

**COMMONWEALTH GRANTS COMMISSION**

**INDIGENOUS FUNDING INQUIRY**

**SUBMISSION**

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**(@ CAEPR / ANU)**

**Submission No.: IFI/SUB/0028**

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18 April 2000

Mr Alan Morris  
Chairman  
Commonwealth Grants Commission (CGC)  
Cypress Court  
5 Torrens Street  
Canberra ACT 2601

**Re: Submission to the CGC Indigenous Funding Inquiry**

Dear Mr Morris,

I am writing to provide a submission to the CGC Indigenous Funding Inquiry. The attached paper "Towards an Index of Relative Indigenous Socioeconomic Disadvantage" is an extended version of the paper I presented at the joint CGC/CAEPR workshop "Indicators for Measuring the Relative Needs of Indigenous Australians", 14 April 2000, The Australian National University, Canberra, Australia. This paper will be published as a Discussion Paper in the Centre for Aboriginal Economic Policy Research Discussion Paper series.

If any further information is required about this submission please do not hesitate to contact me on (02) 6249 0649.

Yours Sincerely

Dr Matthew Gray

Towards an index of relative Indigenous socioeconomic disadvantage

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## Summary

Understanding geographic variations in the socioeconomic status of Indigenous peoples is of importance when developing policies aimed at reducing the level of Indigenous disadvantage. Knowledge of geographic variations in socioeconomic status provides an understanding of some of the underlying structural reasons and impediments to improving the socioeconomic status of Indigenous Australians.

This paper explores how a variety of indicators of socioeconomic status that can be combined to form a composite index of relative socioeconomic disadvantage for Aboriginal and Torres Strait Islander Commission (ATSIC) regional council areas. Data from the 1991 and 1996 Censuses, augmented with administrative data from ATSIC are used to construct an index of relative socioeconomic disadvantage for the 36 ATSIC regional council areas. The changes in relative socioeconomic disadvantage between 1991 and 1996 are also analysed. The estimates in this paper are the first for Indigenous Australians using 1996 Census data.

The limitations of relative indexes of socioeconomic disadvantage, particularly with respect to Indigenous Australians, are discussed. Particular attention is paid to data limitations which are exacerbated when comparing relative socioeconomic disadvantage over time. However, in spite of the many limitations, carefully selected variables can be used to estimate a ranking of socioeconomic disadvantage of ATSIC regional council areas.

This research paper is timely as the Commonwealth Grants Commission (CGC) is conducting the Indigenous Funding Inquiry, measuring the relative need of Indigenous people in different geographic regions. In this context, an important contribution of this paper is an assessment of the usefulness of a composite index of relative socioeconomic disadvantage for the calculation of funding relativities. The conclusion reached is that relative indexes of socioeconomic disadvantage, such as the one documented in this paper, are of very limited use in calculating funding relativities.

## Indicators of socioeconomic disadvantage

Any index of relative socioeconomic disadvantage needs to take account of a range of factors that combine to determine socioeconomic status. Many of the variables included in the Australian Bureau of Statistics (ABS) standard index of socioeconomic disadvantage for the total Australian population do not provide unambiguous and / or culturally appropriate measures of socioeconomic disadvantage for Indigenous Australians. Four variables have been chosen to measure differences in socioeconomic status between ATSIC regions. The variables chosen are family income, housing, educational attainment and the level of non-employment.

- Access to financial resources is a critical factor in determining socioeconomic status. This paper uses a measure of the proportion of households living in poverty. We define a household as living in poverty if its equivalent income is less than the Henderson poverty line after taking into account housing costs.
- Housing adequacy is captured using a measure of overcrowding. A household is said to be overcrowded if the total bedroom requirement is greater than the number of bedrooms in the dwelling. The number of bedrooms needed for there to be no overcrowding is then expressed as a ratio of the total number of Indigenous dwellings in the ATSIC region.
- Low levels of educational attainment are thought to be a primary factor underlying Indigenous disadvantage. The level of educational attainment is measured by the proportion of the people aged 15 years and over who do not have a post-secondary educational qualification.
- Clearly employment is an important determinant of access to financial resources and hence social status. In addition, employment may have a number of non-pecuniary

benefits, including giving a sense of purpose and of having a worthwhile life. In this paper employment disadvantage is measured by the proportion of the population aged 15 years and over that are not employed. CDEP employment is treated here as non-employment.

### **Estimates of the index of socioeconomic disadvantage**

Many aspects of the socioeconomic profile of an ATSI region cannot be measured directly, but there may be several variables that are recognised as contributing to a particular dimension. Often a single composite of the variables, an index, which reflects the population profile of these variables, is a useful summary measure of socioeconomic status. This paper uses a statistical technique Principal Component Analysis to estimate the indices of socioeconomic disadvantage. It is important to note that the indexes are only relative (not absolute) indexes that rank the ATSI regions according to the level of socioeconomic disadvantage of the Indigenous people residing in them.

The ranking of relative socioeconomic disadvantage of the 36 ATSI regions shows the following:

- As a general rule, the least disadvantaged regions are either in the more densely populated southeast or else are regions that encompass a major urban area or State or Territory capital city. The most disadvantaged regions are in the remote areas of Australia. For example, in 1996 the urban areas, Hobart, Wangaratta, Sydney, Ballarat and Brisbane filled the first five spots on the ranking, while the more remote areas Cooktown, Warburton, Apatula and Nhulunbuy filled positions 33 to 36 on the ranking of relative socioeconomic disadvantage.
- It must be remembered when interpreting these results that the ranking is relative and that the socioeconomic status of Indigenous people in the best ranked ATSI regions is very low compared to non-Indigenous Australians in the same regions.

When analysing changes in the ranking according to relative socioeconomic disadvantage it is critical to bear in mind that while changes may be due to real changes in relative socioeconomic disadvantage, they may also be a product of variable data quality, both across regions and between censuses.

- The regions, which had a worsening in their socioeconomic status, are concentrated Coffs Harbour, Tamworth and Wagga Wagga in regional New South Wales. It appears that the general economic decline in these regions between 1991 and 1996 has had a negative impact upon the socioeconomic status of Indigenous people in these regions.
- The regions, which have improved their relative socioeconomic position, are Alice Springs and Cairns. Cairns is a region in which there has been generally strong economic growth between 1991 and 1996 and it appears that this strong economic performance had impacted upon the economic status of Indigenous people in these regions.
- The ranking of ATSI regions between 1991 and 1996 is relatively stable. This suggests that estimates of socioeconomic status based upon data which is several years old may not be too unreliable. This finding is important; almost all data on Indigenous socioeconomic status is several years old by the time they are available.

### **Limitations of the results**

- The relative ranking of ATSI regions depends upon the variables included in the construction of the index. Different underlying variables would have resulted in different final indexes and ranking of socioeconomic disadvantage.
- ATSI regions are considerably larger than the level at which spatial indexes of socioeconomic status are conventionally estimated. Generally they are estimated using relatively small geographic regions. For example the ABS's Socioeconomic Index for Areas indexes which are estimated at the Collection District (CD) level. The use of a

larger geographic unit as the basis of the index masks considerable variation within regions.

- The analysis assumes that the variables on employment, education, income and housing combine in the same manner to characterise 'disadvantage' across ATSI regions. However, clearly doses of education in Warburton would not lead to the same labour market opportunities for Indigenous people as education in Sydney, even if it were available. Housing can be viewed in the same manner, while the adequacy of income in terms of purchasing power can also be place specific.

### **Policy implications - how useful are relative indexes of socioeconomic status?**

A key question, in the context of the CGC inquiry, is how useful are relative indexes of socioeconomic status, such as the one constructed here, for determining the needs of groups of Indigenous Australians relative to one another. Relative indexes have several characteristics which limit their usefulness for the purposes of allocating funding between geographic regions.

The primary shortcoming is that relative indexes do not contain any information about the size of differences in socioeconomic status. For example, it is not possible to say how much more disadvantaged the ATSI region of Apatula is compared to Perth. In practice, the only conceivable common unit of measurement in a composite index is dollars required to alleviate disadvantage or some similar measure. If this approach were to be adopted there are a number of conceptual, methodological and technical issues that would need to be overcome. In practice this may be impossible.

### **Conclusion**

The estimates in this paper of the relative socioeconomic status of Indigenous people in ATSI regions demonstrates how indicators of a range of socioeconomic factors can be combined to produce a composite index of disadvantage. This approach contributes to an understanding of geographic variations in socioeconomic disadvantage in several ways. First, it allows a wide range of variables to be combined into a useful overall summary ranking of disadvantage. Second, the approach takes into account the correlations between the various aspects of socioeconomic status.

At the present time, census data remain the only comprehensive source of data on Indigenous Australians and any index of relative socioeconomic disadvantage will rely heavily on the variables available from the census. These variables measure only a very limited range of factors which are related to socioeconomic status. There is, therefore, a danger inherent in the use of census-derived social indicators and indexes of social advantage or disadvantage that there will always be a temptation for program managers and policy makers to use these data in the absence of others, despite their well documented shortcomings, as a means of assessing differences in need between geographic regions.

### **Acknowledgments**

We are indebted to Professor Jon Altman, Dr Boyd Hunter, Dr Roger Jones, Dr Will Sanders and Dr John Taylor for comments. An earlier version of this paper was presented in October 1999 as part of the Centre for Aboriginal Economic Policy Research Seminar Series. We would like to thank those who attended that seminar and especially Malcolm Nicholas of the Commonwealth Grants Commission who acted as a discussant. Editorial assistance was provided by Linda Roach and Hilary Bek, with layout by Wendy Forster.

**CENTRE FOR ABORIGINAL ECONOMIC POLICY RESEARCH**

## introduction

Socioeconomic status is a term which is commonly used to refer to the intersection of the social and economic spheres of life. At its core, it has remained largely unchanged for over 50 years providing a summary measure of income, education and occupation. Over time, the concept has evolved so that it now encompasses many aspects of social status (Australian Bureau of Statistics (ABS) 1998).

Understanding geographic variations in the socioeconomic status of Indigenous peoples is of importance when developing policies aimed at reducing the level of Indigenous disadvantage. Knowledge of geographic variations in socioeconomic status provides an understanding of some of the underlying structural reasons and impediments to improving the socioeconomic status of Indigenous Australians.

This paper explores how a variety of indicators of socioeconomic status can be combined to form a composite index of relative socioeconomic disadvantage for ATSIC regional council areas. Data from the 1991 and 1996 Censuses augmented with administrative data from ATSIC is used to construct indexes of relative socioeconomic disadvantage for Indigenous Australians for the 36 ATSIC regional council areas. The changes in relative socioeconomic disadvantage between 1991 and 1996 are also analysed. The estimates in this paper are the first for Indigenous Australians using 1996 Census data.

The limitations of relative indexes of socioeconomic disadvantage, particularly with respect to Indigenous Australians are discussed. Particular attention is paid to data limitations, which are exacerbated when comparing relative socioeconomic disadvantage over time. However, in spite of the many limitations, carefully selected variables can be used to estimate a ranking of socioeconomic disadvantage of ATSIC regional council areas.

This research paper is very timely as the Commonwealth Grants Commission (CGC) is conducting the Indigenous Funding Inquiry into measuring the relative need of Indigenous people in different geographic regions. In this context, an important contribution of this paper is an assessment of the usefulness of a composite index of relative socioeconomic disadvantage for the calculation of funding relativities. The conclusion reached is that relative indexes of socioeconomic disadvantage, such as the one documented in this paper, are of very limited use in calculating funding relativities.

When estimating indexes of socioeconomic disadvantage it is important to be clear as to whether the index is measuring relative or absolute disadvantage. Absolute disadvantage refers to the quantum of need in any individual region. Relative socioeconomic disadvantage refers to the rank ordering of this quantum. This paper focuses on relative socioeconomic status between places rather than absolute differences in socioeconomic status.

There has been a steady stream of research which seeks to estimate variations in Indigenous socioeconomic status between geographic regions (Altman and Liti 1994). The first estimates appear to be by Altman and Nietiwenhuysen (1979) which was then followed by Miller (1985). More recently Tesfaghiorghis (1991) used 1986 Census data to analyse the socioeconomic status by State/Territory of residence and by Section of State (major urban, other urban, rural locality and other rural). The first analysis of socioeconomic status at the ATSIC regional council level was Tesfaghiorghis (1992). Tesfaghiorghis constructed an index of socioeconomic advantage based upon three variables: the percentage of the working -age population qualified, the employment to population ratio and median individual income, using data from the 1986 Census.

Khalidi (1992) used data from the 1976 and 1986 Censuses to extend the work of Tesfaghiorghis (1992) in two main ways. First, Khalidi used a much wider range of variables in the construction of the index. Second, Khalidi analysed the changes in socioeconomic status between 1976 and 1986.

In 1993 there were legislative amendments that reduced the number of ATSI regions from 60 to 36 ATSI regional jurisdictions'. (Altman and Mu. 1994) reconstruct data from the 1986 and 1991 Censuses to analyse socioeconomic status for the 36 ATSI regional councils. Variables measuring income, education and employment are combined to generate an index of socioeconomic advantage.

Despite some methodological variation, the key finding from each was that the more remote a geographic region, the greater the socioeconomic disadvantage. This result is robust to indexes including a range of variables. This occurs because the most disadvantaged regions tend to be disadvantaged by all measures including, income, employment, housing and education. The estimates, however, have been plagued by apparently anomalous ranking's which appear to be due to poor data quality for some ATSI regions.

The remainder of this paper is structured as follows. The following section discusses the variables chosen to be included in the index of relative socioeconomic disadvantage. Next, the index of relative socioeconomic disadvantage is presented and some of the issues of interpretation discussed. The estimated ranking of ATSI regions using data from the 1991 and 1996 Censuses is then presented. Changes in the relative ranking of ATSI regions between 1991 and 1996 are presented next. Finally, the utility of such indexes is examined in the context of the CGC brief to inquire into the relative needs of Indigenous groups.

### **Indicators of socioeconomic disadvantage**

Any index of relative socioeconomic disadvantage needs to take account of a range of factors that combine to determine socioeconomic status. A standard index of socioeconomic disadvantage is constructed for the Australian population as a whole by the ABS. The ABS when constructing their index of relative socioeconomic disadvantage for the Australian population as a whole (ABS 1998) include a wide range of variables (including income, educational attainment, unemployment and jobs in relatively unskilled occupations). Many of the variables used by ABS do not provide unambiguous and/or culturally appropriate measures of socioeconomic disadvantage for Indigenous Australians.

A major difference between the index described in this paper and the index of socioeconomic disadvantage constructed by the ABS is the geographic level at which the indexes are constructed. The ABS constructs its index at the level of a Collection District (CD) of which there were 34,500 at the time of the 1996 Census. It is not possible to construct indexes of socioeconomic status for Indigenous Australians at the CD level because the Indigenous population in many CDs is too small for statistical purposes (Hunter 1996). An alternative would be to use the census Australian Indigenous Geographic Classification (AIGC) and to construct indexes of socioeconomic disadvantage for Indigenous Australians at the level of the Indigenous Area or Indigenous Location of which there are 692 and 934, respectively.' This issue is revisited later in the paper.

Four variables have been chosen to measure differences in socioeconomic status between ATSI regions. The variables chosen are family income, housing, educational attainment and the level of non -employment. While these variables are not the classic factors used in socioeconomic status studies, there are good reasons for this choice. The income variable is income after housing and the advantage if this variable is that it allows us to separately examine housing need and eliminates that (large) portion of income, which is likely to vary significantly across the regions. The other non -standard variable is the proportion of the population not employed. The proportion of the population not employed is a more accurate reflection of social status for Indigenous Australians than the conventional labour force variables because it is not subject to the additional regional fluctuations of the labour force participation rate. This section first discusses the conceptual issues surrounding the choice of each variable and then the characteristics of ATSI regions are described.



### ***Income status***

Access to financial resources is a critical factor in determining socioeconomic status. This paper uses a measure of the proportion of households living in poverty. There is no agreed best approach' to setting a poverty line. We define a household as living in poverty if its equivalent income is less than the Henderson poverty line after taking into account housing costs (Jones 1994, 1999). The after tax Henderson poverty line is used because Indigenous people living in different ATSI regions will face very different housing costs, depending upon both the rents in the private housing market as well as the availability of cheap or free public and community housing. The Henderson poverty line also takes into account household size and composition in estimating how much income is needed for a household to be not living in poverty.

While there have been doubts raised as to the accuracy of the Henderson poverty line for the analysis of Indigenous poverty (Altman and Hunter 1998), the Henderson measure is the only one for which data are readily available. The ABS has the necessary data to construct more appropriate poverty lines but these data are not available to private researchers to utilise.

An always difficult and contentious issue is the criteria used to define what constitutes an Indigenous household. In this paper an Indigenous family household is defined as one which includes an Indigenous family, where either the family reference person or their spouse states Indigenous origin, or a family of related adults with one or more Indigenous members identified.<sup>2</sup>

The proportion of Indigenous households with a family income below the after housing costs Henderson poverty line was 27.7 and 29.7 per cent in 1991 and 1996, respectively (see Appendix Table B2). There is a very large amount of variation in the proportion of households living in poverty between ATSI regions. For example, in 1996 in the ATSI region of Darwin only 22.3 per cent of households were living in poverty as compared to 37.5 per cent of households in Apatula. Across ATSI regions, no consistent pattern of changes is evident and, with the small number involved and relatively high levels of non-response to income questions, differences may be due to methods of estimation. The pattern of results is, however, similar between censuses.

While in general the proportion of households living in poverty is lower in urban areas, it should be noted that the census only seeks to quantify case income from formal sources; cash, income from informal sources and imputed income from subsistence activities are not generally quantified in the census. Such sources of income can be significant in some rural and remote situations (Altman and Allen 1992).

### ***Housing adequacy***

Housing adequacy is captured using a measure of overcrowding. A household is said to be overcrowded if the total bedroom requirement of a household is greater than the number of bedrooms in the dwelling (Jones 1994, 1999).<sup>3</sup> The number of bedrooms needed for there to be no overcrowding is then expressed as a ratio of the total number of Indigenous dwellings in the ATSI region.

The bedroom need measure does not take into account a number of important aspects related to the quality of the housing stock, including factors such as whether the house has working sewage, electricity and water. However, to the extent to which these factors are related (correlated) with the bedroom need variable, will be reflected in the indexes of socioeconomic disadvantage.

There appears to have been a slight decrease in the number of extra bedrooms needed per dwelling in order to eliminate overcrowding between the 1991 and 1996 Censuses, from 0.44 to 0.336 per dwelling (see Appendix Table B4). There is a great deal of variation in bedroom need between ATSI regions, with the greatest level of bedroom need being in ATSI regions, which are relatively remote. For example, in 1996 the ATSI region of Nhulunbuy needed an average of an extra 4.8 bedrooms per existing dwelling.

This compares to only an extra 0.11 bedrooms needed per existing dwelling in the ATSI region of Queanbeyan.

## Educational attainment

Low levels of educational attainment are thought to be a primary factor underlying Indigenous disadvantage (Hunter and Schwab 1998). Low levels of educational attainment limit labour market opportunities for earning income and the ability to profitably run a business. More fundamentally lack of education may limit the capability to translate access to resources into improvements in socioeconomic status (Sen 1992).

The level of educational attainment is measured by the proportion of the population aged 15 years and over who do not have a post-secondary qualification. Several other variables could have been used as a measure of educational attainment, including age left school and whether ever attended school. The proportion of the working age population who never attended school is probably a poor indicator for explaining differences in socioeconomic status between ATSI regions. This is because the variable either takes a very high value in remote regions or a very low value in non-remote regions and therefore is not very useful in explaining variations in socioeconomic status.

The very low levels of post-secondary educational attainment amongst the Indigenous population are very apparent with over 85 per cent of the Indigenous population in 1996 having no post-secondary qualification (see Appendix Table B3). There was, however, an increase in the proportion of the Indigenous population with a post-secondary qualification between 1991 and 1996.

The proportion of the working-age population with no post-secondary qualification for each of the ATSI regions is presented in Appendix Table B3. There are very large differences across ATSI regions in the proportion of the working-age population with no post-secondary qualification. In 1996, the ATSI region of Warburton over 97 per cent of the working-age population had no post-secondary qualification as compared to the ATSI region of Wangaratta, which had only 76.6 per cent with no post-secondary qualification.

## Labour force status

Clearly employment is an important determinant of access to financial resources and hence social status. In addition employment may have a number of non-pecuniary benefits, including giving a sense of purpose and the feeling of having a worthwhile life. In this paper employment disadvantage is measured by the proportion of the population aged 15 years and over that are not employed. This differs from the measures of employment used by the ABS of the proportion of males and females in the labour force who are unemployed. We choose to use the proportion of the population who are not employed primarily because it is thought to be a better indicator of Indigenous labour market disadvantage given the very variable labour force participation rate across ATSI regions and the fact that many of the differences in the participation rate may not be due to differences in the desire to work but rather to differences in the opportunities to work. Hunter and Gray (1999) have demonstrated that while Indigenous people have a much lower rate of participation in the labour force than non-Indigenous people they want to work at least as much as the non-Indigenous population.

An important characteristic of Indigenous economic life is the Community Development Employment Projects (CDEP) scheme. Under the CDEP scheme Indigenous communities receive a grant of a similar size to their collective unemployment benefit entitlement plus a notional 40 per cent capital and administration payment to undertake community defined 'work'. The benefit recipients are then expected to work part-time for their entitlements. Historically, the CDEP scheme was available on a one-in/all-in basis for each community. The current policy, which evolved gradually during the 1990s, means that when the scheme is provided in a community, the unemployed have some choice as to whether or not they participate.

Originally the CDEP scheme was available only to remote communities but in recent years its geographic dispersion has increased and there are numerous schemes in Urban areas. Nonetheless, CDEP schemes are predominantly concentrated in rural and remote regions that have very poor non-CDEP employment prospects (Altman and Hunter 1996). At the time of the 1996 Census (August) there were approximately 18,000 working CDEP participants, accounting for around 20 per cent of Indigenous employment (Taylor and Bell 1998). In some rural and remote areas the proportion of employment which is in CDEP schemes is much higher.

In this paper CDEP participants are treated as being not employed since the scheme is essentially a job creation scheme that provides participants with an income slightly higher than their social security entitlements. Furthermore, it is unclear as to the extent to which CDEP employment provides the non-pecuniary benefits that mainstream forms of employment may provide.

Identification of CDEP participants from the census forms was highly unreliable in 1991, with only a very small proportion of CDEP participants were recorded. Some improvements to the identification of CDEP employment were made in the 1996 Census, with working CDEP participants being reliably identified in the discrete Indigenous communities in which the Indigenous Enumeration Strategy (IES) was used (4). However, in regions in which the IES was not used, the identification of CDEP participants was very unreliable (see Altman and Gray (2000) and Alphenaar, Majchrzak-Hamilton and Smith (1999) for a detailed discussion).

ATSIC program data provide a more accurate source of CDEP participant numbers, particularly for 1991. But these do not indicate those employed in CDEP prior to the week of the census (Taylor 1998). For this reason, Taylor suggests a participant to employee ratio of 60 per cent in rural areas and 80 per cent in urban areas. What exactly constitutes an urban ATSIC region is open for debate but for the purposes of this analysis ATSIC regions in which more than 20 per cent of the Indigenous population were enumerated using the IES are categorised as remote (Appendix Table A1). The proportion of the working-age population employed is therefore derived as the total number employed (CDEP and non CDEP) minus the number of CDEP employed derived from ATSIC administrative data.

The Census employment numbers for each ATSIC region are therefore adjusted for estimates of the number of working CDEP participants based on the adjusted ATSIC figures to give an estimate of the rate of non-CDEP employment. A detailed description of the adjustments made to the employment figures for CDEP can be found in Appendix A.

The proportion of the working-age populations not employed for each of the ATSIC regions are presented in Appendix Table B1. In 1996, there was a very large amount of variation in the proportion of the working-age population not employed between ATSIC regions, ranging from 55.6 per cent in Sydney to 96.2 in Cooktown. Generally speaking the ATSIC regions incorporating capital cities have a much lower proportion of the working-age population not employed as compared to ATSIC regions in the more remote parts of Australia. This is thought to largely reflect differences in the regional demand for labour, but may also reflect differences in the work skills and work related productivity of Indigenous people. The variation in the proportion not employed between ATSIC regions is very similar between 1991 and 1996.

The exclusion of CDEP employment increases the measured rate of non-employment in a number of ATSIC regions in remote areas of Australia, which have significant numbers of CDEP employees. In other words, failure to exclude CDEP employment overstates mainstream employment opportunities.<sup>5</sup>

## Estimates of the index of socioeconomic disadvantage

### Statistical method

As discussed, many aspects of the socioeconomic profile of an ATSI region cannot be measured directly, but there may be several variables that are recognised as contributing to a particular dimension. Often a single composite of the variables, an index, which reflects the population profile of these variables is a useful summary measure of socioeconomic status. This paper uses Principal Component Analysis to estimate the indices of socioeconomic disadvantage. It is important to note that the indexes estimated are relative indexes that rank the ATSI regions according to the level of socioeconomic disadvantage of the Indigenous people residing in them.

Principal Component Analysis is a technique, which is often used to summarise a number of related variables into a single index. In essence, Principal Component Analysis reduces a number of related variables to a new set of (uncorrelated) components. Which are ordered so that the first few components explain most of the variation present in the original variables. Each principal component is a linear combination of the original variables, and is independent of the other components (Rao 1964).

A score is then calculated for each ATSI region by applying the weights for each variable estimated by the Principal Component Analysis to the value of each variable for the ATSI region, and then adding up the weighted values. These scores can then be used to distinguish between ATSI regions and to rank them. Such a composite index should be created only if the variables included in the composite have some useful combined economic interpretation, otherwise the, empirical results will have little meaning.

The major advantage of Principal Component Analysis is that it allows us to reduce a number of often overlapping variables into a single index for each ATSI region, which takes into account the correlation between the different variables in the index. These correlations are generated by the interrelationships between the variables.

A comparison of relative socioeconomic status between 1991 and 1996 raises difficulties. Many of the variables used in this paper are expressed as a proportion of the working-age population (aged 15 to 64 years). The large non-biological increase in the Indigenous population between the 1991 and 1996 Censuses leads to potential problems when comparing changes in the relative socioeconomic disadvantage of ATSI regions (ABS 1998; Gray 1997; Taylor 1997). This large non-biological increase in the Indigenous population is due to increased identification as being Indigenous between the 1991 and 1996 Censuses.

One way that the newly identified Indigenous population can influence intercensal comparisons is if they exhibit socioeconomic characteristics dissimilar to others in the region. Indeed, the validity of intercensal comparisons of Indigenous socioeconomic status depend, in part, upon which Australians identified themselves as Indigenous in the 1996 Census, but did not in previous censuses. Hunter (1998) has shown that it is possible to dismiss bogus identification or 'census vandals' as a major factor underlying the large nonbiological increases in the Indigenous population. The apparent lack of compositional change in the Indigenous population identified in that paper suggests that census data can be taken at face value and that intercensal comparisons of socioeconomic status are valid.

There have not been any changes in the boundaries of the ATSI regional councils between 1991 and 1996, although 26 of the 36 regions have changed their name, reverting in most cases to a previous (pre-1991) name. Appendix Table D 1 presents information on the names of the regions in 1991 and 1996 and information on the location of each regional office.

## DISCUSSION PAPER NO 196

**Index of relative socioeconomic disadvantage, 1991 and 1996**

This section presents estimates of the index of socioeconomic disadvantage using data from the 1991 and 1996 Censuses. The estimates of the weights to be applied to each of the variables included in the index are discussed. The ranking of ATSI regions according to relative socioeconomic disadvantage is then discussed.

The estimates of the principal components from the 1991 and 1996 data are presented in Table 1. A general rule of thumb is that only principal components with a value of greater than one need to be included in the index. The estimates find that in both 1991 and 1996 there is only one principal component with an eigenvalue greater than one, meaning that the data can be appropriately summarised by the first principal component. The first principal component explains a relatively high proportion of the total variance, explaining 73.2 and 70.4 per cent in 1991 and 1996, respectively.

There is some variation in the weights given to each variable. Using the data for 1996 the proportion of households in poverty after housing costs has a weight of 0.40, the proportion of the working -age population not employed has a weight of 0.55, the proportion with no qualification of 0.54 and the ratio of the number of bedrooms needed to the number of dwellings has weight of 0.49. There is very little difference in the weights between 1991 and 1996 suggesting that the underlying relationships between these variables is relatively stable over time.

**Table 1. Estimate of index weights to be given to each variable, 1991 and 1996**

	1991 - Index weights	1996 - Index weights
Proportion of households in poverty after housing costs	0.3721	0.4008
Proportion of working -age population not employed	0.5594	0.5496
Proportion of working -age population with no qualification	0.5486	0.5446
Ratio of bedrooms needed to the number of dwellings	0.4977	0.4906
<u>Proportion of variance explained by the first principal component</u>	<u>0.7328</u>	<u>0.7044</u>

Notes: The number of principal components retained is by convention determined by the amount of variance explained. The convention is to retain principal components with an eigenvalue greater 1. For the 1991 data, the eigenvalue of the first principal component is 2.93, the second 0.72, the third 0.28 and the fourth 0.067. Using the 1996 data the eigenvalue of the first principal component is 2.81, the second 0.74, the third 0.33 and the fourth 0.11.

The weights presented in Table 1 are then used to combine the indicators of housing need, educational qualification, labour force status and households living in poverty into the index of relative socioeconomic disadvantage. Each ATSI region is assigned a rank from 1 to 36 according to their relative socioeconomic position that is determined by each regions socioeconomic index value. A rank of 1 is given to the least disadvantaged region and the rank of 36 is given to the most disadvantaged region. The value of the index for each ATSI region is not presented; just the ranking which is implied by the index values.

The ranking of ATSI regions for 1991 is estimated using the 1996 weights in order to eliminate variation in the ranking due to differences in the weights used to construct the ranking. The similarity of the 1991 and 1996 weights (Table 1) means that the ranking of ATSI regions is not sensitive to whether 1991 and 1996 weights are used.

The ranking of ATSI regions according to socioeconomic disadvantage in 1991 and 1996 is presented in tabular form in Table 2. The ATSI regions are divided into four groups: those ranked 1 to 9; those ranked 10 to 18; those ranked 19 to 27; and those ranked 28 to 36. These four groups are then labelled 'least disadvantaged', 'less disadvantaged', 'more disadvantaged' and 'most disadvantaged'. These groupings are presented in mapped figures (Figure 1 for 1996 and Figure 2 for 1991). Whilst these groupings are arbitrary, they are a useful way of illustrating geographic variations in socioeconomic disadvantage.

We first discuss the ranking of ATSI regions for 1996 and then the results for 1991 are briefly commented on. As a general rule, the least disadvantaged regions are either in the more densely populated southeast or else are regions that encompass a major urban area or State or Territory capital city (Figure 1). These results are consistent with the findings of previous research. For example Hobart, Wangaratta, Sydney, Ballarat and Brisbane fill the first five spots on the ranking. The lowest ranked ATSI regions are those in the remote regions of Australia. For example Cooktown, Warburton, Apatula and Nhulunbuy fill positions 33 to 36 on the ranking of relative socioeconomic disadvantage. The major exception to this pattern is that the remote Torres Strait was in the less disadvantage category. The results for Port Augusta should be treated with caution because of difficulties with the 1996 Census data for the Port Augusta region (Alphenaar, Majchrzak-Hamilton and Smith 1999).

It must be remembered when interpreting these results that the ranking is relative and that the socioeconomic status of Indigenous people in the best ranked ATSI regions is very low as compared to non-Indigenous Australians. For example, the Indigenous people living in Sydney, ranked as one of the least disadvantage ATSI regions, had a non-employment rate of 55.6 per cent in 1996. This compares to a non-employment rate of 42.9 per cent amongst non-Indigenous people living in the ATSI region of Sydney.

The geographic patterns of socioeconomic disadvantage of the ATSI regions for 1991 are presented in Figure 2. The results are only very briefly commented upon in this section. The overall pattern of ranking of ATSI regions in 1991 is consistent with the results for 1996. Regions, which are in urban or predominantly urban areas, have relatively low levels of socioeconomic disadvantage, whereas ATSI regions comprised predominantly of remote areas dominate the regions with the highest level of socioeconomic disadvantage.

The results of this analysis produce a significantly different ranking to that produced by Altman and Liti (1994) from their index of socioeconomic advantage. For example, Altman and Liti (1994) found that in 1991 Cooktown was amongst the 12 'More advantaged' regions. In contrast, we find that Cooktown is in the group which corresponds to Altman and Liti category of 'least advantaged regions'. There are a number of possible reasons for this difference. First, several of the variables used to construct the index presented in this paper differ from those used by Altman and Liti. It appears that the major reason for the differences in the ranking between these estimates and Altman and Liti estimates is the treatment of CDEP employment. Altman and Liti treat CDEP employment as employment whereas we treat it as unemployment. It is clear that whether or not CDEP employment is included as employment or non-employment has a very major impact upon the relative ranking of ATSI regions. Second, the index presented in this paper uses Principal Component Analysis to take account of the inter-relationships between the variables.

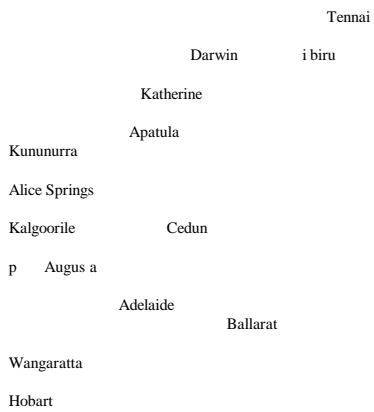
Several results identified by Altman and Liti as being anomalous disappear in the ranking's produced in this paper. For example, Altman and Liti find that Mt Isa and Broome Regional Councils are in the 'advantaged' and 'More advantage' categories. The indexes presented in this paper result in Mt Isa and Broome being ranked as having a relatively higher level of socioeconomic disadvantage than the ranking produced by Altman and Mu.

Derby  
 Broorne  
 11-1  
 South Hedland  
 Warburton  
 4 4  
 Narrogin  
 Most disadvantaged  
 More disadvantaged  
 Less disadvantaged  
 Least disadvantaged

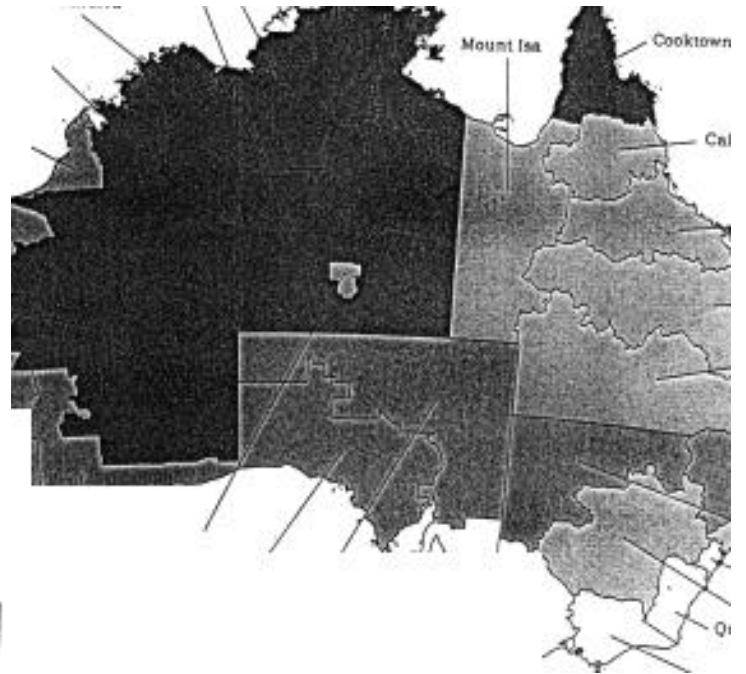
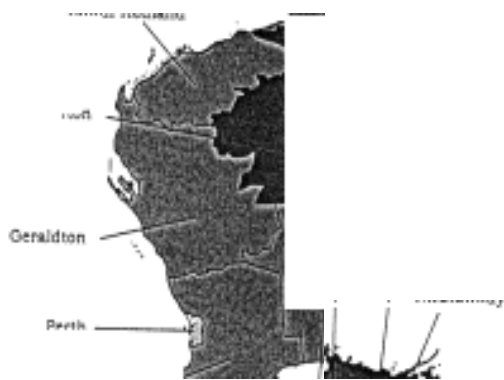
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Figure 1. Relative socioeconomic disadvantage ranked by quartile, 1996

Inset: Torres Strait Area



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**Table 2. Relative ranking of socioeconomic disadvantage by ATSIC region, 1996**

ATSIC Region	Rank 1996	Rank 1991	Change in Ranking between 1991 and 1996
Hobart	1	1	0
Wangaratta	2	3	1
Sydney	3	2	-1
Ballarat	4	5	1
Brisbane	5	6	1
Queanbeyan	5	4	-2
Darwin	7	7	0
Adelaide	8	8	0
Torres Strait	9	10	1
Perth	10	11	1
Alice Springs	11	16	5
Coffs Harbour	12	9	-3
Rockhampton	13	12	-1
Townsville	14	13	-1
Cairns	15	21	6
Mount Isa	15	16	-1
Wagga Wagga	16	14	-3
Roma	18	17	-1
South Hedland	19	20	1
Kalgoorlie	20	19	-1
Tamworth	21	18	-3
Narrogin	22	24	2
Ceduna	23	23	0
Geraldton	24	22	-2
Broome	25	26	1
Bourke	26	27	1
Port Augusta	27	25	-2
Derby	28	29	1
Kununurra	29	30	1
Katherine	30	28	-2
Tennant Creek	31	33	2
Jabiru	32	32	0
Cooktown	33	31	-2
Warburton	34	36	2
Apatula	35	34	-1
Nhulunbuy	36	35	-1

Notes: The relative ranking of ATSIC regions by socioeconomic status are estimated using the 1996 weights. The relative ranking is derived from the underlying index values that are difficult to interpret and are therefore not presented in this paper. The ranking of ATSIC regions for 1991 and 1996 are constructed using the 1996 weights. The indexes for 1991 and 1996 are both constructed using the weights estimated using the 1996 data. Because the weights estimated for 1991 and 1996 are very similar (Table 1) the results are not sensitive to the choice of weights.

### Changes in the ranking between 1991 and 1996

This section presents estimates of the change in relative ranking of socioeconomic status of the ATSIC regions between 1991 and 1996. Particular attention is paid to the difficulties in making intercensal comparisons in socioeconomic status. When analysing the changes in the ranking according to relative socioeconomic disadvantage it is critical to bear in mind that while changes may be due to real changes in relative socioeconomic disadvantage, they may also be a product of variable data quality, both across regions and between censuses. The sensitivity of the ranking to data quality means that small changes in

ranking between 1991 and 1996 should not necessarily be interpreted as a change in the overarching socioeconomic disadvantage. In the discussion which follows, only a change in ranking of three or more places between 1991 and 1996 is interpreted as a 'real' change in the ranking.

Changes in the ranking of ATSI regions between 1991 and 1996 are presented in Table 2 and in Figure 3. As an example of the interpretation of the changes in ranking, Alice Springs was ranked sixteenth in 1991 and improved five places to be ranked eleventh in 1996. This improvement is largely due to the Alice Springs housing situation improving relative to other ATSI regions with the number of bedrooms needed per dwelling falling from 0.932 in 1991 to 0.594 in 1996.

The regions, which had a worsening in their socioeconomic status, are concentrated in regional New South Wales (Coffs Harbour, Tamworth and Wagga Wagga). These are regions which experienced a general decline in economic status between 1991 and 1996.<sup>(6)</sup> It appears that this decline in the economic status of non-Indigenous people in regional southeastern Australia has had negative impact upon the socioeconomic status of Indigenous people living in these regions. This decline does not mean that the level of socioeconomic disadvantage within these regions has increased between 1991 and 1996, rather that it has relative to other ATSI regions.

The regions, which have improved their relative socioeconomic position, are Alice Springs and Cairns. Cairns is a region in which there has been generally strong economic growth between 1991 and 1996 and it appears that this strong economic performance had impacted upon the economic status of Indigenous people in these regions.<sup>7</sup>

While changes in the ranking of socioeconomic disadvantage over time may be due to the influence of the general level of economic activity in the regional economy they may also be due to differences in the efficiency of regional administrative structures in procuring resources and using available resources effectively. Whilst such qualitative observations are difficult to quantify, they can be powerful explanators and should not be discounted.

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## Limitations of the results

The index, which has been produced, depends upon the variables included in the construction of the index. Different underlying variables would have resulted in a different final index and associated ranking of socioeconomic disadvantage. Other indexes, data permitting, could be developed which focus on particular social conditions. If variables relating to an important aspect of a socioeconomic dimension under consideration are absent from a particular index then the index will not reflect these aspects. Consequently the index described in this paper does not provide good measures for some social conditions. It is derived as an overall index that allows key issues to be canvassed. It is generally consistent with the methodology used by the ABS (1998).

A limitation of the index suggested in this paper is that it contains no variables which measure access to infrastructure such as - schools, community services, health care services, shops and transport. It should however be noted that the concept of socioeconomic status does not conventionally include information on factors such as access to infrastructure and so this will be a limitation of all conventional indexes of socioeconomic status. This is a particularly serious limitation when ranking ATSI regions because there are large differences in the access to and quality of infrastructure between ATSI regions.

The high intercensal mobility of Indigenous Australians between regions means that any examination of socioeconomic status over time is not an analysis of the same group of individuals. Intercensal socioeconomic analysis examines the change in the socioeconomic status of the region. Taylor and Bell (1994) have examined this issue in some detail.

ATSI regions are considerably larger than the level at which spatial indexes of socioeconomic status are conventionally estimated. Generally they are estimated using a relatively small geographic region, such as the ABS's Socioeconomic Index for Areas which is estimated at the CD level. The relatively large ATSI regions may be quite heterogeneous as compared to CD's which tend to be relatively homogenous. This means that the use of a larger geographic unit as the basis of the index masks considerable variation within the region. Based on the results of this analysis the urban ATSI regions are the least disadvantaged regions in Australia, but within these regions there are pockets of considerable disadvantage. Indigenous Areas such as Tregar and Blacktown, Bidwill in Sydney, and Elizabeth in Adelaide have Indigenous unemployment rates of 67.5 per cent, 55.4 per cent and 51.5 per cent, respectively. This compares to remote regions like Biniari (68.4 per cent) and Barunga Manyallaluk (67.0 per cent) in Katherine; Minfflang (55.2 per cent) and Wadeye (51.7 per cent) in Jabiru; or Galiwinku (55.6 per cent) and Gapuwiyak outstations (50.0 per cent) in Nhulunbuy.<sup>8</sup>

To avoid overlooking pockets of disadvantage an index of socioeconomic disadvantage perhaps should be computed for Indigenous Areas in much the same way that the ABS's Socioeconomic Index for Areas is computed for the total population. The Indigenous Areas level index could then be aggregated to ATSI Regions, ATSI Zones and State geographic levels. As discussed, it is not possible to construct indexes of socioeconomic status for Indigenous Australians at the CD level because the Indigenous population in many CDs is too small for statistical purposes (Hunter 1996). It would, however, be possible to construct the index using the 1996 Census Indigenous geographic classification.

If the index of socioeconomic disadvantage was estimated using Indigenous Locations or Indigenous Areas then it would be very difficult, if not impossible, to adjust the labour market indicators for CDEP employment. This is for two reasons. First it has been historically impossible to obtain reliable estimates of working CDEP participants as opposed to total CDEP participants from ATSI administrative data. Second, in major urban areas it is not possible to reconcile particular CDEP schemes with the Australian Indigenous Census Geographic classifications (or any other geographic classification for that matter). For example, a person who works in the Redfern CDEP scheme may not

reside in the ILOC in which Redfem is located (see Altman and Gray (2000)) for a more detailed discussion).

Although Principal Component Analysis allows weights to be assigned to variables in the composition of the index, the implicit assumption is made that the weights are constant across all ATSI regions. This means that the variables on employment, education, income and housing combine in the same manner to characterise disadvantage, in Sydney as they do in Warburton. However, clearly, doses of education in Warburton would not lead to the same labour market opportunities for Indigenous people as education in Sydney, even if it were available. Nor can housing be viewed in the same manner, while the adequacy of income in terms of purchasing power can also be place specific.

## **Policy implications - how useful are relative indexes of socioeconomic status?**

At the time of the competing this discussion paper the CGC is conducting the Indigenous Funding Inquiry. The Terms of Reference for this inquiry ask the Commission to

inquire into and develop a method that can be used to determine the needs of groups of Indigenous Australians relative to one another across government and government -type works and services provided or funded by the Commonwealth, or by States, Territories or local government with Commonwealth financial assistance through specific purpose payments (CGC, 2000).

The terms of reference do not ask the Commission to measure the total needs of Indigenous Australians; or advise on the level of resources that should be available for programs (CGC 2000).

The CGC inquiry covers four key functional areas: housing and infrastructure; employment and training; health; and education. The index of relative socioeconomic disadvantage constructed in this paper uses socioeconomic indicators from the census in the functional areas of housing, employment, education and income. Indicators for the functional areas of infrastructure, training and health are not readily available from the census and hence are not included in the index estimated here.<sup>(9)</sup> None -the-less the methodology used in this paper can easily incorporate other variables.

A key question, in the context of the CGC inquiry, is how useful are relative indexes of socioeconomic status, such as the one constructed here, in determining the needs of groups of Indigenous Australians relative to one another. Relative indexes have several characteristics which limit their usefulness for the purposes of allocating funding between geographic regions.

The primary shortcoming is that relative indexes do not contain any information about the size of differences in socioeconomic status. For example, it is not possible to say how much more disadvantaged the ATSI region of Apatula is compared to Perth. Conceptually, for an index of socioeconomic disadvantage to be useful for the purposes of generating funding relativities, the measures of disadvantage would need to have a common unit of measurement. In practice, the only conceivable common unit of measurement is dollars required to alleviate disadvantage or some similar measure. If this approach were to be adopted there are a number of conceptual, methodological and technical issues which would need to be overcome and in practice this may be impossible.

A major issue which would be confronted if attempting to devise a composite index of socioeconomic disadvantage with a dollar metric for the purpose of calculating funding relativities is differential cost disabilities between ATSI regions. These cost disabilities are both in terms of service and program delivery and in terms of household expenditure in the most remote ATSI regions (for example central Australia) and would need to be calculated in order to estimate sensible funding relativities. This is a particularly important issue when comparing ATSI regions because of the very large differences in the Indigenous populations and their spatial density (see Appendix Table CI).

In spite of these major limitations, indexes of relative socioeconomic disadvantage do provide some useful information for the purposes of calculating funding relativities. Relative indexes require much less information than do estimates of socioeconomic disadvantage which allow for differences to be quantified. In other words, the data requirements are less stringent and the estimated ranking of regions is more robust to data quality problems, providing that a consistent methodology is used and well defined and appropriate variables are selected. The overall picture of geographic differences of socioeconomic disadvantage and the relative ranking of ATSI regions implied by relative indexes provide a useful benchmark against which estimates of differences in need between ATSI regions can be compared. At the least, funding formulae should probably be consistent with the relativities implied by the appropriate socioeconomic status index.

An important finding of this paper is that the ranking of ATSI regions between 1991 and 1996 is relatively stable. This suggests that estimates of socioeconomic status based upon data which is several years old may not be 'too unreliable'. This finding is important; almost all data on Indigenous socioeconomic status is several years old by the time they are available. 10

## Conclusion

The estimates in this paper of the relative socioeconomic status of ATSI regions demonstrate how indicators of a range of socioeconomic factors can be combined to produce a composite index of disadvantage. This approach contributes to an understanding of geographic variations in socioeconomic disadvantage in several ways. First, it allows a wide range of variables to be combined into a useful overall summary ranking of disadvantage. Second, the approach takes into account the correlations between the various aspects of socioeconomic status.

The estimates here improve and fine tune existing past estimates, for example that of Tesfaghiorghis (1991, 1992), Khalidi (1992) and Altman and Liti (1994). A range of improved variables are used. First, CDEP employment is treated as non-employment, something that has not been done in previous studies. This change resulted in a significant re-ordering of the ATSI region. Second, the poverty measure takes into account household size and composition. The poverty measure also takes into account differences in housing costs between ATSI regions which can be very substantial. The other major improvement is the use of Principal Component Analysis which takes into account the correlations between the various measures of socioeconomic disadvantage.

At the present time, census data remain the only comprehensive source of data on Indigenous Australians and any index of relative socioeconomic disadvantage will rely heavily on the variables available from the census. These variables measure only a very limited range of factors which are related to socioeconomic status. To the extent that these variables accurately reflect differences in socioeconomic status, the relative ranking of socioeconomic disadvantage presented in this paper will be misleading. There is, therefore, a danger inherent in the use of census-derived social indicators and indexes of social advantage or disadvantage that there will always be a temptation for program managers and policy makers to use these data, despite their well-documented shortcomings, as a means to assess differences in need between geographic regions.

While indexes of relative socioeconomic disadvantage provide a ranking of the socioeconomic status of Indigenous people across geographic regions, they do not contain any information on the extent of differences in socioeconomic status between regions and are of only very limited use in estimating Indigenous funding relativities between geographic regions.

## Notes

1. The AIGC structure groups CDs together into three hierarchical levels. The three classifications are, from smallest to largest: Indigenous Location (ILOC), Indigenous Area (IARE) and ATSIC Region (AREG). There are 36 AREG, 692 IARE and 934 ILOC. IAREs generally include around 280 Indigenous persons and comprise one or more ILOCs. In general, IAREs were allocated on the basis of language or cultural groupings of Indigenous people. In some urban areas, however, Statistical Local Areas (SLAs) were used as the base unit and IAREs were aggregations of SLAs with more than 260 Indigenous people. ILOCs generally include at least 80 Indigenous persons and comprise one or more CDs.
2. This definition excludes households where the only Indigenous person(s) present on census night are children, relatives or boarders, reducing the number of Indigenous family households. See Jones (1999) for a detailed discussion of the effects of this definition on the number of Indigenous family households identified.
3. The total bedroom requirement of each household and each family is assessed using the following criteria:
  - a married or de facto couple require one bedroom;
  - any other adult member of the household requires one bedroom;
  - dependent children share to a maximum of two per bedroom;
  - persons who are recorded as temporarily absent from the dwelling on census night are included in the assessment of bedroom requirement; and
  - non-family members aged 15-24 years and studying full time are assumed to be temporary residents only and are excluded from the calculation of bedroom requirements. It is assumed that they will be identified as dependents temporarily absent from their family residence.

In households identified by the census as containing more than one family, the bedroom requirements of each family is computed separately. These family requirements are then added, along with that of any other adult non-family members (boarders) living in the dwelling, to give the total bedroom requirement of the household. In group households each person is allocated one bedroom under the rules applied here, and the bedroom requirement is equal to the number of group members. Lone person households have a one bedroom requirement.

4. As part of the IES in nominated discrete community's enumeration was carried out by Indigenous interviewers using specially designed census forms. For the nominated discrete communities, three census forms were used. The Community List which was a coverage check of dwellings and households; the Special Indigenous Household Form which was a listing of household members and visitors; and the Special Indigenous Personal Form, equivalent to the Standard Personal Form but reworded for an interviewer and to suit the cultural situation of Indigenous communities (Alphenaar, Majchrzak-Hamilton and Smith 1999).
5. This assumes that very few of the CDEP employed can find employment in a mainstream labour market job.
6. Unpublished calculations from the 1991 and 1996 Censuses show that these regions experienced very low rates of employment growth between 1991 and 1996.
7. For example, the overall level of employment in the ATSIC region of Cairns increased by 35 per cent between 1991 and 1996 which led to an increase in the employment to population ratio of 3.4 percentage points.
8. The remote unemployment rates are calculated as a percentage of the labour force excluding CDEP.

9. The Community Housing and Infrastructure survey does offer some prospects for the derivation of indicators of differences in the quality of infrastructure between ATSIC regions.
10. There is of course no guarantee that this stability in ranking over time will be replicated in estimates of differences in need between ATSIC regions.

## Appendices

### Appendix A. Adjustment of employment numbers for CDEP employment

The number of non-CDEP employed in each ATSIC region for 1991 and 1996 has been estimated by adjusting the number employed derived from the censuses by the number of working CDEP participants. The number of working CDEP participants by ATSIC region has been primarily estimated using administrative data from ATSIC. ATSIC administrative data provides the number of registered CDEP participants, however at any given point a significant proportion of participants may not be working. Taylor (1998) has suggested that the number of working CDEP participants is approximately 60 per cent in rural and remote areas and 80 per cent in urban areas. The ATSIC regions have been classified as urban and non-urban for the purposes of adjusting CDEP participants numbers on the basis of the proportion of the population enumerated using the Special Indigenous Personal Forms (SIPF) in the 1996 Census. ATSIC regions which had more than 20 per cent of the Indigenous population enumerated using a SIF form are classified as being remote.

For Cooktown in 1996 and Warburton in 1991 the estimates, based upon the ATSIC administrative data of the number of working CDEP participants is larger the total number of employees identified in the respective censuses. This is probably because the assumption that only 60 per cent of CDEP participants registered with ATSIC are working at any point in time is incorrect for these schemes. The number of CDEP participants in Warburton in 1996 is estimated using the 1996 Census estimate of the number of CDEP employees. This is possible for Warburton because of the very high proportion of the Indigenous population enumerated using the SIPR. The number of CDEP participants in Cooktown in 1991 is estimated using information from the National Aboriginal and Torres Strait Islander Survey (NATSIS) (see Hunter and Altman 1996 for details).

Table A1. Use of the SIF in the 1996 Census

	Indigenous population	Number of SIF forms distributed	Proportion of the Indigenous population enumerated using SIF form
Apatula	7,518	7,352	98
Nhulunbuy	7,001	6,755	96
Jabiru	7,746	6,944	90
Warburton	2,686	2,402	89
Cooktown	5,635	4,846	86
Tennant Creek	3,449	2,781	81
Katherine	7,122	5,221	73
Torres Strait Area	6,064	3,647	60
Derby	3,958	2,332	59
Kununurra	4,088	2,117	52
Broome	3,423	1,442	42
Alice Springs	4,449	1,577	35
Ceduna	1,867	554	30
Port Augusta	5,888	1,743	30
Mount Isa	6,658	1,877	28
South Hedland	4,298	1,010	23
Kalgoorlic	3,152	501	16
Townsville	14,678	2,040	14
Cairns	14,712	1 796	12
Rorna	8,804	1,045	12
Darwin	8,992	907	10
Rockhampton	11,332	1,018	9
Geraldton	5,006	438	9
Adelaide	12,689	279	2
Perth	17,998	SO	0
Sydney	34,286	0	0
Brisbane	27,635	0	0
Coffs Harbour	25,058	0	0
Wagga Wagga	18,047	0	0
Hobart	13,873	0	0
Ballarat	11,079	0	0
Tarnworth	10,711	0	0
Wangaratta	10,395	0	0
Queanbeyan	9,123	0	0
Bourke	7,344	0	0
Narrogin	6,204	0	0
Australia	352,968	60,674	29

Note: ATSI regions in which more than 20 per cent of the Indigenous population were enumerated in the 1996 Census using the Special Indigenous Enumeration Strategy are categorised as remote for the purposes of estimating the number of working CDEP participants.

Sources: 1996 Census and private correspondence with the ABS.



**Table A2. Persons employed in CDEP by ATSI region, 1991 and 1996**

	1991 Number of CDEP Participants	1991 Number of working CDEP Participants	1996 Number of CDEP Participants	1996 Number of working CDEP Participants
Adelaide	0	0	519	415
Alice Springs	199	119	432	259
Apatula	804	482	982	589
Ballarat	0	0	143	114
Bourke	715	572	971	777
Brisbane	0	0	30	18
Broome	416	250	1,143	686
Cairns	633	380	1,226	736
Ceduna	278	167	683	410
Coffs Harbour	279	223	917	734
Cooktown	3,178	1,907	3,063	1,838
Darwin	0	0	SO	40
Derby	1,159	695	1,679	1,007
Geraldton	46	37	518	414
Hobart	0	0	0	0
Jabiru	721	433	1,312	787
Kalgoorlie	29	23	156	125
Katherine	1,250	750	1,512	907
Kununurra	938	563	1,508	905
Mount Isa	1,027	616	604	362
Narrogin	0	0	631	505
Nhulunbuy	827	496	1,689	1,013
Perth	0	0	209	167
Port Augusta	1,344	806	1,487	892
Queanbeyan	46	37	116	93
Rockhampton	500	400	0	0
Rorna	0	0	474	379
South Hedland	285	171	415	249
Sydney	86	69	225	180
Tarnworth	219	175	785	628
Tennant Creek	345	207	593	356
Torres Strait Area	753	452	1,355	813
Townsville	979	783	584	467
Wagga Wagga	185	148	444	355
Wangaratta	109	87	227	182
Warburton	1,123	674	1,334	800
Australia	18,473	11,722	28,016	18,203

Note: ATSI participant data is converted to CDEP employee data by using a conversion factor of 0.60 for urban regions and 0.80 for remote regions. A SIF to population ratio of greater than 23 per cent is deemed to be a remote region (see Appendix Table A1).

Source: 1991 and 1996 Censuses, ATSI administrative data and the 1994 NATSIS.

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## Appendix B. Socioeconomic characteristics of the ATSI regions', 1991 and 1996

**Table B1. Proportion of the working-age population not employed, 1991 and 1996**

**Proportion of the working-age population not employed**

	<b>1991</b>	<b>1996</b>
Queanbeyan	61.1	58.7
Bourke	85.6	82.7
Coffs Harbour	70.6	69.5
Sydney	55.6	53.8
Tamworth	76.1	77.3
Wagga Wagga	72.2	68.4
Wangaratta	56.9	55.1
Ballarat	58.8	57.8
Brisbane	61.3	56.7
Cairns	75.4	68.3
Mount Isa	74.2	67.8
Cooktown	96.2	87.1
Rockhampton	71.2	64.2
Rorna	70.3	69.4
Torres Strait	68.6	69.9
Townsville	71.4	65.0
Adelaide	63.4	66.5
Ceduna	80.2	88.7
Port Augusta	81.5	82.3
Perth	71.5	66.6
Broome	78.6	82.3
Kununurra	90.6	82.3
Warburton	89.7	88.7
Narrogin	76.8	76.1
South Hedland	79.9	71.0
Derby	86.3	83.5
Kalgoorlie	77.4	71.4
Geraldton	76.2	79.1
Hobart	53.7	51.4
Alice Springs	74.8	72.0
Jabiru	85.4	82.3
Katherine	78.3	78.8
Apatula	87.3	87.3
Nhulunbuy	91.5	87.6
Tennant Creek	89.8	83.8
Darwin	68.1	63.6
Australia	71.4	69.7

Note: The 1996 estimates for Port Augusta should be treated with caution because of problems with the enumeration of the Pitjantjatjara lands in the 1996 Census. The working-age population is defined as those aged 15 years and over.

Sources: 1991 and 1996 Censuses and ATSI administrative data.

**Table B2. Proportion of households in poverty by ATSI region, 1991 and 1996**

<b>Proportion of households In poverty</b>		
	<b>1991</b>	<b>1996</b>
Queanbeyan	23.8	29.4
Bourke	33.4	30.7
Coffs Harbour	29.8	33.6
Sydney	23.8	26.2
Tamworth	34.6	34.6
Wagga Wagga	31.8	33.5
Wangaratta	25.3	26.7
Banarat	26.7	29.1
Brisbane	27.0	28.7
Cairns	31.9	29.6
Mount Isa	20.5	24.5
Cooktown	31.4	34.9
Rockhampton	25.6	30.5
Roma	29.4	32.2
Torres Strait	20.3	20.5
Townsville	25.6	29.5
Adelaide	27.1	30.9
Ceduna	30.5	31.2
Port Augusta	29.3	38.4
Perth	30.7	30.5
Broome	35.5	31.9
Kununurra	32.0	30.9
Warburton	40.8	34.5
Narrogin	34.6	30.3
South Hedland	25.4	28.4
Derby	28.2	32.5
Kalgoorlic	27.5	27.1
Geraldton	28.3	31.7
Hobart	21.1	24.2
Alice Springs	22.0	22.4
Jabiru	33.4	29.1
Katherine	30.7	33.4
Apatula	30.3	37.5
Nhulunbuy	23.8	34.7
Tennant Creek	34.2	31.4
Darwin	18.8	22.3
Australia	27.7	29.7

Note: The proportion of households with an equivalent income less than the Henderson poverty line after taking into account housing costs is from Jones (1994, 1999). The figures were derived using data from the 1991 and 1996 Censuses.

Sources: Jones (1994, 1999).

**Table 03. Proportion of the working-age population with no postsecondary qualification by ATSI region, 1991 and 1996.**

**Proportion of the working-age population with no post-secondary  
Qualification**

	<b>1991</b>	<b>1996</b>
Queanbeyan	86.5	79.8
Bourke	95.3	91.8
Coffs Harbour	87.4	80.8
Sydney	83.9	78.1
Tarnworth	90.3	86.1
Wagga Wagga	89.8	86.6
Wangaratta	83.8	76.6
Ballarat	87.1	80.4
Brisbane	86.4	80.4
Cairns	92.1	86.5
Mount Isa	94.3	92.3
Cooktown	97.7	95.7
Rockhampton	92.3	87.5
Roma	94.6	90.4
Torres Strait	91.8	88.4
Townsville	92.0	87.8
Adelaide	87.7	81.3
Ceduna	93.6	87.8
Port Augusta	94.2	89.0
Perth	88.6	83.0
Broome	92.7	88.2
Kununurra	96.6	94.8
Warburton	98.6	97.5
Narrogin	94.8	90.5
South Hedland	93.8	88.6
Derby	96.8	94.9
Kalgoorlie	93.6	91.4
Geraldton	94.8	91.8
Hobart	86.0	81.0
Alice Springs	93.4	88.4
Jabiru	97.1	97.1
Katherine	96.4	95.6
Apatula	98.6	98.1
Nhulunbuy	98.0	97.6
Tennant Creek	98.3	94.9
Darwin	89.7	83.8
Australia	90.7	85.7

Note: Not stated responses to the question as to whether the respondent has a post-secondary qualification are excluded. The working-age population is defined as those aged 15 years and over.

Sources: 1991 and 1996 Censuses.

**Table B4: Ratio of number of bedrooms needed to number of dwellings, 1991 and 1996****Ratio of number of bedrooms needed to number of dwellings**

	<b>1991</b>	<b>1996</b>
Queanbeyan	0.145	0.110
Bourke	0.467	0.400
Coffs Harbour	0.232	0.135
Sydney	0.148	0.105
Tamworth	0.334	0.170
Wagga Wagga	0.202	0.126
Wangaratta	0.137	0.085
Ballarat	.0.159	..0.112
Brisbane	0.183	0.105
Cairns	0.633	0.445
Mount Isa	0.914	0.672
Cooktown	1.795	1.483
Rockhampton	0.418	0.237
Roma.	0.375	0.247
Torres Strait	1.131	1.270
Townsville	0.644	0.401
Adelaide	0.139	0.127
Ceduna	0.964	0.619
Port Augusta	1.111	0.504
Perth	0.244	0.185
Broome	0.835	0.791
Kununurra	1.661	1.584
Warburton	4.017	2.164
Narrogin	0.343	0.241
South Hedland	0.778	0.572
Derby	1.577	1.312
KaIgoorlic	0.587	0.587
Geraldton	0.527	0.371
Hobart	0.080	0.052
Alice Springs	0.932	0.594
Jabiru	2.809	3.061
Katherine	1.961	2.459
Apatula	2.937	3.506
Nhulunbuy	3.775	4.841
Tennant Creek	2.063	2.238
Darwin	0.440	0.336
Australia	0.750	0.631

Note: The total bedroom need in each ATSI region is from (Jones **1994, 1999**). The figures were derived using data from the **1991** and **1996** Censuses. The total number of Indigenous dwellings in each ATSI region is derived from census data.

Sources: Jones (**1994, 1999**); **1991** and **1996** Censuses.

## Appendix C. indigenous population by ATSI region, 1991 and 1996

**Table C1. Population estimates by ATSI region, 1991 and 1996**

	Population		Working -age population	
	1991	1996	1991	1996
Queanbeyan	5,769	9,123	3,499	5,405
Bourke	5,969	7,344	3,603	4,364
Coffs Harbour	15,876	25,058	9,505	14,527
Sydney	22,905	34,286	14,383	29,983
Tarnworth	8,499	10,711	4,885	6,283
Wagga Wagga	12,776	18,047	7,382	10,275
Wangaratta	8,156	10,395	5,199	6,461
Ballarat	8,579	11,079	5,102	6,675
Brisbane	16,261	27,635	9,759	16,241
Cairns	11,059	14,712	6,742	9,002
Mount Isa	5,947	6,658	3,562	3,991
Cooktown	5,724	5,635	3,760	3,774
Rockhampton	8,083	11,332	4,706	6,477
Rorna	6,195	8,804	3,568	4,979
Townsville	11,238	14,678	3,227	3,570
Torres Strait Area	5,617	6,064	6,724	8,531
Adelaide	9,459	12,689	5,771	7,680
Ceduna	1,540	1,867	890	1,071
Port Augusta	5,233	5,888	3,220	3,624
Perth	12,099	17,998	7,076	10,653
Broome	3,166	3,423	1,810	2,071
Kununurra	3,713	4,088	2,144	2,402
Warburton	2,406	2,686	1,517	1,849
Narrogin	5,420	6,204	3,097	3,623
South Hedland	4,194	4,298	2,625	2,639
Derby	3,828	3,958	2,421	2,478
Kalgoorlie	2,567	3,152	1,515	1,907
Geraldton	4,385	5,006	2,579	2,952
Hobart	8,885	13,873	5,200	8,227
Alice Springs	4,000	4,449	2,543	2,877
Jabiru	7,250	7,746	4,446	4,799
Katherine	6,212	7,122	3,594	4,229
Apatula	6,113	7,518	3,772	4,877
Nhulunbuy	5,936	7,001	3,574	4,368
Tennant Creek	3,074	3,449	1,875	2,082
Darwin	7,325	8,992	4,431	5,628
Mean	7,374	9,805	4,436	5,877

Note: The working-age population is defined as the population aged 15 or more years at the time of the census.

Source: 1991 and 1996 Census.

## Appendix D. ATSI regional council details

**Table D1. ATSI Regional Council details, 1999**

<b>State (Zone)</b>	<b>Regional council (current name)</b>	<b>Regional council (name 1991)</b>	<b>Regional council (previous name)</b>	<b>Regional office</b>
NSW East	Tamworth	Kamilaroi	Tamworth	Tamworth
	Coffs Harbour	NE Indigenous	Coffs Harbour	Lismore
NSW West	Bourke	Murdi Paaki	Bourke	Bourke
	Wagga Wagga	Binaal Billa	Wagga Wagga	Wagga Wagga
	Queanbeyan	Queanbeyan	Queanbeyan	Queanbeyan
NSW Metropolitan	Sydney	Sydney	Sydney	Sydney
Victoria	Ballarat	Tumbukka	Ballarp6t	Melbourne slo
	Wangaratta	Binjirru	Wangaratta	Melbourne slo
Qld South	Roma Rockhampton	Goolburri Central Qld	Roma Rockhampton	Roma Rockhampton
Qld Metropolitan	Brisbane	SE Qld Indigenous	Brisbane	Brisbane
Qld North	Townsville Cairns	Townsville Cairns and district	Townsville Cairns	Townsville Cairns
Qld Far North West	Mt Isa Cooktown	Mt Isa and Gulf Peninsula	Mt Isa Cooktown	Mt Isa Cooktown
Torres Strait	Torres Strait Regional Authority	Torres Strait Regional Authority	Torres Strait	Torres Strait Regional Authority
South Australia	Adelaide Ceduna Port Augusta	Patpa Warra Yunti Wangka Wilurrara Nulla Wimila Kutju	Adelaide Wangka Wilurrara Nulla Wimila Kutju	Adelaide Ceduna Port Augusta
WA South West	Narrogin Perth	Kaata-Wangkinyiny Icarlarnyiny	Narrogin Perth	East Perth East Perth
WA South East	Kalgoorlie Warburton	Wongatha Western Desert	Kalgoorlie Western Desert	Kalgoorlie Warburton
WA Central	Geraldton South Hedland	Geraldton Ngarka-Ngarle-Yarndu	Geraldton Ngarka-Ngarle-Yarndu	Geraldton South Hedland
WA North	Broome Derby	Kullarri Derby	Broome Derby	Broome Derby
Tasmania	Hobart	Tasmanian Regional	Hobart	Hobart s/o
NT Central	Alice Springs Apatula Tennant Creek	Alice Springs Papunya Yapakurlangu	Alice Springs Apatula Tennant Creek	Alice Springs Alice Springs Tennant Creek
NT North	Darwin Jabiru Katherine Nhulunbuy	Yilli Rreung Jabiru Garak-Jarru Miwatj	Darwin Jabiru Katherine Nhulunbuy	Darwin Darwin Katherine Nhulunbuy

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