Status	South Australia	%	Australia	%
Aboriginal and Torres Strait Islander	30,431	1.9	548,369	2.5

Age	South Australia	%	Australia	%
0-14 years	286,936	17.9	4,144,025	19.3
15-24 years	208,834	13.1	2,866,471	13.3
25-44 years	418,701	26.1	6,030,028	28.1
45+ years	682,101	42.8	8,467,195	39.3

Source: ABS 2011 Census

The series of figures below show a map of the states and territories of Australia (Figure 3.1), an accessibility and remoteness map (Figure 3.2), and a map of the regional areas and metropolitan area of Adelaide (Figure 3.3). The following region maps show the Socio-Economic Indexes for Areas (SEIFA-IRSD, Figures 3.4 to 3.9).
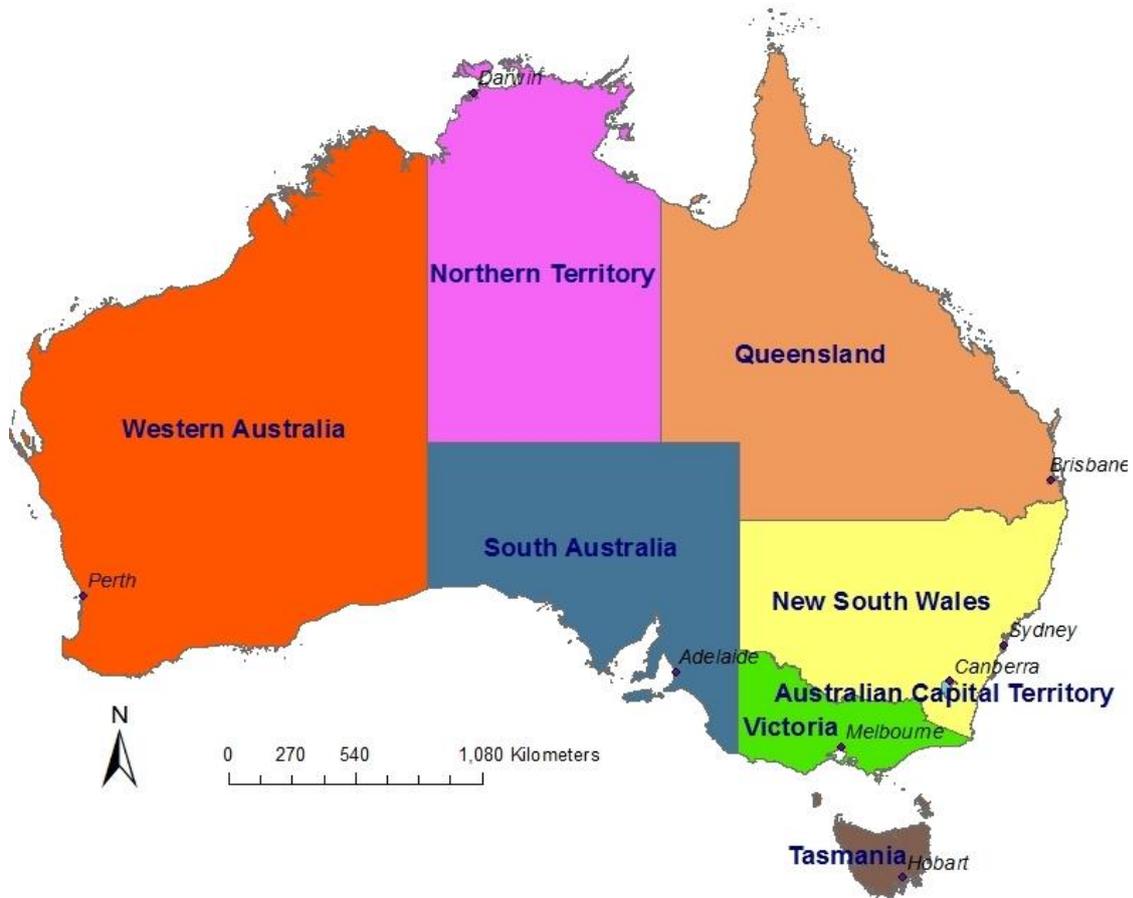
Figure 3.1 The states and territories of Australia

Map created by Oluwatomi Adejoro

Source: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011)
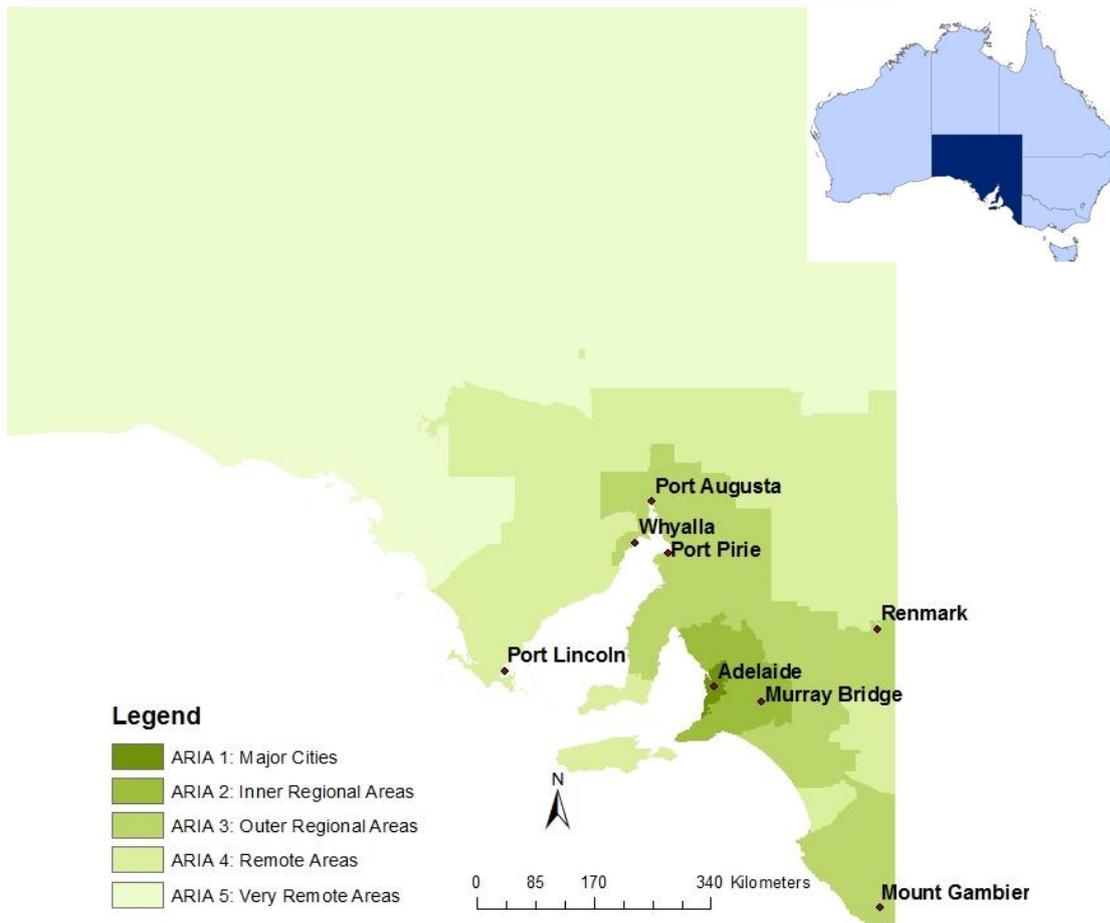
Figure 3.2: Accessibility and Remoteness Index for Australia (ARIA), showing Adelaide (capital city) and other major cities of South Australia

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011 and Accessibility/Remoteness Index of Australia (ARIA), Australia 2006)
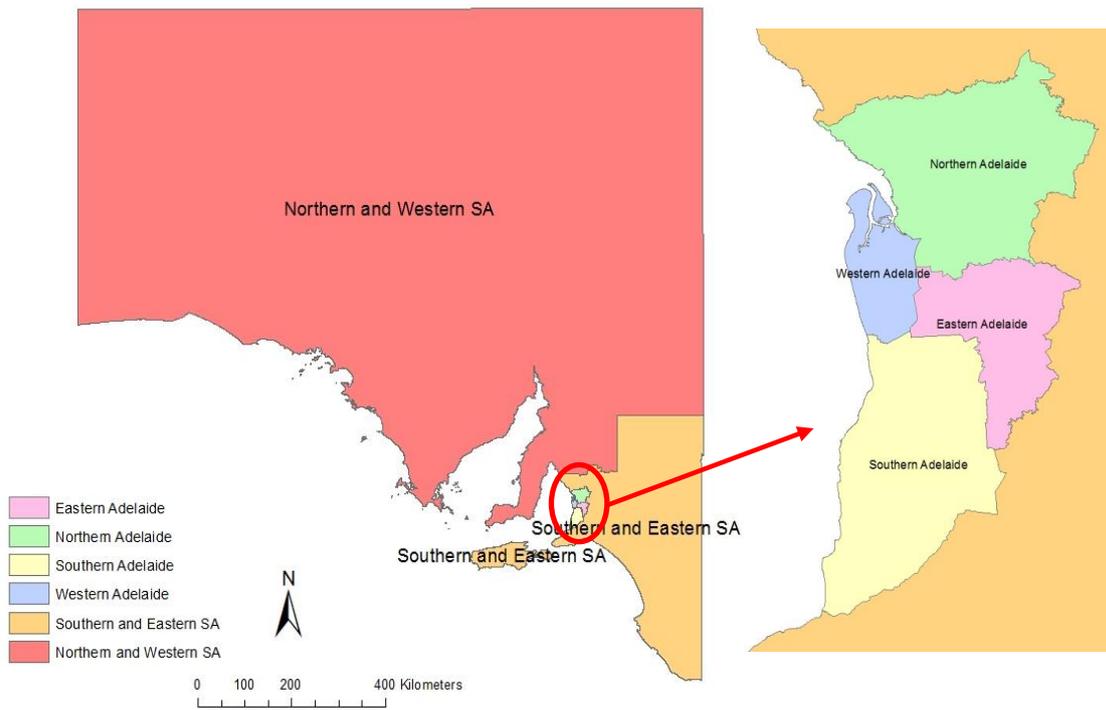
Figure 3.3 Six major statistical regions of South Australia showing the capital city of Adelaide

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011)
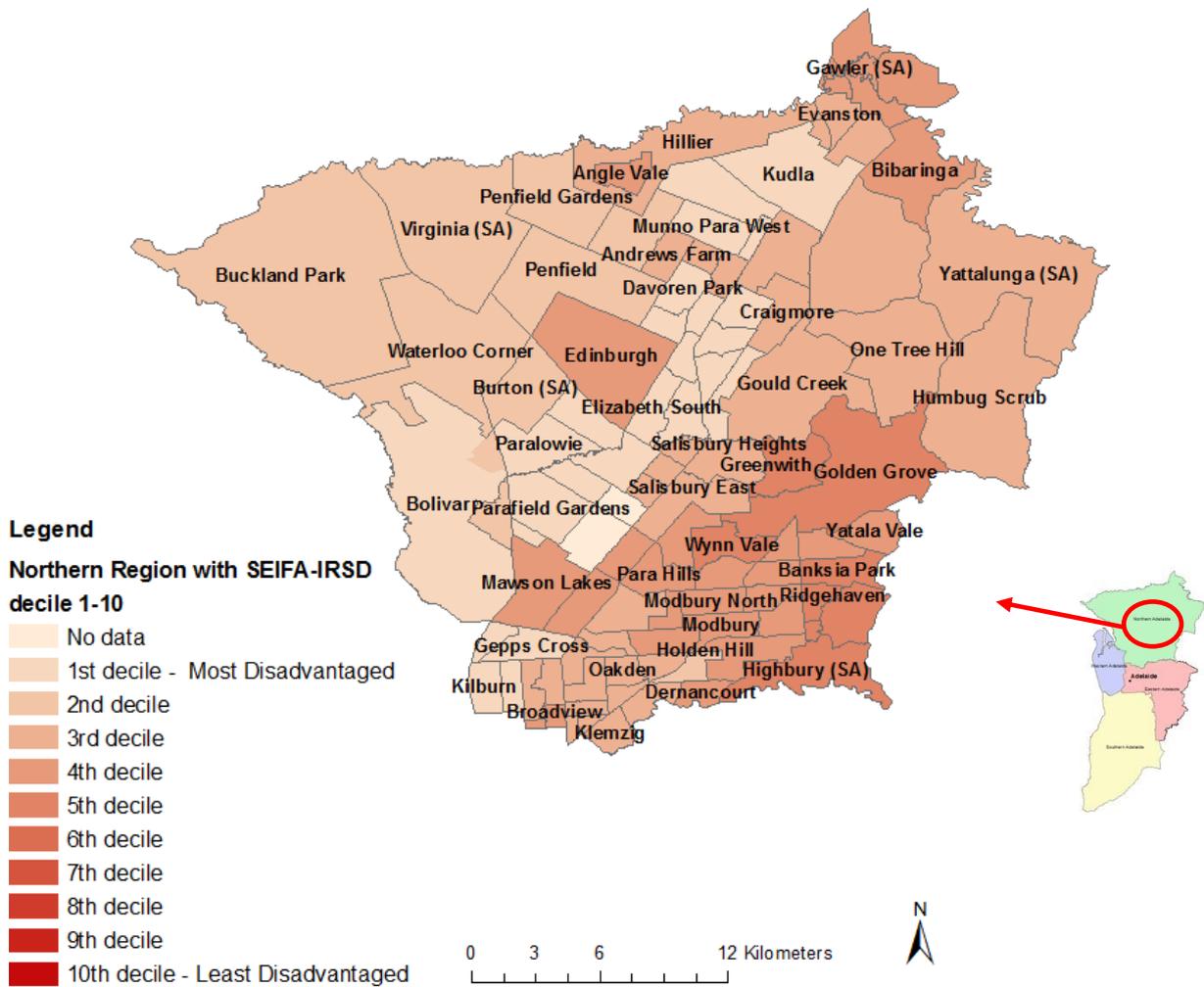
Figure 3.4 Northern Adelaide region showing suburbs and their relative disadvantage using SEIFA-IRSD deciles

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011 and Socio-Economic Indexes for Areas (SEIFA-IRSD), Australia, released 2006)
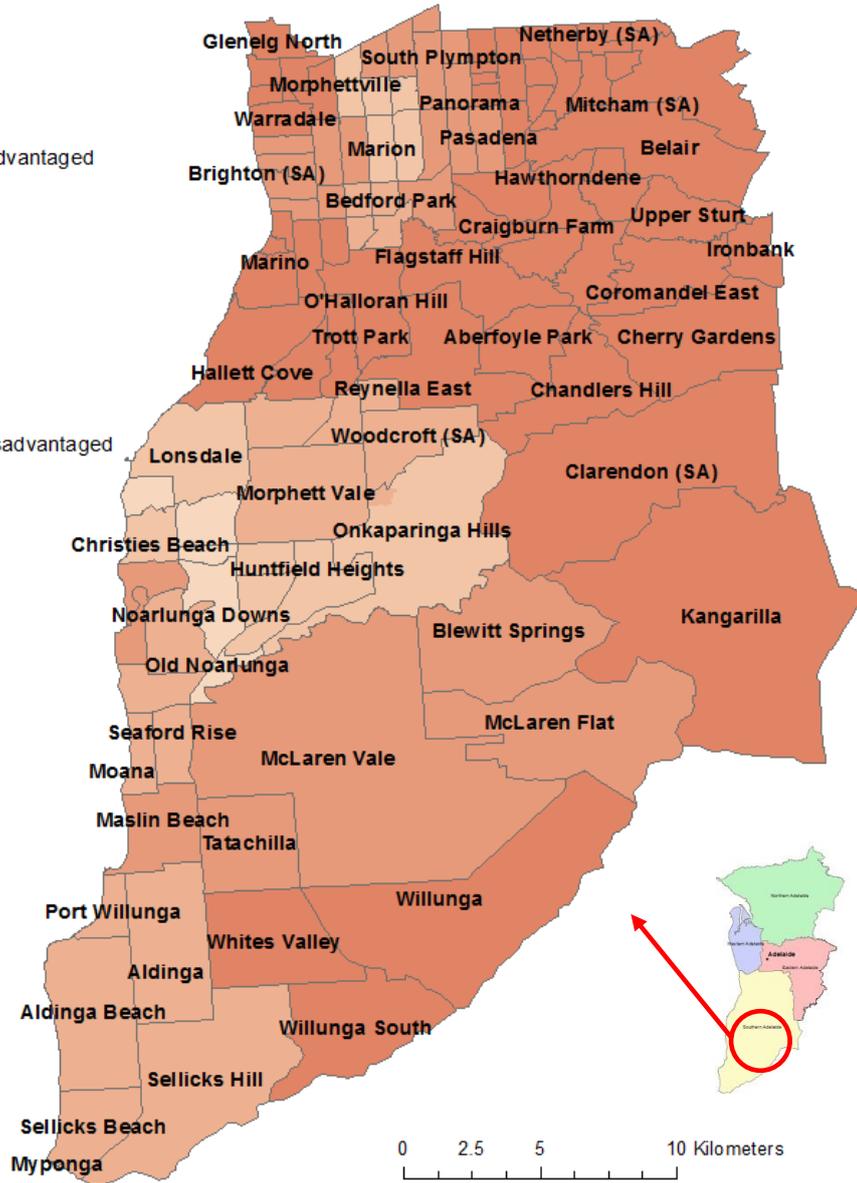
Figure 3.5 Southern Adelaide region showing suburbs and their relative disadvantage using SEIFA-IRSD deciles

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011 and Socio-Economic Indexes for Areas (SEIFA-IRSD), Australia, released 2006)
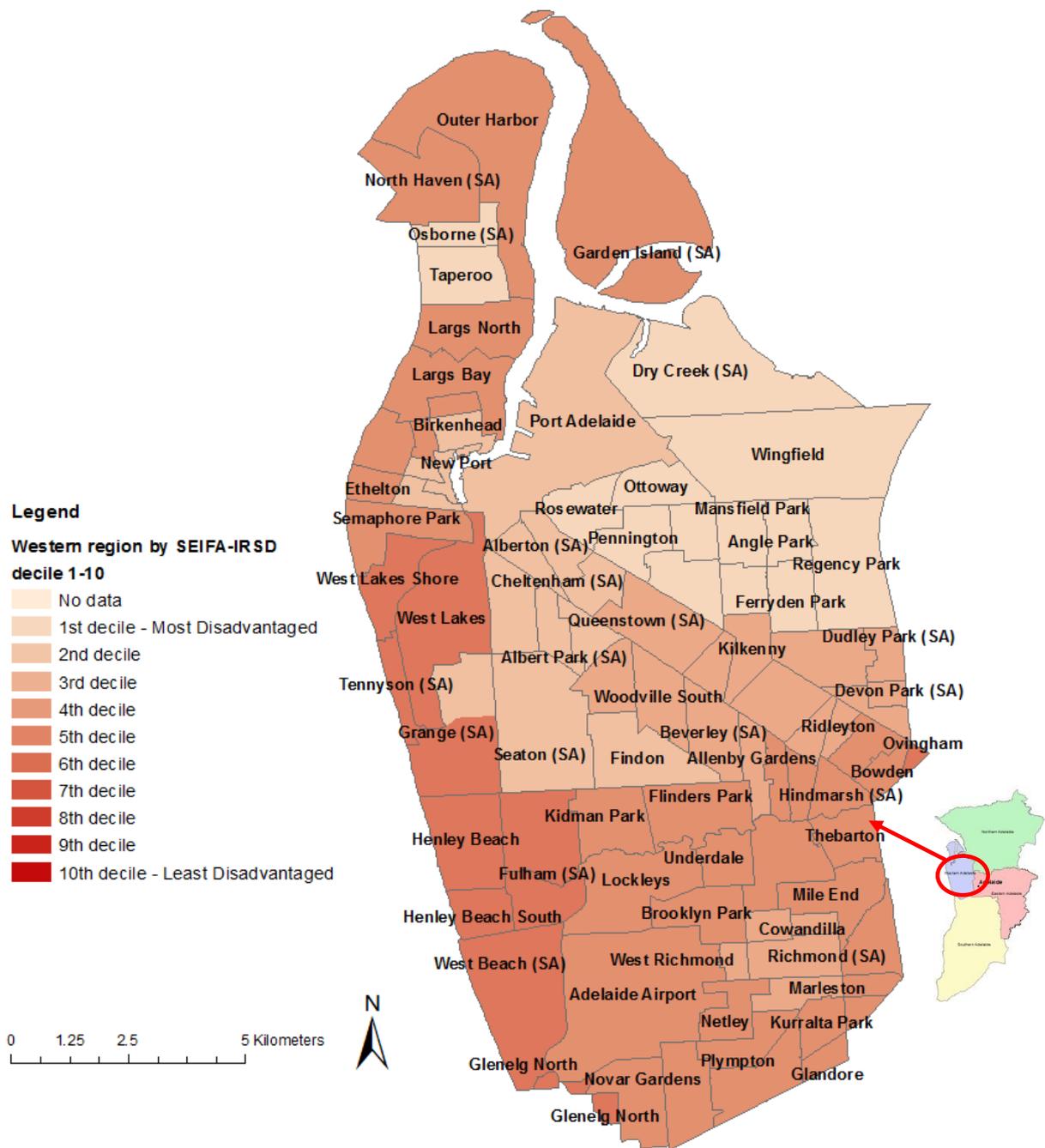
Figure 3.6 Western Adelaide region showing suburbs and their relative disadvantage using SEIFA-IRSD deciles

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011 and Socio-Economic Indexes for Areas (SEIFA-IRSD), Australia, released 2006)
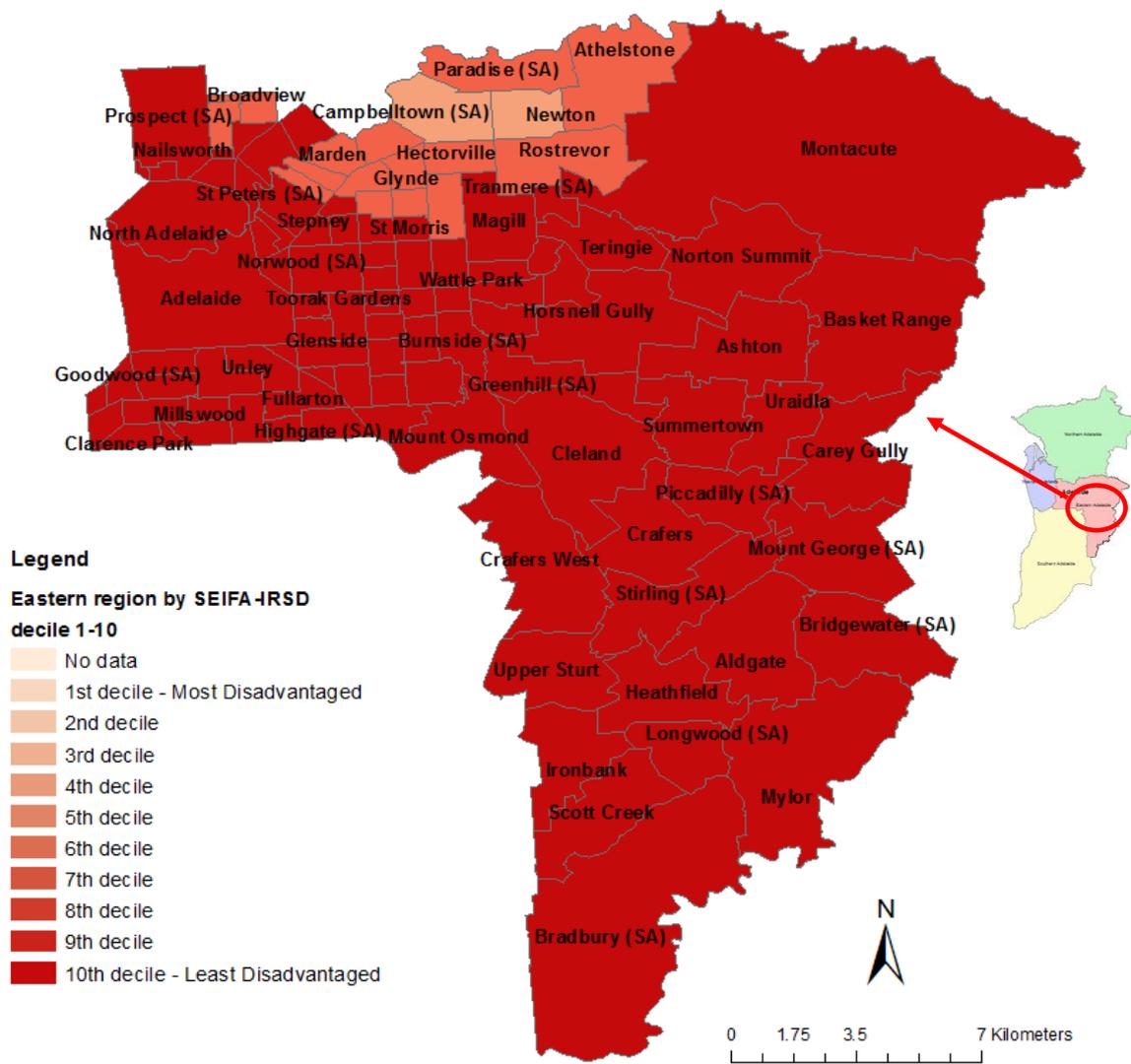
Figure 3.7 Eastern Adelaide region showing suburbs and their relative disadvantage using SEIFA-IRSD deciles

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011 and Socio-Economic Indexes for Areas (SEIFA-IRSD), Australia, released 2006)
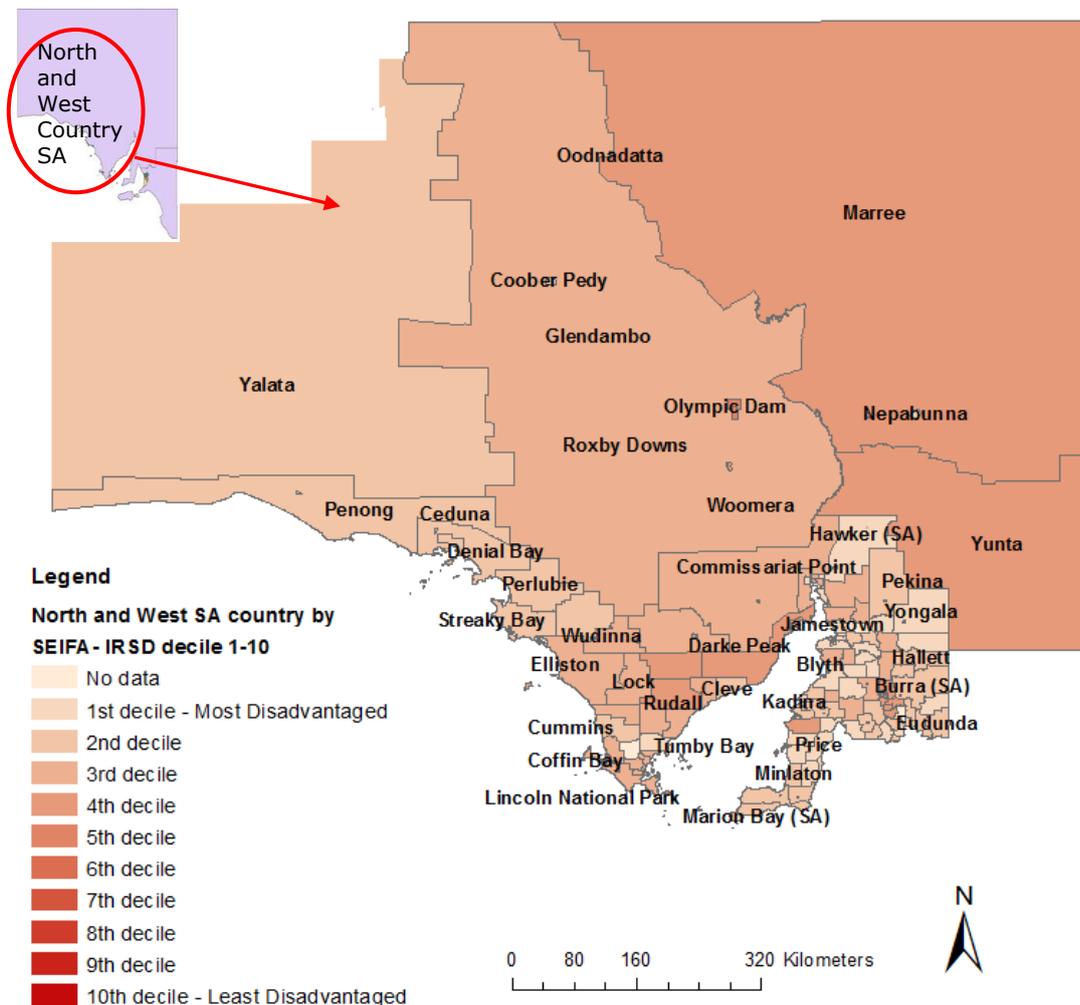
Figure 3.8 North and West of Country region of South Australia showing suburbs and their relative disadvantage using SEIFA-IRSD deciles

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011 and Socio-Economic Indexes for Areas (SEIFA-IRSD), Australia, released 2006)
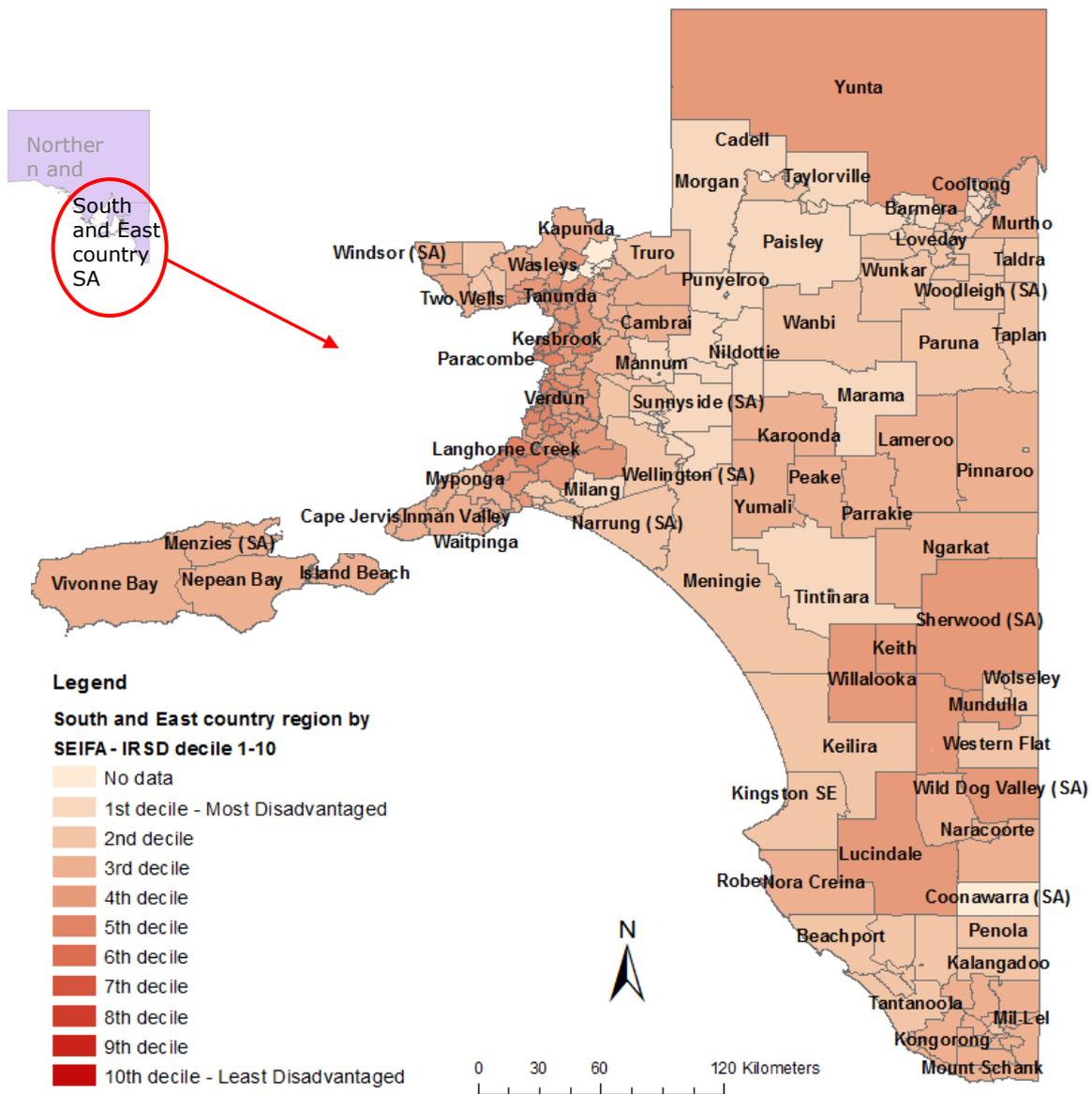
Figure 3.9 South and East Country region of South Australia Country Region showing suburbs their relative disadvantage using SEIFA-IRSD deciles

Map created by Oluwatomi Adejoro

*Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011 and Socio-Economic Indexes for Areas (SEIFA-IRSD), Australia, released 2006)*

3.1.1 Education in South Australia

In South Australia, primary schools are provided by the Department of Education and Children's Services, and the Catholic and Independent Schools' sectors. A very small proportion of children are taught at home or 'home-schooled'. Junior Primary and Primary School covers Reception to Year 2, for children aged 5 to about 8 years. The primary years, 3 to 7, cater for students up to 12 years of age (including some at aged 13 years) (DECS 2009).

Secondary schooling covers Years 8 to 12 (and occasionally Year 13), providing core study areas and extension courses to assist in the development of skills, knowledge and values in various formats until students are around 18 years of age (DECS 2009).

From 1 January 2009, new legislation required all 16 year olds to be in full time education or training until they achieved a qualification or turned 17, reflecting research which shows that young people who leave school too early are often unemployed by their 20s, and then find it difficult to find work and careers of their choice (DECS 2009).

There are six major public and private universities in South Australia. The three major public universities are: The Flinders University of South Australia (established 1966), The University of South Australia (established 1991) and The University of Adelaide (established 1874). The three major private universities are University College London's School of Energy and Resources (Australia), Cranfield University and Carnegie Mellon University - Australia (established 2006). Two of the major public universities – University of Adelaide and University of South Australia - have multiple campuses scattered around South Australia. Tertiary vocational education is provided by TAFE South Australia colleges throughout the state. There are over 50 institutions of tertiary vocational education (TAFE) in South Australia. TAFE SA campuses are distributed across Adelaide CBD, the suburbs, regional and remote areas of South Australia (TAFE SA, n.d.). A complete list of universities and vocational education campuses is provided in Table 3.3 below.

Table 3.3: A list of universities and vocational education campuses in South Australia

Public Universities

Flinders University of South Australia - Bedford Park

University of Adelaide - National Wine Centre of Australia - Adelaide

University of Adelaide - North Terrace Campus - Adelaide

University of Adelaide - Roseworthy Campus - Roseworthy

University of Adelaide - Thebarton Campus - Thebarton

University of Adelaide - Waite Campus - Glen Osmond

University of South Australia - Magill

University of South Australia - City East campus - Adelaide

University of South Australia - City West campus - Adelaide

University of South Australia - Mawson Lakes campus - Mawson Lakes

University of South Australia - Underdale campus - Underdale

University of South Australia - Whyalla campus - Whyalla Norrie

Private Universities

Carnegie Mellon University – Australia

University College London's School of Energy and Resources

Cranfield University

Colleges and Vocational Education (TAFE SA)

There are 49 campuses, learning centres and Aboriginal Access Centres across South Australia (TAFE SA, n.d.).

3.2 Data Sources

This sub-chapter examines the datasets used in this study, and explores the reliability, quality and structure of these data.

3.2.1 Longitudinal Survey of Australian Youths (LSAY)

The LSAY data forms the basis of the data used in this study. This dataset is suitable because it is based on a random sample of youths from all over South Australia, so it allows for various comparisons across different types of setting. Approval to access and use this dataset for this study was obtained in the first instance from the Australian Data Archive (ADA) as the main custodian of the dataset. ADA is a national body in charge of digital data collection and archiving. With all necessary approvals, data users and researchers can apply to be given access to these datasets for secondary analysis purposes (ADA 2012). This approval was further ratified by the National Centre for Vocational Education Research (NCVER) as the manager of the data set. NCVER provides analytical and reporting services for the LSAY data.

The LSAY project randomly surveys a large sample of high school students. The large random sample ensures that the cohort is representative nationally. The students are interviewed about their statuses and attitudes towards various social factors such as finance, education, training, employment, health, accommodation, social activities and other related factors. The initial data is collected by administering LSAY questionnaires and achievement tests to students through the school. Subsequently, students are followed up longitudinally via telephone interviews conducted annually (LSAY 2011).

In 2003, a nationally representative sample of more than 10,000 students aged 15 years was selected to participate in the study, which became the third cohort of the LSAY program. This is referred to as the LSAY Y03 cohort and it is the dataset provided by ADA for this study. The LSAY data is comprised of 10,307 de-identified records for the whole of Australia. 1039 (n) of these records are from South Australia, representing 50.8% male and 49.2% female youths who were surveyed as having been in at least Year 9 at approximately aged 15 years in 2003, and will continue to be longitudinally surveyed annually till they are 24 years old. Weights have been assigned to each

respondent so that respondents are a true representation of the population of 15 years olds (N=21,186) in South Australia as at 2003. The dataset was checked and cleaned to remove records with unknown age, gender or postcode of residence. Figure 3.10 shows the distribution of the LSAY Y03 cohort of young people surveyed longitudinally as having been in at least Year 9 at approximately aged 15 years in 2003. As per the figure, more than 30% of young people surveyed lived in the Northern suburbs of Adelaide.
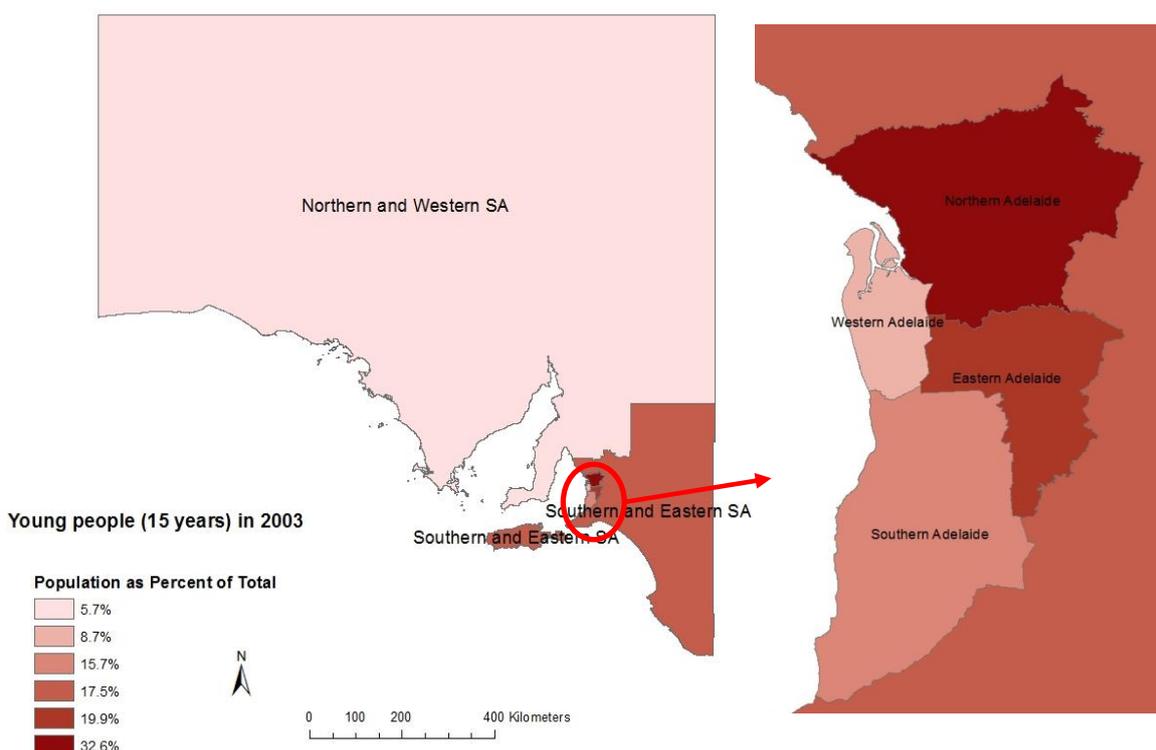
Figure 3.10 Six Major Statistical regions of South Australia showing the distribution population of young people (15 years) represented in the LSAY data

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011 and LSAY Y03)

3.2.2 The measures

The LSAY data consist of different variables relating to social characteristics. In order to examine whether and how locational characteristics affect youths' social outcomes as a preliminary investigation we will need and use only a few of the variables as described in Table 3.4.

Table 3.4: Data items in the LSAY dataset

Major topic area		Data items
Control variables (Individual characteristics	Sex	1. Male 2. Female
	Indigenous status	1. Indigenous 2. Non-Indigenous
Dependent variables (outcomes)	Highest school level completed	1. Year 12 2. Year 11 3. Year 10 4. Year 9 or below 5. Year level unknown
	Highest qualification completed	1. Certificate I 2. Certificate II 3. Certificate III 4. Certificate IV 5. Certificate - level unknown 6. Advanced diploma/diploma 7. Bachelor degree 8. Graduate diploma/ certificate 9. Postgraduate (PhD/Masters) 10. Did not complete a qualification
	Labour force status	1. Employed 2. Unemployed 3. Not in labour force 4. Unknown labour force status
	Living in own home	1. Currently own or buying 2. Currently renting 3. Not living in own home 4. Unknown
Independent Variable	Postcode	• Postcodes will be used to map each record to other geographic fields such as statistical region and suburbs. • Postcodes will also be used to merge the indices (SEIFA-IRSD, ARIA and the proposed DTI) to each record. Method for this will be discussed in later sections.
Other	Weight	Weights are created to ensure that the selected sample(s) match the original population. The weights are constructed to ensure that, when applied, the collected sample represents the underlying population of 15-year-olds attending school I 2003. Methods for deriving the weights will not be discussed in this study.

Table 3.5: Characteristics of the LSAY Y03 cohort, South Australia 2003 - 2011

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of LSAY respondents in South Australia (n)	1039	944	860	765	662	604	551	492	444
Population of South Australian young people age 15 years represented (N)	21186	21186	21186	21186	21186	21186	21186	21186	21186
Average age of respondents at the time of interview	15.7	16.7	17.7	18.7	19.7	20.7	21.7	22.7	23.7
Sex (%)									
Male	50.8	50.9	50.8	50.6	50.5	50.4	50.4	50.2	49.9
Female	49.2	49.1	49.2	49.4	49.5	49.6	49.6	49.8	50.1
Indigenous status (%)									
Indigenous	2.1	2.0	2.0	1.9	1.8	1.7	1.8	1.8	1.7
Non-Indigenous	97.9	98.0	98.0	98.1	98.2	98.3	98.2	98.2	98.3

Source: Compiled from the Longitudinal Survey of Australia Youths (LSAY) Y03 Cohort.

3.2.3 Administrative boundaries

Other geographical data necessary for spatial analysis in this study, such as administrative boundaries, have been collected from the Australian Bureau of Statistics (ABS). Spatial data from the ABS have been made available in a spatially referenced format, making it easily and readily used in the GIS environment. Throughout this project, youths are grouped according to an administrative statistical region, area or boundary within which their aggregate achievements are then calculated. These boundaries are part of the Australian Standard Geographical Classification (ASGC).

The Australian Standard Geographical Classification (ASGC) is a hierarchical classification system of geographical areas and consists of a number of interrelated structures. It provides a common framework of statistical geography and enables the production of statistics which are comparable and can be spatially integrated. The ASGC is constructed on the principle that it must fulfil user needs for spatial statistics while also conforming to general classification principles. Members within one class are of the same type, classes are uniquely defined so as to be mutually exclusive and, in total, the members in each class cover the entire class. (ABS 2011)

The following ASGC boundaries were used in this study - State and Territories (S/T), Statistical Region (SR), Statistical Local Area (SLA) and Suburbs and Postal areas. Figure 3.11 illustrates how the ASGC boundaries interrelate.

States and Territories (S/T) - The S/T is the largest spatial unit in the Main Structure and in the ASGC. Six states and five territories are recognised in the ASGC: Australian Capital Territory, New South Wales, Northern Territory, Queensland, South Australia, Tasmania, Victoria, Western Australia, Jervis Bay Territory and the external Territories of Christmas Island and Cocos (Keeling) Islands. S/Ts consist of one or more Statistical Regions (SR). The study area for the research is South Australia. The South Australia's S/T is identified by unique one-digit code of 4 within Australia.

Statistical Region (SR) – The SR structure also known as Statistical Subdivision has been in use since 1986 for the production of standard statistical outputs from Population Censuses and labour force surveys (ABS 2011). The statistical regions are large areas designed for the output of

surveys at a broader scale. South Australia has 6 SRs. Four of these SRs divide Adelaide into the Northern, Western, Southern and Eastern Adelaide and the remaining two divides the regional areas into Northern Western SA and Southern Eastern SA (figure 3.10). The 6 SRs have been used in this research.

Statistical Local Area (SLA) - The SLA is a generally used multi-purpose base spatial unit. It is the smallest unit defined in the ASGC 2011 edition. Researchers can use SLA for collecting and reporting area based data different from what the population census authority already do. South Australia can be divided by SLA with no overlaps or gaps. SLA is technically the aggregate of boundaries of incorporated Local Government Areas (LGA) administered by local government bodies called Local Government Councils. Statistical regions or sub-divisions of the ASGC is the aggregate of SLAs (ABS 2011).

Suburbs and Postal Areas - The ASGC also includes classifications for Suburbs and Postal Areas which have been used in this study to provide more accurate delineation of postcodes and suburbs that residents identify with.

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┌──────────┐   ┌──────────────┐   ┌──────────────┐   ┌──────────────┐   ┌──────────────┐
│          │   │ States and   │   │ Statistical  │   │              │   │ Suburbs      │
│ Australia│ → │ Territories  │ → │ Regions/Sub- │ → │ Statistical  │ → │ and postal   │
│          │   │ e.g.         │   │ division     │   │ Local Areas  │   │ areas e.g.   │
│          │   │ South        │   │              │   │              │   │ South        │
│          │   │ Australia    │   │              │   │              │   │ Australia    │
└──────────┘   └──────────────┘   └──────────────┘   └──────────────┘   └──────────────┘
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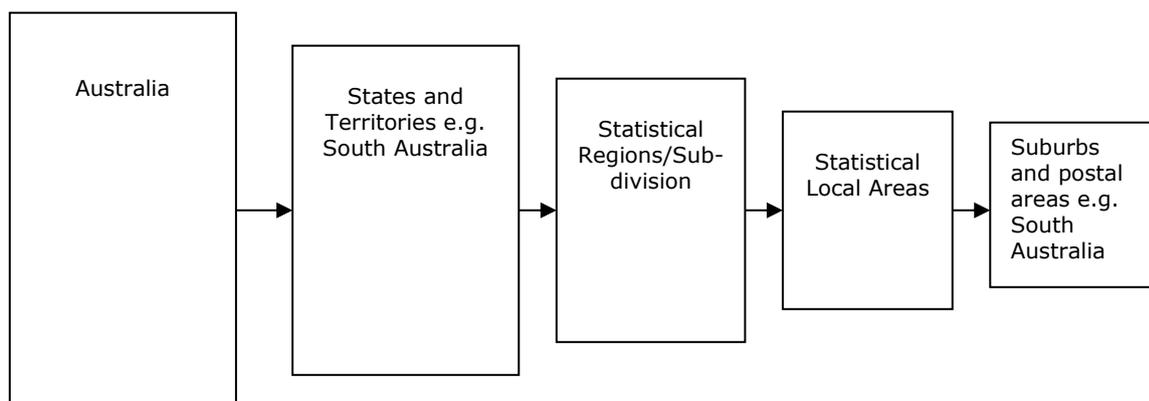
Figure 3.11: ASGC boundaries interrelation chart

See Appendix A for mapped examples of actual regions and how they relate to each other.

3.3 Indices for measuring

This study employs the use of two main indices – the Socio-Economic Index for Areas - Index of Relative Socio-Economic Disadvantage (SEIFA-IRSD) and Accessibility/Remoteness Index of Australia (ARIA), and one derived index – Distance to Tertiary Institution (DTI), and uses them to spatially explain the difference in the social achievements of youths in South Australia.

3.3.1 Socio-Economic Index for Areas - Index of Relative Socio-Economic Disadvantage (SEIFA-IRSD)

Socio-Economic Indexes for Areas (SEIFA) is a product developed by the ABS that ranks areas in Australia according to relative socio-economic advantage and disadvantage. They are measures which summarise a range of socio-economic variables associated with disadvantage. These indexes are compiled at the Census Collection District (CD) level, and may be used to rank areas according to the general socio-economic well-being of residents. The indexes are based on information from the five-yearly Census. One of the five SEIFA indexes which will be used in this study (and referred to as 'SEIFA-IRSD' throughout this study) is the Index of Relative Socio-Economic Disadvantage (IRSD). The SEIFA-IRSD incorporates attributes such as low educational status, high unemployment, low income and other characteristics that reflects disadvantage (ABS Census – SEIFA 2006).

Each index is a summary of a different subset of Census variables and focuses on a different aspect of socio-economic advantage and disadvantage. Some common uses of SEIFA-IRSD include:

- determining areas that require funding and services

- identifying new business opportunities

- research into the relationship between socio-economic disadvantage and various health and educational outcomes

The 2006 SEIFA-IRSD scores data is available free from the ABS website. A detailed publication containing the methodology and how SEIFA-IRSD scores can be used as a research tool is also available (ABS Census – SEIFA-IRSD 2006). The LSAY data has a postcode data for each record and the SEIFA-

IRSD data from the ABSS also has a postcode field. In this study, postcodes will be used to map each LSAY record to its respective SEIFA-IRSD index. The SEIFA-IRSD scores were divided into deciles (1 to 10) however, this study will derive quintile scores (1 to 5, quintile 1 being equivalent to decile 1 to 2 etc.) to measure the relative disadvantage of each youth according to the postcode in which they live.

3.3.2 Accessibility/Remoteness Index for Australia (ARIA)

The Accessibility/Remoteness Index of Australia (ARIA) is used to assess the remoteness of the location of a home. ARIA was developed by National Centre for the Social Applications of GIS (GISCA) and endorsed by the ABS as a joint project with the Australian Department of Health and Ageing in 1998. ARIA is an unambiguously geographical approach to defining remoteness. ARIA measures remoteness in terms of access along the road network from populated localities to each of five categories of Service Centre. Localities that are more remote have less access to Service Centres; those that are less remote have greater access to Service Centres. It scores each location and, depending on the score, classifies the location into one of five groups: highly accessible, accessible, moderately accessible, remote and very remote. ARIA scores data for all geographical locations in Australia was obtained.

ARIA score derivation and category

Populated towns with populations of greater than 1,000 persons are considered to contain at least some basic level of services (for example health, retail), and as such are regarded as Service Centres. Those Service Centres with larger populations are assumed to contain a greater level of service provision.

The road distance from each of the populated localities to the boundary of the nearest Service Centre in each category was calculated. This calculation resulted in five distance measurements being recorded for each populated locality, one for each Service Centre. Populated towns within a Service Centre in the relevant category were given a distance value of zero for that category.

Each distance value was divided by the Australian average (mean) for that category in order to derive a standardised (or ratio) value. Distance measurements are standardised so that large distance measurements would not overwhelm the effect of the other distance measurements (GISCA 1998).

For each populated locality, the standardized value from each of the five Service Centre categories is summed to produce an overall index value ranging between 0 and 15. The lower the value, the better the access to services. The ABS classed the final values as follows:

- Highly accessible/Major cities (ARIA score 0 to <0.2) – Unlimited and easy accessibility to largely varied services and recreational facilities such shopping, schools, transportation, health facilities and places of social activities

- Accessible/Inner cities (ARIA score 0.2 to <2.4) – Some limited accessibility to largely varied services and recreational facilities such shopping, schools, transportation, health facilities and places of social activities

- Moderately accessible/Outer cities (ARIA score 2.4 to <5.95) – Significantly limited accessibility to largely varied services and recreational facilities such shopping, schools, transportation, health facilities and places of social activities

- Remote area (ARIA score 5.95 to <10.5) - Very limited accessibility to largely varied services and recreational facilities such shopping, schools, transportation, health facilities and places of social activities

- Very remote area (ARIA score 10.5 or greater) – Very little accessibility to services and recreational facilities such shopping, schools, transportation, health facilities and places of social activities

The LSAY data has a field used to record the ARIA index for each record. The ARIA scores have been allocated to each youth according to the statistical region in which they live.

3.3.3 Distance to the nearest tertiary institution (DTI)

The main task of this study is to derive a new index of Distance to the nearest Tertiary Institution (DTI) which will rank each suburb according to proximity to the nearest institution of higher learning. This index will be useful in examining the relationship between proximity to a place of higher learning and educational outcomes, and to identify areas that require additional higher education facilities.

The DTI will be derived in ArcGIS using postcodes. A detailed methodology on its derivation will be described in the next section. Postcodes will used to map each LSAY record to its respective suburbs in order to derive DTI index for each record. The DTI scores will be divided into quintile scores of 1 to 5 (1 being very near to 5 being very far).

- Score 1: Very near – At least one institution of higher learning is within the postcode

- Score 2: Near - At least one institution of higher learning is within 10km radius of the centre of the postcode

- Score 3: Far - At least one institution of higher learning is within 10km to 20km radius of the centre of the postcode

- Score 4: Very far - At least one institution of higher learning is within 20k to 30km radius of the centre of the postcode

- Score 5: Extremely far - A higher institution of learning is more than 30km away from the centre of the postcode

3.4 Software

ArcMap

The main spatial software used in this study was ArcGIS version 10. ***ArcGIS*** is a platform for designing and managing solutions through the application of geographic knowledge (ESRI 2013). ArcMap is the main component of ArcGIS and was used to analyse and display the spatial data.

Statistical Analysis Software (SAS)

SAS is a statistical package which can be used for data processing, analysis and management (SAS 2013). Special statistical data analysis were carried out in SAS version 9.3 and results were often exported and imported back into ArcMap for display or further spatial manipulations.

Microsoft Excel

Results from statistical analysis were tabulated and organised using Microsoft Excel (Microsoft 2013).

3.5 Data analysis

A young person's abilities and efforts alone may not be sufficient in identifying whether he is at risk for succeeding or failing socially. This study is mainly focused on the initial investigation of the LSAY data and reports on the variation of social outcomes of youth according to time and place. This research is focused on South Australia and draws from a model of social achievements where the social outcome of individuals may be explained by influenced by locational factors.

3.5.1 Geocoding

Each record in the LSAY dataset – representing each person in the study – has to be mapped to a spatially referenced location and therefore assigned a suburb and Statistical Region (SR). This process of geocoding is necessary in order to be able to spatially analyse the data in a GIS environment. This study uses postcode to geocode each case in the survey. These postcodes are the ones given by the respondents when they answered the question about their usual place of residence.

Geocoding using postcodes entails some limitations. One is that some respondents may change their usual place of residence before the next interview year/period. To manage this problem, the results will be presented at an aggregated statistical region level. Furthermore, the weights assigned to respondents are recalculated and reassigned each interview year, so that postcodes are accurately represented and longitudinal data analysis can be carried out on a yearly basis. Another limitation of geocoding using postcodes is that postcode sizes vary a lot and as such there may be varied level of socioeconomic statuses within a large postcode size compared to a small postcode. Hence a high level of caution needs to be applied around postcode to postcode comparison.

3.5.2 Geospatial database build-up

The administrative boundary ESRI shapefiles for Australia, state of South Australia, regions, postcodes and suburbs were obtained from the Australian Bureau of Statistics (ABS) and these shapefiles were used to incorporate the attributes of the feature dataset. The following steps were carried out in ArcGIS 10 in order to merge these four boundary files and create a unique identifier (as mentioned above, this study uses postcode for establishing a link between the spatial data and non-spatial data.)

- Administrative boundaries for Australian states, regions, postcode and suburbs into ArcGIS were imported. South Australia's (SA) boundary was selected and exported as a new layer

- The boundary for SA was clipped to regions, suburbs and postcodes

Using the capabilities of ArcGIS 10, the GIS variables were associated with other environmental characteristics and the social outcomes in order to explore the spatial determinants affecting social achievements of young people in the case study area.

- Joins and relates were used to link SEIFA-IRSD and ARIA to the boundaries using postcode field as the link key

- Point shapefiles for higher education schools were overlaid on boundaries

- LSAY data was imported into ArcGIS; data was linked to the boundaries using postcode

The last step in the spatial data processing was to derive the index of proximity to the nearest higher education facility, which can be represented by distance to the nearest suburb that has an institution of higher learning.

To estimate the distance from each suburb to the nearest school of higher learning, first, the center of every postcode that has an institution of higher learning had to be identified using the geographic centroid of each postcode's polygon. A centroid is defined as the halfway point on its east-west and north-south boundaries (Harries 1999 pp.108). The centroid of a postcode polygon was identified by the halfway point on its east-west and north-south boundaries using functions and calculations in ArcGIS. Centroids of postcodes with at least one school of higher learning were assigned as "Destinations" and every other postcode centroid were assigned as an "Origin". The distance between the destination and origin centroids were estimated and classified using the DTI index (1-5).

3.5.3 Descriptive analysis

A summary analysis of the non-spatial variables was conducted following spatial processing operations on the spatial datasets to derive a database that can be compared with young peoples' social outcomes in every suburb.

Simple contingency tables were adopted for the descriptive analyses because these approaches have the ability to determine the differences between the means of the outcomes variables (dependent variables) within each statistical region and the overall proportions as determined by the total population Australia-wide. This type of analysis requires that every record in the dataset is assigned into a single statistical region.

In this study, the indices served as the independent variable, while education, employment and living arrangement, which represent the achievement of

young people in every suburb, served as the dependent variables. Sex and indigenous status served as the control variables. Descriptive data analysis was performed in SAS to obtain cross tabulation.

Summary graphs, which compare outcomes in each statistical region in South Australia with the whole of Australia, were also produced. Graphs were plotted in MS Excel.

3.5.4 Visual analysis

Using ArcGIS 10 and its capabilities, as discussed in the section 3.5.2, this study employed spatial analysis of a spatial dataset. Specifically, the spatial variables were later associated with incidence of social achievement outcomes to visually explore the spatial determinants affecting young people's social success. Findings from spatial analysis will be displayed as maps. The maps will provide visual support for interpretation of any variability in social achievements among the levels of each index. The maps will also allow for a visual comparison of outcomes between regions given similar conditions.

3.5.5 Test of statistical significance using multiple logistic regression analysis

In order to determine the strength of the relationship between each geographical index (SEIFA-IRSD, ARIA and DTI) and social achievement indicators, a multivariate logistic regression analysis was performed.

In this case, geographical indexes are the independent variables in the regression model while each of the three social achievement indicators - employment, education, and social status of home ownership - is the dependent variable in its own model. The logistic regression method was chosen due to the categorical nature of the dependent variables – employment, education, social status of home ownership.

The form of the full regression models can be mathematically stated as follows:

$$\hat{p} = \frac{\exp(b_0 + b_1 X_1 + b_2 X_2 + \ldots + b_p X_p)}{1 + \exp(b_0 + b_1 X_1 + b_2 X_2 + \ldots + b_p X_p)}$$

$\hat{p}$ is the expected probability that the outcome (employment/education/social status of home ownership) is present; X_1 through X_p are the independent geographical variables (SEIFA-IRSD/ARIA/DTI); $p=3$ and b_0 through b_p are the regression coefficients.

The dependent variables are expressed in binary form, with 1 being the presence of desired outcome. Results of the analysis are discussed further in details in the next chapter.

Chapter 4 – Results and discussion

This chapter presents the results of the study which is based on the premise that social achievements in young people in South Australia vary spatially. This assertion will be examined using the spatially referenced records in the LSAY data set. The variations will be explored using maps, charts and contingency tables. In the previous chapter, we presented the spatial pattern of two of the three independent variables of this study – Socio-economic index for Australia (SEIFA-IRSD) and Accessibility/Remoteness index (ARIA) – in this chapter we will derive and present the third index, the Distance to Institution of learning (DTI) index. Thereafter, the chapter presents each dependent variable representing social achievement – education, employment and living arrangement, and their correlation with the indices.

4.1 Spatial patterns of social achievements and characteristics

The social characteristic of the youth population is an important component for consideration when exploring their socio-economic achievements spatially since these achievements are also related to people's attributes. The LSAY data set contains information from successive cohorts of 15 year old students, so we can explore their social activities over time.

Education is considered to be one of the most important aspects related to social achievements. Good education increases the chance of gaining good employment with higher salary, which leads to a better quality of life and decreased likelihood of poverty (Bradon 2008). Generally, it is no longer enough just to complete Year 12: young people need to pursue further study to put them on the path to success.

By 2011, over 80% had completed their Year 12 education, 66% completed a tertiary qualification, 49% were living in their own home or renting, and approximately 89% had a job. These data are presented in Table 4.1.

Table 4.1: Characteristics of LSAY cohort, South Australia 2003 - 2011

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011
Highest school level completed (%)									
Year 12	0.0	2.0	16.7	73.2	76.8	79.6	77.8	76.5	80.6
Year 11	0.4	16.3	74.8	21.7	18.2	15.7	18.6	19.9	16.0
Year 10	15.5	77.2	8.4	4.9	4.8	4.5	3.3	3.2	3.4
Year 9 or below	84.1	4.5	0.2	0.2	0.2	0.2	0.2	0.3	0.0
Highest qualification completed (%)									
Certificate I	0.0	0.0	0.5	0.9	0.8	2.5	2.7	3.1	2.8
Certificate II	0.0	0.0	0.6	2.8	3.7	4.7	5.6	5.1	4.7
Certificate III	0.0	0.1	0.2	2.1	4.5	5.4	7.9	11.4	12.4
Certificate IV	0.0	0.0	0.1	0.6	2.6	3.5	4.3	4.0	4.4
Certificate Other	0.0	0.1	0.5	0.8	1.2	1.2	2.2	3.4	4.0
Advanced diploma/diploma	0.0	0.0	0.0	0.5	2.1	3.9	4.0	3.9	4.4
Bachelor degree	0.0	0.0	0.0	0.0	0.9	2.7	10.6	22.6	31.0
Graduate diploma/ certificate	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.7	0.6
Postgraduate (PhD/Masters)	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	1.6
Did not complete a qualification	100.0	99.8	98.1	92.4	84.1	76.1	62.2	45.2	34.0
Labour force status (%)									
Employed	43.9	51.3	58.2	79.1	84.0	85.2	82.8	86.3	88.9
Unemployed	0.0	12.9	10.6	7.8	4.2	4.8	7.9	4.2	4.6
Not in the labour force	56.1	35.8	31.2	13.1	11.9	10.0	9.3	9.5	6.5
Living in own home (%)									
Currently own or buying	0	0	0	0.3	1.4	1.4	7.1	10.5	13.5
Currently renting	0	1.5	2.1	9.5	14.1	22.2	25.8	29	35.3
Not living in own home	100	98.1	96.6	90.3	84.6	76.5	67.1	60.5	51.2
Unknown	0.0	0.5	1.3	0.0	0.0	0.0	0.0	0.0	0.0

Source: Compiled from the Longitudinal Survey of Australia Youths (LSAY) Y03 Cohort.

These figures represent the results aggregated to the entire state of South Australia and while this is valuable information, it is also important to see if this varies by location. Previous research has shown that the participation rates of rural youngsters in education are lower than that of their metropolitan based counterparts (Kylie H, Gary M, Phil M 2002).

4.2 Social achievements by place

This analysis can be further defined by considering location. LSAY records have been matched to spatial locations using postcode and further characterized by computing their respective SEIFA-IRSD and ARIA indices.

4.2.1 Social achievements by statistical region

There are six statistical regions in South Australia which take into account the rural/urban dichotomy and their population. Statistical regions were defined as follows by the Australian Bureau of Statistics (ABS).

- Urban/Metropolitan – These are the four major metropolitan regions: Northern Adelaide, Southern Adelaide, Eastern Adelaide and Western Adelaide

- Rural/Country – These are the two country regions: Northern Western country region and Southern Eastern country region

Table 4.2 shows the overall outcomes of education, employment and living arrangement for the six regions. The table shows that youths in the rural exhibit the highest rates of independent living compared to the statewide results. By 2011, or at approximately 24 years of age, youths in the rural regions display a higher proportion of those who have moved into their own homes, compared with their urban counterparts. The proportion of those who completed their Year 12 education is lower in the rural regions compared to those in the urban regions, and to the state and national values. Employment rate for young people is shown in the table to be more promising for those in the rural region and the Western Adelaide urban area when compared to the state and national outcomes. The Western Adelaide urban region clearly has the highest rate for completing at least one tertiary qualification, but has the lowest rate in independent living.

Table 4.2 Outcomes by statistical region of South Australia in 2011

Statistical Region	Employed	Completed Year 12	Completed a qualification	Living in own home or renting
Eastern Adelaide (Urban)	84.4	91.3	64.8	52.8
Northern Adelaide (Urban)	88.6	81.5	66.3	29.4
Southern Adelaide (Urban)	86.5	77.3	55.5	46.1
Western Adelaide (Urban)	94.9	89.5	80.1	27.8
Northern and Western Country (Rural)	96.8	66.8	66.2	65.9
Southern and Eastern Country (Rural)	94.5	65.9	60.7	85.3
State-wide Average	*88.9*	*80.6*	*66.0*	*48.8*
National Average	*86.0*	*82.5*	*69.2*	*47.1*

Source: Compiled from the Longitudinal Survey of Australia Youths (LSAY) Y03 Cohort.

Employed

Living independently
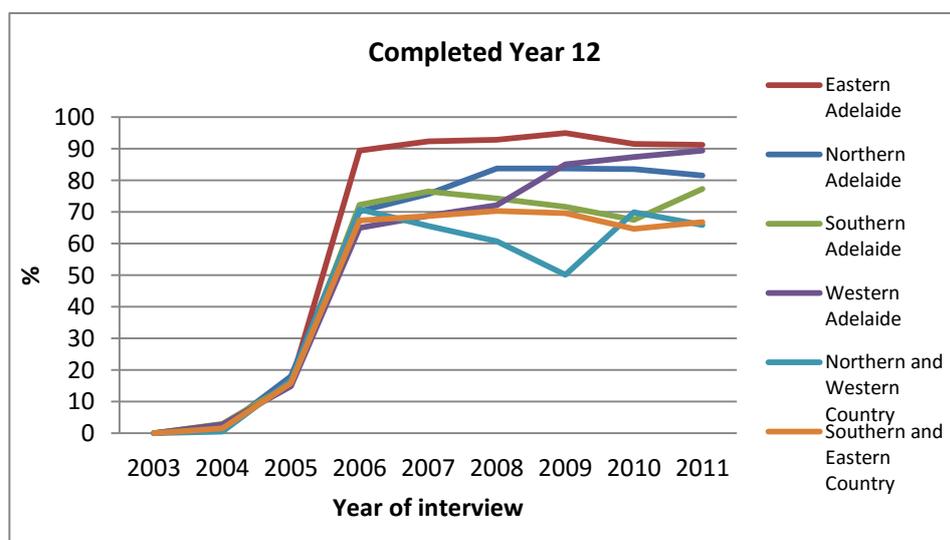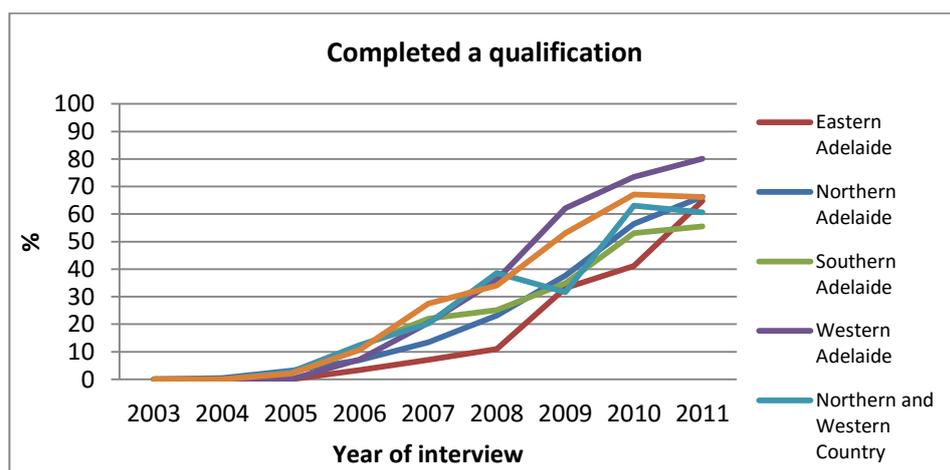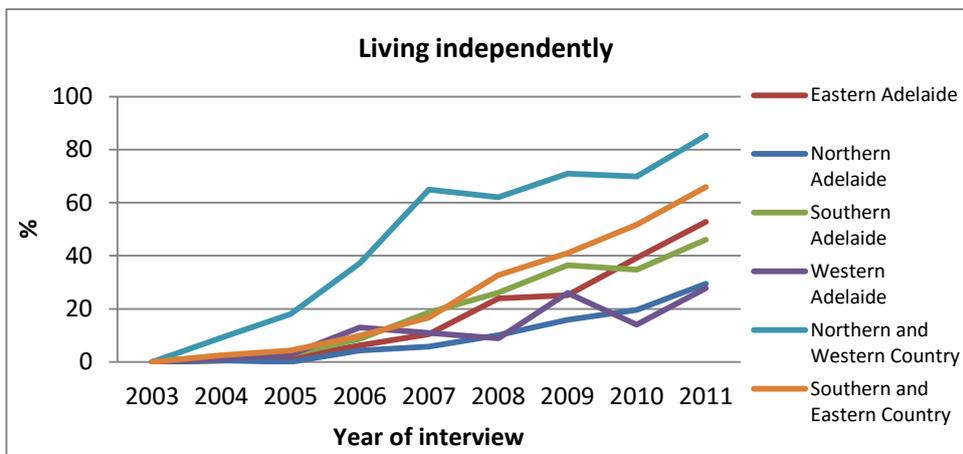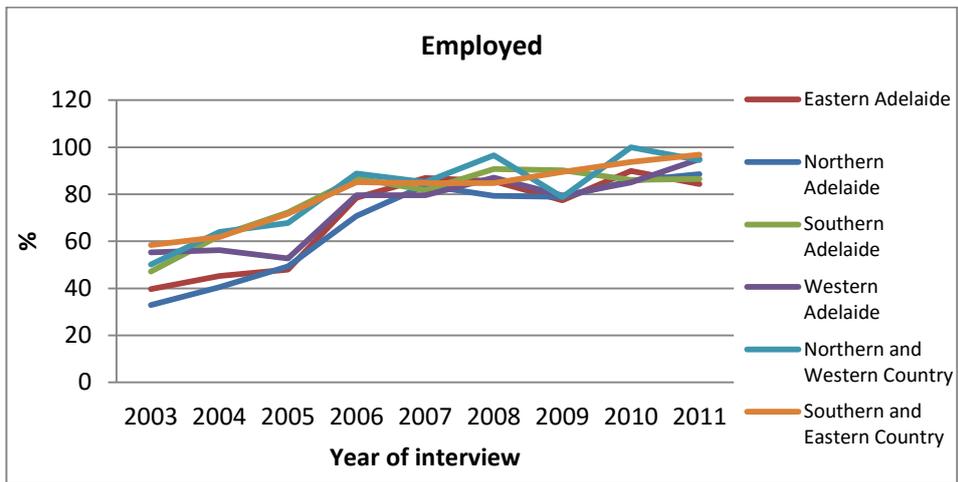
Figure 4.1: Longitudinal outcomes by region

Source: Compiled from the Longitudinal Survey of Australia Youths (LSAY) Y03 Cohort.

Figure 4.2 shows the distribution of the highest qualification attainment in the six regions. The figure shows that the Bachelor's degree had the highest proportion found in the Eastern and Western Adelaide regions while the Northern Western Country region had the highest proportion on Certificate III holders. The highest proportion of those who did not complete a qualification was observed in the Southern Adelaide metro region.
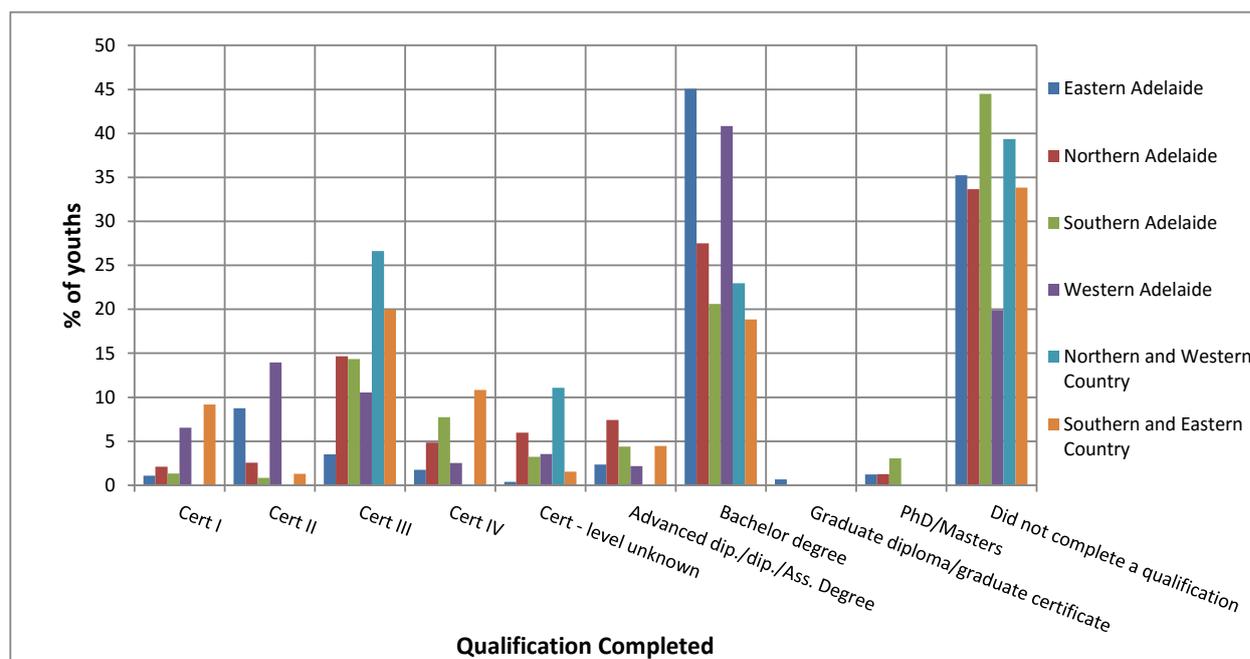
Figure 4.2: Qualification attainment of young people at 24 years by statistical region

Source: Compiled from the Longitudinal Survey of Australia Youths (LSAY) Y03 Cohort.

Figures 4.3 and 4.4 present the spatial pattern of social outcomes in the six statistical regions when compared to the state and national outcomes. The figures show a number between 0 and 4 for each region in each map. These numbers represent the number of social outcomes for which the region has a higher rate compared to their state-wide and nation-wide counterparts. From the maps, we can clearly see that Southern Adelaide has the value of 0 in the state comparison map and 1 in the national comparison map. This shows that Southern Adelaide was consistently below the state average for all four outcomes but above the national average for only one outcome. The map

shows that Western Australia was above both the state and national rates for 3 out of 4 social outcomes and the Southern Eastern country region was consistently above for 2 outcomes. We can conclude that young people in the Western Adelaide region are the highest social achievers overall when compared to their state and national counterparts.
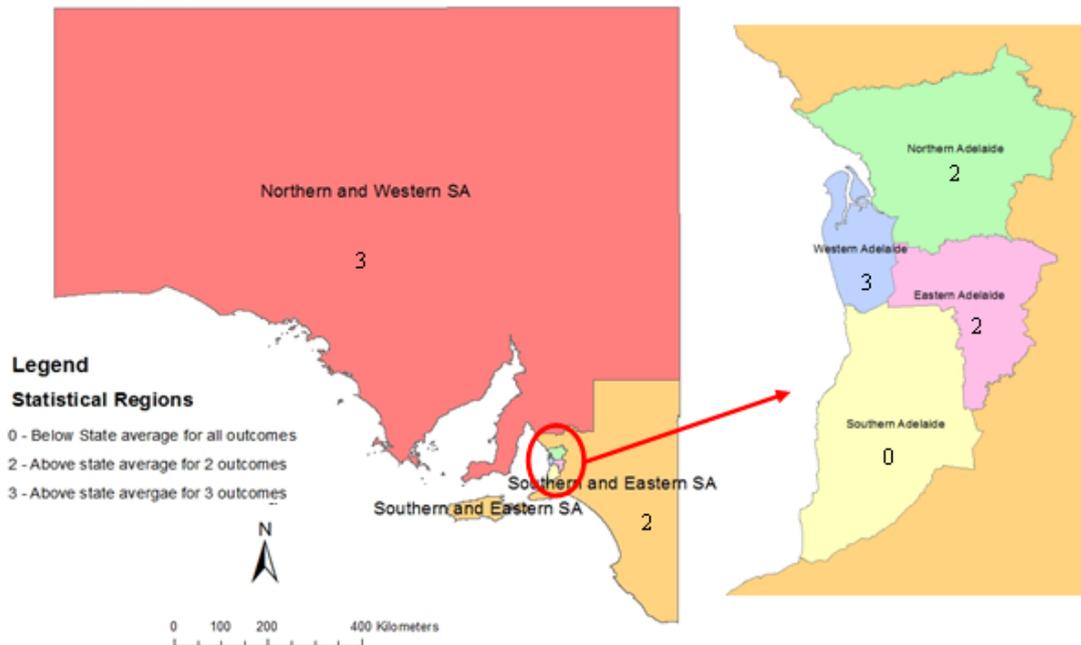

Figure 4.3: Summary of statistical region outcomes compared with state outcome

Map created by Oluwatomi Adejoro

Figure 4.4: Summary of statistical region outcomes compared with national outcome

Map created by Oluwatomi Adejoro

4.3 Social achievements by ARIA

As mentioned earlier in chapter 3, geographical areas in South Australia are classified into five index scores of accessibility or remoteness based on the road distance to service towns of different sizes. These index scores take into account the accessibility of places to service centres, or conversely of remoteness of places. The index scores can be classified as detailed below.

- Highly accessible/Major cities – Unlimited and easy accessibility to largely varied services and recreational facilities

- Accessible/Inner cities – Some limited accessibility to largely varied services and recreational facilities

- Moderately accessible/Outer cities – Significantly limited accessibility to largely varied services and recreational facilities

- Remote area - Very limited accessibility to largely varied services and recreational facilities

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- Very remote area – Very little accessibility to services and recreational facilities

Table 4.3 shows the overall outcomes of education, employment and living arrangement for the five ARIA regions. The table shows that by 2011, youths in the major cities exhibit the lowest rates of independent living compared to the State and National rates. At approximately 24 years of age, youths in the outer regional areas, remote and very remote areas have higher proportion of those who have moved into their own homes compared with their major and inner regional areas counterparts. The p-value from result of chi-square test indicates that the employment rate of 43.6% for young people in major cities is significantly lower at an alpha level of 0.05, (since p<.0001) than the state wide proportion of 48.8% of employment rate for young people. The proportion of those who complete a qualification is zero in the very remote areas compared to those in the other areas, and to the state and national average but not statistically significant. The employment rate for young people is shown in the table to be high for most areas when compared to the state and national outcomes, although not statistically significant.

Table 4.3 Outcomes by ARIA class of South Australia in 2011

ARIA class	Employed	Completed Year 12	Completed a qualification	Living in own home or renting
Major cities	87.7	82.9	66.8	43.6***
Inner regional areas	94.1	71.3	60.9	53.0
Outer regional areas	100.0	62.0	67.8	100.0
Remote areas	93.1	70.2	64.8	81.7
Very remote areas [a]	100.0	100.0	0.0	100.0
State-wide Average	*88.9*	*80.6*	*66.0*	*48.8*
National Average	*86.0*	*82.5*	*69.2*	*47.1*

Source: Compiled from the Longitudinal Survey of Australia Youths (LSAY) Y03 Cohort.

a - Low of volume of records so rates may not be reliable

*** - Difference of rate from state-wide average is statistically significant at an alpha level of 0.05, p<0.001

Completed a qualification

Completed Year 12

Employed
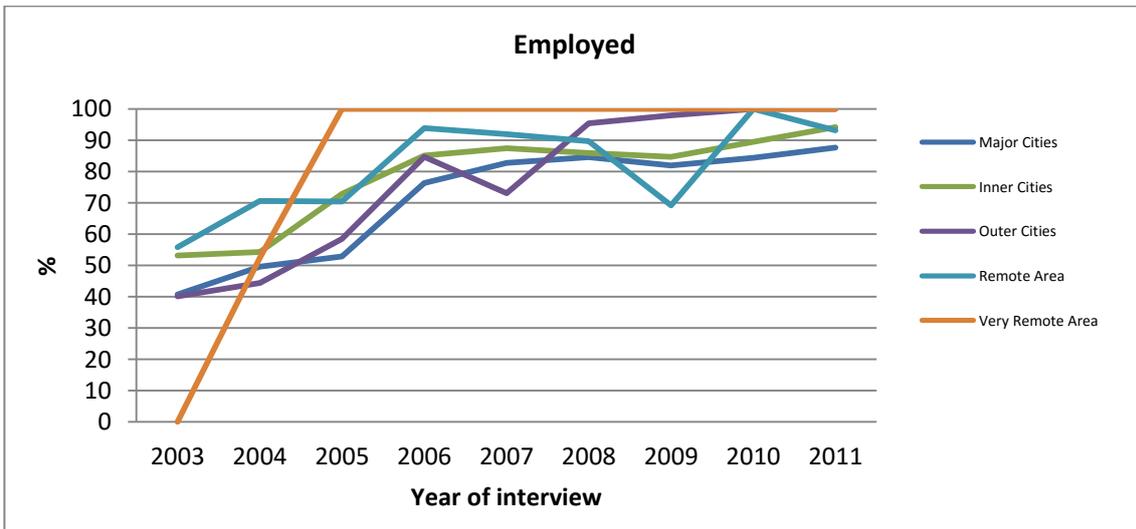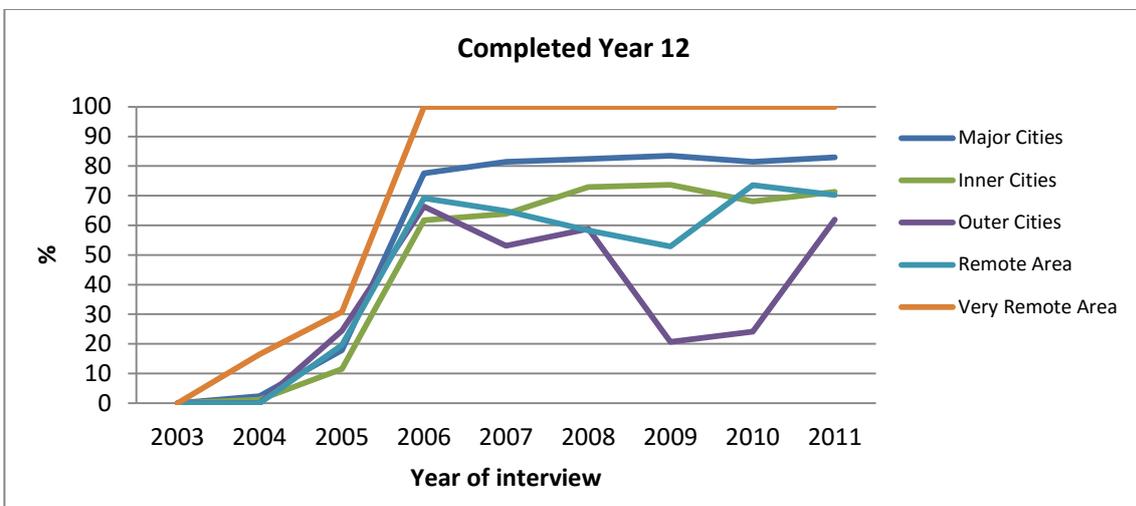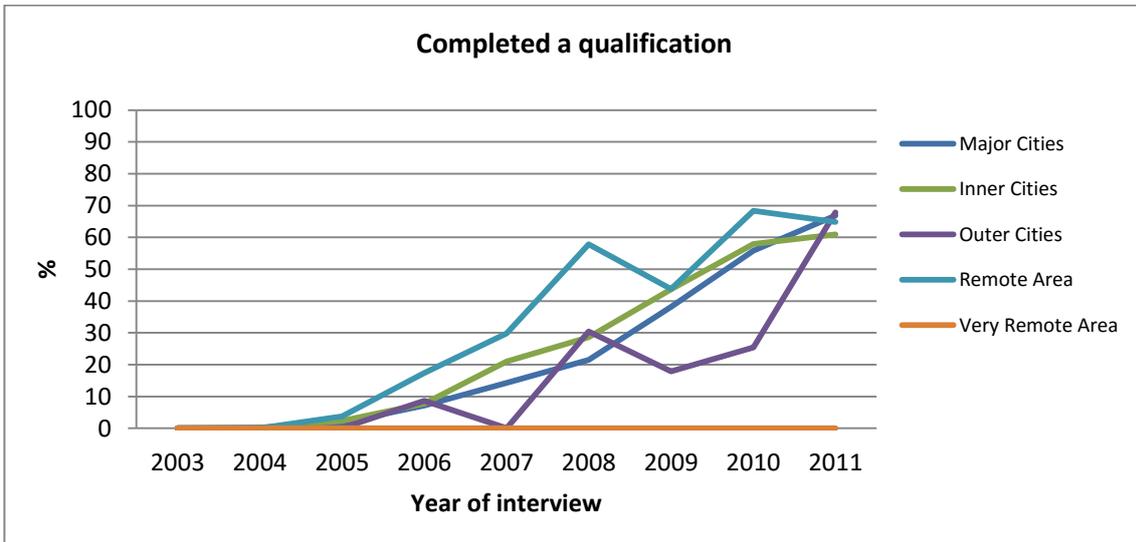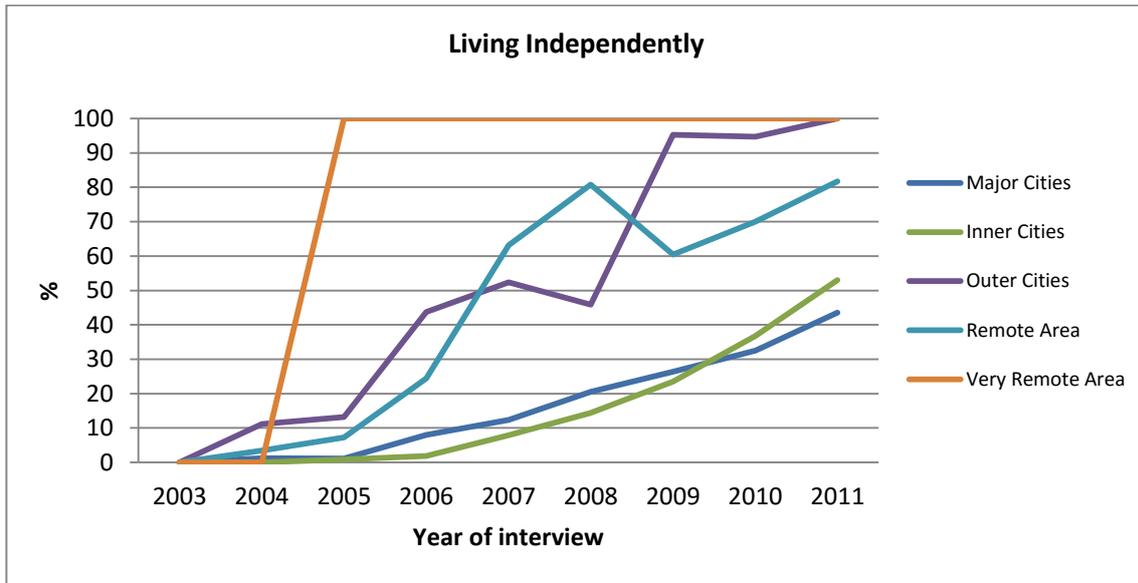
Figure 4.5: Longitudinal outcomes by ARIA

Source: Compiled from the Longitudinal Survey of Australia Youths (LSAY) Y03 Cohort.

Figure 4.6 presents the spatial pattern of social outcomes across the five ARIA zones when compared to the state and national outcomes. Similar to Figures 4.3 and 4.4, the labels show a number between 0 and 4 for each region in each map. This numbers represents the number of social outcomes that the region has at a higher rate, when compared to their state-wide and nation-wide counterparts. From the maps, we can see that the result is quite consistent when benchmarking to state or national outcomes, with the exception of the outer regional areas which was above state rates in 2 outcomes, but above national rates in 3 outcomes.
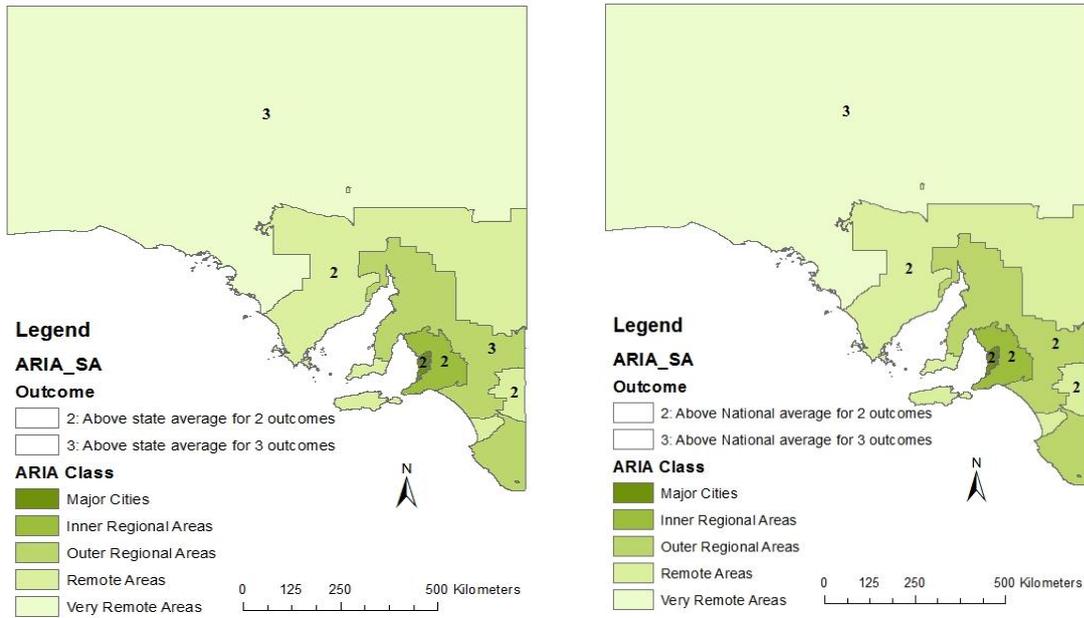
**Figure 4.6: Summary of ARIA outcomes compared with state and national outcomes**

Map created by Oluwatomi Adejoro

Source: Compiled from the Longitudinal Survey of Australia Youths (LSAY) Y03 Cohort

4.4 Social achievements by SEIFA-IRSD

This subchapter looks much more closely possible influence of SEIFA-IRSD on each of the 4 social outcomes.

SEIFA-IRSD quintile scores (derived from decile scores) of 1-Most disadvantaged to 5-least disadvantaged are used to measure the relative disadvantage of each youth according to the postcode in which they live. These index scores incorporate attributes such as low educational status, high unemployment, low income and other characteristics that reflects disadvantage

Table 4.4 shows the overall outcomes of education, employment and living arrangement by SEIFA-IRSD. The table shows that by 2011, youths in the 4th SEIFA-IRSD index score had the highest proportion for those who were employed and for those who completed a qualification. Youths in the most disadvantaged index range they also had the lowest proportion of those who were employed, those who completed a qualification, and who were those living independently. Surprisingly, this group had a rate of Year 12 completion which is higher than state average. Longitudinally, youths from the least disadvantaged SEIFA-IRSD areas maintained the highest rate of Year 12 completion throughout the study period. The p-value from result of chi-square test indicates that the employment rate (95.4%) for young people in least disadvantaged areas is significantly higher (p<0.0001), than the state wide proportion of 88.9% of employment rate for young people. Similarly, the rate of year 12 completion (90.6%) and attainment of a qualification (79.0%) for young people in least disadvantaged areas are both significantly higher (p<0.0001), than the state wide proportion of 80.6% and 66.0% respectively for young people.

Table 4.4 Outcomes by SEIFA-IRSD Quintile of South Australia by 2011

SEIFA-IRSD Index	Employed	Completed Year 12	Completed a qualification	Living in own home or renting
Quintile 1: Most Disadvantaged 20%	78.4	80.8	45.4	32.6
Quintile 2: 2nd most disadvantaged 20%	89.1	75.5	62.3	44.9
Quintile 3: Average/Middle 20%	90.4	73.4	65.2	61.6
Quintile 4: 2nd least disadvantaged 20%	95.4***	77.8	79.0***	40.8
Quintile 5: Least Disadvantaged 20%	86.7	90.6***	65.3	57.4
State-wide Average	*88.9*	*80.6*	*66.0*	*48.8*
National Average	*86.0*	*82.5*	*69.2*	*47.1*

Source: Compiled from the Longitudinal Survey of Australia Youths (LSAY) Y03 Cohort.

*** - Difference of rate from state-wide average is statistically significant at an alpha level of 0.05, p<0.001

Completed a qualification

Completed Year 12
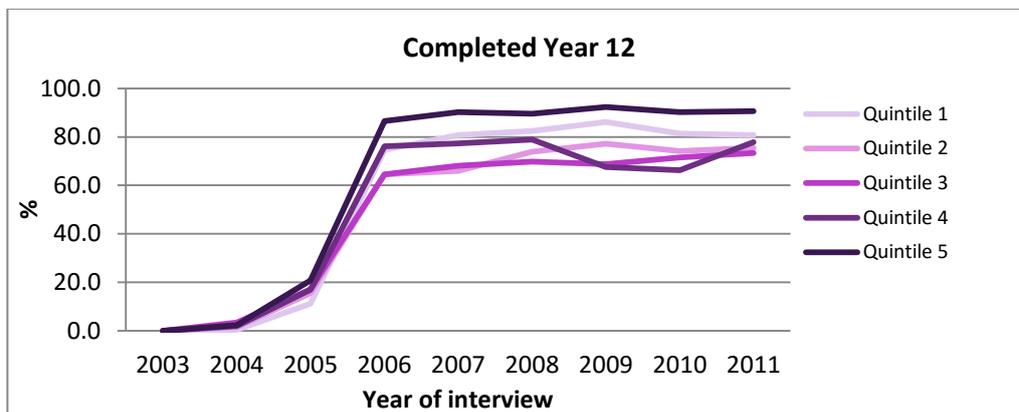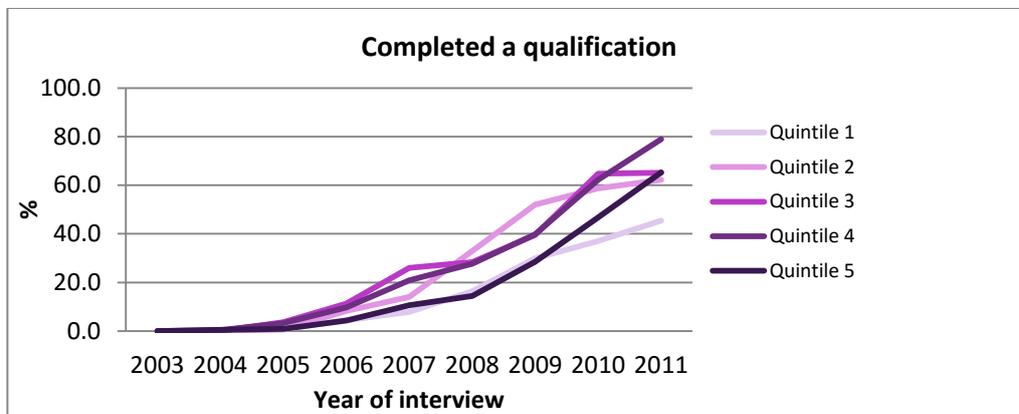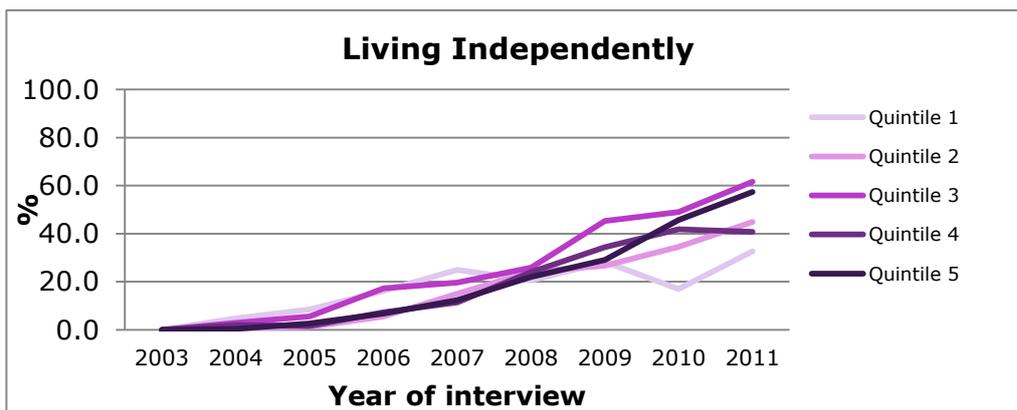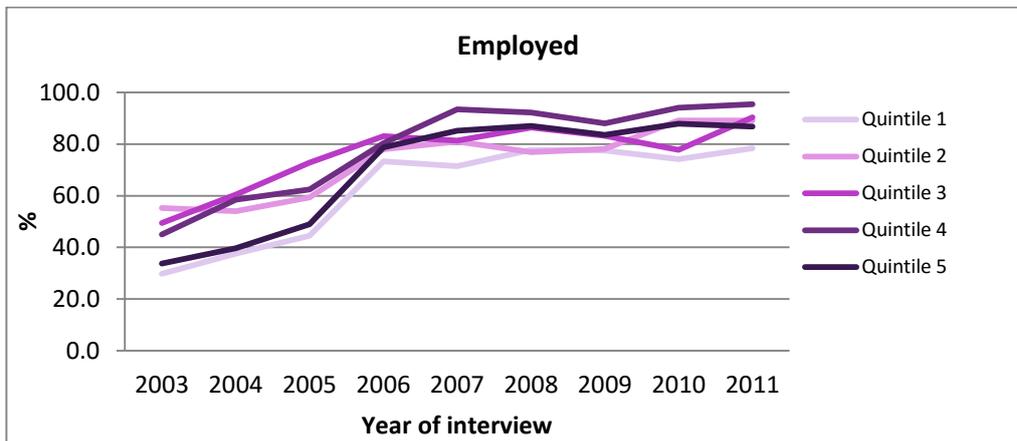
Figure 4.7: Longitudinal outcomes by SEIFA-IRSD

Source: Compiled from the Longitudinal Survey of Australia Youths (LSAY) Y03 Cohort.

In figures 4.8 to 4.15, SEIFA-IRSD scores were reclassified into quintile scores and each quintile score has been attributed to a youth according to the postcode in which they live. The maps show the spatial pattern of social outcomes across the five SEIFA-IRSD quintile scores when compared to the state and national outcomes. The labels show a number between 0 and 4 for each region in each map. These numbers represent the number of social outcomes in each SEIFA-IRSD postcode with a higher rate compared to their state-wide and nation-wide counterparts. From the maps, we can see that the result is quite consistent when benchmarking to state or national outcomes. Higher rates than their state and national peers in all 4 outcomes can be seen mostly in areas with SEIFA-IRSD scores of 5 (least disadvantaged). This shows that youth from areas with a SEIFA-IRSD score of 5 (least disadvantaged) are more likely to achieve more desirable social outcomes when compared to their

state-wide or national   peers. Only the four urban areas of South Australia have been illustrated in the maps. The country areas have too few observations to be reported at SEIFA-IRSD level.
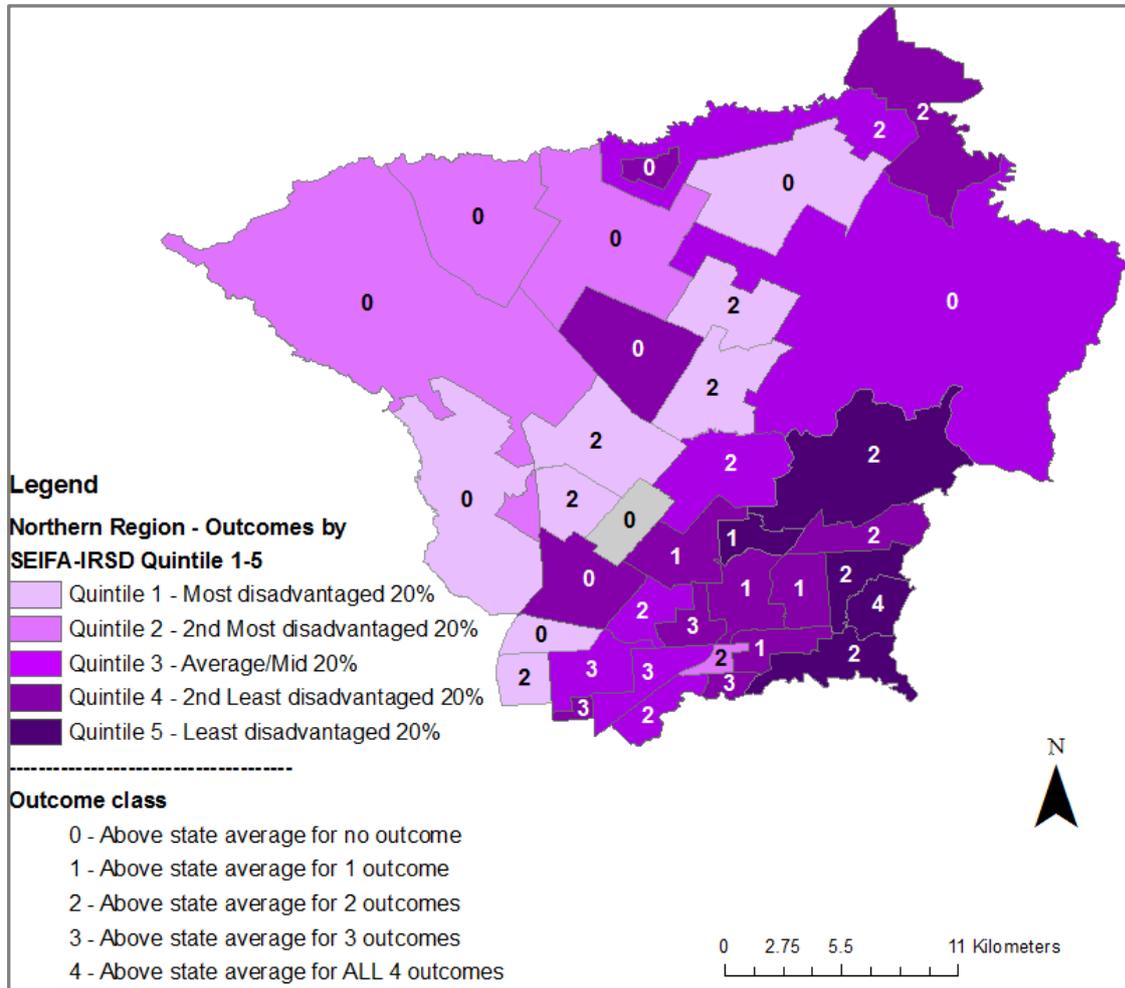
Figure 4.8: Summary of outcomes in Northern Adelaide Region by SEIFA-IRSD compared with state outcomes

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011
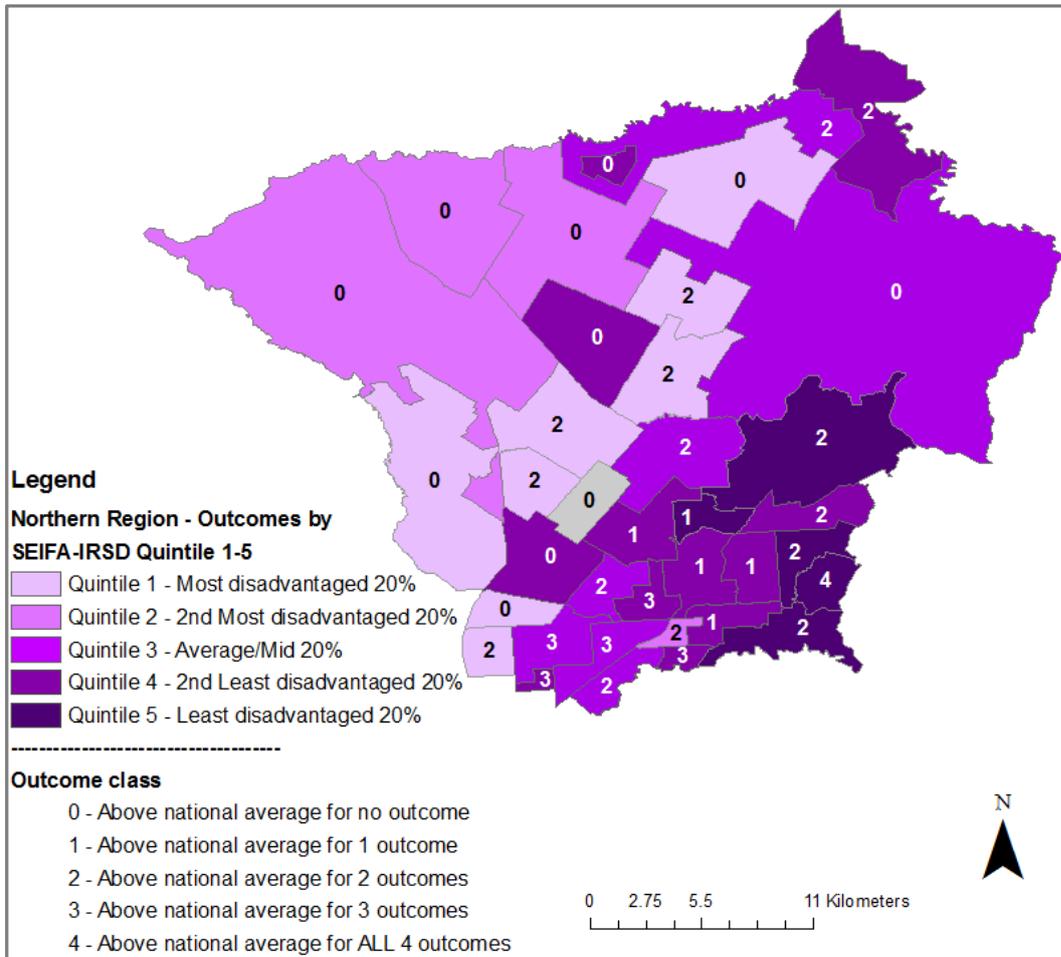
Figure 4.9: Summary of outcomes in Northern Adelaide Region by SEIFA-IRSD compared with National outcomes

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011
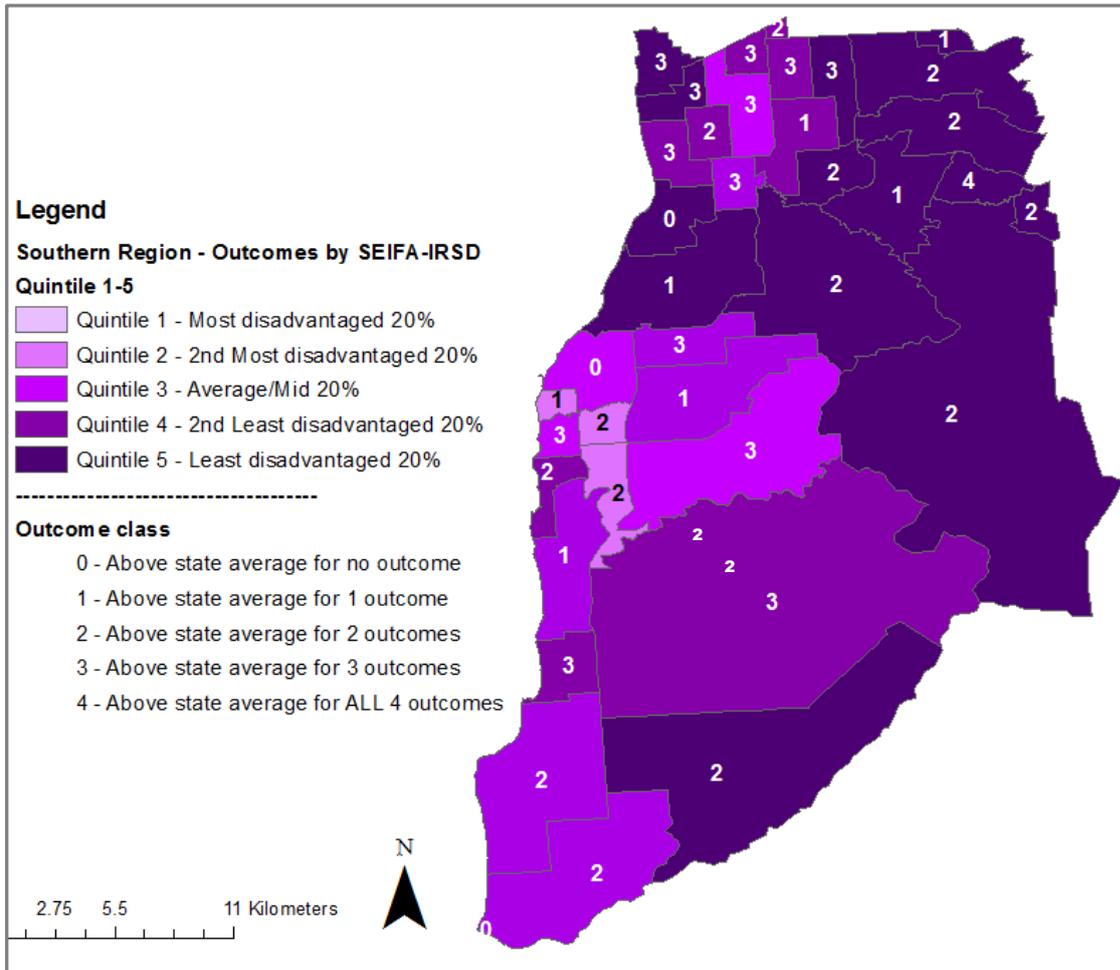
Figure 4.10: Summary of outcomes in Southern Adelaide Region by SEIFA-IRSD compared with state outcomes

Map created by Oluwatomi Awodeyi

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011
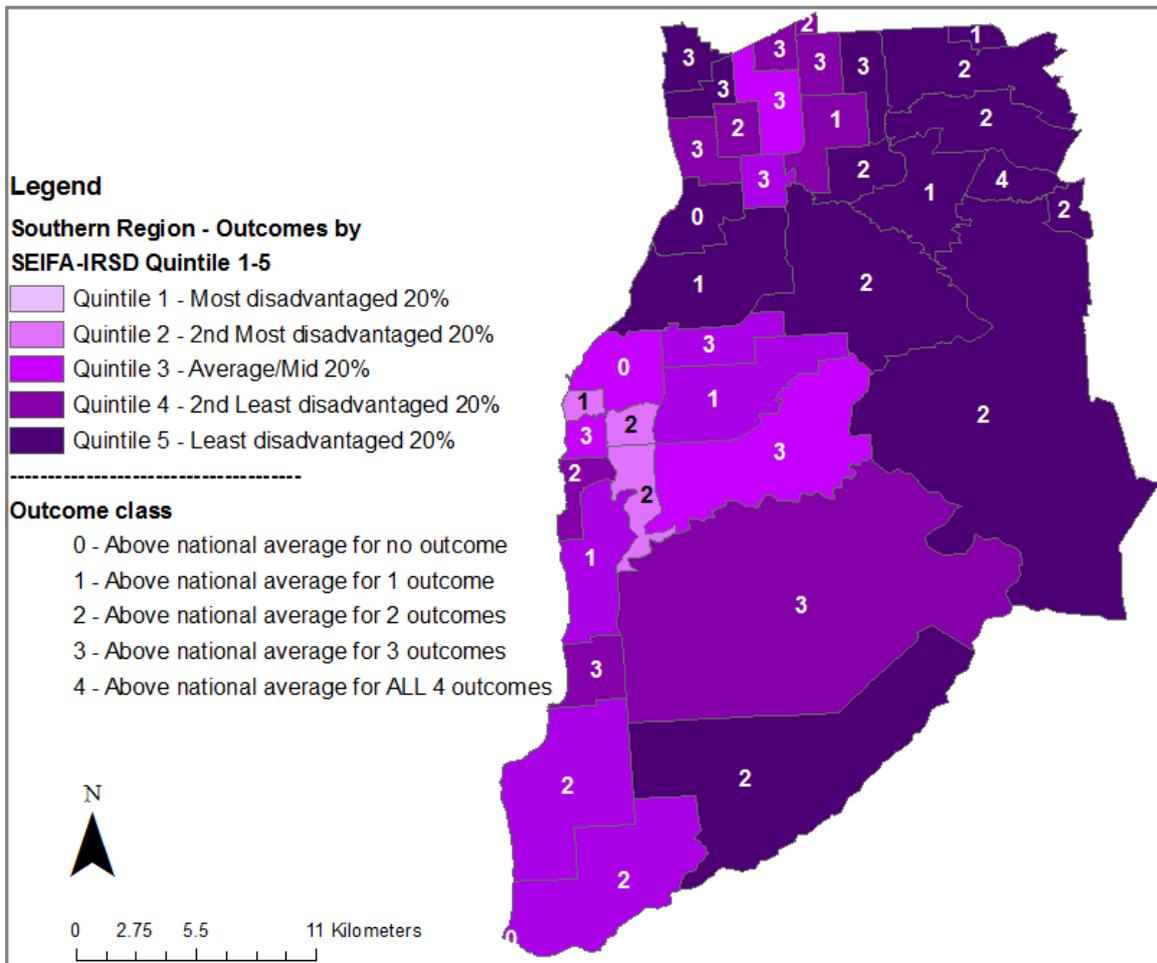
Figure 4.11: Summary of outcomes in Southern Adelaide Region by SEIFA-IRSD compared with national outcomes

Map created by Oluwatomi Awodeyi

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011
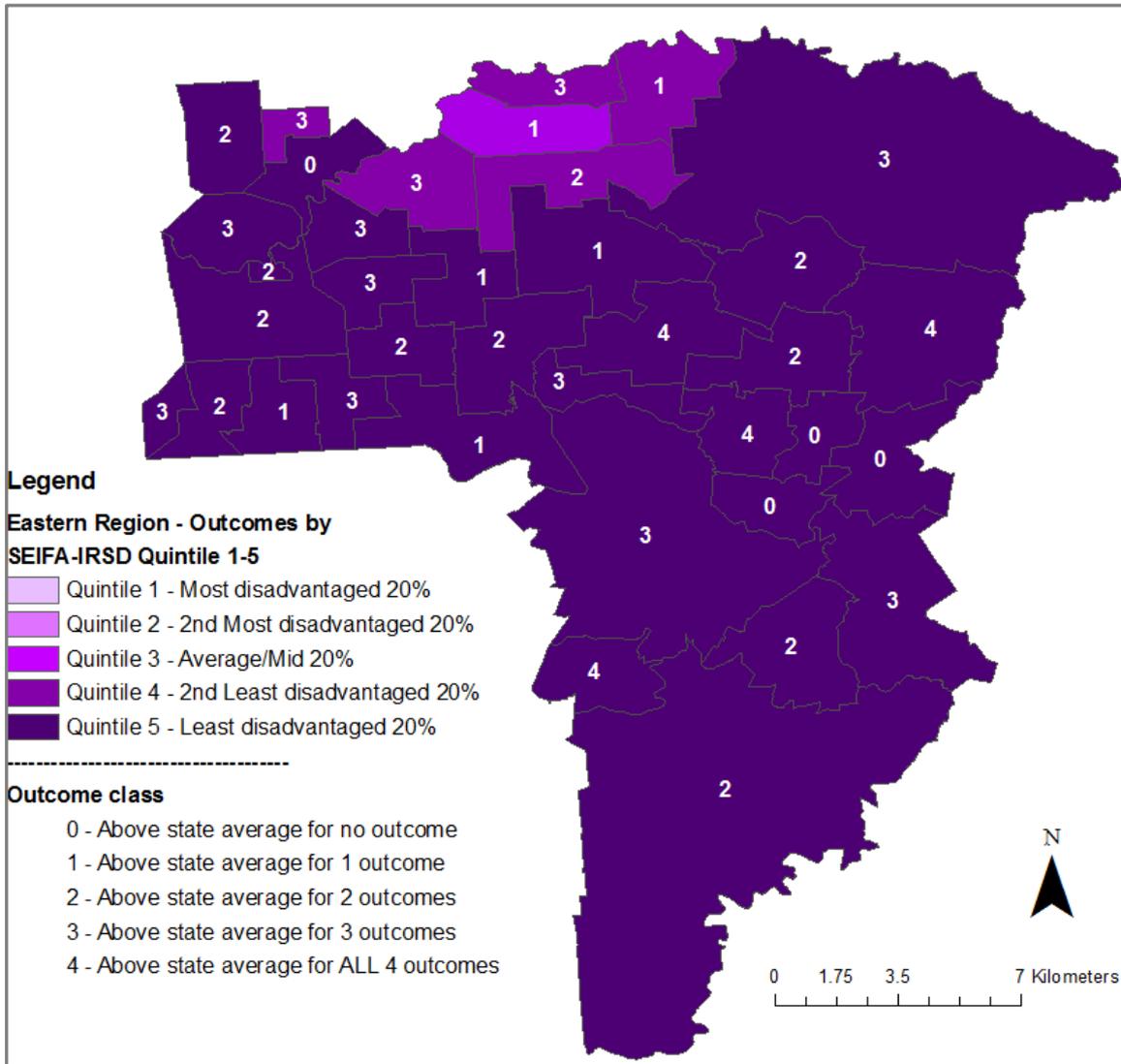
Figure 4.12: Summary of outcomes in Eastern Adelaide Region by SEIFA-IRSD compared with state outcomes

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011
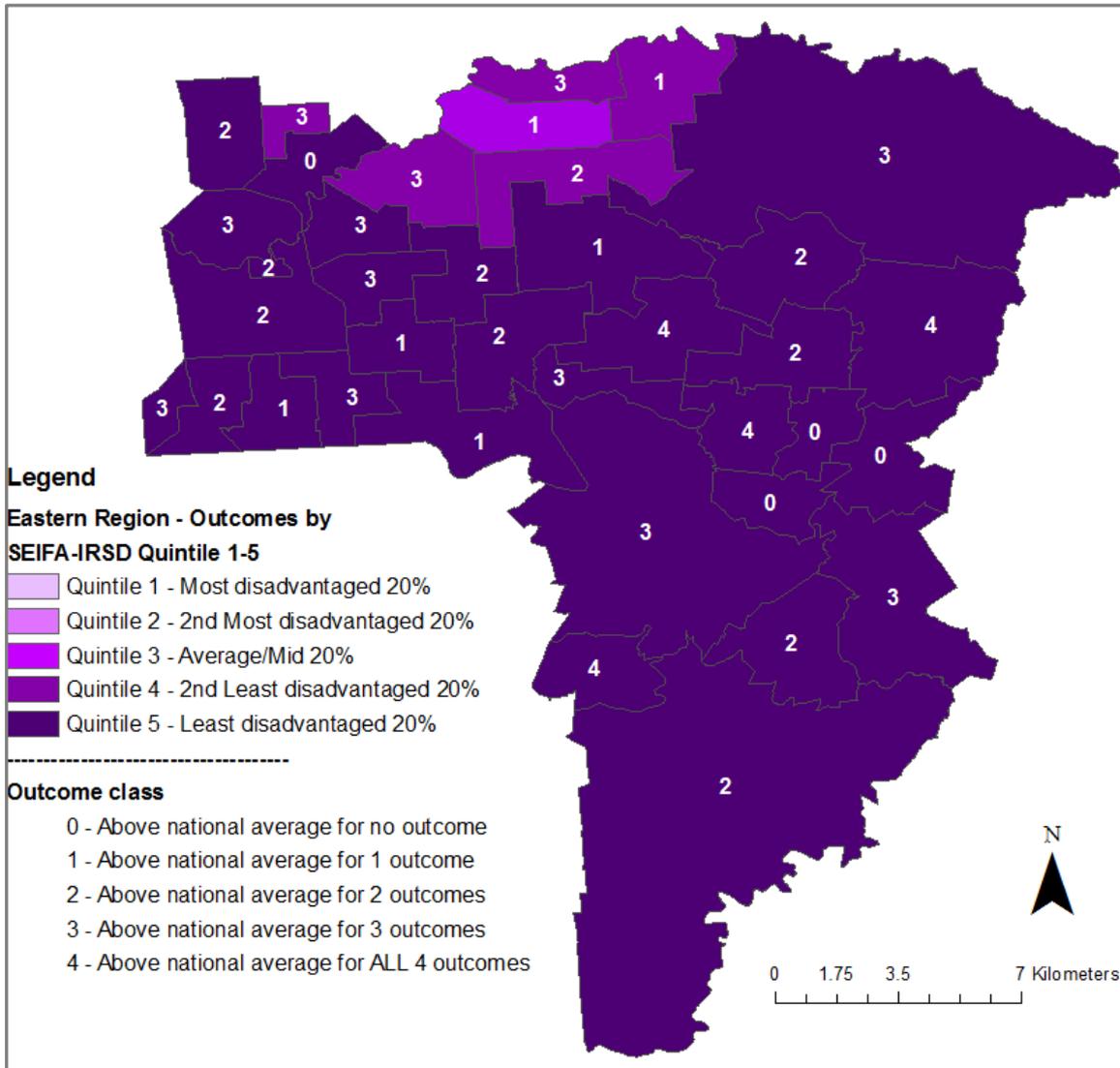
Figure 4.13: Summary of outcomes in Eastern Adelaide Region by SEIFA-IRSD compared with national outcomes

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011
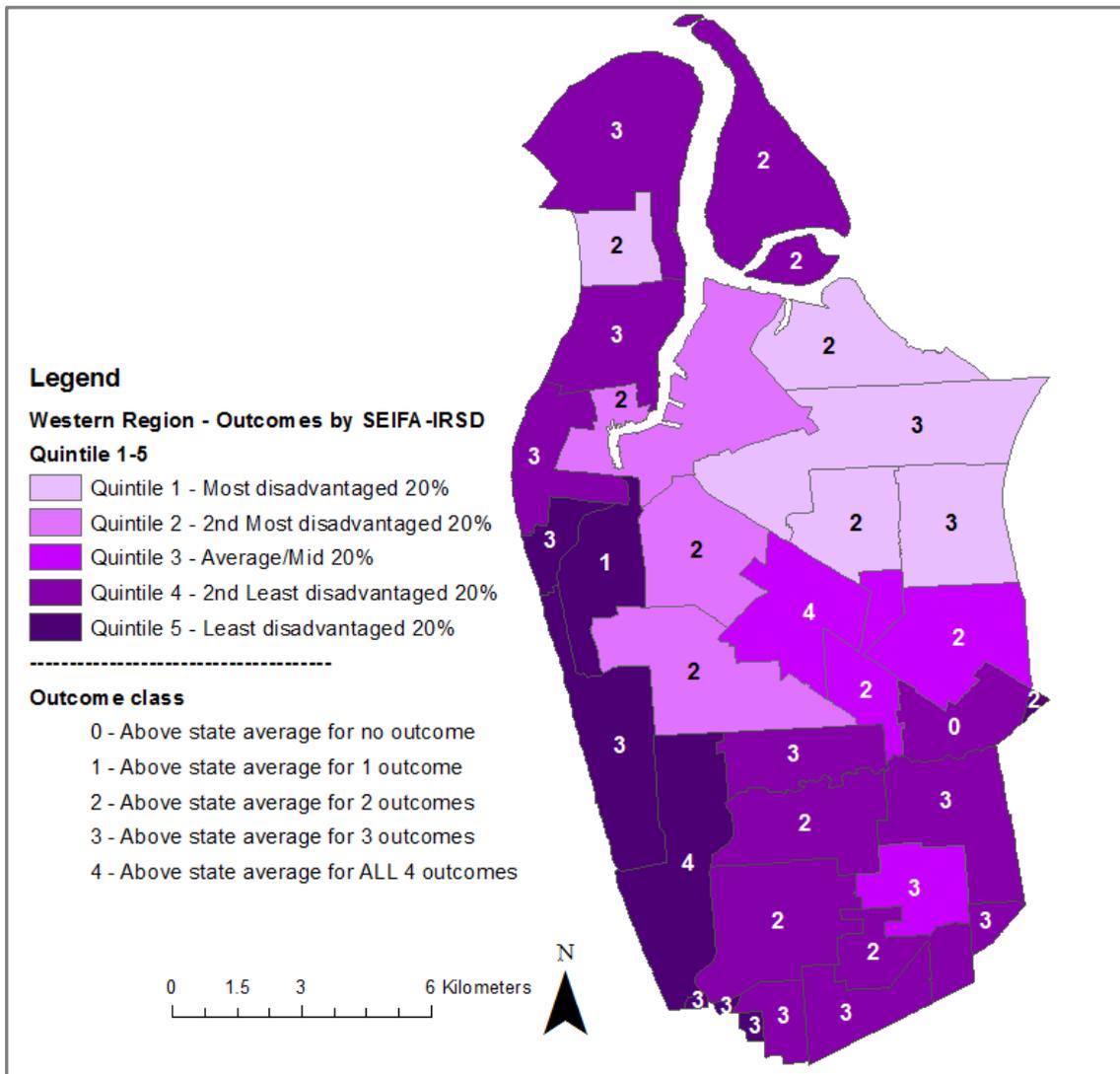
Figure 4.14: Summary of outcomes in Western Adelaide Region by SEIFA-IRSD compared with state outcomes

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011
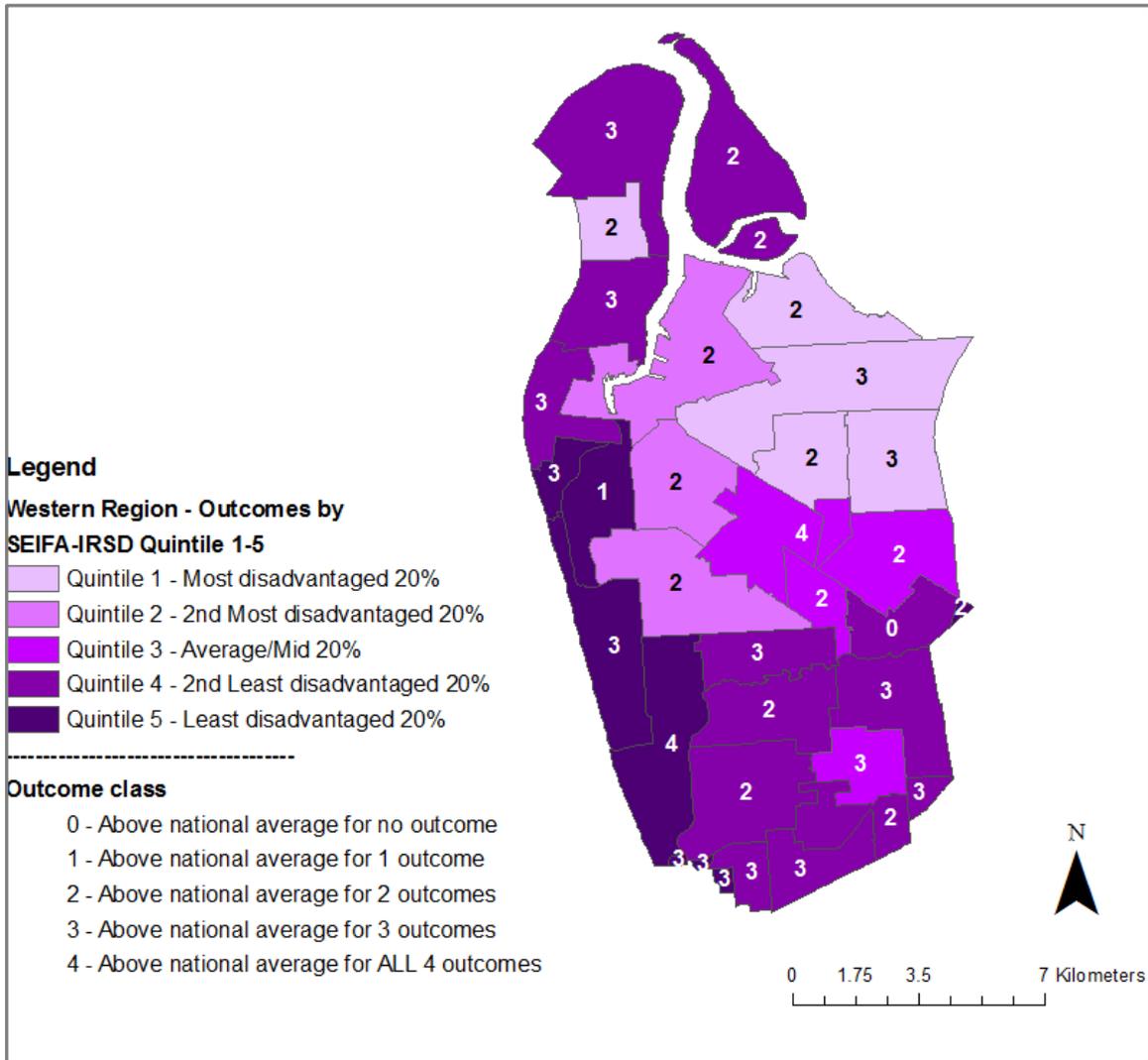
Figure 4.15: Summary of outcomes in Western Adelaide Region by SEIFA-IRSD compared with national outcomes

Map created by Oluwatomi Adejoro

Sources: Australian Bureau of Statistics (Australian Standard Geographical Classification (ASGC) Digital Boundaries, Australia, released July 2011

4.5 Distance to the nearest Tertiary Institution (DTI)

As discussed in the previous chapter, the main task of this study is to derive a new index of Distance to the nearest Tertiary Institution (DTI) which will rank each suburb according to proximity to the nearest institution of higher learning. This index will be useful in examining the relationship between proximity to a place of higher learning and educational outcomes, and to identify areas that require additional higher education facilities.

As discussed and listed in the previous chapter, there are six major public and private universities, and over 50 institutions of tertiary vocational education (TAFE) in South Australia. Figures 4.16 and 4.17 show the location maps of universities and TAFEs (institutions of higher learning) across urban and regional South Australia.
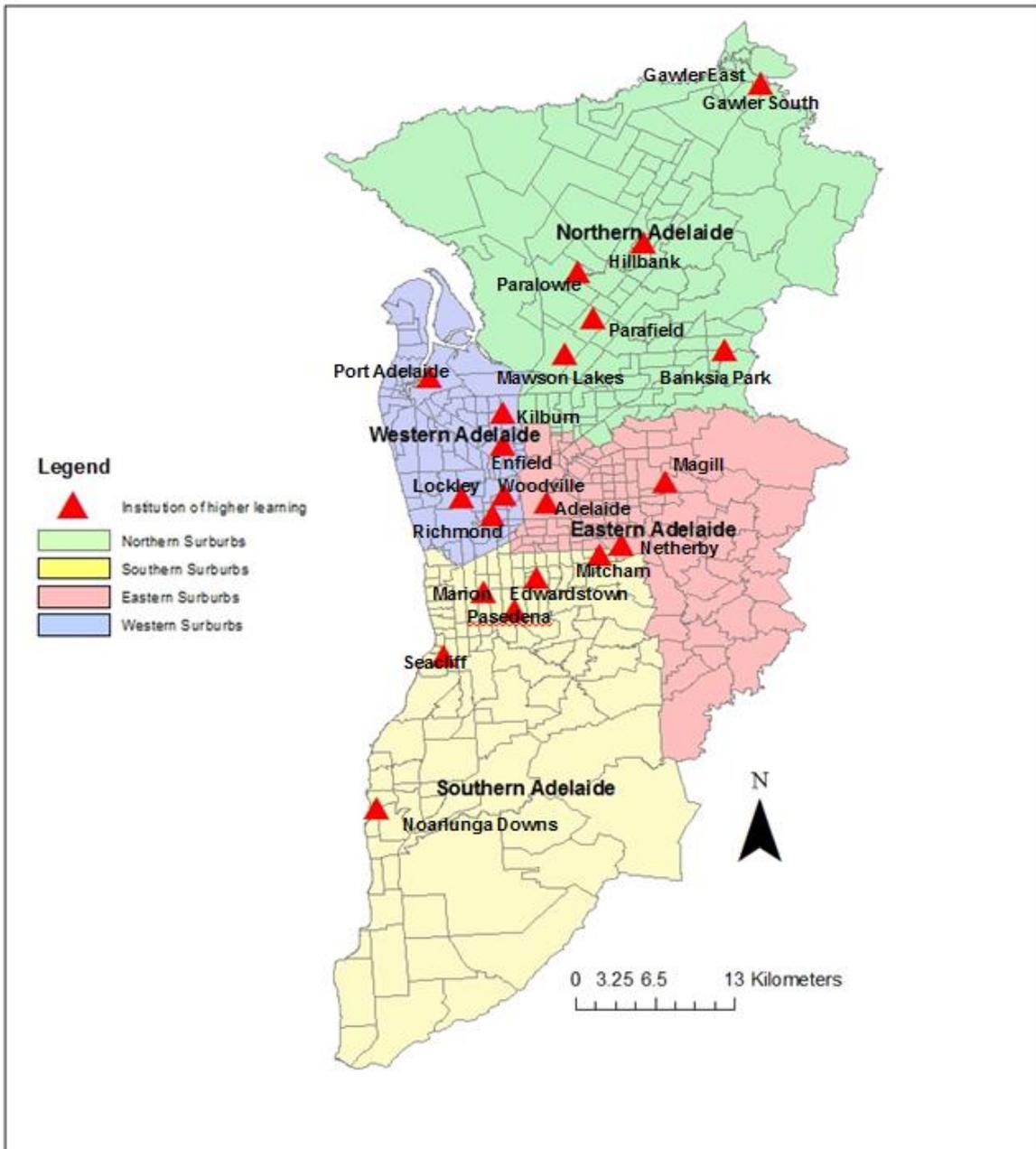
Figure 4.16: Map of urban and suburban areas of South Australia showing the locations of institutions of higher learning

Map created by Oluwatomi Adejoro
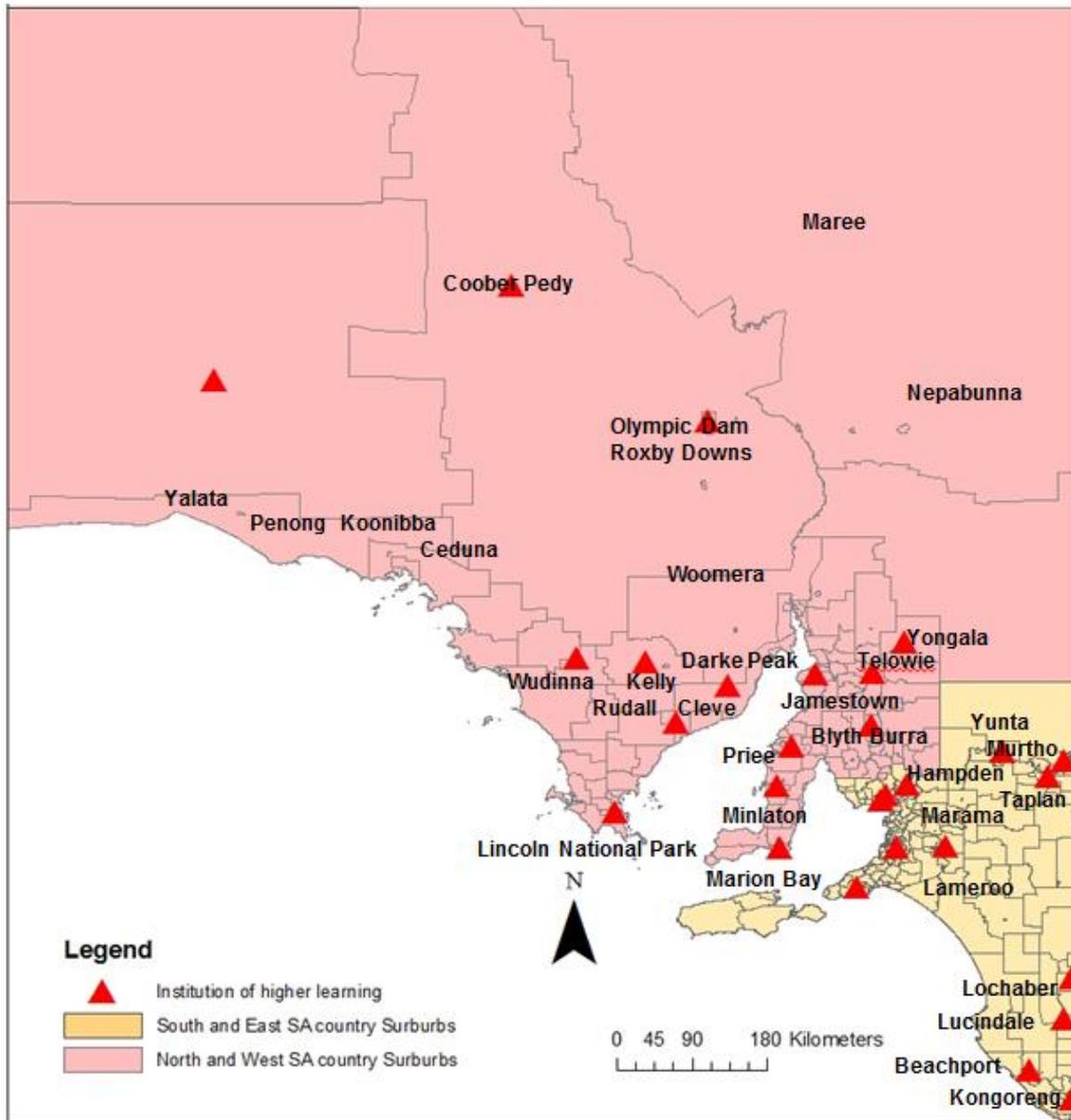
Figure 4.17: Map of regional/country areas of South Australia showing the locations of institutions of higher learning

Map created by Oluwatomi Adejoro

The DTI index was derived using postcodes. Euclidean Distance tool was used to measure the straight-line distance from the centre of a postcode area to the nearest higher institution of learning. Each LSAY record with similar postcodes has been assigned to a similar DTI index. Postcodes were used to map each record to its respective suburb in order to derive the DTI index for each record. The DTI scores will be divided into quintile scores of 1 to 5 (1 being very near to 5 being extremely far from the nearest higher institution of learning).

- Score 1: Very near – At least one institution of higher learning is within the postcode

- Score 2: Near - At least one institution of higher learning is within 10km radius of the centre of the postcode

- Score 3: Far - At least one institution of higher learning is within 10km to 20km radius of the centre of the postcode

- Score 4: Very far - At least one institution of higher learning is within 20k to 30km radius of the centre of the postcode

- Score 5: Extremely far - A higher institution of learning is more than 30km away from the centre of the postcode

The maps below (figures 4.18 and 4.19) show the DTI index for each suburb in South Australia. DTI scores have been attributed to each suburb according to their postcode. The maps show that suburbs presented in lightest shade of green such as Yalata, Kelly, Yongala, Adelaide, Pooraka, Bilbringa and Magill belong within postcodes which have been classified as DTI 1 i.e. with at least one institution of higher learning while areas shaded in the darkest shade of green such as Maree, Ngarkat, Perlubie, Redhill, Vivonne, Perilla, Lameroo, Wilmington and Streaky Bay are within postcodes which have been classified as DTI 5 (extremely far) i.e. the distance from the centre of these postcodes to the nearest institution of higher learning is over 50km away. As expected, DTI 3, 4 and 5 can be seen only in the country areas (figure 4.19) while most areas within the urban areas (figure 4.18) are within DTI 1 to 2.
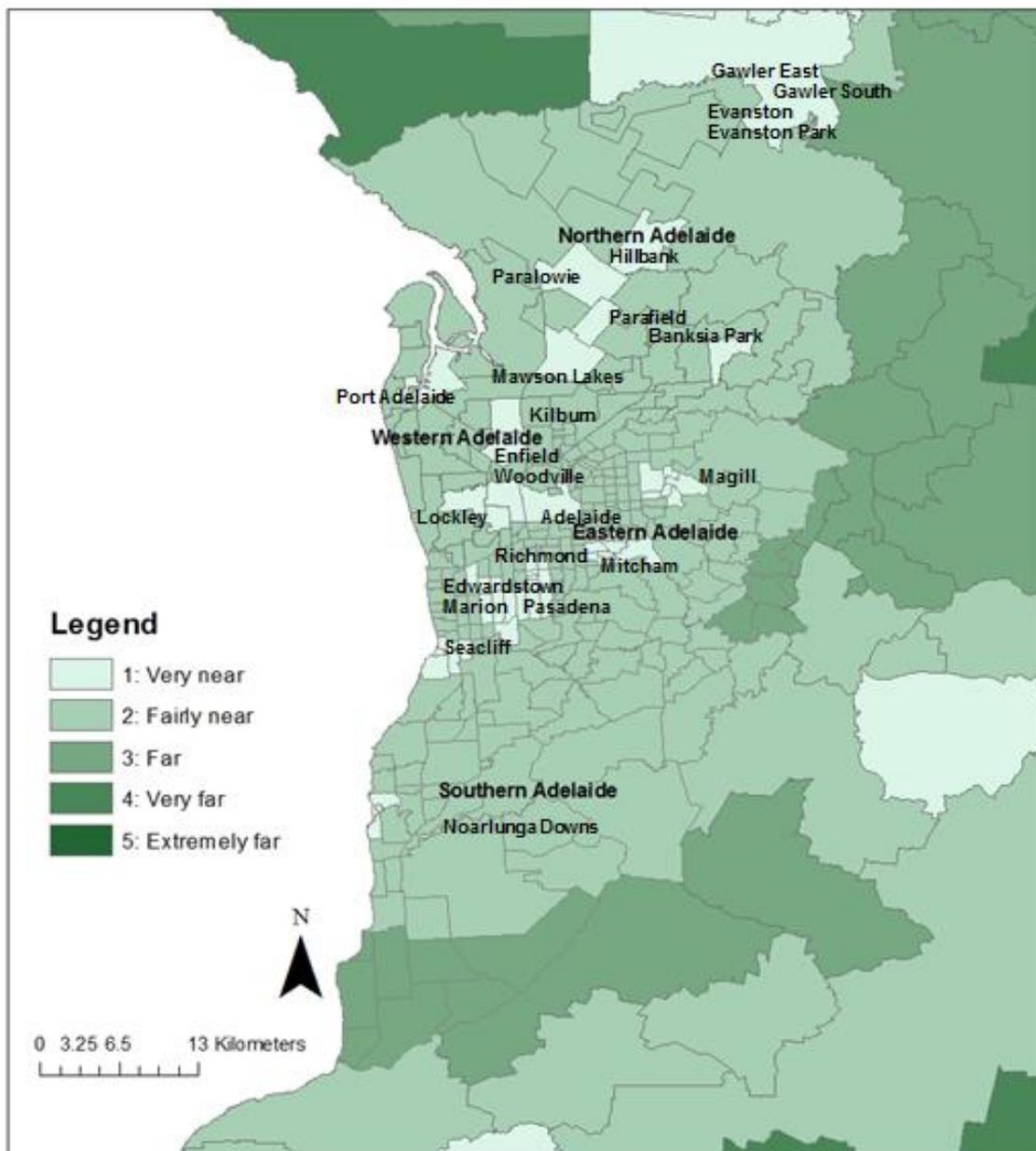
Figure 4.18: Map of urban and suburban areas of South Australia showing the classification suburbs into one of the five classes of DTI

Map created by Oluwatomi Adejoro
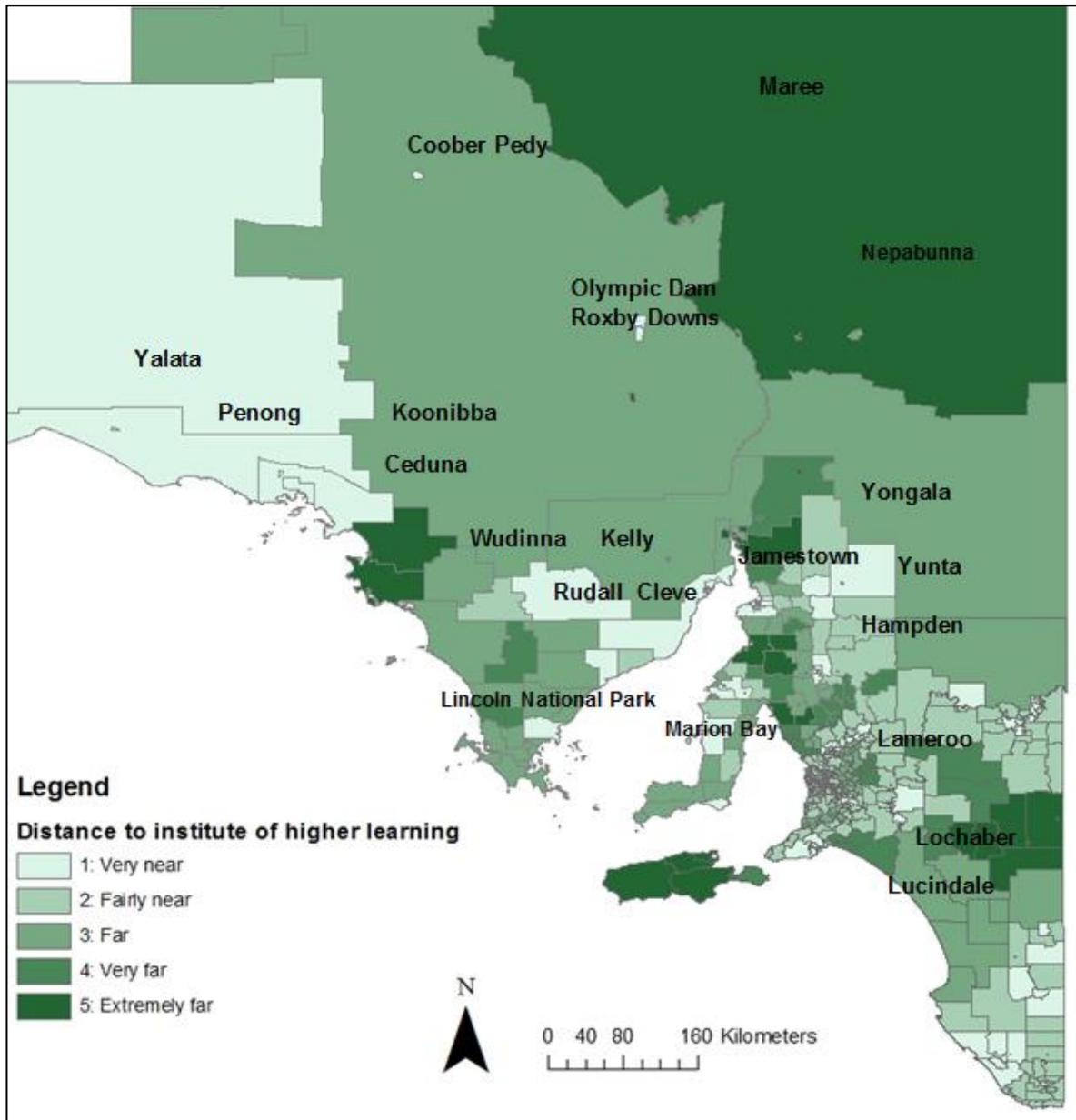
Figure 4.19: Map of regional/country areas of South Australia showing the classification suburbs into one of the five classes of DTI

Map created by Oluwatomi Adejoro

The result of the LSAY data analysis by DTI is presented in Table 4.5 below. The table shows the overall outcomes of education, employment and living arrangement. The table shows that by 2011 youths in living near a higher education facility tend to have higher rates of employment, 90.8% and 91.5%, for DTI 1 (Very near) and 2 (Fairly near) respectively. These rates (also when including the DTI 3 (Far) rate of 90.2%) are also higher than the state and national averages. The highest rate of those who are living in their own home (54.6%) was observed in the cohort of youths within the DTI 2 index (Fairly Near), followed by 50.9% which was observed in the cohort of youths within DTI 1 index (Very Near). These rates are also higher than the state and national averages. The result of chi-square test indicates that the higher employment rate (91.5%) and rate of independent living (54.6%) for young people living fairly near higher education facilities are both significantly higher (p<0.05 and p<0.01 respectively), than the state wide proportion of 88.9% and 48.8% respectively for young people. This may not be so surprising considering the fact that most youth will move from their parents' home to rent a place closer to their respective places of study for an easy commute and maximum accessibility. It is likely that they will continue to live independently on their own and away from their parents' home even after completing their studies. Surprisingly, youths living 'Very Far' (DTI 4) have the highest rate of Year 12 completion (statistically significant at p<0.01).

Figure 4.20 below presents a graphical representation of rates for the four outcomes by DTI. The graph depicts that employment and independent living rates tend to fall with an increase in DTI, while Year 12 completion rates tend to increase with an increase in DTI. There are no noticeable patterns or trends observed for the 'Completed a Qualification' outcome.

Table 4.5 Outcomes by DTI, South Australia by 2011

DTI Index	Employed	Completed Year 12	Completed a qualification	Living in own home or renting
DTI 1 – Very near	90.8	74.5	68.7	50.9
DTI 2 - Fairly near	91.5*	82.7	66.2	54.6**
DTI 3 – Far	90.2	76.9	73.1*	46.5
DTI 4 - Very far	87.2	88.4**	67.4	47.5
DTI 5 - Extremely far	85.3	88.0	66.8	44.2
State-wide average	*88.9*	*80.6*	*66.0*	*48.8*
National average	*86.0*	*82.5*	*69.2*	*47.1*

Source: Compiled from the Longitudinal Survey of Australia Youths (LSAY) Y03 Cohort.

* - Difference of rate from state-wide average is statistically significant at an alpha level of 0.05, p<0.05

** - Difference of rate from state-wide average is statistically significant at an alpha level of 0.05, p<0.01
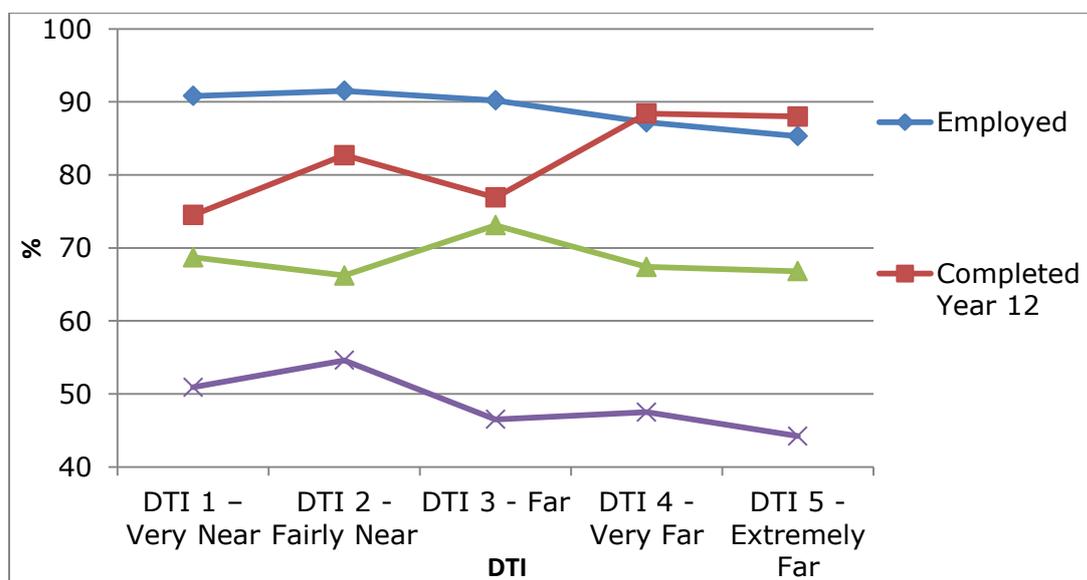

Figure 4.20: Graph showing outcomes by DTI, South Australia by 2011

Source: Compiled from the Longitudinal Survey of Australia Youths (LSAY) Y03 Cohort.

4.6 Result of the multivariate regression analysis (test of statistical significance)

Following the individual analysis of each of the variables in the model, the regression analysis was carried out on a combination of the three geographical indices i.e., SEIFA-IRSD, ARIA and DTI, to explore which of these independent indices is significantly explained by the values of dependent variables – employment, education, and social status of home ownership in South Australia. Results of the multiple regression analysis are shown in the tables below.

The "Test of global null hypothesis" table (Table 4.6) shows that for this analysis, the goodness of fit of the model is statistically significant at 0.05. This means that the models with the three estimator variables together for each of the four outcome variables fit significantly. In other words, the logistic regression model has the ability to explain and compare the geographical determinants of social achievements. These logistic regression models can help us to understand how much more likely a young person is to achieve one of the social outcomes when compared with a base category.

The models show that we can use the geographical index SEIFA-IRSD Quintile to estimate likely social outcome for young people. Youths living in the least disadvantaged areas (SEIFA-IRSD Quintile 4 and 5) are more likely than others to be employed, complete year 12 and have a qualification, and there is a strong significant relationship between SEIFA-IRSD and these three outcomes. In the same way, SEIFA-IRSD is a weak determinant for independent living but quintiles 2 and 4 are still slightly significant at $p<0.05$.

Living extremely far away from an institution of learning (DTI) is almost similar to the effect of being in a most disadvantaged SEIFA-IRSD area (although not as significant) with consistently higher likelihood of having low level of social outcomes than those closer to these facilities. DTI goes one step further than SEIFA-IRSD by being able to also estimate if a young person is living independently with a strong statistical significance of $<p.001$. The models however shows that DTI can mainly be used to estimate outcomes for those living extremely far away from higher learning facilities as this appears to be the only category with strong statistical significance.

As indicated by the result of the logistic regression, Accessibility/Remoteness index (ARIA) is the least significant determinant of social outcomes for young people with no ability to significantly estimate employment, year 12 or qualification outcomes. Surprisingly, ARIA is the best geographical estimator for whether a young person is living independently, with the model showing that it is highly likely for young persons living in the major city to still be living with their parents or wards and very much likely youths from remote backgrounds to be living independently. There is a strong relationship between ARIA and independent living status and this shouldn't be a surprise given the cost of accommodation in the major city of South Australia (Adelaide) compared to that of the regional areas.

On the overall, the logistic regression models show that while SEIFA-IRSD Quintile is the best estimator for employment, year 12 and qualification outcomes and ARIA is the best estimator for independent living, DTI can be used as a moderately reliable estimator for all four outcomes being statistically significant at ** p<.05 in most cases or *** p<.01 in the case of estimating qualification outcomes.

Table 4.6 - Testing global null hypothesis: BETA=0

Outcomes (dependent variables)	Likelihood Ratio Chisq	Pr>Chisq
Employment status	45.64	***
Year 12 completion status	72.78	***
Qualification status	49.83	***
Independent living status	42.52	***

Table 4.7 - Logistic regression coefficients - Employment status

	Estimate	Standard Error	Pr > ChiSq
Quintile 2: 2nd most disadvantaged 20%	0.61	0.36	*
Quintile 3: Average/Middle 20%	1.37	0.29	***
Quintile 4: 2nd least disadvantaged 20%	1.52	0.31	***
Quintile 5: Least Disadvantaged 20%	1.29	0.29	***
ARIA - Inner Region	0.17	0.15	
ARIA - Outer Region	0.30	0.27	
ARIA - Remote areas	0.04	0.64	
ARIA - Very Remote	13.79	0.54	
DTI 2 - Fairly Near	-0.20	0.15	**
DTI 3 - Far	-0.19	0.22	
DTI 4 - Very Far	-3.45	0.56	**
DTI 5 - Extremely Far	-8.48	0.82	**

* p<.10, ** p<.05, *** p<.01

Table 4.8 - Logistic regression coefficients - Year 12 completion status

	Estimate	Standard Error	Pr > ChiSq
Quintile 2: 2nd most disadvantaged 20%	0.65	0.42	
Quintile 3: Average/Middle 20%	0.89	0.35	**
Quintile 4: 2nd least disadvantaged 20%	1.15	0.36	***
Quintile 5: Least Disadvantaged 20%	1.63	0.35	***
ARIA - Inner Region	0.00	0.14	
ARIA - Outer Region	-0.26	0.27	
ARIA - Remote areas	-0.87	0.81	
ARIA - Very Remote	-13.19	0.85	
DTI 2 - Fairly Near	0.12	0.14	
DTI 3 - Far	0.19	0.22	
DTI 4 - Very Far	12.43	0.87	**
DTI 5 - Extremely Far	15.77	0.12	*

* p<.10, ** p<.05, *** p<.01

Table 4.9 - Logistic regression coefficients - Qualification status

	Estimate	Standard Error	Pr > ChiSq
Quintile 2: 2nd most disadvantaged 20%	0.66	0.62	
Quintile 3: Average/Middle 20%	0.99	0.54	*
Quintile 4: 2nd least disadvantaged 20%	1.20	0.55	**
Quintile 5: Least Disadvantaged 20%	0.86	0.53	
ARIA - Inner Region	0.08	0.19	
ARIA - Outer Region	-0.85	0.45	*
ARIA - Remote areas	0.39	0.83	
ARIA - Very Remote	-12.16	0.75	
DTI 2 - Fairly Near	-0.30	0.19	
DTI 3 - Far	-0.54	0.30	
DTI 4 - Very Far	-10.76	0.77	**
DTI 5 - Extremely Far	-11.69	0.84	***

*p<.10, ** p<.05, *** p<.01*

Table 4.10 - Logistic regression coefficients - Independent living status

	Estimate	Standard Error	Pr > ChiSq
Quintile 2: 2nd most disadvantaged 20%	-1.38	0.77	*
Quintile 3: Average/Middle 20%	0.69	0.47	
Quintile 4: 2nd least disadvantaged 20%	0.81	0.48	*
Quintile 5: Least Disadvantaged 20%	0.51	0.46	
ARIA - Inner Region	0.42	0.20	**
ARIA - Outer Region	1.81	0.61	***
ARIA - Remote areas	2.36	0.82	***
ARIA - Very Remote	12.27	0.75	
DTI 2 - Fairly Near	-0.06	0.19	*
DTI 3 - Far	-0.11	0.29	**
DTI 4 - Very Far	-3.86	1.61	
DTI 5 - Extremely Far	-11.48	0.70	

* p<.10, ** p<.05, *** p<.01

4.7 Summary

This project has successfully investigated the employment, educational and social achievements of South Australian youths using four different geographical indices - Statistical Regions, ARIA, SEIFA-IRSD and the newly derived DTI. The analyses and results above show that each of these indices can help us interpret the outcomes in different ways. As this project is based on the initial investigation of the LSAY data, these findings are initial and not conclusive at this stage, as there may be other factors influencing the rates for outcomes by and within each of the indices. For example, factors such as age, sex, and indigenous status have not been controlled for to eliminate their effects. Also, further tests of significance of difference between the rates are required to evaluate the findings when demographics such as age, sex and indigenous backgrounds are controlled for.

The next chapter will examine the results in more detail, offer some conclusions, and make recommendations for further future analyses and research.

Chapter 5 – Conclusions and recommendations

5.1 Introduction

This investigation of the level of social achievement of South Australian youths, from a cohort first contacted as 15 year-olds at school in 2003, has shown that the social-economic achievement of young people varies according to their spatial location. There is some evidence that the presence of disadvantage is more indicative of a risk of a low level of social achievement.

This study has been carried out in a political atmosphere where there has been a lot of debate about the challenges of youth development. Although there are varied and contradictory opinions, the general consensus emerging is that more research needs to be done to fully understand the factors affecting the social development of young people as they progress into adulthood. This thesis contributes to the increasing knowledge base by using the data from the Longitudinal Survey of Australian Youths (LSAY) to examine the social achievements of youths in relation to the characteristics of where they live.

Government and policy makers are always demanding evidence to aid in decision making. This study will highlight the spatial factors and patterns underlying the social achievements of young people in the cohort.

5.2 Analysis

5.2.1 Is there a spatial variance in social achievements?

This study shows that most young people manage the transition to adulthood well, although they may do so by taking circuitous routes. As many as a quarter experience a period of 'disengagement' at some point between the ages of 15 and 25 — when they are neither in employment or study. This finding is consistent with the study carried out by the National Centre for Vocational Education Research in 2011 (Karmel and Liu 2011, Which paths work for which young people?, NCVER, Adelaide). There is a small group who is disadvantaged, perhaps because of their low socio-economic status.

The maps in Chapter 4 were created to visually illustrate the patterns of young people's achievements in South Australia.

5.2.2 Statistical region

Previous studies have shown in a broad sense that areas classed within the urban regions often enjoy the best goods and services, and this may contribute to positive social outcomes for residents compared to their counterparts in the rural regions. The statistical regions structure is a broad but simple spatial unit set with no overlap or gaps and one used commonly to report census or population type statistics in Australia (ASGC 2001).

The six major statistical regions of South Australia (Northern, Western, Southern and Eastern Adelaide; Southern-Eastern Regional and Northern-Western Regional) were investigated in this study. The first four regions divide Adelaide City (urban areas) into four portions while the Southern-Eastern Regional and Northern-Western Regional portions cover the rest of South Australia (country areas). Generally, the city areas are more developed and populated than the country areas.

By comparing these regions to social achievements, youths in the Western statistical region out performed their state and national peers consistently in employment and education, but seem to lag behind when it came to independent living. The country areas have the highest rate of employment and independent living. The Eastern region youths are also outperforming their peers in Year 12 completion and independent living. This result seems to suggest that in which region a youth lives may have some effect on social achievements. However, the pattern is not entirely clear. Testing of the significance of the relationship is necessary to confirm any association.

5.2.3 ARIA

Concerns are often expressed that students in outer regional and remote locations have less access to a broad curriculum range, due to relatively small school size and/or fewer specialised teachers being available in the area. If

this were the case, rural students could find their access to post-school educational and employment opportunities limited.

In this study, we found that young people living in the regional and remote areas of Australia are, on average, as likely to participate in Year 12 and higher education as their peers living in metropolitan areas. This is consistent with findings by the Australian Council for Educational Research (ACER) in its LSAY briefing number 5, which also suggests that rural students are not substantially disadvantaged in terms of the quality of literacy and numeracy education they are receiving in their early to middle years of schooling (ACER 2002).

Overall, we found that young people in the very-remote areas of South Australia generally outperformed their state and national peers in at least three of the four outcomes investigated in this study. Although this findings require further investigation, it may, to an extent, be explained by the structure of industries in rural areas, which are likely to provide relatively more opportunities for apprenticeships there, helping young people achieve a position of financial and domestic independence much quicker that their urban peers. More speculatively, it is possible that strong community relationships in many remote areas may help in creating opportunities for young people.

5.2.4 SEIFA-IRSD

Youths in the SEIFA-IRSD Quintiles 4 (2nd least disadvantaged) and 5 (least disadvantaged) consistently outperformed their peers in all four outcomes. This is consistent with findings by the Foundation for Young Australians (FYA), which suggests that too many young people who are not in work, education and training are from disadvantaged backgrounds, particularly those from low socio-economic backgrounds, Indigenous youth, young people with a disability or health problem, and those who struggle to do well at school (FYA 2012). One can perhaps argue that social achievement is greater closer to the least disadvantaged areas, as has been shown to be the case in other studies (Marks et al. 2001). However, this assertion is not completely conclusive, since this study did not include any statistical test of significant difference. In the absence of further analysis, an explanation could be that there are more

pressures and opportunities for the young people from these areas because their parents are well placed on the socio-economic ladder. A test of significant difference may, however, be recommended for future research.

5.2.5 DTI

In this research, a new class of indices, Distance to Tertiary Institutions (DTI), which can be useful in summarising changes in achievement, is presented. The key focus of this study is to define the achievements of young people in terms of their proximity to the nearest institution of higher learning. DTI scores were divided into quintile scores of 1 to 5 (1 being very near to 5 being extremely far from the nearest higher institution of learning) and each young person in the LSAY data set was assigned a DTI score. Trends in social achievements were observed, and the new class of indices appears to be useful in explaining variation in achievements.

Results presented in Chapter 4 show that by 2011, youths living near a higher education facility tend to have higher rates of employment and independent living. These youths out-performed their state and national peers as well. This may not be so surprising considering the fact that most youth will move from their parents' home to rent a place closer to their respective places of study for an easy commute and maximum accessibility. It is likely that they will continue to live independently on their own and away from their parents' home even after completing their studies.

This finding seems consistent with the point that was made in a 2008 Report for the United Kingdom Government, entitled *University Challenge: Unlocking Britain's Talent*. The report argued that local tertiary education availability delivers significant local benefits to surrounding communities and individuals, particularly in communities that are disconnected from the national and global economy. It was noted that local higher education availability unlocks local talents higher education participation, can help retain skills in a community, produces more productive, healthy and highly skilled workers and fosters entrepreneurship, leading to growth in a broad range of new and often

knowledge intensive businesses and jobs (Department of Innovation, Universities and Skills 2008).

Although, further statistical analysis of significant association is recommend, this preliminary study shows that distance or proximity to places of tertiary learning can play a significant role in improving social outcomes for young people. A longer-term solution is for the Government to support measures to expand the accessibility of higher education opportunity more evenly across rural and regional Australia. This is not necessarily about building new campuses, but sustaining the existing presence and working more closely with the universities, TAFE and others to expand accessibility and provide genuine student choice across regional communities (CSU 2009).

5.3 Conclusion

The first objective of this study was to provide a summary spatial snapshot of the distribution of youths in South Australia (age 15 to 24 years) by sex, indigenous status and other relevant demographics using the Australian census data. The LSAY data currently in the custody of the Australian Data Archive (ADA) at the Australian National University (ANU) has proven to be a valuable resource for exploratory analysis. Table 3.5 illustrates the characteristics of young people, with the majority being from a non-indigenous background. Currently, 13% of the population of South Australia are between 15-24 years of age (Table 3.2).

Also as proposed in the objectives, the LSAY data was used to map each youth to their geographic areas/statistical region, and classify and summarize their achievements into the Accessibility Remoteness Index for Australia (ARIA) and Socioeconomic Index For Area - Index of Relative Socio-Economic Disadvantage (SEIFA-IRSD) indices. Results consistently show that youths in rural locations exhibit the highest rates of independent living when compared to the statewide and national results, while urban youths are more likely to complete their Year 12 education than their rural counterparts. Also, youth from areas with the least SEIFA-IRSD disadvantage are more likely to achieve more desirable social outcomes, when compared to their state-wide or national peers. These findings are comparable with those found in the LSAY research

reports produced by the Australian Council for Educational Research (ACER 2002).

The key objective of the study was to investigate whether a new factor, proximity and distance to the nearest tertiary institution, may also be a contributing factor to the socio-economic achievements of young people. This was examined firstly by deriving a new index of Distance to (the nearest) Tertiary Institution (DTI) which ranked each suburb according to proximity to the nearest institution of higher learning, using postcodes. Areas closest to a tertiary institution generally exhibited better employment and living arrangement outcomes when compared to the state and national averages. However, these areas have the lowest rate of Year 12 completion.

This study has investigated the employment, educational and social achievements of South Australian youths using four different geographical indices - Statistical Regions, ARIA, SEIFA-IRSD and the newly derived DTI. The analyses and results show that each of these indices approaches the outcomes in a slightly different way. The study has shown quite clearly that there are other spatial characteristics (that can be captured by other indices, such as DTI) which impact upon the level of social achievements, along with the usual spatial measures (ARIA, SEIFA-IRSD), and these need to be taken into consideration by policy makers and researchers to fully understand the interaction of factors affecting the social development of young people in South Australia.

This study has achieved the goal of answering the major research question 'Does location matter when analysing the social achievements of young South Australians?'. It has been demonstrated that there are spatial differences that can explain and potentially contribute to the social achievements of young people.

5.4 Recommendations for further research

The issue of low social achievements in youths is going to be of huge concern for a long time to come. It is important that research continues to be undertaken on this matter and that this research contributes to the initiation of long term intervention programs to aid the efforts of social workers and education officers who continue to deal with issues regarding youth development.

It would be beneficial for this type of study to include other data fields which would contribute to a more detailed description of each youth's physical and social environment, particularly, data fields about other social issues such as crime, prostitution and gambling. Considering this, other linear and non-linear statistical analysis models will be useful to this type of research.

The analysis of the LSAY data in this study will also benefit from further investigation into the links between social achievements and ethnicity. A high level of disadvantage among youths living in statistical regions with a high proportion of people who speak a language other than English may be worth investigating.

Lastly, as this project is based on the initial investigation of the LSAY data, these findings are preliminary and not conclusive at this stage, as there may be other factors influencing the rates of outcomes by and within each of the indices. For example, factors such as age, sex, and indigenous status, have not been controlled for in this study. Also, time related factors such as changes in circumstance, services and infrastructural developments and changes in political atmosphere have not been accounted for in this study. More investigations which take these factors into consideration will be useful for future research works looking into proximity as a predictive factor for social outcomes.

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Appendix A - Mapped examples of regions of South Australia and how they relate to each other

Maps of South Australia with Statistical Region/Subdivision, Statistical Local Area showing suburbs and postcodes as labelled
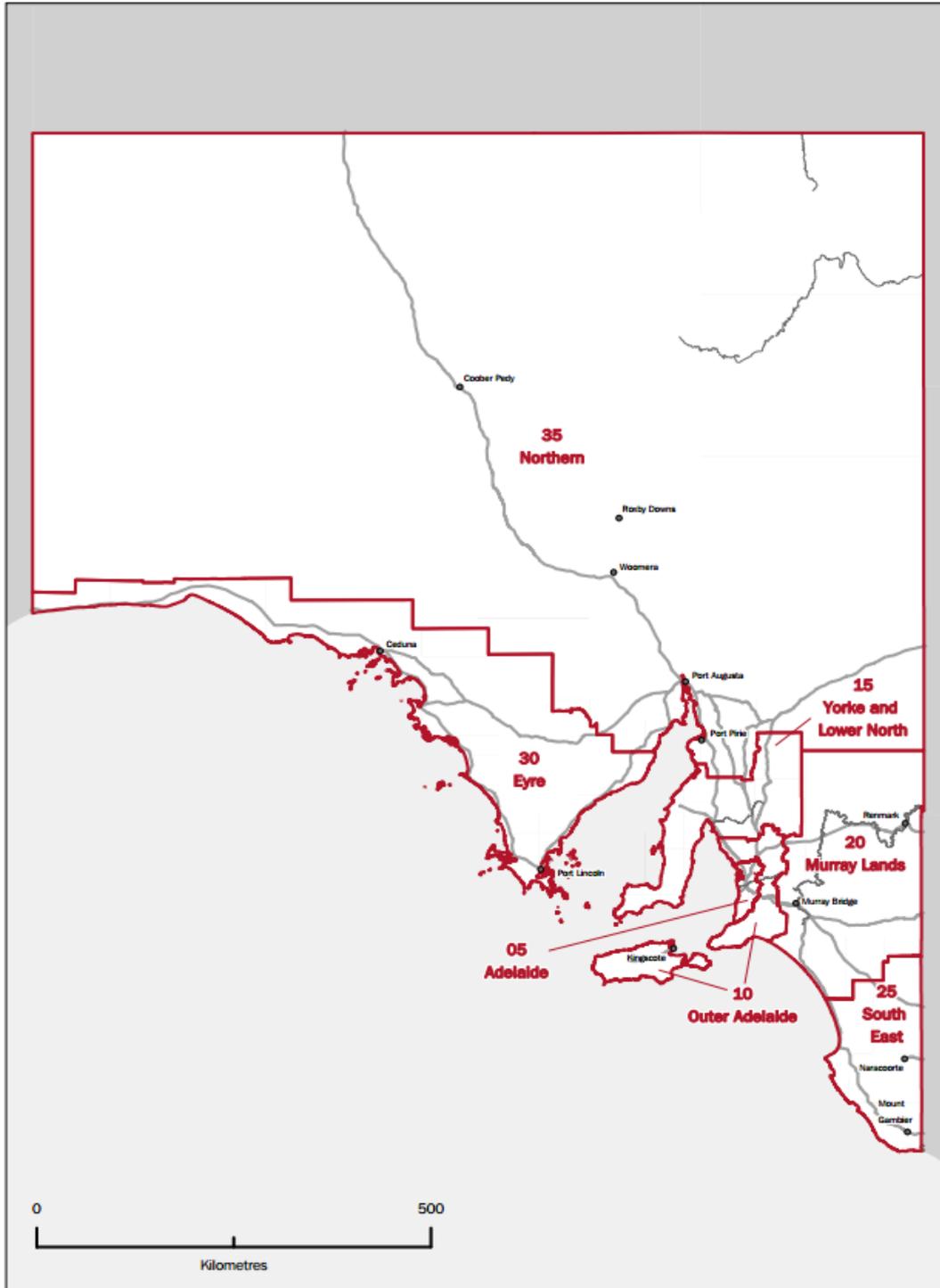

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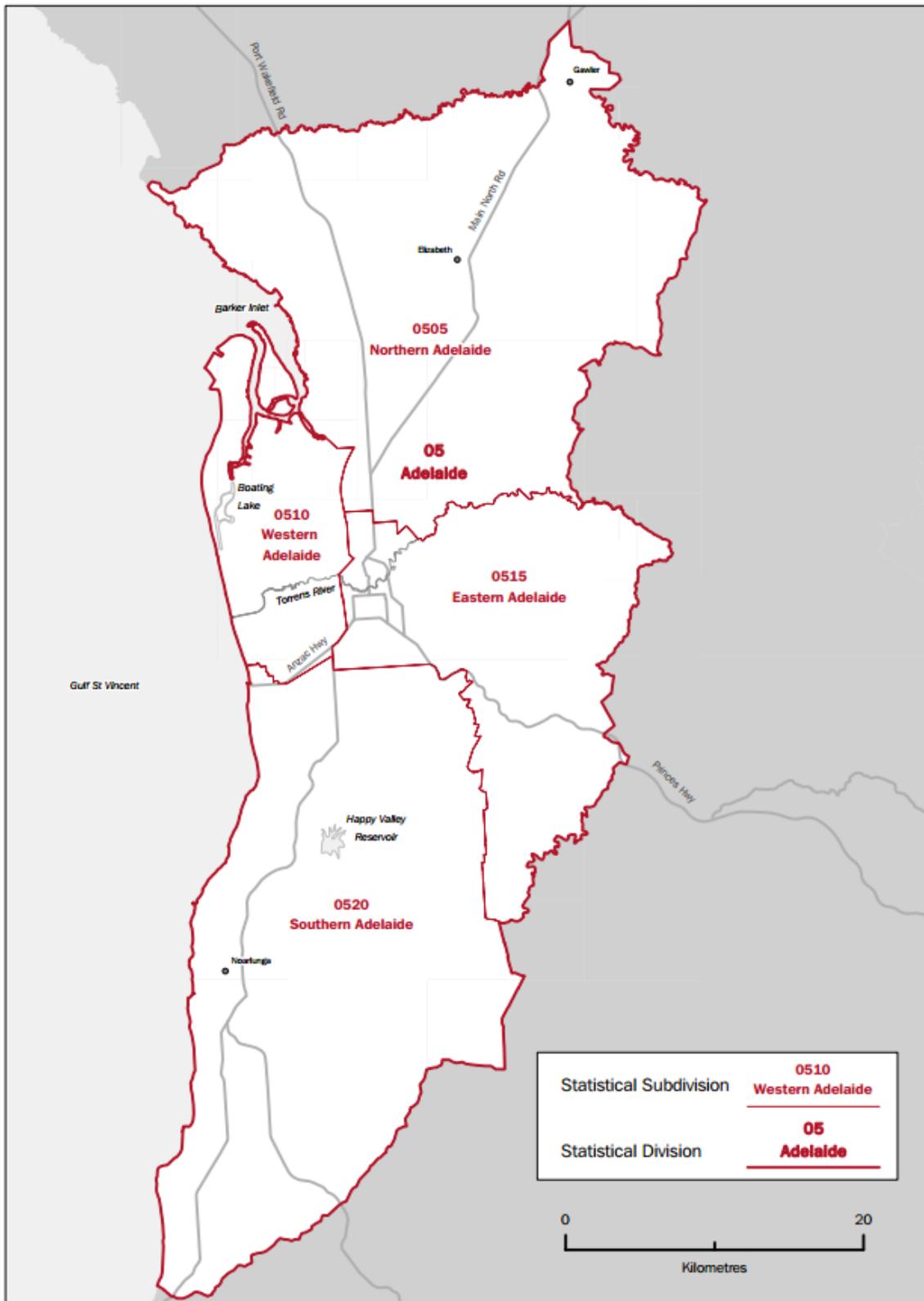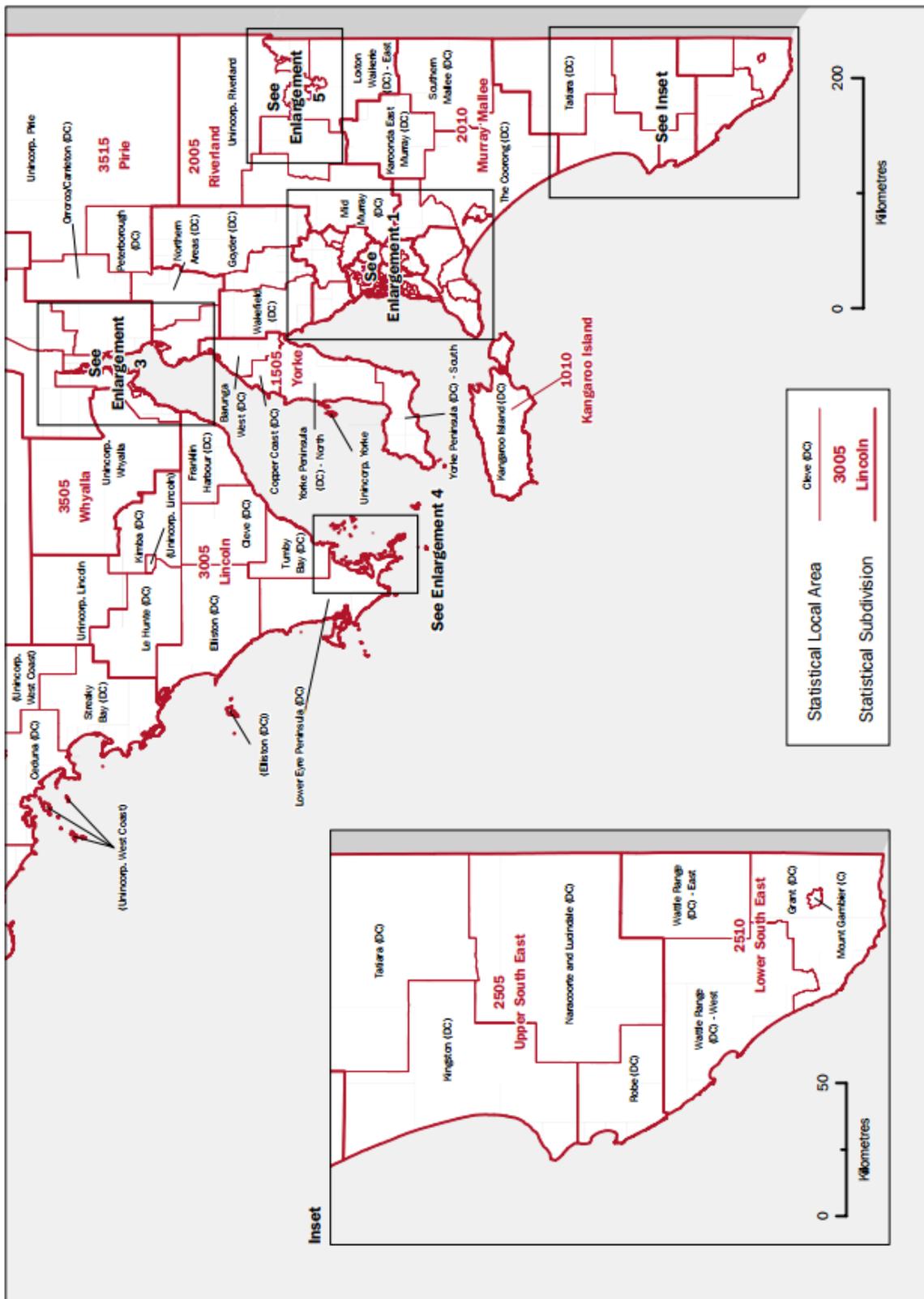
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*Source: Australian Bureau of Statistics*
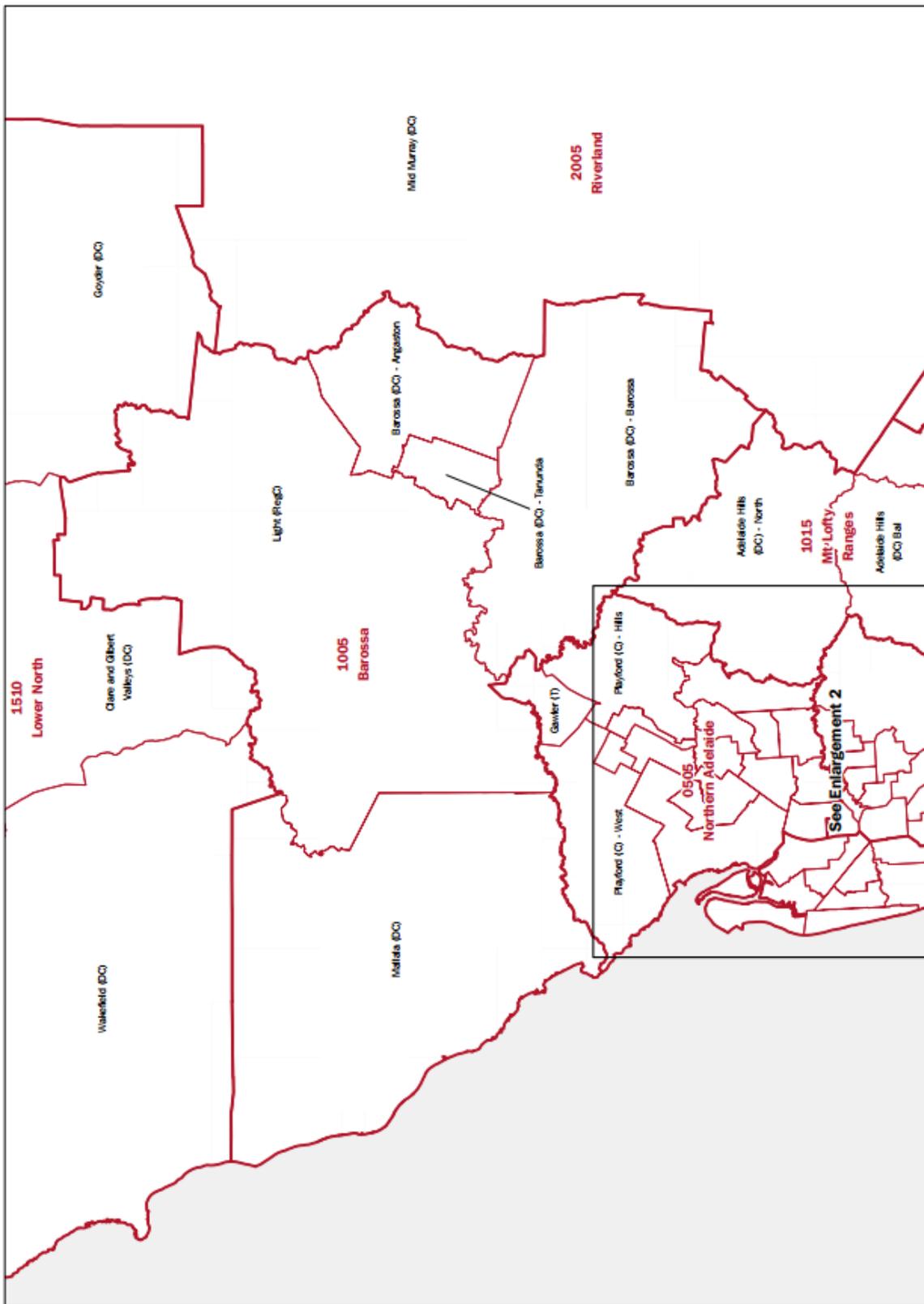
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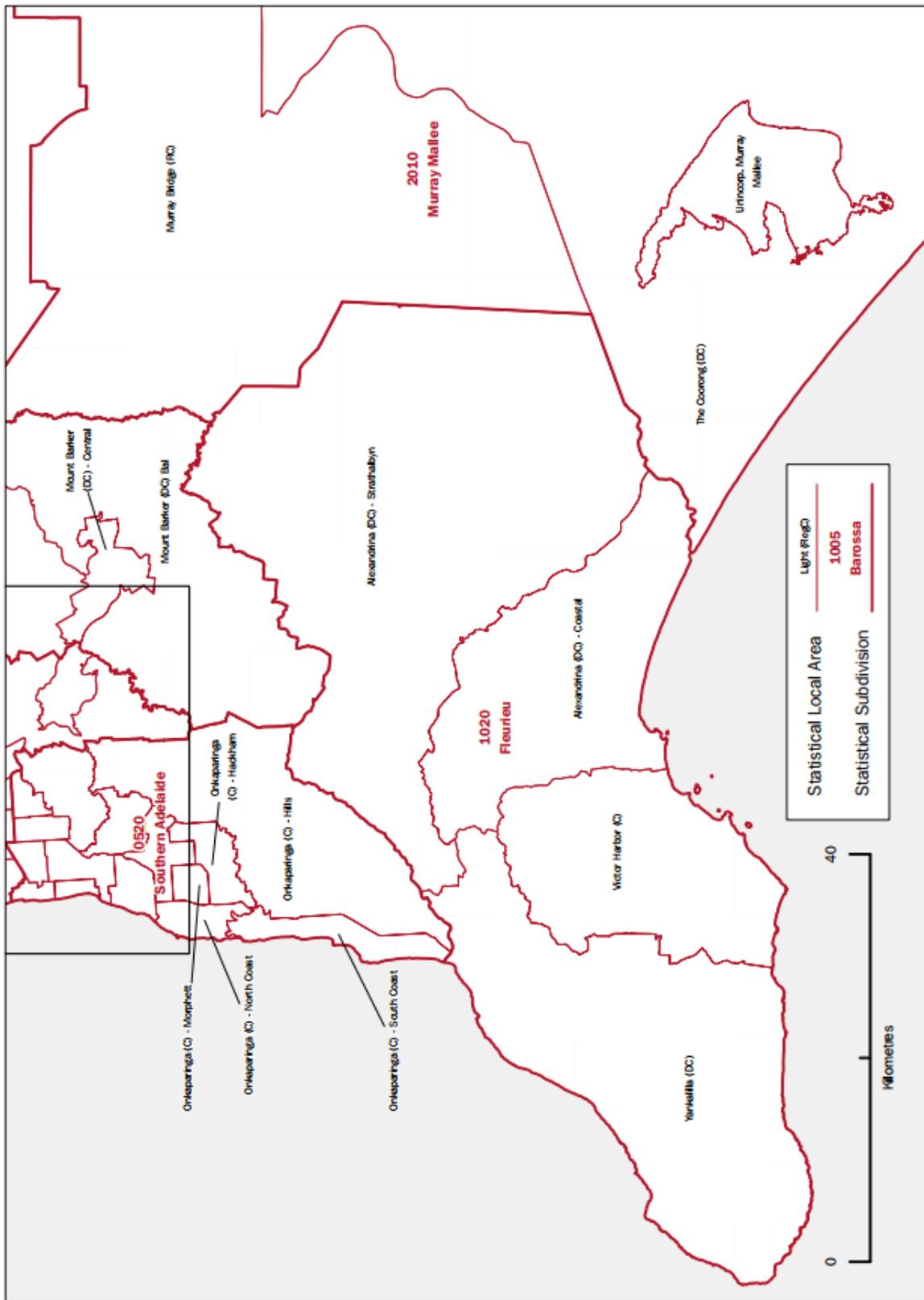
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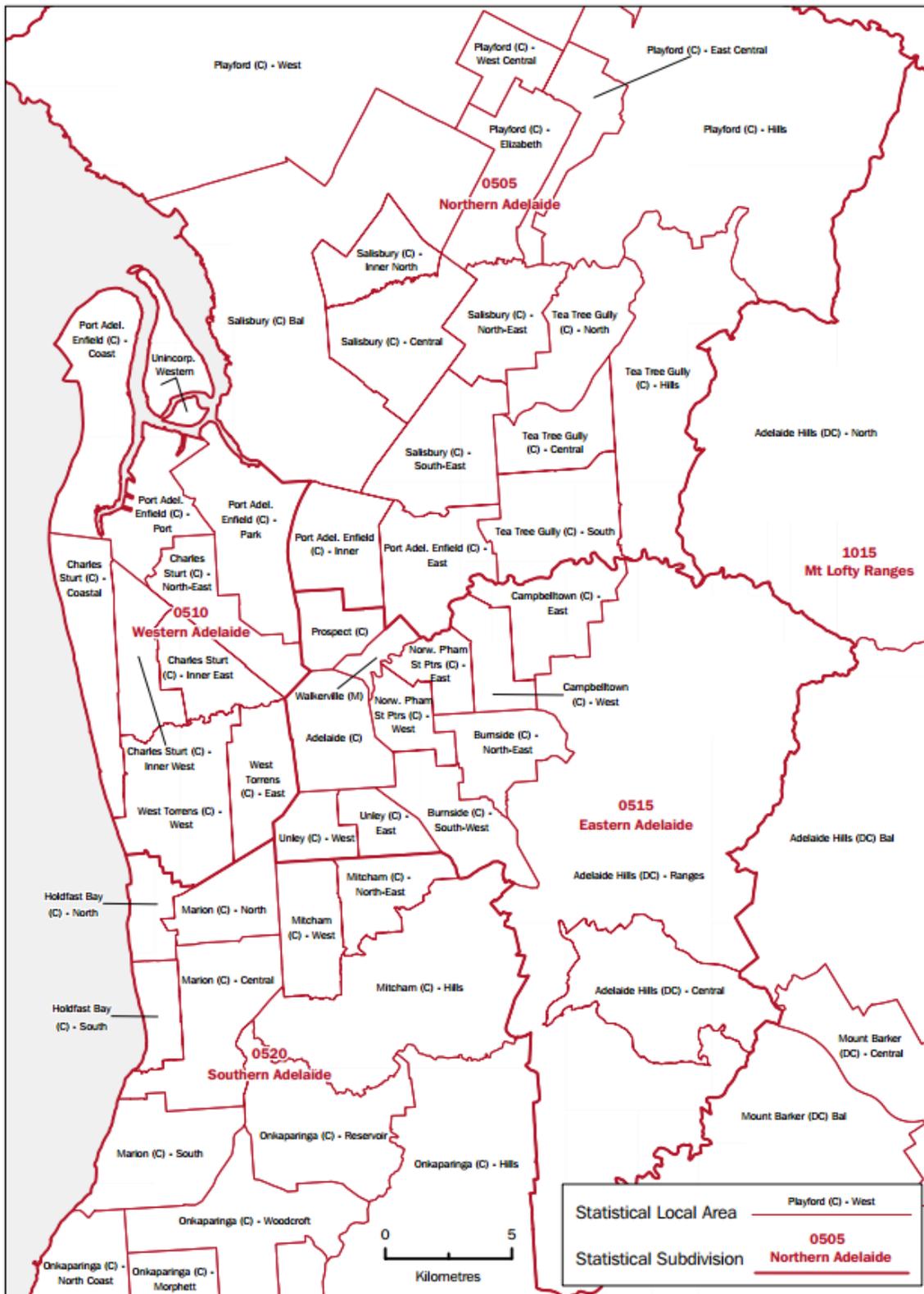
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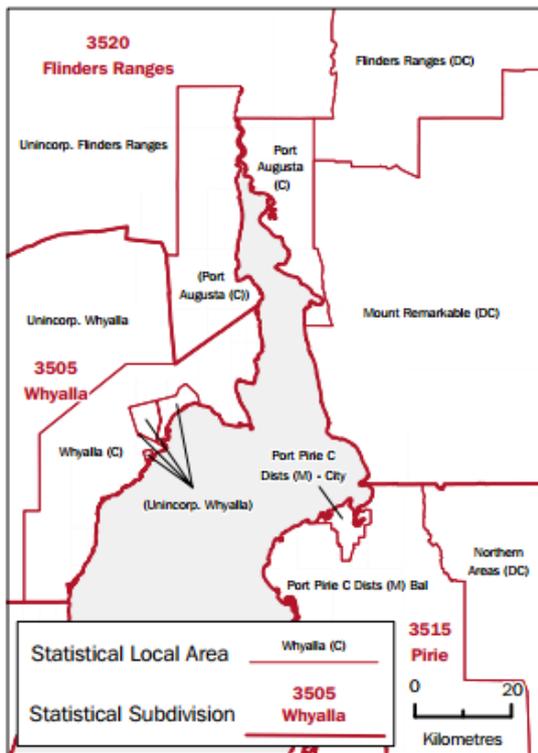
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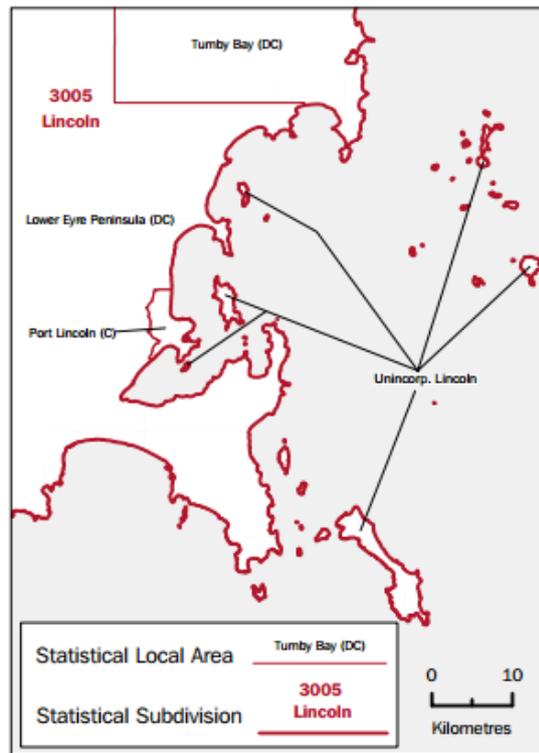
Enlargement 4

Enlargement 5

Source: Australian Bureau of Statistics

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Department of Physical Geography and Ecosystem Science
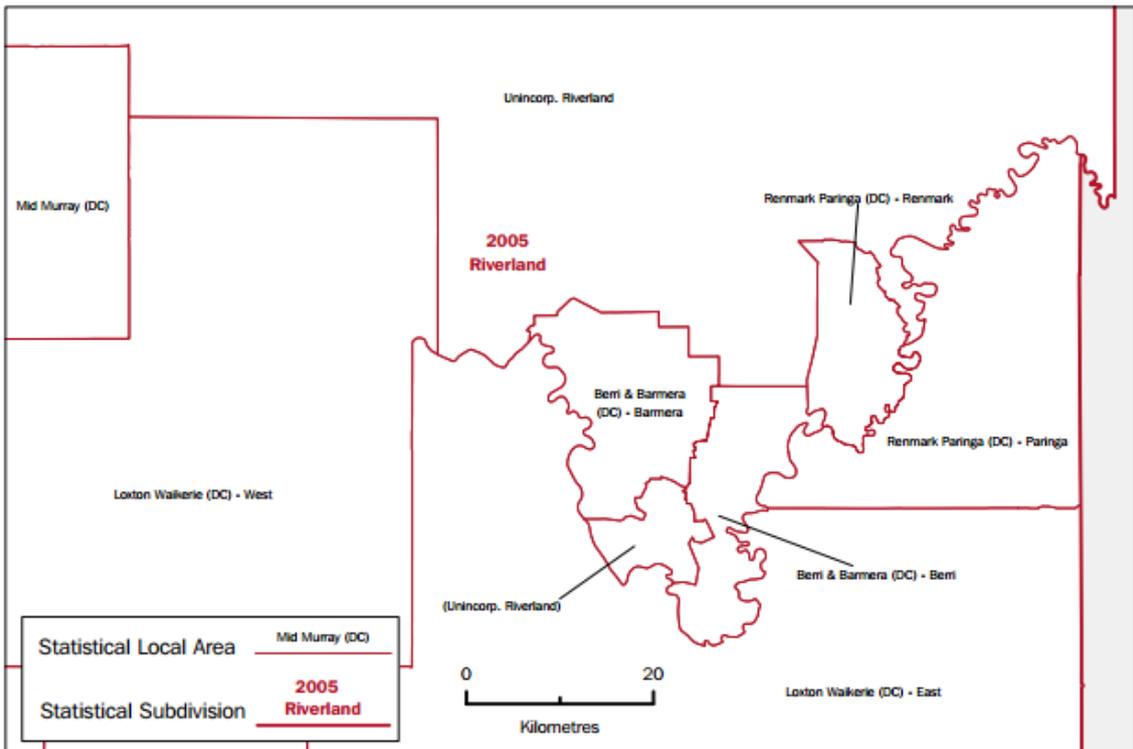
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