

## CONTINUING CHALLENGES IN ATTEMPTING TO MEASURE THE SIZE, AND CHANGING SIZE, OF AUSTRALIA'S INDIGENOUS POPULATION

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*The Australian Bureau of Statistics (ABS) recently released the publication 2006 Population Distribution, Aboriginal and Torres Strait Islander Australians which contains 2006 Census usual residence counts and Estimated Resident Populations (ERPs). This paper comments on selected data from the ABS report and reviews some of the challenges faced in attempting to measure the size, and changing size, of the nation's Indigenous population.*

### INTRODUCTION

The recent publication of the ABS report 2006 Population Distribution, Aboriginal and Torres Strait Islander Australians has no doubt generated much interest amongst researchers, planners and policy-makers concerned with Indigenous issues.<sup>1</sup> Contained in this report are the 30 June 2006 preliminary experimental Indigenous Estimated Resident Populations (ERPs) for Australia and the states and territories, census counts for various Indigenous geographic areas, estimates of the net census undercount as well as commentary on census procedures, processes and data quality. Of particular interest is the revised and improved Post-Enumeration Survey (PES)

for the 2006 census and the major impact this has on the Indigenous ERP.

This paper reviews some of the challenges involved in estimating Indigenous population size and change and offers some comments on the recently released Indigenous population figures. It begins by presenting the latest Indigenous ERPs, those for 30 June 2006.

### 2006 INDIGENOUS POPULATION ESTIMATES

National as well as state and territory ERPs by Indigenous status at 30 June 2006 are shown in Table 1. It can be seen that the nation's Indigenous population is estimated to have passed the half million mark,

**Table 1: Estimated resident populations\* by Indigenous status, 30 June 2006**

	Indigenous	Non-Indigenous	Total	Per cent Indigenous	Per cent non-Indigenous
NSW	148,178	6,669,004	6,817,182	2.2	97.8
Vic	30,839	5,097,471	5,128,310	0.6	99.4
Qld	146,429	3,945,117	4,091,546	3.6	96.4
SA	26,044	1,542,160	1,568,204	1.7	98.3
WA	77,928	1,981,117	2,059,045	3.8	96.2
Tas	16,900	473,022	489,922	3.4	96.6
NT	66,582	144,092	210,674	31.6	68.4
ACT	4,043	330,182	334,225	1.2	98.8
Australia	517,174	20,184,314	20,701,488	2.5	97.5

Source: ABS

Note: \* preliminary, and may be revised

and is in fact just over twice the first experimental Indigenous ERP calculated for 1986 (Table 2). At the state and territory scale the overall picture is similar to 2001: New South Wales and Queensland are reported as home to the largest number of Indigenous people, and the Northern Territory stands out as having by far the greatest percentage of its population identifying as Indigenous—31.6 per cent compared to no more than four per cent in any other jurisdiction.

The ABS cautions that these Indigenous ERPs are experimental and preliminary, experimental because the practical and conceptual difficulties in measuring the Indigenous population render it more uncertain than the total ERP, and preliminary because it may be subject to revision following analysis of the demographic components of change between 2001 and 2006 and Post-Enumeration Survey (PES) results. Final 30 June 2006 Indigenous ERPs are due to be published in mid-2008, and estimates and projections from 1996 to 2016 are scheduled to be released in August 2009 in the Experimental Estimates and Projections, Aboriginal and Torres Strait Islander Australians series.<sup>2</sup>

Although ERPs for the Indigenous population are published to the nearest

single person, it is important to stress that they cannot be assumed to possess anything like this degree of accuracy. As the following section makes clear, estimating the size of the nation’s Indigenous population is no simple task and the resulting ERPs possess quite a degree of uncertainty.

**CHALLENGES IN ESTIMATING THE SIZE OF THE INDIGENOUS POPULATION**

In attempting to produce Indigenous population estimates from the census a range of conceptual, procedural and complex statistical estimation influences come into play. Figure 1 summarises the principal influences that shape the picture the census provides of the Indigenous population and the subsequent adjustments made to census counts to derive the ERP. These are discussed briefly in turn.

**Census concepts and questions**

An initial consideration is the socially constructed nature of the Indigenous population. It does not have precise and uncontested boundaries. Individuals and groups from different perspectives may subscribe to different definitions of who is Indigenous. The Commonwealth Government uses a three-fold definition. According

**Table 2: The estimated size of Australia’s Indigenous population**

Based on:	Experimental Indigenous ERP for 30 June:				
	1986	1991	1996	2001	2006
1986 Census	240,152				
1991 Census	<i>250,738</i>	282,979			
1996 Census		<i>345,381</i>	386,049		
2001 Census		<i>366,943</i>	<i>414,390</i>	458,520	
2006 Census					517,174*

Source: ABS

Notes: Backcast ERPs are shown in italics (see the section ‘Indigenous population growth’ for description of these)

\* preliminary, and may be revised

to this Commonwealth working definition an Indigenous person is someone who (i) is of Aboriginal or Torres Strait Islander descent, (ii) identifies as Aboriginal or Torres Strait Islander, and (iii) is accepted as such by the community in which they live.<sup>3</sup> For population data, the relevant definition is that embedded in the census question. Figure 2 shows the precise form of the question in the mainstream 2006 Census household form.

In addition, the picture of the Indigenous population obtained by the census is one which is seen through a lens of western demographic concepts and categories. Some of these concepts and categories, such as household, family and usual address, may have limited relevance or different

interpretations in traditionally-oriented Indigenous communities.<sup>4</sup>

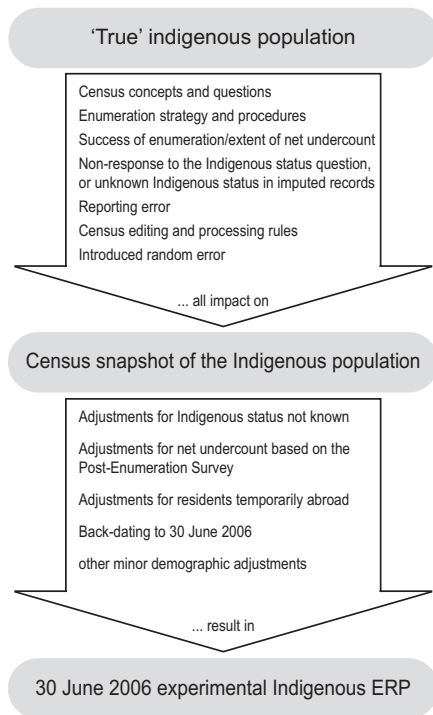
### Enumeration strategy and procedures

As in previous censuses, the ABS pursued an Indigenous Enumeration Strategy (IES), a series of efforts aimed at maximising coverage of Indigenous people. In selected remote communities and urban town camps where the vast majority of the population is Indigenous this strategy included enumeration by interview rather than self-completion. Census responses collected in this way, mostly in northern Australia, were recorded on modified census forms designed to better suit data collection under these circumstances. These forms contain some differences to the mainstream forms in census questions and wording. To facilitate interview-based data capture enumeration in these areas was spread out over a number of weeks around census night rather than being done on the actual census night (8 August in 2006). The benefits of the interview-based approach in remote areas probably outweigh the complications arising during processing due to the need to integrate records collected using two different methods.

Indigenous people living outside these remote communities and urban town camps filled out a census form in the conventional self-completion manner. This applied to 83 per cent of Indigenous people counted in the 2006 census.<sup>5</sup> Nonetheless the IES also operated a number of procedures in these areas. One of the most important of these was the employment of Indigenous Assistants who could be called upon by census collectors when needed.

As in the 2001 census, the ABS permitted independent observation of the operational aspects of the enumeration in selected sites in northern Australia. For 2001 Martin et al. 2002 reported significant departures in practice from the intentions of the IES.<sup>6</sup> A report on the 2006 census

**Figure 1: Factors influencing the Census snapshot of the Indigenous population and experimental Indigenous ERP**



observation is due to be published later this year.

### Success of enumeration

However carefully planned, censuses inevitably miss some people and inadvertently count others more than once. Some people are missed because, for a variety of reasons, they do not receive a census form (or do not get interviewed in a remote Indigenous community). Others may receive a form but mistakenly believe it does not apply to them or to certain individuals in their household (such as babies or foreign citizens) or because they think they were counted elsewhere. A small group of people refuse to participate in the census. Whatever the reasons, certain categories of people have a greater tendency to be missed than others. Across a number of countries research shows that those more likely to be missed by a census include:<sup>7</sup> young children, young adults (especially men), recent migrants, never married people, the unemployed, ethnic minorities and Indigenous people, single person households, and those in rental accommodation.

Some enumeration difficulties specific to the 2006 count in Indigenous communities were noted by the ABS, with lower than expected Indigenous counts in parts of Western Australia and South Australia.<sup>8</sup> The recruitment and retention of census staff proved problematic in parts of northern Western Australia and the Northern Territory and is thought to be part of the reason for higher than expected numbers of non-contact dwellings.

### Indigenous status not known

Another challenge in determining the size of the Indigenous population derives from the absence of Indigenous status information in a significant minority

of census records. Nationally 1.15 million census records did not have Indigenous status recorded in 2006, two and a half times the number of individuals counted as Indigenous.<sup>9</sup> Of these, 29 per cent were due to census forms being returned without the Indigenous status question being answered, whilst 71 per cent were due to imputed records.<sup>10</sup> Imputed census records are created during data processing for people thought to be resident in dwellings at the time of the census but for whom no census forms were received. Indigenous status is not one of the variables for which values are created during imputation.

At 5.7 per cent the proportion of census records with unknown Indigenous status in 2006 was higher than the 4.1 per cent in 2001. However, amongst people returning census forms the non-response rate to the Indigenous status question was 1.7 per cent, lower than the 2001 rate of 2.0 per cent. This improvement may have resulted from moving the question from question 17 on the census form in 2001 to question 7 in 2006. The overall increase in the proportion of census records with unknown Indigenous status derives from a large increase in the number of imputed records, thought largely to be due to an increased number of gated and high-rise dwellings.<sup>11</sup>

### Reporting error

A further problem arises from incorrect responses to the Indigenous status question, either inadvertently or deliberately. If one person completes the census form for all members of a household, that individual may be misinformed about how others

**Figure 2: 2006 Census question on Indigenous status**

<p>Is the person of Aboriginal or Torres Strait Islander origin?</p> <p><small>* For persons of both Aboriginal and Torres Strait Islander origin, mark both 'Yes' boxes</small></p>	<p><input type="radio"/> No</p> <p><input type="radio"/> Yes, Aboriginal</p> <p><input type="radio"/> Yes, Torres Strait Islander</p>
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Source: ABS

would describe their Indigenous status. Additionally, those filling out the form may misread or misunderstand the question, or simply mistakenly fill in the wrong check box. Furthermore, there may be census vandals who intentionally answer questions incorrectly.

The Post-Enumeration Survey gives some indication of the extent of this problem.<sup>12</sup> The PES is a sample survey conducted shortly after each census with the aim of estimating how many people were missed in the census and how many were counted more than once. The 2006 PES was undertaken in September and October 2006 and sampled a total of 88,245 people. Table 3 cross-classifies Indigenous status as reported in the census with Indigenous status as stated to PES interviewers, showing that the vast majority of census responses are correct according to the PES. Slightly more people described themselves as Indigenous in the census but by comparison with the overwhelming majority of people who provided the same responses, this difference is not significant.

### Editing and processing rules

Editing and processing also affect the census picture of the Indigenous population. In the 2006 census the ABS edited Indigenous status responses during processing so that 'Aboriginal' and 'Torres Strait Islander' were changed to non-Indigenous if both parents were born overseas.<sup>13</sup> This is probably a correct edit in the vast majority of cases. However, from a conceptual viewpoint it is not impossible for an Indigenous person to have two overseas-born parents. This edit may well become increasingly questionable in future censuses

as the Indigenous population becomes more diverse and the global movement of people increases.

### Introduced random error

The final influence on the census portrayal of the Indigenous population is the random error added to census tables to 'avoid identification of individuals'.<sup>14</sup> All cells in a table are altered slightly, an approach which is new for 2006; previously only cell counts of 1 or 2 were adjusted by randomly changing their values to 0 or 3. Hence, summing cells from lots of different tables is likely to give figures which differ from independent totals (for example, summing data for all Statistical Local Areas in a Statistical Division will give different numbers to the same table for the Statistical Division).

The influences mentioned so far are those which act as filters between the true Indigenous population and the picture painted by the census. Attention now turns to the various adjustments made to census counts to obtain the 30 June ERP.

### Adjustments for Indigenous status not known

The significant number of census records with unknown Indigenous status presents a major challenge to the production of reliable estimates of the Indigenous (and non-Indigenous) population. Unknown Indigenous status records were 'allocated as

**Table 3: Indigenous status as reported in the census and PES\***

Census response	PES response		Total
	Indigenous	Non-Indigenous	
Indigenous	2,576	283	2,859
Non-Indigenous	116	75,406	75,522
Unknown	38	1,218	1,256
Total	2,730	76,907	79,637

Source: ABS

Note: \*matched responses only

either indigenous or non-indigenous according to the distribution of stated responses within each age group, sex, census form type and geographic area'.<sup>15</sup> Findings from the PES suggest that this is not an unreasonable allocation. Table 3 shows that 1,256 individuals whose Indigenous status was not known in the census were interviewed in the PES. Of these, 38 (three per cent) described themselves as Indigenous to the PES interviewer and the rest, 1,218 (97 per cent), described themselves as non-Indigenous.

### **Adjustments for net undercount**

Adjustments to census counts were also made for net undercount. In what is probably the most significant development for Indigenous population estimation for a long time, the 2006 PES was the first such survey to be conducted in remote areas and discrete Indigenous communities.<sup>16</sup> In censuses prior to 2006 a view had been adopted by the ABS that the PES could not be conducted in remote areas because of both operational difficulties (finding adequate numbers of trained personnel in large numbers of locations) and concerns about the ability to produce timely independent PES and census results. Doubts were also held about the ability of the ABS to adequately conduct the essential census-PES record matching with sufficient accuracy for remote Indigenous people. To the ABS's credit all these issues were robustly and satisfactorily tested in the lead up to the 2006 census and, by adopting rigorous internal procedures to ensure independence of all operational stages, the PES was successfully extended to remote Indigenous communities.<sup>17</sup> In addition to these operational improvements, the PES estimation methodology was also considerably modified and improved.<sup>18</sup> As a result the estimates of census net undercount are less likely to be biased than in previous censuses.

The theoretical sophistication and

successful implementation of the improved PES has enabled ABS to produce what are probably the best ever estimates of the Indigenous population. The PES provides independent estimates of the population that should have been counted on census night. By comparing these PES estimates with actual census counts net undercount rates can be calculated. These are shown in Table 4. Because of small sample sizes for the Indigenous population in some individual states and territories, PES population estimates were calculated for five jurisdictional groupings. Ironically, the success of the PES casts the enumeration of Indigenous people in a rather poor light, with the national Indigenous net undercount rate standing at 11.5 per cent and, as Table 4 shows, very high rates in the Northern Territory and Western Australia. These compare to a total population net undercount rate of 2.7 per cent. These high undercount rates effectively act as a warning not to use Indigenous census counts as accurate measures of Indigenous population size.

### **Other adjustments**

The final two important adjustments were those for people overseas on census night and a timing adjustment. First, data from the international passenger cards on residents temporarily overseas at the time of the census were used to add to the population estimate. Then the demographic components of change which occurred between 30 June and 8 August 2006 were used to backdate the census estimate to give the 30 June ERP.

### **Uncertainty**

Even after all these adjustments, the resulting 30 June ERPs for the Indigenous population cannot be regarded as accurate to the last digit. In fact, the PES provides an indication of the minimum extent of uncertainty (the uncertainty due to PES

sampling error). ABS has published the standard errors for the PES estimates of the Indigenous population, thus allowing 95 per cent confidence intervals to be calculated. These intervals are for the census night PES estimates of the population for the five state and territory groupings rather than the 30 June ERP for each state and territory, but this is not significant. The important point is that they stress the relatively high level of uncertainty of Indigenous population estimates for some jurisdictions. Table 5 presents the 95 per cent confidence intervals, demonstrating that estimates of the

Indigenous population are merely points within wide distributions.

## INDIGENOUS POPULATION GROWTH

Uncertainty in the 2006 ERPs is just one of several factors contributing to difficulty in understanding temporal trends in the Indigenous population. At 517,174 the national Indigenous ERP for 30 June 2006 was 12.8 per cent greater than the 30 June 2001 ERP (Table 2). Over the same 2001 to 2006 period the non-Indigenous population grew by 6.5 per cent to 20,184,314. Although at

**Table 4: Indigenous net undercount rates, census night 2006**

	Usual residence census count 8 August 2006	PES estimate 8 August 2006	Net undercount rate <sup>1</sup> (per cent)
NSW & ACT <sup>2</sup>	142,382	151,048	5.7
Vic, SA & Tas	72,467	73,380	1.2
Qld	127,580	145,843	12.5
WA	58,710	77,304	24.1
NT	53,661	66,402	19.2
Australia	455,028	513,977	11.5

Notes: <sup>1</sup>Calculated as (PES estimate – Census count) / PES estimate x 100%

<sup>2</sup>The grouping of some states and territories in calculating net undercount rates is due to high standard errors in PES estimates for some jurisdictions.

**Table 5: PES Indigenous population estimates and 95 per cent confidence intervals, census night 2006**

	PES estimate 8 August 2006	95% confidence interval	
		Lower bound	Upper bound
NSW & ACT	151,048	133,122	168,974
Vic, SA & Tas	73,380	64,879	81,881
Qld	145,843	133,912	157,774
WA	77,304	66,318	88,290
NT	66,402	61,814	70,990
Australia	513,977	487,891	540,063

Source: ABS

the time of writing Indigenous births and deaths data were not available for the whole 2001 to 2006 period it will almost certainly be the case that, as for previous intercensal periods, Indigenous demographic change will be greater across the whole of Australia than measured natural increase (overseas migration is thought to be negligible). Debate continues about the extent to which residual unexplained growth is due to inaccurate enumeration and estimation of the Indigenous population, incomplete measurement of natural increase, and the extent to which individuals report their Indigenous status differently from one census to another. Unfortunately there are no robust data sources which provide a definitive answer to this conundrum. It can be tentatively suggested, however, that the extension of the 2006 PES to remote areas for the first time hints at a more accurate ERP being responsible for at least part of the unexplained growth.

Due to difficulties in understanding the components of Indigenous population change ABS does not attempt to make experimental Indigenous ERPs based on different censuses consistent. Instead it produces a new ERP series based on the current census, backcasting on the assumption of only natural increase (and no unexplained growth). Table 2 presents the national Indigenous ERPs based on several censuses. Note especially the sizeable difference between the 1991 census-based ERP for 1991 and the backcast 1996 census-based ERP for that year—the latter being 22 per cent greater than the former.

At the state and territory scale similar discontinuities exist, as shown in Figure 3. Indigenous ERPs for census years are indicated by the bold diamonds and backcast ERPs by the lines. Note how for New South Wales and Victoria the 2006 ERPs are roughly in line with the trend indicated by the 2001-based backcast ERPs;

for South Australia, Tasmania and the ACT the 2006 ERPs are slightly lower than might have been expected. Interestingly, for Queensland, Western Australia and the Northern Territory—those jurisdictions significantly affected by the extension of the PES to remote areas—the 2006 ERPs are higher than expected on the basis of the 2001-based ERPs. In the case of the Northern Territory the 2006 ERP is around 5,000 higher than the 2001-based experimental projections. It raises an interesting question. Condon et al. backcast the Territory population from the 2001 ERP to 1966 on the assumption of only natural increase.<sup>19</sup> They discovered that their backcast estimates were very close to the 1996 ERP and also very close to the Northern Territory administration's Indigenous population estimates for 1966 and 1971. If a similar backcasting exercise were to be undertaken based on the 2006 ERP the Territory's Indigenous population would be about 5,000 higher for the whole period. Were all these earlier estimates inaccurate?

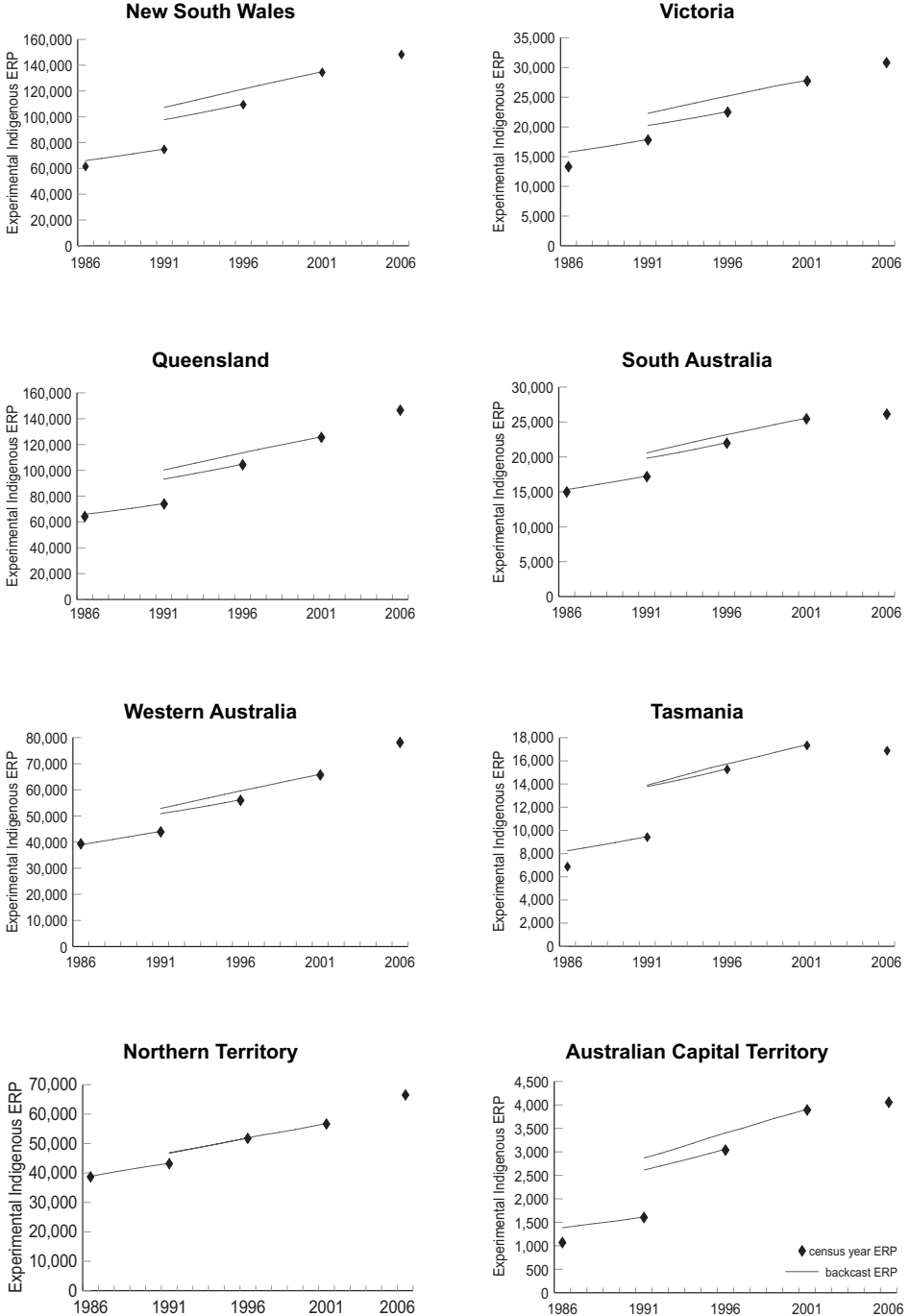
## CONCLUSIONS

The ABS should be commended for producing what is probably the best estimate yet of the nation's Indigenous population, and for providing considerable transparency in its methods. But at the same time, it is clear that a great deal of work remains to be done before a clear picture of Indigenous population dynamics emerges. Whilst progress has been made in the coverage and quality of Indigenous demographic data researchers still struggle to obtain precise answers to many of the basic demographic questions, such as:

- What is the size of Australia's Indigenous population?
- What are the demographic components of change for the recent intercensal period?
- How is the Indigenous population



**Figure 3: State and territory experimental indigenous ERPs based on different censuses**



Source: ABS

Notes: 2006 ERPs are preliminary and may be revised. Experimental Indigenous ERPs backcast from 2006 to 1996 are scheduled to be published by ABS in August 2009.

distributed geographically, and now has this changed in recent years?

- How is the age structure of the Indigenous population changing, and, in particular, to what extent is it ageing?

Getting closer to more reliable answers to these questions may be achieved through the establishment of a longitudinal study which links census records from one census to the next along with vital statistics. This is no simple or cheap undertaking, but, as the experience of the UK Longitudinal Study has shown, it could prove an invaluable resource. The ABS is currently considering establishing a Statistical Longitudinal Census Dataset which would link five per cent of census records, though the proposal is to use probabilistic matching and not to incorporate vital statistics.<sup>20</sup> Among many other things, it could provide

a consistent set of population accounts for a sample of the population and help solve the unexplained growth conundrum. In addition, there are probably several administrative data sources which could supplement the census. Whilst legal and practical barriers to accessing such data may well exist at present, further investigation could prove worthwhile.

In conclusion, the improved methods, efforts and transparency of the ABS with regards to estimating Australia's Indigenous population from the 2006 census are to be welcomed. We hope it will continue, and lead to bolder initiatives in coming years.

### Acknowledgements

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