

A REVIEW OF MEASUREMENT AND CAUSAL ANALYSIS OF INDIGENOUS POVERTY AND DISADVANTAGE IN REMOTE AUSTRALIA

Yiheyis T. Maru and
Vanessa H. Chewings

May 2011
ISSN: 1834-5638

Socio-Economics and the Environment in Discussion
CSIRO Working Paper Series 2011-02



Further information: Bev Rose - bev.rose@csiro.au

CSIRO Ecosystem Sciences
GPO Box 284, Canberra ACT 2601
Australia
www.csiro.au

© CSIRO 2007. All rights reserved.

This work is copyright. Apart from any use as permitted under the Copyright Act 1968 (Cwlth), no part may be reproduced by any process without prior written permission from the Commonwealth.

A Review of Measurement and Causal Analysis of Indigenous Poverty and Disadvantage in Remote Australia

Yiheyis T. Maru and Vanessa H. Chewings¹

ABSTRACT

This paper is a review of current assessment frameworks, time series features and an analysis of the causes of Indigenous poverty and disadvantage. Current frameworks used to assess the chronic nature of Indigenous poverty and disadvantage are mainly descriptive in nature and inadequate in terms of considering Indigenous perspectives and concerns about well-being improvement. They are also backward looking and not indicative of causal structures. Existing national longitudinal data sets have either limited coverage or inadequate Indigenous sample sizes and cannot be used to make any meaningful multidimensional analysis of chronic Indigenous poverty and disadvantage. Explanations as to why disadvantage and poverty persist are fragmentary and often polarized, including either an Indigenous culture of dependency or government policy failures. The persistence of Indigenous disadvantage and poverty is evident when using even inadequate measures such as income. The persistence of poverty in spite of several efforts seems to indicate traps – different sets of complex feedback loops that create vicious circles and make escaping from poverty a non-linear affair. This paper suggests adapting and then adopting a broader inequality and poverty assessment framework such as a capability approach by Amartya Sen. It also calls for research which would apply integrated systems approaches and modelling to explore the nature of poverty and inequality traps among Indigenous people and to provide comprehensive evidence base for effective solutions.

Keywords: poverty traps, horizontal inequality, Aboriginal, capability approach, systems and modelling approaches

¹ CSIRO Ecosystem Sciences, PO Box 2111, Alice Springs NT 0871, Australia

INTRODUCTION

Australia is one of the most highly developed countries in the world. Out of 182 countries, the United Nations Human Development Report ranked Australia as having the second highest score in the Human Development Index (HDI)¹ (UNDP, 2009). Economically, Australia grew for 17 consecutive years before the global financial crisis (World Fact Book, 2009). Even during the global financial crisis in 2008-2009, the change in the Australian GDP was positive (a 1.3% change over the previous year). This contrasts with negative GDP changes in the 7 major OECD countries.

Despite Australia's high economic performance and development, Australian Indigenous people continue to suffer from poor socio-economic conditions. For example, when Australia, at 0.968 HDI, was ranked second out of 182 countries (UNDP, 2009), a separate HDI exercise by Yap et al. (2010) estimated a HDI score of 0.737 for Australia's Indigenous population. This Indigenous HDI score equates to a country rank of 105th, which is slightly higher than the Syrian Arab Republic and the Occupied Palestinian Territories, but slightly lower than Fiji and Sri Lanka. These levels of disparity between Indigenous and non-Indigenous Australia are not for lack of government intervention.

In this paper we examine frameworks, trends, meaning, as well as causes of poverty and disadvantage among Indigenous Australians. The objective is to identify whether there are gaps in measurement and suggest improved assessment frameworks and analytic approaches to the pervasive and persistent deprivation in

¹ The HDI index is a composite measure of a country's achievement in three essential dimensions of human development: health, knowledge, and a decent standard of living.

Indigenous well-being and socio-economic disparity between Indigenous and non-Indigenous Australians.

The paper has three parts. The first part is a review which has three sections. The first section explores the trend in measures of Indigenous disadvantage and implications for causal analysis. The second section reviews the meaning and measures of Indigenous poverty, identifies gaps in chronic poverty assessment and suggests areas which could be improved. Comments are also given on the causal implications of the nature and trends in poverty. The third section reviews causal factors and explanations given about Indigenous poverty and disadvantage, which are mainly descriptive in nature. In the second part of this paper we discuss salient themes that emerge from the reviews in the preceding sections. The last part makes concluding remarks about data and framework needs which could lead to improved measurements. As there are multiple factors and interactions which cause poverty, but a lack of an adequate integrated explanation, we also suggest a research agenda that explores the nature and extent of poverty traps and disadvantage using systems and modelling approaches.

REVIEW

Trends in Inequality and Indigenous Disadvantage

Over the last two decades there have been a number of attempts to measure Indigenous disadvantage. Some of these Indigenous disadvantage/advantage measurements were internal in the sense that they were comparisons between Indigenous statistical regions. Others are frameworks and measurements that compare Indigenous disadvantage with average advantage figures for all Australia or that of non-Indigenous Australians.

External Comparisons

The HDI and Overcoming Indigenous Disadvantage (OID) are two important frameworks that are used to assess and compare disadvantage/advantage in Indigenous Australians with other Australians and Indigenous peoples in other countries. As mentioned in the Introduction Cooke et al. (2007) estimated Indigenous HDI using the Australian census data gathered by the Australian Bureau of Statistics (ABS) between 1991 and 2001. Over this study period, they reported a declining HDI score for Indigenous Australians while that of the general population improved, widening the gap in human development (see Table 1). This study also showed that Indigenous Australians ranked substantially lower than other comparable Indigenous populations in Canada, the USA and New Zealand.

TABLE 1 ABOUT HERE

Another study, Yap et al. (2010), calculated HDI scores shown in Table 1 using the 2001 and 2006 ABS data. The HDI estimates are consistently low for Indigenous Australians. The non-Indigenous HDI scores have consistently increased while the Indigenous HDI scores fluctuated. The lowest score was in 2001 and this was followed by a substantial increase by 2006. Strict comparisons may not be possible because Cook et al. (2007) and Yap et al. (2010) used different proxies to estimate HDI, which may contribute to the increase in HDI estimates. Even at shorter life expectancy differences, the HDI gap estimate by Yap et al. is substantially higher than previous years indicating a worsening Indigenous and non-Indigenous gap. The HDI gap is even higher for remote Indigenous Australians, with levels similar to the least developed countries. For instance the HDI score of 0.53 among the Northern Territory Indigenous population equates to a rank of 145, which is equivalent to Nepal and slightly above Sudan and Bangladesh (Yap et al., 2010).

The OID reports (SCRGSP, 2009) are another important source of information. It has indicators that provide invaluable information on the states and trends of Indigenous well-being compared with that of non-Indigenous Australians. As shown in Table 2, the disparity is across almost all well-being indicators reported (SCRGSP, 2009). These persistent disparities exist against a backdrop of a decade of sustained economic prosperity in Australia and efforts by governments to close the gap between Indigenous and non-Indigenous Australians (SCRGSP, 2009; Altman et al., 2009).

What is sobering is that these disparities are set to continue and in some cases to increase in the future. Altman et al. (2009) predict that with the exception of some education and private sector employment outcomes, where convergence is likely within a short time period, it may take more than 100 years before the gap is closed. In fact divergence is predicted in some indicators such as higher degree qualification, unemployment rate, labour force participation rate, employment to population ratio, median weekly personal and household incomes, household size and proportion of population who own or purchase homes.

TABLE 2 ABOUT HERE

Internal Comparison

A number of studies have ranked Indigenous regions in Australia in terms of socio-economic disadvantage, and these ranks appear consistent over decades. In the early 1990's, Tesfaghiorghis (1991) constructed an index of Indigenous socio-economic differences among the Aboriginal and Torres Strait Islander Commission (ATSIC) regions. The index was an unweighted sum of scores of three variables: education, employment and income, and was derived from the 1986 Census tabulations by ATSIC regions, prepared by the ABS. Tesfaghiorghis noted a

significant range of index scores among the 60 ATSIC regions². High index scores of Aboriginal socio-economic status were clustered in relatively small regions in south-eastern Australia while the socio-economic status was low for remote Australian regions.

Using census and other data collected in the 1990's, indices similar to that by Tesfaghiorgis were developed by different authors to assess regional differences in Aboriginal socio-economic status (Gray and Auld, 2000; ABS, 2000). Gray and Auld (2000) constructed an index that combined regional scores of four variables: family income, housing, educational attainment and the level of non-employment. They found stability in the 1991 and 1996 census based index ranking of the 36 ATSIC regions.

The ABS (2000) also developed nine experimental indices as background information to the 2000 *Indigenous Funding Inquiry* by the Commonwealth Grants Commission. These indices include a general index based mainly on Census data, an economic index, housing and infrastructure indices, an educational index, unemployment and income index and health indices. The study found that the pattern of disadvantage was stable with the different data sets and additional indicators. In Table 2 we have included the Experimental General Index which used additional indicators of health. This index is based on a melded 1996 census, 1994 National Aboriginal and Torres Strait Islander Survey (NATSIS) and a national perinatal dataset.

TABLE 3 ABOUT HERE

² Prior to 1993 there were 60 ATSIC regions. The ABS used 36 ATSIC regions to disseminate Indigenous data 1991-2001. Current boundaries are 37 Indigenous Regions (IREG) using Australian Indigenous Geographical Classification (AIGC).

Recently, Biddle et al. (2009) constructed an index using the 2001 and 2006 ABS census data. Their index combined nine variables related to employment, education, income, and housing. Across all nine input variables the large capital city regions were the least disadvantaged. Biddle et al. noted a remarkable degree of stability within index score ranks of regions particularly among the large capital city regions which were the least disadvantaged, and the remote regions such as Cape York, Port Augusta, Kununurra, Derby and most regions in the Northern Territory which were the most disadvantaged.

Whereas the studies shown in Table 3 are based on 36 ATSI Regions, Biddle et al. (2009) used 37 Indigenous Region boundaries from the AIGC classification. Although the Indigenous Regions are based on the previously used ATSI regions, many boundaries have changed so results are shown separately in Table 4. The authors noted a high degree of continuity between 2001 and 2006 in terms of the Indigenous socio-economic rankings of areas. With a correlation of 0.942 across the two years, those that ranked high in 2001 also tended to rank high in 2006. Townsville and Alice Springs was among the few regions that changed rank between 2001 and 2006. Although both regions had high rates of net inward migration over the period the study suggested that internal Indigenous migrants to Townsville had better outcomes, on average, than internal Indigenous migrants to Alice Springs.

There has been little change on regional level distribution of socio-economic status since such indices were first calculated in 1991 (Biddle et al., 2009). Biddle et al. noted that then, as now, capital city regions ranked relatively well, whereas remote regions, especially in the Northern Territory, ranked relatively poorly.

Regional Australia fell somewhere in between. If anything, the remote/non-remote disparity was more pronounced using this most recent Census.

TABLE 4 ABOUT HERE

Strengths and Weaknesses of Measurement Frameworks

Methodologically, socio-economic indices used to measure regional differences have limitations. These include averaging of socio-economic indicators over an area which may not be homogenous, equal weighting assigned to indicators that make up the indices and selecting data biased by availability and mainstream urban socio-economic values.

Notwithstanding these limitations, the measurements reported by the authors over five census collection periods and presented in Tables 3 and 4 consistently show high socio-economic disadvantage for remote regions when compared with the urban regions.

The HDI and the OID frameworks, which are used to compare Indigenous disadvantage relative to non-Indigenous Australians, also have strengths and weaknesses. The HDI was developed when it became apparent that measuring development and socio-economic well-being of countries using single indicators, commonly GDP or income per capita, was inadequate. In 1990 the first human development report with HDI values for many countries was issued. Subsequent reports emphasised different significant global issues related to human development such as water, migration and climate change.

While the HDI is a significant improvement from previous GDP or income based reporting in terms of providing relevant information on the socio-economic development of countries, it still faces challenges inherent to indices. These

challenges relate to assumptions of homogeneity, indicator selection and assigning weights. There can be significant variation in the socio-economic conditions within the unit considered which may be masked by the assumption of homogeneity, for instance, the HDI rank of Australia compared with its Indigenous people noted earlier.

The HDI gives equal weights to indicators of three basic aspects of human development: education, health and income. Equal weighting is debatable. The index doesn't prevent different weighting, although reaching a global consensus on different weights may be difficult. Indigenous Australians would almost certainly weight these three aspects differently. Income and money are generally less valued by Indigenous Australians than by non-Indigenous Australians. For example, for the Mullunbarra-Yidinji clan of the Wet Tropics, non-market benefits derived from cultural and provisioning ecosystem services contribute far more significantly to their well-being than material goods (Sangha et al., in press). Furthermore, Indigenous people tend to share their income and use it to affirm family and clan ties more than is seen in mainstream society (Altman, 2000).

The selected indicators of HDI reflect both problems with data availability and an urban and western bias in the definition of development and well-being. In a bid to make the index simple and inclusive, indicators are based on datasets that are widely available, particularly in developing countries. Although a substantial improvement over using GDP as a primary measure of development, the data and indicators involved in HDI still reflect mainstream views of human development and well-being. Writers of the Arctic Human Development Report (Young and Einarsson, 2004: 16) questioned the relevance of the HDI to Indigenous people. They raised concerns directed at the three components of the HDI. First, for many Arctic

residents, their well-being is found in a way of life that includes traditional activities such as hunting and gathering that provide subsistence, sustain culture and knowledge but that 'minimizes the need for the sorts of material goods and services included in calculations of GDP per capita'. Second, many Arctic residents also hold highly sophisticated knowledge and skills relevant to their well-being, but often these do not translate to high scores of adult literacy and gross school enrolments. Third, even the weight given to life expectancy can be disputed given that a shorter life deeply rooted in traditional values and cultural practices may be better than a longer life spent trying to adjust to the loss of a highly-valued lifestyle.

The OID has its origins in a decision by the Council of Australian Governments (COAG) in 2002 to regularly report against key indicators of Indigenous disadvantage (Bank, 2007), and was part of COAG's response to the official decade of reconciliation with Indigenous Australians (COAG, 2004). This report formed a critical part of monitoring of the COAG's commitment to practical reconciliation through the pursuit of statistical equality between the standard of living of Indigenous and other Australians in the areas of health, housing, education and employment (Taylor, 2008).

Banks (2007) notes that the OID report has a two tier framework with causally linked components. The first tier contains shared vision or priority outcomes on what life should be like for Indigenous people as well as 12 headline indicators that measure whether they are being realised. The three priority outcomes are:

1. Safe, healthy and supportive environments with strong communities and cultural identity;

2. Positive child development and prevention of violence, crime and self-harm, and
3. Improved wealth creation and economic sustainability for individuals, families and communities.

The second tier, which Bank noted was innovative when compared to other reporting systems elsewhere, contains 'strategic change areas' - causal factors linked to the priority outcomes that hold the key to disadvantage/advantage. These strategic change areas are:

1. Early child development and growth (prenatal to age 3)
2. Early school engagement and performance (pre school to year 3)
3. Positive childhood and transition to adulthood
4. Substance use and misuse
5. Functional and resilient families and communities
6. Effective environmental health systems
7. Economic participation and development

Though not explicit, causal links are also assumed among the three outcome areas. Hunter (2007) has conducted an exploratory study on the direction, strength and cumulative effects of causation among these outcome areas and calls for further rigorous examination – a point to which we return later.

The OID framework reports along causally linked multiple indicators, thus most of the critique about indices is not applicable. The OID measures Indigenous well-being using indicators that reflect mainstream socio-economic values such as

performance in education, employment, health and housing so that comparisons can be made with the general population.

There are some scholars that question the appropriateness of closing statistical gaps (eg. Pholi et al., 2009; Taylor, 2008). An emphasis on gaps portrays Indigenous people from a 'deficit perspective' and this can take away the focus and priorities from positive aspects of life and things that work. Another concern is whether achieving statistical equality adequately accommodates the aspiration of Indigenous Australians. This is not to say that Indigenous communities do not want equity, but there may be aspects of living that Indigenous people wish to keep and maintain different.

While aspects of well-being and advantage dimensions identified in OID can be important for Indigenous people and appear innocuous, related policies that aim to improve performance may be inconsistent with the expressed desires of Indigenous peoples. An example is policies that attempt to improve Indigenous employment rates and income through improved participation in the mainstream urban economy. These policies may not sit well with the desire of many Indigenous people to live in small dispersed communities in remote areas on their traditional lands or country (Taylor, 2008).

Another important limitation of the OID framework is the lack of some potentially valuable indicators. In 2005, a consultation conducted by the SCRGSP (2005: 2.11) with some Indigenous people identified culture as an essential aspect of Indigenous well-being that is not reflected in the OID framework and its indicators. Driven by mainstream values, the OID also has overlooked elements of Indigenous customary activities that are essential in reproducing culture but also have significant economic and social well-being benefits (Altman, 2005; Altman et al., 2006; Sangha

et al., in press). The OID framework also lacks indicators of longer term resilience of remote Indigenous communities. In particular, there are no measures of the social capital that are crucial to remote Aboriginal community function, nor cultural indicators that might underlie this, such as the maintenance of languages or cultural practices (Stafford Smith et al., 2008)), nor ecosystem services underpinning their well-being (Sangha et al., in press).

Taylor (2008) pointed out that even the best attempts to rectify these limitations are constrained by the core purpose and main drivers of the OID framework and available official data. The SCRGSP (2005: 2.11–2.15) identified three areas of potential indicators to measure the importance of culture to Indigenous well-being: the practice of culture by Indigenous people; the formal recognition of Indigenous culture; and appreciation of Indigenous people by non-Indigenous people. However, even the most comprehensive set of customised data on Indigenous people, the NATSISS, has only some data relevant to one of these three potential indicators.

The genuine recognition of difference in the perception of well-being should not necessarily lead to different measurement frameworks. As shown in Figure 1 mainstream views of well-being and doing, government drivers and Indigenous priorities for livelihood improvement, while having differences are not mutually exclusive. Taylor (2008) noted that the challenge is to develop frameworks and indicators that serve government policy imperative as well as produce measures that have widespread relevance to Indigenous peoples. He suggested that to develop mutually useful indicators the focus has to be, following (Mantziaris and Martin, 2000) what he calls on ‘a recognition space’ where Indigenous and government perspectives of well-being intersect.

FIGURE 1 ABOUT HERE

Taylor (2008) noted that though this space is not necessarily the totality of the translation of Indigenous people's own perceptions of their well-being, it provides a mutually meaningful space for engagement and measurement by both Indigenous people and policy makers. We will pick up this topic further in the Discussion section.

The Meaning and Measures of Poverty

Poverty refers to lack of welfare or deprivation in a standard of living. Theoretically inequality does not necessarily imply poverty or deprivation. However, in the case of Indigenous Australians inequality is so pervasive that it is tightly linked with poverty. Authors identify different types of poverty: absolute, relative or subjective on the one hand and transient (temporary) or persistent (chronic) on the other. Absolute poverty refers to lack of basic necessities such as food, clothing and shelter. While the extent of absolute poverty in Australia may be relatively low, over a quarter (28%) of Indigenous Australians aged 15 years and over lived in households where members had run out of money for basic living expenses including food, clothing and medical bills (The National Aboriginal and Torres Strait Islander Social Survey 2008). Nationwide there are around 105,000 people (0.5% of the total Australian population) who are homeless. The numbers of Indigenous homeless are estimated at 1.8% of the Indigenous population which is more than 3 times that of the non-Indigenous homeless population.

Relative poverty is defined with reference to the average standard of living in a given society. A measure of relative poverty will include those who are absolutely poor. It also indicates the level of inequality in a society. When absolute and relative poverties follow cultural, racial, religious or any other tight group contours then it forms horizontal inequality.

There are authors (eg. Goedhart et al., 1977; Van Praag et al., 1980) who argue that poverty is an individual feeling and not an objective status along income levels. They define subjective poverty in its narrow sense as the necessary household budget, income, or consumption below which people perceive they are poor, or in a broad sense as being below a certain degree of satisfaction in multiple domains of life including income, employment, health and leisure (Van Praag and Ferrer-i-Carbonell, 2008).

Deprivation is a broad concept related to poverty (Townsend, 1979; Mack and Lansley, 1985; Ringen, 1988) and refers to an enforced lack of socially perceived necessities. The necessities are social context dependent and include basic needs such as food, clothing, shelter and the ability to keep warm in winter. But they can also include an inability to afford other items such as a phone or a microwave, depending on what is regarded as essential by a majority of the community where one lives. Deprivation exists when people cannot afford items that are widely regarded as essential: things that no one should have to go without.

Introduced by Townsend (1979), deprivation is commonly measured using index scores derived by summing the number of essential items that are lacking and cannot be afforded. Deprivation is now measured in the USA and many European countries. The first nationwide estimates for Australia are reported by Saunders and Naidoo (2009).

Despite these different measures, level of personal or household income is commonly used to measure poverty. It is an indicator of command over the resources necessary for living. A measure widely adopted to identify those who are poor is the poverty line. The poverty line can be relative or absolute. Relative poverty lines, commonly applied in the OECD countries including Australia, are

measures below a certain proportion (often 50% or 60%) of the median or mean income of the population. Absolute income poverty lines in contrast are threshold levels of income deemed necessary to achieve an adequate standard of living in a society. In Australia an absolute poverty line was established by the Henderson poverty inquiry in 1973. This Henderson poverty line is based on a benchmark income of \$62.70 per week for the September quarter 1973 which was the disposable income required to support the basic needs of a family of two adults and two dependant children at the time. This poverty line has been updated regularly by the Melbourne Institute (2010) according to changes in average incomes.

The income based measures of poverty, although indicative, are inadequate for at least four reasons. First the measures are value laden. The value given to income and money varies across cultures. Prosperity is measured in quite different ways among many Indigenous groups. In large sections of the Indigenous population social status is accrued by becoming an effective material resource distributor rather than by being an accumulator (Altman, 2000). Sharing of money and other resources is widely practiced among Indigenous people and level of income may not tell the full story of who is better off in a community.

Second, income is a one dimensional measure but poverty is a multifaceted phenomenon. Poverty has economic as well as social, psychological, political, legal and environmental dimensions. One can be deprived in several domains of life: income, education, health, employment, agency, security, ability to go about without shame and human rights (Sen, 1992).

Third, a level of income may not be the most appropriate way to evaluate poverty and disadvantage. Sen (1992) argued that different people require different levels of resources to achieve a similar standard of living. He also noted that people

have different levels of resource conversion factors, i.e. abilities to convert resources into well-being outcomes, because of pervasive differences in their personal characteristics (such as age, gender, general abilities, particular talents, proneness to illness), as well as external characteristics (such as ownership of assets, social background, environmental predicament). This significant variation in conversion ability causes people to need different amounts of resources and primary goods to achieve the similar well-being outcomes. For instance, for the same standard of living, the level of income required by an old Indigenous person with renal dialysis living in a very remote area in Australia would be different from a healthy young non-Indigenous adult living in a city. For this reason poverty lines can be misleading, particularly when there are high rates of disability and chronic diseases among a group within a population as is the case in Indigenous Australia.

Fourth, income poverty measures are retrospective and lack depth. While income poverty lines separate the poor and the non poor, they don't inform whether these statuses are transitory or persistent. Income analyses on longitudinal data have been applied to surmount this problem and identify how many are acutely and chronically poor (Carter and May, 2006). These developments are commendable and we will explore their application in the Australian context later on. However, Carter and May (1999) and Carter and Barrett (2006) argue that these income-flow based metrics can hide very different types of poverty that carry different kinds of implications. For example, people moving from poor to non-poor as measured by their income can be categorised as transitorily poor, while their ownership or access to productive assets have not changed. Their income could have increased due to random price and yield fluctuations, or irregular earnings from remittances and gifts.

To this group one can add some of those who depend on social security benefits that have income more than the poverty line but lack any productive assets.

Carter and May (1999, 2001) and Carter and Barrett (2006) have developed a forward looking poverty measure in the asset or 'capital space'. Central to their approach is the distinction between poverty that is structural and thus persistent compared with poverty that is stochastic and thus transitory. A structurally poor household is one in which both the income that they are observed to earn, and the income that they can be expected to earn based on their asset-holdings, are below the poverty threshold. In contrast, a stochastically poor household is one in which their asset-holdings are insufficient to produce an income that is above the poverty threshold, but their observed income is above this threshold. Equally, a household can be stochastically not-poor if the reverse situation holds.

Sen (1992) develops the concept 'capability' as an evaluation space that is even more appropriate than 'income' and 'assets' or resource-based evaluation of poverty and disadvantage. The core concepts of Sen's capability approach are functionings and capabilities. Functionings Sen (1999) explains, are various things a person may value being and doing including being adequately nourished, sheltered, healthy, having self-respect, caring for others, and taking part in community life (Sen, 1992: 39). Capabilities refer to genuine opportunities or freedoms individuals have to realize these functionings. He defined poverty as a failure in basic capability. It is in these substantive freedoms that people need to be assessed as to whether they are poor and disadvantaged, rather than access to income or even other resources that may or may not offer the ability to be and do what one has reason to value. Sen in his capability approach also noted that attempts to equalise ownership of resources or holdings of primary goods are inadequate, for they fail to promote

equality in the substantive freedom enjoyed by different persons. We will raise the potential of the capability approach more in the Discussion section.

There are other multidimensional approaches to measuring poverty that have an eclectic selection of indicators from the income needs, services, resources and utility evaluation spaces. These include measures of social exclusion (Eurostat, 2002), the UN's Human Poverty Index (HPI), and the Scandinavian levels-of living measure of poverty (Erikson and Uusitalo, 1987).

The European Union has adopted a social exclusion approach to poverty and deprivation (Eurostat, 2002). Individuals are considered to be at risk of social exclusion if they have low financial resources as well as low human capital, or low social capital, or have poor health, or are discriminated against in various ways. The UN HPI, inspired by the capability approach, is computed as the weighted average of the levels of indicators in three well-being dimensions: longevity, knowledge, and standard of living. The Scandinavian approach considers measures of poverty involving a detailed survey on nine dimensions of individual well-being: employment, economic resources, education, health, security of person and property, family and social environment, housing and local resources, recreation; and political resources (Erikson and Uusitalo, 1987).

Measurement of Poverty Among Indigenous Australians

In a submission to the Inquiry into Poverty and Financial Hardship in Australia, Altman et al. (2003) make a case describing the profound and entrenched nature of poverty among Indigenous Australians. The submission by Altman et al. (2003) echoed what Altman and Hunter (1997) found six years earlier based on a comparative review of changes in Indigenous poverty. Citing work by Ross and Mikalauskas (1996), they concluded that levels of Indigenous income poverty in the

early 1990's remained remarkably similar to levels found earlier by the Henderson Poverty Inquiry of 1975. Ross and Mikalauskas (1996) reported 50% and 61% of Indigenous households with children being in the 'very poor' and 'rather poor' categories (Altman and Hunter, 1997: 4).

Noting the limitations of income measures of poverty, Hunter (1999) applied a multidimensional approach that included non-monetary indicators of welfare such as health, education, effects of dispossession or affinity with land, access to justice, and housing. Hunter found that income did not adequately explain the endemic and entrenched nature of Indigenous poverty in Australia. One of Hunter's findings was that, irrespective of the different measurement methodologies, Indigenous people were about two to three times more likely to be impoverished than the non-Indigenous population.

Hunter also noted that Indigenous poverty was not only entrenched and complex, but the 'nature of the poverty experienced may be qualitatively different to that of other poor' (Hunter, 1999: 9). Unlike non-Indigenous Australians, having higher income did not guarantee Indigenous Australians good health, or lower rates of arrest, incarceration or victimisation. One-third of Indigenous households in both low and high-income groups suffer from chronic health problems (Hunter, 1999: vi, vii). Inadequate housing, high arrest rates, and a dislocation from traditional lands are a common experience in Indigenous households, irrespective of their income (Hunter, 1999: 14).

In a recent sample based deprivation study, Saunders and Naidoo (2009) suggested that Indigenous Australians are not only the most poor in terms of income poverty, but also the most deprived. The poverty rate (household below 50% median income) among Indigenous households was 38% compared to 14% for all

Australian households. The percentage incidence of deprivation among Indigenous people was also the highest at 60% compared to 15% for all households. These households lacked and cannot afford four out of 26 items regarded as essential by at least 50% of the sample Australian community.

While the findings of the studies introduced above strongly suggest the existence and nature of chronic or persistent poverty among Indigenous Australians, adequate measurement requires longitudinal data, preferably along multiple well-being dimensions. One candidate source of data for persistent poverty analysis is the Household, Income and Labour Dynamics in Australia (HILDA) surveys which have been collected in eight successive waves since 2001. There are now a number of studies that have used the HILDA data and identified between 3% and 10% of the Australian population as persistently poor (Headey et al., 2005; Rodgers and Rodgers, 2006; Saunders and Bradbury, 2006; Buddelmeyer and Verick, 2008; Headey, 2008; Rodgers and Rodgers, 2009).

Unfortunately for our purposes, the HILDA data inadequately samples the Indigenous population and does not cover remote and sparsely populated areas of Australia where a significant proportion of Indigenous people live. Being a household survey, it also excludes the homeless and similar itinerant people, who presumably are some of the poorest members of society and include a large number of Indigenous people (Rodger and Rodger, 2006).

Nonetheless, Buddelmeyer and Verick (2008) identified some factors associated with becoming or remaining poor that significantly characterise the condition of Indigenous people. These factors include lack of education and employment, long-term disability, living in outer regional or remote areas and family

break-up. We will now examine these factors, which have been implicated in conditions of persistent poverty, in an Indigenous context.

Lack of education is extensive among Indigenous peoples. Indigenous people aged 15 years and over were still half as likely as non-Indigenous Australians to have completed school to Year 12 in 2006 (23% compared with 49%). They were also twice as likely to have left school at Year 9 or below (34% compared with 16%). These relative differences have remained unchanged since 2001.

In the 2006 Census, the labour force participation rate of Indigenous people aged 15–64 years was 57%, compared with 76% for non-Indigenous people. The proportion of Indigenous people aged 15–64 years who were not in the labour force was higher than that of non-Indigenous people (43% and 24% respectively). Some people are not actively engaged in the labour market for reasons including caring responsibilities, study, illness, disability, retirement and/or lack of labour market opportunities in their area. (ABS, 2006: cat.no.4713.0, p. 81)

After adjusting for differences in the age structures of the Indigenous and non-Indigenous populations, Indigenous Australians were twice as likely as non-Indigenous Australians to report their health as fair or poor in 2004–05 (NATSIHS, 2004–05). In 2006, Indigenous people overall were twice as likely as non-Indigenous people to have a profound/severe core activity limitation. Disability was defined as any limitation, restriction or impairment, which has lasted, or is likely to last, for at least six months, and restricts everyday activities (Australian Institute of Health and Welfare (AIHW), 2007: cat. no. 4704.0).

Nearly half (48%) of the Indigenous population lived in outer regional or remote areas in 2006. This is in contrast to only 11% of the non-Indigenous

population (ABS: cat no 4713.0, 2008: 13). The proportion of one parent Indigenous families is significantly higher than that for non Indigenous families (30 % and 10% respectively ABS: cat no 4713.0, 2006:28). Income poverty is even higher among Indigenous people in remote areas of the country. In 2006, approximately 30% of Indigenous adults living in major cities were in the lowest (1st) quintile of equivalised gross weekly household income compared with 60% of Indigenous adults in very remote areas. Among the states and territories, the Northern Territory had the highest proportions of Indigenous Australians below the 50th percentiles (87%) (AIHW, 2008: 771-773).

Time series data analysis by the ABS and Australian Institute of Health and Welfare (AIHW, 2008: 771-773) using data from the Census and from NATSIS are also useful indicators of the extent and chronic nature of poverty among Indigenous people. In 2006 approximately 72% of Indigenous adults (persons aged 18 years and over) were below the 50th percentile of equivalised gross weekly household income. There was little difference in the proportion of Indigenous adults below the 50th percentiles of equivalised gross weekly household income in 1996, 2001 and 2006 (AIHW, 2008).

This study by AIHW also indicates a marked disparity in household income poverty levels by remoteness. In 2006, approximately 30% of Indigenous Australians aged 18 years and over living in major cities were in the lowest (1st) quintile of equivalised gross weekly household income compared with 60% of Indigenous Australians in very remote areas. Around 18% and 13% of Indigenous Australians in major cities were in the fourth and fifth quintiles of income respectively, compared with 3% and 2% respectively of Indigenous Australians in very remote areas. Among the states and territories, the Northern Territory had the highest

proportions of Indigenous Australians below the 20th and 50th percentiles (59% and 87% respectively).

Causes of Disadvantage and Poverty

The current state and trends of socio-economic marginality and persistent poverty among Indigenous people are attributed in the literature to a number of different causes. Some studies list factors such as joblessness, low education levels, disability and health problems etc. that characterise poverty. These factors are also seen as both causes and effects of poverty. Other studies invoke a set of fundamental causes ranging from colonial dispossession of Indigenous people and historical failures of institutions (rules, policies and associated programs), lack of access to different capitals, demographic structures and geographic remoteness, through to a culture of dependence.

This emphasis on divergent factors provides a spectrum of critical causal explanations for the current Indigenous social and economic conditions. At one end of this causal spectrum are those that emphasise many aspects of Indigenous cultures as antithetical to improvement in social well-being and economic development (eg. Sandall, 2001; Sutton, 2001). At the other end of the spectrum are those that attribute decades of government programs and policy failures as fundamental causes of the current suffering of Australian Indigenous people (eg. Sackett, 1991; Folds, 2001).

Sutton recognised the contribution of historical dispossession, dislocation, separation, exclusion from and inadequacy of services and the tyranny of distance in explaining current dire conditions of many Indigenous people (2009:81). However he disputed the sufficiency and even the causal primacy of these factors. Sutton warned that one should not exaggerate the historical role of policies in creating the

current Indigenous disadvantage and misery. In emphasising the role of culture, Sutton asked a rhetorical question ‘... why was community dysfunction at its greatest in those places to whom history and the colonisation process had been recent and therefore [in relative terms] the kindest?’ (2009:55)

Sutton argued for the possibility of ‘cultural underpinning to the current widespread Indigenous disadvantage and suffering’ (2001:149, 145). He noted that ‘dependency ... has deep roots in Aboriginal culture’ (2009: 64), and that ‘current Aboriginal dependency ... is not merely passivity resulting from impoverishment and alienation, but is also actively constructed, partly though not wholly, out of classical social behaviour, in a great many Aboriginal communities’. There are more aspects of Indigenous cultures such as ‘... privileging of social capital over accumulation, political atomism, customary externalisation of blame and similar obstacles to autonomous progressive action [that] can rest on some very deeply seated [pre-existent] Indigenous cultural conceptions of power, obligation, causality and economy’ (2001: 135).

Sutton disputed claims by Dodson (2003) and Pearson (2000) that most if not all of the violence and widespread alcohol abuse among many Aboriginal communities are not part of Aboriginal tradition or culture. He argued that in as far as they are practiced widely that they in fact form part of a society’s culture at least at the time of observation (2009: 64). He then goes further to note that violence, particularly against women, may have cultural traits that may have lingered from pre-colonial practices.

Sutton warned of the futility of attempts to get rid of current Indigenous suffering and disadvantage unless they consider the ‘critical and central role of socialisation of children in those aspects of Indigenous cultures that are antithetical

to well-being and economic development' (Sutton, 2001: 136). He noted that a deep and radical cultural redevelopment is a precondition, if there is any hope of ending the current Indigenous suffering (Sutton, 2001: 151).

Cowlishaw (2003) questioned Sutton's emphasis on Aboriginal culture as a central factor to current Indigenous suffering. She argued that the notion that apportions degrees of blame to separate causal variables such as 'colonial history' or 'Aboriginal culture' misses the dynamic interplay of these factors. She contended that '... if history has produced culture, then we can no longer propose that Aboriginal people are mechanically reproducing some ancient tendency, but must recognise the social response to changing conditions.' (2003: 8). Cowlishaw proposed that the key to understanding what is happening in Indigenous communities is to turn 'to a cultural analysis of the institutions which manage Indigenous people and ... arenas of interaction and interchanges between Indigenous persons and whitefellas' (2003: 11).

Targeting difficulties in Indigenous engagement in long term employment opportunities in the mining industry as a context, Trigger (2005) reviewed the literature to assess to what extent Indigenous culture -defined as key assumptions and dispositions that drive every day behaviour – matters to current socio-economic state and the future of Indigenous economic development. He agreed with other writers such as Sutton and Pearson that Indigenous cultures or corruption of them do matter significantly and the policies and programs for Indigenous economic development need to be informed by a thorough understanding of the fundamental tensions between aspects of kin-based Aboriginal cultures and market based culture that are assumed to be essential for improved individual material well-being. However, Trigger questioned why the web of Indigenous relatedness, demand

sharing and egalitarian ethos, which is fundamental to Indigenous moral economy, should necessarily be incommensurate with economic success on the part of individuals (Trigger, 2005: 52). He argued that the kinship-based internal distributions of income can, over time, be transformed into more economically productive outcomes. He also noted that neither competition among individuals nor an aspiration to accumulate resources, both considered essential for engaging with the market based economy, are entirely lost to Indigenous communities.

Folds (2001) questioned the possibility of having the best of both worlds as demands from policy to improve socio-economic indicators require forgoing Indigenous values that are central to Indigenous identity and resilience. He suggested that historical government policies have failed Indigenous people and continue to be at cross purposes with aspirations and values of Indigenous people such as the Pintubi. The Pintubi have used these programs for their own purposes as resources to keep and reinforce their culture and identity alive. These practices lead to cross purposes and the assured failure of government programs.

Similarly Altman (2000) noted that the early historical process of colonisation significantly reduced the number of Indigenous people (through killing and introduced diseases) and caused widespread dispossessions of their rights, including their entitlement to land and sea resources. This established the initial conditions for the current entrenched disparities and poverty among Indigenous people. Altman attested that since the recognition of the Indigenous population as Australian citizens in 1967, government policies and programs and vast amounts of expenditure have failed to substantially improve the living conditions of Indigenous people.

Other causal factors proposed include a) restricted access to different forms of capital to undertake entrepreneurial activities typically experienced by Indigenous Australians (Daly, 1994; de Bruin and Dupuis, 2003; Furneaux and Brown, 2008); b) young population structure and high Indigenous population growth. A conservative estimate puts an average fertility at 2.1 children per Indigenous woman and 1.8 per non-Indigenous woman. The Indigenous population is estimated to have grown at an average rate of 2.43% per year between 2001 to 2006 (Biddle and Taylor, 2009). This growth contains both natural and increases in self identifications of more people as Indigenous.

The remote and dispersed location of residence of a significant number of Indigenous populations is often another important factor given in explaining their economic marginality and entrenched poverty. At the time of the 2006 census, 24 % of the population lived in remote and very remote regions (ABS, 2006: cat. no. 4705.0). Most of those in remote and very remote regions lived in dispersed discrete and Indigenous dominated settlements that often have difficulty accessing public and private services and economic and labour market opportunities.

Studies into very low labour participation rates in remote regions by Tesfaghiorgis (1991) and almost two decades later by Biddle (2009) concluded that poor access to services and labour markets were important factors for unemployment and economic marginality. However, Hughes and Hughes (2010) disputed remoteness as a major constraint for Indigenous unemployment, noting that there are job vacancies in remote communities that are often taken up by non-Aboriginal people from other areas. Nevertheless job opportunities and labour demand do not automatically lead to high employment and incomes in remote communities. Examples include regions such as Anmatjere in central Australia

where there have been many unskilled and low skill job vacancies despite a continued high rate of unemployment among local Indigenous people. Davies et al. (2010) reported a complex interaction of institutions, networks and capital that constrain Indigenous take up of local employment opportunities in the region.

Many of the papers reviewed for this work suggest there are multiple factors and interactions contributing to Indigenous poverty, but do not offer an adequate integrated explanation. Consequently we suggest a systems and modelling approach is needed. For instance, Altman (2000: 8-11) identified a broadly related set of factors that may explain Indigenous economic marginality. These include: 1) historical exclusion from the mainstream provisions of the Australian welfare state and associated legacies; 2) structural factors such as population structure and location of residence; 3) cultural factors such as differing priorities and absence of labour migration; and 4) demand side issues such as discrimination. Altman noted two other important features of these causal factors. The first is that many of these factors that explain Indigenous marginality are also factors that, from an Indigenous perspective, are important for continuity, identity, distinctiveness and cultural survival. Examples include high Indigenous population growth, low labour migration owing to regional and family allegiances, the continued use of Indigenous languages and the maintenance of traditional ceremonial obligations. While adding to Indigenous resilience these somewhat paradoxically negate participation in and benefits from the mainstream economy. The second feature is that the explanation of economic marginality of Indigenous peoples in diverse contexts is to be found in the interplay of these broad causal factors. Although Altman described each factor briefly, there is not yet an integrated explanation of the interactions of these structural and behavioural factors.

Relevant to the interplay between some behavioural factors is a critique on the OID implicit causal mechanism developed by Hunter (2007). The OID mainly focuses on individual and household behaviour in its causal framing of disadvantage highlighting the domestic settings of child rearing and the interactions between family and schooling as major areas for action (Taylor, 2008) to prevent and improve disadvantage (Bank, 2007). However, Hunter (2007) disputed the robustness of claimed causal mechanisms underlining the framework. First, he disagreed with grouping the indicators into three disadvantage domains: quality of family and child development; community life, including cultural identity, and individual, family and community participation with mainstream economy. His results using the 2002 NATSISS data in a principal component analysis suggested there were more than three disadvantage dimensions. Second and more importantly, Hunter noted that the OID has no explicit theoretical causal model that allows us to make sense of how the various dimensions of disadvantage relate to one another and the significance of aspects of each dimension in a causal chain. Based on a staged regression exercise guided by developmental theories of crime and educational participation, Hunter (2007: 195) suggested the existence of what Myrdal (1944, 1957) called cumulative causation in the way feedback mechanisms involving peer group and role model significantly affect school attendance of an Aboriginal person.

DISCUSSION

At least four themes emerge from the preceding review of the literature on Indigenous disadvantage and poverty. These themes relate to frameworks, measurements, data requirements and causal mechanisms.

Improved Frameworks

The limitations of the HDI and OID as frameworks for measuring Indigenous disadvantage and well-being were highlighted in the Review section. They relate to what the frameworks, and in particular the OID, emphasise and omit. The suggestion by Taylor is to develop a framework and indicators that allow measurement on a recognition space – a conceptual space where the mainstream meaning and interpretation of well-being crossover with that by Indigenous peoples. Such a framework would be relevant to Indigenous peoples while also serving government measurement goals. Taylor acknowledges that this overlap is necessarily reductive as it would not capture the totality of Indigenous understanding of well-being but only that shared and negotiated by government and Indigenous people.

A design process for mutually beneficial indicators can go a step further to accommodate more aspects of well-being that may be outside the recognition space but essential to and shared by many Indigenous groups. For instance, living in very remote areas in very small and discrete settlements close to one's country and customs may be rewarding and essential for well-being and health but it can be a significant challenge to create labour markets and costly to provide a variety of government and non-government services. In such circumstances mutually beneficial indicators may not be apparent but forcing people to move to service and market centres would be counterproductive and contrary to development principles and human rights. Governments, non-government and private stakeholders, while working on constraints to create real livelihood options for Indigenous people within mainstream economic activities, need to gear their effort towards recognising, supporting and promoting the public and market value of livelihood activities which

remote Indigenous people identify with. An adapted capability approach that guides and assesses development as freedom – as expanding options for people to be and do what they value – may be a suitable process for capturing mutual indicators in the recognition space as well as some essential indicators in the Indigenous space important for well-being and development.

The capability framework has other advantages. It can be used to provide guidance when developing indicators relevant to Indigenous concepts of well-being and development, and it can also be used to develop multidimensional measures of poverty and disadvantage. Poverty in the capability approach is when one fails to undertake basic functionings - being and doing as one values, including the ability to be well nourished and well sheltered, to escape avoidable morbidity and premature mortality, to appear in public without shame and so forth (Sen, 1993:31).

The capability framework draws attention to underlying reasons for poverty that may not be picked up by income measures. It does this in two ways. Firstly it demands the direct assessment of one's ability to achieve basic functionings such as health that have intrinsic value or are constitutive of the valued well-being outcomes. This is in contrast to measuring only resources such as income or employment which are the instruments or means to the ends that different people value. This is important given that high income has not always been associated with good health in the Indigenous context (Hunter, 1999). Secondly, the capability approach recognises that people have different basic requirements for resources such as income. For example, an old person with a renal disease living in a remote settlement in Australia has a basic income requirement which is different to that of a young healthy person living in a city. While an income poverty line treats basic income requirements of individuals or households in the same way, the basic

capability approaches requires consideration of that differences in basic resource requirements of individuals and households. This diagnostic ability of the framework can bring crucial aspects of deprivation such as race, gender based disadvantages, illness and disability into focus.

Gaps in Measurements

Despite their limitations, the HDI and OID provide historical and current estimates of Indigenous disadvantage. We make two important observations from the nature of these estimates.

The first is the simple observation that advantage/disadvantage in Australia follows strong Indigenous and non-Indigenous group contours. In other words the Indigenous disadvantage is what Stewart (2009) in the development literature calls horizontal inequality. This is in contrast to vertical inequality - inequality in the living standard in a society that does not follow any apparent tight grouping. All other things being equal, escape from disadvantage and poverty is harder for those in horizontal inequality than those in vertical inequality because of additional group level barriers.

The second observation is the chronic nature of the inequality and its strong likelihood of continuing into the future despite various efforts by government and non-government agencies over decades. This shows persistence inequality. The persistence of unequal states for a long time is strong evidence for the existence of multiple equilibria that are maintained by self reinforcing mechanisms or traps. An inequality trap is maintained by complex interactions of structural and behavioural causal factors that drive advantage and disadvantage. Inequality is maintained by deterioration, with no or much slower socio-economic improvements among Indigenous people compared to those of the non-Indigenous people. For instance

during the recent sustained economic growth many Indigenous people were among the last to be employed and during the global financial crises that followed they were the first to be fired (Hunter, 2009).

Again despite their limitations, the income based measures of Indigenous poverty also indicate widespread and persistent poverty. Broader measures of poverty may identify even higher numbers of persistently poor Indigenous people. There may be many Indigenous people in transitory income poverty that are structurally persistently poor. Furthermore, as indicated in Hunter's study (1999), even those with relatively higher incomes may be poor in non-monetary dimensions of welfare, such as health and safety. Many of those with chronic health problems and those that experience repeated encounters with the justice system can be justifiably categorised as persistently poor.

If one employs the capability approach that considers poverty not only as a low level of the means (eg. income, assets) to achieve outcomes, but as a failure in basic freedom to be and do what one values, then many more Indigenous people can be categorised as suffering persistent poverty, as many persistently depend on the welfare state. To be poor is to lack effective freedom of choice in how to live one's life. Such a broader account of basic freedom can also pick up disabilities as a result of alcohol and substance abuses as well as abuses against women and children.

Addressing Data Limitations

Research on poverty and disadvantage lacks longitudinal or panel data especially from Indigenous Australians. For example the extensive and useful national panel survey HILDA does not cover remote and sparsely populated areas of Australia where a significant proportion of Indigenous people live and has inadequate

Indigenous sample size. The Australian Government Department of Families, Housing, Community Services and Indigenous Affairs initiated a Longitudinal Study of Indigenous Children in 2008 that aims to track the long-term development of 2,200 Indigenous babies and children from 11 regional communities across Australia. This is a significant development that will provide longitudinal data for analysing dynamics in well-being improvement and causality. However, Hunter (2007) raised issues with the regional instead of national nature of the study as well as the small sample size of the cohorts. It is essential that the national panel surveys be expanded to adequately cover Indigenous Australians. Such expansion of longitudinal data will significantly improve our understanding of complex causes of persistent Indigenous poverty and disadvantage using approaches heavily dependent on statistical methods as well as providing empirical data for calibration and testing of models that can be developed using systems approaches.

Accounting for Causal Mechanisms

The current state of understanding about Indigenous disadvantage and poverty is mainly descriptive in nature. The review section on causes of disadvantage and poverty shows a spectrum of factors deemed to have generated and sustained the current state of Indigenous poverty and disadvantage. Authors emphasise different factors, partly due to the contexts within which their causal understanding developed. Also many authors will be constrained by the text based description of causes as this does not enable a comprehensive and simultaneous examination of multiple factors and the extent and direction of their relationships. For example, Altman recognises the multiplicity and interaction of factors but describes each one separately. These text descriptions may be an effective way to develop an in depth understanding of an individual or a few causal factors. However, a systems and modelling approach is

required to capture the dynamics that arise due to interactions and feedback loops among multiple factors.

Systems thinking advises that it is important to look for endogenous causes of problems, and cautions that people often fail to do so. At first glance Sutton's exposition on the significant contribution of some Indigenous cultural traits and Indigenous childrens' socialisation to current Indigenous suffering seems in accord with this systems principle of looking for endogenous causes. While these causes need to be examined, separating what are endogenous causes of poverty and disadvantage and what are not will be a significant challenge for systems approaches. Since colonisation the lives and livelihoods of most Indigenous people have not been entirely private. They have been subject to several interventions in the forms of policies and programs which may lead to causal mechanisms located distant in time, space and social organisations (Forrester, 1994).

As introduced before, Hunter (2007) had done a preliminary exercise on the importance of cumulative causation on Indigenous norms and developmental processes using longitudinal data and statistical methods. However, we expand the call to involve not only positive feedbacks within the Indigenous norm and behavioural domain but multiple interacting causal loops that may span behavioural, structural variables and pattern of historical response to interaction between Indigenous system with government and other non-Indigenous systems. While statistical and empirical methods using longitudinal data are important to establish certain cumulative causes we call for a broader complex systems approach, together with participatory modelling to assist in understanding the inevitably complex feedback loops that maintain persistent inequality and poverty or what is known as

poverty traps in both development (eg. Carter and Barrett, 2006; Bowles et al., 2006) and resilient (eg. Holling, 2001; Carpenter and Brock, 2008) literature.

The value of introducing systems approaches and participatory modelling is also to challenge and improve partial and often implicit mental models of causal mechanisms of Indigenous poverty and disadvantage held by stakeholders including policy makers, communities, industry groups and researchers (eg. Senge, 1992; Forrester, 1994, Sterman, 2000). Explicit models can help expose assumed factors and their interactions, and facilitate questioning from different perspectives and knowledge of the systems, creating a platform for shared understanding and social learning (eg. Midgley, 2000, 2003; Pahl-Wostl, 2006; Ison et al., 2007; Reed et al., 2010). Models can also be used to illuminate core dynamics, explain current states of the livelihood systems, highlight uncertainties in knowledge and evidence gaps, explore plausible scenarios and pathways (eg. Sterman, 2000), all of which assist in policy making and designing effective programs for action.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE WORK

Existing measurements show the chronic nature of Indigenous poverty and disadvantage despite efforts to address these issues for decades. This persistence, which is also predicted to continue, is a strong indicator of inequality and poverty traps. The gaps that need attention in order to adequately understand Indigenous persistent inequality and poverty include broader and more appropriate measurement frameworks, longitudinal data sets and systems methods for causal analysis. We also suggest a research work to adapt and then test a theoretically well informed capability approach as a broader framework. This framework has a potential to provide adequate, forward looking measurement of poverty and inequality as well as capturing the essence of Indigenous views and concerns on

well-being improvement as the state and trend of what Indigenous people are able to do and be what they value. These areas are currently missing in frameworks such as the OID. We also raised the need for adequate longitudinal datasets on various indicators of Indigenous well-being by expanding existing panel data both in terms of area covered and sample size. In addition, we note the current fragmentary nature of causal analysis and call for an integrated research agenda that employs systems and modelling approaches to understand complex feedback loops involved in persistent Indigenous poverty and disadvantage as well as provide a learning platform and evidence base for appropriate policies and actions.

ACKNOWLEDGEMENTS

We thank Cameron Fletcher for his input on initial discussions for preparing this paper. We are grateful to reviewers: Dr. Jocelyn Davies, Dr. Ashley Sparrow and Dr James Butler for their comprehensive comments which helped reshape this paper.

REFERENCES

- Australian Bureau of Statistics (2000) Report on Experimental Indigenous Socioeconomic Disadvantage Indexes. Canberra: Consultant's report to Commonwealth Grants Commission. Australian Bureau of Statistics.
- Australian Bureau of Statistics (2006) Population Characteristics, Aboriginal and Torres Strait Islander Australians 2006. Cat. no. 4713. Canberra: Australian Bureau of Statistics.
- Australian Bureau of Statistics (2006) National Aboriginal and Torres Strait Islander Health Survey 2004-05 (NATSIHS). Cat. no. 4715. Canberra: Australian Bureau of Statistics.
- Australian Institute of Health and Welfare (2008) Australia's health 2008. Cat. no. AUS 99. Canberra: AIHW.
- Altman, J.C. (2000) The economic status of Indigenous Australians. CAEPR Discussion Series. Canberra: Centre for Aboriginal Economic Policy Research (CAEPR), Australian National University.

- Altman, J.C. (2005) Development options on Aboriginal land: Sustainable Indigenous hybrid economies in the twenty-first century. In *The Power of Knowledge, the Resonance of Tradition*. L. Taylor, G. Ward, G. Henderson, R. Davis and L. Wallis (eds.). Canberra: Aboriginal Studies Press, 34–48.
- Altman, J.C. and Hunter, B. (1997) Indigenous poverty since the Henderson Report. CAEPR Discussion Paper No. 127. Canberra: Centre for Aboriginal Economic Policy Research (CAEPR), Australian National University.
- Altman, J., Hunter, B. and Johns, M. (2003) Submission to the Senate Community Affairs References Committee Inquiry into Poverty and Financial Hardship in Australia. Centre for Aboriginal Policy Research, Australian National University.
- Altman, J.C., Biddle, N. and Hunter, B.H. (2009) Prospects for 'Closing the Gap' In Socioeconomic Outcomes for Indigenous Australians? *Australian Economic History Review* 49(3): 225-251.
- Altman, J.C., Buchanan, G.J. and Biddle, N. (2006) The real 'real' economy in remote Australia. In *Assessing the Evidence on Indigenous Socioeconomic Outcomes: A Focus on the 2002 NATSISS*. B.H. Hunter (ed.). Canberra: ANU E Press, 139–52.
- Banks, G. (2007) Indigenous disadvantage: Are we making progress? Chairman, Productivity Commission. <http://www.pc.gov.au/speeches/?a=7655>
- Biddle, N. (2009) Ranking regions: Revisiting an index of relative Indigenous socio-economic outcomes. CAEPR Working paper. Canberra: Centre for Aboriginal Economic Policy Research (CAEPR), Australian National University.
- Bowles, S., Durlauf, S.N. and Hoff, K.R. (2006) *Poverty traps*. Princeton: Princeton University Press.
- Buddelmeyer, H. and Verick, S. (2008) Understanding the Drivers of Poverty Dynamics in Australian Households. *The Economic Record* 84(266): 310-321.
- Carpenter, S.R. and Brock, W.A. (2008) Adaptive capacity and traps. *Ecology and Society* 13(2):40.
[online] URL: <http://www.ecologyandsociety.org/vol13/iss2/art40/>
- Carter, M.R. and May, J. (1999) Poverty, Livelihood and Class in Rural South Africa. *World Development* 27(1): 1-20.
- Carter, M.R. and May, J. (2001) One kind of freedom: Poverty dynamics in post-apartheid South Africa. *World Development* 29(12): 1987-2006.
- Carter, M.R. and Barrett, C.B. (2006) The economics of poverty traps and persistent poverty: An asset-based approach. *Journal of Development Studies* 42(2): 178-199.
- COAG (Council of Australian Governments) (2004) Communiqué, 24 June 2004. <http://www.coag.gov.au/meetings/250604/index.htm#Indigenous>
- Cooke, M., Mitrou, F., Lawrence, D., Guimond, E. and Beavon, D. (2007) Indigenous well-being in four countries: An application of the UNDP'S Human Development Index to Indigenous Peoples in Australia, Canada, New Zealand, and the United States. *BMC International Health and Human Rights* 7(1): 9.

- Cowlshaw, G. (2003) Euphemism, banality, propaganda: anthropology, public debate and Indigenous communities. *Australian Aboriginal Studies* 1: 2–18.
- Daly, A. (1994) The determinants of employment income for Indigenous Australians. CAEPR Discussion Paper No. 68. Canberra: Centre for Aboriginal Economic Policy Research (CAEPR), Australian National University.
- Davies, J., Maru, Y.T., Hueneke, H., Grey-Gardner, R. and Chewings, V.H. (2010) Outback livelihoods: employment, sustainable livelihoods and development in Anmatjere region, central Australia. DKCRC Research Report. Alice Springs: Desert Knowledge Cooperative Research Centre 61. <http://www.desertknowledgecrc.com.au/publications/dkcrc-0825>
- de Bruin A. and Dupuis A. (2003) Indigenous Entrepreneurship. In *Entrepreneurship: new perspectives in a global age*. A. De Bruin and A. Dupuis (eds.). Hampshire, England: Ashgate Publishing Ltd.
- Dodson, M. (2003) Violence Dysfunction Aboriginality. Speaking notes, National Press Club, Canberra, Australia, 11 June 2003.
- Erikson, R. and Uusitalo, H. (1987) The Scandinavian approach to welfare research. In *The Scandinavian Model, Welfare States and Welfare Research*. R. Erikson, E. Hansen, S. Ringen and H. Uusitalo (eds.). New York: M.E. Sharpe.
- Eurostat (2002) *European Social Statistics: Income, poverty and social exclusion*. Luxembourg: Office for official publication of European Communities.
- Folds, R. (2001) *Crossed purposes: The Pintupi and Australia's Indigenous policy*. Sydney: UNSW Press.
- Forester, J.W. (1994) Learning through Systems Dynamics as Preparation for the 21st Century. Keynote Address for Systems Thinking and Dynamic Modelling Conference for K-12 Education, June 27-29 1994. Concord Academy, Concord, MA, USA.
- Furneaux, C. and Brown, K. (2008) Australian Indigenous entrepreneurship: A capital-based view. *The International Journal of Entrepreneurship and Innovation* 9(2): 133-144.
- Goedhart, T., Halberstadt, V., Kapteyn, A. and Van Praag, B. (1977) The poverty line: Concept and measurement. *Journal of Human Resources* 12: 503-520.
- Gray, M.C. and Auld, A.J. (2000) Towards an index of relative Indigenous socio-economic disadvantage. CAEPR Discussion Series. Canberra: Centre for Aboriginal Economic Policy Research (CAEPR), Australian National University.
- Headey, B. (2008) Poverty is low consumption and low wealth, not just low income. *Social Indicators Research* 89(1): 23-39.
- Headey, B., Marks, G. and Wooden, M. (2005) The Structure and Distribution of Household Wealth in Australia. *Australian Economic Review* 38(2): 159-175.
- Holling, C.S. (2001) Understanding the complexity of economic, ecological, and social systems. *Ecosystems* 4: 390-405.
- Hughes, H. and Hughes, M. (2010) Indigenous Employment, Unemployment and Labour Force Participation: Facts for evidence based policies. *CIS Policy Monograph* 107. The Centre for Independent Studies.

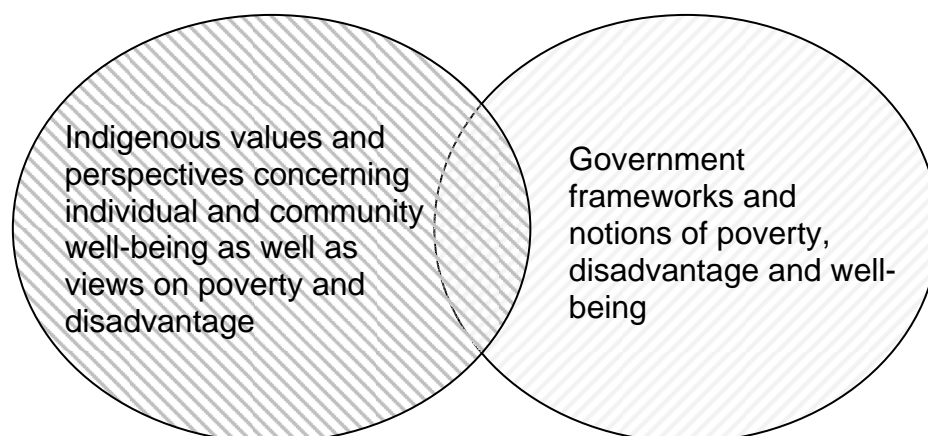
- Hunter, B.H. (1999) Three Nations, Not One: Indigenous and Other Australian Poverty. CAEPR Working Paper no. 1. Canberra: Centre for Aboriginal Economic Policy Research (CAEPR), Australian National University.
- Hunter, B.H. (2007). Cumulative Causation and the Productivity Commission's Framework for Overcoming Indigenous Disadvantage. *Australian Journal of Labour Economics* 10(3): 185-202.
- Hunter, B.H. (2009) Prospects for closing the gap in a recession: revisiting the role of macroeconomic factors in Indigenous employment. CAEPR topical issue no. 1/2009. Canberra: Centre for Aboriginal Economic Policy Research (CAEPR), Australian National University.
- Ison, R., Roling, N. and Watson, D. (2007) Challenges to science and society in the sustainable management and use of water: Investigating the role of social learning. *Environmental Science and Policy* 10: 499-511.
- Mack, J. and Lansley, S. (1985) *Poor Britain*. London: George Allen and Unwin Ltd.
- Mantziaris, C. and Martin, D.F. (2000) *Native title corporations: A legal and anthropological analysis*. Federation Press.
- Melbourne Institute (2010) *Poverty Lines: Australia*. The University of Melbourne, Melbourne Institute of Applied Economic and Social Research.
[online] URL: <http://www.melbourneinstitute.com>
- Midgley, G. (2000) *Systemic Intervention: Philosophy, methodology, and practice*. New York: Kluwer Academic/Plenum Publishers.
- Midgley, G. (2003) *Systems Thinking*. 4 vols. London: Sage.
- Myrdal, G. (1944) *An American Dilemma: The Negro Problem and Modern Democracy*. New York: Harper & Brothers.
- Myrdal, G. (1957) *Economic Theory and Under-Developed Regions*. London: Gerald Duckworth.
- Pahl-Wostl, C. (2006) The importance of social learning in restoring the multifunctionality of rivers and floodplains. *Ecology and Society* 11(1): 10.
[online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art10/>
- Pearson, N. (2000) *Our Right to Take Responsibility*. Cairns: Noel Pearson and Associates, Australia.
- Pholi, K., Black, D. and Richards, C. (2009) Is 'Close the Gap' a useful approach to improving the health and well-being of Indigenous Australians? *Australian Review of Public Affairs* 9(2): 1-14.
- Reed, M.S., Evely, A.C., Cundill, G., Fazey, I., Glass, J., Laing, A., Newig, J., Parrish, B., Prell, C., Raymond, C. and Stringer, L.C. (2010) What is Social Learning? *Ecology and Society* 15 (4): r1.
[online] URL: <http://www.ecologyandsociety.org/vol15/iss4/resp1/>
- Ringen, S. (1988) Direct and Indirect Measures of Poverty. *Journal of Social Policy*, 17(3): 351-365.
- Rodgers, J.R. and Rodgers, J.L. (2006) *Chronic and Transitory Poverty in Australia 2001-2004*. Department of Economics, University of Wollongong.
<http://ro.uow.edu.au/commwkpapers/164>

- Rodgers, J.R. and Rodgers, J.L. (2009) Contributions of Longitudinal Data to Poverty Measurement in Australia. *The Economic Record* 85(s1): S35-S47.
- Ross, R.T. and Mikalauskas, A. (1996) Income poverty among Aboriginal families with children: Estimates from the 1991 Census. CAEPR Discussion Paper No. 110, Canberra: Centre for Aboriginal Economic Policy Research (CAEPR), Australian National University.
- Sackett L. (1991) Promoting Primitivism: Conservationist Depictions of Aboriginal Australia. *Australian Journal of Anthropology* 2(2): 233-246.
- Sangha, K.K., Butler, J., Delisle, A. and Stanley, A. (*In press*) Identifying links between ecosystem services and Aboriginal well-being and livelihoods in north Australia: Applying the Millennium Ecosystem Assessment framework. *Journal of Environmental Science and Engineering*.
- Saunders, P. and Bradbury, B. (2006) Monitoring Trends in Poverty and Income Distribution: Data, Methodology and Measurement. *Economic Record* 82(258): 341-364.
doi:10.1111/j.1475-4932.2006.00344.x
- Saunders, P. and Naidoo, Y. (2009) Poverty, Deprivation and Consistent Poverty. *Economic Record* 85(271): 417-432.
doi:10.1111/j.1475-4932.2009.00565.x
- SCRGSP (Steering Committee for the Review of Government Service Provision) (2005) Overcoming Indigenous Disadvantage: Key Indicators 2005. Canberra: Productivity Commission.
[online] URL: <http://www.pc.gov.au/gsp/reports/Indigenous/keyindicators2005>
- SCRGSP (Steering Committee for the Review of Government Service Provision) (2009) Overcoming Indigenous Disadvantage: Key Indicators 2009. Canberra: Productivity Commission.
[online] URL: <http://www.pc.gov.au/gsp/reports/Indigenous/keyindicators2009>
- Sen, A. (1992) *Inequality re-examined*. London: Clarendon Press.
- Senge, P. (1992) *The Fifth Discipline: The Art and Practice of the Learning Organization*. Sydney: Random House.
- Stafford-Smith, M., Moran, M. and Seemann, K.W. (2008) The 'viability' and resilience of communities and settlements in desert Australia. *The Rangeland Journal* 30(1): 123-135.
- Sterman, John D. (2000) *Business Dynamics: Systems thinking and modeling for a complex world*. McGraw Hill.
- Stewart, F. (2009) Horizontal Inequality: Two Types of Trap. *Journal of Human Development and Capabilities* 10(3): 315-340.
- Sutton, P. (2009) *The politics of suffering: Indigenous Australia and the end of the liberal consensus*. Carlton, Vic: Melbourne University Press.
- Sutton, P. (2001) The politics of suffering: Indigenous policy in Australia since the 1970s. *Anthropological Forum* 11(2): 125-173.
- Taylor, J. (2008) Indigenous Peoples and Indicators of Well-being: Australian Perspectives on United Nations Global Frameworks. *Social Indicators Research* 87(1): 111-126.

doi:10.1007/s11205-007-9161-z.

- Tesfaghiorgis, H. (1991) Aboriginal economic status by ATSI regions: analyses of 1986 Census data. Discussion Paper No. 11. Canberra: Centre for Aboriginal Economic Policy Research (CAEPR), Australian National University.
- Townsend, P. (1979) *Poverty in the United Kingdom: A Survey of Household Resources and Standards of Living*. Berkeley: University of California Press. Downloaded from <http://books.google.com.au>
- The World Factbook 2009* (2009). Washington, DC: Central Intelligence Agency. <https://www.cia.gov/library/publications/the-world-factbook/index.html>
- Trigger, D. (2005) Mining projects in remote Aboriginal Australia: Sites for the articulation and contesting of economic and cultural futures. In *Culture, Economy and Governance in Aboriginal Australia*. D.J. Austin-Broos and G. M. Macdonald (eds.). Sydney: University of Sydney Press.
- UNDP (2009) *Human Development Report 2009. Overcoming barriers: Human mobility and development*. United Nations Development Programme. <http://www.unhcr.org/refworld/docid/4ac9d10d2.html>.
- Van Praag, B.M.S. and Ferrer-i-Carbonell, A. (2008) A Multi-dimensional Approach to Subjective Poverty. In *Quantitative approaches to multidimensional poverty measurement*. Chapter 8. N. Kakwani and J. Silber (eds.). New York: Palgrave, Macmillan.
- Van Praag, B.M.S., Geodhart, Th. and Kapteyn, A. (1980) The Poverty Line: a pilot survey in Europe. *The review of Economics and Statistics* 62(3): 461-465.
- Young, O. and Einarsson, N. (2004) Introduction. In Arctic human development report. pp. 1–15. Akureyri: Stefansson Arctic Institute. <http://www.svs.is/AHDR/>
- Yap, M. and Biddle, N. (2010) Gender Gaps in Indigenous Socioeconomic Outcomes: Australian Regional Comparisons and International Possibilities. *The International Indigenous Policy Journal* 1(2): Article 3. Available at: <http://ir.lib.uwo.ca/iipj/vol1/iss2/3>

Figure 1. Overlapping space (hatched) for shared indicators of well-being and development



Source: Adapted from Taylor (2008).

Table 1. Australian Non-Indigenous and Indigenous HDI estimates

Nation-territory/ census data used	HDI	HDI	Gap	Source
Australia	Non-Indigenous	Indigenous		
1990/1	0.835	0.675	0.160	Cooke
1995/6	0.850	0.677	0.173	Cooke
2000/1	0.858	0.674	0.173	Cooke
2006*	0.965	0.737	0.228	Yap
Northern Territory				Cooke
2006	0.998	0.530	0.468	Cooke

* Yap et al. (2010) used recent ABS (2009) estimates of Indigenous life expectancies, which are higher than previous estimates. This is due to a change in estimation methods and is not a real change in life expectancy.

Source: Adapted from Cooke et al. (2007) and Yap et al. (2010).

Table 2. Values for well-being indicators between Indigenous (Indig) and non-Indigenous (nIndig) Australians for time periods from 1999-2008. Note that the estimates are approximate, refer to the source tables for confidence intervals and caveats. The years are in superscript e.g. ⁹⁹⁻⁰⁰ for 1999-2000, ⁰⁰ for 2000, ⁰⁴⁻⁰⁵ for 2004-05, ⁰⁶ for 2006, ⁰⁶⁻⁰⁷ for 2006-07

Indicator examples	Gaps and change over time	Indig	nIndig	Indig	nIndig	Comment
Life expectancy	In years. Due to changes in methodology no time series data is available. Table 4.1.1.			M67.2, F72.9 ⁰⁵⁻⁰⁷	M78.8, F82.6 ⁰⁵⁻⁰⁷	Gap of 11.5 (M) & 9.7 (F) years
Infant and child mortality	Mortality rates, 0-4 years. Deaths per 1000 population. For WA, SA & NT. Table 4A.2.4.	4.0 ⁰⁹⁻⁰¹	1.0 ⁰⁹⁻⁰¹	3.3 ⁰⁵⁻⁰⁷	0.9 ⁰⁵⁻⁰⁷	
Reading, writing and numeracy	Proportion of year 7 students who achieved the reading benchmark.	60.1% ⁰¹	88.4% ^{01*}	64.7% ⁰⁷	89.3% ^{07*}	Gaps consistent across measures & unchanged
Year 12 attainment	Tables 4A.5.2 & 4A.5.6.	29.3% ⁰¹	66.0% ⁰¹	32.6% ⁰⁶	70.8% ⁰⁶	38% gap, unchanged
Employment to population ratio	Tables 4A.6.5 & 4A.6.6.	43.2% ⁰¹	68.0% ⁰¹	48.0% ⁰⁶	71.7% ⁰⁶	24% gap unchanged
Household income	Grossed weekly median income. Table 4A.9.1.	\$365 ⁰¹	\$564 ⁰¹	\$398 ⁰⁶	\$612 ⁰⁶	35% gap unchanged
Substantiated child abuse and neglect	Rate per 1000 children 0-16 years. Table 4A.10.1.	14.8 ⁹⁹⁻⁰⁰	4.2 ⁹⁹⁻⁰⁰	35.3 ⁰⁷⁻⁰⁸	5.5 ⁰⁷⁻⁰⁸	
Imprisonment and juvenile detention rates	Imprisonment rates per 100,000 adult population. Table 4A.12.4.	1264.5 ⁰⁰	128.0 ⁰⁰	1769.4 ⁰⁸	133.3 ⁰⁸	
	Juvenile detention rate per 100,000 people. Table 4A.12.17.	318.1 ⁰¹	15.1 ⁰¹	403.0 ⁰⁷	14.4 ⁰⁷	
Teenage birth rates	Per 1000. Table 5A.2.23.	70.9 ⁰⁴	13.8 ⁰⁴	70.1 ⁰⁷	13.7 ⁰⁷	
Disability and chronic diseases	The need for assistance with a core activity.			7.3% ⁰⁶	4.1% ⁰⁶	
Hospitalisation rates for potentially preventable chronic diseases	Standardised rates per 1000 population. Table 7A.2.1.	154 ⁰⁴⁻⁰⁵	24 ⁰⁴⁻⁰⁵	186 ⁰⁶⁻⁰⁷	29 ⁰⁶⁻⁰⁷	

Hospitalisation for self harm	Standardised rates per 1000 population. Table 7A.8.5.	3.1 ⁰⁴⁻⁰⁵	1.5 ⁰⁴⁻⁰⁵	3.5 ⁰⁶⁻⁰⁷	1.4 ⁰⁶⁻⁰⁷
Overcrowding in housing	People living in overcrowded households. Table 9A.1.5.	30.7% ⁰¹	6.3% ⁰¹	27.2% ⁰⁶	5.7% ⁰⁶
Access to clean water, functioning sewerage & electricity	Indigenous communities with no organised sewerage system. Table 9A.3.4.	7.5% ⁰¹		2.1% ⁰⁶	Some improvement.

* Values are for the non-Indigenous and Indigenous people combined.

Source: Adapted from SCRGSP (2009).

Table 3. *Indices ranked consistently in quartiles where 1=least disadvantaged, 2=less disadvantaged, 3=more disadvantaged, 4=most disadvantaged*

Region	Indices				
	1986AL	1991AL	1991GA	1996GA	1996ABSb
Apatula	4	4	4	4	4
Jabiru	4	4	4	4	4
Kununurra	4	4	4	4	4
Tennant Creek	4	4	4	4	4
Warburton	4	4	4	4	4
Derby	4	3	4	4	4
Nhulunbuy	3	4	4	4	4
Katherine	3	3	4	4	4
Cooktown	3	2	4	4	4
Ballarat	1	1	1	1	1
Brisbane	1	1	1	1	1
Hobart	1	1	1	1	1
Queanbeyan	1	1	1	1	1
Sydney	1	1	1	1	1
Wangaratta	1	1	1	1	1
Adelaide	2	1	1	1	1
Darwin	1	1	1	1	2
Wagga Wagga	2	2	2	2	2
Ceduna	2	3	3	3	3
Port Augusta	3	2	3	3	3
South Hedland	3	4	3	3	3
Bourke	4	3	3	3	3
Torres Strait	2	2	2	1	3
Townsville	1	1	2	2	3
Mount Isa	1	2	2	2	3
Kalgoorlie	4	4	3	3	3
Broome	2	2	3	3	3
Alice Springs	2	3	2	2	2
Cairns	3	3	3	2	2
Coffs Harbour	2	2	1	2	2
Roma	2	3	2	2	2
Tamworth	3	3	2	3	2
Geraldton	3	3	3	3	2
Narrogin	4	4	3	3	2
Rockhampton	2	2	2	2	1
Perth	3	2	2	2	1

Source: 1986AL adapted from Altman and Liu (1994), 1991AL adapted from Altman and Liu (1994), 1991GA and 1996GA adapted from Gray and Auld (2000), 1996ABSb adapted from ABS (2000).

Table 4. *Ranked indices for Indigenous regions for 2001 and 2006. A value of 37= least favourable outcome, 1=most favourable. As each region ranked in the same quartile (Q) for both 2001 and 2006 original ranks are provided*

Region	2001	2006	Q	Region	2001	2006	Q
Apatula	37	37	4	Dubbo	18	17	2
Nhulunbuy	36	36	4	Cairns	17	18	2
Jabiru	35	35	4	Townsville	16	13	2
Katherine	34	33	4	Torres Strait	15	15	2
Tennant Creek	33	34	4	Roma	14	14	2
Kununurra	32	32	4	Rockhampton	13	10	2
Cape York	31	31	4	Wagga Wagga	12	16	2
Derby	30	30	4	Queanbeyan	11	12	2
Kalgoorlie	29	28	4	Darwin	10	11	2
Port Augusta	28	29	4	Coffs Harbour	9	9	1
Ceduna	27	24	3	Perth	8	7	1
Mt Isa	26	26	3	Adelaide	7	6	1
Bourke	25	25	3	Non-Met. Victoria	6	8	1
South Hedland	24	27	3	Brisbane	5	3	1
Broome	23	21	3	Tasmania	4	4	1
Geraldton	22	22	3	Sydney	3	5	1
Tamworth	21	20	3	Melbourne	2	2	1
Alice Springs	20	23	3	ACT	1	1	1
Narrogin	19	19	3				

Source: Adapted from Biddle (2009).