How reliable are Indigenous population projections?

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Abstract

Projections of Australia’s Indigenous population are used in a wide range of planning, service provision, policy development, and research activities. But apart from a very general sense that Indigenous population data are imprecise, little is known about the reliability of these projections. This paper evaluates several past sets of ABS Indigenous population projections. It addresses the question ‘How well did past ABS Indigenous projections predict the Indigenous Estimated Resident Populations (ERPs) five years later?’ Past ABS projections of the Indigenous population are assessed against subsequent ERPs using Percentage Discrepancy measures. Both total and age-specific populations are evaluated. The results show that ABS Indigenous projections have generally not predicted the next census year’s ERP very well, with the exception of the Northern Territory. Users should be prepared for the large levels of discrepancy revealed in this study for past projections to be repeated with the most recent set of Indigenous projections.

Keywords

Indigenous; population projections; Australia; ABS
Introduction

Projections of Australia’s Indigenous population inform a multiplicity of planning, service provision, infrastructure, policy development, and research activities with population size, geographical distribution and age composition relevant to national finances, health, policy evaluations, social policy, housing and education to name a few (e.g. Taylor 2006; Jackson 2008; Biddle & Taylor 2009). In the realm of Indigenous affairs, there is a focus on evidence-based approaches to address the large and persisting gaps in socio-economic outcomes between Indigenous and other Australians, as well as in the evaluation of Indigenous targeted policies and programs towards these ends (Taylor et al. 2011). More specifically, Indigenous population estimates affect Commonwealth financial allocations to Australia’s states and territories in the form of funding for Indigenous-targeted programs. Not least, the share of the national Indigenous population held by each State and Territory is a component in the formula for distributing around $40 billion of funds from the national Goods and Services Tax, collected by the Commonwealth and distributed to States and Territories (CGC 2015; Corr 2015). The rolling finances for some jurisdictions, notably those with substantial Indigenous populations across the north of the country (the Northern Territory in particular and, to a lesser extent, Western Australia and Queensland) are highly dependent on this source of revenue. Projections should indicate likely demographically-driven changes to these financial allocations in coming years.

Projections can also be used to provide clues about the possible future progress in reducing health and other socio-economic disparities which are articulated in national policies for ‘closing the gaps’ between Indigenous and other Australians (Council of Australian Governments 2015). Presently targets exist in key areas such as mortality rates, education, and employment. Governments and researchers need projections to determine likely trajectories in these targets as well as to sound early warnings where policies might be failing, such that these can be adjusted (see for example, Taylor and Barnes 2013).

Indigenous projections have another set of uses. Demographers make a distinction between population estimates and population projections. Estimates describe resident population numbers for past years based on data collected for those years (such as a census); the Australian Bureau of Statistics’ (ABS) official population estimates are referred to as Estimated Resident Populations (ERPs). Projections are calculations which extend beyond the most up-to-date estimates into the future, and are based on assumed future trends in factors such as fertility, mortality and migration. Because the ABS only prepares Indigenous ERPs for census years (those ending in 1 or 6), the first few years of Indigenous population projections often effectively function as interim ERPs. Based on past publishing lags, the 2016 Indigenous ERPs are likely to be published by the ABS in 2018. In the meantime many users will rely on the current set of ABS Indigenous population projections (ABS 2014) to provide annual population estimates.

Thus Indigenous population projections have many uses and users – but are they any good? To find out, this paper evaluates past Indigenous population projections produced by the ABS. The ABS is the primary source for national and sub-national Indigenous projections and, whilst other researchers have produced Indigenous projections (e.g. Biddle 2013; Khalidi 2008; Wilson 2009) the ABS projections are the most well-known and widely used, so we restrict our analysis to their projections only. The paper attempts to answer the question ‘How reliable are the ABS Indigenous population projections?’ by specifically focusing on how accurate historical Indigenous projections have been at both national and state/territory scales. Undoubtedly, forecast accuracy is only one of many characteristics on which projections might be judged (Smith et al. 2013), but for many users it is the most important and understandable gauge. Although other

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1 Indigenous ERP as defined by the ABS (2004b).
authors have broadly commented on the reliability of the ABS Indigenous population projections before (e.g. Biddle and Wilson 2013; Wijesekere 2008; Taylor 2011), to the best of our knowledge this paper presents the first detailed analysis.

However, a key requirement for measuring the accuracy of a past population projections is a reliable ERP to compare it against. Unfortunately, considerable uncertainty surrounds Indigenous population numbers (ABS 2013a; Taylor et al. 2014), with ERPs based on successive census counts often turning out higher than expected, prompting questions about data reliability and the true drivers of Indigenous population growth. For example, Figure 1 below illustrates the five sets of Indigenous ERPs and projections for Australia produced by the ABS to date. The thin dashed lines show projection scenarios. The thicker lines depict sets of ERPs based on the census years shown by the graph labels. These are ‘backcast’ to earlier dates by accounting for deaths but not identification change, which occurs when individuals who choose to declare themselves as being in one Indigenous status category for one census then change that category at a subsequent census. The historical net flows in identification change are overwhelmingly towards changing from non-Indigenous to Indigenous as a result of a number of societal factors (Taylor 2014). Collectively this means historical ERPs are only approximate when substantial identification change has occurred, as is thought to have been the case for the past several censuses.

Comparing ABS ERPs and projections for Indigenous Australians over time highlights significant differences between the two datasets. The lowest ERPs and projections are the 1991-based set. ERPs from the 1996 Census turned out much higher than expected on the basis of the 1991-based ERPs and projections. The exact reasons for the discrepancies are unknown, though it is likely to be a combination of improved census enumeration and ERP calculation in 1996, and increasing propensities to identify as Indigenous over time. It can be seen that the other substantial differences between sets of ERPs and projections are evident between the 2006- and 2011-based data sets. More is understood about this most recent difference, thanks to a detailed investigation by the ABS (2013a). It found that about 70% of the 2006-11 growth in the population enumerated in the census could be accounted for by the demographic factors of births, deaths and migration, whilst much of the remaining 30% was due to increased propensities for individuals to identify as Indigenous on census forms.
Figure 1: ABS ERPs and projections of Australia’s Indigenous population


Notes: The thick lines represent ERPs based on the census year shown in the graph. The ERPs are ‘backcast’ to earlier years (by accounting for deaths but assuming no overseas migration and no identification change). The thin dashed lines represent projections.

Given significant uncertainty around Indigenous population figures, we modify our research question to ‘How well did past ABS Indigenous projections predict the Indigenous ERP five years later?’ and instead of referring to ‘projection error’ it is more appropriate to use the term ‘projection discrepancy’ to describe the difference between a projection and the subsequent ERP. It should be noted that officially the ABS makes no attempt to provide population predictions or forecasts. Instead, their Indigenous projections are presented as “…illustrations of the growth and change in population which would occur if certain assumptions about future levels of fertility, mortality and migration were to prevail” (ABS 2009 p. 7).

Despite this cautionary notice, users are prone to effectively interpret the data as forecasts (Taylor, 2011).

Given this ABS warning about their projections and the data limitations noted above, is it still worth evaluating Indigenous population projections? We argue that there are at least two key reasons why such an exercise is worthwhile. First, the ABS Indigenous population projections are widely used as both projections and short-term estimates, so it is helpful to provide users with some evidence on how well (or poorly) past projections have turned out relative to subsequently published sets of Indigenous ERPs. This can give users a ballpark indication of the likely success of current projections in predicting the next census year ERP. Of course, past levels of discrepancy in projections will not necessarily be repeated in current and future sets of projections, but with no major changes in data and projection methods they do at least offer some clues. The second main reason for undertaking a projections assessment is to enable demographers to see if technical problems come to light which can be rectified when preparing future projections.

This paper continues as follows. In the next section on ‘data and methods’ we describe the ABS projections which were evaluated along with the various sets of ERPs they were compared against, together with the evaluation measures employed. The subsequent section then presents the results of both total population
and age-specific projection discrepancies, before a final section which consists of a discussion and conclusions.

Data & Methods

Projections and estimates data

The ABS Indigenous population projections included in this study were those starting in 1991, 1996, 2001 and 2006 (ABS 1996, 1998b, 2004a, 2009). In the 1991-based set there were 3 projection variants (low, medium and high), whilst the later sets of projections comprised two main variants (low/high or Series A/B). Projections from all variants were compared to the Indigenous ERPs based on the census five years later (ABS 1998, 2004a, 2009, 2013b). The four sets of projections were evaluated for this short five year period only because not all projections extended far enough into the future for them to be assessed out 10 years to the subsequent ERP.

The method used by the ABS to create all four sets of Indigenous projections was a modification of the standard cohort-component model (ABS 1996, 1998b, 2004a, 2009). Projection methods and assumptions for the demographic components of change are briefly described below, with assumptions summarised in Table 1.

Deaths were projected in the standard way by multiplying age-sex-specific mortality rates by the populations of each age and sex. However, assumptions on the future of mortality varied between the sets of projections. In the 1991-based set the low, medium and high variants included, respectively, no mortality rate change, modest declines, and large declines; in the 1996- and 2001-based projections mortality rates were held constant. In the 2006-based set of projections Series A had constant mortality while Series B assumed mortality decline.

Net interstate migration was assumed constant at the values measured in the most recent census whilst overseas migration was assumed to be zero for all sets of projections. Changes in the propensity to identify as Indigenous were included only in the 1996-based and 2001-based high series where net gains to the Indigenous population were assumed; all other projections had no identification change.

Fertility was handled rather differently from the traditional cohort-component model. The ABS Indigenous projection model calculates both births to Indigenous women and births to non-Indigenous women partnered with Indigenous men. Births are projected by multiplying age-specific fertility rates by the numbers of Indigenous women and by multiplying age-specific paternity rates by the numbers of Indigenous men. All babies born to couples comprising non-Indigenous women and Indigenous men are assumed to be Indigenous. Wilson (2009) and Biddle and Wilson (2013) provide a critique of this approach. In the 1991-based projections the high and medium variants assumed constant fertility whilst the low series assumed a slight decline in the fertility of Indigenous mothers. The 1996- and 2001-based projections assumed gradual declines in fertility rates and constant paternity rates, and the 2006-based set also included fertility rate decline but paternity rate increases.
Table 1: Summary of assumptions for ABS state/territory Indigenous population projections

<table>
<thead>
<tr>
<th>Projection set</th>
<th>Fertility</th>
<th>Mortality</th>
<th>Interstate migration</th>
<th>Identification change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991-based low</td>
<td>Slight fertility decline; constant paternity</td>
<td>No mortality change</td>
<td>Constant net numbers</td>
<td>None</td>
</tr>
<tr>
<td>1991-based medium</td>
<td>Constant fertility; constant paternity</td>
<td>Small mortality decline</td>
<td>Constant net numbers</td>
<td>None</td>
</tr>
<tr>
<td>1991-based high</td>
<td>Constant fertility; constant paternity</td>
<td>Mortality decline</td>
<td>Constant net numbers</td>
<td>None</td>
</tr>
<tr>
<td>1996-based low</td>
<td>Slight fertility decline; constant paternity</td>
<td>No mortality change</td>
<td>Constant net numbers</td>
<td>None</td>
</tr>
<tr>
<td>1996-based high</td>
<td>Slight fertility decline; constant paternity</td>
<td>No mortality change</td>
<td>Constant net numbers</td>
<td>Gains to Indigenous population</td>
</tr>
<tr>
<td>2001-based low</td>
<td>Slight fertility decline; constant paternity</td>
<td>No mortality change</td>
<td>Constant net numbers</td>
<td>None</td>
</tr>
<tr>
<td>2001-based high</td>
<td>Slight fertility decline; constant paternity</td>
<td>No mortality change</td>
<td>Constant net numbers</td>
<td>Gains to Indigenous population</td>
</tr>
<tr>
<td>2006-based Series A</td>
<td>Slight fertility decline; paternity increases</td>
<td>No mortality change</td>
<td>Constant net numbers</td>
<td>None</td>
</tr>
<tr>
<td>2006-based Series B</td>
<td>Slight fertility decline; paternity increases</td>
<td>Mortality decline</td>
<td>Constant net numbers</td>
<td>None</td>
</tr>
</tbody>
</table>


Note: In all sets of projections overseas migration was assumed to be zero.

**Evaluation methods**

Two evaluation measures were used in this study: Percentage Discrepancy and Adjusted Percentage Discrepancy. Numerically they are equivalent to Percentage Error and Corrected Percentage Error (Keilman 1999; Wilson 2015) but are re-named here because, as we have outlined above, it is not really appropriate to refer to forecast error given the uncertainty surrounding Indigenous ERPs.

Percentage Discrepancy (PD) at time t+5 is defined as the population projection (P) five years from the starting year t minus the new ERP based on the census for year t+5 divided by the same ERP and expressed as a percentage:

\[ PD_{t+5} = \frac{P_{t+5} - ERP_{t+5}^{new}}{ERP_{t+5}^{new}} \times 100\% \]

For example, if a projection starting in 2006 had the population increasing from 9,200 in 2006 to 9,500 by 2011 but the new 2011 ERP based on the 2011 Census was 10,000 then the Percentage Discrepancy would be \((9,500 - 10,000) / 10,000 \times 100\% = -5\%\). A positive Percentage Discrepancy indicates a projection that was higher than the newly calculated ERP, while a negative figure indicates a projection that turned out too low.
However, as Figure 1 demonstrates, Indigenous ERPs based on different censuses are inconsistent. Percentage Discrepancy incorporates discrepancies due to both projected population growth and inconsistent starting populations. A projection could therefore have a large Percentage Discrepancy even if the projected growth matched the growth over the projection period measured by the new backcast ERP series. Adjusted Percentage Discrepancy (APD) removes this starting population difference. It is calculated as:

\[
APD_{t+5} = \frac{P_{t+5} - ERP_{t+5}^{new} - (ERP_{t}^{old} - ERP_{t}^{new})}{ERP_{t}^{new}} \times 100\%
\]

Implicit in this measure, of course, is an assumption that the new ERP series based on the next census provides a dependable set of population estimates. Given that these backcast ERPs do not incorporate identification change, they may understate the amount of Indigenous population growth which has occurred. It is important to keep in mind therefore that APD is an imperfect measure.

To illustrate the calculation of APD, we take the same example as before. Assume that a new 2011-based set of ERPs puts the population at 10,000 in 2011 and 9,600 in 2006. Some of the -5% Percentage Discrepancy is due to different ERPs for 2006. If this starting year difference is removed then the Adjusted Percentage Discrepancy is obtained: \([9,500 - 10,000 - (9,200 - 9,600)] / 10,000 \times 100\% = -1\%\). In other words, had the projection started off in 2006 at the 2011-based ERP of 9,600, its projected growth of 300 would have resulted in a population projection for 2011 only 1% below the 2011 ERP. The Adjusted Percentage Discrepancy is therefore an indication of how well the population projection would have fared in the absence of starting year ERP inconsistencies (and assuming the backcast ERPs are reliable).

Discrepancies within 10% are regarded as acceptable. While different users will have different views on what is acceptable, depending on the purpose for which the projections are used, 10% is the maximum amount of error one survey discovered that users were prepared to tolerate (Tye 1994). Errors exceeding 10% make planning and service delivery based on projection outputs increasingly problematic.

**Results**

**Total populations**

Figure 2 shows how the projections performed at predicting total Indigenous ERPs five years later at the national and state/territory levels. Graphs on the left-hand side show Percentage Discrepancies while those on the right show Adjusted Percentage Discrepancies which adjust for differences in ERP series based on different censuses.

At the national level, Percentage Discrepancies varied from -18% to +10%, with only the 1996- and 2001-based high series over-projecting the population. These figures are large in comparison with the errors in projecting the Australian population as a whole, for which the average error five years ahead was under 1% across all ABS projections produced from the 1980s to the early 2000s (Wilson 2007). However, the graph at the top right of Figure 2 illustrates what the Percentage Discrepancies would have been if the starting populations had been aligned with the ERP series five years later. The discrepancies are much smaller, and aside from the 1996- and 2001-based high series, do not exceed 2.1%.

At the state and territory scale, Figure 2 demonstrates that the Percentage Discrepancies are generally very large, especially for the smaller Indigenous populations of Tasmania and the ACT. Several sets of projections for these two jurisdictions exceed 30% Discrepancy after five years. The NT is the only jurisdiction with reasonably successful projections, with all projections shown in the graph achieving less...
than 10% Discrepancy and 6 out of the 9 projections coming within 5% of the ERP. The Adjusted Percentage Discrepancies for the states and territories paint a picture of much lower discrepancies, particularly if the 1996- and 2001-based high series are excluded.

What Figure 2 shows, therefore, is that while ABS Indigenous projections have not been particularly successful at predicting the Indigenous ERP based on the next census, they have been better at predicting population growth over the five year period as measured by the ERP series based on the next census.

**Figure 2:** Percentage Discrepancies (left) and Adjusted Percentage Discrepancies (right) of ABS Indigenous population projections five years ahead; Australia and states/territories

Note: Ordering of projections from left to right is: 1991-based low, medium, and high; 1996-based low and high; 2001-based low and high; 2006-based Series A and Series B.
Figure 2 continued
Figure 2 continued

- **Tas**
  - Percentage Discrepancy
  - Adjusted Percentage Discrepancy
- **NT**
  - Percentage Discrepancy
  - Adjusted Percentage Discrepancy
- **ACT**
  - Percentage Discrepancy
  - Adjusted Percentage Discrepancy

Graphs showing discrepancies over different years for Tas, NT, and ACT.
Age-specific populations

Projections by five year age groups could not be evaluated for the 1991-based projections because they were only published in broad age ranges (ABS 1996). Not surprisingly, however, given the results shown in Figure 2, the projections for all three variants were substantially lower than the 1996 ERPs for nearly every broad age group. Fortunately, projections by five year age group were available for the later three sets of projections, and their Percentage Discrepancies and Adjusted Percentage Discrepancies are illustrated in Figure 3.

Perhaps the most obvious feature of the graphs on the left-hand side of Figure 3 is that for Australia, and most of the states and territories, the Percentage Discrepancies by age after five years were very large. In other words, the projections generally failed to provide good predictions of the next set of census-based ERPs for individual age groups. Like the total population projections (Figure 2), the age-specific discrepancies were mostly negative, indicating under-projections relative to later ERPs. For Tasmania and the ACT in particular, the age-specific projections bore little resemblance to later ERPs. The one exception is the NT, where projections of most five year age groups were within 10%.

Projections of the 75+ age group turned out the worst of all the age groups for many states and territories, and for all of them combined (as measured by the median absolute Percentage Discrepancy by age across all projections shown in Figure 3). Averaged across all projections, the 75+ age group was under-projected more than all other age groups, a finding probably due in part to the lack of mortality decline assumed for most projections (Table 1).

In the childhood ages, the numbers of 5-9 year olds were the most under-predicted for many states and territories, and overall (as measured, again, by the median absolute Percentage Discrepancy). This finding is consistent with recent research which found significant amounts of identification change between 2006 and 2011 in the childhood ages, and especially amongst those aged 5-9 in 2011 (ABS 2013a; Biddle and Campbell 2014).

The Adjusted Percentage Discrepancies mostly paint a better picture (shown in the graphs on the right-hand side of Figure 3), indicating that if the projections had started off at the ERP backcast from the next census, then the discrepancies would have been smaller. This is especially the case for the 2006-based projections for all jurisdictions except the ACT. The NT again performs relatively well, but the Adjusted Percentage Discrepancies for South Australia and WA were also fairly small.
Figure 3: Percentage Discrepancies (left) and Adjusted Percentage Discrepancies (right) of ABS Indigenous population projections by age group five years ahead; Australia and states/territories.

Note: Adjusted Percentage Discrepancies cannot be calculated for the 0-4 age group because the population of this cohort at the start of the projections is required but the necessary data are unavailable.
Figure 3 continued

Figure 3 continued
Discussion and conclusions

In this study we have summarily evaluated Indigenous population projections published by the ABS for Australia and its states and territories, including those by age group, over four sets of projections. We have evaluated their reliability based on two measures. The first was the Percentage Discrepancy which measured the percentage difference between the projected population and the eventual ERP. The second was Adjusted Percentage Discrepancy. This measure removes the discrepancy due to inconsistent starting populations.

Our analysis demonstrates that past ABS Indigenous projections have generally not predicted the next census year’s ERP very well, with the exception of the NT. However, the Adjusted Percentage Discrepancies demonstrate that projections of population growth over the five year interval have been better. Relatively large discrepancies for some jurisdictions, notably the ACT and Tasmania, are in part due to the small size of their Indigenous populations. This is because there is an inverse mathematical relationship between population size and projection discrepancies (or errors) in which small differences between projections and ERPs manifest as large Percentage Discrepancies (Taylor 2014).

However, large differences between the Percentage Discrepancies and Adjusted Percentage Discrepancies for Tasmania and the ACT (Figure 2) are also indicative that the combined influence of identification change, mixed partnering, migration and changed census procedures have been most influential for these jurisdictions. Indigenous population growth in Tasmania and the ACT was the highest amongst all states and territories in the 30 years to 2011 at 519% for Tasmania and 382% for the ACT (Taylor and Bell 2013). These are symptomatic of the issues faced by the ABS and researchers in truly understanding the past and future size of the Indigenous population as it is currently officially measured.

Our results re-emphasise the tenuous, complex and changing influences on Indigenous population change which in turn make the task of producing Indigenous ERPs all the more difficult. Creating backcast populations in the face of rapid growth of the Indigenous population in some states and territories from what are essentially socio-cultural factors demonstrates these ongoing difficulties. This research highlights the inability for the data architecture around Indigenous enumeration and subsequent projections to adequately incorporate the fluid nature of the Indigenous population and/or to capture it wholeheartedly in official collections (like the census). This is because ‘being’ Indigenous is a social construct within the confines of official data collections and is based on self-identification. With aims such as balancing respondent burden and capturing the best possible data with limited resources, self-identification is engrained in the current data architecture and official definitions. Conversely, collections like the census cannot be expected to capture all the historical tensions for individuals between identification (as recorded in official data sets) and identity (as expressed from within). There are many reasons why individuals may change either at different points in time and this is clearly an area which requires more research.

Results by age group reflect some issues with the assumptions behind the ABS Indigenous projections. In particular, high discrepancies for older ages (especially 70 years and over) for the Adjusted Percentage Discrepancy were noticeable in most jurisdictions. This is, at least in part, due to the constant mortality rate assumption in ABS projections, although it may also be due to the small numbers of people in these ages. Meanwhile, the notable (negative) increases in Percentage Discrepancies for young people aged 5-9 can be considered a consequence of the concentration of a large proportion of the people who might be termed ‘new [Indigenous] identifiers’ being recorded within these ages (Taylor and Bell 2013; Biddle and Campbell 2014).
Nevertheless, on the basis of our study we offer a series of suggestions with regards to the current set of 2011-based Indigenous projections (ABS 2014) to assist users in applying these to planning and other purposes:

- Series A of the 2011-based projections is marginally higher than the other two main series (B and C) and is probably the best one to use given the tendency toward under-projection in the past.

- Projections for the NT Indigenous population in 2016 are likely to be reasonably close to the forthcoming ERP based on the 2016 Census (perhaps within ± 5%).

- For all other jurisdictions, the projection for 2016 is unlikely to be a good guide to the 2016 ERP.

- Projections of population growth over the intercensal period are likely to be roughly in the right ballpark – with the possible exception of the ACT.

- Projections by age group are probably reasonable for the NT only.

Given the multitude of data challenges, and limited success to date in forecasting the ERP five years later, the question must be asked as to whether Indigenous population projections should continue to be produced? We argue that there are at least two reasons why they should. First, Indigenous population numbers are essential for informing planning, service delivery, in scenario modelling and in policy development as noted earlier. The projections are too important not be produced.

Second, there is hope for better Indigenous projections in the future. The Indigenous data environment is improving thanks to more sophisticated methods for estimating the ERP (ABS 2013b) and the creation of new ABS datasets such as the Australian Census Longitudinal Database (ABS 2013c) which permits changes in identification between censuses to be more accurately measured and understood. More extensive time series of historical Indigenous mortality decline are also now available (Wilson 2014), providing a more solid foundation for forecasting. Datasets such as these should facilitate the formulation of more refined population projection assumptions. Assumptions should therefore include continued declines in mortality (rather than keeping mortality constant), and non-zero identification change – especially in the childhood ages where it is particularly significant (Biddle and Campbell 2014).

Greater use should be made of multi-state projection methods which allow interaction between population groups. This means projecting the Indigenous and non-Indigenous populations simultaneously (e.g. Wilson 2009), rather than just the Indigenous population on its own. A whole literature exists on the conceptual and practical benefits of multi-state methods (summarised by Ledent and Zeng 2010). A challenge remains, however, to extend multi-state methods to model the complexity of fertility when babies are born to mixed Indigenous/non-Indigenous couples. Developments in this area should help improve projections in the childhood ages in particular.

In conclusion, our evaluation has revealed the many weaknesses, but also a few strengths, of the ABS Indigenous population projections. Most past sets of projections have not been good at predicting the ERP based on the next census five years later, but those for the NT are an exception. In addition, projections of population growth appear to have been better than projections of the population total five years ahead. There is hope for more reliable projections in the future, but clearly many challenges remain regarding data quality, assumption-setting, and projection model development.
References


Tye, R. (1994). *Local authority estimates and projections: how are they used and how accurate do they need to be? Working Paper 9, Estimating with Confidence project. Department of Social Statistics, University of Southampton, UK.*


