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A Study of Health Inequality between Indigenous and Non-Indigenous Australians

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature: …….

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Abstract

The health disadvantage of Indigenous people in Australia has been recognised for a long time. The reasons for this poor health status are considered to be complex and multi-faceted. Socioeconomic status, socio-cultural factors, access to quality healthcare, environmental factors and risky behaviours are considered the major factors affecting Indigenous health. Despite this, very little progress has been made in reducing the health inequality between Indigenous and non-Indigenous Australians.

This thesis examines the health inequality between Indigenous and non-Indigenous Australians. First, the thesis investigates the gap in subjective and objective health outcomes between the two populations. The health outcomes include self-assessed health, chronic diseases and injury. Second, it looks at the relative contribution of four factors to the low health status of Indigenous Australians, viz.: demographic, behavioural, socio-economic and cultural. Third, as the Indigenous population is not a homogenous group, the thesis analyses separately the health status of different groups relative to non-Indigenous people. Fourth, the extent of association of each of the four factors to the health outcomes is examined. In addition, similar analyses are undertaken for healthcare utilisation.

The thesis finds that only a minor proportion of the gap in health outcomes can be explained by observable demographic, behavioural and socio-economic characteristics. The removal of Indigenous people from their natural families (especially that of relatives) as part of the ‘assimilation policy’ is a major contributing factor to the health status gap between Indigenous and non-Indigenous people. The better socio-economic and behavioural status enjoyed by Indigenous people who experienced removal from their natural families does not improve their health status compared to those who did not experience any removal. Policies to address the trauma and grief associated with past policies of removal are needed if the gap in health status between Indigenous and non-Indigenous Australians is to be closed.

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Acronyms

ABS	Australian Bureau of Statistics
ACCHS	Aboriginal Community Controlled Health Services
ACT	Australian Capital Territory
AIHW	Australian Institute of Health and Welfare
AMA	Australian Medical Association
AMI	Acute Myocardial Infarction
ASGC	Australian Standard Geographic Classification
BMI	Body Mass Index
CAI	Computer Assisted Interviewing
CD	Census Collection District
CDEP	Community Development Employment Projects
CHD	Coronary Heart Disease
CHINS	Community Housing and Infrastructure Needs Survey
CRP	C - reactive protein
CURF	Confidentialised Unit Record File
CVD	Cardiovascular Disease
ED	Emergency Department
GP	General Practitioner
GSS	General Social Survey
ICF	Indigenous Community Frame
NATSIS	National Aboriginal and Torres Strait Islander Survey
NATSIHS	National Aboriginal and Torres Strait Islander Health Survey
NATSISS	National Aboriginal and Torres Strait Islander Social Survey
NHPA	National Health Priority Area
NHS	National Health Survey
NHS (G)	National Health Survey (General)
NHS (I)	National Health Survey (Indigenous)
NSW	New South Wales
NT	Northern Territory
OECD	Organization of Economic Cooperation and Development
PAPI	Pen and Paper Interviewing

PBS	Pharmaceutical Benefit Scheme
RADL	Remote Access Data Laboratory
RHD	Rheumatic Heart Disease
SA	South Australia
SCRCSSP	Steering Committee for the Review of Commonwealth/State Service Provision
SCRGSP	Steering Committee for the Review of Government Service Provision
SLA	Statistical Local Areas
WA	Western Australia
WAACHS	Western Australian Aboriginal Child Health Survey

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Chapter 1

Introduction

The health of the Australian population has improved markedly over the last century. Today, Australians have relatively high levels of health, as measured by indices such as life expectancy (good), mortality at all ages (low) and incidence of serious morbidity among non–aged members of the population (low) (AIHW 2006). Despite this, major inequalities exist within the country, one of the largest and most persistent being the health disadvantage of Indigenous peoples. Indigenous Australians have much poorer health than other Australians, with a significant burden of morbidity as a consequence of chronic diseases (such as diabetes, circulatory system disease, and end-stage renal disease), infectious diseases (such as pneumococcal disease, hepatitis B, or sexually transmissible infections) and mental health (ABS and AIHW 2003).

The average life expectancy for Indigenous Australians is 10–12 years less than that of other Australians and infant mortality rates are nearly two times the national average (ABS 2010). Indigenous people experience multiple health risks compared to non-Indigenous people and the coexistence and interactive effects of these factors could contribute to their excessive ill health. The leading causes of death for Indigenous and non–Indigenous Australians are similar; however, deaths occur at much higher rates and at younger ages for Indigenous Australians for nearly all causes. Indigenous Australians also have worse health than comparable Indigenous populations in New Zealand and Canada (AMA 2002).

1.1 Objectives and structure of the study

The health inequalities between Indigenous and non-Indigenous Australians are well documented. But there has been very little progress in closing the gap over the past decades. Behavioural, socio-economic, environmental, cultural, historical factors or the provision and utilization of healthcare services or a combination of all these can affect the health of the population. How much of the health difference between the Indigenous and non-Indigenous population in Australia is contributed by these factors remains unclear. Booth and Carroll (2005a), using data from the 2001 National Health Survey (NHS), found that between one-third and one-half of the self-assessed health status gap between the two populations can be explained by differences in socio-economic status thus emphasizing that there are other factors at work. According to Sibthorpe, Anderson and Cunningham (2001) there could be differences in self-perception of health and more objective measures of health. But Booth and Carroll (2005a) found that their result is robust when objective health measures are taken as dependent variables.

This thesis investigates health inequality between Indigenous and non-Indigenous people in Australia. It uses more recent data and a more extensive set of dependent and independent variables (including being a 'Stolen Generation member') than used by Booth and Carroll (2005a). The study focuses on the gap in both subjective (self-assessed health) and objective (heart disease, diabetes, asthma, arthritis and injury) health outcomes between the two populations, and examines the relative contributions of four factors to the low health status of Indigenous Australians. They are:

- Demographic factors
- Behavioural factors
- Socio-economic factors
- Cultural factors

The Indigenous population in Australia is not a homogenous group. There are many hundreds of language groups and a wide diversity of cultural, social, economic and geographical settings within and between Indigenous Australian communities. Given the heterogeneity of the Indigenous people, an understanding of the health status of different groups of Indigenous people is important. Therefore this thesis discusses separately the health status of selected groups of Indigenous people relative to the non-Indigenous people. The thesis also examines the relative contributions of demographic, behavioural, socio-economic and cultural factors to the health status of these different groups of Indigenous people. The different groups of Indigenous people analysed in the thesis include

- Those who live in remote areas and those who live in non-remote areas
- Those who speak English and those who speak an Indigenous language as their main language at home
- Members and relatives of the Stolen Generation, created as part of Australian governments' past assimilation policies, and those who did not experience any removal.

The examination of Indigenous status by 'whether a member or relative of the Stolen Generation' is an extension on the work of Booth and Carroll (2005a) who have touched upon the first two groups of Indigenous people.

The high prevalence and incidence of chronic and infectious diseases makes access to, and utilisation of, health services an essential determinant of good health among Indigenous people. The study by Booth and Carroll (2005a) also suggests that there are disparities in access to health services among the Indigenous and non-Indigenous population. But it did not analyse how much of the difference in health status between the two populations is explained by access to health services. Understanding the barriers to accessing and utilising health care services is important in closing the health gap for Indigenous Australians. Therefore, this thesis examines the utilisation pattern of health care services among Indigenous people and compares the situation with that of non-Indigenous Australians.

As with health status, the pattern of health service utilisation could be different for different groups of Indigenous people. Therefore the pattern of health service utilisation between non-Indigenous Australians and the different groups of Indigenous people detailed above are compared. Comparisons are also made between Indigenous people with and without private health insurance.

Thus the main objective of this thesis is to explore the degree to which differences in health and healthcare utilisation are due to demographic, socio-economic, behavioural and cultural factors and to provide an evidence base for the formulation of policy in closing the health gap between the Indigenous and non-Indigenous populations. In an exploratory study using 1994 National Aboriginal and Torres Strait Islander Survey (NATSIS), Cunningham, Sibthorpe and Anderson (1997) found that 'having been taken away as a child' is significantly associated with reported poor self-assessed health among the Indigenous population. Being a 'Stolen Generation member' (a broader variable than that used by Cunningham, Sibthorpe and Anderson (1997) which includes the individual and their relatives) is a unique feature of the Australian Indigenous people and the examination of its impact on health status and utilization of health services is a major innovation of this thesis.

This thesis is structured into eight chapters including this introductory chapter.

Chapter 2 begins by providing background information on Indigenous Australians and an overview of their health status. Next, the chapter discusses different measures of health status and their relevance to the Indigenous people. It then discusses the health system in Australia and its utilisation by the Indigenous people. The chapter concludes by describing the factors that could possibly contribute to the poor health status of Indigenous Australians based on the literature review.

Chapter 3 describes the datasets and the samples used to generate the empirical results in the remainder of this thesis. The chapter also sets out the strengths and weakness of the datasets for analysing the health status of Indigenous Australians.

Chapters 4, 5, 6 and 7 present the empirical findings of this study. Chapter 4 develops an econometric model and investigates the factors affecting self-assessed health among Indigenous and non-Indigenous people. It examines whether a gap exists in self-assessed health between Indigenous and non-Indigenous Australians. The chapter then explores the contribution of demographic, behavioural, socio-economic and cultural factors to the gap between the two populations. The chapter also examines specifically the health status of Indigenous people: (a) living in remote and non-remote areas; (b) who spoke English at home and who spoke an Indigenous language at home; and (c) who were themselves or had relatives removed from their natural families and those who experienced no removal relative to the non-Indigenous people. It also assesses the robustness of self-assessed health as a measure of health status for Indigenous Australians. Finally, Chapter 4 provides a decomposition analysis of the differences in self-assessed health between Indigenous and non-Indigenous people to illustrate the extent to which observable demographic, behavioural, socio-economic and cultural factors can account for those differences.

Chapter 5 uses the econometric model developed in Chapter 4 to examine the factors contributing to heart problems, diabetes, asthma, arthritis and injury. The chapter investigates whether gaps exist in the incidence of chronic diseases and injury between Indigenous and non-Indigenous people. Further it explores the contribution of demographic, behavioural, socio-economic and cultural factors to differences in health status between the two populations on these measures. As done in Chapter 4 this chapter also examines specifically the objective health status of the three different groups of Indigenous people relative to non-Indigenous people.

Chapter 6 discusses healthcare service utilisation among Indigenous Australians. The chapter first develops an econometric model and investigates the factors affecting healthcare service utilisation. Using binary logit models, the chapter tests for the existence of any gap in the utilisation of healthcare services between Indigenous and non-Indigenous people. It then explores the contribution of

demographic, behavioural, socio-economic and cultural factors to the gap in the utilisation of healthcare services. Given the heterogeneity of Indigenous people, the chapter examines the pattern of utilisation of healthcare services of the different groups of Indigenous people, including those with and those without private health insurance, relative to non-Indigenous people. Finally, the chapter looks at the factors associated with perceived unmet healthcare needs among the Indigenous Australians.

The results from Chapters 4, 5 and 6 show that being related to Stolen Generation members has a significant association with poor health status and lower utilisation of healthcare when in need. Given this, understanding the impact of the experience of removal (of oneself or of relatives) from the natural families on Indigenous health becomes imperative. Chapter 7 discusses the demographic, behavioural, socio-economic, cultural and health characteristics of those who experienced removal from their natural families and others. The chapter analyses the factors associated with the health status and healthcare service utilisation of those two groups of Indigenous people. It then explores the gap in the health status and utilisation of healthcare services between the two groups and the contribution of demographic, behavioural, socio-economic and cultural factors to the gap. Finally, the chapter provides a decomposition analysis of the differences in self-assessed health of each group of Indigenous people with non-Indigenous people to illustrate the extent to which observable demographic, behavioural, socio-economic and cultural factors can account for those differences.

Chapter 8 is the concluding chapter of this thesis. The chapter reviews the findings from Chapters 4, 5, 6 and 7. It discusses the contribution this thesis makes to the understanding of health disparities between the Indigenous and non-Indigenous populations and sets out the strengths and weaknesses of this study. The chapter then outlines the policy recommendations for closing the health status gap between the Indigenous and non-Indigenous population.

The thesis shows that the removal of relatives from their natural family is a major contributing factor to the health status gap between Indigenous and non-Indigenous people. Indigenous people who experienced removal (of oneself or relatives) from their natural family have poor health status compared to Indigenous people who did not experience any removal and this cannot be explained by differences in observable characteristics. The better socio-economic and behavioural status enjoyed by Indigenous people who experienced removal from their natural families compared to those with no removal experience does not help them in overcoming their health disadvantage.

Chapter 2

Indigenous health in Australia: the context

This chapter provides an overview of the geographic distribution of Indigenous people in Australia, their health status, the healthcare system in Australia and Indigenous healthcare utilisation. The chapter also links the geographic distribution and other characteristics of the Indigenous population to their health status. It then examines different measures of health status used in quantitative analysis and its relevance to Indigenous Australians. Finally the chapter discusses health models relevant for Indigenous Australians. This chapter thus provides a contextual and theoretical background to the rest of the thesis.

2.1 Indigenous Australians and their health status

Two main groups of Indigenous Australians—Indigenous people from the Australian continent and the Island State of Tasmania, and Torres Strait Islanders—constitute about 2.5% of the total population (ABS 2006). The geographical distribution of the Indigenous people is distinct. In 2006, 31% of the Indigenous people lived in major Australian cities (where they constitute 1% of the population), 22% lived in inner regional Australia; 23% in outer regional Australia; 8% in remote Australia and 16% in very remote Australia (constituting 45% of the population in very remote areas). The proportion of Indigenous people living in different geographical areas varies across States (ABS 2006).

Table 2.1 shows the demographic distribution of the Indigenous and non-Indigenous populations.

Table 2.1 Demographic measures by Indigenous status

Demographic Variables	Indigenous (%)	Non-Indigenous (%)
Sex		
Male	47	49
Female	53	51
Age (in years)		
18–24	22	13
25–34	27	19
35–44	23	20
45–54	15	18
55–64	8	14
65 & above	5	16
Area of residence		
Living in non-remote areas	72	99
Living in remote areas	28	1
Marital status		
Married	33	59
Household structure		
Couple with children	29	39
Couple only	11	28
Single person and children	14	7
Single person	10	13
All other households	35	12

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Estimates in the table are calculated using ABS provided population weights.
2. t-tests assessing the significance of the difference between the means for the Indigenous and non-Indigenous populations are significant for all the variables except for couple with children

According to Table 2.1 the Indigenous population is younger than the non-Indigenous population and a relatively higher proportion of Indigenous persons live in remote areas.

Geography is a major determinant of health status. It is a general perception that Indigenous people living in remote and very remote areas have worse health compared to the large majority of Indigenous people living in cities and urban areas. Hence a large number of studies have concentrated on remote and very remote Indigenous people despite the fact that the majority of Indigenous people live in non-remote areas. Better physical access to basic healthcare services, availability of fresh food at cheaper prices, better education and employment opportunities among

the urban Indigenous people could be the reasons behind this perception. Evidence suggests that even though the burden of many chronic diseases is lower among urban Indigenous people when compared with those in remote areas, the health of urban Indigenous people is still poor relative to non-Indigenous people. The lack of concentration on the non-remote areas could be a large contributor to the health gap between the two populations (Cass et al. 2001; Maple-Brown et al. 2011).

Among Indigenous Australians, all-cause mortality rates, morbidities due to chronic diseases, health risk factors and hospitalization are lower in very remote areas/homelands when compared to remote/centralized/outer regional areas (McDermott et al. 1998; Andreasyan and Hoy 2010). The reasons for this health gradient could be complex. It is possible that people in very remote areas move to other areas for better access to healthcare services for themselves or their family members and when they die they are recorded under the place of death. Another possibility is that Indigenous people experience better health in very remote areas compared to remote areas due to factors such as better social environment, better family support, increased physical activity, healthier diet and lower rates of substance and alcohol abuse (O'Dea 1984; Naughton, O'Dea and Sinclair 1986; O'Dea, White and Sinclair 1988; McDermott et al. 1998; Burgess et al. 2005). Looking at the perinatal outcomes, Indigenous mothers living in remote areas (very remote/remote areas are not separated) were less likely to have a healthy baby when compared to mothers living in regional areas or cities (Graham et al. 2007).

Indigenous Australians are disadvantaged relative to other Australians over a range of measures. The Indigenous population in Australia experiences higher rates of unemployment, lower levels of income, poorer educational status, poorer living conditions, poorer health status and higher rates of arrests and imprisonment compared to other Australian population groups (ABS and AIHW 2003; SCRGSP 2003).

Table 2.2 reports the means for the socio-economic variables for the Indigenous and non-Indigenous populations. According to Table 2.2 the proportion of Indigenous people with education below Year 10 is higher, and with post school qualifications lower. Unemployment and non-participation in the labour force is higher among Indigenous people compared to non-Indigenous people. The gross weekly equalized household income among Indigenous people is low and their dependence on welfare is high. Indigenous people are also more likely to live in overcrowded and rental accommodation.

It is now well established that Indigenous Australians experience socio-economic disadvantage on all major indicators compared to non-Indigenous Australians. According to Booth and Carroll (2005a) one-third to one-half of the self-assessed health gap between Indigenous and non-Indigenous Australians can be explained by differences in socio-economic factors such as income, education and employment. Self-assessed health, chronic disease conditions and health risk factors were poorer among Indigenous Australians with lower levels of education (Biddle 2006). A number of studies have reported on the relationship between socio-economic gradients and health status within the Indigenous population. Among Indigenous people lower socio-economic status was associated with increased prevalence of clinically diagnosed and self-reported diabetes, self-reported cardiovascular disease and end stage renal disease (Cass et al. 2001; Cass et al. 2002; Cunningham et al. 2008; Cunningham, 2010a, 2010b). Unlike with other chronic diseases, there exists either no association or less consistent associations between socio-economic status and self-reported asthma and arthritis among Indigenous Australians (Cunningham 2010c, 2011). According to data from the 1995 NHS a significant positive relationship exists between non-Indigenous income and self-assessed health, but no significant difference in self-assessed health exists between low and high-income Indigenous families. This lack of relationship remained even after adjusting for age differences between the low- and high-income Indigenous families (Gray, Hunter and Taylor 2003).

Table 2.2 Socio-economic measures by Indigenous status

Socio-economic variables	Indigenous (%)	Non-Indigenous (%)
Employment Status		
Full-time employment	31	46
Part-time employment	21	19
Unemployed	8	3
Not in labour force	40	33
Education		
Education below Year 10	29	14
Year 10 education	35	23
Year 12 education	15	18
Vocational education	10	14
Diploma	7	12
Degree	5	18
Weekly Income (deciles)		
Less than $150	23	9
$150–$199	18	11
$200–$249	16	9
$250–$353	10	9
$354–$499	9	9
$500–$632	8	9
$633–$766	6	10
$767–$958	4	11
$959–$1291	4	11
$1292 or more	2	12
Welfare –main income	47	26
Household Crowding	25	4
Tenure Type		
Owner occupied household	25	Not available
Renters	73	47
Others	2	Not available

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Estimates in the table are calculated using ABS provided population weights.
2. t-tests assessing the significance of the difference between the means for the Indigenous and non-Indigenous populations are significant for all the variables
3. Overcrowding is defined by the number of extra bedrooms required in a dwelling, based on the number, age, sex and interrelationships of household members (NATSIHS 2004-05)

Booth and Carroll (2005b), using 2001 NHS, found that overcrowding of adults is associated with worse health and explains approximately 30% of the health gap between the Indigenous people living in remote areas and the non-Indigenous population.

Table 2.3 reports statistics relating to behavioural patterns of Indigenous and non-Indigenous Australians.

Table 2.3 Behavioural factors by Indigenous status

Behavioural Variables	Indigenous (%)	Non-Indigenous (%)
Alcohol Consumption		
Low risk alcohol consumption (in a week)	32	50
Medium risk alcohol consumption (in a week)	8	8
High risk alcohol consumption (in a week)	8	6
Last consumed alcohol—one week to less than 12 months (ex-drinkers)	27	21
Last consumed alcohol—12 months or more (ex-drinkers)	14	7
Never consumed alcohol	10	9
Smoker Status		
Smoker	52	23
Ex-smoker	20	30
Never smoked	28	47
Physical Activity		
Exercise	30	41
Dietary habits		
Consumption of full-cream milk	77	43
Consumption of non full-cream milk	19	51
Consumption of vegetables	94	99
Consumption of fruits	85	93

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Estimates in the table are calculated using ABS provided population weights.
2. t-tests assessing the significance of the difference between the means for the Indigenous and non-Indigenous populations are significant for all the variables

Table 2.3 shows that smoking and high risk level of alcohol consumption is high among Indigenous people and their engagement in physical activity is low compared to the non-Indigenous population.

In Australia, based on an Indigenous cohort, Burke et al. (2007) showed that a moderate level of alcohol intake is associated with lower coronary heart disease (CHD). Burke et al. (2007) also showed that ex-drinkers faced higher risk of CHD and cardiovascular disease (CVD). Diabetes is a risk factor for CHD. Obesity, lack of physical exercise and poor diet are risk factors of diabetes and are also risk factors for CVD. A cohort study on Indigenous Australians found that waist circumference,

body mass index (BMI) and hip circumference are associated with CVD, independent of traditional risk factors (Wang and Hoy 2004).

The literature reviewed above shows that links exist between demographic, socio-economic and behavioural factors and the health status of Indigenous Australians. These health determining factors are not unique to the Indigenous population. However, there are factors unique to Indigenous Australians, and their links to health status is discussed in the following paragraph.

Indigenous people are culturally different from non-Indigenous people and, as discussed in Chapter 1, they are not a homogenous group. However, very few studies have analysed the effect of cultural factors on health status. Despite the passing comments in the literature that Indigenous culture is a determinant of ill health, supporting and strengthening cultural identity has been identified as an important factor in improving Indigenous health (Bond 2005). Dockery (2009) using the 2002 NATSISS found that Indigenous Australians with strong attachment to their culture have significantly better self-assessed health. None of the studies have analysed the impact of the Stolen Generation for the health status of Indigenous Australians. According to 2004–05 NATSIHS, 44% (Table 2.4) of the Indigenous population directly or indirectly experienced removal from their natural families and a lack of knowledge on its contribution to their health disadvantage is a major shortcoming of the studies of inequality between the Indigenous and non-Indigenous populations.

Table 2.4 shows the distribution of cultural/Indigenous specific variables.

Table 2.4 Cultural factors by Indigenous status

Variable	Indigenous (%)	Non-Indigenous (%)
Cultural identity		
Main language at home		
English	86	90
Indigenous languages	14	0
Other language	1	10
Identifies with tribal/language group or clan*	48	NA
Recognizes area as homeland and traditional country*	61	NA
Removal from natural family		
Respondent removed from natural family	7	NA
Relatives removed from natural family	43	NA
Household composition		
Multifamily households	17	4

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Estimates in the table are calculated using ABS provided population weights.
2. *Data available for non-remote Indigenous only
3. t-tests assessing the significance of the difference between the means for the Indigenous and non-Indigenous populations are significant for all the variables

2.2 Measuring health status

Different methods are used to measure the health status of individuals and populations quantitatively. These can be either subjective or objective. Self-assessed health is a commonly used measure of subjective health status. While it may not always be equivalent to health status as measured by a medical professional, it does reveal something about a person's perception of his or her own health at a given point in time. Subjective health assessment has become a critically important component of contemporary empirical health research (Albrecht 1994; Schofield 1996; Ettner 1996; Saunders 1996; Kennedy et al. 1998; Deaton and Paxson 1998; Smith 1999), which some argue is as reliable as, or even more reliable than, biomedical measures (Epstein 1990).

Self-assessed health status may provide insights into how people perceive their own health. Research has shown that self-assessed health predicts mortality and morbidity (McCallum, Shadbolt, and Wang 1994; Idler and Kasl 1995; Idler and Benyamini 1997; Gerdtham et al. 1999), subsequent chronic disease (Shadbolt 1997), functional decline (Idler and Kasl 1995; Ferraro, Farmer, and Wybraniec

1997), recovery from major medical events (Wilcox, Kasl, and Idler 1996), life satisfaction (Larson 1978) and health service use (Hansen et al. 2002). According to Sibthorpe, Anderson, and Cunningham (2001) there are two general approaches to subjective health assessment. The first involves the use of multiple items, covering a number of dimensions of health which is designed to sum to a single index. In the second approach, a single global question, 'How is your health in general? ' is used.

Although Indigenous Australians have poor health status relative to their non-Indigenous counterparts, little is known about how they perceive their own health. In the ABS surveys, the respondents were asked to rate their health given five response categories: 'poor', 'fair', 'good', 'very good' and 'excellent'. Indigenous Australians are believed to have a different concept of health than other groups, and hence the question arises whether a single global question is appropriate to measure the self-assessed health status of Indigenous people. Sibthorpe, Anderson, and Cunningham (2001), using the 1994 National Aboriginal and Torres Strait Islander Survey (NATSIS) and 1995 National Health Survey (NHS), concluded that a global self-assessed health question may be a valid measure for Indigenous Australians whose main language is English.

The self-assessed health indicator has been found to have good test–retest reliability (Lundberg and Manderbacka 1996; Martikainen, Lahelma, and Aromaa 1996). But analyzing a unique Australian survey (1995 NHS), Crossley and Kennedy (2002) found that a total of 28% of respondents change their reported health status in the same survey. Of these, only 3% changed their response by more than one category. A higher proportion of older than younger persons changed their self-assessed health. According to Crossley and Kennedy (2002), response reliability is related to age, income and occupation.

Some further limitations to using self-assessed health as a measure of health status among the Indigenous population need to be acknowledged. Wiseman (1999) opines that "while variations in self-assessed measures of health may act as good proxies of

mortality and morbidity in homogeneous populations, in some groups, such as the Indigenous communities of Australia, these subjective measures may provide a misleading picture".

To obtain the true health perceptions of Indigenous people, it is important to use socially acceptable and culturally appropriate survey techniques. Cultural and social factors can influence people to wrongly estimate their health status. According to Eades (1982), "In Indigenous society the passing of information doesn't result from a direct query. It is the result of normal two-way interaction between people". Therefore, establishing a personal relationship with the interviewee is important in collecting information on health issues from Indigenous people (Mobbs 1991). Indigenous people often specify time periods with reference to historical events. Thus they may find it difficult to answer survey questions on their subjective health status over conventional time frames, say four weeks ago or one year ago (Semmons 1983).

Research from developing countries has shown lower self-reports of morbid conditions than what should be expected given mortality levels. These studies have examined self-reported morbidity and not self-reported health. According to Sen (2002), there is a strong need to scrutinize the statistics on self-perception of illness in a social context by taking note of levels of education, availability of health facilities and public information on illness and remedy. Sen's observation on self-reported morbidity suggests some caution needs to be exercised in using self-assessed health as a proxy for morbidity and mortality among the Indigenous population.

Cardiovascular disease (CVD), diabetes, asthma, arthritis and injury are examples of objective health measures and are used in this thesis together with self-assessed health to examine the gap in health status between Indigenous and non-Indigenous Australians. Cardiovascular disease, diabetes and injury have been identified as major health problems facing Indigenous Australians.

2.3 The healthcare system in Australia

Australia experiences higher life expectancy and lower rates of infant mortality compared with other similar countries. The healthcare system in Australia has played a major role in preventing and managing infectious and chronic diseases and in attaining these better health indicators.

Healthcare services in Australia are administered through a federal system of government and are provided by the public and private sectors. The States have autonomy in administering health services and their health departments administer public hospitals and other services, such as mental health services, school dental services, family health services, health promotion and rehabilitation services. Local governments (municipal or shire councils) are responsible for some environmental health services and public health programmes but play no role in clinical services. The private sector includes doctors (e.g., general practitioners and specialists), private hospitals and day hospitals, diagnostic services and private health insurance funds (Healy, Sharman, and Lokuge 2006).

In Australia, the tax-funded health insurance scheme, Medicare, provides the citizens and other eligible populations rebates for primary and specialist medical services. Medicare provides universal access to affordable medical care. It provides subsidized access to the doctor of choice for out-of-hospital care, subsidised prescription drugs and free public hospital care (inpatient or outpatient). Individuals eligible for Medicare may also choose treatment as private patients in public or private hospitals, with some assistance from Medicare. Treatment as a private patient in a public or private hospital allows choice of doctor. For private patients in private hospitals, Medicare meets 75% of the schedule fee for medical services provided in hospital. The hospital accommodation costs are not reimbursable by Medicare when treated as a private patient (Healy, Sharman, and Lokuge 2006).

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The Medicare Benefits Schedule sets out the fees and charges under Medicare. Generally there is no limit upon the amount of medical services that an individual may use under Medicare but there are a few exceptions (e.g., in vitro fertilization). Healthcare benefits under Medicare are not rationed, however, public hospital services are prioritized through waiting lists (Healy, Sharman, and Lokuge 2006). There are no Medicare subsidies for cosmetic surgery, private dental services, ambulance services, home nursing, physiotherapy, long-term care, occupational therapy, speech therapy, chiropractic and podiatry services, treatment by psychologists, visual and hearing aids and prostheses and complementary medicine (Health Insurance Corporation 2004). A safety net to protect patients from high out-of-pocket medical costs has been introduced for non-inpatient services, including general practitioner (GP) visits, specialist consultations, tests and X-rays. Once an annual safety net threshold is met, Medicare covers 80% of all out-of-pocket costs over and above the rebate for the rest of the year.

The GPs provide primary care and are gatekeepers for referral to non-emergency care. They are mostly self-employed and charge their patients on a fee-for-service basis. GPs can either bill the patient (who then applies to Medicare for reimbursement) or "bulk-bill" Medicare (the fee as per Medicare schedule). Medicare usually pays a rebate that is equal to 100% of the schedule fee for general practitioner services. Medicare reimburses 85% of the schedule fees for specialist consultations (Healy, Sharman, and Lokuge 2006).

The Pharmaceutical Benefit Scheme (PBS) subsidizes the purchase of pharmaceuticals and it covers most drug purchases and all "essential" drugs. It also includes a patient/family safety net to limit annual expenses on pharmaceuticals covered under the PBS (Healy, Sharman, and Lokuge 2006).

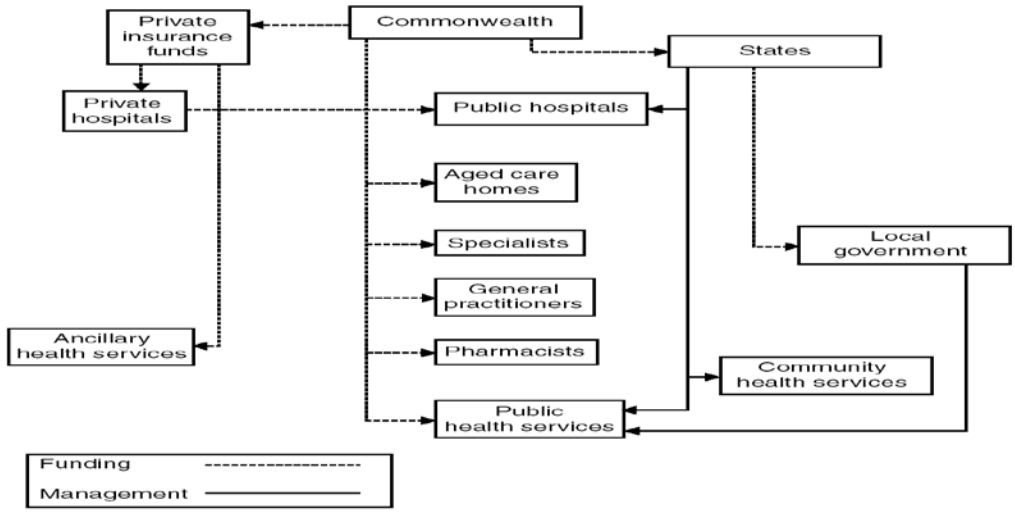
Private, or voluntary, health insurance in Australia provides greater consumer choice and quicker access to hospital care. Members of private health insurance funds can insure against the costs of treatment and accommodation as private patients in

hospitals, for the gap between the Medicare benefit and fees charged for inpatients, and for ancillary services (Healy, Sharman, and Lokuge 2006).

The Indigenous population can avail treatment from mainstream health services, Indigenous-specific health services (Aboriginal Community Controlled Health Services or ACCHS), GPs or the Royal Flying Doctor service. The ACCHSs were established to provide accessible and appropriate health services to the Indigenous people (Deeble et al. 1998). By 2003–04, 124 ACCHS were operating throughout Australia, with more than 40% located in remote regions (SCRCSSP 2004). The actual roles performed by these services vary considerably. While some have the capacity to employ a wide range of appropriate health professionals, others are largely restricted to general practitioner-type services, and some mainly function as referral services.

Despite the existence of universal health coverage, Indigenous Australians have poor health indicators and health status compared to other Australians. This suggests that Indigenous Australians have barriers in accessing healthcare services which are not experienced by other Australians. Health care utilisation pattern and the barriers faced by Indigenous Australians in accessing the health care are discussed below.

Figure 1: Organizational chart of the health system



Source: Healy, Sharman, and Lokuge 2006

2.4 Indigenous healthcare utilisation in Australia

In Australia, Indigenous people attended hospital emergency departments (EDs) at about twice the rate as non-Indigenous people (Thomas, Anderson, and Kelaher 2008; Costa et al. 2008). The rates of emergency department presentations varied across Indigenous people living in different geographic locations. Relative to non-Indigenous people, the emergency department presentation rates were higher among Indigenous people living in rural areas (Costa et al. 2008). The higher utilisation of emergency department services raises questions on the availability, accessibility and appropriateness of GP and other primary healthcare services among Indigenous Australians. According to Thomas, Anderson, and Kelaher (2008), "the Indigenous patients in the NT and WA do not appear to use ED's for 'primary care' problems more than non-Indigenous patients".

Indigenous people have higher hospitalisation rates than non-Indigenous people for almost any disease or condition (Williams, Gracey, and Smith 1997; Vicary and Westerman 2004; Subramaniam et al. 2005; Jamieson, Harrison, and Berry 2008). The hospitalisation of Indigenous Australians was higher for ambulatory-sensitive conditions (Stamp, Duckett, and Fisher 1998; Ishak 2001; AIHW 2008). This suggests the existence of barriers in accessing primary healthcare services among Indigenous people. The Indigenous people's participation in disease screening (which helps in the early detection of diseases), rehabilitation services and immunization is low compared to non-Indigenous people (Coory et al. 2002**;** Shepherd, Battye, and Chalmers 2003; Menzies, McIntyre, and Beard 2004). Lack of health literacy could be a reason behind the non-utilisation of preventive healthcare services. Evidence also suggests that Indigenous people have low levels of access to, and use of, health services such as Medicare, the PBS and private GPs (Keys Young 1997; Bell et al. 2000). In 2004–05, Aboriginal people and Torres Strait Islanders reported visiting a GP or specialist (either in a private practice or an Aboriginal and Torres Strait Islander primary health care service) at a similar rate to other Australians (AHMAC 2008).

The higher rates of ED presentations and hospitalisation among Indigenous people did not always relate to quality utilisation/availability of healthcare services. Evidence suggests that Indigenous patients often walked out before being seen or before their treatment was completed (Thomas, Anderson, and Kelaher 2008). Indigenous patients admitted to hospitals were 19 times as likely as admitted non-Indigenous patients to be discharged from the wards against medical advice (AHMAC 2006). Absence of cultural security, language barriers, loneliness and isolation faced when being admitted in a hospital and dislike of the way the hospital staff treat the Indigenous patients are some of the reasons behind self-discharge (Franks and Beckmann 2002; Henry et al. 2007).

Evidence also suggests that Indigenous Australians are less likely to receive optimal diagnostic and therapeutic procedures for health problems when compared to non-

Indigenous Australians (Cunningham 2002; Cass et al. 2003; Ishak 2003; Coory et al. 2008). These disparities are not explained by differences in age, sex, co-morbidities or the cause of the disease. The poor follow-up after treatment and the lack of compliance with medication can lead to the recurrence of the disease among Indigenous Australians (Kejriwal et al. 2004). The patients' poor understanding of their disease is often linked to the non-compliance and reduced active involvement in their management (Devitt and McMasters 1998).

Indigenous people are more likely than non-Indigenous people to live in remote or very remote areas where access to healthcare services is poor. Therefore locational barriers are cited as a common problem for Indigenous people living in rural and remote areas. Surveys of over a 1,000 discrete Indigenous communities found that 69% were more than 100 km from the nearest hospital (Thomas and Anderson 2006). Indigenous people living in remote areas often have to travel long distances, leaving their families, to metropolitan areas to access specialist medical services. For Indigenous people in urban areas acceptability and appropriateness of healthcare services act as major barriers when compared to availability (Scrimgeour and Scrimgeour 2008).

The utilisation of health care services by Indigenous and other Australians may be related to differences in healthcare status, differing levels of service provision and/or other barriers to accessing services. The lack of culturally appropriate services, lack of effective communication (due to cultural and language differences and power dynamics) between the healthcare staff and Indigenous patients, shame felt in having health problems, unavailability of Indigenous or same sex staff, lack of transport, lack of finances, difficulties in arranging accommodation in urban areas, fear of discrimination and dislocation from the family, difficulty in understanding biomedical jargon, beliefs that diseases are caused by curses or black magic or is a payback for past offences are some of the barriers faced by Indigenous people in accessing healthcare services (Lowell 1998; Bell et al. 2000; Craig 2002; Gruen, Weeramanthri, and Bailie 2002; Thomas and Anderson 2006; Mc Grath et al. 2006;

Anderson et al. 2008). Self-reported data from NATSIHS 2004–05 showed that among the Indigenous people who sought healthcare in the previous 12 months, 4% experienced worse treatment when compared to non-Indigenous people. Barriers to healthcare can therefore be classified as problems of availability, affordability, acceptability and appropriateness (Scrimgeour and Scrimgeour 2008).

Indigenous people are generally reluctant to use mainstream health services (Sutherland 1993; Gray et al. 1995; Coory 1999; Carriage, Harris, and Kristensen 2000; Silburn et al. 2006). However, evidence shows that Indigenous people living in remote areas were happy to access community healthcare services (Silburn et al. 2006). The power imbalances in the interaction between doctor and patients, functioning of the healthcare services based on a value structure which is non-Indigenous, existence of institutional racism and lack of trust in the government run healthcare services often act as barriers in accessing mainstream healthcare services by Indigenous Australians (Ivanitz 2000; Henry, Houston, and Mooney 2004; Houston 2004).

In 2003–04, about 94% of hospitalisations involving Indigenous people were in public hospitals, compared to 60% for other Australians (ABS and AIHW 2005). Lack of private health insurance is a barrier to accessing private hospitals and the services of those health professionals who work solely or primarily within the private health system.

In summary, geographical distance, out-of-pocket expenses, lack of effective communication with service providers, cultural barriers, lack of proper knowledge about their diseases and availability of treatment options, power dynamics, racial discrimination or cultural insecurity faced by Indigenous patients in Australian mainstream healthcare services undermine the utilisation of healthcare services by Indigenous Australians and affect effective health service delivery by the healthcare providers. These barriers contribute to the poor health status of Indigenous Australians.

2.5 Discussion and conclusion

The determinants of Indigenous health are complex and multifaceted. It is well established that the large gap which exists today between Indigenous and non-Indigenous health cannot be narrowed by medicines and medical care alone. There is widespread recognition from international literature that social factors can affect health outcomes (RWGIH 1980; Wilkinson and Marmot 1998). But disputes exist about the relative importance of different factors and the relationship between them. Several national and international models and theories exists which try to explain disparities in health status among people. But the relevance of these models to the context of Indigenous health is yet to be rigorously assessed.

The literature review in the beginning of this chapter showed that socio-economic variables could not explain fully the health status gap between Indigenous and non-Indigenous Australians and a large gap remains unexplained. The review has found instances where social environment, family support and attachment to culture are associated with better health outcomes among Indigenous people. Lack of cultural security, language barriers and the loneliness and difficulty faced when being away from the family makes acceptability and appropriateness rather than availability the major reason behind the poor utilisation of healthcare services among Indigenous Australians.

Exploratory research among an Indigenous (Koori) community in Australia found that health and its determinants are complex. Participants of this study suggested that poor Indigenous health was due to behaviours, racism, history, land rights, dispossession, lack of an apology or a treaty, loss and grief, lack of self-esteem, shame, lack of role models and identity and a range of other factors, none separable from the other. All these issues were faced by the Indigenous families on a daily basis. The study also stressed the importance of trans-generational impacts of issues such as dispossession, the Stolen Generation and ongoing racism and social exclusion on Indigenous people. Thus, to understand Indigenous health

disadvantage, it is important to acknowledge the impact of colonialism and dispossession and the lost and Stolen Generations of families and the Indigenous culture which is distinct from the Western culture (Tynan et al. 2007).

European settlement in Australia suppressed the cultural practices of Indigenous people by forcefully introducing Western culture. Despite its importance, cultural factors have received only passing comments in the literature on Indigenous health. The importance of cultural factors and culture in interpreting the health of Indigenous Australians has been accepted for a long time but no systematic investigation of the social processes involved has been done so far (Morrissey et al. 2007). Culture has remained a constant in terms of Indigenous health. In the public health models culture is often viewed as a barrier to health and its role as a determinant of better health remains unexplored.

In the 20th century the Government's White Australia Policy tried to assimilate Indigenous people with Western Culture by forcefully removing Indigenous children from their family of origin and placing them under the care of Europeans. This policy could have had devastating effects on the Indigenous social structure and culture and its transmission. The Stolen generation, as they are referred to, is a unique feature of Australian Indigenous people which is likely to have trans-generational effects but its impact on the health status of the people has not been systematically studied.

Grossman (1972) in his health production model conceived health capital as the output of a multivariate production process. The model assumes that individuals inherit an initial stock of health that depreciates over time. The individual can positively influence the stock of capital through gross investments. Gross investments in health capital can be made using the consumer's own time, market goods and personal characteristics such as medical care, diet, exercise, cigarette smoking, excessive alcohol consumption, recreation and housing. The level of education of

the producer also affects how efficiently he or she can produce health. According to the Grossman model, death occurs when the stock falls below a certain level.

Different aspects of the Grossman model may be useful in the study of factors contributing to Indigenous health. Among Indigenous people in Australia the initial stock of health may be less than that of non-Indigenous people. This is in contrast to Muurinen and Grand's (1985) expansion of the Grossman model which hypothesised that although all components of stocks are unequally distributed between social classes, the inequality in inherited health may be less than in other inherited stocks because of its distinctive, genetic component. Evidence shows that Indigenous babies are more than twice as likely to be born premature or underweight (less than 2.5 kg) as non-Indigenous babies (AMA 2005). Major causes of low birth weight babies include smoking, alcohol and substance abuse, sexually transmitted diseases and malnutrition in the mother. This projects the importance of social issues such as dispossession, Stolen Generation, racism, social exclusion, poor socio-economic conditions and other stressful life events that have trans-generational impacts on Indigenous people and consequently affect their initial stock of health and the rate of depreciation of their health stock. These issues again hinder the subsequent efficiency in the production of good health.

Jacobson (2000) extended the model of Grossman (1972) and depicted "family" as a producer of health. In the model each individual in the family is both the producer of his or her own health as well the health of other family members. Family plays an important role in the Indigenous world. Thus Jacobson's (2000) healthcare demand model may be particularly relevant for the Indigenous people in Australia. On addressing the importance of family, it is worth noting that the structure and composition of Indigenous families are very different compared to the non-Indigenous. Indigenous households are often multigenerational and have several families residing in them. How well families function determines the production of good health. Dysfunctional families can pose a risk to good health. Poor financial circumstances, alcohol and substance abuse problems, the historical legacies of

forced separation from family and removal from traditional country continues to adversely affect the life and family functioning of Indigenous people.

The Stolen Generation and its trans-generational effects could be a major reason behind the poor initial stock of health of Indigenous Australians and later, the faster depreciation as suggested by Grossman. Studies have shown that the assimilation policies did not enhance Indigenous people's level of education or their employment prospects (Majchrzak-Hamilton and Hamilton, 1997; Dockery 2009). The poor educational status of the Indigenous parents could adversely affect the gross investments in health status of themselves and their children. Evidence also suggests that forced removal is often associated with poor behavioural factors and poor health status among Indigenous Australians (Dockery 2009). Though assimilation was a policy introduced by the then government to improve the status of Indigenous people it has indeed had devastating effects on those people.

Thus, to understand Indigenous health disadvantage, it is important to acknowledge the impact of colonialism and dispossession and the lost and Stolen Generations of families and the differences between Indigenous and Western culture. This research will examine the relative contribution of the impact of past policies of removal on health disadvantage of Indigenous people along with other conventional factors like socio-economic status and behaviour. The main data used for this study are from the 2004-05 NATSIHS and comparisons of the results are made with data from the 2001 National Health Survey (Indigenous) (NHS [I]) and the 2002 NATSISS.

Chapter 3

The data

Chapter 2 provides an overview of the Indigenous people in Australia and their health status, the health system in Australia and the utilisation of healthcare services by Indigenous Australians. The health of Indigenous people by every health status measure is inferior to that of non-Indigenous people. According to Chapter 2, the factors underlying their poor health status are complex and could be unique to Indigenous Australians.

Though the factors associated with lower levels of health among Indigenous people have been examined by many research studies, much of the gap in health outcomes between Indigenous and non-Indigenous Australians remains unexplained. As discussed in Chapter 1 this thesis examines the relative contributions of demographic, behavioural, socio-economic and cultural factors to the low health status of Indigenous Australians. It also tries to estimate and explain the gap in health status across several dimensions which include: (a) Indigenous and non-Indigenous persons; (b) different categories of health outcomes (subjective and objective); (c) geographical area of residence; (d) main language spoken at home; and (e) experience of removal from natural families.

For robust estimation based across these dimensions the data requires the following characteristics: (a) a nationally representative sample of Indigenous Australians; (b) information on subjective and objective health; (c) information on demographic, behavioural, socio-economic and cultural factors (including details on Stolen Generation); (d) utilisation of healthcare services and (e) nationally representative samples of non-Indigenous Australians against which to compare the results.

The thesis relies on secondary use of data collected by the ABS which satisfies the characteristics described in the previous paragraph. As no one dataset meets all the

required characteristics two separate sets of data are used, one based on a survey of Indigenous Australians and one based on a general population survey. These two datasets are 2004–05 National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) and 2004–05 National Health Survey (NHS) and the results in the following chapters are based on them. Three other datasets are also used to compare the results over the years. These include 2002 National Aboriginal and Torres Strait Islander Social Survey (NATSISS), 2001 National Health Survey (Indigenous) (NHS [I]) and 2001 National Health Survey (General) (NHS [G]). The next section looks at the 2004–05 NATSIHS dataset in detail. Detailed information on the 2002 NATSISS and the 2001 National Health Survey (NHS) is given in the Appendix for Chapter 3.

3.1 2004–05 National Aboriginal and Torres Strait Islander Health Survey (NATSIHS), and 2004–05 National Health Survey

The 2004–05 NATSIHS is the third and the largest health survey of Indigenous Australians conducted by the ABS (Indigenous estimates are also available for the 1995 and 2001 health surveys). The survey was conducted during the 10 month period August 2004 to July 2005. It was the first time that the NATSIHS was run as a survey separate to the NHS.

The NATSIHS is cross-sectional and collected information on personal and household characteristics of Indigenous people resident in private dwellings across all states and territories in Australia including people living in remote areas. The survey excluded visitors to private dwellings. Indigenous persons in the scope of the survey were those identified by an adult within each sampled private dwelling as a usual resident of that dwelling.

Only Indigenous households were considered in the scope of the survey. An Indigenous household is defined as a household where at least one person of Aboriginal and/or Torres Strait Islander origin is usually resident (including

children). In the NATSIHS only households containing one or more persons aged 18 years and over were included. Non-Indigenous people were not eligible for selection in the NATSIHS sample although, if they were the parent or guardian of an Indigenous child, they could have acted as spokesperson for the child (they could also have acted as the household spokesperson). The topics covered in the 2004–05 NATSIHS were:

- Demographic/Socio-economic characteristics
- Health related actions
- Health risk factors
- Health status
- Women's health

The NATSIHS collected information for 9,785 Indigenous persons from 4,883 private dwellings. The NATSIHS sample was then combined with an additional 654 Indigenous persons from 351 private dwellings collected from NHS. Thus the total Indigenous sample consists of 10,439 persons from 5,234 households. This represents about 1 in 45 of the total Indigenous population from across Australia.

For the survey, the in-scope Indigenous population was divided into persons residing in Indigenous communities, referred to as the community frame, and the remainder of in-scope population was referred to as the non-community frame. Samples were drawn from the community frame and the non-community frame using different sample designs. The Indigenous Community Frame (ICF) consisted of a list of discrete Indigenous communities (including any outstations associated with them) in remote areas of Queensland, South Australia, Western Australia and the Northern Territory. The ICF was constructed using both Census counts and information collected in the 2001 Community Housing and Infrastructure Needs Survey. The non-community frame consisted of a list of Census collection districts (CDs) including estimates of the number of Indigenous dwellings in each CD based on the 2001 Census. In non-community areas, households were screened for Indigenous

residents by asking any responsible adult in the household whether any of the usual residents identified themselves as Indigenous.

Information was obtained from both adults and children (0-17 years) in the selected households. Households selected in community areas selected up to one adult (aged 18 years and over) and one child aged 0-17 years for inclusion in the survey. The households selected in non-community areas selected up to two adults (aged 18 years and over) and two children aged 0-17 years to participate in the survey. Indigenous selections identified in the 2004–05 NHS were included in the NATSIHS non-community sample.

For the data collection, persons aged 18 years or more were interviewed personally, with the exception of persons who were too sick or otherwise unable to respond personally. Persons aged 15 to 17 years were interviewed with the consent of a parent or guardian. If the consent wasn't obtained a parent or guardian was interviewed on their behalf. For persons aged less than 15 years, information was obtained from a person responsible for the child.

Differences exist in the data collection methods used in remote communities and in other geographic locations. In the 2004–05 NATSIHS, 'remote' is used to refer to the aggregation of the Australian Standard Geographic Classification (ASGC) Remoteness Areas of 'Remote Australia' and 'Very Remote Australia', defined as Statistical Local Areas (SLAs) with a dwelling density of less than 0.057 dwellings per square kilometer.

In remote communities the standard household survey approaches were modified to take account of language and cultural issues. Interviews were conducted using a paper questionnaire. For obtaining quality data from the remote communities some survey questions were excluded and some were reworded. For example, in non-remote areas questions on diabetes refer to 'diabetes or high sugar levels' where as in remote areas it is described as 'diabetes or sugar problems'. In remote

communities, women's health data was collected through personal interview with adult female respondents after informing them of the potential sensitivity and the voluntary nature of these questions. In other geographical areas a Computer Assisted Interviewing questionnaire was used. In addition, two paper questionnaires were used to collect information on substance use (for all persons aged 15 years and over) and specific women's health issues (for women aged 18 years and over). These questionnaires were voluntary and self-enumerated. Because of the different collection methodologies described above not all data items are available for the total Indigenous population. The content for the NATSIHS in remote community areas is a subset (approximately 80%) of the content collected in other areas. Data items not collected in these remote Indigenous communities are not released for the remote area in general or for total Australia.

The 2004–05 NATSIHS was conducted at the same time as the 2004–05 NHS. The 2004–05 NHS (cross-sectional survey) had a sample of 19,501 private dwellings across Australia. The survey has 19,501 adult and 6,405 child records. Both urban and rural areas in all states and territories are covered, but very remote areas of Australia are excluded. The non-Indigenous sample (25,511) from the 2004–05 NHS enables comparison with the Indigenous sample of 2004–05 NATSIHS. The different geographic scope of the NATSIHS and NHS results in comparisons only being available for non-remote or total Indigenous and non-Indigenous populations. Remote (which includes very remote areas) comparisons are thus not appropriate due to non availability of non-Indigenous data for these areas.

3.2 Data access and analysis tools

The survey data used in the thesis are available through Confidentialised Unit Record Files (CURFs) accessed though the ABS Remote Access Data Laboratory (RADL). For obtaining data through RADL, statistical codes are first submitted on-line to the ABS; the code is then run and the output is made available. Direct access to the unit records is not allowed in order to protect the confidentiality of the data.

Data for Indigenous people from the 2004–05 NATSIHS and the comparable non-Indigenous data from the 2004–05 NHS can be accessed through the 2004–05 NATSIHS CURF. Similarly, the data for Indigenous people from the 2001 NHS (I) and the comparable non-Indigenous data from the 2001 NHS(G) can be accessed through the 2001 NHS(I) CURF. The CURFs for 2002 NATSISS and 2002 General Social Survey (GSS) are available separately, but the ABS does not allow users to combine these records to compare the Indigenous and non-Indigenous populations. The data accessed through the RADL is analysed using the statistical software SAS (version 9.1) and STATA 10.

3.3 Strength and weakness of the datasets to analyse the health status of Indigenous Australians

The 2004–05 NATSIHS is the main dataset used in this thesis, supplemented by the 2004–05 NHS for non-Indigenous comparisons. The main results presented in the following chapters are based on NATSIHS. As stated earlier, it is the largest health survey of Indigenous Australians conducted so far. The 2004–05 NATSIHS and 2004–05 NHS have information on subjective (self-assessed health status) and objective (chronic diseases and injury) health outcomes and a variety of factors which can affect these health outcomes. 2002 NATSISS and 2001 NHS (I) are also specifically targeted towards the Indigenous population and supplement the NATSIHS data and these are used to validate the results from NATSIHS. The 2004–05 NATSIHS is similar in many ways to the Indigenous component of the 2001 NHS (the NHS (I)). The sample size of the 2004–05 NATSIHS is significantly larger than the sample size of the 2001 NHS (I). The difference in sample sizes means that the estimates from the 2004–05 survey generally have smaller standard errors and therefore can be considered more reliable than those from the 2001 NHS (I). The 2002 NATSISS does not have sufficient information on objective health measures and access to and use of health services but it has a lot more variables relating to the attachment of Indigenous people to their culture when compared to 2004–05 NATSIHS.

All the datasets used in the thesis are cross-sectional, making it difficult to establish causality or to analyse changes in health status over time. Another drawback of the datasets used is that the coverage is limited to people living in private dwellings. This could be a potential limitation when studying the health status of Indigenous Australians. The survey excluded Indigenous people in hospitals, nursing and convalescent homes, hostels and prisons. The NATSIHS has collected information on remote and non-remote areas but not all data items are available for the total Indigenous population. As noted earlier, the content for the NATSIHS in remote community areas is a subset (approximately 80%) of the content collected in other areas. Another drawback with the datasets is that while data on Indigenous people living in remote areas are available, data on the non-Indigenous population living in remote areas are not available. Therefore remote area comparisons cannot be made between the Indigenous and non-Indigenous populations which forbids an understanding of the role played by Indigenous remoteness in explaining differences in the health status of the two populations. Also, all the variable items in the datasets including those related to health are self-reported.

3.4 Sample size

In this study, the samples from the datasets are restricted to persons aged 18 years or more and those who answered the survey questions themselves. Table 3.1 shows the Indigenous and non-Indigenous samples used in the analysis.

Table 3.1 Indigenous and non-Indigenous sample size

Dataset	Observations
Indigenous	
2004–05 NATSIHS	10439
2001 NHS (I)	3681
2002 NATSISS	9359
Non-Indigenous	
2004–05 NHS	25511
2001 NHS (G)	26379

Chapter 4

Indigenous Australians and self-assessed health

There have been several studies suggesting the poor health status of Indigenous Australians (as discussed in earlier chapters), but much of the gap in health status between Indigenous and non-Indigenous Australians remains unexplained. Chapter 2 discussed subjective and objective measures of health status and the limitations of using self-assessed health among the Indigenous population. The literature reviewed in Chapter 2 also discusses the different factors associated with self-assessed health among Indigenous and non-Indigenous Australians.

This chapter tries to answer the following questions: (a) are Indigenous Australians (in general and some selected subgroups within them) more likely to report poor self-assessed health compared to non-Indigenous Australians? (b) If so, does this difference hold when demographic, behavioural, socio-economic and cultural variables are controlled for? (c) Is self-assessed health a good measure of health status for Indigenous Australians?

Econometric models used to answer the above questions are described below. The analysis is based upon self-assessed health status as reported in the 2004–05 NATSIHS and the 2004–05 NHS. The chapter provides a detailed description of the demographic, behavioural, socio-economic and cultural variables that could determine and possibly explain the difference in self-assessed health status between the Indigenous and non-Indigenous populations. Consistency of the results to alternate data sets and sensitivity to alternate estimation methods are examined. The chapter finally presents a decomposition analysis of the differences in self-assessed health between Indigenous and non-Indigenous people.

4.1 Descriptive Statistics

In the ABS surveys, the variable self-assessed general health is based on the response to the question 'In general would you say that your health is excellent, very good, good, fair or poor?' Table 4.1 shows the distribution of self-assessed health among the Indigenous and non-Indigenous people aged 18 years or over and who answered the survey questions themselves.

Table 4.1 Distribution of self-assessed health among the Indigenous (I) and non-Indigenous (NI) people

Self-assessed	NATSIHS & NHS, 2004–05		NHS(I) &NHS, 2001	
health	I (%)	NI (%)	I (%)	NI (%)
Excellent	11	20	12	18
Very good	29	35	26	33
Good	36	29	33	31
Fair	17	12	20	14
Poor	7	5	8	5

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey, 2004–05 National Health Survey, 2001 National Health Survey (Indigenous) and 2001 National Health Survey (General)

1. Estimates in the table are calculated using ABS provided population weights.
2. The Chi-square test assessing the significance of the difference between the Indigenous and non-Indigenous people is significant with probability <0.0001.

It can be seen that Indigenous Australians are more likely than non-Indigenous people to rate their health as 'good', 'fair' or 'poor', and correspondingly much less likely to rate their health as 'very good' or 'excellent'; and this result is consistent across the datasets.

4.2 A general model of health status

The literature reviewed in Chapter 2 shows the association of demographic, behavioural, socio-economic and cultural factors with the health status of Indigenous and non-Indigenous Australians. In this thesis, an individual's health is modelled as a function of a set of explanatory variables which have been grouped into four main categories.

$$H_i = f\ (D_i,\ B_i,\ S_i,\ C_i) \tag{4.1}$$

Where H_i is the health outcome of individual i, D_i represents a set of demographic factors associated with that individual, B_i represents behavioural factors, S_i represents socio-economic factors and C_i represents cultural factors. The variables under demographic, socio-economic, behavioural and cultural factors are selected based on theory and evidence from previous studies.

If this relationship between the outcome variable and explanatory variables was a linear one, the function could be estimated by ordinary least squares regression of the form:

$$H_i = \alpha + \beta D_i + \chi B_i + \delta S_i + \gamma C_i \ + \varepsilon_i \tag{4.2}$$

However, models with limited and categorical dependent variables are often more suited to estimation using probit or logit models. With the responses to self-assessed health being ordinal and categorical (excellent, very good, good, fair and poor), the ordered probit model is arguably the most appropriate. In the ordered probit model the dependent variable H_i is a categorical measure of self-assessed health. It assumes an underlying latent variable, H_i^*, which can be interpreted as the individual's true health. The higher the value of H_i^* the more likely the individual is to report a higher category of self-assessed health.

$$H_i^* = \alpha Z_i^* + \eta_i \tag{4.3}$$

Where α is the vector of coefficients, Z^* is a vector of explanatory variables thought to affect health and $\eta_i$is a random error term.

In practice H_i^* is a latent dependent variable and the observed counterpart of it is denoted by H_i which may be specified as follows.

$$H_i = \begin{cases} 1 \; if \; -\infty < H_i^* \leq \mu 1 & (if \; the \; person \; has \; poor \; health) \\ 2 \; if \; \mu 1 \leq H_i^* \leq \mu 2 & (if \; the \; person \; has \; fair \; health) \\ 3 \; if \; \mu 2 \leq H_i^* \leq \mu 3 & (if \; the \; person \; has \; good \; health) \\ 4 \; if \; \mu 3 \leq H_i^* \leq \mu 4 & (if \; the \; person \; has \; very \; good \; health) \\ 5 \; if \; \mu 4 \leq H_i^* \leq \infty & (if \; the \; person \; has \; excellent \; health) \end{cases} \quad (4.4)$$

Where μ1-$\mu 4$ are threshold parameters that denote the cut-points between one health state and another. η_i is normally distributed across observations. A positive coefficient for a variable (e.g., for income) means that individuals with higher income have higher values of latent health and are more likely to report a higher category of self-assessed health. A negative coefficient means higher values of that variable are associated with lower values of the latent variable and greater likelihood of reporting a lower category of self-assessed health**.**

An alternative specification is used in the main body of the thesis, in which the dependent variable is collapsed into a binary dummy and estimated using the binary logit model. A drawback of this approach is that some information is sacrificed since, unlike the ordered probit model, the binary logit model does not make full use of the variation in responses along the scale. However, the binary logit model is preferred for the analysis presented in this Chapter for two main reasons, with the results from the ordered probit model provided in Appendix Table A4.2. First, the interpretation of results is much more straightforward in the case of the binary logit model. With the results presented in the form of marginal effects, the ordered probit model generates five marginal effects estimates for each variable, corresponding to the effect of that variable on the probability of reporting each of the five response categories. One of the aims of this chapter is to do a decomposition analysis for the gap in self-assessed health between Indigenous and non-Indigenous people. In order to present the results of the decomposition analysis in a meaningful way, it would in any case be necessary to move to a binary specification.

Second, one of the assumptions underlying the ordered probit regression is that the relationship between each pair of outcome groups is the same. This is called the

proportional odds assumption or the parallel regression assumption. The Score statistic for the proportional odds assumption generated as part of the SAS post-estimations tests reject the parallel regression assumption for the ordered probit models. According to Long and Freese (2006), however, the parallel regression assumption is often violated.

In the binary logit estimation approach self-assessed health is reduced to a dichotomous measure. The responses "excellent" and "very good" are taken to represent good health and are coded as "1" and the responses "good", "fair" or "poor" are taken to represent poor health and coded as "0". Again an underlying latent variable H^* is assumed where respondents report good health when this variable exceeds some cut off (arbitrarily normalized to 0);

$H = 1$ if $H^* > 0$

$H = 0$ if $H^* \leq 0$

In the logit model, a simple linear regression equation is estimated:

$$Y_i = \alpha + \beta X_i + \varepsilon_i \tag{4.5}$$

Where the outcome variable Y is the log of odds that $H = 1$, that is,

$$Y = Log\left(P\{H=1\} \Big/ 1 - P\{H=1\} \right) \tag{4.6}$$

α is the constant term, β the vector of coefficients to be estimated and X the vector of explanatory variables. This gives the standard binary logit model.

4.3 Explaining the gap in Indigenous and non-Indigenous health

The main aim of this chapter is to investigate and explain the gap in self-assessed health status between the Indigenous and non-Indigenous people. The pooling of Indigenous and non-Indigenous data allows an estimate of the gap in health status

between the two populations to be made through the inclusion among the independent variables of a variable to capture Indigenous status. It also helps to assess whether the differences in health status that are observed across the samples diminish when adjustment is made for differences in independent variables capturing demographic, behavioural, socio-economic and cultural factors.

$$H_i = f(\alpha I_i + \beta D_i + \gamma B_i + \delta S_i + \zeta C_i) \quad (4.7)$$

Where H_i is the health outcome and I is a dummy variable representing the individual's Indigenous status. The coefficient α then provides an estimate of the difference in health status associated with being Indigenous. As the independent variables (D, B, S and C) are progressively added to the model, the changes in the magnitude of α provide an indication of how much of the health status gap is accounted for by these variables.

In a model of the form of Equation 4.7, the estimated coefficients on the independent variables are constrained to be the same for the Indigenous and non-Indigenous populations. That is, the model assumes that the demographic, behavioural, socio-economic and cultural factors have the same effect on the health of Indigenous people as they do on the health of other Australians. To allow for heterogeneous effects, the models are estimated separately for the Indigenous and non-Indigenous populations when appropriate.

To investigate differences in health status of Indigenous people across other dimensions, Indigenous status is further distinguished with reference to living in remote and non-remote areas, speaking English or an Indigenous language as the main language at home and experience of removal (of oneself or of relatives) from natural families. Dropping the subscript to denote individuals, these models have the general form:

$$H = f(\alpha I_{NR} + \beta I_R + \gamma D + \delta B + \zeta S + \kappa C) \quad (4.8)$$

$$H = f(\alpha I_{ENG} + \beta I_{IL} + \gamma D + \delta B + \zeta S + \kappa C) \quad (4.9)$$

$$H = f(\alpha I_{IR} + \beta I_{RR} + \eta I_{NOR} + \gamma D + \delta B + \zeta S + \kappa C) \quad (4.10)$$

Where H is the health outcome. In Model 4.8 and Model 4.9 Indigenous status is now captured by two mutually exclusive dummy variables: denoting Indigenous people living in non-remote areas (I_{NR}) and those living in remote areas (I_R) in Model 4.8; and Indigenous people who speak English as the main language at home (I_{ENG}) and who mainly speak an Indigenous language at home (I_{IL}) in Model 4.9. Model 4.10 distinguishes between three groups of Indigenous Australians based on their experience with polices of removal: I_{IR} represents Indigenous people who were themselves removed from their natural families, I_{RR} Indigenous people who had relatives removed from their natural families, and I_{NOR} Indigenous people who did not experience any removal from their natural families. The variables I_{IR} and I_{RR} are not mutually exclusive.

4.4 Variable definitions

In this section, the 2004–05 NATSIHS and 2004–05 NHS data are used to examine the factors affecting self-assessed health status and to investigate the extent to which differences in observed characteristics can explain the gap in health status between Indigenous and non-Indigenous Australians. The independent variables are chosen based on a review of the available literature and acknowledging the limitations of the data used. A similar analysis is undertaken using data from the 2001 NHS to check whether the results are consistent across the surveys. The definitions of the dependent and independent variables used in the thesis are described below and also provided in Appendix Table A4.1. The samples for the regression were restricted to persons aged 18 years or more and who answered the question in the surveys themselves.

4.4.1 Dependent variable

In the ABS survey the response to the question on self-assessed health is a categorical variable taking the value 1 = poor, 2 = fair, 3 = good, 4 = very good and 5 = excellent. In order to use a binary logit regression model for the analysis the responses “excellent”, and “very good” are coded as “1” and represents good health and the responses “good”, “fair” or “poor” are coded “0” and represents poor health.

4.4.2 Independent variables

Demographic factors

Chapter 2 provides comparisons between the Indigenous and non-Indigenous sample populations for a range of variables under the broader factors, viz.: demography, behaviour, socio-economic status and culture.

The demographic variables include age, sex, marital status, geographical location of residence (remote or non-remote) and household structure. The age composition of Indigenous and non-Indigenous people differ. The Indigenous people are comparatively younger compared to non-Indigenous people (refer Table 2.1 Chapter 2). To capture the effect of age on self-assessed health, age is broken down into six dummy variables viz. 18–24, 25–34, 25–44, 45–54, 55–64 and 65 and above.

The majority of Indigenous and non-Indigenous Australians live in non-remote areas. But a greater proportion of Indigenous people live in remote areas compared to the non-Indigenous population (refer Table 2.1 Chapter 2). The literature reviewed in Chapter 2 shows different relationships exist between the geographic location of residence and Indigenous health. It is popularly thought that non-remote Indigenous people have better health compared to those in remote areas due to better socio-economic and healthcare opportunities but there also exist studies which show health advantages of living in remote areas. To analyse the effects of geographic

location of residence on self-assessed health, a dummy variable is used indicating a person lives in a remote or very remote area as opposed to non-remote areas.

Existing literature suggests that marriage is associated with better health possibly through mechanisms such as better social support and material resources (Kobrin and Hendershot 1977; Pearlin and Johnson 1977; Becker 1981; Joung et al. 1994). It is also true that health affects marital status. For analyzing the effect of marital status the variable is categorized as married or unmarried. Being 'married' includes those living with another person in a couple relationship which was reported as either registered or de facto. Table 2.1 in Chapter 2 shows that the percentage categorized as married is lower among the Indigenous people compared to the non-Indigenous.

Daly and Smith (1997) show that there exist a high proportion of Indigenous families with lone parents. According to this study, Indigenous sole parents are younger, have lower educational status, are less likely to be in employment and have more children to support. The Henderson poverty benchmarks indicate that they bear higher relative levels of poverty compared to other Australian sole parent families (Daly and Smith 1997). Hammill (2001) argues that family dysfunction is widespread among the Indigenous communities. This has left the grandmothers as the sole caregivers for grandchildren in several Indigenous communities. For these reasons, looking at the household structure of Indigenous people is considered important. The household structure is broken down into five dummy variables representing the categories of couple with children, couple only, lone parent with children, single person household and all other households. According to Table 2.1 all other households forms the largest category among the Indigenous Australians.

Socio-economic factors

As discussed in the previous chapters, one-third to one-half of the health gap between Indigenous and non-Indigenous people in Australia can be explained by differences in socio-economic status, such as education, employment and income.

To assess the effect of socio-economic factors on self-assessed health this thesis uses these variables plus a wider set of controls such as welfare dependence, household tenure type and overcrowding in houses.

As a key determinant of human capital, education shapes future employment opportunities and earning potential. International and national research has clearly established that higher levels of educational attainment are associated with better health outcomes (Grossman 1972; Ross and Wu 1995; Kennedy 2002). Higher education improves health directly and also indirectly through work and economic conditions, social and psychological resources, and health lifestyle (Ross and Wu 1995). Biddle (2006) looked at the relationship between education and health for Indigenous and non-Indigenous Australians aged from 20 to 64 years using data from the 2001 NHS and found that, for non-Indigenous Australians, those who did not complete high school were more likely to report their health as being fair or poor. This did not vary much by the person's age. Like non-Indigenous Australians, Indigenous people who had completed high school were less likely to report fair/poor health than those who did not. For the Indigenous population, the difference increased slightly with age.

Using cross-sectional data, Ross and Mirowsky (1999) observed that self-assessed health increased significantly with years of formal education after adjusting for age, sex, race, marital status and parental education. Having a university degree has no net association with self-assessed health beyond the amount attributable to the additional years of schooling (Ross and Mirowsky 1999).

It has been universally accepted that the health of people improves with years of schooling or adult literacy rates, and previous studies looking at education as a determinant of health have focused mainly on years of schooling completed. University education and other post-school skilled qualifications can enhance the chances of obtaining employment and earning higher incomes. But the existing studies have either not looked at the association between post school education and

health outcomes or have found no relationship. Table 2.2 in Chapter 2 shows that post-school education is lower among Indigenous people when compared to the non-Indigenous. It is therefore important to include variables to capture the impact of post-school education on the health status. Educational status in this study is represented by six groups, classified as: (1) education below Year 10 (includes those with no education); (2) Year 10 education (includes those with year 11 education and basic vocational education); (3) Year 12 education; (4) vocational education (skilled); (5) diploma; and (6) degree (Bachelor or higher). Each of the education variables is represented by a binary dummy.

Similar to other studies, Table 2.2 in Chapter 2 shows that Indigenous Australians have lower employment rates and higher rates of unemployment and non-participation in the labour force than Australians as a whole. Indigenous Australians are also far more likely than other Australians to be discouraged workers (Taylor and Hunter 1998). A two way relationship can exist between employment status and health outcomes. Unemployment can negatively affect the health outcomes or people with poor health often become unemployed. Employment status in this study is represented by four groups; employed (full-time); employed (part-time); unemployed (looking for full-time and part-time work); and not in the labour force. Each of the employment variables is a binary dummy. Being 'employed' also includes Indigenous persons employed in a Community Development Employment Project (CDEP).

Indigenous households are more likely to be multi-generational and have several families in residence than other Australian households. Differences in household types and compositions and their assumed requirements relative to income can be taken into account by the application of equivalence scales. Thus equalized household income is chosen as the income variable. In NATSIHS the gross weekly equalized cash income of household is categorized into ten deciles. For the 2004–05 NATSIHS the OECD scale, which requires information about income and household

composition, is used. The people are categorized as welfare dependent if government pensions and allowances are the main source of personal cash income.

Housing may affect health through both direct and indirect ways. In Australia, Waters (2001) found that housing tenure is independently associated with self-assessed health status. Renters are more likely than homeowners to report fair or poor health status (Waters 2001). According to Shaw (2004, 408), "owning rather than renting may confer a sense of security, control and mastery, which in turn may have flow-on effects for health and well-being". The association between housing tenure and self-assessed health may be mediated by elements such as physical and social environments in the home and surrounding community (Pollack, von dem Knesebeck, and Siegrist 2004).

Again in Australia Waters (2001) found weak evidence of a link between overcrowding and poor self-assessed health using the 1995 NHS. Booth and Carroll (2005b), using 2001 NHS, found that overcrowding of adults is associated with worse health and explains approximately 30% of the health gap between the Indigenous population living in remote areas and the non-Indigenous population.

Indigenous people in Australia are much less likely to own their homes when compared with other Australians (FaHCSIA 2010). In this study the data on different tenure type of households is available only for the Indigenous Australians. The tenure type of Indigenous households is represented by three groups: owner (with and without mortgage), renters (excluding boarders) and others. Due to data limitations comparison cannot be made with the non-Indigenous population. Various measures can be used to assess overcrowding in dwellings. In this chapter overcrowding is defined by the number of extra bedrooms required in a dwelling, based on the number, age, sex and interrelationships of household members.

Behavioural factors

A number of personal behaviours, including smoking, immoderate levels of alcohol consumption, too little physical exercise and poor diet, have been shown to contribute to adverse health outcomes (Manderbacka, Lundberg, and Martikainen 1999, Petrie et al. 2008). Smoking is much more common among Indigenous people than among non-Indigenous people across Australia (Cunningham 1997; Table 2.3 above). The behavioural health risk variables in this study include smoking status, alcohol consumption status, dietary practices and exercise. There is the possibility of reverse causation between health and some of these variables.

Smoking (tobacco) status in this study is represented by three groups: current smoker, ex smoker and those who have never smoked. Current smokers are in turn comprised of three groups: current smokers daily, current smokers weekly (at least once a week but not daily), current smokers less than weekly. Ex-smoker refers to those who have previously smoked daily or have smoked 100+ cigarettes in their lifetime or have smoked pipes/cigars at least 20 times. Never smoked includes those who have not previously smoked daily nor smoked 100+ cigarettes in their lifetime nor have smoked pipes/cigars at least 20 times. Each of the smoker status variables is represented by a binary dummy.

Alcohol consumption status is measured by alcohol risk level over a seven day average. The alcohol consumption status is categorized into six levels: low risk, medium risk, high risk, last consumed alcohol one week to less than 12 months ago, last consumed alcohol 12 months or more ago (ex drinkers) and never consumed alcohol. This categorization is as determined by the ABS.

The dietary behaviour variables include consumption of full-cream milk or other milk, whether usually eat vegetables each day and whether usually eat fruit each day. Each of the dietary behaviour variables is a binary dummy. The exercise

variable takes on a value of 1 for those who did moderate or vigorous exercise in the previous two weeks and zero otherwise.

Cultural variables

A set of variables which indicate the strength of attachment of Indigenous people to their culture is used to measure the effect of culture on health status. Being a member or a relative of the Stolen Generation is considered a cultural variable for the analysis. The variables are based on the responses to the questions 'whether respondent taken away from natural family' and 'whether relatives taken away from natural family'. This variable is a unique feature of Indigenous Australians.

The other cultural variables in 2004–05 NATSIHS include the responses to the questions 'whether identifies with tribal group, language group or clan', 'whether recognize area as homelands and traditional country' and the 'main language at home: English, Australian Indigenous languages and other language'. In 2004–05 NATSIHS the data for the first two questions are available only for non-remote Indigenous people and hence these variables are not included in the analysis. Three dummy variables are included to capture whether English, an Australian Indigenous language or an 'other language' is the main language spoken at home.

Indigenous households are compositionally different from Western households. Indigenous families typically have other families or relatives living with them. Two or more family households with only family members present and one or more family households with non-family members present are categorized as multifamily households.

Objective health measures

The literature reviewed in Chapter 2 has discussed whether self-assessed health is a good measure of health status in general and for Indigenous people in particular.

This issue is investigated by including objective health variables in the regression modelling. If the estimated difference between Indigenous and non-Indigenous health is accounted for by the inclusion of objective health measures it suggests that lower self-assessed health is driven by lower actual health.

The objective health variables include BMI, heart problems, diabetes, asthma, arthritis and injury. Cancer is not included in the analysis since the percentages of malignant cancer for which the data is available is very small for Indigenous and non-Indigenous people. BMI is represented by four dummies: underweight (BMI less than 18.5), normal weight (BMI 18.5 to 24.99), overweight (BMI 25 to 29.99) and obese (BMI 30 and above). The BMI variable is calculated from reported height and weight information. All the health condition variables are represented by binary dummies.

4.5 The results

The main aim of this chapter is to estimate and investigate the gap in self-assessed health status between Indigenous and non-Indigenous people. As discussed in Section 4.3, the pooling of the Indigenous and non-Indigenous data helps to assess the gap in health status between the two populations. The pooling allows inclusion of a variable for an individual's Indigenous status among the independent variables, and the coefficient on this variable provides an estimate of the 'independent' effect of being Indigenous, as opposed to non-Indigenous, on health status. It is then possible to assess whether the estimated differences in health status that are observed across the samples change when differences in demographic, behavioural, socio-economic and cultural factors are controlled for. These four sets of independent variables are progressively added to assess their contribution to self-assessed health. The non-Indigenous people constitute the comparison category.

Model 1 of Table 4.2 includes only Indigenous status and gender as the explanatory variables and the marginal effect of Indigenous status is -0.14 and is highly significant. This shows that there is a significant difference in self-assessed health

between Indigenous and non-Indigenous people. Indigenous people are 14% less likely to report being in good health than non-Indigenous people. Model 2 estimates how much of that health gap is attributable to demographic variables like age, marital status, area of residence (classified as remote and non-remote) and household structure. The inclusion of these variables, especially age, increases the gap in health status between Indigenous and non-Indigenous people. This suggests that while the Indigenous people are younger compared to non-Indigenous, they are less healthy on an age-standardised basis.

Results from Models 3 and 4 show that even after controlling for behavioural and socio-economic variables, Indigenous Australians are significantly more likely to report fair or poor self-assessed health. The descriptive statistics (Table 2.3 Chapter 2) show that 52% of the Indigenous people are current smokers and 20% are ex-smokers. This smoking status rate is very high compared to non-Indigenous people, for whom the corresponding figures are 23% and 30%. The percentage of people with lower levels of education and poorer employment status is higher among Indigenous people (Table 2.2 Chapter 2). Despite their importance, the behavioural and socio-economic variables do not explain all the difference between the two populations.

Controlling for the cultural identification variables (Model 5)—main language spoken at home, living in a multifamily household and removal (of oneself or relatives) from the natural family—further closes the estimated gap in the health status between Indigenous and non-Indigenous people. Among the cultural variables, neither language spoken at home nor household structure contribute to the estimated gap in the health status, but the removal of people from the natural family (especially if a relative was removed) contributed significantly to the gap in health status between Indigenous and non-Indigenous Australians. Dockery (2009) also finds a similar result using 2002 NATSISS as discussed in Chapter 2.

Here, the estimated coefficients imply that those Indigenous Australian whose relatives were removed are 7% less likely to report being in good health than Indigenous Australians who did not experience removal, and 11% less likely to report being in good health than non-Indigenous Australians. Those who were directly removed are also estimated to report lower health, but the estimate is not statistically significant.

Forceful removal of children from their natural families is unique to Indigenous Australians and this historic policy shows a lasting impact on health status over generations. Having been taken away as a child is found to be associated with poor self-assessed health among the Indigenous population (Cunningham, Sibthorpe and Anderson 1997) but the estimated effect here is not statistically significant. The presence of a lower percentage of first generation Stolen Generation members in the sample could be a reason why they are not contributing to negative self-assessed health compared to the subsequent generations. The West Australian Aboriginal Child Health Survey (WAACHS) assesses the inter-generational effects of forced removal/separation from their natural family and homeland and shows a link between forced separation of Indigenous carers and adverse outcomes for their children. The WAACHS results clearly demonstrate that the behavioural and emotional difficulties experienced by the carers are passed over to their children as well (Silburn et al. 2006).

Thus the binary logit results show that socio-economic, behavioural and cultural factors contribute to most of the gap in self-assessed health status between the two populations.

Table 4.2 Marginal effect of being Indigenous and self-assessed health status (binary logit model)

	1 Indigenous status and gender		2 + Demographic variables		3 + Behavioural variables		4 + Socio-economic variables		5 + Cultural variables	
Indigenous Status	**-0.14**	***	**-0.17**	***	**-0.11**	***	**-0.07**	***	**-0.04**	**
Male	-0.02	***	-0.03	***	-0.04	***	-0.07	***	-0.07	***
18–24 years			0.04	**	0.02		0.03	**	0.03	**
24–34 years			-		-		-		-	
35–44 years			-0.07	***	-0.06	***	-0.07	***	-0.07	***
45–54 years			-0.14	***	-0.13	***	-0.13	***	-0.13	***
55–64 years			-0.22	***	-0.21	***	-0.14	***	-0.14	***
65 years and above			-0.28	***	-0.27	***	-0.1	***	-0.1	***
Married			0.04	***	0.04	***	0.04	***	0.04	***
Couple with children			0.07	***	0.05	***	0.04	***	0.05	**
Couple with no children			0.06	***	0.03	*	0.01		0.01	
Lone parent family			0.02		0.02		0.07	***	0.07	***
Lone person			0.02		0.01		0.02		0.01	
Other households			-		-		-		-	
Remote and very remote areas			-0.03	*	0.00		-0.00		-0.03	*
Low risk alcohol consumption					-		-		-	
Medium risk alcohol consumption					0.03	**	0.02		0.22	
High risk alcohol consumption					-0.08	***	-0.08	***	-0.08	***
Last consumption of alcohol—one week to less than 12 months ago					-0.07	***	-0.05	***	-0.05	***
Last consumption of alcohol—12 months or more ago					-0.13	***	-0.08	***	-0.08	***
Never consumed alcohol					-0.09	***	-0.05	***	-0.04	**
Smoker					-		-		-	
Ex-smoker					0.09	***	0.07	***	0.07	***
Never smoked					0.14	***	0.11	***	0.11	***
Exercise					0.12	***	0.09	***	0.09	***
Consumption of non full-cream milk					0.02	***	0.00		-0.00	

	1 Indigenous status and gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Vegetable consumption			0.07 **	0.05	0.07 **
Fruit consumption			0.09 ***	0.08 ***	0.09 ***
Education below Year 10				-0.04 ***	-0.04 ***
Year 10 education				-	-
Year 12 education				0.02	0.02 *
Vocational education				-0.02	-0.01
Diploma				0.04 **	0.04 ***
Degree				0.05 ***	0.06 ***
Employed full-time				-	-
Employed part-time				-0.01	-0.01
Unemployed				-0.04	-0.04
Not in labour force				-0.11 ***	-0.11 ***
Weekly income				0.01 ***	0.01 ***
Welfare—main source of income				-0.08 ***	-0.08 ***
Household crowding				0.03 *	0.03
Owner occupied houses				0.00	0.01
Rental houses				-	-
Other tenure				-0.08	-0.07
Multifamily households					-0.01
English—main language spoken at home					-
Indigenous language—main language spoken at home					0.08 ***
Other languages—main language spoken at home					-0.1 ***
Person removed from natural family					-0.02
Relatives removed from natural family					-0.07 ***
Observations used	**18212**	**18212**	**18212**	**18212**	**18212**
Likelihood Ratio (Pr > Chi2)	**212 *****	**1143 *****	**1881 *****	**2464 *****	**2525 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *.
2. '-'represents reference variables.

When long-term conditions, injury and BMI, proxying physical health, are controlled for, there is no significant difference between Indigenous and non-Indigenous Australians in self-assessed health (results not shown in Table 4.2). The lower self-assessed health of Indigenous Australians relative to non-indigenous Australians in these data can therefore be accounted for by the differences in observable, objective health conditions. In this sense, self-assessed health status appears to be a valid measure of the actual health of Indigenous Australians and for comparisons between Indigenous and non-Indigenous samples. This result is consistent with that of Booth and Carroll (2005a).

In all the models, the Likelihood Ratio Chi-square test that all the regression coefficients are equal to zero is rejected at 1% level.

An analogous pooled binary logit analysis is also undertaken using 2001 NHS data and the results are consistent with that of 2004–05 NATSIHS. The estimates for Indigenous status based on 2001 NHS are reported in Appendix Table A4.3. In 2001 NHS cultural variables (living in a multifamily household and the main language spoken at home) do not contribute to the health status gap. This is mainly because the Stolen Generation variables are not available and thus not included in the analysis.

The ordered probit model also generates similar results to those that have been obtained using the binary logit model (refer Appendix A4.2). There are similar changes in the relative magnitude of the Indigenous coefficient as the demographic, behavioural, socio-economic and cultural variables are added to the model.

To investigate the differences in health status of Indigenous people living in different geographical areas, the dummies for remoteness and Indigenous status are interacted to generate separate estimates for Indigenous people living in remote areas and Indigenous people living in non-remote areas relative to the non-Indigenous population. The demographic, behavioural, socio-economic and cultural

variables are again progressively added to assess their contribution to self-assessed health for those living in remote and non-remote areas. These models help to show whether the factors contributing to the health gaps are different for these two geographically distinct groups. Table 4.3 shows the marginal effects for non-remote Indigenous and remote Indigenous people separately. The non-Indigenous people constitute the comparison category.

Table 4.3 Marginal effect of being Indigenous by geography and self-assessed health status (binary logit model)

Variables	1 Indigenous status & gender	2 + Demo-graphic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Non-remote Indigenous	-0.13***	-0.18***	-0.12***	-0.08***	-0.05 **
Remote Indigenous	-0.14***	-0.18***	-0.09***	-0.05***	-0.06**
Observations used	**18212**	**18212**	**18212**	**18212**	**18212**
Likelihood Ratio (Pr > Chi2)	**212 *****	**1140 *****	**1883 *****	**2466 *****	**2522 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result not included

The results suggest that Indigenous people have worse health compared to the non-Indigenous people irrespective of their geography. The inclusion of demographic variables (Model 2) increases the gap in health status of the two groups of Indigenous people relative to non-Indigenous people. This suggests the inferior health status of Indigenous people in remote and non-remote areas is accentuated when considered on an age-standardised basis.

The behavioural, socio-economic and cultural variables account for most of the health status disadvantage of Indigenous people living in non-remote areas. But this is slightly different in the case of remote areas. The behavioural and socio-economic variables explained most of the gap and their contribution was higher than that for the non-remote areas. The cultural variables did not contribute to the gap in the case of remote areas.

The results suggest the fact that Indigenous people are not homogenous and a single policy/programme cannot close the health status gap of the whole Indigenous population. Different policies suitable for those living in different geographic locations have to be implemented. According to 2004–05 NATSIHS, smoking is higher and school participation is lower in Indigenous people living in remote areas compared to those in non-remote areas. Therefore remote areas require policies to improve their education status and awareness programmes to reduce their high levels of smoking.

The Indigenous specific variable, the removal from the natural family, is important in explaining the self-assessed health gap between the Indigenous and non-Indigenous population in non-remote areas. Thus arises the need to tackle effectively the trauma cased by the historic policies of forced removal of people from their natural families. Among those who lived in remote areas, the experience of removal from the natural family is low compared to those in non-remote areas (34% vs. 56%). The higher prevalence of living in multifamily households in remote areas could possibly provide social protection and reduce the adverse effects of the experience of removal from natural family.

The inclusion of physical (or objective) health variables suggests that self-assessed health is a good measure of the actual health of both the remote and non-remote Indigenous people.

Indigenous status by main language spoken at home is investigated to examine whether speaking an Indigenous language or English had a separate effect on self-assessed health (Table 4.4). This also allows investigation of whether the factors contributing to the health status gap are different for those who speak English at home compared to those who mostly speak an Indigenous language at home. Non-Indigenous people form the comparison category.

The results for those who speak English at home are similar to the results in the previous table. The behavioural factors explain the entire gap among people who

speak an Indigenous language at home. The results now suggest that self-assessed health status is a good measure of actual health only for those who speak English. Once the objective health variables are included the marginal effect for those speaking an Indigenous language is 0.08 and is highly significant (result not shown in Table 4.4). This result suggests that measuring health status using self-assessed health among Indigenous people who speak an Indigenous language at home can underestimate their health problems. This result confirms the finding of Sibthorpe, Anderson, and Cunningham (2001) that self-assessed health is a valid health measure for Indigenous Australians whose main language is English but may not be for those who speak an Indigenous language.

Table 4.4 Marginal effect of being Indigenous by the main language spoken at home and self-assessed health status (binary logit model)

Variables	1 Indigenous status &gender	2 + Demo-graphic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
English	-0.14***	-0.17***	-0.11***	-0.07***	-0.04*
Indigenous language	-0.14***	-0.13***	-0.02	0.04	0.06*
Observations used	**18212**	**18212**	**18212**	**18212**	**18212**
Likelihood Ratio (Pr > Chi2)	**212 *****	**1146 *****	**1893 *****	**2479 *****	**2493 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result not included

Finally, the estimated effect of Indigenous status by the removal from the natural family is also investigated to examine whether being a member of the Stolen Generation, a relative of a Stolen Generation member or an Indigenous person who did not experience any removal had a differential effect on self-assessed health. The factors contributing to the health status gap for the groups are also analysed. Non-Indigenous people form the comparison category.

The demographic, behavioural and socio-economic factors account for much of the gap in health status for Indigenous persons directly removed from their natural

families and for those who did not experience any removal. However, after controlling for the demographic variables, there exists a larger gap in health status between Indigenous people whose relatives were removed from the natural family and non-Indigenous people**.** Behavioural and socio-economic variables explained some of the gap, but a substantial estimated gap persists after controlling for all observable factors. Only some of this remaining gap is explained by the inclusion of objective health variables, suggesting that the inferior self-assessed health status reported by Indigenous people whose relatives were removed from their families reflects a dimension of health disadvantage that is additional to the inferior objective conditions they experience relative to the non-Indigenous population. For those who had relatives removed from their natural families and those who did not experience any removal, speaking an Indigenous language at home or living in a multifamily household did not contribute to the gap in the health status.

Table 4.5 Marginal effect of being Indigenous by removal from the natural family and self-assessed health status (binary logit model)

Variables	1 + Indigenous status &gender	2 + Demo-graphic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Indigenous person removed from natural family	-0.14***	-0.09***	-0.05	-0.03	-0.03
Indigenous people who had relatives removed from natural family	-0.13***	-0.18***	-0.13***	-0.11***	-0.11***
Indigenous people who did not experience any removal	-0.12***	-0.15***	-0.08***	-0.03	-0.05**
Observations used	**18212**	**18212**	**18212**	**18212**	**18212**
Likelihood Ratio (Pr > Chi2)	**230 *****	**1156 *****	**1895 *****	**2485 *****	**2526 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result not included

Tables 4.2 to 4.5 show that there exists a gap in self-assessed health status between Indigenous and non-Indigenous people. In these models, however, the effects of the independent variables on health status (the marginal effects) are constrained to be

the same for the Indigenous and non-Indigenous populations. It is instructive to estimate models separately for the Indigenous and non-Indigenous samples to allow for differential effects. The marginal effects in Table 4.6 (column A) show the association of demographic, behavioural, socio-economic and cultural variables with self-assessed health for Indigenous Australians, using the full range of variables available for Indigenous persons. To facilitate a comparison between the effects of variables on self-assessed health for Indigenous and non-Indigenous persons (Table 4.6 Columns B and C), the models are then restricted to variables which are available for both populations.

In Column A of Table 4.6 an age gradient is seen among Indigenous people. Self-assessed health declines with age and the results are significant for all age groups. Self-assessed health is lowest among the 45–54 year age group.

Among those who consumed alcohol, the high risk drinkers reported poor self-assessed health. This is consistent with the results of a study on the relationship between alcohol consumption and self-assessed health status in rural Australia (Petrie et al. 2008). Of the other behavioural variables, ex-smokers, those who have never smoked or drank alcohol, those who consumed fruits and vegetables daily and those who exercised regularly reported better health status. Better behaviour is thus associated with better health.

Examining the association of socio-economic variables with self-assessed health, the Year 12 variable shows a weak positive effect. However, there is no significant association with other education variables. Thus this result does not support the finding by Biddle (2006) that self-assessed health was poorer among Indigenous Australians with lower levels of education.

Table 4.6 Marginal effects for self-assessed health: Indigenous and non-Indigenous Australians

Variable	A Indigenous Estimate		B Indigenous Estimate		C Non-Indigenous Estimate	
Male	0.02		0.02		-0.08	***
18–24 years	0.05	*	0.05	*	0.02	
25–34 years	-		-		-	
35–44 years	-0.10	***	-0.10	***	-0.05	***
45–54 years	-0.22	***	-0.22	***	-0.11	***
55–64 years	-0.21	***	-0.21	***	-0.12	***
65 years and above	-0.18	***	-0.17	***	-0.07	***
Married	0.02		0.04	*	0.04	**
Couple with children	0.01		0.01		0.06	**
Couple with no children	0.01		0.01		0.02	
Lone parent family	0.05		0.05		0.09	***
Lone person	-0.01		-0.02		0.03	
Other households	-		-		-	
Remote and very remote areas	-0.01					
Low risk alcohol consumption	-		-		-	
Medium risk alcohol consumption	-0.04		-0.04		0.04	**
High risk alcohol consumption	-0.08	**	-0.08	**	-0.07	***
Last consumption of alcohol—one week to less than 12 months ago	-0.04		-0.04		-0.05	***
Last consumption of alcohol—12 months or more ago	0.02		0.02		-0.12	***
Never consumed alcohol	0.07	**	0.08	**	-0.08	***
Smoker	-		-		-	
Ex-smoker	0.06	**	0.06	**	0.07	***
Never smoked	0.07	***	0.08	***	0.11	***
Exercise	0.08	***	0.08	***	0.09	***
Consumption of non full-cream milk	-0.03		-0.03		0.00	
Vegetable consumption	0.08	**	0.06		0.07	
Fruit consumption	0.07	***	0.07	***	0.09	***
Education below Year 10	-0.04		-0.03		-0.05	***
Year 10 education	-		-		-	
Year 12 education	0.05	*	0.05	*	0.01	
Vocational education	0.00		-0.00		-0.02	
Diploma	0.03		0.02		0.04	**
Degree	0.05		0.04		0.05	***
Employed full-time	-		-		-	
Employed part-time	-0.06	**	-0.05	**	0.00	
Unemployed	-0.08	*	-0.08	*	-0.03	
Not in labour force	-0.10	***	-0.09	**	-0.12	***
Weekly income	0.01	*	0.01	*	0.01	***
Welfare—main source of income	-0.06	*	-0.06	*	-0.08	***
Household crowding	0.01		0.01		0.03	

Variable	A Indigenous Estimate		B Indigenous Estimate	C Non-Indigenous Estimate
Owner occupied houses	0.05	**		
Rental houses	-			
Other tenure	-0.06			
Multifamily households	-0.04		0.03	0.02
English —main language spoken at home	-			
Indigenous language—main language spoken at home	0.05			
Other languages- main language spoken at home	-0.03			
Person removed from natural family	-0.00			
Relatives removed from natural family	-0.06	***		
Observations used	**3346**		**3346**	**14866**
Likelihood Ratio (Pr > Chi2)	**447 *****		**424 *****	**1940 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '-' represents reference variables
3. Columns B and C exclude the geography, housing tenure, main language spoken at home and Stolen Generation variables

Relative to those employed 'full-time', being 'employed part-time', 'unemployed' and 'not in labour force' are all significantly associated with poor self-assessed health. Of the Indigenous people who are employed part-time a sizeable number are employed in low skilled occupations or CDEP. Also many Indigenous people might be opting for part-time jobs due to the following reasons: to care for others; because of some kind of disability which limits their involvement in full-time jobs; or inability to obtain full-time employment. Many of those who are employed part-time may want to work full-time but are unable to do so. This could contribute to their poor self-assessed health status. Of the employment status dummies 'not in labour force' shows the highest negative association with self-assessed health. This is likely to reflect 'reverse causality'—those with poorer health status being less likely to participate in the labour market.

Dependence on welfare as the main source of livelihood is associated with poor self-assessed health. Table 2.2 in Chapter 2 shows that 47% of Indigenous people depend on welfare for livelihood. Long term welfare dependence robs people of their self esteem, their ability to be responsible to themselves and make valuable contributions to their community. Dependency on welfare can become intergenerational and it can be associated with lack of motivation for economic engagement among younger Indigenous people (Daly and Smith, 2003).

Higher equalized household income is also associated with better health. Home ownership provides the most secure form of housing tenure and compared to renters, Indigenous home owners have significantly better self-assessed health. This result is consistent with that of the national and international literature (Shaw 2004; Waters 2001). According to Shaw (2004), "owning rather than renting may confer a sense of security, control and mastery, which in turn may have flow-on effects for health and well-being". The association between housing tenure and self-assessed health may be mediated by elements such as physical and social environments in the home and surrounding community (Pollack, von dem Knesebeck, and Siegrist 2004). Reverse causality could exist in that less healthy people are more likely to be renters than owners.

The variables 'person removed from natural family' and 'relatives removed from natural family' test for the impact of the policy of forced removal of Indigenous children from their families. Being a relative of Stolen Generation members is significantly associated with poorer health status. This result confirms the long term or intergenerational effects of policies on health. The results show no significant difference in health status among Indigenous people who speak English or an Indigenous language at home.

Columns B and C in Table 4.6 show that there is no gender difference in reporting of self-assessed health among Indigenous people. But compared to non-Indigenous women, non-Indigenous men report poor health status. An age gradient is seen

among Indigenous and non-Indigenous people. Marriage has a positive effect for Indigenous and non-Indigenous people. Other demographic variables have no significant effect on Indigenous people. The variables, 'couple with children' and 'lone parent family' have a positive effect for non-Indigenous people.

Among Indigenous people, those who never consumed alcohol report better self-assessed health compared to low risk alcohol consumers. This is at variance from non-Indigenous people, where those who never consumed alcohol report poorer self-assessed health than those with low risk alcohol consumption. It could be because of the difference in the social meaning of alcohol consumption in these two populations. It is also possible that non-Indigenous people who have never consumed alcohol have poorer physical health than those who are low risk alcohol consumers. Medium risk alcohol consumption is associated with better self-assessed health among non-Indigenous people but no such relationship was found among the Indigenous population. Compared to smokers, ex-smokers and those who have never smoked exhibited better health among Indigenous and non-Indigenous people.

For the education variables, the patterns of coefficients are similar for Indigenous and non-Indigenous people. But for Indigenous people the results are mostly not significant. Education below Year 10 has a negative effect on self-assessed health for both non-Indigenous and Indigenous people, but it is significant only for the former. For Indigenous people with Year 12 education, compared to those with education up to Year 10, there is a significant positive effect on self-assessed health. A positive association between post-school levels of education and self-assessed health is apparent among non-Indigenous Australians. A similar association exists among Indigenous Australians but the results are not significant. This may be due to the smaller proportion of Indigenous people that have post-school qualifications (refer Table 2.2).

Compared to the full-time employed, Indigenous people who were employed part-time, unemployed and those not in labour force show poorer self-assessed health.

Non-Indigenous people who are not in labour force also have considerably poorer self-assessed health. Again this is likely to reflect those with pre-existing health problems being less likely to participate in the labour force. Indigenous and non-Indigenous people who depend on welfare as the main source of income also have poor self-assessed health, and this may similarly reflect a degree of reverse causation.

4.7 Addressing the health status gap—the decomposition analysis

The results reported in Table 4.2 show a large and statistically significant gap in self-assessed health between Indigenous and non-Indigenous people. To help illustrate the contribution of various factors to this gap in health status a decomposition analysis is undertaken based on the modelling estimates of the probability of good health among the Indigenous people. The analysis allows us to decompose the gap in self-assessed health into a component that may be attributed to differences in the demographic, behavioural, socio-economic and cultural characteristics of the populations; a component attributable to differences in the *effects* of those characteristics for each population, and a component which remains unexplained by either of these factors.

To obtain the predicted likelihood of an individual reporting good health with all variables evaluated at their means the following equation is used:

$$\hat{Y} = \hat{\alpha} + \hat{\beta}\overline{X} \tag{4.11}$$

Where $\hat{a}$ and $\hat{\beta}$ are the values of the coefficients estimated from Equation 4.5 above. Substituting $\hat{Y}$ into Equation 4.6 allows the determination of the predicted probability of reporting good health as:

$$P\{H = 1\} = \exp(\hat{Y}) \Big/ 1 + \exp(\hat{Y})$$

The predicted likelihood of reporting good health is calculated under various assumptions. Indigenous people are given the non-Indigenous means to show how much of the difference is due to differences in observable characteristics (or for subsets of characteristics such as behaviour or socio-economic status).

$$\hat{Y} = \alpha_I + \widehat{\beta_I}\bar{X}_{NI} \quad (4.12)$$

Where α_I is the Indigenous intercept, $\widehat{\beta_I}$ is the vector of estimated coefficients for Indigenous people, $\bar{X}_{NI}$ is the vector of means of the explanatory variables for the non-Indigenous people.

The predicted likelihood of good health among the Indigenous people can also be calculated by substituting the non-Indigenous logit coefficients (or subsets of logit coefficients such as behaviour and socio-economic status) instead of the means, to see what would happen if Indigenous people had the same responses to characteristics.

$$\hat{Y} = \alpha_{NI} + \hat{\beta}_{NI}\bar{X}_I \quad (4.13)$$

Where α_{NI} is the non-Indigenous intercept, $\hat{\beta}_{NI}$ is the vector of estimated coefficients for non-Indigenous people, $\bar{X}_I$ is the vector of means of the explanatory variables for the Indigenous people.

The models are restricted to variables which are available for both populations. The models exclude geographical location of residence, housing tenure, main language spoken at home and Stolen Generation variables.

The predicted likelihood of good health is calculated under various assumptions.

a) Indigenous people are given the non-Indigenous means of the independent variables to show how much of the difference is due to differences in observable characteristics (or non-Indigenous means for subsets of

characteristics such as behaviour, socio-economic status). In the general case, Indigenous coefficients and non-Indigenous means are used. In the subset analysis, only some of the non-Indigenous means are imposed to calculate the predicted likelihood of reporting good health, while others are left unchanged at their Indigenous means. This is done for the subset of socio-economic variables and for the subset of behavioural variables, to separately identify the estimated effect of differences in socio-economic and behavioural characteristics of the Indigenous and non-Indigenous on the gap in self-assessed health.

b) Indigenous people are given the non-Indigenous logit coefficients (or subsets of logit coefficients such as behaviour and socio-economic status), to see what would happen if Indigenous people had the same responses to their characteristics as non-Indigenous people. As in (a), in the general case non-Indigenous coefficients and Indigenous means are used. In the subset analysis, only some of the coefficients for the non-Indigenous population are imposed at a time, namely the coefficients for the socio-economic variables and the coefficients for the behavioural variables.

The results of this decomposition analysis for self-assessed health are given in Table 4.7. The predicted likelihood of reporting good health is 54% for non-Indigenous Australians and 39% for Indigenous Australians. That is, non-Indigenous Australians are almost one and a half times more likely than Indigenous Australians to assess themselves as being in good health.

Table 4.7 Decomposition analysis of Indigenous self-assessed health

Predicted likelihood of reporting good health:	Indigenous	Non-Indigenous
Unadjusted	39%	54%
Using the means of non-Indigenous population for all independent variables	43%	
Using the estimated coefficients for non-Indigenous population	45%	
Using the non-Indigenous socio-economic status means	44%	
Using the non-Indigenous behaviour means	42%	
Using the non-Indigenous socioeconomic status estimated coefficients	40%	
Using the non-Indigenous behaviour estimated coefficients	39%	

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Living in remote/ very remote areas, speaking an Indigenous language at home, household tenure and experience of removal from the natural family are not included in the analysis.

The decomposition analysis shows that only one-fourth of the gap in health status between Indigenous and non-Indigenous people is accounted for by differences in observable characteristics. The differences in the effects of the variables contributed to approximately one-third of the gap. The finding is comparable with the results of Booth and Carroll (2005a)**.** The results suggest that merely improving the socio-economic status and health behaviours of Indigenous people cannot solve their health disadvantage, as there are other factors which contribute to the same.

In Table 4.2 the estimated effect of being Indigenous on self-assessed health is mostly explained by the demographic, behavioural, socio-economic and cultural variables. But the decomposition results indicate that the observable characteristics only explain 25% of the difference in health status of Indigenous and non-Indigenous Australians. This can be attributed to a number of variables not being included in the models underlying the decomposition analysis due to their non-availability or non-applicability to the comparable non-Indigenous sample. These are living in remote/very remote areas, household tenure, speaking an Indigenous language at home and experience of removal from the natural family. It has been found in the analysis in the previous sections that Stolen Generation is a major contributing variable to the gap in health status between the Indigenous and non-Indigenous populations.

On the unadjusted means, Indigenous people are 15 percentage points less likely to report good health. The differences in the estimated effects of all the variables can

account for six percentage points of that 15 percentage point difference. Only a minor fraction of this is attributable to differences in the effects of the socio-economic and behavioural variables that might be considered potential instruments of policy. Rather, it seems that differences in the effect of aging on health status between the Indigenous and non-Indigenous population play an important part. Table 4.6 shows that the health of Indigenous people drops off much more rapidly with age for Indigenous people than it does for non-Indigenous people.

4.8 Conclusion

The results reveal that Indigenous Australians are significantly more likely to report their health status as fair or poor compared to non-Indigenous Australians. This is true irrespective of area of residence, main language spoken at home and being a member of the Stolen Generation or otherwise. This result is robust to alternate datasets and estimation methods. Also, self-assessed health appears to be a valid measure of health status for Indigenous Australians, in the sense that differences in self-assessed health between the two populations correlate closely with differences in objective health measures.

Controlling for the mainstream factors like behaviour and socio-economic status reduces the difference but does not close the gap entirely. These variables could explain only one-fourth of the difference in the health status between the two populations. The result suggests that the employment status of Indigenous Australians has an impact on their health. Similar is the case with dependence on welfare for living and high risk alcohol consumption. The Indigenous specific determinant—membership of the Stolen Generation—is a major contributor to the gap in health status. Therefore unless policies are made that help to ease the trauma caused by the historical policy of removal of children from their natural families, the detrimental trans-generational effects are likely to continue and the gap remain unclosed.

Chapter 5

Chronic diseases, injury and Indigenous Australians

Chapter 4 discussed the factors contributing to the health status gap between Indigenous and non-Indigenous Australians with self-assessed health as the dependent variable. This chapter focuses on the factors affecting the objective health outcomes of Indigenous Australians and examines whether a gap also exists in objective health status between the Indigenous and non-Indigenous groups.

The 2004–05 NATSIHS collected data on whether each respondent currently had heart problems, diabetes, asthma and arthritis, and whether they had incurred an injury in the four weeks prior to the interview. These items are included in National Health Priority Areas (NHPA) and used as the objective health outcomes in this chapter. Not all the health priority areas in NHPA are included in this study due to data limitations.

Chapter 5 is structured as follows. The econometric models set out in Chapter 4 are used to test whether a gap exists in objective health status between Indigenous and non-Indigenous people. It then explores the contribution of demographic, behavioural, socio-economic and cultural factors to the gap between the two populations. Third, the chapter also examines specifically the health status of Indigenous people: (a) living in remote and non-remote areas; (b) who speak English or an Indigenous language at home; and (c) who experienced removal from their natural families and those who did not experience any removal relative to the non-Indigenous people.

5.1 Estimating the determinants of objective health outcomes

As in Chapter 4 data from the 2004–05 NATSIHS and 2004–05 NHS are used to examine the risk factors of the chronic diseases and injury and whether these are different for the two populations, and to estimate their contribution to any gap in health status between the two groups. A similar analysis is conducted using data from the 2001 NHS to check whether the results are consistent across the surveys.

People were classified as having heart problems, diabetes, asthma or arthritis if, in the 2004–05 NATSIHS, they reported that they currently have the disease (refer to Appendix Table A4.1). People were classified as having an injury if they reported having sustained an injury in the previous four weeks. The response to the dependent variable question is classified as a binary variable that is, having the disease/injury or no disease/no injury. For each of the conditions, the dependent variable takes on a value of 1 if the individual indicates they have the chronic disease/injury or 0 otherwise. The binary logit model set out in Equations 4.5 and 4.6 in Chapter 4 is used to estimate the effects of the explanatory variables on objective health outcomes. The samples for the regression analysis were restricted to persons aged 18 or more and those who answered the question about objective health outcomes themselves.

5.1.1 Descriptive statistics

Table 5.1 shows the prevalence of chronic diseases and injury among Indigenous and non-Indigenous people aged 18 years or over and who answered the survey questions themselves.

Table 5.1 shows that the distribution of chronic diseases and injury is similar across the different datasets used. Estimates from both datasets show that Indigenous Australians are significantly more likely to be affected by asthma and diabetes when compared to non-Indigenous Australians. However, Indigenous people appear to have a lower incidence of heart problems compared to non-Indigenous people.

Table 5.1 Objective health outcomes by Indigenous status

Health variable	2004–05 NATSIHS		2001 NHS	
	Indigenous (%)	Non-Indigenous (%)	Indigenous (%)	Non-Indigenous (%)
Arthritis	16	20	Not available	Not available
Asthma	16	10	17	11
Diabetes	11	5	9	4
Heart problems	23	27	19	26
Injury	16	17	11	10

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey, 2004–05 National Health Survey, 2001 National Health Survey (Indigenous), and 2001 National Health Survey (General)

1. t-tests assessing the significance of the difference between the means for the Indigenous and non-Indigenous populations are significant in all cases with the exception of injury for the 2001 NHS.
2. Estimates in the table are calculated using ABS provided population weights.

5.2 Binary logit model results

Binary logit models are estimated with the pooled Indigenous and non-Indigenous samples and with the dependent variables representing the presence of heart problems, diabetes, asthma, arthritis and injury. The pooling allows the inclusion of a variable for Indigenous status to capture any gap in objective health status between the Indigenous and non-Indigenous populations, and to assess whether differences in objective health that are initially observed between the two samples diminish when adjustment is made for demographic, behavioural, socio-economic and cultural variables. Table 5.2 reports marginal effects on the Indigenous status indicator, while the full results for the model are reported in Appendix (Tables A5.1 to A5.5). The four sets of independent variables are progressively added to assess their contribution to objective health outcomes. Descriptions of the independent variables are provided in Chapter 4. In Table 5.2, a positive marginal effect indicates that Indigenous people are estimated to have a higher chance of having that particular objective health outcome than non-Indigenous people (the comparison category).

Table 5.2: Marginal effect of being Indigenous and chronic diseases/injury (binary logit model)

Disease/injury	Variables	1 Indigenous status &gender	2 + Demo-graphic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Heart problems	Indigenous Status	-0.06***	0.06***	0.06***	0.05***	0.02
Diabetes	Indigenous Status	0.08***	0.09***	0.08***	0.08***	0.07***
Asthma	Indigenous Status	0.05***	0.07***	0.06***	0.04***	0.03***
Arthritis	Indigenous Status	-0.06***	0.08***	0.07***	0.03**	0.01
Injury	Indigenous Status	-0.02***	-0.02***	-0.01*	-0.01	-0.03**
Observations used		**18212**	**18212**	**18212**	**18212**	**18212**

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result in the Appendix (Tables A5.1 to A5.5)
3. In all the models, the Likelihood Ratio Chi-square test that all the regression coefficients are equal to zero is rejected at 1% level.

Once the demographic variables are controlled for, Indigenous people are worse off compared to the non-Indigenous for all the chronic diseases. This suggests that even though Indigenous people are younger compared to the non-Indigenous they are affected with the chronic diseases at a younger age. Indigenous people are 6 to 9% more likely to have chronic diseases compared to the non-Indigenous.

Australia has one of the highest recorded rates of diabetes in the developed world (Dunstan et al. 2002) and Indigenous Australians have the fourth highest rate of Type 2 diabetes in the world. Compared to non-Indigenous people, the disease is highly prevalent among Indigenous Australians (de Courten et al. 1998; McDermott, Campbell, and McCulloch 2008). The binary logit analysis in Table 5.2 shows that for diabetes none of the variables in the models contribute much to

the gap. The full results suggest that diabetes is particularly more prevalent among people living in remote areas (see Appendix Table A5.2).

Metabolic and lifestyle factors like smoking and physical inactivity are classically considered as major risk factors for diabetes (Willi et al. 2007; Magliano 2008). BMI is found to be an important risk factor for Type 2 diabetes among Indigenous Australians. In this study BMI variables were added to the models to check for their contribution to the gap but were not found to contribute much to the gap (the marginal effect changes from 0.07 to 0.06—not shown in Table 5.2). The Indigenous people in the lowest BMI category showed higher incidence of diabetes than corresponding rates for non-Indigenous people suggesting that the optimal range of BMI is likely to be lower than that suggested for non-Indigenous people (Daniel et al. 1999).

The factors contributing to the gap in diabetes between Indigenous and non-Indigenous people remain unclear. The question of what else could contribute to the difference arises. Evidence suggests that C-reactive protein, an emerging risk factor for CVD, is independently associated with the development of diabetes in Indigenous people (Wang and Hoy 2007). Though not empirically confirmed, Longstreet et al. (2007) opined that low magnesium intake (through diet and inadequate magnesium replenishment in drinking water) may be a potential contributor to diabetes among Indigenous people in Australia. Is the poor access to healthcare services (or lack of culturally appropriate services) such as prevention, early detection and treatment causing the gap? Further analysis with relevant data is required to ascertain the role of the factors mentioned above. Diabetic complications could lead to kidney and heart diseases and is thus highly relevant to finding the factors behind the high prevalence of the disease among Indigenous Australians.

In the case of heart disease, the socio-economic and cultural factors contribute to the gap between the Indigenous and non-Indigenous population. The contribution of the cultural factors is higher compared to the socio-economic factors. Heart disease is more prevalent among people living in remote areas and among the relatives of Stolen Generation members.

In the case of asthma, behavioural, socio-economic and cultural variables reduce the gap between Indigenous and non-Indigenous people, but Indigenous people are still estimated to have a significantly higher incidence. Asthma is significantly higher among Indigenous people who were themselves removed from the natural family. As in the case of diabetes there are other factors which cause the health status gap between the two populations.

Behavioural, socio-economic and cultural factors contribute to the gap in the case of arthritis. Unlike the cases of diabetes and heart disease, the prevalence of arthritis is not higher among those who live in remote areas. But arthritis is higher among Indigenous people who had relatives removed from their natural families.

Injury from various sources is reported as a major health issue among Indigenous communities in Australia (Ivers et al. 2008). Injury rates for Indigenous people are higher than for non-Indigenous people (Helps and Harrison 2006; Clapham, Stevenson, and Lo 2006). Contrary to expectations, Indigenous people in this study are estimated to be less likely to incur an injury than the non-Indigenous. A possible reason for the deviation in the result may be that the injury data used for the estimation is self-reported. The studies which have examined the injury rate among Indigenous people have used either hospital separations data or mortality data. The lower prevalence of injury could also be because major injuries are lower among Indigenous compared to non-Indigenous people as suggested by Irie, Pollard, and Bellamy (2010) based on data from the Queensland Trauma registry. Also, there may exist a selection bias as people who are injured could be either in the hospital or even deceased. The 2004–05 NATSIHS has not collected data from Indigenous people living in hospitals. Existing literature supports

this by the finding that the Indigenous population is more likely to die or to be hospitalized due to injury than the non-Indigenous population (Moller, Thomson, and Brooks 2004; Berry, Nearmy, and Harrison 2007).

The pooled binary logit estimates based on 2001 NHS data also show results similar to 2004–05 NATSIHS (refer Appendix Table A5.6). The Stolen Generation data were not collected in 2001 NHS and hence not included in the analysis. This accounts for the slight differences between 2004–05 NATSIHS and 2001 NHS results.

To test whether these results differ for Indigenous people living in remote areas and those living in non-remote areas, the same models are again estimated with Indigenous status now captured by two separate dummy variables (see Table 5.3). For each of these two dummy variables—Indigenous persons living in remote areas and Indigenous persons living in non-remote areas—the comparison category consists of all non-Indigenous persons.

Once the demographic variables are controlled for, the prevalence of all the chronic diseases are higher among the non-remote Indigenous people compared to the non-Indigenous people. For heart disease socio-economic and cultural factors contributed to the gap and as in Table 5.2 the major part of the gap is accounted for by the inclusion of cultural factors. In the case of arthritis, behavioural, socio-economic and cultural factors close the gap between the Indigenous and non-Indigenous people. Behaviour, socio-economic and cultural factors contribute to the gap in the case of non-remote area asthma but a large gap still remains unexplained. For diabetes in non-remote areas a wide gap remains but a slight contribution of the socio-economic and cultural variables is noted. Therefore, there exist factors other than behaviour, socio-economic and cultural factors that affect diabetes and asthma.

In the case of heart disease and diabetes, the remote Indigenous people have worse health compared to the non-Indigenous people and the gap remains largely unexplained. According to 2004–05 NATSIHS the prevalence of diabetes is 1.5 times higher in

remote areas compared to non-remote areas. As has been done in the previous section, the contribution of BMI to the gap in the diabetes status is estimated (marginal effects are 0.11*** for remote Indigenous people and 0.05*** for non-remote Indigenous people). Despite controlling for BMI, a large gap still remains unexplained. In the case of asthma, no significant difference exists and in the case of arthritis, the Indigenous people living in remote areas are better off compared to the non-Indigenous people.

According to Booth and Carroll (2005a) socio-economic factors contributed approximately one-fifth of the diabetes gap between the Indigenous people living in remote and non-remote areas and non-Indigenous people. In the present study the contribution of SES ranges from one-seventh in non-remote areas to one-eleventh in remote areas. Poor access to healthcare services in remote areas including prevention, screening and specialist services could contribute to the higher burden of heart disease and diabetes among remote Indigenous people.

In the case of injury, the lower incidence experienced by Indigenous people relative to non-indigenous people applies to those living in remote and non-remote areas.

Table 5.3: Marginal effect of being Indigenous by geography and chronic diseases/injury (binary logit model)

Disease/Injury	Variables	1 Indigenous status and gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Heart problems	Non-remote Indigenous	-0.06***	0.06***	0.06***	0.05***	0.02
	Remote Indigenous	-0.05***	0.06***	0.07***	0.07***	0.05**
Diabetes	Non-remote Indigenous	0.06***	0.09***	0.09***	0.08***	0.07***
	Remote Indigenous	0.12***	0.16***	0.15***	0.14***	0.14***
Asthma	Non-remote Indigenous	0.08***	0.07***	0.06***	0.05***	0.04***
	Remote Indigenous	0.01	0.003	-0.01	-0.01	-0.01
Arthritis	Non-remote Indigenous	-0.01	0.10***	0.08***	0.04***	0.02
	Remote Indigenous	-0.12***	-0.04***	-0.06***	-0.07***	-0.06***
Injury	Non-remote Indigenous	0.01	-0.01*	-0.01	-0.002	-0.02*
	Remote Indigenous	-0.07***	-0.08***	-0.07***	-0.06***	-0.06***
Observations used		**18212**	**18212**	**18212**	**18212**	**18212**

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full results not included
3. In all the models, the Likelihood Ratio Chi-square test that all the regression coefficients are equal to zero is rejected at 1% level.

Table 5.4 reports the results when Indigenous status is further distinguished according to whether the individual speaks an Indigenous language at home as opposed to English. Once the demographic variables are controlled for, Indigenous people who speak English as their main language suffer more from all the chronic diseases when compared to the non-Indigenous. For heart problems, socio-economic and cultural factors close the gap between the two populations. Cultural factors are the major contributor to the gap. In the case of diabetes, none of the variables (other than a small contribution from cultural factors) contribute to the gap. Behaviour, socio-economic and cultural factors contribute to a little less than half the gap between the two populations in the case of asthma, leaving the other half unexplained. In case of arthritis, behaviour, socio-economic and cultural factors explain the gap.

Once the demographic variables are controlled for, no significant difference exists in the case of heart disease, asthma and arthritis between Indigenous people speaking an Indigenous language at home and the non-Indigenous. For diabetes, all the variables contribute slightly but a large gap still remains unexplained.

The result for diabetes is similar to the general results shown in Table 5.2 and geography results shown in Table 5.3. The speaking of an Indigenous language is more prevalent in the remote areas compared to non-remote areas but the results for heart problems differ from those living in remote areas. The results for those speaking English as the main language at home and those living in non-remote areas are similar.

Table 5.4 Marginal effect of being Indigenous by the main language spoken at home and chronic diseases/injury (binary logit model)

Disease/Injury	Variables	1 Indigenous status and gender	2 + demographic variables	3 + behavioural variables	4 + socio-economic variables	5 + cultural variables
Heart problems	English	-0.06***	0.06***	0.06***	0.05***	0.02
	Indigenous Language	-0.04**	0.04	0.04	0.02	0.01
Diabetes	English	0.07***	0.09***	0.09***	0.09***	0.07***
	Indigenous Language	0.15***	0.11***	0.09***	0.08***	0.07***
Asthma	English	0.06***	0.07***	0.06***	0.04***	0.04***
	Indigenous Language	-0.01	0.03	0.02	0.01	0.01
Arthritis	English	-0.04***	0.09***	0.07***	0.03***	0.01
	Indigenous Language	-1.14***	-0.03	-0.05**	-0.07***	-0.07***
Injury	English	-0.00	-0.02**	-0.01	-0.01	-0.02*
	Indigenous language	-0.11***	-0.10***	-0.08***	-0.08***	-0.08***
Observations used		**18212**	**18212**	**18212**	**18212**	**18212**

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full results not included
3. In all the models, the Likelihood Ratio Chi-square test that all the regression coefficients are equal to zero is rejected at 1% level.

In the case of injury, Indigenous people speaking English or an Indigenous language are better-off compared to non-Indigenous people.

Finally, the distinction is made between Indigenous people according to their association with the Stolen Generation (see Table 5.5). In the cases of diabetes and asthma a significant gap exists between Indigenous people who were themselves removed from their natural families and non-Indigenous people once the demographic variables are controlled for. Among the Indigenous people removed from their natural families, the gaps in diabetes and asthma remain unexplained.

Once the demographic variables are controlled for, a significant gap exists in the case of all the chronic diseases between Indigenous people who had relatives removed from natural families and non-Indigenous people. For those who had relatives removed from their natural families, the gaps in heart disease and diabetes remain unexplained. In the case of asthma, the behaviour, socio-economic and cultural factors explain some of the gap but there still exists a significant and unexplained gap for each of the three Indigenous groups. Behaviour and socio-economic factors explain the gap in the case of arthritis.

Table 5.5 Marginal effect of being Indigenous by the removal from the natural families and chronic diseases/injury (binary logit model)

Disease/Injury	Variables	1 Indigenous status and gender	2 + demographic variables	3 + behavioural variables	4 + socio-economic variables	5 + cultural variables
Heart problems	Oneself removed	0.09***	0.01	0.01	-0.00	-0.00
	Relatives removed	-0.06***	0.08***	0.08***	0.08***	0.08***
	No removal experience	-0.07***	0.04***	0.04***	0.02	0.02
Diabetes	Oneself removed	0.09***	0.03***	0.03***	0.02***	0.02***
	Relatives removed	0.06***	0.09***	0.09***	0.09***	0.09***
	No removal experience	0.08***	0.08***	0.08***	0.07***	0.07***
Asthma	Oneself removed	0.05**	0.05**	0.05**	0.05**	0.04**
	Relatives removed	0.05***	0.06***	0.05***	0.04***	0.03***
	No removal experience	0.04***	0.06***	0.05***	0.04***	0.03***
Arthritis	Oneself removed	0.05*	-0.02	-0.03	-0.03*	-0.03*
	Relatives removed	-0.04***	0.12***	0.10***	0.06***	-0.06***
	No removal experience	-0.08***	0.06***	0.04***	0.00	0.01
Injury	Oneself removed	-0.05***	-0.04*	-0.03	-0.03	-0.03
	No removal experience	-0.05***	-0.04***	-0.03***	-0.03***	-0.03**
Observations used		**18212**	**18212**	**18212**	**18212**	**18212**

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full results not included
3. In all the models, the Likelihood Ratio Chi-square test that all the regression coefficients are equal to zero is rejected at 1% level.

Socio-economic factors close the gap in heart disease between Indigenous people who did not experience any removal and non-Indigenous people. For those who did not experience any removal none of the variables explained the gap in diabetes. This result is consistent with that of the Stolen Generation. Behavioural, socio-economic and cultural factors explain only half the gap in asthma and the other half remains unexplained. In the case of arthritis, behavioural and socio-economic factors explain the gap.

The three groups of Indigenous people are better-off compared to non-Indigenous in the case of injury.

Table 5.2 shows that gaps exist in the prevalence of chronic diseases between Indigenous and non-Indigenous people. For the results reported in Tables 5.6 and 5.7, the binary logit models are estimated separately for the Indigenous and non-Indigenous populations, thus allowing the effects of the demographic, behavioural, socio-economic and cultural variables on objective health status to vary between the two populations. Table 5.6 reports models for Indigenous Australians only and with the full set of independent variables available for this group. Table 5.7 provides a comparison of Indigenous and non-Indigenous estimates with the independent variables limited to those available to for both populations.

Table 5.6 Marginal effects for chronic disease/injury: Indigenous Australia

Variables	Heart	Estimate	Diabetes	Estimate	Asthma	Estimate	Arthritis	Estimate	Injury	Estimate
Male	-0.05	***	-0.00		-0.11	***	-0.02	**	0.01	
18–24 years	-0.12	***	-0.07	***	0.03		-0.08	***	0.03	*
25–34 years	-		-		-		-		-	
35–44 years	0.12	***	0.06	***	-0.01		0.07	***	-0.01	
45–54 years	0.23	***	0.16	***	0.03		0.17	***	-0.00	
55-–64 years	0.33	***	0.19	***	0.05		0.27	***	-0.06	***
65 years and above	0.39	***	0.19	***	0.02		0.34	***	-0.05	*
Married	0.03		0.01		-0.02		0.03	*	0.00	
Couple with children	-0.06	***	-0.03	***	-0.01		0.00		0.02	
Couple with no children	-0.02		-0.01		-0.00		-0.00		0.01	
Lone parent family	-0.03		-0.03	**	-0.02		0.03		0.02	
Lone person	0.01		-0.02		0.02		0.05	*	0.01	
Other households	-		-		-		-		-	
Remote and very remote areas	0.02		0.04	***	-0.06	***	-0.07	***	-0.03	**
Low risk alcohol consumption	-		-		-		-		-	
Medium risk alcohol consumption	-0.00		-0.03		-0.02		-0.02		-0.00	
High risk alcohol consumption	0.00		-0.02		0.00		0.04		0.04	*
Last consumption of alcohol—one week to less than 12 months ago	0.03		0.01		0.00		0.02		-0.02	
Last consumption of alcohol—12 months or more ago	0.00		0.02		0.00		0.01		-0.06	***
Never consumed alcohol	0.03		0.03	*	-0.04	**	0.03		-0.06	***
Smoker	-		-		-		-		-	
Ex-smoker	0.02		0.03	**	-0.01		-0.00		0.02	
Never smoked	-0.01		0.03	**	-0.03	*	-0.02		-0.01	
Exercise	-0.02		-0.02	*	-0.03	*	0.02		0.05	***
Consumption of non full-cream milk	0.04	**	0.05	***	-0.00		0.01		0.01	
Vegetable consumption	0.04		-0.06	**	-0.04		0.00		0.02	
Fruit consumption	-0.02		0.02		-0.02		-0.05	**	-0.00	

Variables	Heart Estimate		Diabetes Estimate		Asthma Estimate		Arthritis Estimate		Injury Estimate	
Education less than Year 10	0.06	***	0.02		0.02		0.02		0.00	
Year 10 education	-		-		-		-		-	
Year 12 education	0.01		0.01		-0.02		-0.04	**	0.02	
Vocational education	0.08	**	0.00		0.05	*	0.01		0.03	
Diploma	-0.03		-0.05	***	0.03		-0.03		0.01	
Degree	0.04		-0.00		-0.02		-0.03		0.02	
Employed full-time	-		-		-		-		-	
Employed part-time	0.02		0.04	**	-0.04	**	0.05	**	0.01	
Unemployed	0.04		0.03		-0.03		0.10	**	-0.02	
Not in labour force	0.10	***	0.03		-0.03		0.11	***	-0.01	
Weekly income	-0.00		-0.00	*	-0.00		-0.00		0.00	
Welfare—main source of income	-0.01		0.01		0.02		-0.02		0.03	
Household crowding			0.00		0.01		-0.02		-0.00	
Owner occupied houses	-0.01		-0.03	**	0.02		0.02		-0.02	*
Rental houses	-		-		-		-		-	
Other tenure	-0.06		-0.00		0.06		0.01		-0.02	
Multifamily households	-0.03		-0.03	**	-0.02		0.01		0.00	
English—main language spoken at home	-		-		-		-		-	
Indigenous language—main language spoken at home	-0.01		-0.02		-0.02		-0.06	***	-0.04	**
Other languages—main language spoken at home	-0.01		-0.07	***	0.01		-0.01		-0.02	
Person removed from natural family	-0.00		0.03	*	0.03		-0.02		-0.03	
Relatives removed from natural family	0.04	**	0.02		-0.001		0.04	***	0.03	**
Observations used	**3346**		**3346**		**3346**		**3346**		**3346**	
Likelihood Ratio (Pr > Chi2)	**559**	***	**439**	***	**169**	***	**512**	***	**183**	***

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '-' represents reference variables

An age gradient exists among Indigenous people with chronic diseases except for asthma. Therefore, as age increases, the prevalence of the disease also increases. Injury is significantly higher among the younger age group. In the case of asthma, arthritis and heart disease the prevalence is lower among Indigenous males compared to Indigenous females. Evidence suggests that arthritis and asthma is more common among females compared to males (Abramson et al. 1996; Access Economics 2005). In the case of heart disease, existing literature suggests that the female protective effect is not seen among the Indigenous population (Wang and Hoy 2004).

The prevalence of arthritis is higher among Indigenous people who are married and those living in lone person households. Compared to Indigenous people living in non-remote Australia, diabetes is higher among those living in remote/very remote areas. For asthma, arthritis and injury, living in remote areas shows a protective effect.

Compared to low risk drinkers the prevalence of injury is higher among high risk alcohol consumers. Injuries can be from accidents, violence or self harm. Evidence suggests that the proportion of serious injuries declines as the government restrictions on the legal access to alcohol increase (Margolis et al. 2011). Doing exercise increases the chances of getting injured. Diabetes is higher among Indigenous people who have never consumed alcohol, ex-smokers and those who have never smoked. Smoking is highly prevalent among Indigenous communities and international studies have suggested that constant exposure to passive smoke are associated with Type 2 diabetes (Zhang et al. 2011). This could be a reason why Indigenous people who have never smoked have a higher prevalence of diabetes.

Low or no education increases the prevalence of heart problems among Indigenous people but no such association is seen in the case of other objective health variables. Having a vocational education increases the chances of having heart problems and asthma. Whether these diseases are work related needs to be investigated. Compared

to the full-time employed, those with part-time employment are largely affected by diabetes and arthritis. Arthritis is also higher among the unemployed and the not in the labour force group. Indigenous people who are not in the labour force also suffer more from heart problems. These results may also reflect reverse causality as the diseases may have negative influences on the working capabilities. Studies have shown that as in other developed countries an inverse relationship exists between socio-economic status and diabetes among Indigenous Australians (Marmot et al. 1991; Robbins et al. 2001; Everson, Maty, and Lynch 2002; Cunningham et al. 2008). But the results in this chapter do not show any such clear cut relationship. Similar to the conclusion of Cunningham (2010c), the traditional socio-economic factors do not contribute to the prevalence of asthma among Indigenous Australians.

Relatives of people who were removed from their natural families show increased chances of being affected with heart disease, arthritis and injury. People who were themselves removed from their families also show an increased chance of being affected with diabetes.

Table 5.7 shows the marginal effects for Indigenous and non-Indigenous Australians. Only the variables available for both the Indigenous and non-Indigenous population are included in this logit analysis. Table 5.7 excludes the geography, tenure, language and Stolen Generation variables included in Table 5.6.

The prevalence of chronic diseases is significantly less among non-Indigenous males compared to females. Similar is the case with Indigenous people except for diabetes. An age gradient exists for heart problems, diabetes and arthritis among Indigenous and non-Indigenous people. That is, older people are more likely to be affected with these diseases. Among the non-Indigenous people, asthma is more prevalent among younger age groups but the reverse is the case among Indigenous people. The data for other Australians and people from other countries show that the prevalence of asthma is higher in children than in adults (Jenkins et al. 2009). The cumulative effects of three factors: life-long exposure to pulmonary toxicants, such as tobacco

smoke and infections; uncertainty among Indigenous Australians about the nature of the disease and of the diagnosis (probably a very significant factor, particularly in the very young and the elderly); and long-term under-treatment of asthma are speculated as reasons behind this disease pattern. Injury is higher among the younger age groups for Indigenous and non-Indigenous people.

Living alone in a house increases the risk of getting arthritis among Indigenous people. Non-Indigenous people living alone are more likely to be affected with heart problems and arthritis.

A positive association has been found with at least one of the alcohol consumption variables and chronic diseases among non-Indigenous people. But no such association is detected among Indigenous people except a weak association in the case of diabetes. Having never consumed alcohol reduced greatly the chances of getting injured among Indigenous and non-Indigenous people. This is similar to the results reported in the literature review. Compared to smokers, ex-smokers are affected more with diabetes among Indigenous and non-Indigenous people. Non-smokers have a significant association with heart disease among the non-Indigenous people but the results are not significant among the Indigenous people. Exercising increased the chances of getting injured among both the populations.

Table 5.7 Marginal effects for chronic disease/injury: Indigenous and non-Indigenous Australians

	Heart		Diabetes		Asthma		Arthritis		Injury	
Variables	**Non-Indigenous estimate**	**Indigenous estimate**	**Non-Indigenous estimate**	**Indigenous estimate**	**Non-Indigenous estimate**	**Indigenous estimate**	**Non-Indigenous estimate**	**Indigenous estimate**	**Non-Indigenous estimate**	**Indigenous estimate**
Male	-0.03 ***	-0.06 ***	0.02 ***	-0.00	-0.04 ***	-0.11 ***	-0.05 ***	-0.03 **	-0.00	0.01
18–24 years	-0.11 ***	-0.13 ***	-0.02 ***	-0.07 ***	0.02 *	0.03	-0.10 ***	-0.08 ***	0.03 ***	0.03 *
25–34 years	-	-	-	-	-	-	-	-	-	-
35-44 years	0.09 ***	0.12 ***	0.03 ***	0.07 ***	-0.02 ***	-0.00	0.13 ***	0.07 ***	-0.03 ***	-0.01
45–54 years	0.26 ***	0.23 ***	0.07 ***	0.16 ***	-0.02 **	0.04 *	0.30 ***	0.19 ***	-0.06 ***	-0.00
55–64 years	0.37 ***	0.33 ***	0.11 ***	0.20 ***	-0.02 ***	0.06 **	0.45 ***	0.29 ***	-0.06 ***	-0.07 ***
65 years and above	0.47 ***	0.38 ***	0.12 ***	0.20 ***	-0.04 ***	0.02	0.46 ***	0.34 ***	-0.08 ***	-0.06 **
Married	0.04 **	0.02	-0.01	0.01	-0.01	-0.06 **	0.01	0.01	-0.00	-0.01
Couple with children	-0.00	-0.06 ***	-0.00	-0.04 ***	0.01	-0.00	-0.00	0.03	-0.00	0.03
Couple with no children	0.02	-0.03	0.00	-0.02	0.02	0.01	0.02	0.03	0.01	0.02
Lone parent family	0.04	-0.03	-0.00	-0.03 ***	0.02	-0.01	0.01	0.05 *	0.01	0.03
Lone person	0.05 **	0.01	-0.00	-0.02	0.01	0.02	0.05 **	0.07 **	0.02	0.02
Other households	-	-	-	-	-	-	-	-	-	-
Low risk alcohol consumption	-	-	-	-	-	-	-	-	-	-
Medium risk alcohol consumption	0.03 **	-0.00	-0.003	-0.03	-0.01	-0.02	-0.003	-0.01	-0.00	-0.00
High risk alcohol consumption	0.01	0.00	-0.00	-0.02	0.01	-0.00	0.03 *	0.03	0.01	0.04

	Heart				Diabetes				Asthma				Arthritis				Injury			
Variables	**Non-Indigenous estimate**		**Indigenous estimate**		**Non-Indigenous estimate**		**Indigenous estimate**		**Non-Indigenous estimate**		**Indigenous estimate**		**Non-Indigenous estimate**		**Indigenous estimate**		**Non-Indigenous estimate**		**Indigenous estimate**	
Last consumption of alcohol—one week to less than 12 months ago	0.04	***	0.03		0.01	***	0.01		0.00		0.00		0.01		0.02		0.00		-0.02	
Last consumption of alcohol—12 months or more ago	0.05	***	0.002		0.03	***	0.03	*	0.03	***	-0.01		0.01		0.00		-0.03	**	-0.07	***
Never consumed alcohol	-0.01		0.03		0.03	***	0.04	**	-0.01		-0.05	***	-0.01		-0.00		-0.03	***	-0.08	***
Smoker	-		-		-		-		-		-		-		-		-		-	
Ex-smoker	0.05	***	0.02		0.00	*	0.03	**	0.01		-0.01		0.01		0.00		-0.01		0.02	
Never smoked	0.03	**	-0.01		-0.00		0.03	**	-0.01		-0.03	**	-0.03	***	-0.03	**	-0.01	*	-0.01	
Exercise	-0.03	***	-0.02		-0.01	**	-0.02	**	0.01		-0.02	*	-0.01		0.03	**	0.03	***	0.06	***
Consumption of non full-cream milk	0.06	***	0.04	*	0.02	***	0.04	***	0.01		0.01		0.01	**	0.03	*	0.00		0.02	
Vegetable consumption	0.01		0.04	*	0.01		-0.06	**	-0.05		-0.01		-0.06	**	0.05	**	-0.03		0.04	**
Fruit consumption	-0.02		-0.02		-0.00		0.01		-0.02		-0.02		-0.03	*	-0.05	**	0.04	***	-0.00	
Education less than Year 10	0.00		0.05	***	0.01	**	0.02		0.02	*	0.01		0.02	*	0.01		-0.02	**	0.00	
Year 10 education	-		-		-		-		-		-		-		-		-		-	
Year 12 education	-0.03	**	0.00		0.01		0.00		-0.00		-0.02		-0.04	***	-0.03	*	0.00		0.02	
Vocational education	-0.00		0.08	**	0.01	**	-0.00		0.00		0.05	**	-0.00		0.02		-0.00		0.03	
Diploma	-0.00		-0.03		-0.00		-0.05	***	0.01		0.04		-0.02	**	-0.02		0.01		0.02	

Variable	Heart		Diabetes		Asthma		Arthritis		Injury	
	Non-Indigenous estimate	Indigenous estimate	Non-Indigenous estimate	Indigenous estimate	Non-Indigenous estimate		Non-Indigenous estimate	Indigenous estimate	Non-Indigenous estimate	Indigenous estimate
Degree	-0.00	0.04	0.00	-0.00	0.01	-0.02	-0.04 ***	-0.02	-0.01	0.03
Employed full-time	-	-	-	-	-	-	-	-	-	-
Employed part-time	0.03 *	0.02	0.002	0.04 **	-0.01	-0.04 **	0.03 ***	0.04 *	-0.01	0.00
Unemployed	-0.04	0.04	0.002	0.04	-0.01	-0.03	0.05 *	0.10 **	0.00	-0.03
Not in labour force	0.05 ***	0.10 ***	0.01 **	0.02	0.00	-0.03	0.05 ***	0.12 ***	-0.02 **	-0.02
Weekly income	-0.00	-0.00	-0.00	-0.01 **	-0.00	-0.00	-0.00 *	0.00	-0.00	0.00
Welfare—main source of income	0.07 ***	-0.02	0.01 **	0.01	0.02 ***	0.02	0.04 ***	-0.01	0.00	0.04 *
Household crowding	0.02	0.00	-0.01	0.01	-0.01	-0.01	0.01	-0.04 **	0.00	-0.01
Multifamily households	0.03	-0.20	0.02	-0.03 **	0.04	-0.02	0.05	0.02	0.03	-0.00
Observations used	**14866**	**3346**	**14866**	**3346**	**14866**	**3346**	**14866**	**3346**	**14866**	**3346**
Likelihood Ratio (Pr > Chi2	**3445 *****	**549 *****	**1001 *****	**407 *****	**192 *****	**137 *****	**3404 *****	**434 *****	**336 *****	**157 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '-' represents reference variables

Having a vocational education increases the risk of injury and heart disease among the Indigenous people. Compared to those employed full-time, part-time employees, the unemployed and those not in the labour force are more likely to be affected with arthritis. This is true for both the populations. Being on welfare increased the chances of getting affected with the chronic diseases among non-Indigenous people. But this is not always the case among Indigenous people. The prevalence of injury is higher among Indigenous people who depend on welfare payment as the main source of income.

5.3 Conclusion

After controlling for demographic factors, Indigenous people have higher incidences of all four chronic diseases investigated when compared to non-Indigenous people. Indigenous people are better-off compared to non-Indigenous in the case of injury and this holds true for the different groups of Indigenous people analysed. This is contrary to the results of previous studies. As discussed in Section 5.2 this deviation could be because of the use of self-reported data or due to a selection bias. This chapter also finds that high risk alcohol consumption is a major contributing factor to the occurrence of injuries among Indigenous people. Living in remote areas is associated with a higher chance of having diabetes but no such relationship exists in the case of other chronic diseases. In fact, Indigenous people living in remote areas are better off in the case of asthma, arthritis and injury when compared to Indigenous people living in non-remote areas. For Indigenous people asthma is more prevalent among the older age groups whereas the reverse is the case among the non-Indigenous people. This result is consistent with some of the earlier studies.

None of the independent variables contributed substantially to the gap in diabetes between Indigenous and non-Indigenous people. This shows that there are other factors which contribute to the gap in diabetes status between the Indigenous and non-Indigenous people and it needs further investigation. In the case of other chronic diseases, the variable removal of oneself or relatives from the natural family is

associated with inferior outcomes, and this fact contributes significantly to the health gap between Indigenous and non-Indigenous people.

Chapter 6

Access to and utilisation of health services by Indigenous Australians

Chapters 4 and 5 look at the subjective and objective health outcomes of Indigenous people and examines the contribution of demographic, behavioural, socio-economic and cultural variables to the gap in these outcomes among Indigenous and non-Indigenous people. Chapter 4 shows that Indigenous Australians are more likely than non-Indigenous people to rate their health as 'fair' or 'poor'. The high prevalence and incidence of chronic and infectious diseases makes access to and utilisation of health services an essential determinant of good health among Indigenous people.

Australia provides publicly funded universal healthcare to its people. Theoretically Indigenous people can access mainstream health services or ACCHS. Despite this, evidence suggests that demographic, social, economic, cultural and healthcare system factors and government healthcare policies inhibit Indigenous people's access to healthcare. Understanding the barriers to accessing and utilising healthcare services is important in closing the health gap for Indigenous Australians.

This chapter investigates whether a gap exists in utilisation of healthcare services between Indigenous and non-Indigenous Australians and the contribution of demographic, behavioural, socio-economic and cultural variables to any differences in the pattern of utilisation. Just as there may be variations in the utilisation of healthcare services between the Indigenous and the non-Indigenous populations, there may also be variations within the Indigenous populations. Thus, the chapter estimates the existence of a gap in healthcare utilisation among Indigenous people: (a) living in remote and non-remote areas; (b) speaking English or an Indigenous language at home; (c) being, or being related to, a Stolen Generation member; and (d) those who have private health insurance and those who do not.

6.1 Estimating the determinants of access to and utilisation of health care services by Indigenous Australians

This section examines the factors affecting the access to and utilisation of healthcare services by Indigenous Australians using the 2004–05 NATSIHS. 'Utilisation' refers to the use of healthcare services. The following variables available in 2004–05 NATSIHS are used to derive the indicators of utilisation and unmet need:

1. Whether people consulted a doctor (GP or specialist) in the previous two weeks (dentist consultations are not included). Data is also available for time since last consulted a doctor with categories ranging from 2 weeks or less to 12 months or more.

2. Whether admitted to hospital in previous 12 months

3. Whether needed to go to hospital/doctor in the previous 12 months but didn't (dental care not included).

According to NATSIHS 2004–05, 80% of Indigenous people visited a doctor or were admitted to hospital in the previous 12 months. Utilisation was higher among Indigenous people living in non-remote areas when compared to remote areas (81% vs. 75%). This difference exists despite the prevalence of heart problems and diabetes being higher among the remote Indigenous people compared to those living in non-remote areas. Indigenous utilisation was lower than for non-Indigenous people (80% vs. 86%) despite their poorer health status. The results are similar when 2001 NHS is used (81% among Indigenous and 85% among non-Indigenous). This suggests there is unmet healthcare need and barriers in accessing healthcare services.

The 2004–05 NATSIHS asked Indigenous people whether they needed to go to a doctor or a hospital in the previous 12 months but didn't. Using this information, a variable called 'perceived unmet need' is derived. For deriving the variable, only the Indigenous people who required healthcare are included in the sample; that is, those who either consulted a doctor or were admitted to hospital in the previous 12 months or who reported needing to but didn't. According to 2004–05 NATSIHS, 4,789 of

5,757 Indigenous people required healthcare. Of the people who required healthcare, some utilised the services of a healthcare provider/facility and others did not utilise any due to various reasons. The Indigenous people who required healthcare but did not utilise any form the 'perceived unmet need' group. Being too busy due to work and personal or family responsibilities are cited by the survey respondents as major reasons for the perceived unmet healthcare need.

6.1.1 General model of healthcare service utilisation

Indigenous Australians face several barriers in accessing healthcare services and thus it is considered as an important determinant of their health outcomes. The model used in this thesis to understand the barriers faced by Indigenous and non-Indigenous Australians in accessing healthcare services is

$$U_i = f(\alpha D_i + \beta B_i + \gamma S_i + \delta C_i) \tag{6.1}$$

Where U_i is the utilisation/non-utilisation of healthcare services by individuals, D_i represents a set of demographic factors associated with that individual, B_i represents behavioural factors, S_i represents socio-economic factors and C_i represents cultural factors. 'Utilisation' refers to the use of healthcare services. Two different measures of 'utilisation/non-utilisation of healthcare' are modelled—visits to doctors/admission to hospital in the previous 12 months and perceived unmet healthcare need. In the binary logit model for visit to doctors/admission in hospital the dependent variable takes the value of one if the services of a health care facility or practitioner are utilised and zero otherwise. In the case of perceived unmet need the dependent variable takes the value of one if there is non-utilisation of health care when in need of it and zero otherwise. Data on perceived unmet healthcare need is not available for non-Indigenous people.

For analyzing the barriers, Andersen's behavioural model of health service use is used as a guide in selecting the variables which could affect health service utilisation (Andersen 1995). Andersen's model suggests that people's use of health services is a function of their predisposition to use services, factors which enable or impede use and their need for care. According to Andersen, the predisposing factors include demographic factors, social structure and health beliefs. The enabling factors include

availability of health personnel and facilities and the means and know-how to get to the healthcare facilities. The need for care can be either the perceived need of the people or the professionally evaluated need.

6.1.2 Explaining the gap in Indigenous and non-Indigenous healthcare service utilisation

The main aim of this chapter is to investigate and explain the gap in healthcare service utilisation between the Indigenous and non-Indigenous people. As with the models for health outcomes in Chapters 4 and 5, pooling Indigenous and non-Indigenous data permits the inclusion of a dummy variable to assess the gap in health service utilisation between Indigenous people and the non-Indigenous comparison category. It also helps to assess whether the differences in healthcare utilisation that are observed across the samples diminish when adjustment is made for differences in independent variables capturing demographic, behavioural, socio-economic and cultural factors.

$$U_i = f(\alpha I_i + \beta D_i + \gamma B_i + \delta S_i + \zeta C_i) \quad (6.2)$$

Where U_i is the healthcare utilisation and I is a dummy variable representing the individual's Indigenous status. The coefficient α then provides an estimate of the difference in healthcare utilisation associated with being Indigenous. As the independent variables (D, B, S and C) are progressively added to the model, the changes in the magnitude of α provide an indication of how much of the gap in utilisation is accounted for by these variables.

In a model of the form of Equation 6.2, the estimated coefficients on the independent variables are constrained to be the same for the Indigenous and non-Indigenous populations. That is, the model assumes that the demographic, behavioural, socio-economic and cultural factors have the same effect on utilisation for Indigenous people as they do for other Australians. Estimating a model of the form of Equation 6.1 separately for the Indigenous and non-Indigenous populations enables a comparison of the effects of independent variables on healthcare utilisation.

Similar to the case of health status, differences in utilisation of healthcare services among Indigenous people living in remote and non-remote areas, speaking English or

an Indigenous language as the main language at home and who experienced removal (of oneself or of relatives) from natural families are investigated. In addition this chapter also examines the differences in utilisation of healthcare services for those with and without private health insurance.

$$U = f(\alpha I_{NR} + \beta I_R + \gamma D + \delta B + \zeta S + \kappa C + \varepsilon) \quad (6.3)$$

$$U = f(\alpha I_{ENG} + \beta I_{IL} + \gamma D + \delta B + \zeta S + \kappa C + \varepsilon) \quad (6.4)$$

$$U = f(\alpha I_{IR} + \beta I_{RR} + \eta I_{NOR} + \gamma D + \delta B + \zeta S + \kappa C + \varepsilon) \quad (6.5)$$

$$U = f(\alpha I_{II} + \beta I_{NI} + \gamma D + \delta B + \zeta S + \kappa C + \varepsilon) \quad (6.6)$$

U is the utilisation/non-utilisation of healthcare services by individuals. In Equations 6.3 and 6.4 Indigenous status is now captured by two separate dummy variables: denoting Indigenous people living in non-remote areas (I_{NR}) and those living in remote areas (I_R) in Equation 6.3; and Indigenous people who speak English as the main language at home (I_{ENG}) and who mainly speak an Indigenous language at home (I_{IL}) in Equation 6.4. Equation 6.5 distinguishes between three groups of Indigenous Australians based on their experience with polices of removal: I_{IR} represents Indigenous people who were themselves removed from their natural families, I_{RR} Indigenous people who had relatives removed from their natural families, and I_{NOR} Indigenous people who did not experience any removal from their natural families. Equation 6.6 distinguishes between Indigenous people with private health insurance (I_{II}) and those with no private health insurance (I_{NI}).

6.2 Healthcare service utilisation—logit model results

The 'utilisation of healthcare services' and 'perceived unmet need' are used as the dependent variables in the analysis. As each is a binary dummy variable, the binary logit model is used. As the data (2004–05 NATSIHS) permits, a range of demographic, socio-economic behavioural and cultural variables and health status variables which can influence the healthcare utilisation of Indigenous people are included. Again, Andersen's model is used only as a guide and other variables thought relevant in the case of Indigenous Australians are also included.

The demographic variables include age, sex, marital status, geographical location of residence (remote or non-remote) and household structure. The socio-economic variables include educational attainment, employment status, income, welfare dependence, household tenure type, overcrowding of houses and private health insurance. The private health insurance variable is based upon whether or not the Indigenous people are currently covered by private health insurance. The behavioural health risk variables include smoking status, alcohol consumption status, dietary practices and exercise. A set of variables related to the culture and history of Indigenous people is also included to find its association with healthcare utilisation. The variables include whether the main language spoken at home is Indigenous, English or other languages, whether the respondent or their relatives were taken away from their natural families and whether living in a multifamily household. Chronic diseases/injury, and the body mass index are included as health status variables. With the exception of private health insurance, the definition of all of these variables is the same as that given in Chapter 4.

The samples for the regression analysis for 'utilisation of healthcare services' and 'perceived unmet need' are restricted to persons aged 18 or more and those who answered the survey questions themselves.

Table 6.1 reports the marginal effects from from the binary logit model for 'utilisation of healthcare services' estimated on the pooled Indigenous and non-Indigenous samples. The initial model, including only Indigenous status and gender, suggests Indigenous people are 6% less likely to utilise healthcare service, and this is highly significant. However, the subsequent addition of demographic variables contributes to the closing of the observed gap in the utilisation of healthcare services between Indigenous and non-Indigenous people.

Model 2 suggests those living in remote and very remote areas are 4% less likely to utilise healthcare services compared to those in non-remote areas. The gap in the utilisation between the two geographic locations becomes insignificant once the cultural factors are controlled for.

Indigenous people who had relatives removed from their natural families were marginally more likely to utilise healthcare services. This result is in contrast with the existing literature which suggests that lack of trust in governmental healthcare services as an aftermath of past assimilation policies often acts as a barrier to accessing healthcare services by all Indigenous Australians. Lower completion of treatment, receiving less than optimal treatment and poor follow up after treatment that is evident among Indigenous people could affect their health outcomes (Cunningham 2002; Cass et al. 2003; Ishak 2003; Kejriwal et al. 2004; AHMAC 2006; Thomas, Anderson and Kelaher 2008; Coory et al. 2008). Despite the higher levels of utilisation, the existence of institutional racism or cultural insecurity in the mainstream healthcare services as discussed in the literature could affect the effective utilisation of healthcare services and thus influence the health outcomes.

With addition of objective health conditions, a gap in the utilisation of healthcare services between Indigenous and non-Indigenous people is identified. The marginal effect is -0.02 and the result is significant (result not shown in Table 6.1). This suggests that Indigenous peoples' access to quality healthcare services for given health needs is less or there is unmet healthcare need among Indigenous people. The result also suggests that the utilisation of healthcare services by Indigenous people in general and Indigenous people who had relatives removed from their natural families is different.

The results of similar models based on 2001 NHS (Indigenous) and 2001 NHS (General) are reported in Table A6.1 in the Appendix. There are similarities in the results to that of Table 6.1. According to Model 1 in Table A6.1, the Indigenous people are 5% less likely to utilise healthcare services and this is highly significant. The demographic and behavioural factors contributed to about half the gap. The gap becomes insignificant on addition of cultural variables.

Table 6.1: Marginal effects on Indigenous status for utilisation of healthcare service

Variables	1 Indigenous status & gender		2 + Demographic variables		3 + Behavioural variables		4 + Socio-economic variables		5 + Cultural variables	
Indigenous Status	**-0.06**	*******	**-0.01**		**0.00**		**-0.00**		**-0.01**	
Male	-0.11	***	-0.10	***	-0.09	***	-0.08	***	-0.08	***
18–24 years			-0.01		-0.01		-0.01		-0.00	
24–34 years			-		-		-		-	
35–44 years			-0.01	**	-0.02	**	-0.02	**	-0.02	**
45–54 years			0.02	***	0.01	**	0.01	**	0.01	**
55–64 years			0.06	***	0.05	***	0.04	***	0.04	***
65 years and above			0.12	***	0.11	***	0.09	***	0.09	***
Married			0.01		0.00		0.01		0.01	
Couple with children			0.01		0.01		0.01		-0.00	
Couple with no children			0.02	**	0.01		0.01		0.00	
Lone parent family			0.02	*	0.02	*	0.01		0.00	
Lone person			0.01		0.01		-0.00		-0.00	
Other households			-		-		-		-	
Remote and very remote areas			-0.04	***	-0.03	***	-0.03	**	-0.01	
Low risk alcohol consumption					-		-		-	
Medium risk alcohol consumption					-0.01		-0.01		-0.01	
High risk alcohol consumption					-0.03	***	-0.03	***	-0.03	***

Variables	1 Indigenous status & gender	2 + Demographic variables	3 + Behavioural variables		4 + Socio-economic variables		5 + Cultural variables	
Last consumption of alcohol—one week to less than 12 months ago			0.00		-0.00		0.00	
Last consumption of alcohol—12 months or more ago			0.01		-0.00		0.00	
Never consumed alcohol			-0.04	***	-0.04	***	-0.04	***
Smoker			-		-		-	
Ex-smoker			0.02	***	0.02	***	0.02	***
Never smoked			-0.00		0.00		0.00	
Exercise			-0.00		0.00		0.00	
Consumption of non full-cream milk			0.04	***	0.04	***	0.04	***
Vegetable consumption			-0.02		-0.02		-0.03	**
Fruit consumption			0.01		0.01		0.01	
Education below Year 10					-0.00		-0.00	
Year 10 education					-		-	
Year 12 education					-0.00		-0.00	
Vocational education					0.00		-0.00	
Diploma					0.00		0.00	
Degree					-0.01		-0.01	
Employed full-time					-		-	
Employed part-time					-0.00		-0.00	
Unemployed					-0.02		-0.02	
Not in labour force					0.02	**	0.02	**

Variables	1 Indigenous status & gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables		5 + Cultural variables	
Weekly income				0.00		0.00	
Welfare—main source of income				0.03	***	0.03	***
Household crowding				-0.03	***	-0.03	***
Owner occupied houses				0.00		0.00	
Rental houses				-		-	
Other tenure				-0.02		-0.02	
Multifamily households						-0.01	
English—main language spoken at home						-	
Indigenous language—main language spoken at home						-0.02	
Other languages— main language spoken at home						0.01	
Person removed from natural family						0.01	
Relatives removed from natural family						0.02	***
Observations used	**18180**	**18180**	**18180**	**18180**		**18180**	
Likelihood Ratio (Pr > Chi2)	**480 *****	**1014 *****	**1142 *****	**1204 *****		**1218 *****	

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *.
2. '-' represents reference variables

The pooled estimates for different groups of Indigenous people are analysed to examine the differences in the utilisation of healthcare services among different groups of Indigenous people. Non-Indigenous people constitute the comparison category. The different groups of Indigenous people include:

1. Those living in remote and those who live in non-remote areas
2. Those who speak English and those who speak an Indigenous language as their main language at home.
3. Members and relatives of the Stolen Generation and those who did not experience any removal
4. Those having private health insurance and those who do not.

Table 6.2 Marginal effects on Indigenous status by geography for utilisation of healthcare service

Utilisation of healthcare services	1 Indigenous status	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Non-remote Indigenous	-0.03***	-0.00	0.00	0.00	-0.01
Remote Indigenous	-0.10***	-0.05***	-0.04***	-0.03**	-0.03**
Observations used	**18180**	**18180**	**18180**	**18180**	**18180**
Likelihood Ratio (Pr > Chi2)	**502 *****	**1013 *****	**1142 *****	**1203 *****	**1217 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result not included.

According to Table 6.2 Indigenous people living in non-remote areas utilise less healthcare services compared to the non-Indigenous. As is observed for Indigenous people in general, differences in demographic characteristics account for this gap in utilisation, but a significant gap reappears with the addition of objective health measures (marginal effect on addition of health variables is -0.02*). This may indicate the existence of unmet healthcare need among Indigenous people living in non-remote areas.

For those living in remote areas the initial gap in the utilisation of healthcare services between Indigenous and non-Indigenous Australians is much higher (-0.10 ***). The

factors contributing to the gap are different for Indigenous people living in remote areas. Demographic variables contribute to half the gap. The behavioural and socio-economic variables also contributed to the gap. The cultural variables do not contribute to the gap. Indigenous people who had relatives removed from their natural families utilised more healthcare services than those without.

One possible explanation for lower utilisation in remote and very remote areas is therefore that Indigenous people living in remote and very remote areas are healthier than those in non-remote areas. The results from Chapter 5 (Table 5.7) show that Indigenous people living in these areas have significantly higher prevalence of diabetes. But in the case of asthma, arthritis and injury the prevalence is significantly lower compared to that in non-remote areas. Existing literature is divided on the health status of Indigenous people living in remote and non-remote areas. Gruen and Yee (2005) emphasise that Indigenous people living in remote Indigenous communities face several health problems and they are mostly undiagnosed and/or untreated. Graham et al. (2007) find that Indigenous mothers living in remote areas are significantly less likely to have a healthy baby than mothers living in regional or urban areas. On the other hand, there is also a literature acknowledging the benefits of living in remote and very remote areas. Indigenous people living in very remote areas of Australia show lower all-cause, cardiovascular, diabetes and renal mortality rates than those in remote areas (Andreasyan and Hoy 2010). According to McDermott et al. (1998) Indigenous people living in homelands have more favourable health outcomes with respect to mortality, hospitalisation, hypertension, diabetes and injury than those living in more centralized settlements in Central Australia. In the Northern Territory, mortality from all causes and mortality and hospitalisation rates from cardiovascular disease are lower among people living in decentralized Indigenous communities or outstations.

The inclusion of objective health variables provides evidence of unmet healthcare need among remote Indigenous people (marginal effect on addition of health variables is -0.03**). This indicates that people living in these areas face a problem in accessing healthcare services. The availability of health professionals or healthcare facilities, which is an enabling factor in the utilisation of healthcare services, could not be controlled for in the models due to data limitations. But it is

evident from the existing literature that healthcare facilities are fewer in remote areas compared to non-remote areas (Thomas and Anderson, 2006). There also exists another possibility, that Indigenous people utilise the services of other healthcare professionals. The descriptive statistics do support this. According to 2004–05 NATSIHS, 22% of Indigenous people visited other health professionals in the previous two weeks and of those people 31% lived in remote areas and 18% in non-remote areas. The utilisation of services of other health care professionals like nurses, chemists, Indigenous health workers, traditional healers, physiotherapists and so on are not included in the utilisation variable due to data limitations. Also, the presence of mental health conditions is not controlled for in the analysis. According to Hunter (2007), Indigenous people living in rural and remote areas experience higher mental health disorders compared to those living in metropolitan areas.

Lastly, selection bias could be the reason behind the lower utilisation of healthcare services among Indigenous people living in remote and very remote areas. Indigenous people needing healthcare in remote areas may move to non-remote areas such that those who remain in these areas are comparatively healthier.

In Table 6.1, Indigenous people speaking an Indigenous language at home were estimated to utilise less of healthcare services but the result is not significant. Including Indigenous status by language allows testing of whether the factors contributing to health service utilisation are different for Indigenous people speaking English or who mostly speak an Indigenous language at home. Non-Indigenous people form the comparison category. The cultural variables used in the model include removal (of oneself or relatives) from the natural family and living in a multifamily household.

Table 6.3 Marginal effects on Indigenous status by the main language spoken at home for utilisation of healthcare service

Utilisation of healthcare services	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
English	-0.04***	-0.01	0.00	0.00	-0.01
Indigenous language	-0.13***	-0.05***	-0.04*	-0.03*	-0.04*
Observations used	**18180**	**18180**	**18180**	**18180**	**18180**
Likelihood Ratio (Pr > Chi2	**500 *****	**1021 *****	**1148 *****	**1208 *****	**1216 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result not included.

Table 6.3 shows that Indigenous people who spoke mostly English utilise less healthcare services compared to non-Indigenous people and this difference can be accounted for by differences in demographic characteristics. The addition of objective health conditions further increases the gap in the utilisation of healthcare services between Indigenous and non-Indigenous people. Thus there appears to be unmet healthcare need among Indigenous people whose main language is English (On addition of health variables Indigenous people who speak English are estimated to be 2% less likely to utilise healthcare services and that is significant). This shows that there are factors other than language which act as barriers in accessing healthcare services.

Indigenous people who speak an Indigenous language at home face a much higher and significant gap in health care utilisation compared to non-Indigenous people. The demographic variables explain more than half the gap between Indigenous and non-Indigenous people. The behavioural and socio-economic factors also contribute to the gap. But the gap again increases after controlling for cultural and health variables. Once again**,** the utilisation of healthcare services is higher among those who had relatives removed from their natural families and there is also evidence of an unmet healthcare need among Indigenous people who speak an Indigenous language at home (marginal effect on addition of health variables is -0.04**). The majority of the people who speak an Indigenous language at home live in remote

areas. Some of the unmet healthcare need could be explained by visits to the other healthcare professionals, as discussed above.

Table 6.4 Marginal effects on Indigenous status by the removal (of oneself or relatives) from the natural family for utilisation of healthcare service

Utilisation of healthcare services	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Indigenous person removed from natural family	0.01	0.00	0.01	0.00	0.00
Relatives removed from natural family	-0.04***	0.01	0.01*	0.01	0.01
Indigenous people who did not experience any removal from the natural family	-0.08***	-0.02**	-0.01	-0.02	-0.01
Observations used	**18180**	**18180**	**18180**	**18180**	**18180**
Likelihood Ratio (Pr > Chi2	**492 *****	**1022 *****	**1151 *****	**1212 *****	**1218 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result not included.

Table 6.4 shows that there exists no significant gap in the utilisation of healthcare services between Indigenous people who were removed from their natural family and non-Indigenous people. Among those who had relatives removed from the natural families, a significant gap exists in the utilisation of healthcare services compared to non-Indigenous people, but it is accounted for by differences in demographic characteristics. There is no gap in healthcare service utilisation by Indigenous people who experienced removal when the objective health variables are controlled for. This suggests that there is no unmet need among the people who experienced removal from their natural families.

Strongest evidence of a significant gap in the utilisation of healthcare services is found among those who did not experience any removal from the natural family. The demographic variables contributed to the majority of the gap. The rest of the gap is filled by the behavioural factors. Adding the objective health variables again increased the gap suggesting unmet healthcare need among Indigenous people who

did not experience any removal from their natural families (marginal effect on addition of health variables is -0.02**).

Next, private insurance is added as a variable to the pooled binary logit models to examine its contribution to the health service utilisation. The data on private health insurance are not available for Indigenous people living in remote areas. Therefore only the non-remote data is included for the analysis. According to 2004–05 NATSIHS, 51% of non-Indigenous Australians have private health insurance compared to 14% of Indigenous people in non-remote areas. The non-remote sample consists of 18,859 non-Indigenous people and 3,307 Indigenous people.

Table 6.5 Marginal effects on Indigenous status for healthcare service utilisation (including private health insurance)

Utilisation of healthcare services	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio economic variables	5 + Insurance	6 + Cultural variables
Indigenous status	-0.04***	-0.01	0.00	-0.01	-0.01	-0.02
Observations used	**16459**	**16459**	**16459**	**16459**	**16459**	**16459**
Likelihood Ratio (Pr > Chi2	**413 *****	**905 *****	**1017 *****	**1075 *****	**1098 *****	**1109 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result not included.

As expected, the marginal effect on having private health insurance is positive (0.03) and highly significant. However, as Table 6.5 shows, controlling for whether or not individuals have private health insurance does not alter the picture we get of the differences in health service utilisation between Indigenous and non-Indigenous people. This is unsurprising given the small proportion of Indigenous people with private health insurance.

Table 6.6 Marginal effects on Indigenous status by insurance status for utilisation of healthcare services

Utilisation of healthcare services	1 Indigenous Insurance status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Have private health insurance	0.01	0.02 *	0.02 *	0.02	0.01
Have no private insurance	-0.04***	-0.01	-0.00	-0.01	-0.02*
Observations used	**16459**	**16459**	**16459**	**16459**	**16459**
Likelihood Ratio (Pr > Chi2)	**418 *****	**910 *****	**1020 *****	**1078 *****	**1088 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result not included

Table 6.6 shows that the utilisation of healthcare services is higher among Indigenous people with private health insurance compared to non-Indigenous people. Indigenous people are affected with diseases at a much younger age and those with private health insurance are more likely to utilise healthcare services compared to non-Indigenous people. A significant gap exists in the utilisation of healthcare services between Indigenous people with no private health insurance and non-Indigenous people suggesting unmet healthcare need (marginal effect on addition of health variables is -0.03***).

Tables 6.1 to 6.4 show that there exists a gap in the utilisation of healthcare services between the Indigenous and non-Indigenous people. The marginal effects in Table 6.7 show the association of demographic, behavioural, socio-economic, cultural and health variables with utilisation of healthcare services for Indigenous and non-Indigenous Australians. Two Indigenous models (A and C) are included in Table 6.7. The second, model B is added to facilitate comparison with non-Indigenous people. Models B and C include only those variables which are available for both the Indigenous and the non-Indigenous population. These models exclude geography, household tenure, main language spoken at home and experience of removal from the natural family.

Table 6.7 shows that the utilisation of healthcare services is lower among Indigenous men compared to Indigenous women after controlling for a set of demographic, behavioural, socio-economic and cultural factors. The result is consistent with the existing literature (Bayram et al. 2003). Evidence suggests that males are less likely to access healthcare for preventive services and they seek help for health problems only at a stage of crisis rather than at a stage when the disease could be effectively managed (Britt et al. 1999; Brown and Blashki 2005). Masculine characteristics such as sense of superiority, independence, self-reliance and dominance often act as a barrier to men accessing and using healthcare services (Smith, O'Hagan, and Gole 2006). An Australian study of the opinions of 15 GPs showed that men were reluctant to use their services because of lack of accessibility, work commitments and cost (Woods, Macdonald, and Campbell 2000).

According to 2004–05 NATSIHS, the prevalence of self-reported chronic diseases is higher among Indigenous females compared to Indigenous males. But the life expectancy of Indigenous males is lower than that of Indigenous females (ABS 2010). Predominance of female staff within the health sector, the lack of culturally appropriate and male specific health clinics, lack of cultural understanding by health staff, lack of ownership and control, shame in having certain diseases and the continuing destruction of men's usual roles within community and family life are some of the barriers faced by Indigenous males in accessing healthcare services (Burdekin 1993; Swan and Raphael 1995; Spry and Lowe 2002). Thus cultural and social factors shape the health seeking behaviour of men. The inability of healthcare services to provide acceptable and appropriate care act as barriers to men accessing healthcare services.

Table 6.7 Marginal effects for utilisation of healthcare services by Indigenous and non-Indigenous Australians

Variables	A Indigenous		B Non-Indigenous		C Indigenous	
Male	-0.10	***	-0.08	***	-0.10	***
18–24 years	-0.00		-0.01		0.00	
25–34 years	-		-		-	
35–44 years	0.00		-0.02	***	0.00	
45–54 years	0.05	**	0.01		0.05	***
55–64 years	0.08	***	0.04	***	0.08	***
65 years and above	0.11	***	0.08	***	0.11	***
Married	0.02		0.01		0.01	
Couple with children	0.01		-0.01		0.02	
Couple with no children	0.02		-0.00		0.02	
Lone parent family	-0.00		-0.00		0.01	
Lone person	-0.00		-0.01		0.00	
Other households	-		-		-	
Remote and very remote areas	-0.02					
Low risk alcohol consumption	-		-		-	
Medium risk alcohol consumption	0.01		-0.01		0.01	
High risk alcohol consumption	-0.04		-0.03	**	-0.04	
Last consumption of alcohol—one week to less than 12 months ago	-0.00		0.00		-0.00	
Last consumption of alcohol—12 months or more ago	0.00		0.00		-0.00	
Never consumed alcohol	-0.07	**	-0.03	**	-0.09	***
Smoker	-		-		-	
Ex-smoker	0.03		0.02	***	0.03	
Never smoked	0.01		-0.00		0.01	
Exercise	0.02		-0.00		0.02	
Consumption of non full-cream milk	0.04	**	0.04	***	0.04	**
Vegetable consumption	-0.02		-0.03		-0.01	
Fruit consumption	-0.00		0.01		-0.00	
Education below Year 10	-0.01		0.00		-0.01	
Year 10 education	-		-		-	
Year 12 education	0.02		-0.00		0.02	
Vocational education	-0.01		-0.00		-0.01	
Diploma	-0.02		0.00		-0.02	
Degree	-0.02		-0.01		-0.01	
Employed full-time	-		-		-	
Employed part-time	-0.02		-0.00		-0.02	
Unemployed	-0.06		-0.01		-0.06	
Not in labour force	0.01		0.02	**	0.01	
Weekly income	-0.00		0.00		0.00	
Welfare—main source of income	0.02		0.03	***	0.03	
Household crowding	-0.04	*	-0.02		-0.05	**
Owner occupied houses	-0.02					
Rental houses	-					

Variables	A Indigenous		B Non-Indigenous	C Indigenous
Other tenure	-0.04			
Multifamily households	-0.01		-0.02	-0.01
English—main language spoken at	-			
Indigenous language—-main	-0.02			
Other languages— main language	-0.02			
Person removed from natural	0.01			
Relatives removed from natural	0.03	**		
Observations used	**3331**		**14849**	**3331**
Likelihood Ratio (Pr > Chi2)	**176 *****		**1005 *****	**161 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '- ' refers to reference variables

An age gradient is seen in the utilisation of healthcare services. Older Indigenous people are more likely to utilise the healthcare services. Compared to low risk drinkers, utilisation is lower among Indigenous people who never consumed alcohol. This could be because they are healthier.

Living in crowded households reduces the chances of Indigenous people utilising healthcare services. Chapters 4 and 5 show that living in crowded households is not significantly associated with poor health. National and international literature shows an association between infectious diseases and crowding. The NATSIHS does not contain data on the presence of infectious diseases, but clearly the results are not consistent with crowding among Indigenous households leading to greater utilisation through this channel. Living in crowded households probably causes less stress among Indigenous people compared to the non-Indigenous. This could be one reason behind the lower utilisation of healthcare services by people living in crowded households. Also, the impact of overcrowding on health status may be different for adults and children. The effects on children are not known as the analysis is based on people aged 18 years or over. The exposure to infections is higher among Indigenous children living in overcrowded households (Leach et al. 1994).

In this study household crowding is measured as the number of extra bedrooms required to meet the proxy occupancy standard derived using Canadian National Occupancy Standard. This standard specifies the number of bedrooms required in a dwelling based on the numbers, age, sex and relationships of household members. The Canadian National Occupancy Standard need not be the appropriate method to measure overcrowding among Indigenous people with different culture and lifestyle.

Indigenous people who had relatives removed from their natural families utilise more healthcare services. For those who are directly removed the result is non-significant. The results are consistent with that of Table 6.4.

There are similarities and dissimilarities in the utilisation of healthcare services among Indigenous and non-Indigenous Australians. Males utilise healthcare services less among Indigenous and non-Indigenous people compared to females. The Indigenous and non-Indigenous people who never consumed alcohol utilise health care less. High risk non-Indigenous alcohol consumers utilised less healthcare services. The results are not significant for Indigenous people. Among the non-Indigenous people, those who are not in the labour force and those who depend on welfare for a living utilise more healthcare services but this is not evident among Indigenous people. Non-Indigenous ex-smokers also utilised more healthcare services.

A separate analysis is done to understand the healthcare utilisation of Indigenous people living in remote and non-remote areas. The results for utilisation of healthcare services are slightly different for Indigenous people living in remote and non-remote areas. The relative utilisation of healthcare services by males is low in both areas. Again, compared to low risk alcohol consumers, those who never consumed alcohol utilise less health care services in the remote areas. This could be because they are healthier. In remote areas, Indigenous people living in crowded and owner occupied households utilise less healthcare services. In the non-remote areas, those who are unemployed utilise health service less compared to those who are employed full-time. In the non-remote areas those who speak a language other than English as the main language at home utilise health services less. It could be because they have problems communicating with the health care provider. The 2002

NATSISS shows that 11% of Indigenous people face language difficulties when communicating with service providers.

6.2.1 Perceived unmet healthcare need

Tables 6.1 to 6.4, using health service utilisation data, suggest that there exists an unmet healthcare need (significant gap exists between Indigenous and non-Indigenous people after controlling for health variables) among Indigenous people when compared to non-Indigenous people. This prevailed among Indigenous people living in remote and non-remote areas, those who speak English or an Indigenous language as the main language at home and those who did not experience any forceful removal from their natural families.

Using 2004–05 NATSIHS, a variable called 'perceived unmet need' is derived which includes Indigenous people who required healthcare but did not utilise any. The 'perceived unmet need' thus derived refers to perceived healthcare need among Indigenous people for which care is not sought. The means for the variable show that perceived unmet need is higher among Indigenous people living in non-remote areas compared to those in remote areas.

Table 6.8 shows the logit coefficients for perceived unmet healthcare needs among Indigenous Australians. The logit model shows the association of demographic, behavioural, socio-economic and cultural variables with unmet healthcare need for Indigenous Australians. The marginal effects can be interpreted as the percentage change in the likelihood of perceived unmet demand.

Compared to Indigenous females, Indigenous males are 6% less likely to report perceived unmet need. This is consistent with the international literature. According to 2004–05 NATSIHS reporting of poor self-assessed health and chronic diseases is higher among Indigenous females compared to Indigenous males. The fact that women are primary caregivers of immediate or extended family members is likely to impede ability of women to seek healthcare for themselves.

High risk drinkers and abstainers of alcohol consumption (one week or more) also face unmet healthcare need. Alcohol use can cause serious health problems, accidents and injuries and can also lead to social problems like domestic violence and imprisonment. All this can increase the need for seeking healthcare. The fear of removal of children by child protection authorities on admission of alcoholism and related problems is likely to inhibit Indigenous people (especially women) accessing healthcare services. Alcoholism disrupts family life and strains relationships. Therefore alcoholics often lose support or persuasion of family members to seek healthcare when in need.

Higher education increases knowledge about disease and the need for healthcare services. The individual perception of need for healthcare services is likely to increase with higher education. Despite this, Indigenous people are unable to utilise healthcare services due to reasons like availability, affordability, acceptability or appropriateness. This may be the reason why higher perceived unmet healthcare need is reported among the better educated Indigenous people: higher education disproportionately affects awareness rather than access.

Table 6.8 Marginal effects for perceived unmet healthcare needs among Indigenous Australians

Variables	Indigenous	
Male	-0.06	***
18–24 years	-0.04	*
25–34 years	-	
35–44 years	0.00	
45–54 years	-0.03	
55–64 years	-0.07	***
65 years and above	-0.12	***
Married	-0.01	
Couple with children	-0.02	
Couple with no children	-0.02	
Lone parent family	-0.05	**
Lone person	0.04	
Other households	-	
Remote and very remote areas	-0.09	***
Low risk alcohol consumption	-	
Medium risk alcohol consumption	0.01	
High risk alcohol consumption	0.08	**
Last consumption of alcohol—one week to less than 12 months ago	0.06	***
Last consumption of alcohol—12 months or more ago	0.06	**
Never consumed alcohol	0.02	
Smoker	-	
Ex-smoker	-0.02	
Never smoked	-0.05	***
Exercise	0.02	
Consumption of non full-cream milk	-0.01	
Vegetable consumption	0.00	
Fruit consumption	-0.03	
Education below Year 10	-0.00	
Year 10 education	-	
Year 12 education	-0.02	
Vocational education	0.07	**
Diploma	-0.01	
Degree	0.08	**
Employed full-time	-	
Employed part-time	-0.01	
Unemployed	-0.01	
Not in labour force	0.01	
Weekly income	-0.00	
Welfare—main source of income	0.02	
Household crowding	-0.05	**
Owner occupied houses	-0.04	**
Rental houses	-	
Other tenure	0.02	
Multifamily households	0.00	
English—main language spoken at home	-	
Indigenous language—main language spoken at home	-0.05	*

Variables	Indigenous
Other languages—main language spoken at home	-0.03
Person removed from natural family	0.01
Relatives removed from natural family	0.10 ***
Observations used	**3346**
Likelihood Ratio (Pr > Chi2)	**233 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '- ' refers to reference variables

It has been argued that past assimilation policies made Indigenous people lose their trust in the institutions of the government including the health services. Removal from the natural family is a stressful life event and the trauma is passed on over generations. The distrust of the mainstream healthcare services is likely to be the reason behind higher perceived unmet need among Indigenous people who had relatives removed from their natural families.

Compared to Indigenous people living in non-remote areas those living in remote areas are significantly less likely to report an unmet need. This contradicts the common perception of lower service availability in remote areas.

Table 6.9 Marginal effects on Indigenous status by removal status for perceived unmet healthcare need

Utilisation of healthcare services	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Indigenous person removed from natural family	0.02	0.02	0.02	0.01	0.01
Relatives removed from natural family	0.13***	0.10***	0.12***	0.11***	0.10***
Observations used	**3346**	**3346**	**3346**	**3346**	**3346**
Likelihood Ratio (Pr > Chi2)	**90 *****	**129 *****	**163 *****	**195 *****	**210 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result not included.

Table 6.8 shows that Indigenous people who had relatives removed from their natural families have higher perceived unmet healthcare need. This holds in both the remote and non-remote areas. Table 6.9 shows that there exists perceived unmet healthcare need among Indigenous people who had relatives removed from their natural families compared to Indigenous people who did not experience any removal. The behavioural, socio-economic or cultural factors did not contribute to this gap. The cultural variables include the main language spoken at home and living in multifamily households.

It would be expected that Indigenous people who have private health insurance would be less likely to experience unmet needs. However, when the variable capturing insurance status is included no significant difference in the incidence of perceived unmet healthcare need is observed between those with and without private health insurance. In fact, the likelihood ratio test for the first model shows that the insurance status and gender variables are not jointly significant in explaining perceived unmet need.

Table 6.10 Marginal effects on Indigenous status by Insurance status for perceived unmet healthcare

Perceived unmet healthcare need	**1 Indigenous Insurance status &gender**	**2 + Demographic variables**	**3 + Behavioural variables**	**4 + Socio-economic variables**	**5 + Cultural variables**
Has private health insurance	-0.00	0.01	0.04	0.06*	0.07*
Observations used	**1990**	**1990**	**1990**	**1990**	**1990**
Likelihood Ratio (Pr > Chi2)	**3.5**	**46 *****	**67 *****	**96 *****	**118 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result not included

6.3 Conclusion

Healthcare utilisation is lower among Indigenous people when compared to non-Indigenous people. The lower utilisation of healthcare services despite poorer health status suggests that there is unmet healthcare need among Indigenous people, and

this is confirmed by the findings of lower rates of utilisation once objective health conditions are controlled for. The unmet health care need existed among Indigenous people living in remote and non-remote areas and those who speak English or an Indigenous language at home. This suggests that non-availability or communication problems are not the only barriers faced by Indigenous people while accessing healthcare services. In the 2004–05 NATSIHS data, 32% of Indigenous persons who reported needing healthcare did not access any.

The utilisation of healthcare services is less among males compared to females and the result is consistent with the existing literature. But, accounting for the objective health variables in the logit analysis suggests that there exists no greater unmet healthcare need for males. Also, perceived unmet healthcare need is less among males. Results from Chapter 4 show that Indigenous males are less likely to report poor self-assessed health compared to Indigenous females. Again, the results from Chapter 5 show that either Indigenous males are better off or there is no significant difference between males and females in the incidence of chronic diseases and injury. However, these results do not necessarily mean that Indigenous males are healthier than females, because the life expectancy of Indigenous males is lower than that of females. The difference in healthcare utilisation could also be because of the differences in health perceptions between the two sexes. Descriptive statistics from 2004–05 NATSIHS show that the majority of Indigenous males do not have male-specific health and well-being services in their local areas. It is evident from the literature that men are generally reluctant consumers of healthcare so the healthcare services need to be well occupied to deal with men's health issues appropriately.

Indigenous people living in remote areas utilised significantly less healthcare services. Controlling for the health variables suggest that there is unmet healthcare need among remote Indigenous Australians. Contrary to this result there is no perceived unmet need for those living in remote areas. Thus the results suggest either of the following: (a) remote Indigenous people are healthier compared to those living in other areas; (b) they are utilising the services of other healthcare providers; or (c) there exists a selection bias.

Among the Indigenous people living in non-remote areas only a small proportion (14%) have private health insurance in contrast to 51% among the non-Indigenous population. The pooled logit analysis suggests that Indigenous people with private health insurance show a significantly higher utilisation of health care services compared to non-Indigenous people once the demographic variables are controlled for. Also, no unmet healthcare need existed among those with private insurance. But in the case of perceived unmet healthcare need no significant difference exists between Indigenous people with or without private health insurance.

Contrary to the existing literature, the utilisation of healthcare services is higher among Indigenous people who had relatives removed from their natural families. This result persists irrespective of remote area status, the main language spoken at home or insurance status. There also exists no unmet healthcare need (after controlling for the health variables). Based on existing literature it is thought that Indigenous people who experienced removal from their natural families would utilise less healthcare services due to their mistrust in the government-run institutions. However, the results suggest that there is perceived unmet healthcare need among Indigenous people who had relatives removed from their natural families. This raises questions on the quality of healthcare services and the level of satisfaction received from these services and suggests that the existence of institutional racism and lack of cultural security could impact on the effective utilisation of healthcare services and thus influence the health outcomes.

Chapter 7

Stolen Generation members and health status

Chapters 4, 5 and 6 of this thesis show that the removal of Indigenous people or their relatives from their natural families is associated with poor subjective and objective health outcomes and a higher perceived unmet healthcare need. This association existed after controlling for demographic, behavioural, socio-economic and cultural factors.

In the analysis in those chapters, variables were included simultaneously to capture the effect of oneself having been removed, and of having relatives who were removed. The statistical association between removal was found to be strongest in the case of having family members who were removed. In Chapter 4, relatives of Stolen Generation members showed a significant association with poor self-assessed health (marginal effect, -0.06*** Table 4.6) relative to Indigenous Australians who did not report any experience of removal. Chapters 5 and 6 show that being related to a Stolen Generation member has a statistically significant association with heart disease (marginal effect, 0.04* Table 5.6), arthritis (marginal effect, 0.04*** Table 5.6), injury (marginal effect, 0.03** Table 5.6) and perceived unmet healthcare need (marginal effect, 0.10*** Table 6.8).

Those having been directly removed from their natural families by a mission, the government or welfare showed a statistically significant adverse effect only in the case of diabetes (marginal effect, 0.03* Table 5.6). It may appear counter-intuitive that the negative impacts of past removal should be stronger for those whose relatives were removed rather than for those who were removed directly. Note, however, that the sample for those directly removed is much lower, and substantially overlaps with those who had relatives removed. In the 2004-05 NATSIHS data, there were 1,432 Indigenous respondents who reported having had relatives removed, compared to just 282 who reported having been removed directly. Moreover, all but 40 of those who reported having been directly removed from their natural family,

also had relatives removed. Therefore the estimation of any separable effect of having been removed directly from having had relatives removed is based on a very small sample, and hence it is not surprising that this variable is insignificant in many of the models. It seems, then, that the experience of removal has a negative impact upon health outcomes for both those removed and those who had relatives removed, but it is not possible to discern any separable impact of direct removal in addition to the effect of being a relative of a member of the Stolen Generation.

Given this persistent finding of inferior health outcomes for those affected by policies of removal, and the inability to thus far account for it through other observable variables, this chapter looks in more detail at the health status and utilisation of healthcare services by members of the Stolen Generation and their relatives. The characteristics of those Indigenous people who experienced removal, either of themselves or their relatives, from their natural families and those who had not experienced removal are compared. For the reasons noted above, in this chapter the Stolen Generation are treated as a single group, and separate analysis for those directly removed and those who had relatives removed is not provided.

The chapter then analyses the existence of the gap in the health status and utilisation of healthcare services between the two groups of Indigenous people, and compares each group with non-Indigenous people. Differences in the pattern of factors affecting the health status and utilisation of healthcare services by Indigenous people who were (or relatives were) removed from their natural families are also investigated. Finally, the chapter provides a decomposition analysis of the differences in self-assessed health between Indigenous people who experienced removal from their natural families and Indigenous people who did not experience any removal.

7.1 The Stolen Generation

Between 1910 and 1970, Australian government authorities removed large numbers of Indigenous children from their families to ‘assimilate’ them to European society and culture. The Indigenous children were taken from their parents and through this

act the government believed that they could break the child's connection with their family and Indigenous culture and help them lose their aboriginality. The focus was particularly on Indigenous children of mixed descent. 'Neglected or unprotected by parents' was often cited as the reason for their removal. The children were forcibly taken without parental consent or consent obtained through threat, duress or undue influence (HREOC 1997). According to van Krieken (1999) "this policy has been described as 'cultural genocide' even though at the time it was presented by state and church authorities as being 'in the best interests' of Indigenous children". These children who were removed from their families became known as Stolen Generations.

The proportion of Indigenous children separated from their families remains a much debated issue. The 'Bringing them Home Report' (HREOC 1997) argues that between one in three and one in ten Indigenous children had been separated from their families between 1910 and 1970. Robert Manne (2001) states that the one in three possibility was derived from a number of local studies and is an exaggerated figure. According to him it is not correct to generalise the number of people removed across states and across decades based on small local studies. Manne (2001) feels that the estimate of one in ten is more realistic. Considerable confusion also exists regarding the absolute number of Indigenous children removed from their families between 1910 and 1970. It is often said that over the years, as many as 100,000 Indigenous children were forcibly separated, or 'taken away', from their families. Peter Read, examining the removal of Indigenous children in NSW between 1883 and 1869, arrived at a figure by extrapolating these figures to the country as a whole and suggested that 50,000 Indigenous children were removed (Manne 2001). Based on ABS 1994 figures, Manne (2001) estimated that between 20,000 and 25,000 Indigenous children were separated from their families between 1910 and 1970.

In 2005, the national rate of Indigenous children in out-of-home care was over six times the rate for other children. Of all the children in out-of-home care in 2004–05 (23,695 children), 5,678 (24%) identified as being of Indigenous origin (AIHW 2009). The Indigenous Placement Principle outlines a preference for the placement of Indigenous children with other Indigenous people when they are placed outside their family (Lock 1997). Despite these principles, Indigenous children being taken

from dysfunctional Indigenous families are being placed with white foster parents and in institutions. This raises fears of a second generation of stolen Indigenous children.

7.1.1 Assimilation policies and its implications for Indigenous people

The Indigenous children forcibly separated from their families faced social and cultural dislocation, with devastating impacts on the health and well-being of subsequent generations (Silburn et al. 2006). The children taken away from their families were denied contact with their Indigenous heritage and in some cases traumatised and abused. In this process many of the children lost their own Indigenous cultural identity.

Indigenous people separated from their natural families were more likely to have poor health status, higher incidence of arrests, alcohol or drug abuse problems, poor employment and educational outcomes and poor social support compared to those who were not separated (Majchrzak-Hamilton and Hamilton 1997; Hunter 2001; De Maio et al. 2005; Dockery 2009). Also Indigenous mothers who were removed from their natural families during childhood are more likely than other Indigenous mothers to be victims of violence (Cripps et al. 2009).

Indigenous families are pivotal to the well-being of Indigenous communities. Families play an important role in defining identity and a sense of connectedness to kinship and culture. The children forcibly removed were separated from their Indigenous family, community and culture and were not permitted to use their languages. The children were told they were unwanted, rejected or that their parents were dead or worthless. The removal of children contributed to the break-up of Indigenous families and erosion of security that the traditional family unit provided. The institutional care given to many children meant they had no experience of living in a family and it adversely affected their parenting and nurturing skills (HREOC 1997).

Analysing the intergenerational effects caused by policies of forced separation and removal using the WAACHS, Silburn et al (2006) found that a higher proportion of

those children whose primary caregivers were not forcibly separated from their natural family were at high risk of clinically significant emotional or behavioural difficulties compared to those children whose primary caregivers were not forcibly separated. Moreover, these children had higher levels of alcohol and drug use problems compared to those children whose primary caregivers had not been forcibly separated from their natural family.

Children removed from their natural families were often prevented or discouraged from identifying as Indigenous to ensure that they had a better chance of success in the mainstream community (Edwards and Read 1989; MacDonald 1995). Despite this, many chose to return to their people and reclaim their identity later on in their life. Clark (2000) through a qualitative analysis found that despite being removed from their families Indigenous people have sought out, recovered and or maintained their Indigenous identity in various ways. Dockery (2009) using 2002 NATSISS found that being a member of the Stolen Generation in fact has a small positive and significant effect on measured cultural attachment.

7.2 Estimating the determinants of health status and health service utilisation for those removed from natural families and those not removed

In 2004–05 NATSIHS, respondents were asked whether they had been taken away from their natural family by a mission, the government or welfare, and whether any of their relatives had had such an experience. Being a very sensitive and stressful issue, interviewers first checked whether individuals were willing to answer questions on the topic, and about two percent of Indigenous people declined to state whether or not they experienced any removal from their natural families. Based on the responses of the remainder, the NATSIHS data indicate that 44% of the Indigenous people were affected by removal. Of these people, 7% were themselves removed from their natural family and 43% had a relative removed from the natural family. For the respondents who were themselves removed from their natural families, 85% had a relative also removed from the natural family. The most

frequently reported relative removed were grandparents/great-grandparents (43%), parents (28%) or uncles/aunts (27%).

Chapters 4 and 5 estimated the health status of Indigenous people, who experienced removal from their natural families (of oneself or relatives) and those who did not experience any removal, relative to the non-Indigenous people. The results suggest that Indigenous people who were themselves removed or those who had relatives removed experienced poor self-assessed health. In the case of objective health outcomes, after controlling for demographic factors, the results when significant all point to those removed/or relatives removed having inferior outcomes. To make a detailed analysis of the factors affecting the poor health status of those who experienced removal from their families, the Indigenous people who were themselves removed and those who had relatives removed were pooled. Since the percentage of Indigenous people who were themselves removed is only 7%, the sample is too small to support separate analysis. Also due to a small sample size, the interaction between being removed oneself and having had family members removed is not undertaken separately.

In this section, the responses to the questions on the experience of removal from the families were combined to create the variable 'people removed from natural families', which takes on a value of 1 for individuals who indicated they or their relatives were removed from their natural families and zero otherwise.

Binary logit models are used to estimate the factors affecting the self-assessed and objective health status of the two groups of Indigenous people:

$$H_{RN} = f(\alpha D_{RN} + \beta B_{RN} + \gamma S_{RN} + \delta C_{RN}) \quad (7.1)$$

$$H_{NOR} = f(\alpha D_{NOR} + \beta B_{NOR} + \gamma S_{NOR} + \delta C_{NOR}) \quad (7.2)$$

where H_{RN} and H_{NOR} are the health outcomes of Indigenous people who experienced removal from their natural families (removal of oneself or of relatives) and those who did not experience any removal.

The models used to estimate the factors affecting the utilisation of healthcare services for the two groups of Indigenous people is:

$$U_{RN} = f(\alpha D_{RN} + \beta B_{RN} + \gamma S_{RN} + \delta C_{RN}) \quad (7.3)$$

$$U_{NOR} = f(\alpha D_{NOR} + \beta B_{NOR} + \gamma S_{NOR} + \delta C_{NOR}) \quad (7.4)$$

where U_{RN} and U_{NOR} are the utilisation of healthcare services by Indigenous people who experienced removal from their natural families (removal of oneself or of relatives) and those who did not experience any removal.

To examine whether there exists a gap in the health status and utilisation of healthcare services between the Indigenous people removed from their natural families and the Indigenous people not removed, models are estimated across both samples and a dummy variable indicating removal is included. The sets of independent variables (D, B, S and C) are progressively added to the model to estimate how much of the health status gap is accounted for by these variables. The Indigenous people not removed from their natural families constitute the comparison category:

$$H_i = f(\alpha R_i + \beta D_i + \gamma B_i + \delta S_i + \zeta C_i) \quad (7.5)$$

$$U_i = f(\alpha R_i + \beta D_i + \gamma B_i + \delta S_i + \zeta C_i) \quad (7.6)$$

where *R* is a dummy capturing removal from natural families, and the coefficient α represents the estimated effect of that removal on health status (Model 7.5) and healthcare utilisation (Model 7.6).

Similar models are used to examine whether a gap exists in the health status and utilisation of healthcare services between Indigenous people removed from their natural families and non-Indigenous people. For this, the Indigenous and non-Indigenous data are pooled. In the analysis, non-Indigenous people form the comparison category.

The demographic, behaviour, socio-economic, cultural and health variables used in previous chapters are again used as independent variables in the regression analysis. The demographic variables include age, sex, marital status, geographical location of residence (remote or non-remote) and household structure. The socio-economic variables include school and post-school educational attainment, employment status, income, welfare dependence, household tenure type and overcrowding in houses. The behavioural health risk variables include smoking status, alcohol consumption status, dietary practices and exercise. The 'main language spoken at home: English, Australian Indigenous languages and other languages' and living in a multifamily household form the cultural variables.

Before reporting the results of the regression analyses, the following section investigates differences in characteristics between the two groups of Indigenous people with respect to the key variables that may contribute to differences in health outcomes. A large number of Indigenous people who experienced removal from their natural families lived in non-remote areas of Australia (79%). Table 7.1 shows the means for the behavioural variables for those Indigenous people removed from their natural families and those not removed.

According to Table 7.1 the physical activity and dietary behaviours of Indigenous people removed from their families are significantly better compared to those not removed. But the percentage of people who never smoked or never consumed alcohol is significantly higher among those not removed compared to those who experienced removal.

Table 7.1 Behavioural factors by removal status

Behavioural variables	Not removed	Removed
Alcohol consumption		
Low risk alcohol consumption (in a week)	31	34
Medium risk alcohol consumption (in a week)	7	9
High risk alcohol consumption (in a week)	8	8
Last consumed alcohol—one week to less than 12 months	28	26
Last consumed alcohol—12 months or more	14	15
Never consumed alcohol	12	8
Smoker Status		
Smoker	52	52
Ex-smoker	18	23
Never smoked	39	26
Physical activity		
Exercise	29	33
Dietary habits		
Consumption of full-cream milk	79	77
Consumption of other milk	17	20
Consumption of vegetables	93	96
Consumption of fruits	83	86

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey,

1. Estimates in the table are calculated using ABS provided population weights.
2. t-test is used to test if there is a significant difference in physical activity and dietary patterns between the two groups of Indigenous people
3. Chi-square test is used to test if there is a significant differences across the drinking and smoking categories
4. There exists no significant difference for (a) alcohol consumption status (b) smoker status and (c) milk consumption. For all the other variables there exist significant differences between the two groups of Indigenous people. Statistical differences are assessed at the 10% level.

Table 7.2 shows the means for the socio-economic variables for Indigenous people removed from their natural families and those not removed. The table shows that significantly more of the Indigenous people removed from their natural families are employed full-time. The proportion of people who are not in the labour force is significantly less among the people who experienced removal. Indigenous people removed from their natural families are better educated with post-school qualifications and live in less crowded households. The descriptive statistics show that Indigenous people removed from their families were better-off compared to those not removed in terms of education, employment status, income, and household crowding.

Table 7.3 shows the cultural measures for Indigenous people removed from their natural families and those not removed. It is clear from the table that Indigenous people who did not experience any removal have stronger attachment to their traditional culture compared to those removed.

Table 7.2 Socio-economic measures by removal status

Socio-economic variables	Not removed	Removed
Employment status		
Full-time employment	28	35
Part-time employment	22	21
Unemployed	7	9
Not in labour force	43	36
Education		
Education below Year 10	33	23
Year 10 education	36	35
Year 12 education	14	13
Vocational education	8	12
Diploma	4	10
Degree	4	6
Weekly Income (in deciles)		
Less than 150	22	23
$150–$199	21	16
$200–$249	18	14
$250–$353	10	11
$354–$499	8	9
$500–$632	7	8
$633–$766	6	6
$767–$958	3	6
$959–$1291	3	5
$1292 or more	2	3
Welfare—main income	50	46
Household Crowding	29	21
Tenure Type		
Owner occupied houses	23	24
Renters	74	73
Others	2	3

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey

1. Estimates in the table are calculated using ABS provided population weights.
2. t-test is used to test if there is a significant difference in welfare dependence and household crowding between the two groups of Indigenous people
3. Chi-square test is used to test if there is a significant difference across employment status and tenure types
4. Mantel Haenszel Chi-square test is used to test if there is a significant difference across education and income categories.
5. There exists no significant difference for welfare—main source of income. For all other variables there exists a significant difference between the two groups of Indigenous people. Statistical differences are assessed at the 10% level.

Table 7.3 Cultural measures by removal status

Cultural variables	Not removed	Removed
Living in a multifamily household	21	13
English-main language spoken at home	76	94
Indigenous language-main language spoken at home	23	6

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey

1. Estimates in the table are calculated using ABS provided population weights.
2. t-test is used to test the significant difference between the two groups of Indigenous people
3. For all the variables there exists a significant difference between the two groups of Indigenous people. Statistical differences are assessed at the 10% level.

Table 7.4 shows the subjective and objective health status of Indigenous people removed from their natural families and those not removed.

Table 7.4 Objective and subjective health by removal status

Health Variables	Not removed	Removed
Self-assessed health		
Excellent	11	9
Very good	30	30
Good	37	34
Fair	15	19
Poor	6	8
Chronic health conditions and injury		
Heart problems	23	22
Diabetes	11	13
Asthma	15	18
Arthritis	15	18
Injury	13	17
BMI measures		
Underweight	5	4
Normal weight	35	34
Overweight	30	29
Obese	30	33

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey

1. Estimates in the table are calculated using ABS provided population weights.
2. The Mantel-Haenszel Chi-square test is used to test if there is a significant difference in self-assessed health and BMI across Indigenous people removed from natural families and Indigenous people not removed.
3. t-test is used to test the significant difference in chronic diseases between the two groups of Indigenous people
4. There exist no significant differences for (a) heart problems and (b) diabetes. For all the other variables there exist significant differences between the two groups of Indigenous people. Statistical differences are assessed at the 10% level.

.Table 7.4 shows that Indigenous people who experienced removal from their natural families are significantly more likely to report poor/fair self-assessed health compared to those who were not removed. With the exception of heart conditions, the prevalence of chronic diseases/injury is significantly higher among Indigenous people removed from their families.

The descriptive statistics show that both utilisation of healthcare services and perceived unmet healthcare needs are higher among the Indigenous people who experienced removal from their natural families compared to those who did not. Although Tables 7.1 to 7.3 suggest that Indigenous people removed from their natural families were better off in various behavioural and socio-economic measures, their health status is worse compared to those not removed. Descriptive statistics based on data from the 2002 NATSISS show a similar pattern to that reported here.

7.3 Regression results

All variables used are derived from 2004–05 NATSIHS and the samples for the regression analysis are restricted to persons aged 18 years or more and those who answered the question about the health status and utilisation variables themselves.

The dependent variables are defined as follows. Indigenous people are considered to have good health when the self assessed health of the respondents is 'excellent' or 'very good'. The people with diseases include those who report that they currently suffer from heart problems, diabetes, asthma and arthritis. The people who report having had an injury includes those who sustained injury in the previous four weeks. The utilisation of a healthcare service variable is equal to one for people who visited a doctor or got admitted to hospital in the previous 12 months. Of the people who required healthcare in the previous 12 months, some utilised the services of a healthcare provider/facility and others did not utilise any due to various reasons. Indigenous people who required healthcare but did not utilise any form the 'perceived unmet healthcare need' group.

Table 7.5 reports the marginal effects on the variable indicating the individual experienced removal. Hence Indigenous people not removed from their natural families form the comparison category. Demographic, behavioural, socio-economic, cultural and health variables are progressively added to the initial models to assess whether the differences in health status and utilisation of healthcare services that are initially observed across the two groups of Indigenous people diminish when adjustment is made for these observable characteristics and behaviours.

Table 7.5 Marginal effects of Indigenous removal from the natural family

Variables	1 Indigenous removal status & gender	2 + demographic variables	3 + behavioural variables	4 + socio-economic variables	5 + cultural variables
Self-assessed health	-0.03*	-0.04**	-0.05**	-0.06***	-0.06***
Observations used	**3346**	**3346**	**3346**	**3346**	**3346**
Chronic diseases					
Heart problem	0.02	0.03**	0.03**	0.04**	0.04**
Diabetes	0.00	0.02*	0.02**	0.03***	0.02**
Asthma	0.02	0.00	0.00	0.01	0.00
Arthritis	0.04***	0.02**	0.02*	0.03***	0.03**
Injury	0.05***	0.04***	0.03**	0.03**	0.02*
Observations used	**3346**	**3346**	**3346**	**3346**	**3346**
Utilisation of health care services					
Visit to a doctor or admission in the hospital in the previous 12 months	0.05***	0.04***	0.04***	0.04***	0.03**
Observations used	**3331**	**3331**	**3331**	**3331**	**3331**
Unmet healthcare need	0.13***	0.10***	0.10***	0.10***	0.09***
Observations used	**3346**	**3346**	**3346**	**3346**	**3346**

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey

1. Main language spoken at home and living in a multifamily household are the cultural variables included
2. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
3. Full results not included
4. In all the models, the Likelihood Ratio Chi-square test that all the regression coefficients are equal to zero is rejected at 1% level.

Table 7.5 shows that Indigenous people removed from their natural families have worse health status (measured by subjective and objective health status) compared to those not removed. There is no significant difference in asthma between the two groups. None of the dependent variables contributed to the self-assessed health status gap between Indigenous people who experienced removal from their families and those who did not. A chronic health disease gap remains unexplained for heart disease, diabetes and arthritis. Demographic, behavioural, socio-economic and cultural factors together explained about half the gap in the injury status.

It was argued from Table 4.7 in Chapter 4 that self-assessed health is a valid measure of the actual health of Indigenous Australians. But the results from Table 7.5 show that lower self-assessed health of Indigenous people who experienced removal from their natural families is not driven by their lower physical health. The self-assessed health status of Indigenous people removed from their natural families does not improve relative to those not so removed once the health variables are held constant. The objective health variables (chronic diseases, injury and BMI) are included as independent variables in the regression modelling of self-assessed health to investigate whether self-assessed health is a good measure of health status for Indigenous people removed from their natural families (marginal effect on addition of health variables is -0.05**). The result suggests that there are factors additional to objective health conditions which influence the self-assessed health status of Indigenous people who experienced removal from their natural families.

The utilisation of healthcare services is higher among Indigenous people removed from their natural families compared with those not so removed. They utilise healthcare services more even after controlling for objective health conditions (marginal effect 0.02*), suggesting that there exists no greater degree of unmet healthcare need for this group. As discussed in Chapter 6, this result contradicts existing literature which suggests that Indigenous people who experienced removal would utilise less healthcare services due to lack of trust in government-run healthcare services. But as discussed in Chapter 6 the existence of factors like institutional racism, cultural insecurity and lack of effective communication could adversely affect the effectiveness of the use of healthcare services and consequently the health outcomes.

Despite higher utilisation of healthcare services, perceived unmet healthcare need is higher among those who experienced removal from their natural families and the gap remains largely unexplained. This suggests that even though the initial utilisation of healthcare services is higher, treatment compliance and outcomes may be poor. Also, perceived unmet healthcare need is higher among better educated Indigenous people. Descriptive statistics show that Indigenous people who experienced removal from their natural families have better educational status than those who did not

experience any removal. Therefore their expectations about health status, and hence perceived unmet healthcare need, may be higher.

Table 7.5 shows that the subjective and objective health status of Indigenous people removed from their natural families is worse than those Indigenous persons who were not removed, and this gap cannot be accounted for by demographic, behavioural, socio-economic, cultural and health factors that can be observed in the data.

One possible explanation for the persistent estimated effect of removal is that it is not the differences in observable characteristics *per se*, but rather variables have a differential impact on the health of persons who have experienced removal as opposed to other Indigenous persons. Table 7.2, for example, shows that those Indigenous Australian who experienced removal appear to have higher educational attainment, but does more education have the same effect on health outcomes for both groups? This can be explored by estimating separate models for Indigenous people removed from their natural families and for those not removed. Table 7.6 contrasts the results from binary logit models of self-assessed health for Indigenous people removed from their natural families and for those not removed.

Table 7.6 Marginal effects for self-assessed health by removal status

Variables	Not-removed		Removed	
Male	-0.02		0.01	
18–24 years	0.10	***	0.05	
25–34 years	-		-	
35-–44 years	-0.08	***	-0.10	***
45–54 years	-0.24	***	-0.16	***
55–64 years	-0.23	***	-0.18	***
65 years and above	-0.19	***	-0.18	***
Married	0.05	*	0.01	
Couple with children	0.01		0.05	
Couple with no children	0.02		0.05	
Lone parent family	0.07	*	0.04	
Lone person	0.04		-0.03	
Other households	-		-	
Remote and very remote areas	-0.04		-0.01	
Low risk alcohol consumption	-		-	
Medium risk alcohol consumption	-0.02		-0.02	
High risk alcohol consumption	-0.07		-0.08	*
Last consumption of alcohol—one week to less than 12 months ago	-0.04		-0.04	
Last consumption of alcohol—12 months or more ago	0.01		0.01	
Never consumed alcohol	0.06		0.10	*
Smoker	-		-	
Ex-smoker	0.06	*	0.04	
Never smoked	0.05	*	0.09	***
Exercise	0.10	***	0.10	***
Consumption of non full-cream milk	-0.05		-0.02	
Vegetable consumption	0.07		0.08	
Fruit consumption	0.07	**	0.01	
Education below Year 10	-0.03		-0.05	
Year 10 education	-		-	
Year 12 education	0.05		0.02	
Vocational education	-0.03		0.05	
Diploma	-0.09	*	0.10	**
Degree	0.12	*	0.03	
Employed full-time	-		-	
Employed part-time	-0.06	*	-0.09	***
Unemployed	-0.13	***	-0.02	
Not in labour force	-0.14	***	-0.06	
Weekly income	0.01	**	0.00	
Welfare—main source of income	-0.02		-0.08	*
Household crowding	-0.01		0.02	
Owner occupied houses	0.05		0.04	
Rental houses	-		-	
Other tenure	-0.10		-0.06	
Multifamily households	0.00		-0.08	
English—main language spoken at home	-		-	
Indigenous language—main language spoken at home	0.10	***	-0.02	

Variables	Not-removed	Removed
Other languages—main language spoken at home	-0.00	-0.00
Observations used	**2265**	**1818**
Likelihood Ratio (Pr > Chi2)	**333 *****	**237 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey

1 Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *

2 '- ' refers to reference variables

An age gradient is seen within both groups of Indigenous people. Age increase is associated with poorer self-assessed health. Having an educational diploma is significantly associated with better self-assessed health among those who experienced removal from their natural families but it is significantly associated with poorer health among those not removed. Having a university degree is associated with good health among those not removed. Compared to those working full-time, being 'employed part-time', 'unemployed' and 'not in labour force' are all significantly associated with poor self-assessed health among those not removed. Being dependent on welfare for a living is significantly associated with poor self-assessed health for those removed from their natural families. Table 7.2 shows that Indigenous people who did not experience any removal have stronger attachment to their culture. The result from Table 7.6 shows that speaking an Indigenous language at home is significantly associated with better self-assessed health among those who did not experience any removal from their natural families.

The marginal effects in Table 7.7 compare the associations of demographic, behavioural, socio-economic and cultural variables with objective health outcomes for Indigenous people removed from their natural families and for those not removed.

Table 7.7 Marginal effects for objective health outcomes by removal status

	Heart		Diabetes		Asthma		Arthritis		Injury	
Variables	**Not-removed**	**Removed**	**Not-removed**	**Removed**	**Not-removed**	**Removed**	**Not-removed**	**Removed**	**Not-Removed**	**Removed**
Male	-0.00	-0.09 ***	-0.01	0.01	-0.09 ***	-0.14 ***	-0.03 **	-0.03 *	0.01	-0.01
18–24 years	-0.15 ***	-0.09 ***	-0.06 ***	-0.06 ***	0.03	-0.00	-0.08 ***	-0.09 ***	0.03	0.03
25–34 years	-	-	-	-	-	-	-	-	-	-
35–44 years	0.09 ***	0.16 ***	0.05 ***	0.10 ***	-0.01	0.01	0.06 **	0.12 ***	-0.00	-0.03
45–54 years	0.23 ***	0.25 ***	0.17 ***	0.17 ***	0.02	0.05	0.14 ***	0.24 ***	0.02	-0.03
55–64 years	0.31 ***	0.41 ***	0.17 ***	0.29 ***	0.05	0.06	0.25 ***	0.34 ***	-0.06 ***	-0.05
65 years and above	0.41 ***	0.43 ***	0.19 ***	0.21 ***	0.05	0.06	0.31 ***	0.42 ***	-0.02	-0.08 **
Married	0.02	0.06 **	0.00	0.01	-0.01	-0.03	-0.00	0.05 *	0.00	0.02
Couple with children	-0.07 ***	-0.05	-0.02	-0.04 **	-0.03	-0.03	-0.00	0.01	0.02	0.01
Couple with no children	-0.02	-0.06 *	0.02	-0.02	0.01	-0.03	-0.01	0.02	0.01	0.01
Lone parent family	-0.04	0.02	-0.04 ***	-0.03	-0.06 ***	0.00	-0.01	0.05	0.02	0.01
Lone person	-0.00	0.03	-0.01	-0.02	0.03	-0.02	0.01	0.10 **	0.03	0.01
Other households	-	-	-	-	-	-	-	-	-	-
Remote and very remote areas	0.01	0.01	0.04 ***	0.02	-0.07 ***	-0.03	-0.06 ***	-0.05 **	-0.02	-0.03
Low risk alcohol consumption	-	-	-	-	-	-	-	-	-	-
Medium risk alcohol consumption	0.01	-0.02	-0.02	-0.04 *	-0.05 **	-0.02	-0.01	-0.02	-0.01	-0.01
High risk alcohol consumption	0.03	-0.01	-0.01	-0.01	0.01	-0.01	0.03	0.01	0.06 *	0.02
Last consumption of alcohol—one week to less than 12 months ago	0.04	0.02	0.02	0.02	0.00	-0.01	0.03	-0.00	-0.01	-0.02
Last consumption of alcohol—12 months or more ago	0.04	-0.02	0.02	0.06 **	-0.01	-0.01	0.01	0.02	-0.05 ***	-0.07 ***
Never consumed alcohol	0.05	-0.01	0.01	0.06 **	-0.03	-0.04	0.01	0.04	-0.06 ***	-0.07 ***
Smoker	-	-	-	-	-	-	-	-	-	-

Variables	Heart				Diabetes				Asthma				Arthritis				Injury			
	Not-removed		Removed		Not-removed		Removed		Not-removed		Removed		Not-removed		Removed		Not-Removed		Removed	
Ex-smoker	0.05	**	0.03		0.06	***	0.02		-0.00		-0.01		0.01		0.01		0.02		-0.00	
Never smoked	0.00		-0.01		0.03	**	0.03	*	-0.02		-0.04	*	-0.02		-0.02		-0.02		-0.01	
Exercise	-0.02		-0.01		-0.02		-0.01		-0.01		-0.04	**	0.02		0.03		0.05	***	0.07	***
Consumption of non full-cream milk	0.05	**	0.03		0.05	***	0.04	**	-0.02		0.00		0.03	*	-0.02		0.02		0.00	
Vegetable consumption	0.04		0.00		-0.05	*	-0.06		-0.06	*	0.00		-0.01		-0.01		0.01		-0.01	
Fruit consumption	-0.02		-0.04		0.01		0.00		0.01		-0.05	*	-0.03		-0.06	**	0.02		-0.04	
Education below Year 10	0.01		0.11	***	0.01		0.03	*	-0.01		0.02		0.01		0.01		-0.01		0.01	
Year 10 education	-		-		-		-		-		-		-		-		-		-	
Year 12 education	-0.04		0.06		-0.02		0.05	*	-0.02		-0.02		-0.02		-0.02		0.00		0.05	
Vocational education	0.11	***	0.04		-0.00		0.01		0.05		0.06		0.03		-0.02		0.01		0.05	
Diploma	0.08		-0.07	**	-0.01		-0.05	***	0.04		0.05		0.03		-0.04		0.02		0.03	
Degree	0.07		0.02		-0.01		0.01		-0.00		-0.06	**	-0.04		-0.04		0.06		0.02	
Employed full-time	-		-		-		-		-		-		-		-		-		-	
Employed part-time	0.01		0.03		0.03	*	0.05	*	-0.04	*	-0.04		0.02		0.07	**	-0.01		0.01	
Unemployed	0.04		0.02		0.03		0.03		-0.04		-0.03		0.11	*	0.03		-0.03		0.00	
Not in labour force	0.11	***	0.09	*	0.01		0.04		-0.04		-0.03		0.10	***	0.07	*	-0.03		0.01	
Weekly income	-0.00		0.00		-0.01	*	-0.00		0.00		-0.01		-0.01		-0.00		0.01	**	0.00	
Welfare—main source of income	-0.03		-0.01		0.01		0.01		0.03		0.01		-0.04		0.02		0.06	**	-0.01	
Household crowding	-0.01		0.01		0.03		-0.05	***	0.02		-0.00		-0.02		-0.02		-0.01		-0.00	
Owner occupied houses	-0.04		-0.00		-0.05	***	-0.01		-0.00		0.05	*	0.03		0.02		-0.02		-0.00	
Rental houses	-		-		-		-		-		-		-		-		-		-	
Other tenure	-0.08	**	-0.06		-0.04	*	0.04		0.06		0.10		0.06		0.01		0.02		-0.05	
Multifamily households	-0.02		-0.03		-0.03	**	0.00		-0.04	*	0.01		0.01		0.01		0.02		-0.03	

Variables	Heart		Diabetes		Asthma		Arthritis		Injury	
	Not-removed	Removed	Not-removed	Removed	Not-removed	Removed	Not-removed	Removed	Not-Removed	Removed
English —main language spoken at home	-	-	-	-	-	-	-	-	-	-
Indigenous language—main language spoken at home	-0.03	0.09 *	-0.00	-0.03 *	-0.03	-0.03	-0.04 **	-0.04	-0.04 **	0.03
Other languages—main language spoken at home	0.05	-0.11	-	-0.02	-0.03	-	-0.08 **	0.10	-	0.01
Observations used	**2266**	**1818**	**2266**	**1818**	**2266**	**1818**	**2266**	**1818**	**2266**	**1818**
Likelihood Ratio (Pr > Chi2)	**419 *****	**351 *****	**341 *****	**306 *****	**121 *****	**118 *****	**347 *****	**287 *****	**142 *****	**76 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '- ' refers to reference variables
3. For 'other languages ' the effect could not be estimated in some models due to lack of variation

Other than a few individual differences in the independent variables between the two groups, Table 7.7 shows no clear systematic differences between the removed and the non-removed.

Table 7.4 shows that Indigenous people who experienced removal have worse health status compared to those who did not experience any removal. The descriptive statistics also show that utilisation of healthcare services is higher among Indigenous people who experienced removal. Table 7.8 looks at the effects of demographic, behavioural, socio-economic and cultural variables on utilisation for the two groups of Indigenous people.

According to Table 7.8 males utilise health care services less when compared with females among both the groups of Indigenous people. An age gradient is seen in the utilisation of healthcare services among both the groups of Indigenous people. Age increase is associated with higher utilisation of healthcare services.

Among those who were removed living in remote or very remote areas, having a degree and being unemployed is associated with less utilisation of healthcare services. It may be that they are healthier and thus utilise healthcare services less. Indigenous people who were not removed from their natural families are less likely to utilise health care services if they live in overcrowded households.

Table 7.8 Marginal effects for utilisation of health care services by removal status

Variables	Non-removed		Removed	
Male	-0.12	***	-0.08	***
18–24 years	-0.02		-0.00	
25–34 years	-		-	
35–44 years	0.01		-0.00	
45–54 years	0.07	***	0.03	
55–64 years	0.08	**	0.08	***
65 years and above	0.15	***	0.09	***
Married	0.02		0.03	
Couple with children	-0.00		0.02	
Couple with no children	-0.02		0.06	**
Lone parent family	-0.02		0.04	
Lone person	-0.01		0.04	
Other households	-		-	
Remote and very remote areas	-0.02		-0.04	*
Low risk alcohol consumption	-		-	
Medium risk alcohol consumption	-0.02		0.03	
High risk alcohol consumption	-0.03		-0.01	
Last consumption of alcohol—one week to less than 12 months ago	0.00		0.00	
Last consumption of alcohol—12 months or more ago	-0.01		0.01	
Never consumed alcohol	-0.05		-0.06	
Smoker	-		-	
Ex-smoker	0.05	**	0.03	
Never smoked	0.02		0.01	
Exercise	0.04	**	0.01	
Consumption of non full-cream milk	0.02		0.05	**
Vegetable consumption	-0.04		-0.05	
Fruit consumption	0.00		-0.01	
Education below Year 10	0.01		-0.03	
Year 10 education	-		-	
Year 12 education	0.03		0.04	
Vocational education	0.04		-0.03	
Diploma	0.01		-0.04	
Degree	0.06		-0.08	*
Employed full-time	-		-	
Employed part-time	-0.02		-0.02	
Unemployed	-0.02		-0.11	*
Not in labour force	0.03		-0.03	
Weekly Income	0.00		0.00	
Welfare—main source of income	0.01		0.05	
Household crowding	-0.04	*	-0.04	
Owner occupied houses	-0.01		-0.02	
Rental houses	-		-	
Other tenure	0.01		-0.05	
Multifamily households	-0.04		0.03	
English—main language spoken at home	-		-	

Variables	Non-removed	Removed
Indigenous language—main language spoken at home	-0.03	0.04
Other languages—main language spoken at home	-0.12	0.03
Observations used	**2249**	**1814**
Likelihood Ratio (Pr > Chi2)	**144 *****	**95 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey,

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '- ' refers to reference variables

Descriptive statistics in the beginning of the chapter show that perceived unmet healthcare need is higher among Indigenous people who experienced removal from their natural families compared to those who did not experience any removal. This is despite the utilisation of healthcare services being higher among those who experienced removal. Table 7.9 examines the association of demographic, behavioural, socio-economic and cultural variables with perceived unmet healthcare need among the two groups of Indigenous people.

High risk alcohol consumption, not consuming alcohol for less than one year and dependence on welfare for living is significantly associated with perceived unmet healthcare need among those who were removed from their natural families. Having vocational education is significantly associated with perceived unmet need among those not removed from their natural families. High risk alcohol consumption could adversely affect treatment compliance and outcomes among those who utilise healthcare services. People dependent on welfare may have difficulties in accessing healthcare services due to parenting or care giving responsibilities or because the expense of seeking treatment is unaffordable. Also there is significantly lower perceived unmet healthcare need among those living in remote and very remote areas and this result is true for both groups of Indigenous people.

Table 7.9 Marginal effects for perceived unmet healthcare need by removal status

Variables	Not-removed		Removed	
Male	-0.06	***	-0.06	**
18–24 years	-0.06	***	-0.01	
25–34 years	-		-	
35–44 years	0.01		-0.01	
45–54 years	-0.02		-0.05	
55–64 years	-0.06	*	-0.08	**
65 years and above	-0.09	***	-0.17	***
Married	-0.01		0.01	
Couple with children	-0.02		-0.02	
Couple with no children	-0.03		-0.01	
Lone parent family	-0.07	**	-0.02	
Lone person	0.02		0.05	
Other households	-		-	
Remote and very remote areas	-0.08	***	-0.09	***
Low risk alcohol consumption	-		-	
Medium risk alcohol consumption	0.04		-0.03	
High risk alcohol consumption	0.04		0.12	**
Last consumption of alcohol—one week to less than 12 months ago	0.05	*	0.07	**
Last consumption of alcohol—12 months or more ago	0.07	**	0.05	
Never consumed alcohol	0.02		0.01	
Smoker	-		-	
Ex-smoker	0.00		-0.05	
Never smoked	-0.04	*	-0.07	**
Exercise	-0.00		0.04	
Consumption of non full-cream milk	-0.01		-0.02	
Vegetable consumption	-0.01		0.03	
Fruit consumption	-0.01		-0.05	
No education	-0.01		0.01	
Year 10 education	-		-	
Year 12 education	-0.02		0.01	
Vocational education	0.10	**	0.04	
Diploma	0.01		-0.03	
Degree	0.09		0.08	
Employed full-time	-		-	
Employed part-time	-0.03		0.01	
Unemployed	0.00		-0.04	
Not in labour force	0.02		-0.01	
Weekly income	-0.00		0.00	
Welfare—main source of income	-0.04		0.11	**
Household crowding	-0.06	**	-0.04	
Owner occupied houses	-0.05	**	-0.03	

Variables	Not-removed		Removed
Rental houses	-		-
Other tenure	0.05		0.11
Multifamily households	-0.01		0.00
English—main language spoken at home	-		-
Indigenous language—main language spoken at home	-0.05	*	0.01
Other languages—main language spoken at home	-0.05		0.00
Observations used	**1874**		**1472**
Likelihood Ratio (Pr > Chi2)	**112 *****		**79 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '- ' refers to reference variables

The decomposition analysis in Table 7.10 shows the estimated probability of good health among the Indigenous people who experienced removal from the natural family and those who did not experience any removal. It separately analyses the differences in self-assessed health of each group of Indigenous people with non-Indigenous people to illustrate the extent to which observable demographic, behavioural, socio-economic and cultural factors can account for those differences. The decomposition analysis is based on Equations 4.5, 4.6, 4.11, 4.12 and 4.13 in Chapter 4, and demonstrates the magnitude of the differences in the likelihood of reporting good health and the degree to which various factors are estimated to contribute to these differences. The probability of reporting good self-assessed health by non-Indigenous Australians is 54% (see Chapter 4); and for Indigenous Australians it is 39% for those not removed from their natural families and 35% for those removed from their families.

Table 7.10 Decomposition analysis—probability of reporting good health

	Indigenous (%)	
Self-assessed health	**Removed**	**Non-removed**
Unadjusted	35%	39%
using the means of non removed	33%	
using the estimates of non-removed	41%	
using the means of non-Indigenous	39%	46%
using the estimates of non-Indigenous	45%	42%
using the non-Indigenous SES means	39%	47%
using the non-Indigenous behaviour means	38%	41%
using the non-Indigenous SES estimates	39%	40%
using the non-Indigenous behaviour estimates	36%	39%

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey

1. Living in remote/very remote areas, speaking an indigenous language at home and household tenure are not included in the analysis.

The results demonstrate that the poorer health of Indigenous Australians who experienced removal cannot be accounted for by differences in observable characteristics. If the variable means of the non-removed group are imposed on those who experienced removal, the gap in health status is in fact accentuated, consistent with those who experienced removal having more favourable characteristics. Instead it appears that it is differences in the *effects* of variables that contribute to the lower health of those who experienced removal, since when the estimates from the non-removed model are assumed for the removed sample, the predicted likelihood of reporting good health increases to 41%.

If non-removed Indigenous Australians were to 'achieve' the same means for the independent variables as non-Indigenous Australians, particularly socio-economic variables, the models predict that their health would be markedly improved: the predicted likelihood of reporting good health increases from 39% to 46%. Their health would respond positively to these improved circumstances. This seems not to be the case for those Indigenous Australians who experienced removal. The modelling results suggest such an improvement in circumstances would result in only a very marginal improvement in self-assessed health.

The *effects* of variables seem to contribute most to the lower health of those who experienced removal, since when the estimates from the non-Indigenous model are assumed for the removed sample, the predicted likelihood of reporting good health

increases to 45%. When the SES variable means of the non-Indigenous Australians are imposed on those Indigenous people who did not experience removal the predicted likelihood of reporting good health increases to 47%. This suggests that improvement in socio-economic circumstances enhances the self assessed health of Indigenous people who did not experience any removal markedly. But it is not evident among those who experienced removal from their natural families.

7.4 Conclusion

The descriptive statistics show that Indigenous people who experienced removal from their natural families are socio-economically and behaviourally better-off but their health status is worse compared to those who did not experience any removal. Existing literature suggests that Indigenous people removed from their natural families have poor socio-economic, behavioural and health status. In this chapter the sample of those who experienced removal mostly comprises the relatives of Stolen Generation members and not members of the Stolen Generation themselves.

The logit analysis shows there exists a gap in self-assessed health and objective health conditions between Indigenous people who experienced removal from their natural families and those who did not. The demographic, behavioural, socio-economic or cultural factors could not explain the gap in self-assessed health, heart problems, diabetes, arthritis and injury between the two groups of Indigenous people. The better educational and employment status among those who experienced removal as shown by the descriptive statistics does not contribute to improved health status. Evidence suggests that Indigenous people attain higher education at a much older age compared to the non-Indigenous (Encel 2000; Gray, Hunter, and Schwab 2000; Biddle 2007). The older the age at which higher education is undertaken, the lower could be its potential benefits on health. Also the lower attachment to culture, especially the use of Indigenous languages, may have adversely affected their health status. These results contradict the existing literature that behaviour issues and poor socio-economic status are the main contributors to the poor health status of Indigenous Australians who experienced removal and suggests that the poorer health

outcomes of Indigenous Australians affected by policies of removal is likely to be attributable to holistic factors.

Previous research has also found that Indigenous people separated from their families have a higher incidence of arrest, have drug abuse problems, lack social support and are victims of violence. Indigenous Australians are over represented at almost every stage of the criminal justice system. All these factors could cause stress and thus could contribute to the health status gap for the Indigenous people who experienced removal from their natural families.

The logit analysis also shows that ulitisation of healthcare services is higher among those who experienced removal. They utilise healthcare services more even when objective health conditions are controlled for, suggesting that there exists no unmet healthcare need. But their perceived unmet healthcare need is higher compared to those who did not experience any removal. The former result contradicts the existing literature that Indigenous people would utilise less healthcare services due to lack of trust in government-run healthcare services. The latter result supports the existing literature that lack of cultural security and institutional racism are barriers in the utilisation of healthcare services and can thus adversely affect its effective utilisation and health outcomes.

In the earlier chapters self-assessed health has been observed to be a valid measure of the actual health status of Indigenous Australians in the sense that Indigenous and non-Indigenous Australians report similar levels of self-assessed health when conditioned upon the presence of objective health measures. But the results from this chapter show that this does not always hold good. There are factors additional to objective health conditions which influence the self-assessed health status of Indigenous people who experienced removal from their natural families. The decomposition analysis undertaken suggests that an improvement in circumstances of those removed would result in only a very marginal improvement in self-assessed health.

Chapter 8

Conclusion

While most of the women in Australia can expect to live an average life of 82.6 years, Indigenous females can expect to live for only 72.9 years. The condition of Indigenous men is poorer than Indigenous women. Life expectancy at birth for Indigenous males is 67.2 years compared to 78.7 years for non-Indigenous males (ABS 2010). The gross inequality in health status continues despite the long standing efforts to close the gap between the two populations. While there have been improvements in Indigenous health status over the decades the overall progress remains slow and inconsistent.

Many causes of the health inequality between the Indigenous and non-Indigenous population have been known from previous studies. Socio-economic disadvantage and greater exposure to behavioural and environmental health risk are often cited as major problems facing Indigenous Australians. How much of the health difference between the two populations is contributed by these factors remains unclear. It is now clear that Indigenous disadvantage goes way beyond mere lack of material wealth. Finding out the nature of the disadvantage is important in understanding why Indigenous Australians did not share the same health benefits that have been experienced by other Australians over the decades, and in solving the problems.

Using nationally representative datasets this thesis explores the existence of gaps in the health status and utilisation of healthcare services between the Indigenous and non-Indigenous Australians and examines the factors which contribute to them. The main objective of the thesis is to explore the degree to which differences in health and healthcare utilisation are due to demographic, socio-economic, behavioural and cultural factors and provide an evidence base for the formulation of policy in closing the gap between the Indigenous and non-Indigenous population. Since the Indigenous population is not homogenous the thesis also examines the relative contribution of these factors to the health status of different groups of Indigenous

people. The different groups of Indigenous people studied include: (a) those living in remote and non remote areas; (b) those who speak English or an Indigenous language as the main language at home; and (c) those who were themselves or had relatives removed from their natural families and those who did not experience any such removal.

This thesis uses more recent data and a more extensive set of dependent and independent variables than that used by previous studies. The Australian governments' assimilation policies led to the forced separation of Indigenous children from their natural families from the turn of the 20th century to the 1970s. According to 2004–05 NATSIHS 44% of Indigenous people are from families affected by these policies. Exploring the effect of being a Stolen Generation member, which is a unique feature of the Australian Indigenous population, on the health status and utilisation of healthcare services is a major innovation of this thesis.

This final chapter of the thesis summarises the results and shows how it could contribute to the evidence base. It also outlines the policy recommendations. Sections 8.1.1 to 8.1.4 below summarise, in turn, the evidence on self-assed health from Chapter 4, on chronic diseases and injury (Chapter 5), on the utilisation of health care services among Indigenous people (Chapter 6) and on the specific factors affecting Indigenous people who experienced removal from their natural families.

8.1 Health status and healthcare utilisation of Indigenous and non-Indigenous Australians

8.1.1 Self-assessed health

The analysis finds that Indigenous people are worse off compared to non-Indigenous people with respect to self-assessed health. This is true irrespective of the areas of residence, the main language spoken at home and being a Stolen Generation member. Though often cited as prominent factors contributing to the poor health status of Indigenous Australians, the thesis shows that behavioural and socio-economic factors do not explain all the difference between the two populations. It

does explain the gap for some groups of Indigenous people but not for all. The decomposition analysis based on the models for self-assessed health predicts that if Indigenous Australians had the same means as non-Indigenous Australian for socio-economic status and behaviour, this would account for only between one-quarter and one-third of the difference in the likelihood of reporting good health status between the two populations.

The experience of removal from the natural family, especially the removal of relatives, is a major factor affecting the self-assessed health status of Indigenous Australians. Risky levels of alcohol consumption, employment status and dependence on welfare are other factors which adversely affect self-assessed health.

8.1.2 Objective health status

As in the case of self-assessed health, Indigenous people are worse off compared to non-Indigenous people with respect to chronic diseases. But contrary to expectations, Indigenous people are better-off compared to non-Indigenous in terms of reported injury. The analysis suggests that behavioural factors do not contribute substantially to the gap in chronic disease status between Indigenous and non-Indigenous. For asthma and arthritis socio-economic factors are also not a major contributor. Cultural factors contributed to closing the gap in the case of heart disease and arthritis. The gap between Indigenous and non-Indigenous people remained largely unexplained for diabetes and partially unexplained for asthma.

There are variations in the prevalence and factors contributing to the gap between different groups of Indigenous people and non-Indigenous people. Diabetes is significantly higher among Indigenous people living in remote areas compared with those in non-remote areas. The demographic, behavioural, socio-economic and cultural factors do not explain the gap in diabetes status between Indigenous and non-Indigenous people irrespective of the area of residence, main language spoken at home and removal from the natural family. The gap in the case of heart disease in remote areas also remained unexplained. Among those who did not experience any removal (either of themselves or their relatives) socio-economic factors contribute to the gap for heart disease and arthritis.

There exists no clear pattern on the contribution of different socio-economic and behavioural variables across the chronic diseases. The experience of removal (of themselves or relatives) from the natural family is the only factor which is contributing to the poor health status for the majority of the objective health measures.

8.1.3 Utilisation of healthcare services

Indigenous people used significantly less healthcare services compared to non-Indigenous people. The low utilisation of healthcare services exists irrespective of the area of residence and the main language spoken at home. For those living in non-remote areas, the estimated gap in utilisation disappears once a range of basic demographic variables are controlled for. However the gap remains partially unexplained for those living in remote areas.

The analysis finds that the higher burden of health problems experienced by Indigenous people relative to the non-Indigenous people is not accompanied by a commensurate increase in the utilisation of healthcare services. This suggests the existence of unmet healthcare need and problems in accessing healthcare services among Indigenous Australians. Unmet healthcare need exists among Indigenous people irrespective of living in remote and non-remote areas, speaking an Indigenous language or English at home and experience of any removal from their natural family. Despite previous evidence of the existence of the gap in healthcare utilisation even after controlling for the objective health measures there exist no perceived unmet healthcare need among Indigenous people living in remote areas.

Contrary to the expectations, Indigenous people who had relatives removed from their natural families utilised more health care services. Also, their level of utilisation seems commensurate with their higher incidence of chronic diseases. Despite this, self-perceived unmet healthcare need is higher among Indigenous people who had relatives removed from their natural families thus raising questions on the quality of healthcare services and the level of satisfaction received from these services. Equal access to healthcare services need not ensure equitable outcomes for Indigenous people. Miscommunication between patient and provider, late presentation to

healthcare facilities, disparities in diagnostic and therapeutic procedures and other culturally insensitive practices could impact on the effective utilisation of healthcare services by the Stolen Generations and thus influence their health outcomes.

Compared with non-Indigenous people, Indigenous people with private health insurance utilise significantly more healthcare services. Given the small proportion of Indigenous people with private health insurance, controlling for private health insurance does not substantially alter estimates of the overall differences in health service utilisation between Indigenous and non-Indigenous people. In Australia, private health and hospital insurance duplicates public coverage systems (for hospital stays) and complements Medicare (for coverage of the in-hospital medical 'gaps' faced by private patients). Ancillary private health insurance, on the other hand, supplements Medicare for services that are not publicly financed. These include dental, optical, chiropractic, physiotherapy, psychological counselling, occupational therapy, speech therapy and podiatry (Colombo and Tapay 2003).

8.1.4 Stolen Generation

Chapters 4, 5 and 6 show that the negative impact of removal on health outcomes and utilisation of healthcare services is stronger for those who had relatives removed rather than for those who were removed directly. None of the observable variables contribute to the gap in the health and healthcare utilisation outcomes. The thesis therefore includes Chapter 7 to study in more detail the health status and utilisation of healthcare services by members of the Stolen Generation and their relatives.

In Chapter 7 people directly and indirectly affected by the removal policies were treated as a single group. A very small sample size for those removed directly makes it impossible to discern any impact of direct removal in addition to the effect of being a relative of a person removed from the natural family.

Indigenous people who experienced removal from their natural families have better educational, employment and income status compared to those who did not experience any removal. But these superior circumstances did not contribute to an improved health status. The decomposition analysis undertaken suggests that the

poor health of those who experienced removal cannot be accounted for by differences in observable characteristics. It is the differences in the effects of the variables that appear to contribute to the lower health of those who experienced removal.

In contrast to existing perceptions, members of the Stolen Generation are found to utilise healthcare services more than other Indigenous persons. Despite this higher utilisation, they are still markedly more likely to perceive themselves as having experienced unmet healthcare needs.

8.2 Measuring the health status of Indigenous Australians

It is important to have robust measures of health status to establish differentials within and between populations. Traditionally, health status was measured using objective measures like mortality and morbidity. But in contemporary health research increasing attention has been given to self-assessed health as a measure of health status and this is often considered a proxy for the objective measures. As discussed in Chapter 4, there are two general approaches to subjective health assessment. The first involves the use of multiple items, covering a number of dimensions of health that may be designed to sum to a single index. In the second approach, a single global question, such as 'How is your health in general?' is used.

For Indigenous Australians health is often not individual, but one that encompasses the health of the whole community and the health of the ecosystem in which they live. Since the concept of Indigenous health is very complex, it is difficult *a priori* to determine the best measure of health status for Indigenous Australians. Sibthorpe, Anderson, and Cunningham (2001) assessed the validity of a global measure of self-assessed health among Indigenous Australians and found that it may be appropriate for use among Indigenous Australians whose primary language is English.

This thesis uses both subjective and objective measures to assess differentials between Indigenous and non-Indigenous people. The subjective health assessment is based on the global question 'In general would you say that your health is excellent,

very good, good, fair or poor?' The objective health assessments are based on the existence of self-reported diseases/conditions (heart disease, diabetes, asthma, arthritis and injury). Having both types of measure available allows an informal test of the validity of inter-cultural comparisons of subjective health status between Indigenous and non-indigenous Australians. If the self-assessed health measure is a good proxy for actual health differences, then the inclusion of objective health measures in the regression models should result in there being no significant differences between groups in self-assessed health. This is because the variation in self-assessed health is captured by actual (objective) health differences.

The presence of self-reported diseases/conditions are found to be strongly and significantly associated with lower self-assessed health, and their inclusion in the regression models eliminates any statistical differences between groups in most cases. This suggests that differences in the subjective health variable are a robust indicator of differences in actual physical health conditions between Indigenous and non-Indigenous Australians. The exception relates to Indigenous people who were removed from their natural families and whose main language spoken at home is Indigenous. Controlling for objective health variables doesn't eliminate the gap in self-assessed health between this group and the non-Indigenous population. This may imply cultural differences in the interpretation of the subjective scale for this group, but more likely that there are factors additional to objective health conditions which influence the self-assessed health status of Indigenous people who experienced removal from their natural families. The result also supports the finding by Sibthorpe, Anderson, and Cunningham (2001) that use of self-assessed health underestimates health problems of those who speak an Indigenous language.

8.3 Recommendations

The findings in this thesis have a number of implications for the development of government policies for improving Indigenous health. Indigenous people in Australia are not a homogenous group and the factors associated with the health status gap between Indigenous and non-Indigenous people for one group of Indigenous people could be different from another group. There are differences among Indigenous people living in remote and non-remote areas, people speaking different languages and members and non-members of the Stolen Generation. Therefore a single policy or programme cannot close the health status gap of the whole Indigenous population.

The proportion of Indigenous people living in remote areas is higher compared to the non-Indigenous population. Among Indigenous Australians 72% live in non-remote areas and 28% live in remote and very remote areas. As discussed in Chapter 2 there is a general perception that Indigenous people living in remote and very remote areas have worse health compared to the large majority of Indigenous people living in cities and urban areas. The healthcare services being nonexistent or not accessible, shortages of fresh food supplies, poor educational and employment status are often cited as the reasons behind this perception.

This study suggests that living in remote areas does not contribute to poor health status of Indigenous Australians, except in the case of diabetes. The results for Indigenous Australians living in remote areas show no significant effect on utilisation of healthcare services and also do not show the existence of any perceived unmet healthcare need.

Existing evidence on the gap in health status between Indigenous and non-Indigenous Australians derives mainly from research on the health status of the remote Indigenous population. Since the majority of Indigenous people live in non-remote areas, their health status is likely to contribute as much, if not more, to the gap in health status as the health of Indigenous people living in remote areas. Therefore effort should not be directed at Indigenous people living in remote areas

only. More research on the health status of Indigenous people living in non-remote areas is required to close the gap between Indigenous and non-Indigenous people.

The findings of this thesis suggest that policies addressing behaviour could contribute to 'closing the gap' for those living in remote areas and speak an Indigenous language. Whereas addressing the trauma of removal is important for those living in non-remote areas.

Diabetes is more prevalent among Indigenous Australians compared with the non-Indigenous. The analysis in the thesis shows that none of the observable characteristics could contribute to the gap in the diabetes status between the two populations. This gap is higher in the remote areas.

Cunningham et al. (2008) show that among urban Indigenous Australians aged 15–64 years diabetes is associated with lower socio-economic status. Their analysis is not based on self-reported data, as in 2004–05 NATSIHS. Physical tests were conducted to ensure that the person had diabetes. But this study may not be representative as participants were predominantly self-selected volunteers, females and half were less than 35 years old. BMI is an important risk factor for Type 2 diabetes. But BMI was not found to contribute to the gap in this study. According to Daniel et al. (1999) the diabetes incidence among Indigenous people with even the lowest BMI is greater than corresponding rates for non-Indigenous populations. Therefore the optimal range of BMI is likely to be lower for Indigenous people than that suggested for the non-Indigenous population (Daniel et al. 1999).

Evidence suggests that Indigenous people face difficulties in accessing an adequate and healthy diet, particularly in remote areas of Australia (Burns et al. 2004). Budget constraints lead to compromising quality of food before quantity as consumers maximize calories (Brimblecombe and O'Dea 2009). Poor nutrition, especially the lack of essential nutrients (like magnesium) could be a potential risk factor for diabetes among Indigenous Australians (Longstreet et al. 2007). The modelling in this thesis includes some controls for the self-reported dietary habits (consumption of fruit and vegetables and consumption of milk), but this does not account for the gap in diabetes between Indigenous and non-Indigenous people. This unexplained gap

could also be attributable to higher reported levels of albuminuria and CRP and lower birth weight among Indigenous people in Australia (AMA 2005; Wang and Hoy 2007) or due to higher levels of psychosocial stress experienced by the Indigenous population.

The burden of diabetes is very high among Indigenous Australians. Thus finding out the determinants of risk for the increased prevalence of the disease is important. The onset of Type 2 diabetes is very early, usually during adolescence, among Indigenous Australians (Maple-Brown, Sinha and Davis, 2010). This thesis has not included Indigenous people who were under 18 years of age. Therefore the actual gap in the diabetes status between the Indigenous and non-Indigenous people would be much higher than that reported in this study. Evidence suggests that diabetes complications, if not controlled, could lead to heart disease and kidney failure (Spencer et al. 1998; Wang and Hoy, 2004). Therefore it is important to manage diabetes among the Indigenous population through proper prevention, diagnosis and management strategies. It would be a challenging task to the health system especially in remote areas where the prevalence is very high but the healthcare resources are poor.

The thesis shows that Indigenous people utilise fewer healthcare services compared with the non-Indigenous despite their poor health status and subsequent analysis (through the addition of objective health variables) shows that there exist unmet healthcare needs. There are differences in healthcare utilisation among different groups of Indigenous people. There could be similarities and dissimilarities among the barriers faced by different groups of Indigenous people.

Indigenous people living in remote areas experience a larger gap and unmet healthcare needs, but are much less likely to report not having utilised healthcare services when in need of them. Non-availability or communication problems are therefore not the only barriers faced by Indigenous Australians in accessing healthcare services in remote areas. This result indirectly suggests that the services of other healthcare professionals play an important role in meeting the healthcare needs of people living in these areas where the services of GPs and specialists are minimal. Descriptive statistics from 2004–05 NATSIHS show that 22% of

Indigenous people and 15% of non-Indigenous people utilised the services of other health professionals in the previous 2 weeks. Among Indigenous people the utilisation of these services is higher among those living in remote areas compared to non-remote areas (31% vs 18%). The results suggest the possibility of workforce flexibility in remote areas where healthcare services could be provided, with adequate training, by nurse practitioners or allied health professionals including traditional healers. These healthcare delivery mechanisms need to be supported by access to Medicare benefits for the services of allied health professionals. Also, a better understanding of the contribution of other healthcare professionals and an in-depth study of the traditional medicines and their efficacy is important.

The relatives of the Stolen Generation members utilise more health services when compared to other Indigenous persons and to non-Indigenous persons. However, these differences in utilisation can be fully accounted for by differences in demographic characteristics. This also holds when objective health variables are controlled for, suggesting no greater degree of unmet healthcare need among relatives of the Stolen Generation. Despite this, relatives of the Stolen Generation are significantly more likely to report going without healthcare when in need of those services. Therefore providing non-racist and culturally secure health services is important for the effective utilisation of healthcare services and achieving better health outcomes.

The analysis in this thesis shows that Indigenous males have a lower incidence of a number of chronic diseases when compared to Indigenous females. The healthcare utilisation of Indigenous males is lower compared to Indigenous females and perceived unmet healthcare need is also significantly less common among Indigenous men. All these results point to Indigenous males having better health status than Indigenous females. But the life expectancy figures show that Indigenous males die earlier (six years) than Indigenous females. Therefore it is important to find the factors associated with the lower life expectancy of Indigenous males to close the gap between the Indigenous and non-Indigenous population.

Evidence suggests that the predominance of female staff within the health sector, lack of culturally appropriate and male specific health clinics, shame in having

certain diseases, strong influence of women's health issues in defining health priorities and action are factors which act as barriers for Indigenous men utilising healthcare services. The healthcare service needs to take actions to decrease or remove the barriers faced by Indigenous males in accessing these services.

The results from this thesis clearly show that the experience of removal from their natural families has had devastating effects on the health status of Indigenous Australians. The evidence suggests that, for the current adult cohort of Indigenous Australians, that impact is more pronounced among those who had relatives removed from their natural families than those who themselves were removed. Given the overlap between these two groups — almost all those who were taken away themselves also had relatives who had been removed — more detailed analyses could not be undertaken to separately identify the factors contributing to the health status gap between the non-Indigenous population and these two groups within the Stolen Generation.

Also, because the variable 'removal from the natural family' is not applicable for the non-Indigenous population, the methodology used here precludes it from being included in the decomposition analysis. If the effect of removal could have been incorporated into the decomposition analysis, undoubtedly this would have been shown as a major contributor to the health status gap between the Indigenous and non-Indigenous populations.

Indigenous people who experienced removal (themselves or their relatives) from their natural families have poorer self-assessed health and greater chronic disease status when compared with non-Indigenous people. They also have poorer health status compared with Indigenous people who did not experience any removal. This phenomenon cannot be explained by demographic, behavioural, socio-economic or cultural factors, or by lower utilisation of healthcare by this group. The better socio-economic and behavioural status enjoyed by Indigenous people who experienced removal from their natural families compared with those with no removal experience has not helped them in overcoming their health disadvantage.

The following are found in those who experienced removal: (a) lower self-assessed health even after controlling for physical health measures; (b) unexpectedly high levels of utilisation of healthcare despite literature that suggests they tend to shy away because of distrust; and (c) high perceived unmet need despite modelling which suggests utilisation in line with observed characteristics and physical health. This could suggest a 'hidden sickness' or 'inner sickness' associated with trauma and loss, that the Indigenous people themselves feel but is not captured by the NATSIHS statistics or adequately addressed by the available healthcare services. This would be consistent with the Indigenous view of health being holistic rather than reductionistic.

The assimilation policies may have been successful in promoting 'mainstream' socio-economic outcomes, but this did not outweigh the trauma created by assimilation policies and its impact on those removed and their subsequent generations, and now manifest in other indicators such as increased arrests, violence and lack of social support. Policies that could ease the trauma created by the forced removal of Indigenous children and which could improve their trust in the government and institutions need to be implemented.

On 13th February 2008, the Prime Minister, Kevin Rudd apologised to the Stolen Generation and to all the Indigenous population for the past historical injustices. Whether that acknowledgement and apology has helped to ease the hurt caused by the assimilation policies will only be known in the years to come. It could have a positive impact on the mental health and well-being of Indigenous persons and help in the healing process. Evidence suggests that support and encouragement to preserve Indigenous culture, especially languages, could improve the sense of cultural identity and thus positively impact on the health status of Indigenous people.

8.4 Contribution to literature and conclusion

Through a decomposition analysis the thesis shows that there is a very big gap in self-assessed health between Indigenous and non-Indigenous people. The differences in observable characteristics only accounts for about 25% of the total gap between

the Indigenous and non-Indigenous populations. The analysis in this thesis provides some significant extensions to the existing literature.

First, using more recent nationally representative data and an extensive set of dependent and independent variables, the thesis updates the work of Booth and Carroll (2005a) in estimating the health inequality between Indigenous and non-Indigenous Australians. Booth and Carroll's (2005a) main focus was to explore the contribution of socio-economic factors to the gap in health status between Indigenous and non-Indigenous Australians. Though they include a few behavioural factors, such as smoking and alcohol consumption in their analysis, the relative contribution of these factors to the health disadvantage of Indigenous people is not specifically analysed as done here. The decomposition analysis in the thesis shows that the differences in socio-economic factors contribute to one-third of the gap in health status and the result is similar to that of Booth and Carroll. Though health impairing behaviours are higher among Indigenous people it has minimal impact on the overall gap in the health status.

Second, it builds upon earlier studies to estimate differences in the utilisation of healthcare services. The utilisation variable includes those who visited a doctor or were admitted to hospital in the previous 12 months. Factors associated with healthcare utilisation are examined. The analysis provides evidence on the existence of unmet healthcare need among Indigenous Australians. It also presents an analysis of the difference between the actual unmet healthcare need and perceived unmet healthcare need which helps in understanding the effectiveness of the healthcare services.

It is now well-established that Indigenous people in Australia comprise a heterogeneous group with diverse languages and customs. This heterogeneity can differentially affect health status, behavioural patterns and utilisation of healthcare services and thus often limits the ability to generalize observations among Indigenous people. In this thesis separate analyses are conducted for different groups of Indigenous people, thus allowing for the fact that these groups may not only have different characteristics but also different health responses to variables. These groups include: (a) those living in remote and non-remote areas; (b) those who speak

English or an Indigenous language; and (3) those who experienced removal from their natural families and others.

The finding of this thesis rejects the common perceptions that poor socioeconomic status, health impairing behaviours and living in remote areas where there is lack of basic facilities and services are the major factors that contribute to the poor health status of Indigenous Australians.

Third, this thesis also looks at the contribution of cultural factors like living in a multifamily household, speaking English or an Indigenous language at home and being a member of the 'Stolen Generation' that were not looked into in the study by Booth and Carroll (2005a).

The thesis examines the impact of being removed from natural family on health status and utilisation of healthcare services. The results from this thesis suggest that the experience of removal from natural families has devastating trans-generational effects on the health status of Indigenous Australians. Better socio-economic and behavioural characteristics cannot by themselves undo the harm caused by the assimilation policies.

The results on 'Stolen Generation' and its impact on the health status of Indigenous Australians are consistent with that of Tynan et al (2007) in the Indigenous (Koori) community (refer to Section 2.5 in Chapter 2). Grossman (1972) in his health production model states that an individual inherits an initial stock of health which depreciates over time but gross investments can enhance the health status of people. Due to disadvantages faced by Indigenous people over generations, their initial stock of health is poor and the depreciation faster when compared with non-Indigenous people. As discussed above, better behaviour, education and medical care by itself cannot produce good health among Indigenous people.

The most important area when it comes to 'closing the gap' is addressing the lower health of Stolen Generation members rather than these commonly perceived issues, and in turn this lower health is something that cannot be accounted for within existing views of health. It will need development of specific approaches and

working with Indigenous people themselves to understand the issues and develop appropriate responses.

The data used in the thesis for analysis have some limitations. First, the analysis is based on cross-sectional data, meaning that caution must be taken in interpreting associations between variables as being ones of causation. Even though the major dataset used in the thesis is cross-sectional, the study has used different datasets (2004–05 NATSIHS and NHS, 2001 NHS [G and I] and 2002 NATSISS) to analyse health status and healthcare utilisation. Thus the main findings have been verified across different years and different data collections.

Second, the 2004–05 NATSIHS collected information only from Indigenous people resident in private dwellings in remote and non-remote areas. Visitors to the private dwellings and people living in hostels, prisons, hospitals and nursing homes were excluded from the survey. The non-inclusion of visitors and people living in hospitals could lead to an underestimate of the number of Indigenous people with poor health status.

Third, all the information including the objective health outcomes in the data are self-reported. The validity of the self-report of diseases among Indigenous people depends on the meaning and expectation of their health and the understanding about their health conditions. Therefore, the self-reporting method used by the Australian Bureau of Statistics in collecting health data could result in an overestimate or underestimate of particular health conditions. As discussed in Section 8.3 the 2004–05 NATSIHS has not captured all the health problems faced by members of the Stolen Generation.

Fourth, the results in the thesis are based on a national level analysis of the Indigenous datasets. State level analysis is not undertaken. The Northern Territory and Western Australia have higher Indigenous representation in their populations compared to other States. Health service delivery is a state matter and the availability of healthcare services can differ from State to State. The Commonwealth is largely responsible for the financing of healthcare through various subsidies, schemes and health programmes, while the responsibility for the administration and management

of the health services remains a state responsibility. The data on availability of healthcare services in different areas is not available at the national level. Also, Indigenous people living in different states belong to different tribal groups and so they may be culturally different.

Fifth, remote area comparisons between Indigenous and non-Indigenous people could not be made as non-Indigenous data for remote areas are not available. These comparisons could have provided details on accessibility and utilisation of healthcare services, educational attainment and employment status.

Sixth, data on the utilisation of healthcare services of other health professionals are not available and hence not included in the analysis. Descriptive statistics from 2004–05 NATSIHS show that 22% of Indigenous people and 15% of non-Indigenous people utilised the services of other health professionals in a two week period. Among Indigenous people the utilisation of these services is higher among those living in remote areas compared with non-remote areas (31% vs 18%). The inclusion of this variable would have made a difference to the gap in the utilisation of healthcare services between the Indigenous and non-Indigenous populations. Also, the data on perceived unmet healthcare need is not available for non-Indigenous people. So the thesis could not analyse the factors contributing to the differences in perceptions between the two populations.

Finally, in the 2004–05 NATSIHS, Indigenous people comprised those who identified themselves or were identified by another household member, as being of Indigenous origin. Among the people who identify as Indigenous, many of them would be of mixed descent. Even though Indigenous people reject the measures of blood quantum, it could possibly have an effect on their health status (particularly when genetic factors affect the health).

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Appendices

Appendix Chapter 3

This appendix gives detailed information on the 2002 National Aboriginal and Torres Strait Islander Social Survey (NATSISS) and the 2001 National Health Survey (NHS) used in the thesis.

2002 National Aboriginal and Torres Strait Islander Social Survey (NATSISS)

The 2002 NATSISS is the second national social survey of Indigenous Australians conducted by the ABS. Carried out between August 2002 and April 2003 the multi-dimensional cross-sectional survey collected information on personal and household characteristics of Indigenous people aged 15 years or over resident in private dwellings across all states and territories in Australia, including people living in remote areas.

The topics included in the 2002 NATSISS were:

- Demographic/core characteristics
- Culture and language
- Family and community
- Health and disability
- Education
- Employment
- Income
- Financial stress
- Information technology
- Transport
- Law and justice

Similar to 2004–05 NATSIHS, 2002 NATSISS incorporated a sample of discrete Indigenous communities (including any out-stations associated with them) and a

sample of dwellings in areas not covered by the discrete Indigenous community sample, referred to here as the 'non-community' sample. The samples for community areas and non-community areas were designed separately with each involving a multistage sampling process. The selection of the samples from community and non-community areas was similar to that of 2004–05 NATSIHS. In both community and non-community areas up to three Indigenous persons (aged 15 years or over) in selected dwellings were randomly selected to participate in the survey. As in the case of 2004–05 NATSIHS the survey excluded visitors to the randomly selected private dwellings.

A total of 9,359 Indigenous persons from 5,887 households participated in the survey. This represents about 1 in 30 of the total Indigenous population aged 15 years or over from across Australia.

For the data collection, persons aged 18 years or more were interviewed personally while persons aged 15 to 17 years were interviewed with the consent of a parent or guardian. If the consent wasn't obtained a parent or guardian was interviewed on their behalf. Information about the dwelling, the financial situation of the household, and income for those who had not been selected was collected from a nominated household spokesperson

The respondents in non-community areas were interviewed using Computer Assisted Interviewing, whereas those in community areas were interviewed using Pen and Paper Interviewing. In the community areas the standard household survey approaches were modified to take account of language and cultural issues but most underlying concepts remained the same across all areas. In discrete Indigenous communities, the interviewers were accompanied, wherever possible, by local Indigenous facilitators, who assisted in the conduct and completion of the interviews.

2001 National Health Survey (NHS)

The NHS conducted by the ABS collected information about the health status of Australians, their use of health services and facilities and health-related aspects of

their lifestyle. Details of demographic and socio-economic characteristics were also collected.

The 2001 NHS had two components:

- a survey conducted on a sample from the general population of Australia (referred to as the NHS(G)), and
- a survey conducted on a supplementary sample of Indigenous Australians (referred to as the NHS(I)).

The 2001 NHS(G) was conducted in 17,918 private dwellings selected throughout non-sparsely settled areas of Australia. Information was obtained about one adult, all children aged 0 to 6 years, and one child aged 7 to 17 years in each selected household. A total of 26,863 persons fully responded to the survey.

The sample of Indigenous people in the 2001 NHS(G) was supplemented to improve the reliability of Indigenous estimates and to allow, for the first time, results to be presented for Indigenous persons living in remote areas. A total of 3,198 Indigenous adults and children were included in the 2001 NHS(I) sample. The 2001 NHS(I) sample was combined with the 483 Indigenous Australians enumerated in the 2001 NHS(G) sample to provide a total sample of 3,681 Indigenous persons (1,853 adults and 1,828 children). Of the total Indigenous sample 954 were from the sparsely settled areas and 2.727 were from non-sparsely settled areas. The 2001 NHS(I) sample covered all areas of Australia, including sparsely settled areas. Only Indigenous households were considered in scope of the NHS(I) survey. Non-Indigenous persons were not eligible for selection in the supplementary Indigenous sample although, if they were the parent or guardian of an Indigenous child, they may have acted as spokesperson for the child.

Data were collected differently for the 2001 NHS(I) sample according to whether respondents lived in sparsely settled areas or non-sparsely settled areas. In non-sparse NHS(I), dwellings were selected using stratified multistage area sampling. Similar to most of the NHS(G) sample selection, CDs formed the first stage selection units. CDs were selected with a probability proportional to the number of Indigenous

households in the CD as identified during the 1996 Census of Population and Housing. Therefore, CDs with a higher proportion of Indigenous households had a greater chance of selection. A random selection of dwellings within selected CDs was then screened to assess their usual residents' Indigenous status. Where a dwelling contained one or more Indigenous usual residents aged 18 years or more, one Indigenous adult (18 years of age or more) and up to two Indigenous children (0 to 17 years of age) were randomly selected to participate in the survey.

In the sparse NHS(I), the sample was obtained from a random selection of discrete Indigenous communities and outstations across Australia using information collected in the 1999 Community Housing and Infrastructure Needs Survey (CHINS). Within selected communities and outstations, a random selection of dwellings was made. Within selected dwellings, one Indigenous adult (18 years of age or more) and up to one Indigenous child (0 to 17 years of age) were randomly selected to participate in the survey.

Data collection was undertaken by ABS interviewers. Persons aged 18 years or more were interviewed personally, with the exception of persons who were too sick or otherwise unable to respond personally. Persons aged 15 to 17 years were interviewed with the consent of a parent or guardian; otherwise a parent or guardian was interviewed on their behalf. For persons aged less than 15 years, information was obtained from a person responsible for the child.

There are a number of differences in the data collection methods in sparsely and non-sparsely settled areas for the 2001 NHS(I). In sparsely settled areas, standard household survey approaches were modified to take account of language and cultural issues. Male interviewers collected personal information from male respondents, and female interviewers collected personal information from female respondents. Also, the interviewers were accompanied, wherever possible, by local Indigenous facilitators, who assisted in the conduct and completion of the interviews. In non-sparsely settled areas (for NHS(I) and NHS(G)), adult females were invited to complete a small additional questionnaire covering specific supplementary women's health topics. This additional questionnaire was voluntary and self-enumerated. In the sparse NHS(I) sample, this information was collected by a female interviewer.

The survey content for the non-sparse NHS(I) was the same as the content included in the 2001 NHS(G), however, NHS(I) did not collect information on mental health issues, country of birth (this was coded to Australia by the ABS) and year of arrival. In addition to the topics not collected in non-sparsely settled areas, topics such as private health insurance, asthma symptoms, exercise, nutrition and child's immunization were not collected in sparsely settled areas. The NHS(G) and NHS(I) enable comparison between the Indigenous and non-Indigenous people.

Appendix Chapter 4

Table A4.1 presents the definition of the dependent and independent variables used in the thesis.

Table: A4.1 Variable definitions

Variable	Definition
Self-assessed health status (SAHS)	Responses to the SAHS questions were scored as follows (1: excellent, 2: very good, 3: good, 4: fair, 5: poor)
Chronic health conditions	Includes those who reported that they currently have arthritis (all types combined), asthma, diabetes and heart and circulatory conditions (all types combined)
Injury	Those who sustained an injury in the past four weeks
Health care utilisation	The variable is derived by summing up the people who visited a doctor or got admitted to hospital in the last 12 months
Unmet healthcare need	The people who required healthcare but did not utilize any (data available for Indigenous persons only)
Age	Age is defined in 6 groups, age 18–24, 25–34, 35–44, 45–54, 55–64 and 65 & above.
Gender	Males and females
Marital status	Married and unmarried
Household structure	Couple with children, couple only, lone parent with children, single person household and all other households
Geography	Geography is represented by two groups: people living in non-remote areas and those living in remote/very remote areas.
Smoker status	Smoking status was represented by three groups; current smoker, ex-smoker and never smoked. Current smokers were comprised of three groups: current smokers daily, current smokers weekly (at least once a week but not daily), current smoker less than weekly.
Alcohol consumption status	Measured by alcohol risk level 7 day average. The alcohol consumption status was categorized into 6 levels: low risk, medium risk, high risk, last consumed alcohol one week to less than 12 months ago, last consumed alcohol 12 months or more ago and never consumed alcohol
Dietary habits	Includes consumption of full-cream milk, whether usually eats vegetables each day and whether usually eats fruit each day
Exercise	Those who did moderate or vigorous exercise (in last two weeks)
Education	Educational status is represented by six groups: education below year 10 (includes those with no education), year 10 education (includes those with year 11 education and basic vocational education), year 12 education, vocational education (skilled), diploma and degree (Bachelor or higher).
Employment	Employment status was represented by four groups; employed (full-time and part-time), unemployed (looking for full-time and part-time work), and not in the labour force.
Income	Gross weekly equalized cash income of household is categorized into ten deciles
Welfare dependence	Government pensions and allowances are the main source of personal cash income
Housing tenure	Owner (with or without mortgage), renters (excluding boarders), other (data available for Indigenous people only)
Body mass index (BMI)	BMI was represented by four groups: underweight (BMI less than 18.5), normal weight (BMI 18.5 to 24.99), overweight (BMI 25 to 29.99) and obesity (BMI 30 and above).
Multifamily households	Two or more family households with only family members present
Main Language spoken at home	English, Australian Indigenous languages and other languages
Removal from natural family	Whether respondent taken away from natural family (Indigenous only), whether relatives taken away from natural family (Indigenous only).

Table A 4.2: Marginal effect of being Indigenous and self-assessed health status (Ordered probit model)

Self-assessed health outcome		1 Indigenous status and gender		2 + Demographic variables		3 + Behavioural variables		4 + Socio-economic variables		5 + Cultural variables	
1	Indigenous status	0.04	***	0.05	***	0.03	***	0.01	***	0.00	
2	Indigenous status	0.05	***	0.07	***	0.05	***	0.02	***	0.01	*
3	Indigenous status	0.03	***	0.04	***	0.03	***	0.02	***	0.01	*
4	Indigenous status	-0.05	***	-0.08	***	-0.05	***	-0.03	***	-0.01	
5	Indigenous status	-0.07	***	-0.09	***	-0.06	***	-0.03	***	-0.01	*
Observations used		**18212**		**18212**		**18212**		**18212**		**18212**	

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result not included

Table A 4.3: Marginal effect of being Indigenous and self-assessed health status (binary logit model using 2001 data)

	1 Indigenous status and gender		2 + Demographic variables		3 + Behavioural variables		4 + Socio-economic variables		5 + Cultural variables	
Indigenous status	-0.15	**	-0.19	***	-0.14	***	-0.08	***	-0.09	***
Observations used	**13574**		**13574**		**13574**		**13574**		**13574**	
Likelihood Ratio (Pr > Chi2)	**85 *****		**648 *****		**979 *****		**1349 *****		**1372 *****	

Source: 2001 National Health Survey (General) and 2001 National Health Survey (Indigenous)

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Full result not included

Appendix Chapter 5

Table 5.2 in Chapter 5 reports estimated marginal effects on the Indigenous status indicator, while the full results for the models are reported in Tables A5.1 to A5.5.

Table A5.1: Marginal effect of being Indigenous and heart problems

Variables	1 Indigenous status &gender		2 + Demographic variables		3 + Behavioural variables		4 + Socio-economic variables		5 + Cultural variables	
Indigenous Status	**-0.06**	***	**0.06**	***	**0.06**	***	**0.05**	***	**0.02**	
Male	-0.06	***	-0.06	***	-0.05	***	-0.03	***	-0.03	***
18–24 years			-0.12	***	-0.12	***	-0.12	***	-0.12	***
24–34 years			-		-		-		-	
35–44 years			0.11	***	0.10	***	0.10	***	0.10	***
45–54 years			0.27	***	0.26	***	0.26	***	0.26	***
55–64 years			0.43	***	0.41	***	0.37	***	0.37	***
65 years and above			0.57	***	0.55	***	0.47	***	0.47	***
Married			0.04	***	0.04	***	0.04	***	0.04	***
Couple with children			-0.03	**	-0.03	**	-0.02		-0.03	*
Couple with no children			-0.01		-0.01		0.00		-0.00	
Lone parent family			0.03		0.03		0.01		0.01	
Lone person			0.03	*	0.03	*	0.03	*	0.02	
Other households			-		-		-		-	
Remote and very remote areas			0.01		0.02		0.02		0.03	*
Low risk alcohol consumption					-		-		-	

Variables	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Medium risk alcohol consumption			0.02	0.03 **	0.03 **
High risk alcohol consumption			0.01	0.01	0.01
Last consumption of alcohol—one week to less than 12 months ago			0.05 ***	0.04 ***	0.04 ***
Last consumption of alcohol—12 months or more ago			0.05 ***	0.03 **	0.03 **
Never consumed alcohol			0.02	-0.00	0.00
Smoker			-	-	-
Ex-smoker			0.03 ***	0.04 ***	0.04 ***
Never smoked			0.00	0.02 *	0.02 *
Exercise			-0.03 ***	-0.02 ***	-0.03 ***
Consumption of non full-cream milk			0.05 ***	0.06 ***	0.06 ***
Vegetable consumption			0.04	005 *	0.04
Fruit consumption			-0.03 **	-0.03 *	-0.03 *
Education below Year 10				0.02	0.02
Year 10 education				-	-
Year 12 education				-0.02 *	-0.02 *
Vocational education				0.01	0.01
Diploma				-0.00	-0.00
Degree				0.00	0.00
Employed full-time				-	-
Employed part-time				0.02 **	0.03 **
Unemployed				-0.02	-0.02
Not in labour force				0.06 ***	0.06 ***
Weekly income				-0.00	-0.00
Welfare—main source of income				0.06 ***	0.06 ***

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Variables	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Household crowding				-0.01	-0.00
Owner occupied houses				-0.02	-0.02
Rental houses				-	-
Other tenure				-0.06	-0.07
Multifamily households					-0.01
English—main language spoken at home					-
Indigenous language—main language spoken at home					-0.01
Other languages—main language spoken at home					-0.02
Person removed from natural family					-0.00
Relatives removed from natural family					0.06 ***
Observations used	**18212**	**18212**	**18212**	**18212**	**18212**
Likelihood Ratio (Pr > Chi2)	**125 *****	**3696 *****	**3821 *****	**3992 *****	**4004 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. ***, Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '-' represents reference variables

Table A5.2: Marginal effect of being Indigenous and diabetes

Variables	1 Indigenous status &gender		2 + Demographic variables		3 + Behavioural variables		4 + Socio-economic variables		5 + Cultural variables	
Indigenous Status	0.08	***	0.09	***	0.08	***	0.08	***	0.07	***
Male	0.01	*	0.01	***	0.01	***	0.01	***	0.01	***
18–24 years			-0.03	***	-0.03	***	-0.03	***	-0.03	***
24–-34 years			-		-		-		-	
35–-44 years			0.04	***	0.03	***	0.03	***	0.03	***
45–54 years			0.10	***	0.08	***	0.08	***	0.08	***
55–64 years			0.17	***	0.13	***	0.11	***	0.11	***
65 years and above			0.25	***	0.19	***	0.13	***	0.13	***
Married			0.00		-0.00		-0.00		-0.00	
Couple with children			-0.02	***	-0.02	***	-0.01	***	-0.01	***
Couple with no children			-0.01	*	-0.00		-0.00		-0.00	
Lone parent family			-0.01		-0.01		-0.01	*	-0.01	*
Lone person			-0.01	**	-0.01	*	-0.01	*	-0.01	*
Other households										
Remote and very remote areas			0.02	***	0.02	***	0.02	***	0.02	***
Low risk alcohol consumption					-		-		-	
Medium risk alcohol consumption					-0.01	*	-0.01		-0.01	
High risk alcohol consumption					-0.00		-0.00		-0.00	
Last consumption of alcohol—one week to less than 12 months ago					0.02	***	0.01	***	0.01	***
Last consumption of alcohol—12 months or more ago					0.03	***	0.02	***	0.02	***
Never consumed alcohol					0.04	***	0.03	***	0.03	***
Smoker					-		-		-	
Ex-smoker					0.01	**	0.01	***	0.01	***
Never smoked					-0.00		0.00		0.00	

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Variables	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Exercise			-0.01 ***	-0.00 ***	-0.01 ***
Consumption of non full-cream milk			0.02 *	0.03 ***	0.03 ***
Vegetable consumption			-0.42 ***	-0.01	-0.02 *
Fruit consumption			0.00	0.00	0.00
Education below Year 10				0.01 **	0.01 **
Year 10 education				-	-
Year 12 education				0.01	0.01
Vocational education				0.01 **	0.01 **
Diploma				-0.01 **	-0.01 **
Degree				0.00	0.00
Employed full-time					
Employed part-time				0.01 **	0.01 **
Unemployed				0.01	0.01
Not in labour force				0.01 **	0.01 ***
Weekly income				-0.00 **	-0.00 **
Welfare—main source of income				0.01 **	0.01 **
Household crowding				-0.00	0.00
Owner occupied houses				-0.01 ***	-0.01 ***
Rental houses				-	-
Other tenure				-0.00	-0.00
Multifamily households					-0.00
English—main language spoken at home					-
Indigenous language—main language spoken at home					-0.00
Other languages—main language spoken at home					0.01 **

Variables	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Person removed from natural family					0.01
Relatives removed from natural family					0.01
Observations used	**18212**	**18212**	**18212**	**18212**	**18212**
Likelihood Ratio (Pr > Chi2)	**212 *****	**1259 *****	**1462 *****	**1567 *****	**1582 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. ***, Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '-' represents reference variables

Table A5.3: Marginal effect of being Indigenous and asthma

Variables	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Indigenous Status	0.05 ***	0.07 ***	0.06 ***	0.04 ***	0.03 ***
Male	-0.06 ***	-0.05 ***	-0.06 ***	-0.06 ***	-0.06 ***
18–24 years		0.01	0.02 *	0.02 **	0.02 **
24–34 years		-	-	-	-
35–44 years		-0.02 **	-0.02 **	-0.02 **	-0.02 **
45–54 years		-0.01	-0.01	-0.01	-0.01
55–64 years		-0.00	-0.00	-0.01	-0.01
65 years and above		-0.02 ***	-0.02 **	-0.04 ***	-0.04 ***
Married		-0.01 *	-0.01 *	-0.01 *	-0.01
Couple with children		-0.00	-0.00	-0.00	-0.00
Couple with no children		0.01	0.01	0.01	0.01
Lone parent family		0.01	0.00	-0.00	-0.00
Lone person		0.00	0.00	-0.00	-0.00
Other households		-	-	-	-
Remote and very remote areas		-0.04 ***	-0.04 ***	-0.04 ***	-0.03 ***
Low risk alcohol consumption			-	-	-
Medium risk alcohol consumption			-0.01	-0.01	-0.01
High risk alcohol consumption			0.01	0.01	0.00
Last consumption of alcohol—one week to less than 12 months ago			0.00	0.00	0.00
Last consumption of alcohol—12 months or more ago			0.03 ***	0.02 **	0.03 ***
Never consumed alcohol			-0.01	-0.02 **	-0.01
Smoker			-	-	-
Ex-smoker			0.00	0.00	0.00
Never smoked			-0.02 ***	-0.02 ***	-0.01 **

Variables	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Exercise			-0.00	0.00	-0.00
Consumption of non full-cream milk			-0.00	0.00	0.00
Vegetable consumption			-0.03	-0.03	-0.04 *
Fruit consumption			-0.02 *	-0.02 *	-0.01
Education below Year 10				0.02 **	0.02 **
Year 10 education				-	-
Year 12 education				-0.01	-0.00
Vocational education				0.01	0.01
Diploma				0.01	0.02 *
Degree				0.01	0.01
Employed full-time				-	-
Employed part-time				-0.01 **	-0.02 **
Unemployed				-0.02	-0.02
Not in labour force				-0.00	-0.00
Weekly income				-0.00	-0.00
Welfare—main source of income				0.02 ***	0.02 ***
Household crowding				-0.01	-0.00
Owner occupied houses				0.02	0.02
Rental houses				-	-
Other tenure				0.05	0.04
Multifamily households					0.00
English—main language spoken at home					-
Indigenous language—main language spoken at home					-0.03 **
Other languages—main language spoken at home					-0.06 ***

Variables	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Person removed from natural family					0.04 *
Relatives removed from natural family					-0.00
Observations used	**18212**	**18212**	**18212**	**18212**	**18212**
Likelihood Ratio (Pr > Chi2)	**214 *****	**281 *****	**327 *****	**368 *****	**410 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. ***, Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '-' represents reference variables

Table A5.4: Marginal effect of being Indigenous and arthritis

Variables	1 Indigenous status &gender		2 + Demographic variables		3 + Behavioural variables		4 + Socio-economic variables		5 + Cultural variables	
Indigenous Status	-0.06	***	0.08	***	0.07	***	0.03	**	0.01	
Male	-0.07	***	-0.06	***	-0.06	***	-0.05	***	0.05	***
18–24 years			-0.09	***	-0.09	***	-0.09	***	-0.09	***
24–34 years			-		-		-		-	
35–44 years			0.11	***	0.11	***	0.11	***	0.11	***
45–54 years			0.27	***	0.27	***	0.26	***	0.26	***
55–64 years			0.47	***	0.46	***	0.41	***	0.41	***
65 years and above			0.54	***	0.55	***	0.42	***	0.43	***
Married			0.01		0.02		0.01		0.02	*
Couple with children			-0.01		-0.00		-0.00		0.00	
Couple with no children			0.02		0.03	*	0.03	*	0.03	
Lone parent family			0.03	**	0.03	**	0.02		-0.02	
Lone person			0.06	***	0.06	***	0.05	***	0.06	***
Other households			-		-		-		-	
Remote and very remote areas			-0.08	***	-0.08	***	-0.07	***	-0.05	***
Low risk alcohol consumption					-		-		-	
Medium risk alcohol consumption					-0.01		-0.01		-0.01	
High risk alcohol consumption					0.03	**	0.03	***	0.03	**
Last consumption of alcohol—one week to less than 12 months ago					0.02	***	0.01		0.01	
Last consumption of alcohol—12 months or more ago					0.03	**	0.01		0.01	
Never consumed alcohol					0.01		-0.01		0.00	
Smoker					-		-		-	
Ex-smoker					-0.01		0.00		0.00	
Never smoked					-0.04	***	-0.03	***	-0.03	***

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Variables	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Exercise			-0.01 **	-0.00	-0.00
Consumption of non full-cream milk			0.01	0.01 **	0.01 **
Vegetable consumption			-0.01	-0.00	-0.03
Fruit consumption			-0.04 ***	-0.03 ***	-0.03 ***
Education below Year 10				0.01 *	0.02 **
Year 10 education				-	-
Year 12 education				-0.04 ***	-0.04 ***
Vocational education				-0.00	-0.00
Diploma				-0.02 ***	-0.02 **
Degree				-0.04 ***	-0.04 ***
Employed full-time				-	-
Employed part-time				0.03 ***	0.04 ***
Unemployed				0.06 **	0.05 **
Not in labour force				0.06 ***	0.06 ***
Weekly income				-0.00 **	-0.00 ***
Welfare—main source of income				0.03 ***	0.03 ***
Household crowding				-0.01	-0.00
Owner occupied houses				0.04 **	0.03 *
Rental houses				-	-
Other tenure				0.02	0.01
Multifamily households					0.03
English—main language spoken at home					-
Indigenous language—main language spoken at home					-0.08 ***
Other languages—main language spoken at home					-0.05 ***

Variables	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Person removed from natural family					-0.03 *
Relatives removed from natural family					0.05 ***
Observations used	**18212**	**18212**	**18212**	**18212**	**18212**
Likelihood Ratio (Pr > Chi2)	**179 *****	**3532 *****	**3632 *****	**3884 *****	**3939 *****

Source: 2004–05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. ***, Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '-' represents reference variables

Table A5.5: Marginal effect of being Indigenous and injury

Variables	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Indigenous Status	-0.02 ***	-0.02 ***	-0.01 *	-0.01	-0.03 **
Male	0.01 **	0.01 **	0.00	0.00	0.00
18–24 years		0.03 ***	0.03 ***	0.03 ***	0.03 ***
24–34 years		-	-	-	-
35–44 years		-0.03 ***	-0.03 ***	-0.03 ***	-0.03 ***
45–54 years		-0.05 ***	-0.05 ***	-0.05 ***	-0.05 ***
55–64 years		-0.07 ***	-0.06 ***	-0.06 ***	-0.06 ***
65 years and above		-0.10 ***	-0.09 ***	-0.08 ***	-0.08 ***
Married		-0.01	-0.01	-0.01	-0.00
Couple with children		0.01	0.01	0.00	0.00
Couple with no children		0.03 **	0.02	0.01	0.01
Lone parent family		0.01	0.01	0.01	0.01
Lone person		0.03 **	0.02 *	0.02	0.02
Other households		-	-	-	-
Remote and very remote areas		-0.05 ***	-0.04 ***	-0.04 ***	-0.02 *
Low risk alcohol consumption			-	-	-
Medium risk alcohol consumption			-0.00	-0.00	-0.00
High risk alcohol consumption			0.02	0.02	0.02
Last consumption of alcohol—one week to less than 12 months ago			-0.01	-0.00	-0.00
Last consumption of alcohol—12 months or more ago			-0.04 ***	-0.04 ***	-0.04 ***
Never consumed alcohol			-0.05 ***	-0.04 ***	-0.03 ***
Smoker			-	-	-
Ex smoker			-0.00	-0.00	-0.00
Never smoked			-0.01 **	-0.01 *	-0.01

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Variables	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Exercise			0.03 ***	0.03 ***	0.03 ***
Consumption of non full-cream milk			0.01	0.00	0.00
Vegetable consumption			0.01	0.01	-0.01
Fruit consumption			0.03 ***	0.03 ***	0.03 ***
Education below Year 10				-0.02 **	-0.01
Year 10 education				-	-
Year 12 education				0.00	0.01
Vocational education				0.00	0.00
Diploma				0.01	0.02
Degree				-0.00	-0.00
Employed full-time					
Employed part-time				-0.01	-0.01
Unemployed				-0.01	-0.01
Not in labour force				-0.02 *	-0.02 *
Weekly income				0.00	-0.00
Welfare—main source of income				0.01	0.01
Household crowding				-0.01	-0.00
Owner occupied houses				0.00	-0.00
Rental houses				-	-
Other tenure				-0.01	-0.02
Multifamily households					0.01
English—main language spoken at home					-
Indigenous language—main language spoken at home					-0.07 ***
Other languages—main language spoken at home					-0.05 ***

Variables	1 Indigenous status &gender	2 + Demographic variables	3 + Behavioural variables	4 + Socio-economic variables	5 + Cultural variables
Person removed from natural family					-0.03
Relatives removed from natural family					0.04 **
Observations used	**18212**	**18212**	**18212**	**18212**	**18212**
Likelihood Ratio (Pr > Chi2)	**18 *****	**335 *****	**437 *****	**452 *****	**488 *****

Source: 2004─05 National Aboriginal and Torres Strait Islander Health Survey and 2004–05 National Health Survey

1. ***, Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. '-' represents reference variables

Table 5.2 in Chapter 5 shows the pooled logit analysis for objective health outcomes based on 2004–05 NATSIHS and 2004–05 NHS. Table A5.6 presents similar analysis using 2001 NHS (I) and 2001 National Health Survey (G).

Table A5.6: Marginal effect of being Indigenous and objective health outcomes (using 2001 data)

Health outcomes	**1 Indigenous status and gender**		**2 + Demographic variables**		**3 + Behavioural variables**		**4 + Socio-economic variables**		**5 + Cultural variables**	
Heart	-0.06	***	0.05	***	0.06	***	0.04	**	0.03	
Diabetes	0.07	***	0.09	***	0.08	***	0.07	***	0.07	***
Asthma	0.06	***	0.05	***	0.04	***	0.03	***	0.04	***
Injury	0.01		-0.01		-0.00		-0.00		-0.01	
Observations Used	**13574**		**13574**		**13574**		**13574**		**13574**	

Source: 2001 National Health Survey (Indigenous) and 2001 National Health Survey (General)

1. Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *
2. Household structure, remoteness, household tenure, household crowding, experience of removal from the natural family and living in a multifamily household could not be included in the analysis due to data limitations.
3. Data for arthritis is not available
4. In all the models, the Likelihood Ratio Chi-square test that all the regression coefficients are equal to zero is rejected at 1% level.

Appendix Chapter 6

Table 6.1 in Chapter 6 shows the pooled logit analysis for healthcare utilisation based on 2004–05 NATSIHS and 2004–05 NHS. Table A6.1 presents similar analysis using 2001 NHS(I) and 2001 NHS(G). Simple descriptive statistics using 2001 NHS showed a similar result (as in 2004–05 NATSIHS and 2004–05 NHS) in the utilisation of healthcare services between Indigenous and non-Indigenous Australians.

Table A6.1: Marginal effects on Indigenous status for utilisation of healthcare services

Utilisation of healthcare services	**1**	**2** +	**3** +	**4** +	**5** +
	Indigenous status &gender	**Demographic variables**	**Behavioural variables**	**Socio-economic variables**	**Cultural variables**
Indigenous Status	-0.05***	-0.03**	-0.02*	-0.03**	-0.01
Observations used	**13548**	**13548**	**13548**	**13548**	**13548**
Likelihood Ratio (Pr > Chi2)	**307 *****	**730 *****	**751 *****	**780 *****	**789 *****

Source: 2001 National Health Survey (Indigenous) and 2001 National Health Survey (General)

1.Marginal effect for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *

2. Household structure, remoteness, household tenure, household crowding, experience of removal from the natural family and living in a multifamily household could not be included in the analysis due to data limitations.