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Socioeconomic outcomes

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The 2011 Census Paper Series

In July 2012, the Australian Bureau of Statistics began releasing data from the 2011 Census of Population and Housing. One of the more important results contained in the release was the fact that the number of people who identified as being Aboriginal and/or Torres Strait Islander (Indigenous) had increased by 20.5 per cent since the 2006 Census. There were also significant changes in the characteristics of the Indigenous population across a number of key variables including language spoken at home, housing, education, and other socioeconomic variables.

In this series, authors from the Centre for Aboriginal Economic Policy Research (CAEPR) document the changing composition and distribution of a range of Indigenous outcomes. The analysis in the series is funded by the Commonwealth Department of Social Services (DSS) (formerly the Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA)) through the Strategic Research Project as well as DSS/ FaHCSIA and State/Territory governments through the Indigenous Populations Project.

The opinions expressed in the papers in this series are those of the author alone and should not be attributed to DSS or any other government departments.

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Abstract

CAEPR has a tradition of producing indices of Indigenous socioeconomic outcomes to support the work of Indigenous peoples and organisations in advocating for improved resources based on relative need, as well as of governments in targeting services where they will have the greatest impact on the Indigenous population. The aim of this paper is to replicate and extend this analysis. A number of insights emerge. First, leaving aside their own circumstances, Indigenous Australians were more likely to live in neighbourhoods where the rest of the population is relatively disadvantaged. Furthermore, in every area analysed, the Indigenous population had higher levels of socioeconomic disadvantage compared to the non-Indigenous population in the area. Within the Indigenous population, analysis showed that even though there was a higher level of disadvantage in remote parts of the country, there was significant variation within location types. There were many disadvantaged urban areas and many relatively advantaged ones in remote and regional Australia.

It was noted in the paper that while important, socioeconomic status is an incomplete measure of wellbeing. For this reason, a broader suite of indices was developed that allows for comparisons between different aspects of Indigenous outcomes. This confirmed previous findings that income, employment and education were correlated geographically, but that there were other notions of wellbeing that potentially move in opposite directions.

The data that was summarised in this paper is available for download from the CAEPR website and it is hoped that this provides a rich set of information for research and policy planning.

Acknowledgements

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List of acronyms

ABS	Australian Bureau of Statistics
ATSIC	Aboriginal and Torres Strait Islander Commission
AICG	Australian Indigenous Geographic Classification
ANU	The Australian National University
ASGS	Australian Statistical Geographic Standard
CAEPR	Centre for Aboriginal Economic Policy Research
CDEP	Community Development and Employment Projects Scheme
DSS	Department of Social Security
ERP	estimated resident population
FaHCSIA	Department of Families, Housing, Community Services and Indigenous Affairs
IEO	Index of Education and Occupation
IER	Index of Economic Resources
IRSAD	Index of Relative Socio-Economic Advantage and Disadvantage
IRSD	Index of Relative Socio-Economic Disadvantage
IRSEO	Indigenous Relative Socioeconomic Outcomes Index
NATSISS	National Aboriginal and Torres Strait Islander Social Survey
PCA	Principal Components Analysis
PINIRSEO	Pooled Indigenous and Non-Indigenous Relative Socioeconomic Outcomes Index
SA1	Statistical Area Level 1
SIOI	Suite of Indigenous Outcomes Indices
SEIFA	Socioeconomic Indexes for Areas

Introduction and overview

The 2011 Census Paper series that this paper is a part of has focused on the geographic and demographic distribution of a range of socioeconomic indicators for the Indigenous population. Underlying this analysis is the view that for governments to be able to meet the targets that they have set for improving Indigenous circumstances, there is a need to understand where it is that Indigenous Australians live, where relative and absolute need is greatest, and what the particular challenges are for different regions across Australia. Across most mainstream indicators, Indigenous Australians lag behind non-Indigenous Australians, meaning that national approaches to improving Indigenous outcomes cannot be ignored. In terms of service delivery, however, those areas with greater levels of measured disadvantage—either relative to the rest of the Australian Indigenous population or relative to the non-Indigenous population in the region—will be those that require the greatest per capita investment in training, infrastructure and job creation or support.

One way to conceptualise disadvantage is through socioeconomic status. Broadly speaking, this refers to the social and economic position of a given individual or group of individuals within the larger society. Socioeconomic status is usually but not always conceived of as a relative concept and can be measured at the individual, family/household, community or area level. In developing its Socioeconomic Indexes for Areas (SEIFA), the Australian Bureau of Statistics (ABS) defines 'relative socio-economic advantage and disadvantage in terms of people's access to material and social resources, and their ability to participate in society' (ABS 2008: p5).

Socioeconomic status is generally unobserved and hence proxy indicators or measures are required. Common measures include educational attainment, occupation, income and housing. However, the relative importance of these and other variables in terms of capturing socioeconomic status can change substantially through time and across populations. For example, the ABS used whether or not a house has a broadband internet connection as a measure of advantage in one of their SEIFA indexes. Being a relatively recent phenomenon, such a variable would not have been relevant in previous years (even if it were available). On the other hand, other consumer items (like colour televisions) have become so ubiquitous that not having one is as likely to be because of choice made by households, as opposed to a particular constraint.

Other measures of socioeconomic status are likely to be more important in different geographical or demographic contexts. For example, lack of access to a car, another SEIFA variable, may be highly relevant in much of Australia. However, not having a car may signal that a person lives in a relatively advantaged area where public transport is widely available and many amenities are close by. Furthermore, certain measures of socioeconomic status that may be highly relevant in one country may take on less importance in another, and this could be because of the geography, culture or institutional structure of the country. For example, the use of private health insurance as a proxy for socioeconomic status is likely to vary depending on the quality of the public health system in the country.

In most contexts though, income, education and employment are the key measures of socioeconomic status. In a survey carried out by Walker and Hiller (2005), close to or above three quarters of respondents rated variables in these areas as being important in 'determining whether an area is disadvantaged.' However, one of the uses of the concept of socioeconomic status is to compare different population sub-groups within a society, and such an analysis implicitly assumes that the concept can be applied universally across the population and across the lifecourse.

There are a number of population sub-groups for whom the different components of socioeconomic status take on greater or lesser relevance. For example, a person's employment status is often seen as a key component of their socioeconomic status. Someone who is unemployed is likely to have poor access to economic resources and is also excluded from a part of life that is seen as being central to Australian society. However, there are a number of stages in life where employment (and full-time employment in particular) could be considered an indication of poor socioeconomic status. This is generally the case when the person would like to focus on other activities and are working out of necessity as opposed to choice. This includes those who are studying full-time, those who have caring responsibilities and those who have retired.

Age is not the only dimension for which the concepts of socioeconomic status used for the total population may not be relevant. Perhaps the most obvious example in Australia is the Aboriginal and Torres Strait Islander (Indigenous) Australian population. According to ABS (2010):

Aboriginal and Torres Strait Islander peoples are culturally and linguistically diverse. However, common to most Aboriginal and Torres Strait Islander communities is a culture that is very different to the non-Indigenous Australian culture. Elements of cultural difference may include, but are not limited to: conceptions of family structure and community obligation, language, obligations to country and continuation of traditional knowledge. This in turn has an effect on the areas of concern that Aboriginal and Torres Strait Islander peoples might see as important to their wellbeing.

While this was written with regards to measuring Indigenous wellbeing, a similar argument could be made for measuring Indigenous socioeconomic status. Clearly, if one is analysing socioeconomic status for a particular population sub-group in isolation then there is greater scope to tailor the measures accordingly. However, when making comparisons across multiple groups or across the country as a whole, there is less scope to vary the measures used.

Ultimately, there is unlikely to be a single measure of socioeconomic outcomes that meets all analytical needs. For this reason, in this paper I take a pragmatic approach and construct a range of measures under different sets of assumptions. First, I take a pre-existing measure of socioeconomic status at the ABS area level the Index of Relative Socio-Economic Advantage and Disadvantage (IRSAD) and see how the areas in which Indigenous and non-Indigenous Australians live in differ.

Recognising that Indigenous Australians make up only a small percentage of the population in the area in which they live (the problem of the so-called ecological fallacy), the analysis in the remainder of the paper is based on three sets of Indigenous-specific indices. These are:

- The Indigenous Relative Socioeconomic Outcomes (IRSEO) Index, which is used to compare the distribution of Indigenous outcomes in 2006 and 2011 at the Indigenous Area level;
- The Pooled Indigenous and Non-Indigenous Relative Socioeconomic Outcomes (PINIRSEO) Index, which is used to compare Indigenous and non-Indigenous outcomes in 2011; and
- The Suite of Indigenous Outcomes Indices (SIOI), which introduce a broader range of measures for the Indigenous population, rather than just socioeconomic status.

Before presenting and discussing the various measures of Indigenous socioeconomic outcomes, the next section of the paper provides some background information on the Indigenous population, as well as the data and geography used in the paper.

Data and geography

Results presented in this paper are based on analysis of the 2006 and 2011 Censuses of Population and Housing. In 2006, the estimated resident population (ERP) of Indigenous Australians was around 517,000. By 2011, the preliminary ERP had increased to around 670,000. This population growth was much faster than suggested by the number of births of Indigenous children minus deaths within the population, meaning that some of those people who were identified (either by themselves or the household member responding to the census) as being Indigenous in 2011 were either missed from the 2006 Census or were identified as being non-Indigenous.

To undertake analysis at the regional and local level, the 2011 Census Paper series¹ uses the Indigenous Structure within the Australian Statistical Geographic Standard (ASGS). This is a four-level structure that builds up from the Statistical Area Level 1 (SA1). The next level above the SA1 in the structure is Indigenous Locations, of which there were 1,116. The next level above Indigenous Locations are Indigenous Areas (IAREs), of which there were 429. This is reduced to 411 substantive areas after excluding administrative codes representing those in a particular State or Territory who did not give any additional detail on their place of usual residence, or who were migratory on the night of the census.

Analysis in this paper will be undertaken at the Indigenous Area level. Data at this level will be made available on the 2011 Census Papers web page.² Summary results, however, will be presented using a structural classification of areas first developed in Taylor and Biddle (2008) to describe the geographic patterns of Indigenous migration between 2006 and 2011. This structural classification took into account the level of remoteness of the Indigenous Area, the size of the urban centre that the Indigenous Area was located in, and for some areas, the proportion of that urban centre that identifies as being Indigenous.

Originally, there were eight location types based on the 2006 Australian Indigenous Geographic Classification (AIGC). However, it was not possible to accurately maintain

1. Other papers in the series can be downloaded from <http://caepr.anu.edu.au/population/censuspapers.php>.
2. See <http://caepr.anu.edu.au/Publications/census-papers/2013CP13.php>.

TABLE 1 **Names and definitions of structural classification of Indigenous Areas (IAREs)**

Location type	Definition
City areas	IAREs within urban centres with a population greater than 100,000.
Large regional towns	IAREs where the Indigenous population is predominantly resident in urban centres of between 10,000 and 100,000.
Small regional towns and localities	IAREs where the Indigenous population is predominantly resident in urban centres of between 1,000 and 10,000, or in rural localities of between 200 and 1,000 listed in the Urban Centre and Locality (UCL) classification.
Regional rural areas	IAREs where the Indigenous population is predominantly resident in dispersed locations in regional Australia that are not listed as rural localities in the UCL classification.
Remote towns	IAREs where the Indigenous population is predominantly resident in urban centres in remote Australia.
Indigenous towns	IAREs where the Indigenous population is predominantly resident in urban centres and localities in remote Australia that have predominantly Indigenous populations.
Remote dispersed settlements	IAREs where the Indigenous population is predominantly resident in the balance of small dispersed settlement in remote Australia.

Source: Taylor and Biddle (2008).

the Town Camp grouping for 2011 due to boundary changes. Therefore Table 1 outlines a seven-category structural classification of the Indigenous Areas in the 2011 ASGS. To keep this classification consistent through time, the groupings are based on 2011 boundaries, but use the remoteness, urban size and Indigenous share of the 2006 usual resident population.

The socioeconomic characteristics of the areas in which Indigenous Australians live

In March 2013, the ABS released the 2011 Socio-Economic Indexes for Areas (SEIFA), a set of measures of relative socio-economic disadvantage and advantage, calculated for almost all geographic areas in Australia. These indexes are based on a compilation of information from a number of census data items which summarise aspects of the socio-economic conditions in a given area through four indices:

- Index of Relative Socio-Economic Disadvantage (IRSD);
- Index of Relative Socio-Economic Advantage and Disadvantage (IRSAD);
- Index of Economic Resources (IER); and
- Index of Education and Occupation (IEO).

The indices are created using a technique known as Principal Components Analysis (PCA), a statistical technique that turns a set of variables into the same number of uncorrelated components. These components are ordered such that the first component explains the largest amount of variation across the original variables,

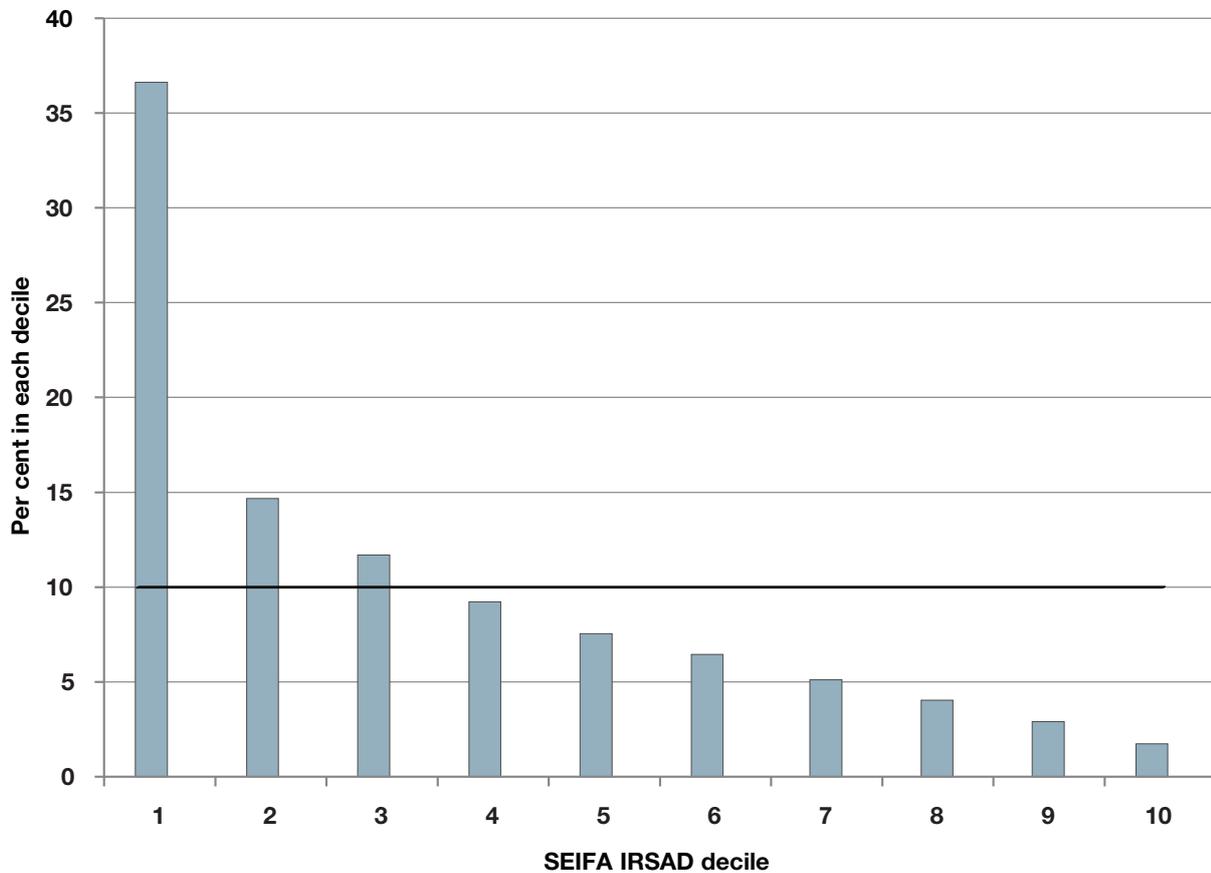
the second component the next largest amount and so on. The components are constructed as a linear combination of the original variables using a component score that is calculated based on a correlation matrix of the original variables (Darlington 1997). In essence, PCA can be used to summarise as much of the variation as possible in the underlying data items into a single index number or a set of indices.

As an example, the IRSAD includes 10 variables that indicate that the area is relatively advantaged (e.g. percentage of people with high income, employed as a manager or professional, households with three or more cars) and 15 variables that indicate an area is relatively disadvantaged (e.g. no education, single parents, unemployed).³ These are then collapsed into a single index value with areas ranked from the most disadvantaged to the most advantaged. A range of geographic areas can be ranked based on their SEIFA score for each of the four indices.

The indices can be used for the targeting and planning of government and commercial services. Another use of SEIFA is to help explain individual behaviour and living circumstances by documenting the geographic context in which particular population sub-groups live. By definition, roughly 10% of all Australians live in the most disadvantaged 10% of neighbourhoods and roughly 10% live in the most advantaged 10%. This is not, however, true of all population subgroups. This uneven distribution of area-level circumstance is documented in Fig. 1, which gives the per cent of Indigenous Australians who live in

3. A full list of variables can be found at <<http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2033.0.55.001main+features100042011>>.

FIG 1 Per cent of Indigenous Australians by SEIFA decile



Source: Customised calculations based on the 2011 Census.

each of the IRSAD deciles from the most disadvantaged decile on the left to the most advantaged on the right.

Around 36.6 per cent of Indigenous Australians live in the most disadvantaged decile, compared to only 1.7 per cent who live in the most advantaged decile. It is true that some of that area-level disadvantage would have been due to the socioeconomic characteristics of those Indigenous Australians themselves. However, the vast majority of Indigenous Australians only make up a small per cent of the neighbourhoods in which they live. What these SEIFA results show, therefore, is that not only are Indigenous Australians relatively disadvantaged, but that they live in areas where their neighbours and friends are disadvantaged. As it is these neighbours and friends that people often use to obtain labour market, education and financial support, then it is quite possible that this area-level disadvantage contributes to individual disadvantage.

An Indigenous Relative Socioeconomic Outcomes (IRSEO) index

For the Australian population as a whole, the SEIFA indices are widely used measures of relative disadvantage at the area level and have been found to correlate with other characteristics of the individuals who live in those areas. For example, Adhikari (2006) found a strong correlation between the 2001 SEIFA scores and the proportion of people in an area who report poor health, obesity and other health risk factors. The discussion in the previous section also showed that in terms of the IRSAD, Indigenous Australians were much more likely to live in the most disadvantaged areas than the non-Indigenous population and much less likely to live in the most advantaged ones. Despite this, such indices are not always useful when it comes to designing policy for the Indigenous population for three main reasons

1. Given the relative size of the Indigenous population, only a small proportion of the population in the areas used as the basis for the indices are likely to be Indigenous. Therefore, the standard SEIFA indices will be dominated by the characteristics of the non-Indigenous population, and will not adequately show the distribution of Indigenous disadvantage. Kennedy and Firman (2004) illustrate this issue of the 'ecological fallacy' by showing that the Indigenous population consistently has a lower socioeconomic status than other residents given the standard SEIFA indices.
2. There are variables in the standard SEIFA indices that may not be as relevant or have a different meaning for the Indigenous population compared to the non-Indigenous population. For example, the presence of Community Development and Employment Projects (CDEP) schemes in a number of areas at the time of the 2011 Census makes the interpretation of the unemployment rate quite difficult. Alternatively, the cut-offs for variables such as income or rent may not reflect the distribution of Indigenous outcomes.
3. The SEIFA indices constructed by the ABS are not comparable between census years as both the variables included and the geographic boundaries differ through time. Hence it would not be possible to compare the change in the distribution of socioeconomic outcomes through time, Indigenous or otherwise.

For these reasons, in 2009 I used data from the 2001 and 2006 Censuses to create an Indigenous specific set of indices which I labelled the Indigenous Relative Socioeconomic Outcomes (IRSEO) index (Biddle 2009a). The main difference between the IRSEO index and those produced for SEIFA was that it was calculated separately for the Indigenous population in each Indigenous Region in Australia, as well as each Indigenous Area. It also used a reduced set of nine socio-economic outcomes of the usual resident population of an area. These were:

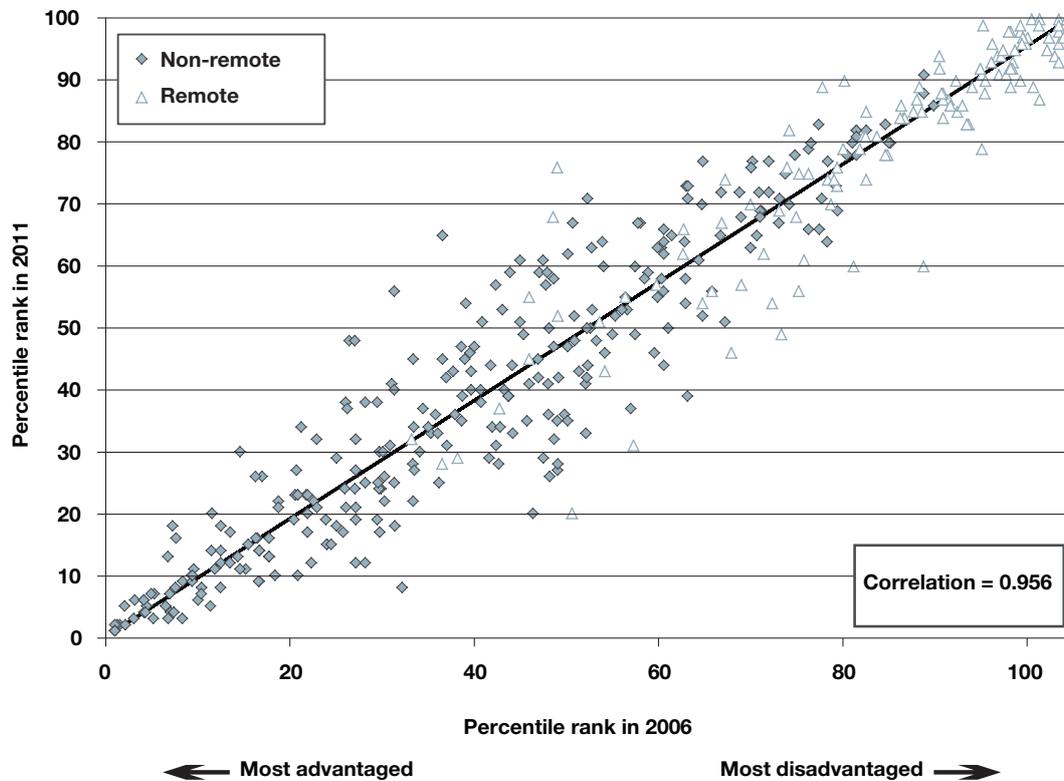
- Population 15 years and over employed;
- Population 15 years and over employed as a manager or professional;
- Population 15 years and over employed full-time in the private sector;
- Population 15 years and over who have completed Year 12;
- Population 15 years and over who have completed a qualification;
- Population 15 to 24 years old attending an educational institution;
- Population 15 years and over with an individual income above half the Australian median;
- Population who live in a house that is owned or being purchased; and
- Population who live in a house with at least one bedroom per usual resident.

The variables for the IRSEO index are constructed around a narrower range of variables than the SEIFA indices. Specifically, following the targets included in the Closing the Gap framework (FaHCSIA 2009), they focus on employment, education, income and housing. However, it is important to note up front that they do not include any information on health, language or other cultural factors. Furthermore, they are dominated by variables specifically constructed for the adult Indigenous population. Because of these limitations, these domains will be expanded on in a later set of analysis in this paper.

The main conclusion from the analysis in Biddle (2009a) was that Indigenous Australians in city areas and large regional towns had substantially better socioeconomic outcomes than their remote counterparts. However, it was also shown that there was significant variation within regions and location type. For example, it was shown that the 'Indigenous Region of Sydney had the greatest diversity with six of the seven most advantaged Indigenous Areas across all of Australia, but ten areas in the lowest two quartiles' (Biddle 2009a: v).

Another finding from the analysis was that there was a high degree of continuity between 2001 and 2006 in terms of the Indigenous socioeconomic rank of the area. As demonstrated in Fig. 2, this was also the case when comparing a 2011-based IRSEO index with the 2006-based index. For the 2011-based index, I rank the 408 Indigenous Areas in the Indigenous Structure of the ASGS that were available for analysis using the first component from a PCA based on the nine variables listed above. I then assign each Indigenous Area to one of 100 percentiles ranging from 1 (the most advantaged) to 100 (the most disadvantaged). This rank is then compared to the percentile rank of that area based on the 2006-based IRSEO. Where the area boundaries from the two censuses do not completely overlap, the 2006-based data is converted to the 2011-based structure using a quasi-population weighted concordance (Biddle 2008).

FIG. 2 Relative socioeconomic rank of Indigenous Areas in 2011 compared to relative rank in 2006



Source: Customised calculations based on the 2011 Census and Indigenous Area results in Biddle (2009a).

Fig. 2 plots the 2011-based rank of the area on the vertical axis against the 2006-based rank of the area on the horizontal axis. Areas in remote Australia are presented in grey, whereas those in non-remote areas Australia are presented in black. Keeping in mind that lower percentile rankings indicate higher advantage, areas that are above the 45-degree line worsened in terms of their relative position between 2006 and 2011 whereas those below the line improved.

The main conclusion from Fig. 2 is that those areas that were identified as being relatively advantaged in 2006 tended to be identified as being relatively advantaged in 2011. With a correlation of 0.956, there is a fair degree of stability through time in terms of socioeconomic outcomes. There are however a number of exceptions, with a minority of areas changing their rank quite considerably through time.

Between 2006 and 2011, there were eight areas that improved their relative socioeconomic ranking by 20 percentile places or more. As this is a relative measure, it is unlikely that there would be many areas that were in the

most advantaged quartile of the distribution in 2006 and significantly improve their ranking over the subsequent period. However, it is a little more surprising to note that there were very few areas that were highly disadvantaged in 2006 but experienced a substantial improvement between 2006 and 2011. Over the same period, there were seven areas that worsened in terms of their socioeconomic rank by 20 percentile places or more. These areas also tended to be in the middle part of the distribution.

It would seem, therefore, that areas that are highly advantaged stayed that way over the most recent intercensal period. Those that were highly disadvantaged also did not change too much. However, there was a greater amount of variation across years for those areas in the middle of the distribution.

Looking at Fig. 2, it is clear that in terms of socioeconomic outcomes, remote areas (presented in grey) tended to have worse outcomes than those in non-remote (presented in black) parts of the country. Specifically, the average rank for remote parts of the country was 79, whereas for non-remote areas it was 39. Once again though, there were

TABLE 2 Indigenous socioeconomic percentile rank by location type – 2011 and change from 2006

Location type	2011 Percentile rank				Change between 2006 and 2011			
	Mean	Standard deviation	Min.	Max.	Mean	Standard deviation	Min.	Max.
City areas	22.0	16.5	1	63	-0.5	6.2	-14	26
Large regional towns	43.2	19.3	4	86	0.1	8.1	-20	18
Small regional towns and localities	52.5	22.2	7	91	1.5	10.1	-24	30
Regional rural areas	41.3	25.6	5	83	2.4	9.0	-23	17
Remote towns	62.1	16.7	20	89	-0.5	10.9	-28	29
Indigenous towns	86.7	15.1	29	100	-1.1	5.2	-24	8
Remote dispersed settlements	85.9	12.8	46	100	-1.8	7.4	-25	13

Source: Customised calculations based on the 2011 Census and Indigenous Area results in Biddle (2009a).

exceptions. For example, Yarrabah in the Cairns – Atherton Indigenous Region was ranked in the 91st percentile in 2011, despite being in a non-remote part of the country. Cherbourg (in Toowoomba – Roma) and Coconut Grove – Ludmilla (in the Darwin Indigenous Region) were two other non-remote areas that ranked relatively poorly. At the other end of the distribution, Bulloo - Quilpie – Barcoo is in a remote part of the Toowoomba – Roma Indigenous Region, but ranked in the 20th percentile in 2011.

Results presented in Table 2 further highlight a considerable geographic variation, this time with a focus on the seven location types introduced and discussed earlier. Specifically, the first part of the table looks at the 2011 percentile rank for areas within these seven classifications. It gives the mean, standard deviation, minimum value and maximum value. The second part of the table focuses on change through time, with negative values indicating an improvement in relative outcomes and a positive value are worsening.

There are three main results that emerge from Table 2. First, there is a clear gradient in socioeconomic outcomes across the location type classification. City areas tend to have the most advantaged outcomes and Indigenous towns/remote dispersed settlements the most disadvantaged outcomes. The second point to note though is the high standard deviation for most of the location types. This picks up on the previous point that measures of remoteness are good, but not perfect, predictors of socioeconomic outcomes.

The final point to note from Table 2 is that there were some patterns to the change through time in relative

rank. City areas, large regional towns and remote towns stayed relatively stable on average. There was, however, a relative worsening of outcomes in small regional towns and regional rural areas alongside a relative improvement in Indigenous towns and remote dispersed settlements.

Comparing the outcomes of Indigenous and non-Indigenous Australians in an area

Those living in remote parts of the country tend to have worse socioeconomic outcomes than those living in non-remote areas. However, an Indigenous person living in the eastern suburbs of Melbourne or the northern suburbs of Sydney may not necessarily make comparisons with Indigenous people living in Indigenous towns and remote dispersed settlements. Rather, a more salient comparison might be with non-Indigenous people living in their immediate surrounds.

In his new book, *Battlers and Billionaires*, Leigh (2013) outlines a number of experiments and empirical analysis which focuses on individual preferences for fairness, including ‘one US study [which] compared individuals with the same income who lived in high-and low-income neighbourhoods’ where it was found that ‘as their neighbours’ incomes rose, an individual’s happiness fell.’ One potential reason for this is that there are a number of goods and attributes that are positional. It doesn’t just matter what you possess, but what others around you do (Corazzini et al. 2012). The example given in Leigh (2013) is a man who becomes dissatisfied with his \$200 suit when all those around him have \$1000 ones. A more pertinent example might be the economic benefits that one derives

from having completed Year 12 when many people around you also have a degree.

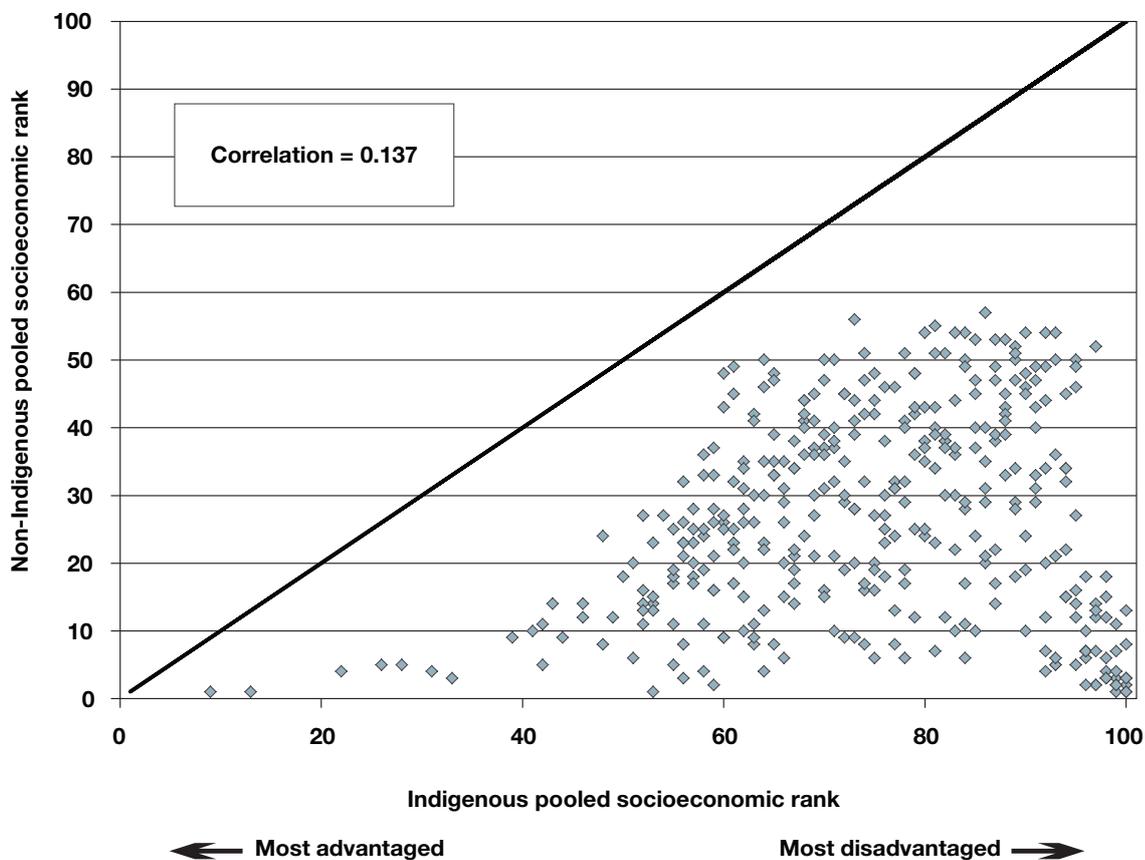
A further reason to focus on comparisons between Indigenous and non-Indigenous Australians is that, apart from the target related to preschool access, the Closing the Gap targets are all relative ones. Due to the way it was constructed, the IRSEO index contains information on the relative socioeconomic position of Indigenous Australians in one area compared to another. However, it has no information on the difference between Indigenous and non-Indigenous outcomes in the area. However, the Pooled Indigenous and Non-Indigenous Relative Socioeconomic Outcomes (PINIRSEO) Index has been designed to facilitate such comparisons.

The PINIRSEO index is based on the same nine variables as the IRSEO index. However, following the analysis presented for the 2006 Indigenous population in Biddle (2009b), a separate index value is created for the Indigenous population in an area, as well as the non-Indigenous population. In essence, the two populations

are treated as separate observations and pooled together into a single dataset. The index is constructed for 368 Indigenous Areas with a population count of at least 100 Indigenous and 100 non-Indigenous usual residents of age 15 years and over. It is created by pooling Indigenous and non-Indigenous area outcomes and running a PCA on 736 observations. These are then ranked into percentiles with 1 the most advantaged area and 100 the most disadvantaged.

The results from the analysis give a mean percentile ranking for the Indigenous observations of 74.7 and a mean percentile ranking for the non-Indigenous population of 26.4. This confirms quite clearly that the Indigenous population is relatively disadvantaged in terms of employment, education, income and housing compared to the non-Indigenous population. What is of greater interest though is the comparison within a particular area between the Indigenous population and the non-Indigenous population. This comparison is summarised in Fig. 3.

FIG. 3 Comparisons between Indigenous and non-Indigenous percentile rank – 2011



Source: Customised calculations based on the 2011 Census.

TABLE 3 Indigenous socioeconomic percentile rank and differences between Indigenous and non-Indigenous Australians, 2011

Location type	Number of areas	2011 Pooled Indigenous Rank				Indigenous and non-Indigenous difference			
		Mean	Standard deviation	Min	Max	Mean	Standard deviation	Min	Max
City areas	96	59.3	14.5	9	84	38.2	12.9	8	74
Large regional towns	76	73.7	10.8	46	96	42.6	12.4	14	86
Small regional towns and localities	88	78.5	12.1	50	95	41.8	13.4	12	81
Regional rural areas	25	73.2	14.3	51	95	37.1	17.5	16	88
Remote towns	36	83.1	9.9	57	98	63.0	14.6	33	88
Indigenous towns	24	95.8	7.2	66	100	89.2	8.9	60	99
Remote dispersed settlements	23	94.3	6.5	74	100	81.3	17.6	38	99

Source: Customised calculations based on the 2011 Census.

Results presented in Fig. 3 plot the Indigenous socioeconomic rank of an area on the horizontal axis against the non-Indigenous rank of the area on the vertical axis. The correlation coefficient of 0.137 (which is significantly different from zero in a statistical sense) shows that more advantaged Indigenous populations tend to live in areas where the non-Indigenous population is more advantaged. But, this relationship is far from perfect.

The 45 degree line in the figure indicates a situation where the Indigenous and non-Indigenous populations in the area have the same socioeconomic ranking. As lower values for the index indicate more advantaged areas, dots that are above the line of equality would indicate areas where Indigenous Australians are more advantaged than the non-Indigenous population, whereas dots below the line indicate areas where Indigenous Australians are more disadvantaged.

It is clear from the results presented in Fig. 3 that there is not a single area where the Indigenous population has better or even relatively equal outcomes compared to the non-Indigenous population. The average intra-area difference is 48.3 percentile places. The smallest gap between the two populations is Sydney - Lower North, where the Indigenous population is ranked in the 9th percentile in the pooled ranking with the non-Indigenous population ranked in the 1st percentile.

There were three areas where the Indigenous population ranked in the 100th (most disadvantaged) percentile whereas the non-Indigenous population ranked in the 1st (most advantaged percentile) Ramingining - Milingimbi and Outstations; Great Sandy Desert; and Kaltukatjara and

Outstations. These areas are all in remote Australia. As shown in Table 3, it was in remote areas where the gaps between the Indigenous and non-Indigenous population were greatest.

Results presented in Table 3 demonstrate that there is a large average gap between the two populations across Australia. In city area and regional rural areas, where the gap is smallest, the Indigenous population of an area ranks around 37-38 percentile places lower than the non-Indigenous population in the same area. Putting this another way, the average difference between the socioeconomic characteristics of Indigenous Australians in city areas and Indigenous Australians in Indigenous towns/ remote dispersed settlements was substantially less than the difference between Indigenous Australians in city areas and non-Indigenous Australians in the same area.

While gaps were large across Australia, it is still the case that it is in remote parts of the country where the gaps are largest. Furthermore, looking at the standard deviation, it is also the case that it is in Indigenous towns where the gap is the most consistent. The employment, education, income and housing circumstances of the non-Indigenous population in remote areas is so far removed from the circumstances of the Indigenous population that it is hard to see how those two populations might share any common identity.

Developing a Suite of Indigenous Outcomes Indices

Socioeconomic status is an important measure or set of measures that captures a person's access to economic resources both now and into the future, as well as their relative position within a society that values things like income, employment and education. Despite the differences between Indigenous and non-Indigenous Australians in terms of history, location, and engagement with mainstream institutions, it is still the case that those Indigenous Australians with higher levels of socioeconomic status tend to have better outcomes across a range of subjective wellbeing indicators (Biddle 2013).

Despite this importance there is a recognised need to capture broader notions of Indigenous wellbeing. A narrow focus on mainstream notions of socioeconomic status provides little scope for alternative Indigenous approaches to development that emphasise other notions of wellbeing such as language maintenance, cultural participation, control/ownership of lands and other resource-generating activities (Altman 2005).

Because of this, there have been a number of other frameworks of wellbeing which recognise the unique cultural heritage of Indigenous Australians. In their Indigenous Wellbeing Framework, the ABS (2010) includes: culture, heritage and leisure; family, kinships and community; citizenship and governance; as well as customary, voluntary and paid work as important domains of wellbeing. These are in addition to, rather than instead of the mainstream notions/determinants of wellbeing like health, education, income and housing.

An alternative framework has been developed for the United Nations Permanent Forum on Indigenous Issues (UNPFII 2008). This framework includes indicators on 'actual control of territories, lands and natural resources', 'promotion of Indigenous languages' and 'measures to protect traditional production and subsistence'. As in the ABS framework, these dimensions or determinants of wellbeing are in addition to rather than in competition with the standard socioeconomic indicators.

In 2011, CAEPR produced a series of papers on *Measures of Indigenous wellbeing and their determinants across the lifecourse*.⁴ This series was primarily based on analysis of sample survey data, including but not limited to the National Aboriginal and Torres Strait Islander Social Survey (NATSISS). The papers produced for this series provided a range of information at the national level, with some broad comparisons made between those living in remote

and non-remote parts of Australia. One of the limitations of using sample surveys for the analysis is that information is not available for analysis at the local level. The data is not available at that level, nor would it be robust enough to undertake such analysis. On the other hand though, the census is also less than ideal as it misses many important aspects of Indigenous wellbeing.

Despite this limitation, there are a range of variables on the census that can take us beyond simple measures of socioeconomic status. Furthermore, it is also possible to use the census to measure the outcomes of particular groups within the Indigenous population. With this in mind, the analysis presented in this section summarises the development of a preliminary Suite of Indigenous Outcomes Indices (SIOI) across five domains. These domains are listed below:

- SIOI 1 Index of income and wealth;
- SIOI 2 Index of employment status;
- SIOI 3 Index of education participation and attainment;
- SIOI 4 Index of child outcomes; and
- SIOI 5 Index of language, social and health maintenance.

The first three of the domains were covered by the IRSEO index presented earlier. However, by calculating them separately and adding additional indicator variables, it is possible to examine how they might vary independently. The fourth domain takes into account the possibility that the outcomes of children in an area may not necessarily correlate completely with the outcomes of adults. The final domain focuses on aspects of maintenance of language, social relationships and health.

Each index contains four component variables, as documented in Table 4. For each of the component variables, the Indigenous Areas are ranked separately with all of the components constructed such that lower values represent more positive outcomes. These are then summed within each domain (without any weighting) with the raw score converted into a percentile ranking.

Looking at the composite variables for each of the domains highlights the limitations of using the census to undertake analysis of Indigenous outcomes. For example, home and car ownership is used as a proxy for wealth in SIOI 1, but there is no information on the value of those assets, or on other assets such as investment properties

4. See <<http://caepr.anu.edu.au/population/lectures2011.php>>.

TABLE 4 **Component variables for a Suite of Indigenous Outcomes Indices**

SIOI 1: Index of income and wealth

- Household income greater than median
- At least one car in household
- Not overcrowded
- Home owned or being purchased

SIOI 2: Index of employment status

- Male employment/population
- Female employment/population
- Employed population who are managers/professionals
- 15-24 year olds (not studying full-time) who are employed

SIOI 3: Index of education participation and attainment

- Population completed Year 12
- Population with a qualification
- Qualifications that are a degree or higher (of those with a qual)
- 15-24 year olds studying

SIOI 4: Index of child outcomes

- 4-5 year olds participating in preschool
- 0 to 14 year olds not in a single parent family
- 0 to 14 year olds with at least one employed person in family
- 0 to 14 year olds not in income poverty

SIOI 5: Index of language, social and health maintenance

- Speaks an Indigenous language at home
 - Undertook volunteer work in previous 12 month
 - Employed population who are working in Heritage activities or Creative and Performing Arts Activities
 - 45 plus year olds who do not have a profound or severe disability
-

or superannuation. The index of education participation and attainment includes whether or not a person has completed Year 12 or a qualification, but no information is available on the level or mark received for that qualification. In terms of child outcomes, there is no information on child health or education attendance, two characteristics that are likely to predict future outcomes.

The fifth index in the suite that of language, social and health maintenance is the most difficult to construct using the census, but arguably one of the most important in explaining broader notions of Indigenous wellbeing. There are obvious limitations with the indicators chosen. While a measure of Indigenous language has been included, it is not possible using the census to identify a person's fluency in that language. On the other hand, there may be a number of people who have the ability to speak an Indigenous language but are missed from this measure because they do not speak it at home. While volunteer work can have a range of benefits for the individual undertaking that work and the community in which that work is undertaken (Leigh 2010), it can also be an indicator of a lack of services in the area, with volunteering taking up the slack. In terms of industry of employment, it is quite possible that Indigenous Australians who are working in heritage activities or creative and performing arts activities are contributing to the maintenance of Indigenous culture and art. However, many others might be contributing to Indigenous cultural maintenance without doing so through their employment. Finally, having a profound or severe disability is only one aspect of health maintenance but one that is captured incompletely in the census (Biddle, Yap and Gray 2013).

Despite these limitations, the SIOI still captures a number of important Indigenous outcomes. Furthermore, as demonstrated in Table 5, at the area level some of the domains are highly correlated with each other. Results are presented as pairwise correlation coefficients which range from -1 (the two indices move in completely opposite

directions) to +1 (one of the indices is perfectly predicted by the other). In between, a value of zero implies that there is no observed relationship between the variables.

Not surprisingly, there is a strong correlation at the area level between the first three of the indices, with employment and education outcomes having the strongest correlation. There is a smaller, but still positive correlation between the child outcomes index and SIOI 1, SIOI 2 and SIOI 3. Although there are limitations of the child outcome measures on the census, it would appear that at least with the data available, children who live in areas where adults have better outcomes tend to have better outcomes themselves.

The last line of the table shows that there is a negative and reasonably large correlation between the Index of language, social and health maintenance and the Index of income and wealth. The remaining correlations were not significantly different from zero. This doesn't mean that the maintenance variables determine or even predict income and wealth at the individual level. Indeed, there is some evidence of there being a positive link between some aspects of Indigenous cultural maintenance and mainstream notions of development (Dockery 2010; Biddle 2013). However, what the data does show is that some areas that are otherwise ranked relatively well on measures of income and wealth might still have a level of need for support in other outcomes. This is demonstrated in Table 6, which gives the average values for the five indices across the location type classification (remembering that lower values indicate more favourable outcomes).

There are a few general trends in the average values in the indices across the location types, with more urban areas ranking relatively well in the first three indices and Indigenous towns/remote dispersed settlements ranking relatively well in the last index. There are, however, a number of nuances which point to a degree of policy complexity. For example, Indigenous Australians in city

TABLE 5 Correlation between Suite of Indigenous Outcome Indices

	SIOI 1 – Income and wealth	SIOI 2 – Employment	SIOI 3 – Education	SIOI 4 – Child outcomes	SIOI 5 – Maintenance
SIOI 1 – Income and wealth	*				
SIOI 2 – Employment	0.649	*			
SIOI 3 – Education	0.701	0.727	*		
SIOI 4 – Child outcomes	0.461	0.552	0.306	*	
SIOI 5 – Maintenance	-0.303	-0.044	-0.036	0.031	*

Source: Customised calculations based on the 2011 Census.

TABLE 6 Means and standard deviations for Suite of Indigenous Outcome Indices

	City areas	Large regional towns	Small regional towns and localities	Regional rural areas	Remote towns	Indigenous towns	Remote dispersed settlements
Means							
SIOI 1 – Income and wealth	33.7	41.3	43.7	29.1	58.5	90.7	87.5
SIOI 2 – Employment	25.3	50.5	59.6	47.1	52.8	72.9	64.2
SIOI 3 – Education	18.1	41.8	55.2	45.3	68.3	84.3	86.6
SIOI 4 – Child outcomes	48.4	50.4	56.1	43.8	43.3	51.7	54.2
SIOI 5 – Maintenance	50.7	55.1	58.0	54.1	63.1	32.5	33.0
Standard deviations							
SIOI 1 – Income and wealth	21.0	20.5	23.9	26.2	20.7	7.1	8.1
SIOI 2 – Employment	19.0	25.1	26.8	27.5	20.9	25.3	28.9
SIOI 3 – Education	13.9	18.4	20.2	21.3	14.8	16.5	11.7
SIOI 4 – Child outcomes	29.1	27.3	29.8	30.6	25.3	30.4	28.6
SIOI 5 – Maintenance	25.0	27.6	27.6	26.3	33.4	27.6	27.1

Source: Customised calculations based on the 2011 Census.

areas rank worse on average than those in regional rural areas in terms of income and wealth. This is despite there being very large differences in the opposite direction for the education index. While this would need to be tested with individual data, this might suggest that the higher levels of education for Indigenous Australians in city areas are of slightly less benefit than some other areas in terms of income and wealth because they are competing in these labour markets with non-Indigenous Australians who also have quite high levels of education.

A second important finding from Table 6 is that Indigenous Australians in remote towns have the worst average ranking in terms of language, social and health maintenance, while those in city areas are doing relatively well. This demonstrates a degree of diversity which can be overlooked when using a simple remote/non-remote binary.

Summary and concluding comments

CAEPR has a tradition of producing indices of Indigenous socioeconomic outcomes to support the work of Indigenous peoples and organisations in advocating for improved resources based on relative need, as well as of governments in targeting services where they will have the greatest impact on the Indigenous population. As far back as 1991, Tesfaghiorghis (1991) used three variables

representing education, employment and income to construct an index of socioeconomic advantage at the Aboriginal and Torres Strait Islander Commission (ATSIC) Region level (the precursor for Indigenous Regions) for the Indigenous population using the 1986 Census.

Altman and Liu (1994) used a similar list of variables to examine socioeconomic status for a reduced number of regions for the 1991 Census, making some comparisons with results from the 1986 Census. Gray and Auld (2000) constructed an index of relative disadvantage using four variables representing family income, housing, educational attainment, and employment. The authors found a reasonable level of stability between 1991 and 1996 in terms of how regions ranked, with Alice Springs and Cairns being notable exceptions. Biddle (2009a) found a similar result for the 2001 and 2006 Census, making comparisons all the way back to the analysis of Tesfaghiorghis (1991).

There have been a number of innovations in this index-based analysis of the census. Gray and Auld (2000) augmented their census-based analysis with administrative data to attempt to control for the CDEP scheme. Biddle (2009b) created a pooled index which enabled intra-area comparisons between Indigenous and non-Indigenous outcomes.

This research has demonstrated a number of policy relevant insights. First, it has confirmed that in terms of socioeconomic status, disadvantage is greatest in remote

parts of country. However, the second insight is that there is significant variation within regions or broad geographic groupings. There are a number of advantaged remote areas and a number of disadvantaged non-remote ones. A final insight that form the index-based analysis is that no matter where the area is located, there are significant gaps between Indigenous and non-Indigenous in the same area in terms of socioeconomic outcomes.

This paper has replicated and extended the above analysis, showing that these patterns have persisted to 2011. It was noted, however, that while important, socioeconomic status is an incomplete measure of wellbeing. For this reason, in this paper I also developed a suite of indices that have allowed for comparisons between different aspects of Indigenous outcomes. This confirmed previous findings that income, employment and education were correlated geographically, but that there were other notions of wellbeing that potentially move in opposite directions.

The data that was summarised in this paper is available for download from the CAEPR website.⁵ It can be used for comparisons of particular areas as well as spatial and other analysis. It is quite likely that as others interrogate the data, other insights will emerge. It is also hoped that the data will raise a number of research questions, including what some of the policies might be that influence average outcomes in the area. For example, the potential impact of a number of location-based policies could be investigated

5. See <<http://caepr.anu.edu.au/publications/censuspapers.php>>.

by comparing the 2006 and 2011 rankings in those areas. Alternatively, it would be worth considering the relationship between the index and the age structure, mobility rates, gender composition or other demographic characteristics of the area.

In undertaking this analysis, however, it needs to be kept in mind that research based on the census will always be limited. The census suffers from significant undercount (especially for the Indigenous population) as well as item-specific non-response. More importantly though, it is very important to recognise that the data items on the census overlap only partially with the broader notions of wellbeing that Indigenous peoples themselves have identified as being important. At the national level, census data should therefore ideally be used alongside analysis of more targeted survey data that has such information. At the local level, the census is useful at identifying areas, towns, suburbs or communities of potential policy concern. However, a detailed understanding of these localities can only come from localised and targeted data collection (both qualitative and quantitative).

Despite these limitations, the results presented in this paper have shown that while there are patterns in advantage/disadvantage and other outcomes, there are many exceptions and nuances that require a careful consideration of local circumstances. Just as all individuals have their own story to tell, so too does every area. It is hoped that by summarising the data and making it freely available to anyone who wants to use it that these stories will have a greater degree of statistical support.

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