

# POPULATION STUDIES RESEARCH BRIEF

ISSUE Number 2010051

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## Northern Territory population estimates as inputs to Australian Government processes - are they fit for purpose?

### KEY FINDINGS

- Estimated Resident Population (ERP) figures for the Northern Territory are used in a range of important calculations by the Australian Government
- ERPs are based on usual Residence Census counts which are adjusted under three broad steps to produce population estimates at 30 June for the Census year.
- History has demonstrated the impacts of relatively poor Census enumeration in the Northern Territory and of the effects of uncertainties surrounding key data used in the adjustments processes
- Impacts are ongoing and directly affect the provision of Australian Government funds to the Northern Territory as well as the ability for the impacts of policies and programs like 'Closing the Gap on Indigenous Disadvantage' to be accurately measured
- A large part of rectifying these issues rests with Territorians themselves who currently provide the least accurate and complete Census returns of all States and Territories.

### RESEARCH AIM

To explore population  
projections for the Northern  
Territory

This research brief discusses some of the national applications to which official population estimates are applied and outlines how these effect the Northern Territory. We describe the derivation of Estimated Resident Population (ERP) counts from Census data to highlight some of the uncertainties inherent in ERP counts and demonstrate the impacts using three historical examples from the Northern Territory.

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## Introduction

In countries which have both national and regional (or state or provincial) governments there is a need for mechanisms for managing government processes between the two tiers of government and between the governments at the second tier. Population estimates frequently play a major part in processes where equitability in the treatment of populations residing in different regions is required. These include:

1. Deciding the levels of representation of the different regions at the national government level,
2. The allocation of national resources between the governments of the regions, and
3. Governments holding one another accountable for achieving collectively agreed social advancement of their populations.

There is a well founded expectation that using official population estimates for these purposes will assist in fostering objectivity and transparency. There is, however, often an unjustified expectation that complete accuracy will be brought to bear when official population estimates are used. This is not always so and complications and considerable confusion can result. This research brief explores the issue of uncertainty around population estimates in the context of remote jurisdictions like the Northern Territory where population size is small and consequently errors around estimates are potentially large. We illustrate this with three examples with specific reference to the Northern Territory.

## What are ERPs?

The ERP is Australian Bureau of Statistics' (ABS's) official estimate of the population of a defined part of Australia, (ABS 2009a). These figures are calculated and released at quarterly intervals each year in ABS's flagship demographic publication, Australian Demographic Statistics (ABS, 2009b). The ERP is therefore the primary population measure of interest to almost all researchers, policy analysts, planner, and almost any other users of population numbers. ERPs are re-calculated from scratch following each Census, which in Australia means every 5 years. The primary building block for deriving the ERP for a given geographic area is the count of the number of people who were found to be present in that location on the night of the Census (usually referred to as the Place-of-Enumeration (POE) count).

For locations with large or medium-sized population (roughly greater than 100,000) ABS uses a consistent formulaic approach for working through the steps from Place-of-Enumeration counts to derive ERP in three broad steps. First is the derivation of what the Census count would have been if all the people who usually live in the location were at their homes on Census night; or the Usual Residence (UR) count. The UR count is derived from the POE count by adding in residents who were not present on Census night and taking away all non-residents (from Australia or overseas) of the location who were present on the night of the Census. All of these adjustments can be derived directly from components of the POE Census counts. However, the UR count requires a precise and practical definition of the concepts of "usually lives in a location" which is identical to the concept of "resident of a location". This, in turn, requires the adoption of an important powerful (and restrictive) convention that at any time every person has one and only one residential location and, furthermore, that every person knows what this is and can articulate it to Census collectors/interviewers.

The second broad step is the calculation of the ERP on the night of the Census. This requires adding on to the UR an estimate of the net number of people who were not, but should have been, counted in the Census. This number is referred to as the "net undercount estimate" and will typically account for both people missed in the Census and also any that enter into the Census count more than the required single time. In recent decades ABS has carried out a special survey – referred to as the Post-Enumeration Survey (PES). The PES is conducted in the weeks and months following each Census

and, using a ‘capture-recapture’ estimation methodology, estimates the size of the “net undercount” from an analysis of matched and unmatched Census and PES records. The ABS also allows for a number of other small adjustments to be made at this second broad step. These are collectively referred to as “demographic adjustments” and are derived by the ABS to account for known faults in the demographic characteristics of ERP counts. These include impossible age distributions for infants and babies, or implausible age specific sex ratios for adults. Residents that are temporarily overseas, estimated from ‘passenger cards’ arrivals and departures records, are added in at this second step rather than the first because, although they are residents they are not part of the Usual Resident count because, not being in Australia on Census night, they are out of scope of the Census. The third broad step in deriving ERPs involves the estimation of the ERP on 30 June of the year of the Census from the ERP on Census night (usually in August). This involves ‘growing’ the population backwards by a few weeks for the period between the Census night and 30 June. This calculation is identical to the standard approach by which official ERPs are updated for the next nineteen quarters (until the next Census) and makes use of births, deaths and interstate and overseas migration data (i.e. all the components of population growth) derived from collections outside of Census processes.

With this in mind we now discuss some of the issues of uncertainties associated with ERP derivations outlined under these broad steps. We use three historical examples as lenses to identify causes and impacts of what are essentially top down processes of estimation which, for small and remote jurisdictions like the NT, present particular problems and challenges:

### **1. Population estimates and political representation.**

The Commonwealth Electoral Act 1918 indicates that the number of seats allocated to the population of each state and territory in the House of Representatives (HoR) is largely decided by population size. Population size is determined by the Australian Statistician according to State and Territory Estimated Resident Populations (ERPs) (see ABS, 2009). The formula for calculating numbers of seats is constrained so that each jurisdiction is allocated whole numbers of seats and the total number of seats across Australia is fixed. Furthermore, there is provision for periodic re-calculation of seat allocation to allow for the changing geographic distribution of the nation’s population (see Wilson, et al., 2005 for full details).

Prior to 2000 this (apparently quite fair) method of allocation had resulted in the Northern Territory being allocated just one of the more than 140 seats in the HoR. However, as a consequence of the 2000 State and Territory ERP determinations made by the Australian Statistician, for the very first time, the NT was allocated a second seat, which of course, doubled its representation. The Territory was duly divided geographically into two electorates (Solomon and Lingiari) and two members (David Tollner and Warren Snowdon respectively) were elected at the next election in 2001. However, much to the dismay and confusion of Territorians the doubling in representation was almost lost just a few years later when the Australian Statistician made a small downward adjustment to the Territory’s ERP to make it just a few people short of the required threshold for two seats. The imminent halving of representation resulted in much public and Parliamentary outcry, including formal Parliamentary committee hearings and reports. Most of the outcry focused on perceptions of political unfairness with little attention being given to the key issue at the heart of this matter – namely the difficulty of estimating the Territory’s population with sufficient accuracy for the purpose for which it was being used.

This story had a happy ending for Territorians due to a remarkably novel solution constructed by Australian federal legislators which largely removed the possibility of Territorians being disadvantaged again as a consequence of uncertainty in ERPs. The solution recognised the existence of uncertainty in ERP counts and based the threshold for seat removal for the Northern Territory and the ACT on the ERP minus the lower limit of a confidence interval for the ERP, while continuing to base the threshold for allocation on the ERP itself. Thus, the threshold for removing a HoR seat was reduced by two times the standard error of the ERP which, because the standard errors are quite large, would require a remarkably large loss of population for a seat, once allocated, to be removed in the

future. The Act of Parliament was duly amended and applied retrospectively and the novel solution has now been enshrined in legislation – perhaps a first for standard errors of population estimates!

## 2. Population estimates and financial allocations

With the creation of the Australian Federation, the national government took on many of the tax and revenue collection activities previously undertaken by States, while States retained some key functions requiring large expenditure of funds (eg education and health). Consequently the national government collected roughly twice as much as it spent and the states spent twice as much as they collected. In an attempt to overcome this financial imbalance it was agreed that the determination of what is a 'fair' allocation should be governed by the principle of 'fiscal equalisation'. This principle is summarised by the Commonwealth Grants Commission (CGC) as

*State governments should receive funding from the Commonwealth such that, if each made the same effort to raise revenue from its own sources and operated at the same level of efficiency, each would have the capacity to provide services at the same standard. [Commonwealth Grants Commission, 2002]*

In converting this principle to a formulaic mechanism the difficulties a State experiences in 'providing services' is quantitatively summarised by the accumulated 'disabilities' the State and its people suffer. This is an extremely complex process but, once completed, results in a single number representing State and Territory 'disabilities'. The funds available for a State or Territory are then calculated as the product of the three terms –

*Total funds available for allocation \* the disability factor \* population size*

The population component is defined as being the population estimate determined by the Australian Bureau of Statistics. The Australian Statistician is required to publish population estimates for the States and Territories at 30th December each year. Changes to fiscal equalisation and the introduction of the Goods and Services Tax (GST) in the 1990s have meant that the above simple formula now distributes some \$A50billion GST revenues annually. The Northern Territory's slice of this pie is about \$2.5billion but with a confidence interval for the Territory's ERP usually at around 10% of the estimate there is considerable scope for the allocation to be much larger or smaller than the principle of 'equity' under the Scheme would otherwise dictate.

But of much greater concern to the Northern Territory government has been the almost consistent bias shown in ABS ERPs. Following most Censuses in the past 25 years, the population estimates have been adjusted upwards substantially by ABS (by as much as 4% following two of the last six Censuses). There is no mechanism within the CGC system for adjusting the allocation of funds following refinement and finalisation by ABS of past population estimates. It is no wonder, therefore, that the Northern Territory Government has expressed grave concerns to ABS about the accuracy of Territory population estimates and has made vigorous representations to the Australian Treasury and to the CGC regarding the fitness-for-purpose of these.

## 3. Population estimates and 'closing the Indigenous / non-Indigenous gap'

Under a recent major initiative of the Council of Australian Governments (COAG) specific targets for the socio-economic and demographic advancement of Indigenous Australians have been set (see, Council of Australian Governments, 2008). These targets can be specified as numeric values for certain social statistical indicators which are to be achieved by all State and Territory governments within specific timeframes. This initiative is one of the main planks of Australian Governments' long-term plans for addressing the deep-seated social and economic disadvantage suffered by Indigenous

Australians. Indicators within the initiative are typically defined in terms of the gap between Indigenous and non-Indigenous people. Targets are typically expressed as achieving a specified reduction within a certain time period. For example, a key target is to eliminate the gap in life expectancy from birth between Indigenous and non-Indigenous people within a generation, which has been taken to be 25 years.

Many indicators for the 'closing the gap' initiatives are defined as ratio statistics in which numerators are to be calculated from datasets derived from administrative records collected by State and Territory government instrumentalities. Denominators are invariably based on ABS- Indigenous and non-Indigenous ERPs. While there may be substantial inaccuracy in the numerator component of many of these statistics it is the extent of unreliability of the denominators that is of current focus. There are good reasons to believe that the errors attached to Indigenous ERPs may be much too large for the intended purposes of monitoring annual progress towards the agreed targets.

Highlighting the difficulties of deriving Indigenous estimates at sub-national levels of geographies, estimates by the ABS are referred to as "experimental" to emphasise the uncertainty around the most appropriate method of deriving these figures and, consequently, the method used to derive them may change from time-to-time (typically from one Census period to another). In addition to methodological changes over time (which can give rise to indeterminate non-sampling errors in estimates) and the typical uncertainties also suffered by total population estimates there is another major source of uncertainty in the Indigenous and non-Indigenous estimates. This is the additional inaccuracy that arises from allocating, to the Indigenous or non-Indigenous populations, all people counted in a Census without an Indigenous status being recorded. The accumulative effect of these various sources of error, some of which cannot be measured, may mean that the errors associated with some of the indicators are likely to be much larger than the expected magnitude of change over the desired reporting interval for monitoring progress towards closing the gap, typically one year. That is, the Indigenous ERPs may not be sufficiently accurate to determine the extent to which the important tasks of closing the gaps in Indigenous disadvantage are progressed.

## Discussion

Official population estimates are legislated into key national processes for the distribution of political representation and federal funds and the importance of these to the Northern Territory cannot be overstated. In addition estimates comprise the denominator for statistical indicators (demographic, social, and health for example) of wellbeing which are applied to comparisons amongst sub-populations (Indigenous and non-Indigenous, migrants and others, and so on). Our examples demonstrate some of the difficulties faced by the ABS as Australia's National Statistical Organisation in fulfilling its obligation to provide accurate population estimates. They highlight the uncertainties evident in the data used to compile ERPs for the Northern Territory and demonstrate some of the impacts of current approaches to population estimation. However, it must be noted that the issue is conceptually and methodologically far more complex than can be presented in this brief discussion.

The discussion here acknowledges that ERPs are, as named, estimates of the population, rather than unfailingly accurate representation of the size and demographic characteristics of the Northern Territory population. Nevertheless, governments must plan, formulate policy, and implement programs with the best available data and in this respect ERPs fulfil this role. Arguments for differential treatment in estimation processes for the Northern Territory are evident from our examples, however, given that only one percent of Australians live in the Territory, it is unsurprising that a break from the standardised approach for all States and Territories has not eventuated. Having said that, the ABS has implemented initiatives to specifically improve the population counts and estimates for the Northern Territory, particularly for Census enumeration and coverage of the PES, in recognition of the high proportion of the population which is Indigenous and living in remote areas.

Indeed, a good deal of the uncertainties outlined here could be addressed by Territorians themselves. Census results suggest that residents of the Northern Territory do not appreciate the importance of the Census as the foundation for ERP estimates nor of the links between the Census and ERPs, and in turn the direct consequences on their lives through the trickle down effects of Australian financial and social programs processes. In all respects, Territorians provide the least complete and least accurate Census returns despite ongoing efforts by the ABS and despite large collaborative efforts between the ABS and the Northern Territory Government to bring about improved counts in the form of reduced undercount, a decrease in non-contacts, reduced not-stated responses to key questions, and improved accuracy in responses overall. And while the uptake of the eCensus, which provides respondents with the option of completing their Census form online, may assist in reducing not-stated responses and with accuracy issues for specific variables, online completion cannot address issues of non-contacts and Census avoidance. The highest rates of not-stated responses to key questions are in inner-city Darwin where rates of population mobility are particularly high.

Given this, users of Territory population estimates must be aware of the issues surrounding their accuracy and fitness-for-purpose. At this time, there is a high focus on Indigenous issues in governments but there are indications that the extent to which official estimates are suitable for detecting changes brought about through contemporary policy and programs is not fully understood. In particular, the required annual reporting of progress towards COAG targets may be over-ambitious, with discussion often unwittingly but inevitably focusing on the consequences of data inaccuracies and inadequacies, because these will usually be larger than underlying trends in real improvements. The examples presented in this brief also demonstrate the critical importance of growing the pool of research-based knowledge on the population dynamics of the Northern Territory including the understanding of the propensity for Territory residents to provide accurate responses to the Census and other important official data collection activities.

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