Is Closing the Gaps a useful approach for overcoming Indigenous Disadvantage?

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DECLARATION

I hereby certify that this dissertation contains no material that has been accepted for the award of any other degree or diploma in any institute, college or university. In addition, to the best of my knowledge and belief, it contains no material previously published or written by another person, except where due reference is made in the text of the dissertation.

27 October 2014

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ABSTRACT

Currently there is considerable disparity in terms of socioeconomic status between Indigenous[1] and non-Indigenous Australians. There is not a single indicator within the domains of education, employment, income, housing and health where Indigenous Australians have better or equal outcomes compared to non-Indigenous Australians (Biddle, 2013c). Since the inclusion of Indigenous Australians as a separate cultural entity within the Census, and the consequent availability of comparative statistics, the extent of this disadvantage has been known. Consequently, it has formed the basis of numerous policies and interventions (Altman, Biddle, & Hunter, 2008). However, it has been acknowledged that these policies have been largely a failure (Australian Public Service Commission, 2007). As of 2008, the Closing the Gaps policy came to the forefront as a means by which to remedy the situation. However, this policy has come under considerable criticism as it is argued that it largely fails to account for cultural difference and difficult to measure factors such as discrimination. In light of this criticism, the current study aimed to empirically determine the potential impact of such factors on Indigenous socioeconomic disadvantage. To achieve this it used the difference between Indigenous and non-Indigenous mean incomes as a way in which to measure Indigenous socioeconomic disadvantage. It used the explanatory variables of educational attainment, health, remoteness of residence, age and gender to ascertain the percentage of this income difference which could be attributed to demographical differences between the two populations. Findings inferred that only 31% of the difference between Indigenous and non-Indigenous incomes could be attributed to demographic differences in the explanatory variables between the two groups. These findings suggested that 69% of the

[1] The term Indigenous is used within this paper to represent both Aboriginal and Torres Strait Islanders to maintain a connection to the commonality of experiences of colonisation and current circumstance shared by both cultures.

income difference could be potentially attributed to other variables not observed by the study and, as Altman (2009) argues, largely ignored by Closing the Gaps.

CHAPTER 1

Introduction

Socioeconomic status is defined as the relative economic and social standing of an individual or group within society (Australian Bureau of Statistics (ABS), 2011a). It is a fundamental determinant of human functioning across the lifespan. It impacts on diverse aspects of human existence, ranging from early childhood development to physical and mental health in later stages of life (APA Task Force on Socioeconomic Status, 2006). It is a multi-causal construct measured by a combination of factors within the domains of education, income, occupation and residence. Each factor is interrelated and is subject to generational transmission (Kincheloe & Steinberg, 2007).

Since comparative statistics became available from the ABS in 1971, it has been possible to empirically measure the socioeconomic disadvantage experienced by Indigenous Australians (Altman, Biddle, & Hunter, 2008). The extent of this disadvantage has resulted in numerous initiatives by successive governments to achieve parity (Altman, 2009). However, despite many years of policy development and implementation, the situation remains relatively unchanged. Indigenous Australians remain the most socioeconomically disadvantaged of all groups within the nation (Steering Committee for the Review of Government Service Provision, 2011 (SCRGSP)).

Currently, considerable disparity exists between Indigenous and non-Indigenous Australians across all socioeconomic indicators (Table 1). There is not a single socioeconomic indicator within the domains of education, employment, income and housing where Australia's Indigenous population has better or equal outcomes compared to the non-Indigenous population (Biddle, 2013c). Furthermore, in comparison to international

Indigenous populations, it is suggested by Kaufman (2003) that Australia's Indigenous population ranks considerably behind those of other developed countries.

Table 1

Comparison of key socioeconomic, health and social indicators between Indigenous and non-Indigenous Australians.

Key indicator	**Indigenous**	**Non-Indigenous**
Attended pre/primary school (% of individuals 3 - 5 years of age)	56%	63%
Left school before year 10 (% of individuals 15 years and over)	25%	13%
Completed year 12 or equivalent (% of individuals 15 years and over)	25%	52%
Obtained post school qualification (% of individuals 15 years and over)	26%	49%
Employment to population ratio (% of individuals 15 years and over)	53%	76%
Median individual income (weekly income in $AUD)	$530	$777
Home ownership (% of individuals with mortgaged or owned home)	36%	68%
Renting (% of individuals renting – private or state tenure)	56%	29%
Male life expectancy (at birth)	67.2 years	78.7 years
Female life expectancy (at birth)	72.9 years	82.6 years
Infant mortality (per 1000 live births)	9.7 deaths	4.4 deaths
Incarceration rate (per 100,000 persons – age standardised)	1891 persons	136 persons

Note. Data was obtained from the Census of Population and Housing: Characteristics of Aboriginal and Torres Strait Islander Australians (ABS, 2012a).

In addition to socioeconomic disparity, Indigenous Australians experience poorer health, both in comparison with non-Indigenous Australians, and with other Indigenous populations of the developed world (Hill, Barker, & Vos, 2007). Within this domain, Indigenous Australians experience lower life expectancy, higher infant mortality, higher levels of disability and higher levels of preventable disease and death (ABS, 2011c). In the context of Indigenous Australians, Marmot (2011) advances a strong argument that these inequalities are cyclical with socioeconomic disadvantage leading to poorer health and poorer health leading to further socioeconomic disadvantage. This argument is also advanced by Pholi (2009) and supported statistically by Zhao, You, Guthridge, and Lee (2011). Indigenous socioeconomic disadvantage has also been linked to other adverse consequences, such as significantly higher arrest rates (Stephens, 2010), and lower levels of social capital within the dominant cultural circles (Hunter, 2004). These adverse consequences have also been shown to work in a similar cyclical manner with socioeconomic disadvantage. Borland and Hunter (2000), Hunter (2001a), and Savvas, Boulton, and Jepsen (2011) amongst others, make arguments in support of this effect in the context of incarceration.

However, whilst the consequences of Indigenous disadvantage have been clearly and empirically determined within the literature, the underlying causes have not been as clearly identified. The root of Indigenous disadvantage is suggested by many to be a product of prior history (Gray & Beresford, 2008). It is argued that marginalisation through years of ethnocentric policy has created a state of intergenerational poverty for Australia's Indigenous people. As Altman (2000) states, it is indisputable that exclusion from the entitlements of citizenship, as a consequence of policies that operated throughout the pre-referendum era, has left an historical legacy in terms of equality and equity. Altman (2000) theorises that the consequent segregation of rights regarding education, wage parity, and home ownership, amongst others, has been undeniably damaging in socioeconomic terms. Furthermore, as

Francis (1996) argues, it is undeniable that the ideologies of these past policies have contributed to the presence of racism and discrimination towards Indigenous Australians in modern society.

The construct of modern racism is traceable to the theories of social Darwinism upon which the initial colonial classification of Indigenous Australians was based (Francis, 1996). However, the view that the current state of Indigenous disadvantage can be explained in its entirety by prior history is contested. As Altman (2000) argues, Indigenous disadvantage is a complex phenomenon based on the interactions of many constructs. Whilst the history of exclusion has been damaging, it is not the sole cause of disadvantage. Population structure, remoteness of residence and cultural differences, amongst other factors, make equally significant contributions to the issue (Altman, 2000).

It is without doubt that the issue of Indigenous disadvantage is complex, as is evidenced by the variety of arguments as to its causes. However, both national and international pressure demands that the issue be resolved. But this is not an easy task. The relative failure of potentially transformative policy over the last forty years provides evidence of the difficulties faced (SCRGSP, 2011). In 2007 the Australian Public Service Commission defined Indigenous disadvantage as a "Wicked Policy Problem". It is a problem where definition is difficult and dependent on a stakeholder's point of view; it is multi-causal and its causes are interdependent; it is steeped in the chronic failure of prior policy; it has no clear solution; and, any solution may lead to unforeseen consequences Australian Public Service Commission (2007).

Current Policy

In February 2008 a long awaited parliamentary apology to Australia's Indigenous people was delivered by the then Prime Minister, Kevin Rudd. The apology was both symbolic and practical by nature. The symbolic aspects of the apology reflected mainly on the mistreatment of the "Stolen Generations", and acknowledged that policies of the past had "inflicted profound grief, suffering and loss on these our fellow Australians" (Rudd, 2008). The practical aspects focussed on the present and future. They outlined a means by which to achieve reconciliation between Indigenous and non-Indigenous Australians. This would be a reconciliation based on a partnership to "close the gaps" between Indigenous and non-Indigenous Australians. It would seek to close the life expectancy gap of 17 years within a generation, halve the gap in infant mortality, and close the gap in educational achievement and employment opportunities within a decade (Rudd, 2008). These goals, set down within the Prime Minister's speech, were quickly adopted by the Council of Australian Governments (COAG) and formed the target areas of the Closing the Gaps strategy aimed at eliminating Indigenous disadvantage (Altman, 2009). An amount of $4.6 billion dollars in Indigenous specific funding was committed over ten years to drive reforms in remote housing, health, childhood development, jobs and improvements in remote service delivery (COAG, 2008). These reforms were to be operationalised in a multifaceted approach via a commitment to a range of strategic platforms or "Building Blocks" comprising: Early Childhood; Schooling; Health; Economic Participation; Healthy Homes; Safe Communities; and, Governance and Leadership. The 'Building Blocks' consisted of statistically measureable targets in respect of which the government pledged to report annual progress. Closing the Gaps is currently the policy in operation.

Closing the Gaps Policy Analysis

Upon brief analysis of Closing the Gaps it can be observed that, whilst the interconnectedness of socioeconomic indicators is recognised, its over-arching goal lies in the promotion of Indigenous participation within the dominant Westernised labour force (Gray & Hunter, 2011). This is largely because employment in the Western sense creates income, and thus increases an individual's command over material resources, and hence their socioeconomic status (Hunter, 2012). Furthermore, through accumulation of income and thus wealth, the possibility of intergenerational transmission of such wealth is increased, and conversely, the transmission of intergenerational poverty is decreased (Foley, 2006). To achieve this, Closing the Gaps has adopted a broad human capital approach with a strong focus on improving Indigenous educational outcomes (COAG, 2008). The policy goal to, *"*At least halve the gap in Aboriginal and Torres Strait Islander Year 12 attainment or equivalent attainment rates by 2020" (COAG, 2008) stands as a testament to this fact. This goal is a highly prominent feature within corresponding policy as is evidenced by the current Aboriginal and Torres Strait Islander Education Action Plan 2010-2014 (Ministerial Council for Education, Early Childhood Development and Youth Affairs (MCEECDYA), 2010). Furthermore, the current political rhetoric recognises that achieving this goal is the most important priority in Indigenous affairs. This is evidenced by the following statement taken from the Prime Minister's Closing the Gap Report 2014:

> "Getting children to school is the Australian Government's number one priority in Indigenous Affairs….. We must break the cycle of non-attendance to ensure today's kids are educated and equipped to become future leaders in their communities" (Abbott, 2014, p. 2).

The choice of such a policy goal is not without substantial supporting evidence. The link between increased levels of education and increased levels of income derived from higher paying employment has, over time, become an economic truism (Heckman, Lochner, & Todd, 2003). However, whilst the evidence for such a focus on educational attainment is substantial, there is contention within the literature as to whether it should be seen as a "panacea" for eliminating Indigenous disadvantage. From a social/structural perspective, Hunter (2003) argues that empirical studies of Indigenous disadvantage have often tended to overemphasise the importance of education suggesting they are inherently biased against difficult to measure constructs such as cultural difference and discrimination. These often overlooked constructs have the potential to contribute considerably to socioeconomic differences. In relation to the Closing the Gaps strategy, Altman (2009) argues that these difficult to measure constructs are entirely overlooked. Altman et al. (2008) support this argument, suggesting the policy's key indicators can be expressed largely in terms of educational status, health, and the implications of the Indigenous population's locational demographics.

Aim and Research Question

It is the aim of this study to examine the impact of these "difficult to measure" constructs upon Indigenous socioeconomic disadvantage, and thus test the efficacy of the Closing the Gaps policy as a means by which to eliminate the current situation. However, to achieve this aim, the study has not focused directly on these constructs. Rather it focuses on the ability of the factors addressed by the Closing the Gaps policy to achieve such a goal. The study uses the difference between Indigenous and non-Indigenous mean incomes as a proxy for socioeconomic disadvantage. It then empirically quantifies the percentage of this income difference that can be attributed to variances between Indigenous and non-Indigenous

Australians in regard to known and measureable income determinants. The particular determinants are educational attainment, age, remoteness of residence, health and gender. These determinants are a combination of the groups of key indicators as expressed by Altman et al. (2008), and demographic factors identified within the literature known to influence incomes. To maintain clarity and focus, the study is guided by the following research question:

> "What percentage of the difference between Indigenous and non-Indigenous mean incomes can be explained by demographical differences in educational attainment, age, remoteness of residence, health and gender?"

To answer the research question, data was obtained from the 2011 Australian Census of Population and Housing, from this point onwards being referred to simply as the Census. The study has adopted a quantitative econometric approach. It decomposes mean income differences between groups into an "explained" portion attributable to demographic differences in the above mentioned factors, and an "unexplained" portion attributable to differences in monetary returns for these. These differences in monetary returns are potentially attributable to unobserved factors such as cultural difference and discrimination. To implement this approach, income was identified as the dependent variable. Educational attainment, age, remoteness of residence, health and gender were identified as the independent variables.

Significance of the Study

The significance of this study lies in its relevance to current Indigenous affairs policy. Firstly, should it be found that the difference between Indigenous and non-Indigenous mean incomes is not largely attributable to variances in the specified income determinants, this would pose serious questions as to the efficacy of the Closing the Gaps strategy. Secondly, it would provide strong evidence that "difficult to measure" factors such as cultural difference and discrimination are potentially implicated in Indigenous socioeconomic disadvantage. Lastly, it would call into question the over-emphasis in both government policy and empirical research upon the link between decreased levels of educational attainment and Indigenous socioeconomic disadvantage, thus opening up new directions in future research and policy regarding the issue.

CHAPTER 2

Review of the Literature

Introduction

Within this chapter a concise discussion of the literature regarding Indigenous disadvantage is presented. The purpose is not to expand upon the relevance or significance of this study, as this has been largely attended to in the preceding chapter. Also, as this study is exploratory by nature, it is not intended to position this study within the current literature. Although similar studies do exist and will be discussed, the research question posed for this study has not been addressed within the Australian context to date. Similar research questions have not been addressed for over two decades. Following the design proposed by Creswell (2003), this review relates closely to the variables proposed by the study. Accordingly, this chapter firstly discusses the literature with regard to income in the Australian Indigenous context, income being the dependent variable of the study. This is followed by discussion of education, age/experience, remoteness of residence, health and gender and the ways in which they have been found to influence income in the Australian Indigenous context. These are the independent variables of the study. The chapter concludes by discussing studies that have employed similar research questions and methodologies in the Australian Indigenous context.

In terms of identifying literature for inclusion in this review, the dearth of literature regarding Indigenous incomes presents a problem. Consequently, this review is largely based upon the findings and conclusions of studies that have investigated Indigenous employment probability. The decision to do so was based on the arguments of Hunter (2001b) and Biddle

and Yap (2006) and Becker (2009), who state that the variables that influence Indigenous employment probability are also implicated in the Indigenous income gap.

Dependent Variable

Income.

Income inequality between Indigenous and non-Indigenous Australians has been a long standing topic of contention within the rhetoric of governments since comparative statistics first became available from the ABS in 1971 (Altman, 2009). At present, the disparity between Indigenous and non-Indigenous incomes is considerable. Indigenous Australians can be expected to earn on average, 41% less than non-Indigenous Australians (ABS, 2012b). This accords with a trend that has been observed since the availability of comparable statistics (Biddle & Yap, 2006).

One reason for the significant attention paid to Indigenous incomes is that they act as a signifier of an individual's command over economic resources (Hunter & Yap, 2014). Furthermore, in the context of the family, income generates wealth, not only for the individual, but for the dependants reliant on that individual (Foley, 2006). Indeed, it may suggested that for a dependent child, a parental income may, in many cases, be considered as a form of human capital because it provides for the means (such as education) to accumulate future wealth. Furthermore, income may be a useful proxy for an individual's overall wellbeing, a traditionally difficult construct to measure (Biddle, 2013b). Indeed, in the context of Indigenous Australians, positive links between income, health and self-reported happiness have been observed (Biddle, 2011). However, whilst income may be considered to be an appropriate dependent variable for the measurement of Indigenous disadvantage, within the context of the present study, it is not without its limitations.

The geographical distribution of Australia's Indigenous population is considerably different to that of the non-Indigenous population. Twenty-four percent of Indigenous Australians live in remote and very remote locations compared to 1% of Australia's non-Indigenous population (ABS, 2007). There are substantial differences in the cost of living across Australia. Measured by the price of a healthy market basket, Landrigan and Pollard (2010) found that on average the cost of food was 23.5% greater in remote areas. Some remote communities paid up to 31% more than their counterparts living in major cities. The latter percentage translated into a price increase in the cost of feeding a family of six from $542 per fortnight to $709 per fortnight. This discrepancy relates, in all probability, to the vast nature of Australia and the impact of distance on prices. Firstly, transport costs involved in the supply of goods and services increase relative to distance from major cities. These costs are passed on to consumers by suppliers (Burns, Gibbon, Boak, Baudinette, & Dunbar, 2004). Altman (2001) argues that it is a combination of both costs to transport operators and monopolisation of the industry. Secondly, in rural and remote areas there are often few outlets from which to acquire goods and services. When this is combined with the sheer distance between communities, it has the potential to significantly limit competition between suppliers, and accordingly limit consumer choice (Ward & Altman, 2002). Consequently, suppliers of goods and services may acquire increased market power. Increased market power, combined with demand inelasticity, provides a means by which suppliers can increase or decrease the price point of certain goods and services with negligible effects on sales (McDonnell & Martin, 2002). Whilst such actions may constitute abuse of market power and thus breach the provisions of the *Competition and Consumer Act* 2010 (CACA), it is argued that this is not an uncommon occurrence. McDonnell and Martin (2002) also reported that even where competition exists in rural and remote communities, there are often agreements made between suppliers of food and essential goods in order that they do not operate in direct

competition with each other. Such a practice may also contravene the CACA. Therefore, with regard to the concept of income being used as a proxy for an individual's wellbeing, it is important to keep in mind that, dependent on the residential location of individuals, their income may not grant them access to the same goods and services as others.

Independent Variables

Educational Attainment.

Increasing Indigenous levels of educational attainment, as stated previously, is currently the key priority of Indigenous affairs policy. Accordingly, it may be considered the key priority of the Closing the Gaps policy. Within Closing the Gaps, increasing Indigenous levels of educational attainment is attended to by the key building blocks relating to early childhood and schooling. The emphasis placed on this policy goal is not unfounded. Under standard economic models derived from human capital theory, participation in education is acknowledged as being a significant determinant of an individual's probability of employment and level of income (Becker, 1964; Becker, 2009; Mincer, 1958). Time spent in quality education can be interpreted as an investment in productivity for the individual. Under the parameters of the model, those with higher levels of education are expected to have a higher probability of employment, and greater monetary rewards from such employment. In the Indigenous context, this relationship has been substantiated by Hunter (1997), Hunter (1999) and Kalb, Le, Hunter, and Leung (2012) in terms of increased probability of employment, and by Daly (1994) and Hunter and Yap (2014). All studies have reported that education is a highly significant factor. Furthermore, it is argued by Biddle (2007) that not only does education benefit individuals in terms of employment and income, it also allows them to make more informed decisions in relation to other aspects of their lives. Such an

argument is supported by Hunter (2003), who found that lack of education was a crucial impediment to the ability of Indigenous people to interact with the justice system. Lastly, education may have positive benefits not only for the individual, but for the community or household. Biddle (2007) suggests that individuals with higher levels of education may act as positive role models, possibly increasing overall levels of education.

At present, Indigenous Australians remain significantly behind their non-Indigenous counterparts in terms of their levels of educational attainment. They are less likely to complete high school. The 2011 Census figures reveal that 47.4 % and 44.4% of Indigenous males and females respectively within the age bracket of 20-24 years had not completed year 12. The corresponding estimates for the non-Indigenous population were 15.8% and 11.6% respectively (Biddle, 2013a). Furthermore, in the context of the Australian school system, where grade progression is rarely based on the achievement of minimum standards, Indigenous students are often considerably behind their non-Indigenous counterparts in the same grade (Biddle, 2013a). This argument is supported by the former Department of Education, Employment and Workplace Relations (DEEWR, 2011) that found the difference between Indigenous and non-Indigenous Australians is approximately equivalent to two full years of schooling.

Whilst education policy over recent decades has witnessed some improvement in the numbers of Indigenous Australians completing year 12, increases in the educational attainment levels of the non-Indigenous population have increased at a similar rate. Accordingly, when investigating the mean difference in educational attainment between Indigenous and non-Indigenous Australians, both Biddle (2013a) and Gray, Hunter, and Schwab (1998) found that the figure has remained relatively unchanged since the availability of comparative statistics. This fact has considerable implications, depending on the manner in which the Australian labour market views education.

The standard human capital model views education as a means by which to enhance productivity, and it views productivity as a means by which to generate income (Becker, 2009). However, under an alternative specification of the model developed by Arrow (1973) and Spence (1973) it is suggested that education may operate as a signalling or screening mechanism whereby employers assume that increased education is a sign of higher skills and ability, and therefore greater potential for enhanced productivity. Accordingly, all other parameters being equal, the individual with the highest level of education will be employed (Spence, 1973). Furthermore, the individual with the highest level of education is likely to receive increased monetary rewards for such employment in comparison to their 'lesser educated' counterparts (Stiglitz, 1975). If this specification of the human capital model is functioning within the Australian labour market, this has considerable implications for current Indigenous policy.

Health.

Improving the health status of Indigenous Australians is a major priority within the Closing the Gaps policy. It is attended to under the key building blocks of early childhood development, health, safe and supportive communities, and remote service delivery. At present, Indigenous Australians experience significantly poorer health than their non-Indigenous counterparts. This disparity goes beyond the frequently reported differences in life expectancy and mortality rates. Amongst other health indicators, the rate of profound disability, heart disease, mental illness and respiratory illness is twice that of the non-Indigenous population. Diabetes and end stage renal disease are over three times more prevalent (Australian Institute of Health and Welfare, 2011).

Within the Australian literature, both government and scholarly, the vast majority of policies, position statements and research papers that relate to Indigenous health relate to the link between socioeconomic disadvantage and health inequality namely, that poverty creates poor health. There is considerable evidence to support this relationship. Devitt, Hall, and Komla (2001); Leonard et al. (2002); Vickery, Faulkhead, Adams, and Clarke (2004); and Walter (2007) amongst others, all report socioeconomic status is a considerable determinant of health. However, as Meer, Miller, and Rosen (2003) argue, wealth may be an a priori condition of health. That is, health may be just as liable to effect wealth. Recognition of this bidirectional relationship is largely absent from the literature regarding Indigenous Australians, which is in stark contrast to the literature regarding the relationship in the Australian population as a whole, and in an international context. In the Australian context, the literature has analysed the correlation between health and employment probability. Cai and Kalb (2006), when analysing the correlation between self-reported health status and labour force participation, found good health significantly increased the probability of employment. The reverse correlation that employment increased health, although statistically significant, was of lesser magnitude (Cai & Kalb, 2006). Cai (2010), when performing a similar style of analysis on more recent data, produced similar findings to Cai and Kalb (2006). However, evidence supporting the reverse correlation was only present for females (Cai, 2010). Wilkins (2004) has supported the correlations found by Cai and Kalb (2006) and Cai (2010) when analysing the effect of disability on employment. Results from the study showed that the presence of a mental or physical impairment, on average, decreased employment probability by one quarter for males and one fifth for females. These effects were shown to increase with the severity of impairment. In the international context, similar findings regarding the effect of health on labour force participation have been found by Bound, Schoenbaum, Stinebrickner, and Waidmann, (1999); Campolieti, (2002) and Langley

et al. (2010), amongst others. However, more notably, within the international context, a direct correlation between health and wealth has been substantiated. Michaud and Van Soest (2008) found a strong correlation in elderly Americans between health and wealth, but no evidence of a correlation between wealth and health. Wu (2003), when analysing the effects of health events on married couples, found that adverse health events or health "shocks" had a severe adverse effect on household wealth. Furthermore, the World Health Organisation (WHO) has recognised the effect of health on wealth within the Declaration of Alma-Ata (Bloom & Canning, 2003).

As it is the intention of this study to analyse the determinants of income rather than the determinants of health, it views the correlation from the perspective that health affects wealth. However, as demonstrated, it is recognised that it is a bidirectional causality.

Remoteness of Residence.

As stated previously, when discussing the dependent variable of income, there is a substantial difference between non-Indigenous and Indigenous populations in terms of remoteness of residence. This is recognised by the Closing the Gaps policy in terms of the implications arising from this locational demographic in regard to the provision of services, particularly in remote areas. The implications of these locational demographics are largely attended to under the key building block of remote service delivery. With regard to research that has investigated the impact of these locational demographics on Indigenous employment and incomes, findings are mixed. Studies that have focussed on the determinants of employment have, in the vast majority of cases, found that remoteness of residence does not impact on Indigenous employment status. In this context Biddle (2009), Hunter (1997) and Hunter (2001b) found that remoteness of residence had no effect on the probability of employment for Indigenous Australians. These findings deserve further investigation,

bearing in mind the adverse ratios of labour supply and demand normally found in rural and remote areas.

Gray and Hunter (1999), when drawing comparisons between Indigenous and non-Indigenous populations, found that non-Indigenous Australians experienced decreased employment probability based on remoteness of residence. However, for Indigenous Australians, they also found that there was no statistically significant difference based on remoteness of residence. Adding to these mixed findings, is the fact that the few studies that have analysed the determinants of income have found that Indigenous incomes decrease considerably as the location of residence moves further away from major population centres. Daly (1994) cited level of remoteness as the most important factor in the determination of Indigenous incomes.

A common hypothesis that has been advanced to explain the discrepancy in findings has been the prevalence of the Indigenous specific Community Development Employment Project (CDEP). The CDEP was a government initiative that enabled an Indigenous community or organisation to use a notional equivalent of the collective entitlement of income support payments to pay wages for those people who chose to participate in community development programs. This was an alternative to receiving individual income support payments (ABS, 2011c). At its peak in 2002/2003, the CDEP was responsible for the employment of 35,400 Indigenous Australians. This represented some 25% of the Indigenous workforce (Biddle, 2009). The prevalence of the CDEP has been implicated in considerable measurement difficulties by all studies from this era. This is because those Indigenous Australians participating in the scheme, due to differences in funding sources, were classified in the Census as being employed. However, Indigenous Australians and non-Indigenous Australians participating in the similar "Work for the Dole" scheme were

classified as unemployed. It is argued that this had a twofold effect. Firstly, it "buoyed up" Indigenous employment rates (Hunter, 1997; Hunter & Taylor, 1996). Secondly, it decreased the Indigenous median wage (Daly, 1991).

Age and experience.

As with education, the variables of age and experience are considered important determinants of income under standard economic models derived from human capital theory (Becker, 1964; Becker, 2009; Mincer, 1958). Under these models it is expected that both increases in age, and experience, will lead to increases in the probability of employment, as well as the monetary rewards gained from such employment (Becker, 1964; Mincer, 1958). However, unlike other variables of interest in the present study, it has been shown repeatedly that their relationship to income does not function in a linear fashion (Heckman et al., 2003). Rather, they present as a non-linear entity. This is best captured via a quadratic function to describe a monotonic relationship with a single inflection point (Viscusi & Aldy, 2003; Weiss & Hassett, 1991).

With regard to their use within this study, whilst they are normally considered two differing determinants of income, Daly (1994) suggests that large scale data sets rarely contain specific information regarding experience. This is the case with the data set to be used by this study. Therefore, it is necessary to 'combine the two', calculating 'potential experience' as a function of age. Age denotes the possibility that an individual has experience, and consequently age may be used as a 'reasonable' proxy for experience (Mincer, 1958). It is intended to adopt this approach in the current study. Consequently, in the context of this literature review, age and experience are discussed as a single entity.

All studies cited within this literature review that relate to either, the probability of employment, or the incomes gained from employment by Indigenous Australians, have shown this pattern, with little or no deviation. Any fluctuation has been a result of a differing methodology capturing differing age profiles. It is of little value within the context of this review to extrapolate individual findings. As Hunter (1997) argues, when age and thus potential experience increase, so do the chances of and rewards from employment. This is a particularly important point when contextualised by the current Indigenous population demographics.

Biddle (2012), when analysing the 2011 Australian Census of Population and Housing, found that there is considerable demographical differences between the Australian Indigenous and non-Indigenous populations. His findings revealed firstly, that the Indigenous population was considerably younger in absolute terms. The median age of Indigenous Australians was 21 years whereas the median age of non-Indigenous Australians was 35 years. Secondly, when analysed in structural terms, individuals aged between 0 and 24 years represented 55.8% of the Indigenous population compared to 31.9% of the non-Indigenous population. Therefore, based on the analysis of Biddle (2012) and the argument of Hunter (1997), population age demographics may be working to increase the Indigenous income gap.

However, age demographics and population structure may be viewed from a different perspective. As a person becomes older there is a marked decrease in income generation and employment probability. All studies cited within this review relating to income or employment reveal this trend. Hunter (1997) hypothesised that this may be due to an individual's specific training within an industry becoming redundant in an ever changing world. This hypothesis is also advanced by Daly (1994) when analysing the determinants of

Indigenous incomes. In this context, it may be argued that the younger structure of the Australian Indigenous population is working to decrease the Indigenous income gap.

Gender.

Within the literature it is widely accepted that females on average earn less than males who display similar characteristics in relation to earning potential. The literature with regard to this phenomenon is so extensive that several meta-analysis and reviews have been performed, both in the Australian and the International contexts. In terms of the Australian context, currently the average income gap between males and females is 17.5% (ABS, 2013). This figure has remained relatively unchanged for the past three decades (Watson, 2010). This gap is often found by income decomposition studies to be largely attributable to "potential" discrimination, for example Borland (1999), Preston (2000), and Kee (2006). This argument is also supported by the meta-analysis within (Miller, 2005), which found that on average, only one-fifth of the Australian gender income gap could be explained by differences in measureable characteristics related to earning potential. However, as currently there is a negligible difference in male to female demographics between Indigenous and non-Indigenous Australians (ABS, 2012a), it is not the gender income gap with regard to Australia as a whole that substantiates the inclusion of this variable, but rather the difference in the gender income gap between Indigenous and non-Indigenous Australians. With regard to this Indigenous specific context, a review of 2006 ABS median wage estimates reveals that the income gap in relation to gender is 46% smaller for Indigenous Australians (ABS, 2010). However, in contrast, the difference in employment rate by gender is greater for Indigenous Australians. This has been shown by Kalb et al. (2012) who, when comparing data from the National Aboriginal and Torres Strait Islander Social Survey (NATSIS) and the Household Income and Labour Dynamics in Australia Survey (HILDA), found that 80% and 57% of

Indigenous males and females respectively were in the labour force compared to 87% and 75% for non-Indigenous males and females respectively. It is these conflicting statistics that substantiate the inclusion of gender as a variable by this study.

Similar Studies

To date there have been only two studies within the Australian Indigenous context that have explored similar research questions to the current study, these being Daly (1992) and Daly (1994). In a similar manner to the current study, these studies both examined the difference between Indigenous and non-Indigenous incomes. Their aim was to determine a percentage of income difference that could be attributed to differences in demographic characteristics between the two groups. To achieve this, both studies followed almost identical methodologies. With regard to the research populations of the two studies, both Daly (1992) and Daly (1994) used population representative data sets generated by the ABS. Daly (1992) used a data set containing information regarding Aboriginal and non-Aboriginal Australians. Daly (1994) used a data set containing information regarding Indigenous and non-Indigenous Australians. Central to the methodologies of both Daly (1992) and Daly (1994) was an econometric technique commonly referred to as the Oaxaca decomposition. This technique, popularised by Blinder (1973) and Oaxaca (1973), decomposes the difference in income between two groups into an "explained" portion, attributable to differences in observed characteristics, and, an "unexplained" portion, attributable to the differences in economic returns to these characteristics. These differences in economic returns are potentially attributable to unobserved factors. With regard to the particular characteristics used to examine the difference between incomes, the studies were similar. Both Daly (1992) and Daly (1994) decomposed the income difference in terms of educational attainment,

age/experience, remoteness of residence, and family demographics. However, although both studies used highly similar methodologies, and were both performed within a relatively short time period, the results presented by Daly (1992) and Daly (1994) differed substantially. Daly (1992) found that 70% and 44% of the income difference between Aboriginal and non-Aboriginal males and females respectively could be attributed to the "explained" portion of the Oaxaca decomposition. In contrast Daly (1994) found that 90% and 100% of the difference between Indigenous and non-Indigenous incomes for males and females respectively could be attributed to the "explained" portion of the Oaxaca decomposition. Effectively, the results of the later study suggested that almost all of the difference in incomes between Indigenous and non-Indigenous Australians could be explained by differences in characteristics. Interestingly, Daly (1994) provides no explanation for this large discrepancy in terms of results between her two studies. However, the author of the current study hypothesises that this discrepancy may be due in part to the different data sets on which they were based, and the different populations investigated. In terms of value to the current study, the methodology used by Daly (1992) and Daly (1994) has been drawn upon heavily with the current study using a similar style of decomposition to answer the research question. Furthermore, due to their similarity to the current study, Daly (1992) and Daly (1994) provide a benchmark by which to compare results, and determine if these findings have changed over the past two decades.

CHAPTER 3

Data Source, Delimitations, Population, Limitations and Ethics

Introduction

The current study is situated within the quantitative paradigm. It is grounded in a positivist framework, and accordingly it assumes there is an objective reality that can be known and described through empirical methods. It relies on the application of econometric analysis to an existing data set in order to answer the research question posed. This chapter details the origins of the data, its demographics and the specific methods regarding its treatment by the current study. The chapter discusses the source, aggregation, delimitations, reduction in population and corresponding limitations. It concludes with the ethical considerations adhered to by the study.

Data Source

The data used by the current study was obtained from the 2011 Australian Census of Population and Housing[2] performed by the ABS. The Census is a cross-sectional survey of the Australian population on a single night performed every five years (ABS, 2011b). Participation in the Census is compulsory. All individuals within Australia on Census night are legally required to complete a Census form under the *Census and Statistics Act 1905.* As a result, the 2011 Census saw 14.2 million forms returned from 9.8 million households nationwide. Accordingly, the Census is regarded as the largest and most comprehensive data

[2] To aid in ease of reading, the 2011 Australian Census of Population and Housing is referred to simply as the Census.

set available in Australia (ABS, 2014; ABS, 2013). As it is the aim of the Census to compile a statistical overview of Australia's population size and key characteristics, data regarding the variables pertinent to the study was available to the researcher. However, under the *Census and Statistics Act (1905)* it is unlawful for the ABS to disclose any personally identifiable data to a third party. Accordingly, micro level data was not available to the researcher. As a result, it was necessary for the researcher to aggregate all data. To achieve this, the study compounded existing ABS Census classifications using Tablebuilder Pro™ provided on licence by the ABS. The process that is displayed in Appendix A resulted in 3,602 observations. Due to the number of classifications within the variables investigated by this study, this process is best displayed visually to avoid prolixity. Specific elements of this process are mentioned where necessary within subsequent sections of this chapter. Due to space constraints, Appendix A only displays the process used to generate a single observation. However, it is assumed that the reader will be able to use this example to deduce how all observations were generated.

Data Delimitation

The data used by this study underwent three processes of delimitation. Firstly, as the dependent variable of interest of this study was income, a logical delimitation of the data was performed on the basis of age. A decision was made on the basis of the legal working age[3]

[3] Legislation regarding legal working age is State and Territory based and therefore it differs according to the relevant jurisdiction. However, whilst in many States and Territories there is no specified minimum working age in the legislation, individuals below the age of 15 are subject to restrictions that relate to when, where and how much work they can perform (Fair Work Ombudsman, 2014).

and retirement age[4], that only data regarding Census respondents aged between 15 and 65 years of age would be used in this study.

Secondly, a delimitation of the data was performed on the basis of non or poor response to specific questions in the Census pertaining to the variables used by this study. It is recognised by the ABS that, due to a multitude of reasons, individuals may respond in an incoherent manner, or they may not respond at all to specific questions contained within the Census form (ABS, 2011b). In this instance, respondents who had failed to respond or had responded incoherently, were categorised by the ABS as either "not stated" or "inadequately described" (ABS, 2011b). These respondents were delimited from the data in all cases, with the exception of those who did not answer the specific Census question pertaining to non-school qualifications. This exception is displayed visually in Appendix A and discussed in the subsequent section of this chapter regarding the variables used by this study.

The final process of delimitation was necessary due to the need for the ABS to adhere to the privacy requirements stipulated under the *Census and Statistics Act 1905.* As a result of this necessity, small random errors were introduced into the provided data set by the ABS to avoid the possible identification of individuals due to the process of compounding Census classifications. As a result, no statistical reliance could be placed on aggregated observations based on small numbers of respondents. Hence, all observations based on fewer than twenty respondents were removed from the data, this figure was obtained by personal communication between the researcher and the ABS Information Consultancy Department (P. Greenway, personal communication, June 26, 2014).

[4] Compulsory retirement is unlawful within Australia as it contravenes the *Age Discrimination Act* 2004. Currently, 65 years is the age at which Australian males born before 1.7.52 qualify to receive the Age Pension. Australian females born before 1.1.49 reach qualifying age at 64 and a half and those females born between 1.1.49 and 30.1.52 qualify at the age of 65. Accordingly, for the purposes of this study, 65 years of age was viewed as the age at which Australians would generally be retired and therefore those falling into the 65 years and older category were eliminated from the study.

Population

As a result of the above mentioned data delimitations, the overall research population was considerably decreased. The original Census population (*n*=21,507,709) comprised of: Indigenous Australians (*n*=548,359), non-Indigenous Australians (*n*=19,900,766) and, individuals who did not state their Indigenous status in the Census form (*n*=1,058,584). After delimitation, the overall population used by the study (*n*=12,326, 416) comprised of Indigenous Australians (*n*=256,297) and non-Indigenous Australians (*n*=12,070,119). This delimitation saw a slight reduction in terms of the Indigenous population as a percentage of the whole. Prior to delimitation Indigenous Australians constituted 2.68% of the population. Post delimitation this percentage declined to 2.07%.

Limitations

The limitations of this study were largely a result of the necessary delimitations which were made. As can be seen from the above, the delimitation process resulted in a considerable reduction to the study's population. As a consequence of this reduction in population, it is possible that non-response bias may have impacted on the validity of the findings. Non-response bias is the condition where the potential responses of those who did not respond may have differed to those who did respond, thus introducing the potential for bias into the findings. There are various methods for determining the direction and magnitude of the bias. For example, Kypri, Samaranayaka, Connor, Langley, and Maclennan, (2011) argue that late respondents have similar characteristics to non-respondents. All are reliant on additional information beyond the rate of non-response, and thus could not be engaged in by this study.

Ethical considerations

Under paragraph 5.1.22 of the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research, this research is claimed to be exempt from ethical review because it has been deemed to be (a) of negligible risk (as defined in paragraph 2.1.7 of the Statement) and (b) involves the use of existing collections of data or records that contain only non-identifiable data about human beings.

CHAPTER 4

Instrument, Classification, Aggregation and Variable Specification

Introduction

This chapter presents a discussion regarding the manner in which data was obtained by the ABS and treated by the researcher so as to allow for the application of analysis in order to answer the research question posed. It presents information regarding the instrument and classification system used by the ABS, the data aggregation process employed by the researcher where necessary, and the specification of variable type in regard to data analysis. This is provided on a variable by variable basis.

Income

Instrument and classification system.

The specific question (Appendix B) within the Census instrument that gathers data regarding the variable of income, asked respondents to specify the total of all wages/salaries, government benefits, pensions, allowances and other income they usually received weekly. Deductions regarding income tax, superannuation contributions, salary sacrifice or any other automatic deduction were not to be made. Respondents were asked to choose from ten grouped and two unbounded income classes derived from the ABS INCP classification system, ranging from negative income[5] to $2000 or more. These income classes were

[5] Negative income occurs mostly in the private business environment where an individual's outgoings may exceed their takings thus representing a negative value for income (ABS, 2011b).

decided by the ABS on the basis of information acquired by the ABS 2009-10 Survey of Income and Housing (ABS, 2011b).

Measurement of central tendency.

Whilst initial data obtained from the ABS specified the number of respondents who fell within each income classification, for this study, it was necessary in terms of the data analysis to convert this to a numerical value which represented central tendency. To achieve this, the estimated arithmetic mean was used. The use of the arithmetic mean in this context is supported by Houthakker (1959) and Smith (2003). Although it is general practice to use the median as a measure of central tendency when working with income data as a means by which to neutralise the impact of data outliers, this was not an issue for consideration in this study due to the pre-aggregated nature of the data. The unbounded categories of negative income and $2000 or more had already achieved this. Furthermore, due to the sometimes sparse nature of the data, on some occasions median estimates would have considerably overstated central tendency. The estimated arithmetic mean was calculated by *Equation 1* where x_i denotes the medians of the class intervals and f_i denotes the class frequencies. The medians of the class intervals were calculated using the standard formula: $x = \frac{Upper\ class\ limit + Lower\ class\ limit}{2}$

$$\overline{x} = \frac{\sum_{i=1}^{n} f_i x_i}{\sum_{i=1}^{n} f_i} \qquad (1)$$

However, for the two unbounded categories, the application of this formula was not possible. To eliminate this issue, and effectively determine the medians of these class intervals, data was obtained from the ABS 2009-10 Survey of Income and Housing and substituted as the values for *x*. This survey, in contrast to the Census, collects information regarding income in non-aggregated dollar amounts (ABS, 2012d). It was determined that the medians of these class intervals were $-101 for the negative class and $2569 for the $2000 or more class.

Variable type.

As an individual's income may take on any value, and furthermore, due to the negative income category within the data, the variable of income was hypothetically infinitive in any direction, which was represented within this study as an interval variable measured in Australian dollars.

Educational Attainment

Instrument and classification system.

Data regarding the variable of educational attainment was obtained for this study via the amalgamation of two separate Census questions and their corresponding ABS classifications. Firstly, data was obtained regarding respondents' educational attainment levels in relation to schooling. The specific Census question pertaining to educational attainment in relation to schooling (Appendix C) asked respondents to state the highest level of primary or secondary schooling completed. Where persons currently in schooling had

returned after a break they were asked to report the highest level achieved prior to that break. Respondents were asked to choose from six educational attainment classifications based on the ABS HSCP classification system coded by the Australian Standard Classification of Education System (ABS, 2001). These classes ranged from "did not go to school" to "Year 12 or equivalent". Secondly, data was obtained regarding respondents' educational attainment in relation to non-school qualifications. The specific question pertaining to non-school qualifications (Appendix D) asked respondents to state the level of the highest qualification completed. Responses to this question were coded by the ABS QUALLP classification system and aggregated by the ABS into seventeen educational attainment classifications ranging from "Certificate 1" to "Doctoral Degree Level".

Data aggregation.

Firstly, as the ABS HSCP and QUALLP classifications were based on two separate questions within the Census, it was deemed necessary for the researcher to aggregate this information to avoid the possibility of double counting. To achieve this, a two stage process was employed following a specific method as instructed by the ABS (P. Greenway, personal communication, June 26, 2014). This process is visually displayed in Appendix A.

1. Individuals who did not respond to the question pertaining to the Census QUALLP classification were deemed to have not completed education beyond primary or secondary schooling.
2. Individuals categorised within all other QUALLP classes were excluded from the count regarding educational attainment at the primary or secondary level.

Secondly, to reduce the number of categorisations within the educational attainment variable, the researcher aggregated the seventeen QUALLP classes into five categories based on levels of data aggregation proposed by ABS (2001). These being: Certificate level; Diploma level; Batchelor level; and, Post Graduate level. Information regarding the original QUALLP classes from which these aggregated classes were created is provided in (Appendix D). As a result, this study categorised educational attainment into ten separate classes.

Variable type.

Within the literature it is a reasonably common practice that educational attainment is represented as a ratio variable, for example in the studies of Daly (1992) and Daly (1994). However, it is argued by the author, that in the general context and the context of this study, this is and was not appropriate. Firstly, as ABS (2001) state, the broad range of potential educational classifications leads to issues in defining a hierarchy of educational attainment from a remuneration perspective. An example would be the inability to empirically determine whether a Bachelor of Fine Arts degree from a tertiary institution could be considered "higher" in terms of monetary rewards than an Advanced Diploma in Electrical Engineering from a technical college. Secondly, it has been shown by Juhn, Murphy, and Pierce (1993) that, even if one could determine such a hierarchy of educational attainment, the largest gains in income arise from discrete jumps in educational attainment. For example, from high school to pre-tertiary, or from pre-tertiary to tertiary. In effect, under no circumstance can education be represented as a ratio variable, as there is no semblance of equidistance between units of measurement. This argument is supported by the statistical proofs of Kawaguchi (2010) and Rupert, Schweitzer, Severance-Lossin, and Turner (1996). Thus, educational attainment was represented in this study as a polytomous variable

comprised of eleven categories represented by ten categorical variables[6] taking on the value of 1 when the condition was present and 0 when the condition was absent.

Remoteness of Residence

Instrument and classification system.

The specific Census question which obtained data regarding remoteness of residence (Appendix F) asked respondents to state the address where they usually lived, or confirm that this information was identical to the address of the dwelling to which the Census form was delivered. Whilst this information was classified into numerous categories by the ABS, remoteness of residence was determined by the Australian Standard Geographical Classification Remoteness Structure (ASGCRS) derived from the Accessibility/Remoteness Index of Australia (ARIA+) devised by the Australian Population and Migration Research Centre and The University of Adelaide. The ARIA+ measures remoteness in terms of access/distance to five categories of service centres. These categories are displayed in Table 2. Service centres are defined as populated localities where the population is greater than a thousand persons. It is assumed by the ARIA+ that greater population density is associated with increased access to goods and services. Distance by road from a given location to the closest service centre in each category is measured. Each distance is then divided by the Australian average for that category, thus producing a ratio, the threshold being three. The values of these ratios are then summed to produce an overall index value ranging between zero and fifteen. A lower index value suggests greater access to services. These index values were calculated for each respondent by the ABS and used to classify a respondent's

[6] Within this study the number of categorical variables used to represent a single polytomous variable was always equal to the number of categories minus one. This method is explained in greater depth within the section of this chapter pertaining to data analysis.

remoteness of location into one of five ASGCRS categories. These were major city, inner regional, outer regional, remote and very remote. The threshold values used for each ASGCRS classification are presented in Table 3.

Table 2

ARIA+ classification system of service centres

Service Centre Category	**Population**
A	250,000 persons or more
B	48,000 – 249,999 persons
C	18,000 – 47999 persons
D	5000 – 17,999 persons
E	1000 – 4,999

Note: Source University of Adelaide (2014).

Table 3

ARIA+ index values of ASGCRS classifications.

ASGCRS Classification	**ARIA+ Index Value**
Major City	0 – 0.2
Inner Regional	> 0.2 - ≤ 2.4
Outer Regional	> 2.4 - ≤ 5.92
Remote	> 5.92 - ≤ 10.53
Very Remote	> 10.53

Note: Source ABS (2010c).

Data aggregation.

Data aggregation by this study was minimal. However, the original data provided by the ABS classified respondents by state as well as by remoteness area and, as it was the intention of this study to observe the Australian population as a whole, it was necessary to aggregate the data so that respondents were classified only by remoteness of residence.

Variable type.

The ASGCRS was derived from the ARIA+ which was derived from a numerical value and therefore, hypothetically, in its raw form could be considered ratio data. However, the threshold placed by the ARIA+ on the ratio values, which constitute the index values, and the inequality of the ARIA+ index groupings used to classify the differing levels of the ASGCRS, negated the ability to consider the data as such. Therefore, remoteness of residence was represented in this study as a polytomous variable comprised of five categories represented by four categorical variables taking on the value of 1 when the condition was present and 0 when the condition was absent.

Health

Instrument and classification system.

Whilst it is recognised by the researcher that health is a multidimensional construct, data available within the Census regarding a respondent's health was limited. Within the Census instrument there were four questions (Appendix G) pertaining to a respondent's health. These consisted of three specific questions followed by a question designed for classification. The three specific questions asked respondents whether they required assistance with self-care, movement or communication based activities. The classification

question asked respondents to state the reason for assistance. The data obtained from these four questions was then aggregated by the ABS into the single ASSNP classification. It measured whether or not respondents required assistance within one or more of the areas described above due to a long term health condition (over six months in duration), old age, disability or a combination of these factors. Whilst the study used this classification as a means to measure health, it is recognised by the researcher that the limited scope of the classification had implications regarding the scope of the study to measure health. Although the WHO defines health as "A state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity" (Official Records of the World Health Organisation, 1948, no.2, p. 100), it may be suggested this study was only measuring the absence of disease or infirmity at the extreme end of the scale. Therefore, due to restrictions regarding data availability, this study defines health as the absence of impediment to self-care, mobility or communication as a result of disability, old age or long term health condition. The potential implications of this reductive definition are explored at a later stage within the dissertation.

Data aggregation.

Due to the ABS aggregation process resulting in a singular classification, this study did not further aggregate data regarding health.

Variable measurement.

Health was represented in this study as a singular categorical variable taking on the value of 0 when the condition was present, and 1 when the condition was absent.

Age and Experience

Instrument and classification system.

As data obtained by the Census did not allow for the direct quantification of experience, it was deemed appropriate to proxy experience by age. Therefore, experience did not constitute a separate variable within the analysis. The use of such a proxy in the Australian Indigenous context is supported by Hunter, (1997); Hunter (2002); Hunter (2003) and Kalb et al. (2012). The specific question within the Census instrument (Appendix E) used by this study to obtain data regarding age, asked respondents to either state their date of birth, or their age at their last birthday. This information was classified by the ABS INCP classification which measures age in single year values.

Data aggregation.

The comparatively smaller Indigenous population of this study (2.52% of the total Census population and 1.26% of the delimited population), combined with the process of compounding Census classifications, created too many zero and small cell counts if age was measured in single years. Such a method would have increased the potential for error and thus bias (ABS, 2011b). Therefore, it was deemed necessary to aggregate the data regarding age into three broad and roughly equal categories (15-32, 33-49, 50-65). The choice of these categories was not incidental. Rather, it was based on the knowledge, as discussed within the review of the literature, that the relationship between age and income in the context of this study is curvilinear. The choice regarding the number of categories was based on the non-linear Principal Components Analysis regarding age and income performed by Meulman, Groenen, and Kooij (2007). It was assumed by the researcher in this study that the point of

inflection where income begins to decrease would occur within the middle category. This assumption was based on the analysis of Jackson and Felmingham (2004) who found that, in the Australian context, individuals aged between 35 and 44 represented the largest percentage share of aggregated Australian incomes, when controlling for population demographics.

Variable type.

Whilst age, in many cases, may be considered a ratio variable due to its absolute zero and equidistance between data points the aggregation process employed by this study made this an impossibility. Therefore, age was represented in this study as a polytomous variable comprised of three categories represented by two categorical variables, taking on the value of 1 when the condition was present, and 0 when the condition was absent.

Gender

Instrument and classification system.

The specific question within the Census instrument used by this study to obtain data regarding gender asked respondents to state whether they were male or female. Respondents were classified by the ABS as such.

Data aggregation.

Due to the ABS aggregation process resulting in a singular classification, this study did not further aggregate data regarding gender.

Variable measurement.

Gender was represented in this study as a singular categorical variable taking on the value of 0 for females and 1 for males.

CHAPTER 5

Descriptive Analysis, Regression Model and Oaxaca Decomposition

Introduction

To answer the research question, this study employed a derivation of the counterfactual decomposition method popularized by Blinder (1973) and Oaxaca (1973), from this point onwards referred to as the Oaxaca decomposition. This method is often used to compare income inequality between two groups and measure the impact of "potential" discrimination. It achieves this via the decomposition of the income differential[7] between two groups based on ordinary least squares (OLS) regression models in a counterfactual manner (Jann, 2008). As a result of this exercise, the income differential is divided into two parts. Firstly, an "explained" portion attributable to differences in observed characteristics, which in the context of this study, were the variables. Secondly, an "unexplained" portion which is attributable to a combination of differences in economic returns to these variables and the potential effect of unobserved variables. These portions are normally expressed as a percentage of the income differential (Jann, 2008). It is these percentages which were used to answer the research question. To effectively employ the Oaxaca decomposition the data was split into three sets. These consisted of: a data set containing only Indigenous observations, a data set containing only non-Indigenous observations; and, a pooled data set containing both Indigenous and non-Indigenous observations. Descriptive statistics were then calculated for all data sets to aid in the correct specification of the regression model, and to determine the

[7] The term income differential refers to the difference in mean incomes.

impact of the data delimitation due to induced random adjustment. The dependent variable was then regressed against the independent variables for all data sets. Following this procedure, the Oaxaca decomposition was implemented, based on the results of these regressions. All statistical analyses for this study was conducted with STATA SE 13.1 statistical modelling software. Therefore, this chapter begins by describing the descriptive analysis employed by this study. This is followed by a brief discussion of the theoretical underpinnings of the regression model used; the process by which it was built; and, the tests employed to determine its adherence to the Gauss-Markov assumptions for the ideal conditions of OLS regression. Lastly, a brief mathematical summary of the Oaxaca decomposition method is provided as, due to its econometric background, it is assumed this method of analysis may be novel and unfamiliar to some readers. This summary is intended to be brief and simplistic[8]. It does not delve fully into the nuances of the method, nor is the full eighteen variable model employed by this study demonstrated, as this would be obtuse and counterintuitive for the purpose of effective explanation. Rather, the intent of this summary is to provide an overview of the key tenets of the method, and provide supporting evidence for the particular derivation used by this study.

Descriptive Analysis

Descriptive analysis was used by this study, firstly to aid in the correct specification of the regression model to be used in the implementation of the Oaxaca decomposition, and secondly to determine the impact of the specific data delimitation based on the ABS induced random adjustment process. As this study employed both interval and categorical variables, the descriptive analysis methods employed differed dependent on the variable in question.

[8] Full proofs of the method and discussion regarding its strengths and weaknesses can be found within Oaxaca (1973) and Oaxaca & Ransom (1994) amongst other papers readily available digitally.

With regard to the independent variables, as these were specified as categorical, the frequencies and proportions for each variable were calculated for both the Indigenous and non-Indigenous data sets[9]. Due to the data aggregation process used by this study, if the data delimitation had not been applied, all proportions and frequencies would have been representable as a function of the number of categorical variables representing each polytomous variable. Furthermore, these would have been identical for both the Indigenous and non-Indigenous data sets. For example, 50% of data would have related to females as there were two potential categories, male and female. However, due to the data delimitation, there was potential for non and under-representation of variables within the data set[10]. Therefore, the purpose of this analysis was to determine whether this delimitation had created large differences in variable proportions between data sets.

With regard to the dependent variable that measured weekly income, this was specified as an interval variable. Accordingly, standard measures to determine central tendency and data shape were employed. However, preliminary analysis of the data sets showed that distributions for this variable were highly asymmetrical, demonstrating considerable right skew. This was evidenced by skewness values for the Indigenous (1.050879), non-Indigenous (0.90553337) and pooled (0.6493736) data sets. This is further supported by the application of the D'Agostino normality test (D'Agostino, Belanger, & D'Agostino, Jr., 1990) which returned significance values of $p < 0.0000$, thus failing to reject the test's null hypothesis that skewness was present. On the basis of this evidence, the decision was made to transform the variable to its natural logarithm. This decision is

[9] The pooled data set was not included in this process as it was a composite of the Indigenous and non-Indigenous data sets and thus extraneous to the purpose of analysis.

[10] For example, prior to the delimitation there existed a regression case which included any individuals who were Indigenous, 50 – 65 years of age, in poor health, lived in very remote Australia and held a postgraduate qualification. As expected there were no Census respondents who fitted this criteria and thus the regression case was removed. The removal of numerous regression cases similar to this had the potential to considerably alter the proportions of any variable employed by the study.

supported by Maddala and Lahiri (1992), Greene (2003) and Baum, (2006). Descriptive statistics for both the original and log transformed variable are provided within the results chapter.

The Regression Model

The regression model employed by this study was derived from the traditional Mincer (1974) earnings model in log linear form displayed in *Equation 2*:

$$\ln y_i = \beta_0 + \beta_1 s_i + \beta_2 e_i + \beta_3 e_i^2 + u_i \ \ (i = \ 1,2, \dots, n) \qquad (2)$$

Where $y_i$is the natural logarithm of income, s_i denotes years of schooling, e_i denotes labour market experience in years, e_i^2 is a quadratic function representing the hypothetical decline in income beyond the income inflection point[11] and $u_i$is an error term representing random disturbance. To fit the data and intentions of the study, this model was adapted and extended in two stages following a similar process to that employed by Daly (1992) and Daly (1994). Firstly, this process involved the addition of the terms $\beta_3 l_i$, $\beta_4 h_i$ and $\beta_5 g_i$ representing remoteness of residence, health status, and gender respectively. The removal of the quadratic term $\beta_3 e_i^2$ pertaining to experience was undertaken, with the substitution of the experience term $\beta_2 e_i$ for $\beta_2 a_i$ which represented age. The dependent variable remained as its natural logarithmic transformation due to the skewed distribution of the dependent variable in its original form as determined by the prior descriptive analysis. This process resulted in *Equation 3*.

$$\ln y_i = \beta_0 + \beta_1 s_i + \beta_2 a_i + \beta_3 l_i + \beta_4 h_i + \beta_5 g_i + u_i \ \ (i = \ 1,2, \dots, n) \qquad (3)$$

[11] The term income inflection point refers to the observable decline in income after an individual reaches a certain age. This phenomena is described in greater depth in both the previous chapter and the review of the literature.

In the second stage of the process, the polytomous variables were removed, and the categorical as defined within the previous chapter were inserted into the regression equation following the $n - 1$ categories rule[12]. This rule was followed to eliminate issues of perfect multicolinearity, an issue arising when a categorical variable can be expressed as an exact linear function of one or more variables within the same regression.[13] This issue can be avoided by the suppression of the constant term, but this was not a method used in this study due to the importance of the constant term within the decomposition analysis (Jann, 2008). Whilst there are statistical traditions regarding which variables should be omitted and thus assigned to the constant term of the regression, they are mathematically irrelevant in OLS regression. The choice regarding omission does not influence the outcome of the procedure (Fox, 2008). Hence, the choice of omitted variables was an arbitrary process. It was decided that the constant term would represent an individual who: had no education; was between 15 and 32 years old; lived in a major city; and, was healthy under the definition provided within the previous chapter. This process resulted in the following regression model presented in *Equation 4*. Within this equation, categorical variables are denoted by the prefix *D*. This model was used for all regressions.

$$\begin{aligned}\ln y_i = {} & \beta_0 + \gamma_1 D\_yr8_i + \gamma_2 D\_yr9_i + \gamma_3 D\_yr10_i + \gamma_4 D\_yr11_i + \gamma_5 D\_yr12_i + \\ & \gamma_6 D\_cert_i + \gamma_7 D\_dip_i + \gamma_8 D\_bat_i + \gamma_9 D\_grad_i + \gamma_{10} D\_post_i + \gamma_{11} D\_3349_i + \\ & \gamma_{12} D\_5065_i + \gamma_{13} D\_inreg_i + \gamma_{14} D\_outreg_i + \gamma_{15} D\_rem_i + \gamma_{16} D\_vrem_i + \\ & \gamma_{17} D\_health_i + \gamma_{18} D\_gender_i + u_i \ \ (i = 1,2,\dots,n)\end{aligned} \tag{4}$$

[12] This is where one categorical variable is dropped from each polytomous variable and assigned to the constant term of the regression (Myers, 1990).

[13] A detailed definition and description of this statistical phenomena is provided by Hirschberg and Lye (2001).

Preliminary tests of the model's conformity to the Gauss-Markov assumptions suggested that heteroscedasticity was present in the standard errors of all regressions. This was observed in the residual vs fitted plots and the conclusion was supported by the application of the White test (White, 1980) which returned low p values ($P<0.01$) for all regressions, thus rejecting the test's null hypothesis that error distribution was homoscedastic. As a result, this study used robust standard errors derived from the method proposed by Huber (1967) and White (1980). This procedure is supported in this context by Woolridge (2013) and Brooks (2014). Accordingly, the Gauss-Markov assumption of homoscadastic standard errors was not investigated within the results, as this is irrelevant when following this procedure (Woolridge, 2013).

The Oaxaca Decomposition

As stated earlier, the purpose of the Oaxaca decomposition is to decompose the income differential between two groups into an "explained" portion attributable to differences in the characteristics of the two groups, and an "unexplained" portion attributable to differences in returns for the same characteristics and potential unobserved variables. To achieve this, the differential is first specified. In the case of this study, the differential (*D*) may be specified as the difference in the predicted means of the natural logarithms of incomes. Using Indigenous (*I*) and non-Indigenous (*NI*) Australians as the two groups, this is demonstrated in *Equation 5*. The values for $\overline{\ln y_{NI}}$ and $\overline{\ln y_I}$ are obtained via separate OLS regressions for each group.

$$D = \overline{\ln y_{NI}} - \overline{\ln y_I} \tag{5}$$

The differential can then be expressed as a function of income equations. This is shown in *Equation 6*. Firstly, the terms $\beta_{NI}\bar{X}_{NI}$ and $\beta_I\bar{X}_I$ effectively represent the product of the vectors of monetary returns to a variable determined by regression coefficients (β), and the vectors of the mean number of individuals represented by those variables ($\bar{X}$) for non-Indigenous and Indigenous individuals respectively. Secondly, the terms $\beta_{0_{NI}}$ and β_{0_I} represent the values of the constant terms for the non-Indigenous and Indigenous regressions respectively. Lastly the terms u_{NI} and u_I represent the error terms of the regressions. At this juncture, it is assumed that $u_{NI} = u_I = 0$, and thus the error terms are redundant within the decomposition. However, they are used at a later stage to estimate confidence intervals and significance values for the "explained" and "unexplained" portions.

$$D = \sum \beta_{0_{NI}} + \beta_{NI}\,\bar{X}_{NI} + u_{NI} - \sum \beta_{0_I} + \beta_I\,\bar{X}_I + u_I \qquad (6)$$

Expanding *Equation 6* for purposes of clarity, *Equation 7* shows the expression of the differential for a two variable model. The variables chosen for this demonstration are education (*edu*) and age (*age*). Both are continuous variables measured in years. Within *Equation 7* $\beta_{edu_{NI}}$ and β_{edu_I} represent the estimated increase in income for one extra year of schooling for non-Indigenous and Indigenous individuals respectively. $\bar{X}_{edu_{NI}}$ and $\bar{X}_{edu_I}$ represent the mean years of schooling for non-Indigenous and Indigenous individuals respectively. $\beta_{age_{NI}}$ and β_{age_I} represent the estimated increase in income for a one year increase in age for non-Indigenous and Indigenous individuals respectively. $\bar{X}_{age_{NI}}$ and $\bar{X}_{age_I}$ represent the mean age of non-Indigenous and Indigenous individuals respectively. $\beta_{0_{NI}}$ and β_{0_I} (as in *Equation 6)* represent the constant terms for the non-Indigenous and Indigenous regressions respectively. Although this model uses continuous variables, the model used by the study is based on categorical variables. In the context of the study, the (β)

values can be thought of as the percentage of income increase or decrease observed due to the presence or absence of a specific attribute, and the ($\bar{X}$) values can be thought of as the proportion of individuals who hold that characteristic.

$$D = \left(\beta_{0_{NI}} - \beta_{0_I}\right) + \left(\beta_{edu_{NI}}\bar{X}_{edu_{NI}} - \beta_{edu_I}\bar{X}_{edu_I}\right) + \left(\beta_{age_{NI}}\bar{X}_{age_{NI}} - \beta_{age_I}\bar{X}_{age_I}\right) \quad (7)$$

The expression of the differential for the two variable model displayed in *Equation 7* can now be decomposed into the previously mentioned "explained" and "unexplained" portions. The first bracketed section in *Equation 8* represents the "explained" portion and the second bracketed section represents the "unexplained" portion.

$$D = \left[\beta_{edu_{NI}}\left(\bar{X}_{edu_{NI}} - \bar{X}_{edu_I}\right) + \beta_{age_{NI}}\left(\bar{X}_{age_{NI}} - \bar{X}_{age_I}\right)\right] + \left[\left(\beta_{0_{NI}} - \beta_{0_I}\right) + \bar{X}_{edu_I}\left(\beta_{edu_{NI}} - \beta_{edu_I}\right) + \bar{X}_{age_I}\left(\beta_{age_{NI}} - \beta_{age_I}\right)\right] \quad (8)$$

However, it is at this point that the decomposition encounters what has come to be known as the "index number problem" (Oaxaca, 1973). *Equation 8* can be just as validly expressed thus - *Equation 9*:

$$D = \left[\beta_{edu_I}\left(\bar{X}_{edu_{NI}} - \bar{X}_{edu_I}\right) + \beta_{age_I}\left(\bar{X}_{age_{NI}} - \bar{X}_{age_I}\right)\right] + \left[\left(\beta_{0_{NI}} - \beta_{0_I}\right) + \bar{X}_{edu_{NI}}\left(\beta_{edu_{NI}} - \beta_{edu_I}\right) + \bar{X}_{age_{NI}}\left(\beta_{age_{NI}} - \beta_{age_I}\right)\right] \quad (9)$$

Where the differences in means ($\bar{X}$) have been weighted by the Indigenous coefficients (β) within the "explained" portion and the differences in coefficients have been weighted by the non-Indigenous means within the "unexplained" portion. This decomposition can be viewed as the inverse of that displayed in *Equation 8.* Effectively, the index number problem is a question of which group should represent the "base" income, as both decompositions will yield slightly different results. As (Gosse, 2002) states, it has been commonplace in the literature to simply report findings where the base wage is assumed to be the majority group. In this example, this would constitute reporting the results from *Equation*

8. However, it is argued by the researcher of this study that this would be a naive approach. This argument is supported by Cotton (1988), Neumark (1988) and Oaxaca and Ransom (1994), amongst others. Attempts have been made within the literature to overcome the index number problem. For example, Reimers (1983) took the average difference between the coefficients of the groups as a weighting mechanism for the decomposition. In a similar manner, Cotton (1988) weighted the decomposition by the proportions of each group within the data. However, both of these methods have been criticised as "arbitrary" with little or no theoretical grounding by Neumark (1988), Oaxaca and Ransom (1994), Elder, Goddeeris, and Haider (2010), and Fortin, Lemieux, and Firpo (2011), amongst others. Therefore, this study, sought a more empirically grounded method. Neumark (1988), alongside his criticism of the methods adopted by Reimers (1983) and Cotton (1988), used the theory of employer discrimination proposed by Becker (1971) to develop a weighting method based on the coefficients from a separate pooled regression model. A similar approach to that proposed by Neumark (1988) was also proposed by Oaxaca and Ransom (1994). Based on the above literature, this study adopted the approach proposed by Neumark (1988). It is displayed mathematically, in the context of the two variable example, in *Equation 10*, where β_{edu_P} and β_{age_P} represent the coefficient values derived from the pooled regression for education and age respectively.

$$D = \left[\beta_{edu_P}\left(\bar{X}_{edu_{NI}} - \bar{X}_{edu_I}\right) + \beta_{age_P}\left(\bar{X}_{age_{NI}} - \bar{X}_{age_I}\right)\right] + \left[\left(\beta_{0_{NI}} - \beta_{0_I}\right) + \bar{X}_{edu_{NI}}\left(\beta_{edu_{NI}} - \beta_{edu_P}\right) + \bar{X}_{age_{NI}}\left(\beta_{age_P} - \beta_{age_I}\right)\right] \quad (10)$$

In terms of developing confidence intervals, and hence significance values for the values of the "explained" and "unexplained" portions of the decomposition, as Jann, (2008)

suggests, this is not a simplistic process. It is based on estimates of the joint variance-covariance matrix of the data sets (Weesie, 1999), which is then transformed by the delta method (Oehlert, 1992) to obtain variances which can then be used to construct confidence intervals (Xu & Long, 2005). It is not the intention of the researcher to delve into this process beyond this explanation. However, the reader is encouraged to view the articles referenced within this paragraph should this method be of interest.

CHAPTER 6

Results

Introduction

This chapter reports the results of the descriptive and inferential methods of analyses detailed within the previous chapter, which were employed to answer the research question. Although only the results obtained from the implementation of the Oaxaca decomposition have direct relevance in regard to the provision of an answer to the research question, but in the interests of complete transparency, all levels of statistical analysis which led to the final result are displayed. Accordingly, this chapter begins by presenting the results of the descriptive analysis. It then presents the results of the three separate regressions. Lastly, it presents the results of the Oaxaca decomposition which were used to answer the research question.

Descriptive Analysis

Dependent variable.

The dependent variable which measured mean weekly income was specified as an interval variable. Hence, both standard and complex descriptive analysis measures to determine central tendency and data shape were employed. The results from this exercise are displayed in Table 4 for both the original and log transformed data. With regard to measures of central tendency, it should be noted that the Indigenous income gap can be observed in both mean and median measures. Furthermore, it is of interest to note from the original data that, despite the extensive delimitation process employed by this study, the estimated mean incomes remained relatively close to ABS reported estimates for the Australian population as

a whole (+1.3% for Indigenous, -18% for non-Indigenous). In regard to data shape, standard deviations remained within expected parameters when working with aggregated income data (Greene, 2003). Post log transformation, the skewness values of all data sets are considered acceptable in terms of normal distribution (Weiss & Hassett, 1991). This conclusion is also supported empirically by the application of the D'Agostino normality test, which in this case returned significance values of $p = 0.1221$, $p = 0.5177$ and $p = 0.0627$ for the Indigenous, non-Indigenous and pooled data sets respectively, and thus allowed the rejection of the test's null hypothesis that skewness was present.

Table 4

Comparison of means, medians, standard deviation, skewness and kurtosis between the standard and log transformed specifications of the dependent variable by Indigenous status

	Measure	Mean income	Log income
Indigenous	Mean	641.3051	6.290618
	Median	537.9408	6.287748
	Standard dev	379.393	0.6005978
	Skewness	1.050879	-0.1293888
Non-Indigenous	Mean	748.8192	6.456931
	Median	631.4347	6.447994
	Standard dev	426.6658	0.5774879
	Skewness	0.9055337	-0.0458992
Pooled	Mean	691.7933	6.400612
	Median	609.9948	6.41345
	Standard dev	357.5553	0.5385588
	Skewness	0.6493736	-0.1361382

Note: Mean income represents the original specification of the dependent variable. Log income represents the log transformed specification of the dependent variable.

Independent variables.

The independent variables measuring gender, age, educational attainment, remoteness of residence and health were specified as categorical. Accordingly, the frequencies and proportions have been calculated for both the Indigenous and non-Indigenous data sets and are displayed in Table 5. As mentioned previously, descriptive statistics of this nature were of particular interest to this study, as it was important to gain insight into the effects of the delimiting process employed due to the procedure of induced random adjustment implemented by the ABS. Results showed the mean difference across all variables was 3%. The largest differences observed were related to the variable of health, showing a difference of 7% for both good and poor.

Table 5

Comparison of regression case proportions between Indigenous and Non-Indigenous Data Sets

	Variable	Indigenous %	Indigenous Freq	Non-indigenous %	Non-Indigenous Freq	Difference %
Gender	Female	53%	447	51%	596	2%
	Male	47%	402	49%	582	2%
Health	Poor health	31%	263	38%	443	7%
	Good health	69%	586	62%	735	7%
Age	Aged 15-32	27%	228	28%	332	1%
	Aged 33-49	36%	303	34%	398	2%
	Aged 50-65	37%	318	38%	448	1%
Remoteness of Residence	Major city	25%	209	27%	315	2%
	Inner regional	23%	196	24%	282	1%
	Outer regional	21%	176	22%	256	1%
	Remote	15%	130	16%	184	1%
	Very remote	16%	138	12%	141	4%
Level of Educational Attainment	No education	6%	48	4%	51	2%
	Yr8	7%	59	5%	58	2%
	Yr9	7%	60	5%	57	2%
	Yr10	7%	60	5%	60	2%
	Yr11	6%	52	4%	53	2%
	Yr12	7%	57	5%	59	2%
	Certificate	25%	216	24%	277	1%
	Diploma	17%	142	19%	227	2%
	Batchelor	11%	97	16%	183	5%
	Postgraduate	7%	58	13%	153	6%
	Mean	*	*	*	*	3%
	Total	*	849	*	1178	*

Note: % = proportion. Freq = frequency. * = no value recorded

Regression Analysis.

Table 6 presents the results from the regression analysis performed on the three separate data sets. As can be seen in Table 6, most variables produced statistically significant coefficients at the p<.001 level, although it must be noted that this did not apply to all coefficients. It may be of interest to the reader to note the increase in income observed as level of educational attainment increased within all data sets[14]. However, as the regression results in terms of the coefficients do not provide a direct answer to the research question they are not discussed further. With regard to the Indigenous data set, the model accounted for 77% of variance in income and was statistically significant, $R^2 = .7710$, df = 17, F= 164.55, p<0.001. With regard to the non-Indigenous data set, the model accounted for 77% of variance in income and was statistically significant, $R^2 = .7727$, df=17, F=17.01, p<0.001. With regard to the pooled data set, the model accounted for 71% of variance in income and was statistically significant, $R^2 = .7124$, df = 17, F = 296.37, p<0.001.

In terms of the conformity of the model to the Gauss Markov assumptions across all data sets, as noted previously, robust standard errors derived from the method proposed by Huber (1967) and White (1980) were applied to alleviate issues of hetroscadacity. As a result, this assumption was not tested. In regard to linearity, residuals were plotted against predicted values for all regressions. The resulting graphs showed normal distribution with the errors centred around zero, suggesting the assumption of linearity had been fulfilled. With regard to normality, normal probability plots of the residuals for all regressions demonstrated a relatively straight line with minimal deviation, therefore suggesting the assumption of normality had been fulfilled.

[14] As the dependent variable has been log transformed, the coefficients should be interpreted by the reader as a percentage increase in income from the constant coefficient. For example, the coefficient for the Year 8 variable within the regression performed on the Indigenous data set is .2407. Accordingly, for an Indigenous Australian who completed year 8 the predicted increase in income over an Indigenous Australian who did not go to school is 24%

Table 6

Regression coefficients, confidence intervals and model statistics for all regressions used in the Oaxaca decomposition

	Data set 1 (Indigenous)		Data set 2 (Non-Indigenous)		Data set 3 (Pooled)	
Variable	β	95% CI	β	95% CI	β	95% CI
Constant	5.5845***	[5.48, 5.68]	5.7878***	[5.68, 5.88]	.5664***	[5.59, 5.74]
Gender	.2303***	[.19, .26]	.3794***	[.32, .41]	.3181***	[.28, .34]
Health	-.5803***	[-.62, -.53]	-.6569***	[-.69, -.61]	-.6261***	[-.65, -.59]
Aged 33-49	.2920***	[.24, .34]	.3141***	[.26, .36]	.3054***	[.26, .34]
Aged 50-65	.2492***	[.19, .29]	.2176***	[.17, .26]	.2359***	[.19, .27]
Inner regional	-.1017***	[-.15, -.04]	-.0343	[-.08, .01]	-.0611**	[-.10, -.02]
Outer regional	-.0474	[-.10, .01]	.0246	[-.02, .07]	-.0056	[-.04, .03]
Remote	-.0223	[-.08, .04]	.1762***	.[.11, .23]	.0956***	[.04, .14]
Very Remote	-.1946***	[-.25, -.13]	.2084***	[.14, .27]	.01237	[-.03, .06]
Year 8	.2407***	[.12, .35]	.0711	[-.05, .19]	.1601***	[.07, .24]
Year 9	.2958***	[.18, .40]	.0817	[-.04, .20]	.1917***	[.10, .27]
Year 10	.3855***	[.27, .49]	.1852**	[.06, .30]	.2933***	[.20, .38]
Year 11	.4094***	[.29, .52]	.0664	[-.05, .19]	.2433***	[.15, .33]
Year 12	.5338***	[.42, .64]	.3402***	[.21, .46]	.4452***	[.35, .53]
Certificate	.6122***	[.52, .70]	.4201***	[.32, .51]	.5303***	[.45, .60]
Diploma	.8850***	[.78, .98]	.5867***	[.48, .68]	.7466***	[.65, .81]
Bachelor	1.1254***	[1.02, 1.22]	.7405***	[.63, .84]	.9374***	[.85, 1.00]
Postgrad	1.3086***	[1.19, 1.42]	.9330***	[.82, 1.03]	1.1197***	[1.04, 1.19]
Obs (*n*)	849		1179		2028	
R^2	.7710		.7727		.7148	
df	17		17		17	
F	164.55***		178.01***		296.37***	
ΔR^2	.7663		0.7181		.7124	

Note: CI = Confidence interval. Obs = Number of observations. *p<.05. **p<.01. ***P<.001

Oaxaca Decomposition

Table 7 presents the results of the Oaxaca decomposition that was based on the results of the regression analyses presented previously. As can be seen in Table 7, only 31% of the differential, could be explained by differences in educational attainment, age, remoteness of residence, gender and health. The remaining 69% of the differential is unexplainable in terms of these differences, and thus potentially attributable to differences in economic returns for these variables between Indigenous and non-Indigenous Australians. These differences in returns are potentially attributable to variables unobserved by this study, and therefore as Altman (2009) argues, unobserved by the current Closing the Gaps policy. With regard to statistical significance, the coefficient for the "explained" portion of the differential was statistically significant, $p<0.05$, 95% CI [.01, .09] as was the coefficient for the unexplained portion, $p<0.001$, 95% CI [.08, .13]. The results of the decomposition suggest that factors other than the variables employed by this study contribute considerably to the difference between Indigenous and non-Indigenous incomes, and hence, Indigenous socioeconomic disadvantage.

Table 8

Results of the Oaxaca decomposition

	Coefficient	Std Error (Rbst)	z	P>|z|	95% CI
Mean Log Income (Non-Indigenous)	6.4508	.0178	360.97	.000	[6.41, 6.48]
Mean Log Income (Indigenous)	6.2906	.0206	305.21	.000	[6.25, 6.33]
Differential (*D*)	.1602	.0272	5.87	.000	[.10, .21]
Explained *% of (D)*	.0499 *31.18%*	.0234	2.13	.033	[.01, .09]
Unexplained *% of (D)*	.1102 *68.82%*	.0142	7.76	.000	[.08, .13]

Note. (Rbst) = robust. CI = confidence interval. D = Differential

CHAPTER 7

Discussion

Introduction

As evidenced by the preceding chapter, with regard to the research question posed, the results of the analysis infer that only 31% of the difference between Indigenous and non-Indigenous mean incomes can be explained by demographic differences in educational attainment, health, remoteness of residence, age and gender. These results are statistically significant at the $p<0.05$ level. As the dependent variable of this study may be considered a valid proxy for socioeconomic status, and the independent variables encompassed the key building blocks and target areas addressed by Closing the Gaps, this finding suggests that the efficacy of this policy as a means to improve Indigenous socioeconomic outcomes should be seriously questioned. It may be inferred from these findings that over two-thirds of Indigenous socioeconomic disadvantage, as proxied by income, is attributable to factors that fall largely outside the scope of the policy. In light of these findings, this chapter focusses on the literature regarding Indigenous socioeconomic disadvantage as a means by which to theorise about factors potentially contributing to the remaining 69% of the difference between Indigenous and non-Indigenous incomes. The factors considered are wealth, habitus, cultural capital and discrimination. This is followed by a brief comparison of the results of this study with those obtained by Daly (1992) and Daly (1994). The focus of the comparison is on the potential impact of the changes in Indigenous and non-Indigenous circumstance over the period extending from the time of these similar studies and the present day, which may have potentially led to such large differences in results. Lastly, directions for future research are investigated and a brief summary and conclusion regarding the current study is presented.

Potential Contributing Factors

Wealth.

From a purely economic perspective, scholars such as Altman (2000) and Altman, Biddle, and Hunter (2004) have argued that the accumulation and intergenerational transfer of wealth is an important factor in determining levels of Indigenous disadvantage. Wealth has been defined as: "prosperity consisting in abundance of possessions; 'worldly goods', valuable possessions, esp[ecially] in great abundance: riches, affluence" (Oxford English Dictionary Online). It is an important determinant of income for two reasons. Firstly, wealth directly generates income. Secondly, the capacity to generate wealth through borrowing and investment is directly proportional to the ownership of assets, and thus initial wealth (Headey, Marks, & Wooden, 2004).

Within the literature, it is generally accepted that wealth is accumulated firstly through the accumulation of life cycle earnings, and secondly through the interpersonal transfer of wealth (Gale & Scholz, 1994). In the Australian context, the second method is regarded as being responsible for the accumulation of a considerable component of individual wealth. O'Dwyer (2001) argues that this is the result of high levels of asset accumulation, and the subsequent intergenerational transmission of these assets, either in whole or in part, through inheritance. This view is supported by Badcock (1994) and Northwood, Rawnsley, and Chen (2002).

Historically, Indigenous Australians have been marginalised, both in terms of wealth accumulation through life cycle earnings, and in relation to asset accumulation. It was not until 1966 that Indigenous Australians were granted the right to equal pay for equal work (Chesterman, 2005). Moreover, it was not until the 1960's that earlier legislation from the

late 1800's and early 1900's establishing and granting powers to Aboriginal Protection Boards in Victoria, New South Wales, Western Australia, Queensland and South Australia[15] were replaced[16]. The legislation had provided boards with wide ranging powers including control over Indigenous occupations, personal finances, living arrangements, education and movements.

In the Australian context, Altman et al. (2004) argue that it is particularly difficult to draw quantitative comparisons of wealth between sub-populations. This is due to the absence of any official statistical collections that directly measure the construct. Consequently, home ownership is often used as a proxy for wealth (Altman et al., 2004). Whilst it is not a perfect proxy, Headey et al. (2004) in the first full scale study to measure the structure of Australian wealth since Knibbs (1918), found that owner-occupied housing and rental investment property accounted, on average, for 67% percent of the total household assets/wealth of Australians. If this figure is taken in context, with the considerable difference in parity between Indigenous and non-Indigenous home ownership rates, namely 36% and 68% respectively (ABS, 2011c), it may be argued that Indigenous Australians are at a considerable disadvantage in respect to wealth.

In a qualitative context, whilst wealth has not been measured directly, the effect of inequality within this domain has been researched and there are findings that support the above supposition. Firstly, research from a phenomenological perspective has found that Indigenous Australians are reluctant to approach commercial lenders, due to the anticipation

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[15] State and Territory based legislation regarding the powers of Aboriginal Protection Boards was contained within the Aboriginal Protection Act, 1869 [Vic]; Aborigines Protection Act, 1883 [NSW]; Aboriginal Protection Act, 1897 [Qld]; Aborigines Protection Act, 1886 [WA]; Act to provide certain matters connected with the Aborigines, 1889 [WA]; Aborigines Act, 1905 [WA]; Aborigines Act 1911 [SA]; Aboriginal Ordinance, 1911 [NT].

[16] Legislation abolishing Aboriginal Protection Boards was contained within the Aboriginal Affairs Act 1967 [Vic]; Aborigines Act 1969 [NSW]; Aborigines Act 1971 [Qld]; Native Welfare Act 1954 [WA]; Aboriginal Affairs Act 1962 [SA]; Social Welfare Ordinance 1964 [NT].

of rejection based on lack of collateral/wealth (Dana, 1996). Secondly, Foley (2006) when examining the issue from an ethnographic perspective, found that these fears of rejection were not unfounded. Sixty percent of participants within her study regarding Indigenous entrepreneurship reported difficulty obtaining finance from prospective lenders. Whilst it must be acknowledged that Indigenous specific finance is available through organizations such as Indigenous Business Australia, it is argued by Altman (2002) that in many cases this is not a complete solution. Firstly, finance from such institutions is mainly provided on a one-off basis. Secondly, the Indigenous share in the asset to be financed must exceed 50%, a requirement that may negate investment partnerships, particularly in businesses with non-Indigenous individuals. Thirdly, initial capital deposits similar to commercial lending institutions apply. Many Indigenous Australians may find this requirement difficult to satisfy, due to the nature of their circumstances at the time. Such difficulties have also been reported by Hughes, Hughes, and Hudson (2010). In addition, they identify the legal constraints on finance presented by the fact that homes and businesses to be offered to prospective financiers as collateral may be located on Indigenous communally owned land.

At present, there is no provision within the Closing the Gaps strategy designed to counteract the inequality between Indigenous and non-Indigenous Australians in terms of wealth. This is despite research evidence suggesting that it may be a considerable contributing factor to Indigenous disadvantage.

Cultural capital and habitus.

Hunter (2007) argues that Indigenous disadvantage can be defined as a vicious cycle of feed-back in which disadvantage reinforces and compounds upon itself generationally. Extending upon this argument, Hunter (2009) implicates the influence of social externalities as a key factor, a process by which an individual's behaviours and social norms are shaped by

the people and institutions with which they interact. Within the literature there is considerable support for this argument. Links between social background and generational transmission of socioeconomic disadvantage have been found in the Australian Indigenous context by Gray (2000), Gray and Beresford (2008), and Hunter (2009). In the general Australian context, links have been found by Considine and Zappala (2002), James (2002), and Khoo and Ainley (2005). In attempting to understand these links, it is argued by both Burbank (2006) and Mills (2008a) that it is useful to draw on Bourdieu's theory of "habitus".

Under the specification expounded by Bourdieu (1990), habitus may be defined as: the recurring patterns of class outlook which are inculcated by everyday experiences within the family, the peer group and the institutions in which an individual functions. Operating below consciousness, habitus provides individuals with a sense of how to act and respond in their daily lives (Bourdieu & Wacquant, 1992). In defining habitus, Bourdieu (1990) theorises that it may be either "transformative" or "reproductive". Individuals who embody a transformative habitus recognise the constraints of social class and act in ways to overcome them. Individuals who embody reproductive habitus unconsciously conform to the constraints of social class and thus resign themselves to the reproduction of the class (Bourdieu, 1990). It is the second of these types of habitus that is implicated in the perpetuation of disadvantage.

Within the literature there is a dearth of Indigenous specific research regarding the social perpetuation of disadvantage. However, in the context of Australians with low socioeconomic status, there is qualitative evidence to support an argument that the reproductive conceptualisation of habitus may be implicated strongly in intergenerational poverty. The finding of Mills (2008a) demonstrates that an individual's conceptualisation of habitus has a powerful negative influence on their goals and aspirations, thus impacting considerably on their life outcomes. Furthermore, Mills (2008b) and Mills and Gale (2011)

demonstrate that the construct of habitus not only operates within the individual, but also within the institutions with which the individual associates. With regard to this aspect, the latter studies were undertaken in the context of schools and revealed that teachers, and even principals, unknowingly consigned their students to a social class, and thus unconsciously acted towards the reproduction of this class. In explaining these findings, both Mills (2008b) and Mills and Gale (2011) argue that Bourdieu's theory of "cultural capital" is a defining factor.

Cultural capital may be defined as the unconscious awareness and compliance with the expected behaviours, attitudes, values, knowledge, and language of the culture in which an individual operates (Henry, Knight, Lingard, & Taylor, 1988). In expounding his theory, Bourdieu pays considerable attention to the role of schools in reproducing inequality. He suggests that they act as a vehicle for the transmission and legitimisation of the dominant culture and hence, the marginalisation of others (Bourdieu, 1998). Furthermore, within earlier conceptualisations of the theory, he argues that whilst cultural capital of the dominant culture is required by the school, the means to acquire it is not provided. He states:

> "By doing away with giving explicitly to everyone what it implicitly demands of everyone, the educational system demands of everyone alike that they have what it does not give" (Bourdieu, 1973, p. 80).

Mills (2008b) argues that if individuals do not possess the correct form of cultural capital, they are actively marginalised. The argument is supported by Henry et al. (1988) who theorise that the school assumes middle-class culture, values and attitudes in all its pupils, and other cultures are often viewed as a liability. It is also argued by Mills (2008b) and Henry et al. (1988), that it is the clash of cultural capital between institutions and individuals that results in both the active marginalisation and perpetuation of reproductive conceptualisations of habitus for many individuals. Whilst there is no quantitative evidence

within the literature to ascertain the prevalence, and thus the impact of cultural capital habitus on Indigenous disadvantage, it is assumed, based on the difference between the dominant and Indigenous cultures, and in view of the qualitative evidence presented previously, that some impact on Indigenous disadvantage may be present. It should be noted that many arguments from a theoretical perspective such as Humpage (2005), Taylor (2008), Altman (2009) and Cowlishaw (2009) have expressed the failings of Closing the Gaps and similar policies to address cultural difference in any form.

Discrimination.

Despite Australia's reputation as a multicultural nation, recent literature suggests that racism and discrimination are not only present, but highly prevalent within contemporary society. In terms of perceived experiences of racial discrimination, one in five Australians believes they have been a target of such practices (Markus, 2013). In an Indigenous specific context the statistics are similar. The National Aboriginal and Torres Strait Islander Social Survey (NATSISS), relying upon rates of self-reported racism, found that 27% of Indigenous Australians believed they had been a target of racial discrimination (ABS, 2010b). In terms of individual racial beliefs within society, Dunn (2003), when surveying residents of New South Wales and Queensland, made the following findings: 78% of respondents believed humans could be sorted by natural racial categories; 13% believed there should be racial segregation; 11.7% believed there was a racial hierarchy of some form; and 7% stated they felt uncomfortable in the presence of people from a different ethnicity to their own. In light of these findings, he expressed the view that a "hard core" of Australian racists exists. One in ten individuals could be classified as "racist" by even the narrowest of definitions.

Findings from recent research suggest that racism and discrimination within Australia operate not only on an individual basis. They are present within the institutions of society.

Dunn, Forrest, Pe-Pua, Hynes, and Maeder-Han (2009) found that, although slightly less prevalent than individual forms of racism, institutional forms of racism within the workplace, schools, justice system and housing market were experienced by one in six Australians. These findings were partially confirmed by Markus (2013). His research revealed that 11% of Australians believed they had experienced race-based exclusion from their workplaces, and 7% believed they had experienced unfair treatment based on their race.

However, whilst there is a relatively large evidence base supporting the prevalence and extent of racial discrimination in Australia, there is considerably less evidence in relation to discrimination against Indigenous Australians within the labour market. A search of the literature revealed four studies, with only one having directly observed the phenomenon. Two of these studies related to the probability of employment, and two related to the impact of discrimination on income.

In the context of Indigenous employment probability, Hunter (2003) indirectly observed the potential impact of discrimination via the comparison of Indigenous and non-Indigenous labour market outcomes. His findings revealed that only one third of the difference in probability between Indigenous and non-Indigenous outcomes could be explained by differences in individual attributes. Accordingly, two thirds of the difference could be attributed to "potential" discrimination. This proportion is only attributable to "potential" discrimination, as it is possible that other factors, not observed by the study, may have contributed to the differential.

In the second study to analyse the impact of discrimination on employment probability, Booth, Leigh, and Varganova (2010) directly observed its impact as a result of gathering data regarding the rate of call-back to false job applications. Four thousand fictitious resumes were sent to employers in response to job advertisements. Findings from the study revealed that the mean call-back rates for resumes with Indigenous and non-

Indigenous names were 26% and 35% respectively. Fictitious Indigenous names were sourced from the indexes of various books listing Indigenous artists. Accordingly, Indigenous names experienced a 9% reduction in call-back rates. Translating this into ratio form, and extrapolating results, Booth et al. (2010) observed that in order for an Indigenous Australian to receive the same response to their search for employment, they needed to submit 35% more resumes.

Comparisons with Similar Studies

With regard to similar studies within the Australian Indigenous context, these being Daly (1992) and Daly (1994), the findings of the current study are at odds. In comparison to the results of these previous studies, the current study identified a considerably larger portion of difference between Indigenous and non-Indigenous median incomes that could not be attributed to demographic differences between the groups. It is theorised by the researcher that this difference is largely a product of the considerable time period that has elapsed between Daly (1992), Daly (1994) and the current study. It may be argued that considerable changes in Indigenous circumstance and population demographics have occurred in this period.

Firstly, in relation to population demographics, there has been a sizeable increase in Australia's Indigenous population, both in absolute and comparative terms. In the 1991 Census from which the data for Daly (1994) was taken, there were 265,500 individuals who identified as Indigenous. This number represented 1.5% of the total Australian population. In the 2011 Census, from which the current study drew its data, there were 548,370 individuals who identified as Indigenous. This number represented 2.3% of the total Australian population. Effectively, in the period between the earlier studies and the present

study, the Australian Indigenous population has doubled, and the ratio of Indigenous to non-Indigenous Australians has increased by 21%. In view of this substantial increase in population, it is reasonable to assume that the diversity of circumstance within this population has also increased.

A second consideration with regard to the time period that has elapsed between studies, is the systematic dismantlement of the CDEP program. As stated within the literature review, the CDEP program has, since its inception, been responsible for the employment of a considerable proportion of the Australian Indigenous population. Using figures from the 2004 NATSIS, Biddle (2009) ascertained that the scheme was operating in almost 200 Indigenous communities, and employed 28% and 20% of the total Indigenous male and female workforce respectively.

As a result of the Northern Territory Intervention and the corresponding measures of income control for Indigenous Australians, the CDEP scheme has largely been dismantled in remote communities (Altman & Johns, 2008). It is argued by Altman and Johns (2008) that, as Indigenous Australians within the CDEP were classified as "employed", despite being paid for work from funds originating from unemployment benefits, the Federal Government could not legally implement the income control for those Indigenous Australians being paid via the CDEP scheme and therefore the scheme was systematically dismatled. Because of the dismantlement of the CDEP, as of the 2011 Census from which the present study drew its data, the percentage of the total Indigenous workforce employed under the CDEP had fallen to 3.2%. In light of this substantial restructuring of Indigenous employment circumstances between the studies of Daly (1992) and Daly (1994) and the present study, it is assumed that there has been a considerable impact upon Indigenous incomes.

Lastly, with regard to differences between studies as a result of the time elapsed, it is theorised by the researcher that the mining boom beginning during the early 1990's has had some impact on Indigenous incomes and the diversity of Indigenous circumstance. It is assumed that this development has considerably altered both the population ratio's between Indigenous and non-Indigenous Australians, and the mean wage received, in remote and very remote areas of Australia. As of the 1991 Census from which the data for Daly (1994) was drawn, there were 86,300 Australians working within the Australian mining industry (Castles, 1991). Between the 1991 Census and the 2011 Census from which the current study drew its data, this figure has effectively doubled with 176,560 Australians now employed within the industry (ABS, 2014). As the mining sector is largely confined to remote and very remote Australia (Taylor & Scambary, 2005), it may be hypothesised that this increase has resulted in a population influx into these locations. Furthermore, as the median salary for mining is considerably higher than the average median salary; $2,388.20 per week compared to $777 per week (ABS, 2014), it is reasonable to assume that this population influx would have considerably altered the median wages in remote and very remote Australia. It must also be noted that this alteration in median wages is likely to be highly biased in favour of non-Indigenous Australians. Although Indigenous Australians employed within the mining industry can be expected to earn 50% more than those who are not (ABS, 2005), the median salary for Indigenous Australians working within the mining sector is approximately half that of non-Indigenous Australians: $1,129 per week compared to $2,388.20 per week (ABS, 2014). Furthermore, despite Indigenous Australians often constituting well over 95% of the population in remote and very remote mining towns (ABS, 2012a), they constitute only 3.1% of the total labour force employed within the mining industry (ABS, 2014).

Directions for Future Research

As expressed throughout this study, the factors underlying and implicated in the issue of Indigenous socioeconomic disadvantage within Australia are diverse, interrelated, and accordingly complex to analyise from a research perspective. As Hunter (2003) has argued, much empirical research regarding the issue has tended to overemphasise the role of differences in the levels of educational attainment between Indigenous and non-Indigenous Australians. Findings from this study suggest that this overemphasis is possibly unfounded. Difficult and often overlooked constructs, such as those theorised previously within this chapter, may potentially contribute considerably more to Indigenous socioeconomic disadvantage. Although these difficult to measure constructs have been investigated within the literature with regard to Indigenous socioeconomic disadvantage, the focus has been largely on their prevalence within Australian society as opposed to their role in the creation and perpetuation of Indigenous socioeconomic disadvantage. Consequently, it would appear that there is a need, although methodologically intense and difficult to implement due to the absence of necessary data, for research that aims at the identification and quantification of these impacts on the current situation. Furthermore, the current study does not in any way claim that the previously mentioned factors within this chapter account for the "unexplained" 69% of the difference between Indigenous and non-Indigenous median incomes in its totality. It is without doubt that other factors, which have to date been unidentified by the literature, have some role and function. Consequently, it is argued that there is a need for the implementation of qualitative research methods to investigate the situation further, as to date this research paradigm has been largely overlooked.

Conclusion

In summary, this study has used the difference between Indigenous and non-Indigenous mean incomes as a means by which to measure Indigenous socioeconomic disadvantage. It has used the explanatory variables of educational attainment, health, remoteness of residence, age and gender to ascertain the percentage of this difference that could be attributed to demographical differences between the two populations. By doing this, the study was able to broadly determine the ability of the current Closing the Gaps policy to improve Indigenous socioeconomic outcomes, as these variables were closely linked to the factors addressed by the policy. In this regard, the findings of the study pose serious questions as to the efficacy of the current Closing the Gaps policy. As the explanatory variables could only account for 31% of the difference between Indigenous and non-Indigenous incomes, it is likely that other unobserved and overlooked factors contribute considerably to the current Indigenous socioeconomic disadvantage. In light of these findings, there is a need for further research within the domain. Furthermore, it is argued that such research should be situated within both the quantitative and qualitative paradigms. Whilst empirical research, as provided by this study, is useful in outlining the broad issue, the diversity of Indigenous circumstance suggests that such approaches also need to be diverse if a workable solution to Indigenous socioeconomic disadvantage is to be found. Lastly, it is argued that the current Closing the Gaps policy is in need of considerable review and reformulation. In this regard, it is suggested that the policy needs to move away from strictly economic approaches to the issue and to investigate the implementation of social and rights based agendas. However, if such a review and reformulation were to occur, it is suggested that there is a need for strong Indigenous perspectives and involvement in the process, ranging from research and policy to practice, as it is debateable whether researchers and

policy makers removed from the diversity of Indigenous circumstance should dictate a culture's future.

REFERENCES

Abbott, T. (2014). *Closing the Gap: Prime Minister's Report.* Canberra: Commonwealth of Australia.

ABS. (2001). *1272.0 - Australian standard classification of education (ASCED).* Canberra: Australian Bureau of Statistics.

ABS. (2005). *6302.0 - Average weekly earnings, industry, Australia, August 2005.* Canberra: Australian Bureau of Statistics.

ABS. (2007). *4705.0 - Population distribution, Aboriginal and Torres Strait Islander Australians, 2006.* Canberra: Australian Bureau of Statistics.

ABS. (2010a). *121.6 - ABS Australian standard geographical classification (ASGC).* Canberra: ABS.

ABS. (2010b). *4704.0 - The health and welfare of Australia's Aboriginal and Torres Strait Islander Peoples.* Canberra: Australian Bureau of Statistics.

ABS. (2011a). *1244.0.55.001 - Measures of socioeconomic status.* Canberra: Australian Bureau of Statistics.

ABS. (2011b). *2901.0 - Census Dictionary 2011.* Canberra: Australian Bureau of Statistics.

ABS. (2011c). *4704.0 - The health and welfare of Australia's Aboriginal and Torres Strait Islander Peoples.* Canberra: Australian Bureau of Statistics.

ABS. (2012a). *1301 - Year book Australia.* Canberra: Australian Bureau of Statistics.

ABS. (2012b). *2076.0 - Census of population and housing: Characteristics of Aboriginal and Torres Strait Islander Australians, 2011.* Canberra: Australian Bureau of Statistics.

ABS. (2013). *6302.0 - Average weekly earnings, May 2013.* Canberra: Australian Bureau of Statistics.

ABS. (2014). *6202.0 - Labour force, Australia, Sep 2014.* Canberra: Australian Bureau of Statistics.

Altman, J. (2000). *The economic status of Indigenous Australians.* Canberra: CAEPR.

Altman, J. (2001). *A report on competition and consumer issues in Maringrida.* Canberra: CAEPR.

Altman, J. (2002). *Generating finance for Indigenous development: Economic realities and innovative options.* Canberra: CAEPR.

Altman, J. (2009). *Beyond closing the gap: Valuing diversity in Indigenous Australia.* Canberra: Centre for Aboriginal Economic Policy Research.

Altman, J., & Johns, M. (2008). *Indigenous welfare reform in the Northern Territory and Cape York: A comparative analysis.* Canberra: CAPER.

Altman, J., Biddle, N., & Hunter, B. (2004). *Indigenous socioeconomic change 1971-2001: A historical perspective.* Canberra: CAEPR.

Altman, J., Biddle, N., & Hunter, B. (2008). *How realistic are the prospects for closing the gaps in socioeconomic outcomes for Indigenous Australians.* Canberra: CAEPR.

APA Task Force on Socioeconomic Status. (2006). *Report of the APA Task Force on Socioeconomic Status.* Washington, DC: American Psychological Association.

Arrow, K. (1973). Higher education as a filter. *Journal of public economics, 2*(3), 193-216.

Australian Institute of Health and Welfare. (2011). *The health and welfare of Australia's Aboriginal and Torres Strait Islander people.* Canberra: Australian Government.

Australian Public Service Commission. (2007). *Tackling wicked problems: A public policy perspective.* Canberra: Commonwealth of Australia.

Badcock, B. (1994). Snakes or ladders?: The housing market and wealth distribution in Australia. *International journal of urban and regional research, 18*(4), 609-627.

Baum, C. (2006). *An introduction to modern econometrics using stata.* Texas: Stata Press.

Becker, G. (1971). *The economics of discrimination.* Chicago: Chicago university press.

Becker, S. (1964). *Human Capital.* New York: Columbia University Press.

Becker, S. (2009). *Human capital: A theoretical and empirical analysis, with special reference to education.* Chicago: University of Chicago Press.

Biddle, N. (2007). *Does it pay to go to school? The benefits of and participation in education of Indigenous Australians (Doctoral dissertation).* Canberra: The Australian National University.

Biddle, N. (2009). *Location or qualifications? Revisiting Indigenous employment through an analysis of Census place-of-work data.* Canberra: CAEPR.

Biddle, N. (2011). *Income, work and Indigenous livelihoods.* Canberra: CAEPR.

Biddle, N. (2012). *CAEPR Indigenous population project: 2011 Census papers: Population and age structure.* Canberra: CAEPR.

Biddle, N. (2013a). *CAEPR Indigenous population project: 2011 Census papers: Education part 2: School education.* Canberra: CAEPR.

Biddle, N. (2013b). *CAEPR Indigenous population project: 2011 census papers: Paper 11, Income.* CANBERRA: CAEPR.

Biddle, N. (2013c). *Paper 13: Socioeconomic outcomes.* Canberra: CAEPR.

Biddle, N., & Yap, M. (2006). *Demographic and socioeconomic outcomes across the Indigenous Australian life-course.* Canberra: CAERP.

Blinder, A. (1973). Wage discrimination: reduced form and structural estimates. *Journal of Human Resources, 8*(4), 436-455.

Bloom, D., & Canning, D. (2003). The health and poverty of nations: From theory to practice. *Journal of Human Development, 4*(1), 47-71.

Booth, A., Leigh, L., & Varganova, E. (2010). *Does racial and ethnic discrimination vary across minority groups? Evidence from a field experiment.* Canberra: Institute for the Study of Labour.

Borland, J. (1999). The equal pay case - Thirty years on. *Australian Economic Review, 32*, 265-272.

Borland, J. & Hunter, B. (2000). Does crime affect employment status? The case of Indigenous Australians. *Economica, 67*(265), 123-144.

Bound, J., Schoenbaum, M., Stinebrickner, T., & Waidmann, T. (1999). The dynamic effects of health on the labour force transitions of older workers. *Labour Economics, 6*(2), 179-202.

Bourdieu, P. (1973). Cultural reproduction and social reproduction. In R. Brown (Ed.), *Knowledge, education and cultural change: Papers in sociology of education* (pp. 77-112). London: Tavistock.

Bourdieu, P. (1990). *In other words: Essays towards a reflexive sociology.* California: Stanford University Press.

Bourdieu, P. (1998). *Practical reason: On the theory of action.* Cambridge: Polity.

Bourdieu, P., & Wacquant, L. (1992). *An invitation to reflexive sociology.* Chicago: University of Chicago Press.

Brooks, C. (2014). *Introductory econometrics for finance.* Cambridge: Cambridge university press.

Burbank, V. (2006). From bedtime to on time: Why many Aboriginal people don't especially like participating in western institutions. *Anthropological Forum, 16*(1), 3-20.

Burns, C., Gibbon, P., Boak, R., Baudinette, S., & Dunbar, J. (2004). Food cost and availability in a rural setting in Australia. *Rural and remote health: the international electronic journal of rural and remote health research, education, practice and policy, 4*(311), 1-9.

Cai, L. (2010). The relationship between health and labour force participation: Evidence from a panel data simultaneous equation model. *Labour Economics, 17*(1), 77-90.

Cai, L., & Kalb, G. (2006). Health status and labour force participation: Evidence from Australia. *Health Economics, 15*, 241-261.

Campolieti, M. (2002). Disability and the labour force participation of older men in Canada. *Labour economics, 9*(3), 405-432.

Castles, I. (1991). *Census characteristics of Australia: 1991 Census of population and housing.* Canberra: Australian Bureau of Statistics.

Chesterman, J. (2005). *Civil rights: how Indigenous Australians won formal equality.* Brisbane: University of Queensland Press.

Considine, G., & Zappala, G. (2002). The influence of social and economic disadvantage in the academic performance of school students in Australia. *Journal of Sociology, 38*(2), 129-148.

Cotton, J. (1988). On the decomposition of wage differentials. *Review of economics and statistics, 70*(2), 236-243.

Council of Australian Governments [COAG] (2008). Canberra: Council of Australian Governments [COAG].

Cowlishaw, G. (2009). *The City's Outback.* Sydney: UNSW Press.

Creswell, J. (2003). *Research design: Qualitative, quantitative and mixed methods approaches.* California: Sage Publications.

CSDH. (2008). *Closing the gap in a generation: health equity through action on the social determinants of health. Final report of the Commission on Social Determinants of Health.* Geneva: World Health Organization.

D'Agostino, R., Belanger, A., & D'Agostino, Jr, R. (1990). A suggestion for using powerful and informative tests of normality. *American Statistician, 44*, 316-321.

Daly, A. (1991). *The employment of Aboriginal Australians in the labour market.* Canberra: CAEPR.

Daly, A. (1992). *The determinants of Aborignal employment income.* Canberra: CAEPR.

Daly, A. (1994). *The determinants of employment income for Indigenous Australians.* Canberra: CAEPR.

Dana, P. (1996). *Commercial enterprise ownership among Australian women: Economic control through entrepreneurship, (unpublished PhD thesis.* California: University of Southern California.

DEEWR. (2011). *Review of funding for schooling - Final report.* Canberra: Department of Education, Employment and Workplace Relations (DEEWR).

Devitt, J., Hall, G., & Komla, T. (2001). *An introduction to the social determinants of health in relation to the Northern Territory Indigenous population.* Casurina: Cooperative Research Centre for Aboriginal and Tropical Health.

Dunn, K. (2003). *Racism in Australia: Findings of a survey on racist attitudes and experiences of racism.* Sydney: University of Sydney.

Dunn, K., Forrest, J., Pe-Pua, R., Hynes, M., & Maeder-Han, K. (2009). Cities of race hatred? The spheres of racism and anti-racism in contemporary Australian cities. *Cosmopolitan Civil Societies Journal, 1*(1), 1-14.

Elder, T., Goddeeris, J., & Haider, S. (2010). Unexplained gaps and Oaxaca-Blinder decompositions. *Labour economics, 17*, 284-290.

Fair Work Ombudsman. (2014). *What age can I start work.* Retrieved from Fairwork.gov.au: http://www.fairwork.gov.au/find-help-for/young-workers-and-students/what-age-can-i-start-work

Foley, D. (2006). *Indigenous Australian entrepreneurs: Not all community organisations, not all in the outback.* Canberra: CAEPR.

Fortin, N., Lemieux, T., & Firpo, S. (2011). Decomposition methods in economics. *Handbook of labour economics, 4*, 1-102.

Fox, J. (2008). *Applied regression analysis and generalized linear models.* California: Sage Publications Inc.

Francis, M. (1996). Social Darwinism and the construction of institutionalised racism in Australia. *Journal of Australian Studies, 20*(50-51), 90-105.

Gale, W., & Scholz, J. (1994). Intergenerational transfers and the accumulation of wealth. *The Journal of Economic Perspectives, 8*(4), 145-160.

Gosse, M. (2002). *The gender pay gap in the New Zealand public service.* Wellington: New Zealand Government State Services Commission.

Gray, J. (2000). *The framing of truancy: A study of non-attendance policy as a form of social exclusion within Western Australia. Unpublished doctoral thesis.* Perth.

Gray, J., & Beresford, Q. (2008). A 'formidable challenge': Australia's quest for equity in Indigenous education. *Australian Journal of Education, 52*(2), 197-223.

Gray, M., & Hunter, B. (1999). *Determinants of employment and labour force participation: A cohort analysis of Indigenous and non-Indigenous Australians, 1986-96.* Canberra: CAEPR.

Gray, M., & Hunter, B. (2011). *Changes in Indigenous labour force status: Establishing employment as a social norm.* Canberra: CAEPR.

Gray, M., Hunter, B., & Schwab, R. (1998). *A critical survey of indigenous education outcomes, 1986-96.* Canberra: CAEPR.

Greene, W. (2003). *Econometric Analysis.* New Jersey: Prentice Hall.

Headey, B., Marks, G., & Wooden, M. (2004). *The structure and distribution of household wealth in Australia.* Melbourne: Melbourne Institute of Applied Economic and Social Research.

Heckman, J., Lochner, L., & Todd, P. (2003). Fifty years of Mincer earnings regressions. *IZA Discussion Paper Series*.

Henry, M., Knight, J., Lingard, R., & Taylor, S. (1988). *Understanding schooling: An introductory sociology of Australian education.* Sydney: Routledge.

Hill, K., Barker, B., & Vos, T. (2007). Excess Indigenous mortality: Are Indigenous Australians more severely disadvantaged than other Indigenous populations. *International Journal of Epidemiology*, 580-589.

Hirschberg, J., & Lye, J. (2001). The interpretation of multiple dummy variable coefficients: An application to industry effects in wage equations. *Applied Economics Letters, 8*, 701-707.

Houthakker, H. (1959). Education and income. *The Review of Economics and Statistics, 41*(1), 24-28.

Huber, P. (1967). The behavior of maximum likelihood estimates under nonstandard conditions. *Proceedings of the fifth Berkeley symposium on mathematical statistics and probability. 1*, pp. 221-233. Berkeley: University of California Press.

Hughes, H., Hughes, M., & Hudson, S. (2010). *Private housing on Indigenous lands.* Sydney: The Centre for Independent Studies.

Humpage, L. (2005). Tackling Indigenous disadvantage in the twenty-first century: "Social inclusion" and the Maori in New Zealand. In R. Eversole, J. McNeish, & A. Cimadamore (Eds.), *Indigenous Peoples and Poverty: An International Perspective* (pp. 158-184). London: Zed Books.

Hunter, B. (1997). The determinants of Indigenous employment outcomes: The importance of education and training. *Australian Bulletin of Labour, 23*(3), 177-192.

Hunter, B. (1999). *Three nations, not one: Indigenous and other Australian poverty.* Canberra: CAEPR.

Hunter, B. (2001a). *Indigenous Australian arrest rates: Economic and social factors underlying the incidence and number of arrests.* Canberra: CAEPR.

Hunter, B. (2001b). *Indigenous Australians in the contemporary labour market.* Canberra: CAEPR.

Hunter, B. (2002). *The rise of the CDEP scheme and changing factors underlying Indigenous employment.* Canberra: CAEPR.

Hunter, B. (2003). The role of discrimination and the exclusion of Indigenous people from the labour market. *Australian Social Policy Conference.* New South Wales: University of New South Wales.

Hunter, B. (2004). *Taming the social capital hydra? Indigenous poverty, social capital theory and measurement.* Canberra: CAEPER.

Hunter, B. (2007). Cumulative causation and the productivity commission's framework for overcoming Indigenous disadvantage. *Australian Journal of Lab our Economics, 10*(3), 185 - 202.

Hunter, B. (2009). Indigenous social exclusion: Insights and challenges for the concept of social inclusion. *Family Matters, 82*, 52-61.

Hunter, B. (2012). *Selected issues in closing the gaps between Indigenous and other Australians 2001-11.* Canberra: CAEPR.

Hunter, B., & Taylor, J. (1996). *Indigenous labour force status to the year 2000: Estimated impacts of recent budget cuts.* Canberra: CAEPR.

Hunter, B., & Yap, M. (2014). *Income, work and education: Insights for closing the gap in urban Australia.* Canberra: CAEPR.

Jackson, N., & Felmingham, B. (2004). The demographic gift in Australia. *Agenda, 11*(1), 21-37.

James, R. (2002). *Socioeconomic background and higher education participation: An analysis of school students' aspirations and expectations.* Canberra: Department of Education, Science and Training (Evaluation and Investigations Program).

Jann, B. (2008). The Blinder-Oaxaca decomposition for linear regression models. *The Stata Journal, 8*(4), 453-459.

Juhn, C., Murphy, K., & Pierce, B. (1993). Wage inequality and the rise in returns to skill. *The Journal of Political Economy, 101*(3), 410-442.

Kalb, G., Le, T., Hunter, B., & Leung, F. (2012). *Decomposing differences in labour force status between Indigenous and non-Indigenous Australians.* Bonn: IZA.

Kaufman, P. (2003). Diversity and Indigenous policy outcomes: Comparisons between four nations. *International Journal of Diversity in Organizations, Communities and Nations, 3*, 159-180.

Kawaguchi, D. (2010). *Applying the Mincer wage equation to Japanese data.* Tokyo: Research Institute of Economy, Trade and Industry, IAA.

Kee, H. (2006). Glass ceiling or sticky floor? Exploring the Australian gender pay gap. *The Economic Record, 82*(259), 408-427.

Khoo, S., & Ainley, J. (2005). *Attitudes, intentions and participation: Longitudenal survey of Australian youth.* 2005: Australian Council for Educational Research.

Kincheloe, J., & Steinberg, S. (2007). *Cutting class: Socioeconomic status and education.* Plymouth: Rowman & Littlefield Publishers, Inc.

Knibbs, G. (1918). *The private wealth of Australia and its growth as ascertained by various methods together with a report of the war census of 1915.* Melbourne: Commonwealth Bureau of Census and Statistics.

Kypri, K., Samaranayaka, A., Connor, J., Langley, J., & Maclennan, B. (2011). Non-response bias in a web-based health behaviour survey of New Zealand tertiary students. *Preventive Medicine, 53*, 274-277.

Landrigan, T., & Pollard, C. (2010). *Food access and cost survey (FACS): Western Australia.* Perth: Government of Western Australia.

Langley, P., Muller-Schwefe, G., Nicolaou, A., Liedgens, H., Pergolizzi, J., & Varrassi, G. (2010). The impact of pain on labour force participation, absenteeism and presenteeism in the European Union. *Journal of Medical Economics, 13*(4), 662-672.

Leonard, D., McDermott, R., Odea, K., Rowley, K., Pensio, P., Sambo, E., & Best, J. (2002). Obesity, diabetes and associated cardiovascular risk factors among Torres Strait Islander people. *Australian and New Zealand journal of public health, 26*(2), 144-149.

Maddala, G., & Lahiri, K. (1992). *Introduction to econometrics.* New York: Macmillan.

Markus, A. (2013). *Mapping social cohesion: The Scanlon Foundation surveys national report 2013.* Victoria: The Scanlon Foundation.

Marmot, M. (2011). Social determinants and the health of Indigenous Australians. *Aboriginal and Islander Health Worker Journal, 35*(3), 21-22.

McDonnell, S., & Martin, D. (2002). *Indigenous community stores in the 'frontier economy': Some competition and consumer issues.* Canberra: CAEPR.

Meer, J., Miller, D., & Rosen, H. (2003). Exploring the health-wealth nexus. *Journal of Health Economics, 22*, 713-730.

Meulman, M., Groenen, P., & Kooij, A. (2007). Nonlinear principal components analysis: Introduction and application. *Psychological Methods, 12*(3), 336-358.

Michaud, P., & Van Soest, A. (2008). Health and wealth of elderly couples: Causality tests using dynamic panel data models. *Journal of Health Economics, 27*(5), 1312-1325.

Miller, P. (2005). The role of gender among low-paid and high-paid workers. *The Australian Economic Review, 38*(4), 405-417.

Mills, C. (2008a). Opportunity and resignation within marginalised students: towards a theorisation of the reproductive and transformative habitus. *Critical studies in Education, 49*(2), 99-111.

Mills, C. (2008b). Reproduction and transformation of inequalities in schooling: The transformative potential of the theoretical constructs of Bourdieu. *British Journal of Sociology of Education*, 79-89.

Mills, C., & Gale, T. (2011). Re-asserting the place of context in explaining student under-achievement. *British Journal of Sociology of Education, 32*(2), 239-256.

Mincer, J. (1958). Investment in human capital and personal income distribution. *Journal of Political Economy, 66*(4), 281-302.

Mincer, J. (1974). *Schooling, Experience and Earnings.* New York: National Bureau of Economic Research.

Ministerial Council for Education, Early Childhood Development and Youth Affairs (MCEECDYA). (2010). *Aboriginal and Torres Strait Islander Education Action Plan 2010-2014.* Melbourne: Ministerial Council for Education, Early Childhood Development and Youth Affairs (MCEECDYA).

Myers, R. (1990). *Classical and modern regression with applications.* California: Duxbury Press.

Neumark, D. (1988). Employers' discriminatory behaviour and the estimation of wage discrimination. *Journal of human resources, 23*(3), 279-295.

Northwood, K., Rawnsley, T., & Chen, L. (2002). *Experimental estimates of the distribution of household wealth, Australia, 1994-2000.* Canberra: Australian Bureau of Statistics.

Oaxaca, R. (1973). Male-female wage differentials in urban labour markets. *International Economics Review, 14*(3), 693-709.

Oaxaca, R., & Ransom, M. (1994). On discrimination and the decomposition of wage differentials. *Journal of Econometrics, 61*(1), 5-21.

O'Dwyer, L. (2001). The impact of housing inheritance on the distribution of wealth in Australia. *Australian Journal of Political Science, 36*(1), 83-100.

Oehlert, G. (1992). A note on the delta method. *The American Statistician, 46*(1), 27-29.

Pholi, K. (2009). Is "Closing the Gap" a useful approach to improving the health and wellbeing of Indigenous Australians? *Australian Review of Public Affairs Journal, 9*(2), 1-13.

Preston, A. (2000). Female earnings in Australia: an analysis of 1991 Census data. *Australian Bulletin of Labour, 26*(1), 38-58.

Reimers, C. (1983). Labour market discrimination against Hispanic and Black men. *The Review of Economics and Statistics, 65*, 570-579.

Rudd, K. (2008). Apology to Australia's Indigenous Peoples. Canberra.

Rupert, P., Schweitzer, M., Severance-Lossin, E., & Turner, E. (1996). Earnings, education and experience. *Economic Review, Q IV*, 2-12.

Savvas, A., Boulton, C., & Jepsen, E. (2011). *Influences on Indigenous labour market outcomes.* Melbourne: Australian Government Productivity Commission.

Smith, J. (2003). Trends and projections in income replacement during retirement. *Journal of Labour Economics, 21*(4), 755-781.

Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics, 87*(3), 355-374.

Steering Committee for the Review of Government Service Provision. (2011). *Overcoming Indigenous disadvantage: Key indicators 2011.* Melbourne: Productivity Commission.

Stephens, B. (2010). The determinants of labour force status among Indigenous Australians. *Australian Journal of Labour Economics*, 287-312.

Stiglitz, J. (1975). The theory of 'screening': Education and the distribution of income. *The American Economic Review, 65*(3), 283-300.

Taylor, J. (2008). Indigenous peoples and indicators of well-being: Australian perspectives on United Nations global frameworks. *Social Indicators Research, 87*, 111-126.

Taylor, J., & Scambary, B. (2005). *Indigenous people and the Pilbara mining boom: A baseline for regional participation.* Canberra: CAEPR.

University of Adelaide. (2014, July 23). *ARIA (Accessibility/remoteness index of Australia)*. Retrieved from Australian Population and Migration Research Centre: http://www.adelaide.edu.au/apmrc/research/projects/category/about_aria.html

Vickery, J., Faulkhead, S., Adams, K., & Clarke, A. (2004). *Indigenous insights into oral history, social determinants of health and decolonisation.* (I. Anderson, F. Baum, & M. Bentley, Eds.) Casuarina: Cooperative Research Centre for Aboriginal Health.

Viscusi, W., & Aldy, J. (2003). The value of statistical life: A critical review of market estimates throughout the world. *Journal of Risk and Uncertainty*, 5-76.

Walter, M. (2007). Aboriginality, poverty and health: Exploring the connections. In I. Anderson, F. Baum, & M. Bentley (Eds.). Casuarina: Cooperative Research Centre for Aboriginal Health.

Ward, S., & Altman, J. (2002). *Competition and consumer issues for Indigenous Australians.* Canberra: CAEPR.

Watson, I. (2010). Decomposing the gender pay gap in the Australian managerial labour market. *Australian Labour Economics, 13*(1), 48-79.

Weesie, J. (1999). Seemingly unrelated estimation and the cluster-adjusted sandwich estimator. *Stata Technical Bulletin, 52*, 34-47.

Weiss, N., & Hassett, M. (1991). *Introductory statistics* (3rd Edition ed.). Reading: Addison-Wesley Publishing Company.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica, 48*(4), 817-838.

Wilkins, R. (2004). The effects of disability on labour fource status in Australia. *Australian Economic Review, 37*(4), 359-382.

Woolridge, J. (2013). *Introductory econometrics: A modern approach.* Ohio: Cengage learning.

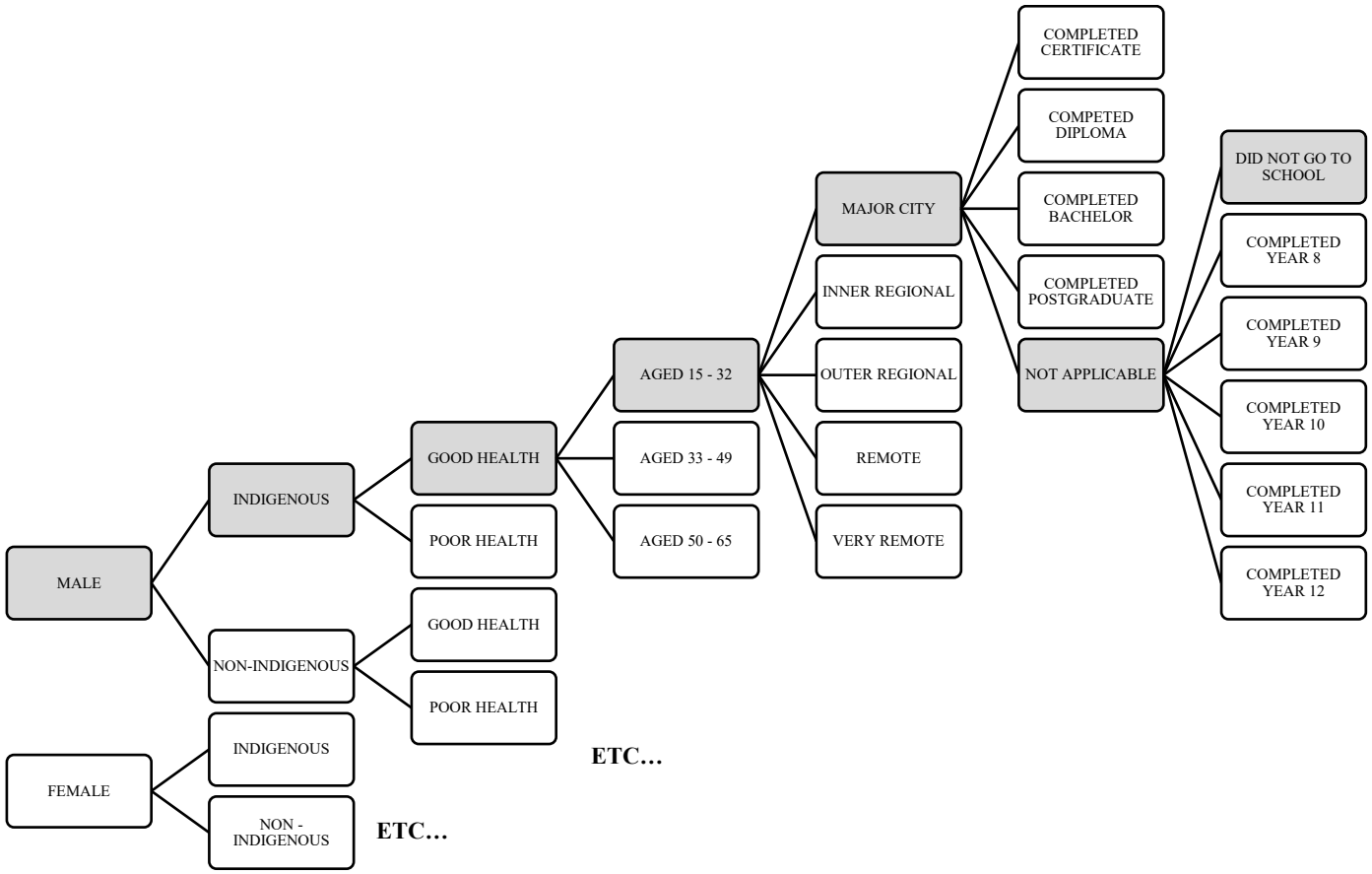
Wu, S. (2003). The effects of health events on the economic status of married couples. *The Journal of Human Resources, XXXVIII*(1), 219-230.

Xu, J., & Long, S. (2005). Confidence intervals for predicted outcomes in regression models for categorical outcomes. *The STATA journal, 5*(4), 537-559.

Zhao, Y., You, J., Guthridge, S., & Lee, A. (2011). A multilevel analysis of the relationship between neighbourhood poverty and public hospital utilization: Is the high Indigenous morbidity avoidable? *BMC Public Health, 11*(737), 1-8.

APPENDIX A

Demonstration of the aggregation process used to compound classifications.



Note. This specific example shows the process used to group individuals who were male, Indigenous, in good health, between 13 and 32, lived in a major city and had no education or qualifications.

APPENDIX B

CENSUS QUESTION – INCOME

33 What is the *total* of all wages/salaries, government benefits, pensions, allowances and other income the person *usually* receives?

- MARK **ONE** BOX ONLY.
- **Do *not* deduct:** tax, superannuation contributions, health insurance, amounts salary sacrificed, or any other automatic deductions.
- Include the following:

Pensions/Allowances
family tax benefit
parenting payment
unemployment benefits
Newstart allowance
rent assistance
pensions
student allowances
maintenance (child support)
workers' compensation
any other pensions/allowances

Other income
interest
dividends
rents (exclude expenses of operation)
business/farm income (exclude expenses of operation)
income from superannuation
any other income

Wages/salaries
regular overtime
commissions and bonuses

- Information from this question provides an indication of living standards in different areas.

ⓘ Visit **www.abs.gov.au/censushelp** for more information.

○ $2,000 or more per week ($104,000 or more per year)	○ $2,000 or more per week ($104,000 or more per year)
○ $1,500 - $1,999 per week ($78,000 - $103,999 per year)	○ $1,500 - $1,999 per week ($78,000 - $103,999 per year)
○ $1,250 - $1,499 per week ($65,000 - $77,999 per year)	○ $1,250 - $1,499 per week ($65,000 - $77,999 per year)
○ $1,000 - $1,249 per week ($52,000 - $64,999 per year)	○ $1,000 - $1,249 per week ($52,000 - $64,999 per year)
○ $800 - $999 per week ($41,600 - $51,999 per year)	○ $800 - $999 per week ($41,600 - $51,999 per year)
○ $600 - $799 per week ($31,200 - $41,599 per year)	○ $600 - $799 per week ($31,200 - $41,599 per year)
○ $400 - $599 per week ($20,800 - $31,199 per year)	○ $400 - $599 per week ($20,800 - $31,199 per year)
○ $300 - $399 per week ($15,600 - $20,799 per year)	○ $300 - $399 per week ($15,600 - $20,799 per year)
○ $200 - $299 per week ($10,400 - $15,599 per year)	○ $200 - $299 per week ($10,400 - $15,599 per year)
○ $1 - $199 per week ($1 - $10,399 per year)	○ $1 - $199 per week ($1 - $10,399 per year)
○ Nil income	○ Nil income
○ Negative income	○ Negative income

APPENDIX C

CENSUS QUESTION – PRIMARY AND SECONDARY EDUCATION

27 **What is the highest year of primary or secondary school the person has *completed*?** • Mark one box only. • For persons who returned after a break to complete their schooling, mark the highest year completed when they last left. ⓘ Visit **www.abs.gov.au/censushelp** for more information about year equivalents	○ Year 12 or equivalent ○ Year 11 or equivalent ○ Year 10 or equivalent ○ Year 9 or equivalent ○ Year 8 or below ○ Did not go to school	○ Year 12 or equivalent ○ Year 11 or equivalent ○ Year 10 or equivalent ○ Year 9 or equivalent ○ Year 8 or below ○ Did not go to school

APPENDIX D

CENSUS QUESTIONS – LEVEL OF HIGHEST QUALIFICATION

28 **Has the person *completed* any educational qualification (including a trade certificate)?** • Mark one box only. ⓘ Visit **www.abs.gov.au/censushelp** for more information on the treatment of AQF or vocational certificates.	○ No ▶ **Go to 32** ○ No, still studying for first qualification ▶ **Go to 32** ○ Yes, trade certificate/ apprenticeship ○ Yes, other qualification	○ No ▶ **Go to 32** ○ No, still studying for first qualification ▶ **Go to 32** ○ Yes, trade certificate/ apprenticeship ○ Yes, other qualification
29 **What is the level of the *highest* qualification the person has *completed*?** • For example: TRADE CERTIFICATE, BACHELOR DEGREE, ASSOCIATE DIPLOMA, CERTIFICATE II, ADVANCED DIPLOMA.	Level of qualification	Level of qualification

APPENDIX E

CENSUS QUESTIONS – LEVEL OF HIGHEST QUALIFICATION

Postgraduate

- Higher Doctorate
- Doctorate by Research
- Doctorate by Coursework
- Professional Specialist Qualification at Doctoral Degree Level
- Statement of Attainment at Doctoral Degree Level
- Bridging and Enabling Course at Doctoral Degree Level
- Master Degree by Research
- Master Degree by Coursework
- Professional Specialist Qualification at Master Degree Level
- Statement of Attainment at Master Degree Level
- Bridging and Enabling Course at Master Degree Level
- Graduate Diploma
- Graduate Qualifying or Preliminary
- Professional Specialist Qualification at Graduate Diploma Level
- Statement of Attainment at Graduate Diploma Level
- Bridging and Enabling Course at Graduate Diploma Level
- Graduate Certificate
- Professional Specialist Qualification at Graduate Certificate Level
- Statement of Attainment at Graduate Certificate Level
- Bridging and Enabling Course at Graduate Certificate Level

Bachelor

- Bachelor (Honours) Degree
- Bachelor (Pass) Degree
- Statement of Attainment at Bachelor Degree Level
- Bridging and Enabling Course at Bachelor Degree Level

Diploma

- Advanced Diploma
- Statement of Attainment at Advanced Diploma Level
- Associate Degree
- Statement of Attainment at Associate Degree Level
- Bridging and Enabling Course at Advanced Diploma and Associate Degree Level
- Diploma
- Statement of Attainment at Diploma Level
- Bridging and Enabling Course at Diploma Level

Certificate

- Certificate IV
- Statement of Attainment at Certificate IV Level
- Bridging and Enabling Course at Certificate IV Level
- Certificate III
- Statement of Attainment at Certificate III Level
- Bridging and Enabling Course at Certificate III Level
- Certificate II
- Statement of Attainment at Certificate II Level
- Bridging and Enabling Course at Certificate II Level
- Certificate I
- Statement of Attainment at Certificate I Level

APPENDIX F

CENSUS QUESTION – LOCATION OF RESIDENCE

8 Where does the person usually live?

- For persons who usually live in another country and who are visiting Australia for less than one year, mark 'Other country'.
- For other persons, 'usually live' means that address at which the person has lived or intends to live for a total of six months or more in 2011.
- For persons who now have no usual address, write 'NONE' in the 'Suburb/Locality' box.
- For boarders at boarding school, write the address of the boarding school or college.
- Remember to mark box like this: ▬

( ) The address shown on the front of this form	( ) The address shown on the front of this form
( ) Elsewhere in Australia – please specify address	( ) Elsewhere in Australia – please specify address
Apartment/Flat/Unit number (if any)	Apartment/Flat/Unit number (if any)
Street number	Street number
Street name	Street name
Suburb/Locality	Suburb/Locality
State/Territory Postcode	State/Territory Postcode
( ) **Other country**	( ) **Other country**

APPENDIX G

CENSUS QUESTIONS – HEALTH STATUS

Identification question.

20 **Does the person ever need someone to help with, or be with them for, self care activities?** • For example: doing everyday activities such as eating, showering, dressing or toileting ⓘ Visit **www.abs.gov.au/censushelp** for more information.	○ Yes, always ○ Yes, sometimes ○ No	○ Yes, always ○ Yes, sometimes ○ No
21 **Does the person ever need someone to help with, or be with them for, body movement activities?** • For example: getting out of bed, moving around at home or at places away from home.	○ Yes, always ○ Yes, sometimes ○ No	○ Yes, always ○ Yes, sometimes ○ No
22 **Does the person ever need someone to help with, or be with them for, communication activities?** • For example: understanding, or being understood by, others.	○ Yes, always ○ Yes, sometimes ○ No	○ Yes, always ○ Yes, sometimes ○ No

Classifying Question

23 **What are the reasons for the need for assistance or supervision shown in questions 20, 21 and 22?** • Mark all applicable reasons. • Remember to mark boxes like this: ■	○ No need for help or supervision ○ Short-term health condition (lasting less than six months) ○ Long-term health condition (lasting six months or more) ○ Disability (lasting six months or more) ○ Old or young age ○ Difficulty with English language ○ Other cause	○ No need for help or supervision ○ Short-term health condition (lasting less than six months) ○ Long-term health condition (lasting six months or more) ○ Disability (lasting six months or more) ○ Old or young age ○ Difficulty with English language ○ Other cause