Understanding the spatial dimensions and drivers of future Indigenous population change in Australia

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1. Introduction

One of the most prominent demographic and social trends in contemporary Australia is the rapid growth of the Indigenous population. In ten years to 2016 it is estimated to have grown from 517,000 to 798,000, an increase of 54%, while the non-Indigenous population grew by 17%. Geographically, Indigenous population growth is highly variable. Over the 2006-16 decade it grew proportionally by the smallest amount in the sparsely populated Northern Territory (16%) and the most in the more populated south-east of Australia, with growth of 75% recorded in the Australian Capital Territory, 74% in New South Wales and 72% in Victoria (ABS, 2019a). Recent growth has been modest in many remote central parts of Australia and high in south-eastern coastal regions (Markham and Biddle 2018).

Sources of Indigenous population growth are very different to those of the non-Indigenous population and highly variable geographically. Net international migration of the Indigenous population is very limited throughout the country, though internal migration is important for some states and regions. There is a relatively large number of Indigenous births every year because of higher than average fertility rates for Indigenous women, a young population age structure with a large proportion of the population in the childbearing ages, and also a high rate of Indigenous inter-generational transmission because over half of partnered Indigenous adults have a non-Indigenous partner (Biddle and Wilson 2013), and about 9 out of every 10 babies born to such couples is recorded as Indigenous. Despite lower life expectancy, deaths are considerably fewer in number than births because of the small size of the older population. The final, but very important, component of Indigenous population growth is identification change, where people report their Indigenous or non-Indigenous identity differently over time. In terms of official statistics, it refers to people identifying as Indigenous in the latest census but non-Indigenous in the previous census 5 years earlier, or vice versa. Data from the Australian Census Longitudinal Dataset (ACLD: a 5% sample of the Census dataset) suggests that the Indigenous population of Australia experienced a net gain of about 80,000 over the 2011-16 intercensal interval (Biddle and Markham 2018). Net identification gains have been highest in New South Wales, Melbourne, Hobart and the Australian Capital Territory, but low or zero in much of remote Australia.

These population dynamics are highly relevant from a public policy perspective. The Indigenous population receives priority policy attention because according to most socio-economic indicators it is highly disadvantaged (AIHW 2018). To plan for future programmes which try to achieve targets and provide other services for the Indigenous population, reliable population estimates and projections are required. The Australian Bureau of Statistics (ABS) only updates its Indigenous population estimates every 5 years, around 3 years after the jump-off year. Unfortunately, the track record of ABS Indigenous population projections in Australia is disappointing with past Indigenous projections generally not good at predicting the Indigenous population just five years later (Wilson and Taylor 2016). Partly this is the result of data quality limitations, however, the limitations of Indigenous population projections are also due to the projection models and assumptions used. In the most recent ABS Indigenous projections no allowance is made for future identification change (ABS 2019b). Given the substantial growth of the Indigenous population due to identification change, this is a surprising omission. In addition, ABS projections are published for the geographies of the States and Territories, Remoteness Areas, and Indigenous Regions but are not available for an important widely-used statistical geography - the Greater Capital City Statistical Areas (GCCSAs) (ABS 2016). These divide States/Territories into two major regions: the greater capital city metropolitan region and the rest of the State/Territory.

The aim of this paper is to present projections of Australia's Indigenous population by GCCSA out to 2051 and discuss the policy implications. We employ a multi-state cohort-component model which, importantly, incorporates identification change and allows mothers to give birth to babies with a different Indigenous status to themselves. This latter aspect reflects the significant impact of Indigenous/non-Indigenous partnering. Section 2 outlines the projection model, data preparations, and projection assumptions used, along with a description of the decomposition approach taken to quantify the contribution of each of the demographic components of change. In the presentation of results we

focus especially on the contribution of identification change to differentials in projected sub-national growth. The final section summarises the main findings and implications from this research.

2. Data and Methods

2.1 Projection model

Projections of the Indigenous population were prepared with a new bi-regional cohort-component projection model specially designed to project subnational populations by Indigenous status (Indigenous and non-Indigenous). This new model represents an extension of the Indigenous status projection model developed by Wilson (2009) for the Northern Territory to permit up to 50 subnational regions covering the whole of Australia. Using a movement accounts framework (Rees 1984), the model explicitly accounts for all relevant demographic components of change, namely births (including allowance for babies to have a different identification to their mothers), deaths, internal migration, overseas migration, and identification change. National-level projections are calculated in a bottom-up approach by summing up outputs across all regions. The model differs notably from that used by the ABS because it models Indigenous and non-Indigenous populations simultaneously and their interaction through identification change and mother-baby identification differences. The model works with five year age groups and five year time intervals.

At the core of the projection model are a set of population accounting equations. In general terms the accounting equation for any period-cohort is:

$$P^{k}_{i,s,pc}(t+5) = P^{k}_{i,s,pc}(t) - D^{k}_{i,s,pc} - E^{k}_{i,s,pc} - ISOM^{k}_{i,s,pc} - OM^{k}_{i,s,pc} + IM^{k}_{i,s,pc} + ISIM^{k}_{i,s,pc} + I^{k}_{i,s,pc}$$

where P refers to population, D deaths, E emigration, $ISOM$ Indigenous status outward mobility, OM internal out-migration, IM internal in-migration, $ISIM$ Indigenous status inward mobility, I immigration, k Indigenous status group, i region, s sex, pc period-cohort, and t time. To ensure the total amount of in- and out-migration across all regions by sex and period-cohort is the same in this bi-regional simplification of the full multi-state model, in-migration is constrained to out-migration across regions. Components above are projected as rates multiplied by populations-at-risk.

Starting with a jump-off year of 2016, the model was used to create projections of Australia's population by Indigenous status by sex and age group in five-year intervals out to 2051 for 15 major regions: Greater Capital City Statistical Areas described by ABS (2016).

2.2 Projection assumptions

Total Fertility Rates (TFRs) for Indigenous women were calculated from average fertility rates recorded for 2011-16 with some adjustments following a validation run of the projection model from 2011 to 2016 to ensure 0-4 year old 'projected' populations were close to 2016 Estimated Resident Populations (ERPs). Indigenous TFRs were assumed to decline gradually by 1% every 5 years subject to a constraint of not falling below the non-Indigenous TFR. TFRs for non-Indigenous women calculated for the 2011-16 period were assumed constant. The proportion of Indigenous babies to Indigenous and non-Indigenous mothers were estimated from a customised 2016 Census table of the Indigenous status of 0-4 year old children and their mothers in households and assumed to remain constant in the projections.

Mortality projections were specified as life expectancy at birth and were linked to a national projection of life expectancy. The national projection was prepared using Ediev's (2008) extrapolative method. Life expectancies at birth by region and Indigenous-status were estimated for 2011-16, and the difference between these values at national life expectancies for the same period were assumed to remain constant throughout the projection horizon.

Zero immigration and emigration were assumed for the Indigenous population, a reasonable assumption given the available evidence - tiny numbers of Indigenous people in the 2016 census reported a usual address overseas 5 years ago. For the non-Indigenous population immigration and emigration were estimated from 2011-16 population accounts reconciled so that all demographic components of change matched the difference between the 2011 and 2016 ERPs. Immigration and emigration flows were constrained to Net Overseas Migration (NOM) totals by region. For Australia as a whole we assumed 250,000 per annum for 2016-21 and 225,000 per annum thereafter.

Interregional migration rates by age and sex were based on 2011-16 reconciled population accounts. Smoothing was applied using de Beer's TOPALS method (de Beer 2012). Migration rates were then adjusted in the running of the projection model by constraining to fixed net internal migration totals.

Identification change rates by age from Indigenous to non-Indigenous, and for the opposite direction, were based on data from the ACLD. Heavy smoothing across age was required due to small sample numbers. Adjustments were made to ensure agreement with the 2011-16 reconciled population accounts to maintain fixed net identification change values.

2.3 Decomposition

A decomposition of the projections was undertaken to reveal the quantity of growth contributed by each of the demographic factors driving population increase. Based on the approach developed by Bongaarts and Bulatao (1999), this decomposition involves creating a series of analytical variant projections with the demographic factors driving growth cumulatively removed in successive variants. This same approach was applied by Rees et al. (2013) to understand projections of subnational ethnic group populations in the UK, and by Andreev et al. (2013) to provide insights into United Nations Population Division projections. The analytical variants are listed in Table 1 below.

Table 1 - Analytical projection variants created for the decomposition

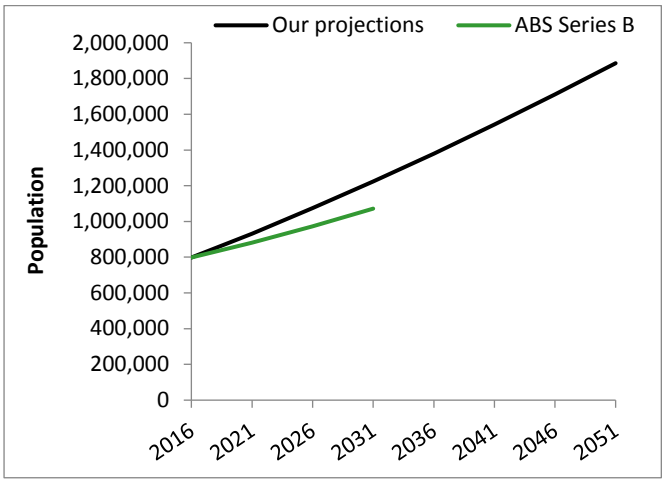
Analytical variant	Includes:
Standard	Age structure effects, rising life expectancy, non-replacement fertility, migration, mother-baby identification differences, identification change
No Identification Change	Age structure effects, rising life expectancy, non-replacement fertility, migration, mother-baby identification differences
No Identification Differences	Age structure effects, rising life expectancy, non-replacement fertility, migration
Natural	Age structure effects, rising life expectancy, non-replacement fertility
Replacement	Age structure effects, rising life expectancy
Momentum	Age structure effects

Once the analytical variants have been produced it is relatively easy to determine the effects of each of the demographic factors. The effect of identification change is calculated as the difference between the Standard projection and the No Identification Change variant. The impact of mother-baby identification differences equals the No Identification Change variant minus the No Identification Differences variant. The impact of population age structure, or momentum of growth embedded in the initial population, is determined by comparing the Momentum projection with the jump-off population. The advantage of this decomposition approach is its simplicity and ease of comprehension while a disadvantage is that the ordering of the removal of factors affects the results due to interaction between them. Nevertheless, the order is designed to minimise impacts from this.

3. Results

The Indigenous population of Australia is projected to reach just under two million (1.89m) by the year 2051, up from 798,000 in 2016 (Figure 1). This would see the Indigenous share of Australia's population rise from 3.3% in 2016 to 4.9% by 2051. This is an average annual growth rate of 3.9% compared to 1.6% for the non-Indigenous population. This is significantly higher than the ABS's most recent B series published in 2019 in which a 2031 population of 1.07 million is projected compared to our 1.22 million. This aggregate difference, of approximately 95,000 persons, is equivalent to the combined 2016 estimated Indigenous population for the States of Victoria and Tasmania (ABS, 2019b).

Figure 1 – Projected Indigenous population of Australia, 2016-51 (Our projections versus ABS, 2019)

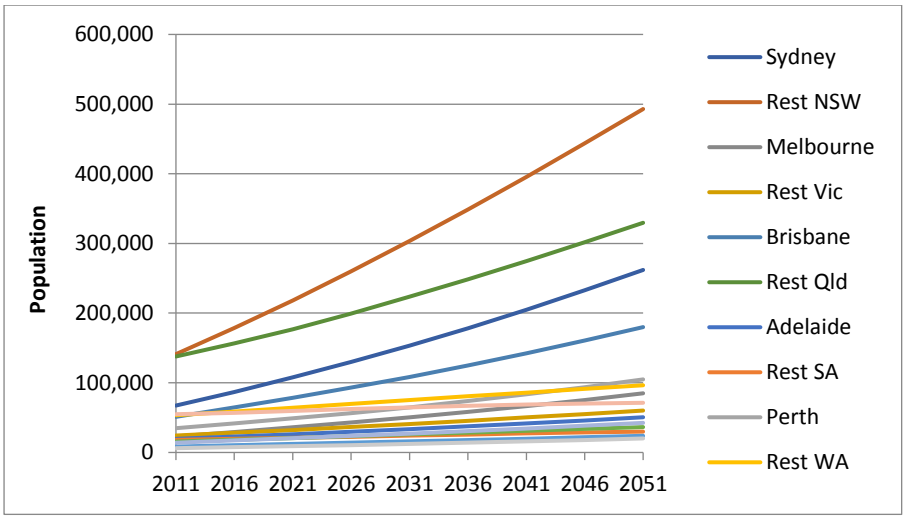


In terms of age structural changes at the national level, significant growth is projected across all age groups with more than an 80,000 person increase projected for each five-year age group from ages 0-5 years upwards to and including age 35-39 years. Proportionally, however, the largest increases are projected in the older age groups. For example, changes to zero to four and five to nine age groups are projected at 88% and 86% respectively, while growth of 387% is projected for those age 65 years and over by 2051. Particularly high (over 500%) growth is projected for these aged 75 years and over.

Sub-national differences in growth and change

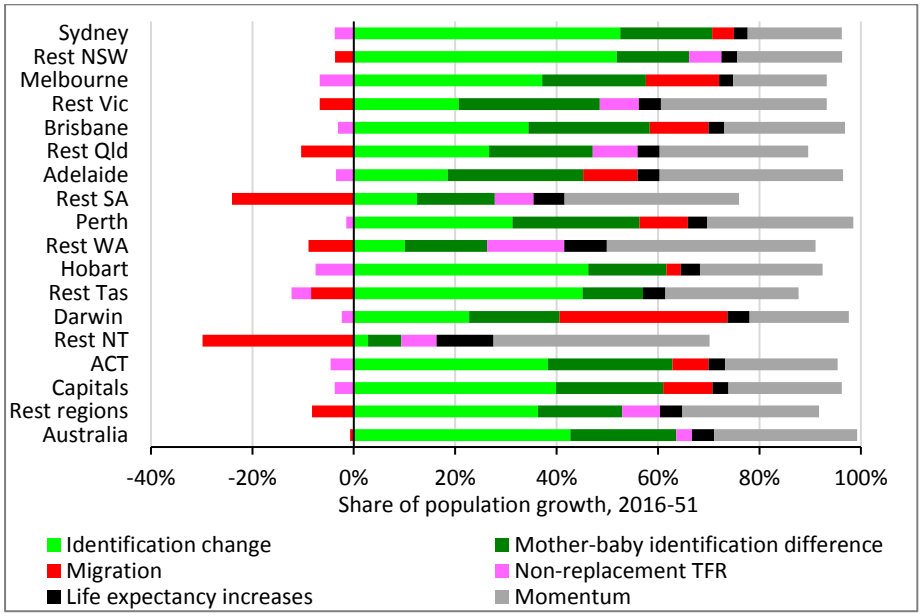
At sub-national level, while the size of the Indigenous population in all regions is projected to increase, comparisons across GCSSA's shows significant absolute growth is projected for the Rest of NSW, Rest of QLD, Sydney and Brisbane in particular (Figure 2). The Rest of NSW region (incorporating the large urban centres of Newcastle, Wollongong and Gosford all in relatively close proximity to Sydney) is projected to have the largest regional population by some margin by 2051 at close to half a million Indigenous residents (492,925). This is equivalent to a third (33%) of the 2016 estimate for the entire Australian Indigenous population. Meanwhile, the Rest of QLD (which includes the near-to-Brisbane urban agglomerations of the Gold Coast and Sunshine Coast) is projected to grow to 329,687, Sydney itself to 261,929 and Brisbane to 179,926.

Figure 2 - Indigenous estimates and projections for regions, 2011-51



In terms of contributions to growth from identification change, the Rest of NSW and Sydney stand out in both absolute and proportional terms. The former is projected to increase by 176,000 from identification change alone, equivalent to 56% of the total growth during 2016 to 2051 (Figure 3). For Sydney identification change is projected to contribute just under 100,000 to growth (57% of all growth). Proportionally, the highest contributions from identification change are observed for the Rest of Tasmania at 60% and while Hobart, the capital of that State (55%).

Figure 3 - Decomposition of future contributions to Indigenous growth by regions, 2016 to 2051



4. Summary of main findings and limitations

There are four main, but interrelated, findings from this study which will be elaborated on in the presentation:

1. The future **size of the Indigenous population** of Australia and its regions will be much larger than currently projected because identification change will drive growth over-and-above population momentum and improvements in life expectancies.
2. **Policy and service delivery implications are far-reaching** across a gamut of targeted services like welfare programs, workforce, health and other demand-driven initiatives. This includes evaluations of progress towards targets for life expectancy and other key indicators for Indigenous Australians. Regionally, governments will need to consider the possible future demand for services given disproportionate projected growth from identification change.
3. There is a **weighty body of research, technical work and statistical capability-building to do** to effectively understand, monitor and project future changes to the Australian Indigenous population. Part of this lays with the ABS who should consider producing a series incorporating identification change in their population projections.
4. In light of the very large future contribution of identification change to growth, a **consultative review** of how Indigenous status is recorded and represented in official data is needed. This process should adequately incorporate the views of Indigenous Australians.

There are limitations to the data and projection assumptions in this research. Existing data for Indigenous Australians are subject to quality issues stemming from difficulties in collecting accurate information and converting them in turn to robust estimates. For example, annual migration data used here does not have a break-down by Indigenous status. Instead we indirectly estimated these. Consequently, we held some of the main assumptions in our projections model constant, including rates of identification change. Nevertheless, while alternative assumptions are possible, these are unlikely to change the headline messages such that our projections may be considered plausible but not perfect.

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