



Australian
National
University



INDIGENOUS POPULATION CHANGE IN THE 2016 CENSUS

F MARKHAM AND N BIDDLE

2016 CENSUS PAPERS

Centre for
Aboriginal Economic
Policy Research
ANU College of
**Arts & Social
Sciences**

CAEPR 2016 CENSUS PAPER NO. 1

Series note

The Centre for Aboriginal Economic Policy Research (CAEPR) undertakes high-quality, independent research to further the social and economic development and empowerment of Indigenous people throughout Australia.

For more than 25 years, CAEPR has aimed to combine academic and teaching excellence on Indigenous economic and social development and public policy with realism, objectivity and relevance.

CAEPR maintains a substantial publications program, including Research Monographs, Discussion Papers, Working Papers, Topical Issues and Census Papers.

The 2016 Census Papers document changes to the Aboriginal and Torres Strait Islander population in terms of its size, composition, and a range of social and economic indicators, using data from the 2016 Census. All papers in the 2016 Census Papers series are peer reviewed internally.

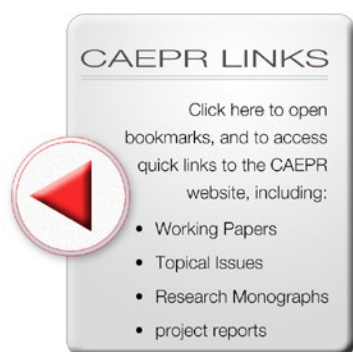
All CAEPR publications are available in electronic format for free download from CAEPR's website:

caepr.cass.anu.edu.au

CAEPR is located within the Research School of Social Sciences in the College of Arts & Social Sciences at the Australian National University (ANU). The Centre is funded from a range of sources, including ANU, the Australian Research Council, industry and philanthropic partners, and Australian state and territory governments.

As with all CAEPR publications, the views expressed in this Census Paper are those of the author(s) and do not reflect any official CAEPR position.

Dr RG (Jerry) Schwab
Director, CAEPR
Research School of Social Sciences
College of Arts & Social Sciences
The Australian National University
November 2017



INDIGENOUS POPULATION CHANGE IN THE 2016 CENSUS

F Markham and N Biddle

Francis Markham is a Research Fellow at the Centre for Aboriginal Economic Policy Research, Research School of Social Sciences, College of Arts & Social Sciences, Australian National University. **Nicholas Biddle** is a Senior Fellow at CAEPR, and Deputy Director of the ANU Centre for Social Research and Methods.

2016 Census Paper No. 1
ISBN 978-1-925286-22-9

An electronic publication downloaded from <caepr.cass.anu.edu.au>.

For a complete list of CAEPR 2016 Census Papers, see <caepr.cass.anu.edu.au/research/publications/2016-census-papers>.

Centre for Aboriginal Economic Policy Research
Research School of Social Sciences
College of Arts & Social Sciences
The Australian National University

Front cover image:
Terry Ngamandarra Wilson, *Gulach* (detail), painting on bark, private collection © Terry Ngamandarra, licensed by Viscopy, 2016

Abstract

The aim of this paper is to provide an overview of the changing size and spatial distribution of the Indigenous population of Australia, comparing the results of the 2011 and 2016 censuses. The paper summarises five key aspects of the intercensal change:

- the growth in the estimated population of Indigenous Australians
- the changing geographic distribution of Aboriginal and Torres Strait Islander people
- the growth in the number of census records with indeterminate Indigenous status
- the spatial mismatch between demographic projections from the 2011 Census and 2016 Census counts
- the potential for identification change to confound changes in socioeconomic outcomes.

We show that the Indigenous population grew rapidly between 2011 and 2016, reaching around 3.3% of the total population estimate, or 798 381 people. This was most likely due to a combination of natural increase and changing patterns of identification. Both aspects of growth were concentrated in more urban parts of the country, especially coastal New South Wales and southeast Queensland. We suggest that care needs to be taken when interpreting Indigenous population change between 2011 and 2016, because of both unexplained population growth and a substantial increase in the number of census records with no answer to the Indigenous status question. In particular, we suggest that identification change may lead to an apparent convergence in the outcomes between the observed Indigenous and observed non-Indigenous populations through time, without there necessarily being any improvement in the life circumstances of individual Indigenous Australians.

Keywords: Indigenous demography, Indigenous geography, identification change, census methodology

Acknowledgments

Funding for this project was provided by the Australian Government Department of the Prime Minister and Cabinet. While this funding was greatly appreciated, all findings and conclusions should be attributed to the authors only.

Acronyms

ABS	Australian Bureau of Statistics
ACLD	Australian Census Longitudinal Dataset
ANU	The Australian National University
CAEPR	Centre for Aboriginal Economic Policy Research
PES	Post-Enumeration Survey
SA1	Statistical Area 1

Contents

Abstract	iii
Acknowledgments	iv
Acronyms	iv
Introduction: Quantifying the Indigenous population	1
Count and undercount	2
Changing geographic distribution of Aboriginal and Torres Strait Islander persons	4
States and territories	4
Regional patterns of growth	5
Growth in people with Indigenous status 'not stated'	8
Type and prevalence of nonresponse	8
Characteristics of nonrespondents in private dwellings	9
People with a partially completed census form	10
Imputed households	11
Exploring the unexplained population growth	12
Geography of unexplained population growth	12
Identification change and socioeconomic outcomes	17
Concluding comments	19
Notes	20
References	20

Tables and figures

Fig. 1. The Indigenous origin question in the 2016 Census of Population and Housing	2
Table 1. Census count and population estimates of Aboriginal and Torres Strait Islander Australians, 1901–2016	3
Fig. 2. Aboriginal and Torres Strait Islander population estimates compared with demographic population projections based on the previous census, 2016–1996	4
Fig. 3. Aboriginal and Torres Strait Islander census count by state and territory, 1971–2016	5
Fig. 4. Change in the number of Indigenous people counted in the census by Indigenous Region, 2011–16	6
Fig. 5. Percentage change in the number of Indigenous people counted in the census by Indigenous Region, 2011–16	7
Table 2. Indigenous and non-Indigenous population count distributions by geographical remoteness, 2016	8

Fig. 6. Nonresponse to the Indigenous origin question in the 2006, 2011 and 2016 Censuses by nonresponse type	9
Table 3. Age–sex profile and imputed age–sex profile of records that did not have a valid response recorded for the Indigenous origin question in the 2016 Census and who lived in, or were imputed to live in, a private dwelling	10
Table 4. Responses to selected census questions among those who returned a census form, by nonresponse and response to the Indigenous origin question, 2016	13
Table 5. Percentage of unit nonresponse in private dwellings, by SA1 characteristics, 2016	14
Fig. 7. Unexpected population change by Indigenous region, 2011–16	15
Table 6. Provisional estimates of the 2016 Indigenous population of regions based on the 2016 Census, compared with projections of the 2016 Indigenous population based on the 2011 Census and natural increase	16
Fig. 8. Change in the percentage of the population with both parents born in Australia for Indigenous and non-Indigenous Australians, by age in 2016	18
Fig. 9. Change in the percentage of the population that left high school after Year 9, for Indigenous and non-Indigenous Australians, by age in 2016	19

Introduction: Quantifying the Indigenous population

Knowledge of the size and composition of the Indigenous population is a matter of much concern to policy makers and Indigenous people. The size and nature of the Indigenous population in Australia was estimated first by colonial authorities from the mid-1850s, and then, post-Federation, by the Australian Government (Rowse 2006). One primary imperative for counting the Indigenous people in federated Australia was the implementation of the nation's discriminatory constitution. The constitution, effective at the time of the first national census (1911), necessitated that Indigenous persons be excluded from official population estimates produced for constitutional purposes, such as the allocation of the members of the House of Representatives to electoral divisions defined on the basis of population, and the distribution of customs duties to the states (Chesterman & Galligan 1997, Arcioni 2012). In practice, this meant that all people who were reached by census collectors were asked to complete a census form, including a question on 'race' that included their 'proportion' of Aboriginal heritage. Those who stated that they were 'more than half' Aboriginal were excluded from most published population statistics (ABS 2011).

Although this discriminatory clause was removed from the constitution by the 1967 referendum, Indigenous people have continued to be identified in the census for very different reasons. Whereas the 1966 Census – the last before the 1967 referendum – enumerated Indigenous persons for reasons of exclusion, the inclusion of a question about the 'racial origin' of census respondents in the 1971 Census was justified on the basis of the state's obligation to improve the material conditions of Aboriginal and Torres Strait Islander people (Rowse 2006). The contemporary Aboriginal and Torres Strait Islander origin question was first asked in the 1981 Census, with the 1976 Census being the last to ask about indigeneity using the language of race. The 1981

Census, and all subsequent censuses, have asked of those enumerated, 'Is the person of Aboriginal or Torres Strait Islander origin?' (See Fig. 1.) The 1996 Census and those following have retained the same question wording but given people the choice to identify as being of both Aboriginal and Torres Strait Islander origin, rather than forcing a mutually exclusive choice between the two origins (Biddle et al. 2015). Answers to the current Indigenous origin question on the census have been used to inform government policy (e.g. the 'Closing the Gap' targets), service delivery (e.g. the National Partnership Agreement on Remote Service Delivery), resource allocation (e.g. the state-based redistribution of revenue from the goods and services tax) and advocacy for social justice (e.g. Calma 2006).

As the foregoing discussion suggests, the definition of the 'Indigenous population' is a contentious one, and the questions in the census have arguably never met the needs of that population itself. Indeed, the notion of an 'Indigenous population' is a colonial construction. As Michael Dodson notes, 'colonising cultures have had a pre-occupation with observing, analysing, studying, classifying and labelling "Aborigines" and Aboriginality. Under that gaze Aboriginality changed from being a daily practice to being "a problem to be solved"' (Dodson 2003). However, Walter and Andersen (2013) insist that recognition of colonial categories need not entail the abandonment of the collection of statistics about Indigenous peoples. Rather, they argue for the reframing of statistical collections and their interpretations in a manner that reflects Indigenous standpoints. Given that the 2014–15 National Aboriginal and Torres Strait Islander Social Survey found that 58% of those who identify as Indigenous also identify with 'a tribal group, language group, clan, mission or regional group', there remain good reasons to consider expanding the number of census measures related to the Indigenous population (cf. Kukutai & Taylor 2016).

FIG. 1. The Indigenous origin question in the 2016 Census of Population and Housing

<p>7 Is the person of Aboriginal or Torres Strait Islander origin?</p> <ul style="list-style-type: none"> For persons of both Aboriginal and Torres Strait Islander origin, mark both 'Yes' boxes. 	<p><input type="checkbox"/> No</p> <p><input type="checkbox"/> Yes, Aboriginal</p> <p><input type="checkbox"/> Yes, Torres Strait Islander</p>
--	--

Source: 2016 Census of Population and Housing form, Australian Bureau of Statistics

Nevertheless, the census continues to ask Australian residents about their Indigenous origin and is likely to do so for the foreseeable future. Tabulations and estimates derived from the census provide the best information that is available on the size and composition of the Indigenous population of Australia, albeit imperfectly. Consequently, a detailed understanding of the change since 2011 is of value to policy makers, service providers and Indigenous people.

This Census Paper, the first in a forthcoming series, provides an overview and analysis of elements of the change in the population of Indigenous people between 2011 and 2016. After this introduction, the second section of the paper focuses on describing the population increase and placing it in historical context. The section that follows illustrates the geographically uneven distribution of the changing Indigenous population count. The fourth section examines the increase in the proportion of census records for which no valid response was recorded on the Indigenous origin questions. The final section evaluates the spatial distribution of 'unexplained' growth in the Indigenous population, and its consequences for the measurement of socioeconomic outcomes.

Count and undercount

Perhaps the single most remarked-upon result from the census is the population count. In the 2016 Census, 590 056 people were counted as Aboriginal, 32 345 were counted as Torres Strait Islander, and 26 767 were counted as both Aboriginal and Torres Strait Islander. Combined, 649 168 people were counted as Indigenous, an increase of more than 100 000 people, or 18.4%, since 2011. This count of the Indigenous population compares with 21 341 231 people who identified as not being of Aboriginal or Torres Strait Islander origin, resulting in the Indigenous population making up 3.0% of those who answered the Indigenous origin census question, an increase from 2.7% in 2011.

The census count underestimates the number of Aboriginal and Torres Strait Islander people to a much greater degree than it underestimates the number of other Australians. The Australian Bureau of Statistics' (ABS) Post-Enumeration Survey (PES), which re-interviews around 0.5% of Australian households, is used as the basis for producing population estimates (as distinct from population counts tabulated from the census). The PES is national, and in 2016 sampled

around 800 households from 33 discrete Indigenous communities. The Indigenous population estimate attempts to correct for at least three types of census undercount (ABS 2017a). First, a significant proportion of census records do not have a response to the Indigenous status question (6.0% in 2016). Some of these individuals are likely to be of Aboriginal and Torres Strait Islander origin. Records with Indigenous status not stated come about either because that particular question was skipped over on the census form or because no census form was received for a dwelling that census collectors deemed to be occupied on census night. In the latter case, census collectors impute the existence of a certain number of residents, but do not answer the Indigenous status question for these individuals. Second, some individuals are missed by the census – they simply do not appear on any household's census form. This could be because they were omitted from a completed census form, because census collectors missed their dwelling, or because census collectors mistakenly thought their dwelling was unoccupied. Third, a number of individuals who are listed as not being of Aboriginal or Torres Strait Islander origin on the census form later state that they are of Aboriginal or Torres Strait Islander origin when asked in the PES several weeks later, a survey that is administered face to face to most participants. After the PES is released, the ABS further adjusts the population estimate, by backdating the census-night estimate to 30 June and by estimating the number of residents temporarily overseas and thus out of scope for the PES (ABS 2017b).

Based on these adjustments, the ABS (2017b) estimates that there were 798 381 Aboriginal or Torres Strait Islander Australians in August 2016. This population estimate is an increase of 128 000 people from 2011, or 3.5% per year. Such population increase is not unusual for the Australian Indigenous population. As Table 1 shows, both the census count and the population estimate of Aboriginal and Torres Strait Islander people have increased considerably in almost every census since the 1967 referendum. While the annualised growth in the Aboriginal and Torres Strait Islander population between 2011 and 2016 of 3.5% is substantial, it is less than the mean annual growth from 1971 to 2011 of 4.1%. The Indigenous census count – that is, the number of people identified as being of Aboriginal or Torres Strait origin in the census itself, without adjustment for undercount – has also increased substantially, rising from 548 370 in 2011 to 649 171 in 2016. This is consistent with historical trends since the 1967 referendum, with the Indigenous census count increasing in every census during that period, with the exception of the 1981 Census (Table 1).

TABLE 1. Census count and population estimates of Aboriginal and Torres Strait Islander Australians, 1901–2016

Year	Census count			Population estimate			
	Indigenous persons	Percentage of total count ^{a,b}	Annual growth rate (%)	Indigenous persons ^c	Percentage of total population ^b	Annual growth rate (%)	Undercount (%) ^d
2016	649 171	2.8	3.4	786 689	3.3	3.5	17.5
2011	548 370	2.5	3.8	662 335	3.0	5.2	17.2
2006	455 030	2.3	2.1	513 977	2.5	2.2	11.5
2001	410 003	2.2	3.0	460 140	2.4	4.3	10.9
1996	352 970	2.0	5.9	372 052	2.0	5.6	5.1
1991	265 489	1.5	3.1	283 631	1.6	3.4	6.4
1986	227 645	1.4	7.3	240 152	1.4	–	5.2
1981	159 897	1.1	–0.1	–	–	–	–
1976	160 915	1.1	6.8	–	–	–	–
1971	115 953	0.9	7.5	150 076	1.1	2.6	22.7
1966	80 750 ^e	0.7	0.1	132 219	1.1	2.4	38.9
1961	80 526	0.8	3.8	117 495	1.1	2.3	31.5
1954	62 084	0.7	2.8	100 048	1.1	2.0	37.9
1947	51 048	0.7	0.9	87 000	1.1	1.2	41.3
1933	45 066	0.7	1.1	73 828	1.1	–0.2	39.0
1921	39 399	0.7	2.7	75 604	1.4	–1.0	47.9
1911	30 052	0.7	–4.6	83 588	1.8	–1.2	64.0
1901	48 248	1.3	–	94 564	2.4	–	49.0

– = not available

a The denominator for this percentage includes those who did not state their Indigenous status in the census.

b Census counts and population estimates from 1901 to 1966 are for what the Australian Bureau of Statistics (ABS) termed 'full blood Aborigines', who were counted in the census to be excluded from population statistics. Because of this exclusion, denominators for these percentages have been counted by adding the Indigenous census counts and population estimates to the official non-Indigenous figures. Persons identified in the pre-referendum censuses as 'half-caste' were counted as non-Indigenous in these censuses and population estimates.

c This column uses Post-Enumeration Survey (PES) population estimates where possible (i.e. excluding those residents temporarily absent from Australia on census night) to consistently calculate the undercount rate.

d These undercount rates are calculated consistently using the method from the 2016 PES, and so do not match the published undercount rates from previous years.

e Excludes Torres Strait Islanders.

Notes: All PES-derived population estimates displayed above are based on the census of that year. To the best of the authors' knowledge, the ABS did not produce estimates of the Indigenous population for censuses between 1966 and 1981. The 1996 PES-derived estimate is based on the estimated population at 30 June, while all other listed figures related to the population on census night in early August.

Sources: Population estimates for 1901–61 from ABS (1986, 2014), for 1986 and 1991 from ABS (1994), for 1996 from ABS (1996) and for 2001–16 from ABS (2017a). Census counts for 1911 from CBCS (1917), for 1921 from CBCS (1927), for 1933 from CBCS (1940), for 1947 from CBCS (1952), for 1954 from CBCS (1962), for 1961 from CBCS (1967), for 1966 from CBCS (1971), for 1901–66 from ABS (2014), for 1971–91 from ABS (2004) and for 1996–2016 from ABS community profiles (www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles)

The proportion of the Australian population identified as Indigenous has also increased rapidly since 1971. While only 0.9% of the total population count identified as being of Aboriginal or Torres Strait Islander origin in the 1971 Census, that figure rose to 2.8% of the count in 2016 (or 3.0% after excluding census records with no Indigenous status recorded). After adjusting for undercount, the best estimate is that Indigenous people comprise 3.3% of the Australian population, an increase from 3.0% of the population estimated in 2011 and 1.4% in 1986.

Of note is the continued trend towards increasing undercount of the Indigenous population in the census (Table 1). The undercount presented here is defined as the difference between the population estimate and the census count, expressed as a percentage of the population estimate. The 2016 final undercount of 17.5% is up only slightly from 17.2% in 2011. Nevertheless, this is the highest level of Indigenous undercount recorded in the post-1967 referendum era. Part of this increase is likely to have come from an improved methodology in estimating the undercount. In other words, previous estimates may have underestimated the extent of the

undercount. However, further research is needed to determine the cause of the elevated undercount, because such an understanding may suggest improvements that might be made to future enumeration methods.

The 3.5% annual growth of the Indigenous population between 2011 and 2016 outstripped demographic projections of population growth based on the 2011 Census by a considerable degree. As Fig. 2 shows, around 42 000 more Indigenous people were identified to be resident in Australia in 2016 than the ABS had predicted in projections based on the 2011 Census. In this chart, the black line represents the best estimate of the Indigenous population based on the census of that year, whereas the shaded region indicates the range of population estimates for that year produced by the ABS based on the immediately previous census. The ‘unexplained growth’ in the Indigenous population is illustrated by the gap between the black line and the shaded region on the chart.

Unexplained growth accounted for around 34% of intercensal population growth between 2011 and 2016. This unexplained growth is likely to result from the changing propensity of people to identify as Indigenous in the census and the PES, and from changes to the methods used to collect data for the census and the PES. Fig. 2 also demonstrates that the gap between the

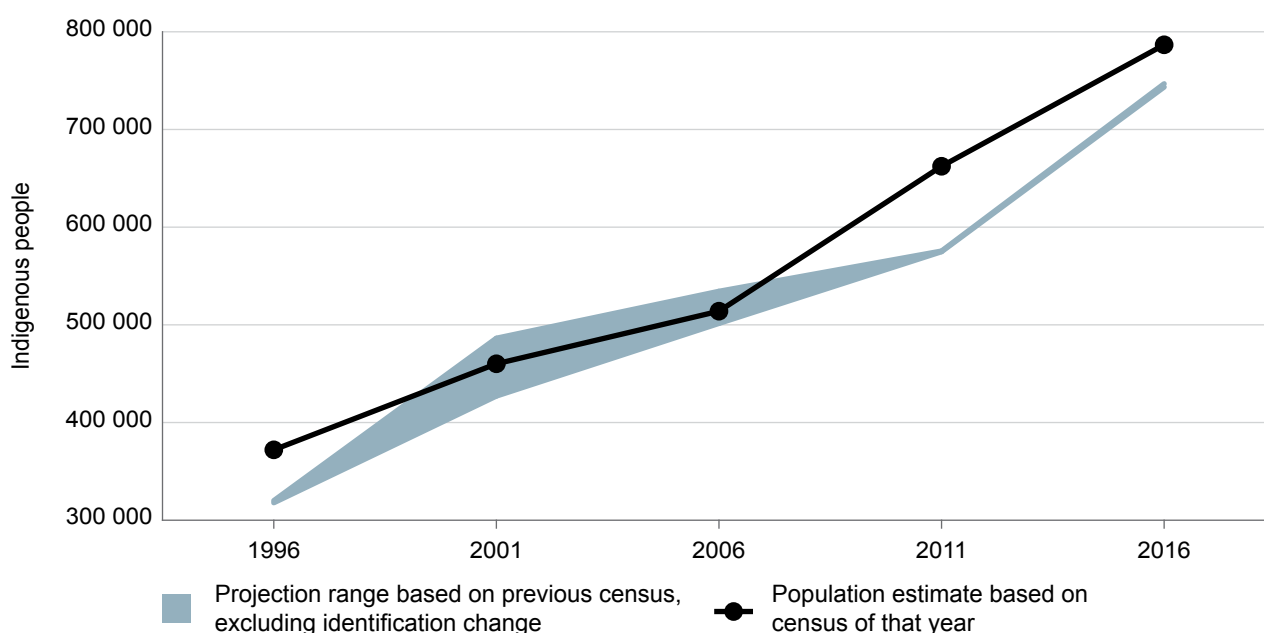
Indigenous population estimates and projections based on the previous census has narrowed compared with growth in the Indigenous population between 2006 and 2011, during which period around 59% of growth was unexplained.

Changing geographic distribution of Aboriginal and Torres Strait Islander persons

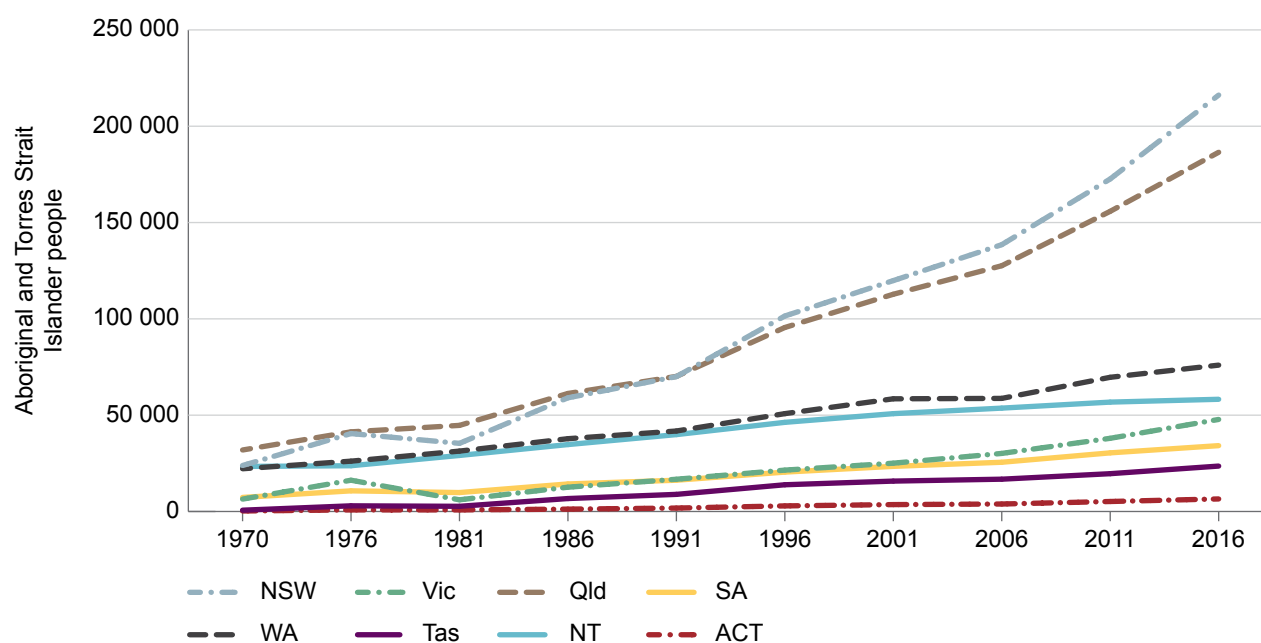
States and territories

While the number of people counted in the censuses as being of Aboriginal and Torres Strait Islander origin increased by 100 801 between 2011 and 2016, this growth was not evenly distributed across the country. Three important patterns appear when growth in the Indigenous population count is examined by states and territories (Fig. 3). First, growth in the Indigenous population count continues to be fastest in New South Wales (an increase of 43 551 people) and Queensland (an increase of 30 656 people), continuing the long-term trend whereby the Indigenous population is increasingly concentrated in these two states (up from 48.1% of the Indigenous population in 1971 to 62.0% in 2016) (Biddle 2012). Second, the Northern Territory continues its unique long-term trend of decelerating population growth,

FIG. 2. Aboriginal and Torres Strait Islander population estimates compared with demographic population projections based on the previous census, 1996–2016



Note: The upper bounds of the projections for 2001 and 2006 have been modified to remove predicted unexplained population growth. Sources: ABS (2014b) for 2006, 2011 and 2016; ABS (1998) for 2001 and 1996

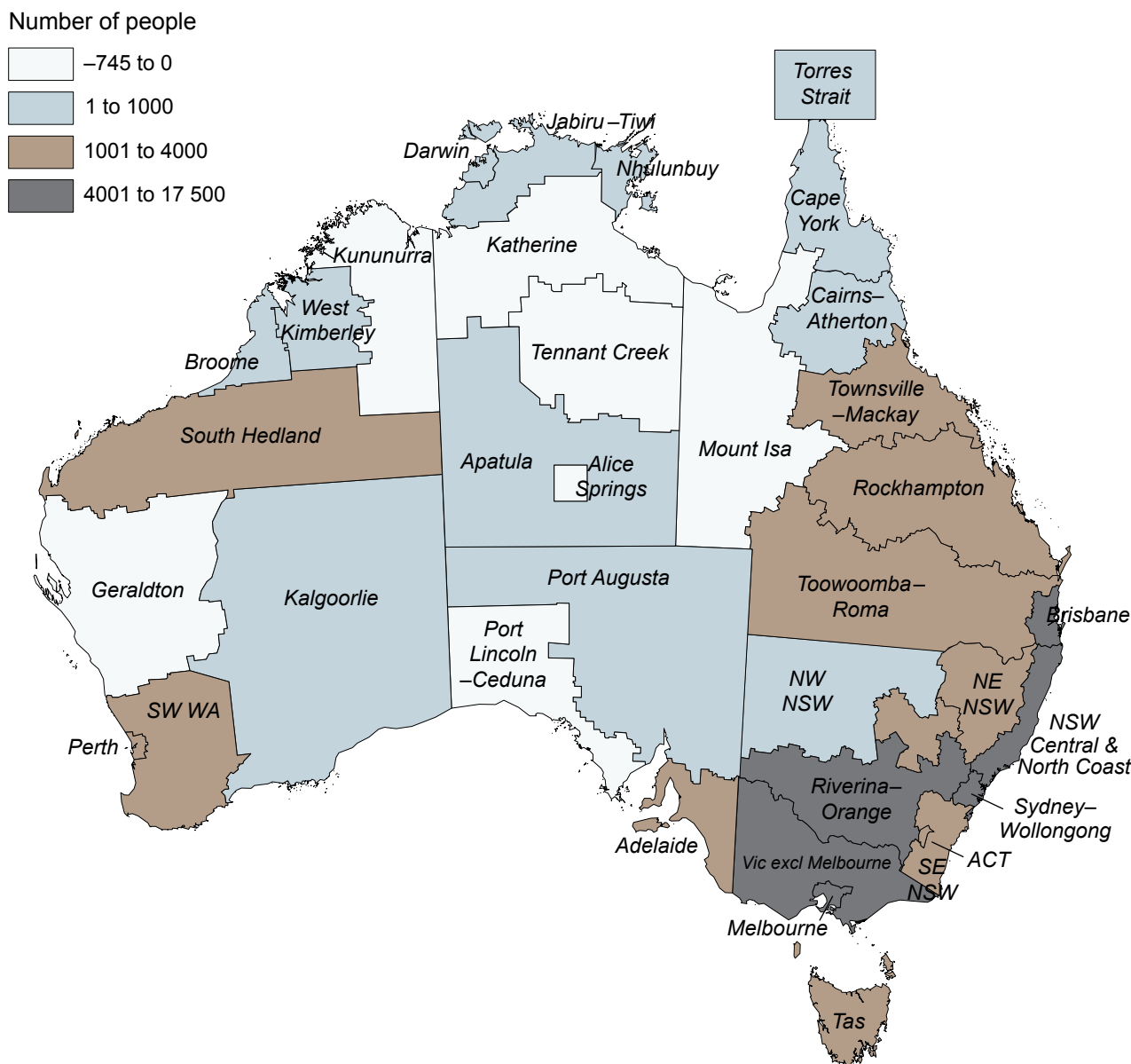
FIG. 3. Aboriginal and Torres Strait Islander census count by state and territory, 1971–2016

with the Indigenous population count increasing by just 0.5% per year (1469 people between 2011 and 2016). All other jurisdictions had an annualised growth rate in the Indigenous population count of between 1.8% and 4.7%. Perhaps more importantly, the Northern Territory retains a uniquely high proportion of the Indigenous population, at 28.3% in 2016 – much higher than the next closest states: Tasmania (4.9%) and Queensland (4.2%). However, the non-Indigenous population of the Northern Territory continues to grow more rapidly than the Indigenous population (1.4% per year). Third, the Indigenous populations of the remaining five states and territories all continue to grow rapidly, but contribute a relatively small proportion of population increase because of the relatively modest size of their Indigenous populations. The annual growth rates of the Indigenous population in Victoria (4.7%), South Australia (2.4%), Western Australia (1.8%), Tasmania (3.7%) and the Australian Capital Territory (4.7%) were not dissimilar to the growth rates of the Indigenous population in New South Wales (4.6%) and Queensland (3.7%). What sets New South Wales and Queensland apart is the combination of both large Indigenous populations and high growth rates.

Regional patterns of growth

Within states and territories, there are distinct patterns of growth in the Indigenous census count. When examined at the regional level, it is clear that growth in the Indigenous census count is concentrated in the most heavily populated parts of New South Wales and Queensland. As Fig. 4 shows, counts increased the most in the Brisbane (17 463 people), New South Wales Central and North Coast (17 452 people), and Sydney–Wollongong (13 852 people) Indigenous regions. These regions accounted for almost half of the recorded gross Indigenous population growth (47.9%). At the other end of the spectrum, several regions experienced a decline in the number of people counted as being of Aboriginal and Torres Strait Islander origin in the 2016 Census. Declining census counts were of a much smaller magnitude than population growth, with Kununurra (745 people) and Alice Springs (359 people) experiencing the largest falls in the number of Indigenous people counted in the census.

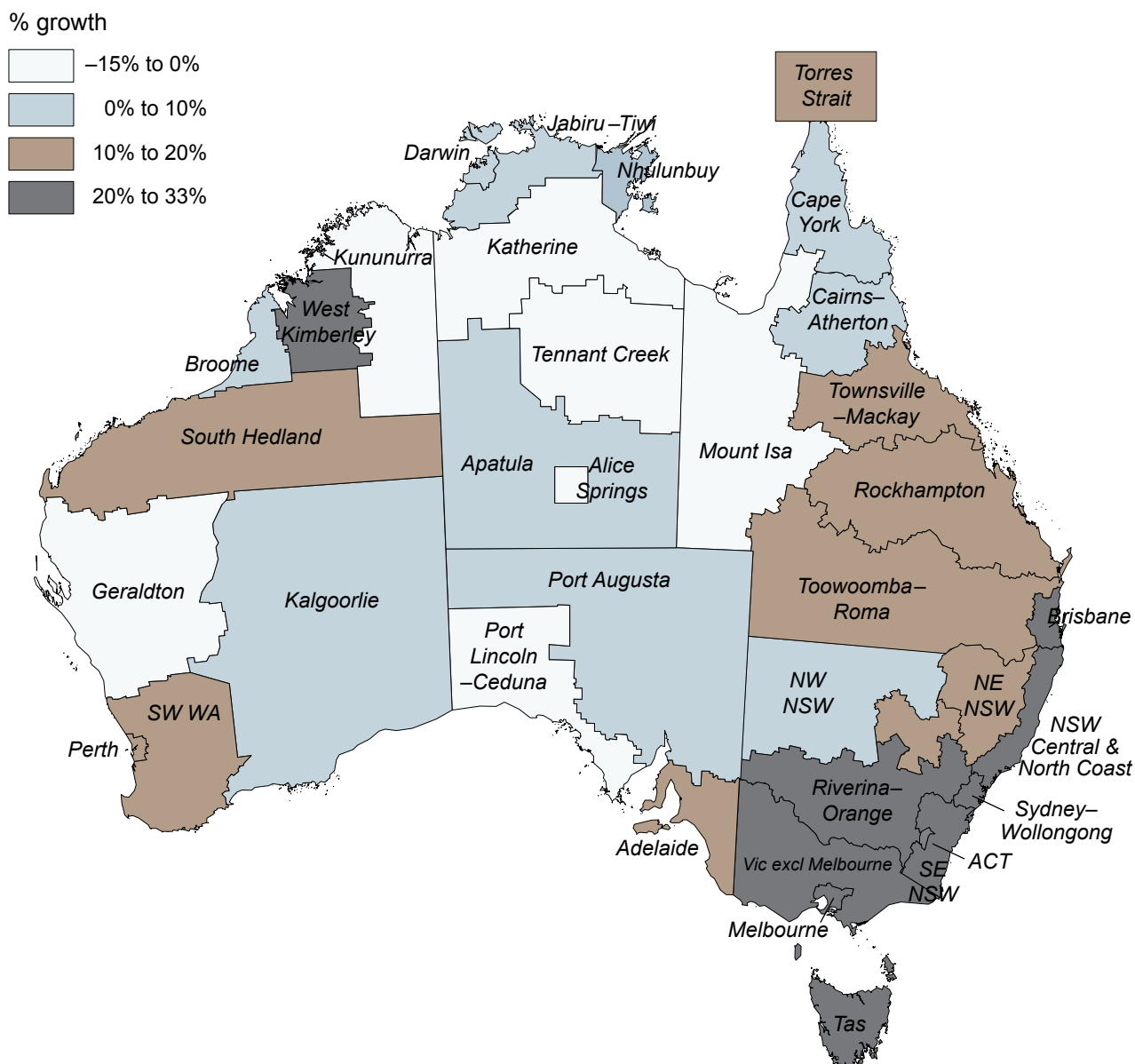
FIG. 4. Change in the number of Indigenous people counted in the census by Indigenous region, 2011–16



A similar geographic pattern of growth is apparent when Indigenous population change is mapped in terms of percentage growth rather than absolute growth. As Fig. 5 shows, percentage population growth was high across much of southeastern Australia, with the Indigenous populations of Victoria, Tasmania, the Australian Capital Territory, southern and eastern New South Wales, and southeast Queensland all growing by more than 20% between 2011 and 2016. The fastest growing regions were the New South Wales Central and North Coast (33.4%), Brisbane (32.8%) and Melbourne (34.5%), whereas population decline was most rapid in Kununurra (13.5%) and Alice Springs (7.2%).

While these results might be interpreted as suggesting that the distribution of the Indigenous population is becoming more similar to that of the non-Indigenous population, the census figures do not tell a simple story of converging geographic distributions. Clearly, the less urbanised Indigenous population continues the long-term trend of becoming increasingly likely to live in cities. As Table 2 shows, 36.8% of the Indigenous population lived in what the ABS terms ‘major cities’ in 2016, an increase of 2.6% from 34.2% in 2011, using a consistent geographic classification. This increase consists of a combination of natural increase, migration and identification change. However, during this same period,

FIG. 5. Percentage change in the number of Indigenous people counted in the census by Indigenous region, 2011–16



the non-Indigenous population also became increasingly urbanised, with 72.3% of non-Indigenous Australian's resident in major cities in 2016, an increase of 1.3% from 71.0% in 2011. However, the starkest divergence in population dynamics lies in 'inner regional' areas, where 24.1% of Indigenous people and 18.1% of non-Indigenous people now live. While the proportion of the Indigenous population living in inner regional areas continues to grow (up 1.7% from 2011), the proportion of the non-Indigenous population living in these locations fell by 0.5% between 2011 and 2016.

Another difference between the two populations is that much of the growth of non-Indigenous Australians in urban areas is likely to be driven by international immigration. For the Indigenous population, migration is negligible, with the small percentage of Indigenous Australians who move overseas mostly balanced by the small percentage who return. Growth in urban areas is therefore likely to be made up of a combination of excess of births over deaths, changing patterns of identification and internal migration. We will explore these patterns in detail when migration data from the 2016 Census become available.

TABLE 2. Indigenous and non-Indigenous population count distributions by geographical remoteness, 2016

Remoteness	Indigenous population count	Percentage of Indigenous count	Change in percentage of Indigenous count, 2011–16	Non-Indigenous population count	Percentage of non-Indigenous count	Change in percentage of non-Indigenous count, 2011–16
Major cities	235 527	36.8	2.6	15 409 691	72.3	1.3
Inner regional	154 087	24.1	1.7	3 858 090	18.1	-0.5
Outer regional	130 976	20.5	-1.5	1 738 227	8.2	-0.6
Remote	40 689	6.4	-1.0	224 485	1.1	-0.1
Very remote	79 041	12.3	-1.9	90 897	0.4	-0.1

Note: Not stated population excluded. Calculated on the basis of 2011 remoteness boundaries, using an area-based 2016 to 2011 Statistical Area 1-level concordance.

Growth in people with Indigenous status ‘not stated’

Type and prevalence of nonresponse

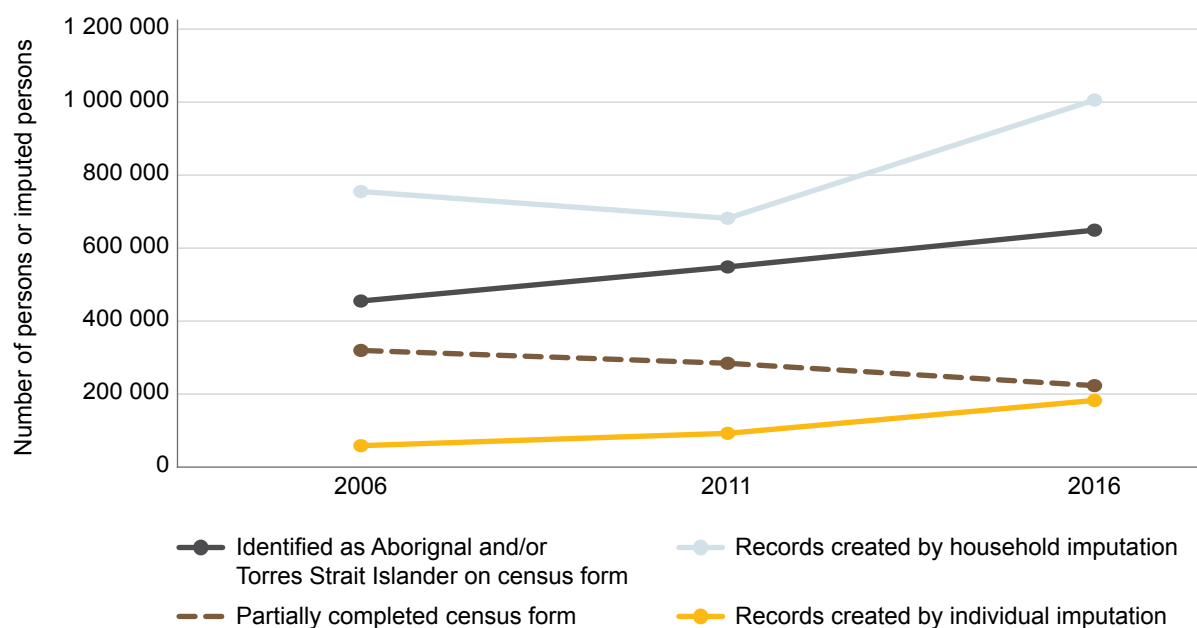
Given the well-publicised concerns about the quality of the 2016 Census (Harding et al. 2017), the growth in the number of census records with no valid response to the Indigenous status question is worthy of further attention. The number of records with Indigenous status not stated grew from 1 058 585 in 2011 (4.9% of people) to 1 411 492 in 2016 (6.0% of people), an increase of 33.3%. This is potentially concerning, because the number of census records with no answer for the Indigenous origin question is more than double the number of people who identified as Aboriginal and/or Torres Strait Islander. This quantity of missing data could be a problem if the increased propensity for the Indigenous origin question to be unanswered is correlated with other variables. If, for example, those who live in remote areas are more likely to constitute the population who left the Indigenous origin question unanswered for the first time, this might bias the results of other analyses. In this context, the predictors of the increase in the number of census records with no valid answer to the Indigenous origin question is of particular interest. While the quality assurance report commissioned by the ABS considered this matter, it did not do so in great detail for the Indigenous population specifically (Harding et al. 2017).

There are three broad categories of census records for which Indigenous status is not stated. The first category, which we term ‘partial form completion’, occurs when people return a partially completed census form to the ABS and leave the Indigenous origin question unanswered. In the 2016 Census, responses to the Indigenous origin question for which both the ‘No’ and a

‘Yes’ response were recorded were also coded as ‘not stated’, a change from the 2011 Census in which they were coded as non-Indigenous. The second category, which we term ‘household imputation’, occurs when whole households are missing from the census. This occurs when no census form is returned from a dwelling that census collectors deem to have been occupied on census night. In this case, the number of people living in the dwelling is imputed by the ABS. The third category, ‘individual imputation’ is similar to household imputation but occurs when individuals fail to appear on any census form and are imputed into the census by the ABS. This occurs in nonprivate dwellings (i.e. shared accommodation such as hotels, hospitals, prisons and other communal dwellings), when individuals who are listed as being present on census night fail to complete an individual census form. In household and individual imputation, the age, sex, marital status and place of usual residence are imputed for missing persons, but Indigenous status is not imputed. In 2016, partial form completion accounted for 223 165 census records (1.0%), household imputation for 1 005 727 census records (4.3%) and individual imputation for 182 606 census records (0.8%).

Examination of the number of census records in each nonresponse category for the Indigenous origin census question in the 2006, 2011 and 2016 censuses (see Fig. 6) reveals four key findings.¹ First, the single largest category of census records having no response for Indigenous status arises from household imputation – that is, by the imputation of persons into private dwellings deemed by census collectors to be occupied on census night and that did not return a census form. This category of nonresponse increased by 47.5% between 2011 and 2016 – a very substantial increase. Second, individual imputation has been growing consistently since 2006,

FIG. 6. Nonresponse to the Indigenous origin question in the 2006, 2011 and 2016 censuses by nonresponse type



although at a slower rate and from a smaller base. In short, a growing number of people are being considered to have failed to return census forms, whether in private or nonprivate dwellings. This affects the census results across all questions, not just the Indigenous origin question. Third, partial form completion has consistently fallen since 2006, meaning that those who do return a census form are increasingly likely to complete the Indigenous origin question. This may be due in part to the increase in the number of forms completed online, for which it is much more difficult to leave individual questions unanswered. Fourth, the number of imputed records (1 188 333) is substantially greater than the number of records in which people identify as being of Aboriginal or Torres Strait Islander origin (649 168), suggesting that it is possible that changes to this category of people might be of sufficient magnitude to bias results for Indigenous people. Certainly, the characteristics of the population of people who fail to answer the Indigenous origin question is worthy of further investigation.

Characteristics of nonrespondents in private dwellings

The overall growth in the number of census records with no valid response to the Indigenous origin question makes understanding the composition of those who are not represented in the census results important. While all forms of nonresponse are important, household imputation is perhaps the most noteworthy because it

contributes the majority of nonrespondents. It is also the type of nonresponse that increased most rapidly between 2011 and 2016.

Table 3 presents what we know about the age–sex composition of those who did not complete the Indigenous origin question, and compares it with that of those who did complete the question. Nonresponse is broken down by partial form completion and household imputation. In the case of item nonresponse, where respondents mostly did complete the age–sex questions themselves, the age–sex profile of nonrespondents is somewhere between that of Indigenous and non-Indigenous Australians. However, it is generally much closer to the non-Indigenous population distribution. This is consistent with unweighted data from the ABS (2017a), which suggest that, among the 223 000 people who partially completed a census form but did not answer the Indigenous origin question, 5.3% identify as Indigenous when asked in an interview. In the case of households who did not return a census form but whose members were imputed by the ABS, the imputed age–sex distribution is older even than the non-Indigenous population. This result should be treated with caution, however, as it is the outcome of the imputation process rather than answers to the survey itself.

In summary, the age–sex profile of item nonrespondents is somewhere between Indigenous and non-Indigenous Australians, whereas the imputed age–sex profile of imputed households looks like a more extreme version

TABLE 3. Age–sex profile and imputed age–sex profile of records that did not have a valid response recorded for the Indigenous origin question in the 2016 Census and who lived in, or were imputed to live in, a private dwelling

Sex	Age	Persons in returned, partially completed census forms		Persons in imputed households in private dwellings		Stated Indigenous on Indigenous origin question		Stated non-Indigenous on Indigenous origin question	
		%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>
Female	0–14	10.9	22 025	8.5	85 078	17.1	105 989	9.1	1 896 588
	15–29	8.4	17 132	10.4	104 239	13.1	81 042	9.8	2 027 186
	30–44	6.9	14 021	11.0	110 144	9.1	56 638	10.8	2 232 805
	45–65	10.3	20 861	12.8	128 719	9.3	57 828	13.1	2 724 176
	65 and over	14.4	29 109	8.0	80 271	2.6	15 843	8.1	1 674 333
Male	0–14	11.5	23 403	8.9	89 714	18.0	111 589	9.6	2 001 003
	15–29	9.6	19 505	10.1	102 061	12.8	79 347	9.8	2 037 447
	30–44	7.1	14 425	10.7	107 819	7.8	48 315	10.2	2 112 627
	45–65	10.5	21 308	12.3	123 704	8.0	49 419	12.3	2 548 837
	65 and over	10.4	21 028	7.4	73 972	2.1	13 052	7.2	1 485 940

of the non-Indigenous population profile. This implies that the partial form–completing population occupies a distinctive place in the age–sex structure, close to the non-Indigenous population but with fewer people aged 30–65. In contrast, imputed people tend to underrepresent children aged 0–14 and overrepresent those aged 15–44.

People with a partially completed census form

We can learn more about people who returned partially completed census forms by examining their responses in the remainder of the census form (Table 4). People who were the ‘primary reference person’ for the census form were only slightly more likely to complete the Indigenous origin question (90.1%) than nonreference people (90.0%). The primary reference person is generally the first person listed on a census form, and may complete the form on behalf of other household members. We might expect to see a substantially lower rate of completion of the Indigenous origin question among those who were not the primary reference person if they were not confident in identifying the Indigenous origin of household members. However, this appears not to be the case.

In general, those who were widowed (1.6% did not state their Indigenous status), poorer (0.9%) and less well educated (1.1%) were less likely to answer the Indigenous origin question than average. In addition, those who speak English at home (0.8% did not state their Indigenous status), those who did not provide unpaid care or assistance (0.8%) and those who were at home

on census night (1.4%) were also less likely to answer the Indigenous origin question.

Mutual patterns of nonresponse appear for the Indigenous origin question, and the age and sex questions. Only 0.9% of those who answered the age and sex questions, did not complete the Indigenous origin question. However, 12.9% of those who failed to answer the sex question and 20.2% of those who failed to answer the age question also did not answer the Indigenous origin question. This is part of a consistent but unsurprising pattern evident in Table 4 whereby those who did not answer other census questions were also unlikely to answer the Indigenous origin question. This is especially clear in the case of legal marital status, where more than one-third of people who did not state their marital status also did not state their Indigenous status.

What is not evident in Table 4 is a clear question ‘exhaustion effect’, whereby people are less likely to answer questions towards the back of the census form. However, an exhaustion effect exists regardless of the answer to the Indigenous origin question. The nonresponse rate for the first census question on sex was 1.1% for people who identified as Indigenous, 0.5% for people who identified as non-Indigenous and 8.7% for people who did not answer the Indigenous origin question. In contrast, the nonresponse rate for one of the last questions on the form about providing unpaid care and assistance was 7.6% for Indigenous respondents, 3.0% for non-Indigenous respondents and 29.6%

for people who did not answer the Indigenous origin question. The exhaustion rate could be quantified as the ratio of the nonresponse rates for these two questions. This shows that Indigenous respondents were 7.2 times more likely to fail to complete the unpaid care question than the sex question, compared with 5.6 times for non-Indigenous respondents and 3.4 times for those who did not answer the Indigenous status question. In summary, the exhaustion effect appears to affect more those who did answer the Indigenous origin question than those who did not.

Imputed households

Imputed households, 2016

An understanding of the characteristics of imputed households is more difficult to come by because, by definition, they have not answered any questions on the census form. However, we can learn something about this large and growing part of the nonresponding population by examining the places in which nonresponding households live. This includes the proportion of an area who identify as Indigenous. The key assumption here is that, while people in imputed households may differ systematically from people in households that returned a census form, they are likely to be more similar to their immediate neighbours than they are to be similar to a randomly selected person in other parts of Australia. Consequently, an investigation of the areas in which imputed households live can tell us something about the characteristics of those households, about which little else is known.

Table 5 shows responses to selected census questions in the neighbourhoods where people in imputed households live. Here the 'neighbourhood' is approximated by census geographic units termed 'Statistical Area 1' (SA1) – areas of census tabulation with an average of approximately 400 people. The first column shows the 'unadjusted' percentage of people living in imputed households by the characteristics of their SA1. For example, in SA1s where between 0% and 2.8% of the population identified as Indigenous, 4.0% of census responses are from imputed households. However, in SA1s where between 10.0% and 33.3% of the population are Indigenous, 7.4% of census responses are from imputed households. This shows that rates of household imputation are higher in areas with a greater Indigenous presence, and suggests, therefore, that Indigenous people may be overrepresented among imputed households and therefore underrepresented in census counts.

Continuing down that 'unadjusted' column, it is clear that remote areas have the highest rate of household imputation, with 8.8% of census responses in these areas created by household imputation. Household imputation was lower in linguistically diverse neighbourhoods, and in neighbourhoods with low poverty rates and highly educated populations. Imputation rates were higher in areas with many nonfamily households (i.e. group houses, people living alone or visitor-only households), in areas with many apartment blocks and in areas with relatively little internet access.

However, many of these variables are correlated at the SA1 level. For example, areas that are more remote are also more likely to have a higher proportion of the population that are of Indigenous origin. For that reason, a multivariate regression model was created to adjust for this correlation and determine the extent to which each areal characteristic is driving household imputation rates. The 'adjusted' column presents the estimated household imputation rate after adjusting for correlated variation in other variables. It shows, for example, that 4.0% of people in SA1s where 0.0–2.8% of the population are of Indigenous origin are estimated to have been imputed. However, holding all other neighbourhood characteristics constant, an estimated 3.7% of households are estimated to be imputed in SA1s with an Indigenous population of 33.3–100%. This suggests that in these areas it is not Indigenous status per se that is driving household imputation, but other characteristics of those areas such as remoteness and poverty. Indeed, the fact that household imputation rates are estimated to be lowest in areas where the highest proportion of the population is Indigenous suggests that the special enumeration strategies that are implemented to collect the census in these areas are effective.

Remoteness is revealed to be the single variable with the biggest impact on adjusted household imputation rates. Adjusted imputation rates rise along the remoteness gradient from 3.9% in major cities to 6.9% in remote areas, falling somewhat to 5.1% in 'very remote' areas. By definition, more remote areas are more difficult to reach, and this appears to affect household imputation rates. Efforts to reduce household imputation rates appear to require a focus on remote and outer regional areas.

The adjustment process has a significant impact on the imputation rates for linguistically diverse areas. The unadjusted imputation rate was lower in linguistically diverse areas, which is somewhat counterintuitive because it might be expected that those speaking a language other than English might be less able to

complete the census. However, this surprising correlation is reversed after other variables are accounted for. It appears likely that it is the locations of linguistically diverse populations that are responsible for their low imputation rates, rather than linguistic diversity per se. Even after adjustment, imputation rates remained correlated with income poverty rates, education rates, rates of nonfamily households and rates of apartment living. However, the magnitudes of these gradients were reduced.

Change in household imputation rates, 2011–16

While the foregoing analysis describes the correlates of imputation rates in SA1s in 2016, it does not answer the question of which neighbourhoods saw the biggest increase in household imputation rates between 2011 and 2016. Answering this question is important because it helps us to understand both the drivers of this significant increase in nonresponse and potential biases that may be introduced when comparing 2011 and 2016 Census findings. In unadjusted terms, imputation rates increased most in areas where a high proportion of people completing the census identified as Indigenous (2.2%), as well as in remote areas (2.7%), areas with little linguistic diversity (2.1%), areas with high poverty rates (1.6%) and areas with low education rates (2.2%).

Significantly, given the 2016 Census's emphasis on online census form completion coupled with a website failure on census night, areas with a high degree of internet adoption had a smaller increase in household imputation rates than areas with little internet adoption. Considered along with the finding that the growth of household imputation was slowest in major cities (0.7%) – areas where the ABS was most likely to adopt the 'digital first' census completion strategy – this suggests that the growth in household imputation rates is unlikely to be driven by people who were inconvenienced by the website failure. This finding corresponds with the report of the Independent Assurance Panel (Harding et al. 2017), which suggested that changes to the method for constructing the sample frame of dwellings eligible to return a census form may be responsible for the increase in household imputation.

Analysis of the adjusted estimates of change in household imputation rates confirms much of this story. However, in the case of Indigenous status, it suggests that household imputation rates grew most slowly (or actually decreased) in areas where the proportion of Indigenous residents was highest, all other things being equal. Consequently, it seems that the growth of household imputation between 2011 and 2016 was not driven by a decreased propensity to respond to the census among the Indigenous population. Rather, the

findings of this Census Paper suggest that the increase in the number of records with no response to the Indigenous origin question appears to mostly result from changing enumeration methods (Harding et al. 2017) and is unlikely to reflect an increased refusal to return census forms. As such, special measures to deal with census nonresponse among the Indigenous population do not appear to be necessary. The usual care required when interpreting incomplete census data is adequate.

Exploring the unexplained population growth

The geography of unexplained population growth

Indigenous population growth between 2011 and 2016 was well above what could be explained by natural increase alone. As described above, the Indigenous population on 9 August 2016 was estimated to be 786 689 on the basis of the PES alone (excluding Indigenous residents temporarily overseas, the inclusion of whom brings the population estimate to 798 381). This was around 42 000 more than the upper range of the Indigenous population projections based on the 2011 Census. This unexplained population growth is likely to arise from identification change, and potentially from changes to enumeration and processing methods between the 2011 and 2016 censuses.

There is little reason to expect that the unexplained population growth is evenly distributed across the country. Although too little information has been published to construct detailed regional population estimates, including age–sex distributions, provisional estimates can be arrived at using a simple, three-step procedure. First, those records with no response to the Indigenous origin question had their Indigenous status imputed based on the percentage of respondents who identified as Indigenous in their SA1. This increased the Indigenous population from a count of 643 136 (excluding those in migratory, shipping and offshore areas) to an estimate of 692 182. Second, a provisional population estimate for each region was arrived at by multiplying these regional, prorated Indigenous population estimates by 1.137. This multiplier was selected so that the sum of all regional population estimates equalled 786 689, the national estimate derived from the PES. Third, Indigenous population projections for each region for 2016, based on the 2011 Census, were subtracted from provisional population estimates for regions. The 2011-based projections were produced on the basis of natural increase and a repetition of 2006–11 migration patterns (Biddle 2013). Consequently, the subtraction of the 2011-based projection from the 2016-based estimate gives a measure of unexpected population

TABLE 4. Responses to selected census questions among those who returned a census form, by nonresponse and response to the Indigenous origin question, 2016

Census question	Indigenous status not stated (%)	Stated Indigenous (%)	Stated non-Indigenous (%)
Primary reference person on form			
Yes	0.9	2.0	97.2
No	1.0	3.4	95.6
Sex			
Male	0.9	2.8	96.3
Female	0.9	2.9	96.3
Not stated	12.9	4.8	82.2
Age			
Stated	0.9	2.8	96.3
Not stated	20.2	11.7	68.1
Legal marital status			
Never married	0.6	3.9	95.4
Widowed	1.6	1.5	96.9
Divorced	0.9	1.8	97.3
Separated	0.9	3.2	95.9
Married	0.6	1.1	98.3
Not stated	35.2	11.1	53.7
Language spoken at home			
English	0.8	3.2	96.0
Indigenous language	0.2	98.5	1.3
Neither English nor Indigenous language	0.7	0.2	99.1
Not stated	14.4	7.9	77.7
Highest year of school			
12	0.5	1.3	98.2
10 or 11	0.8	3.2	96.0
9 or less	1.1	4.1	94.8
Not stated	8.4	5.6	86.0
Personal income			
\$399 or less	0.9	3.2	96.0
\$400–\$799	0.8	2.4	96.8
\$800 or more	0.5	1.4	98.1
Not stated	7.1	5.4	87.5
Provided unpaid care or assistance			
Yes	0.6	2.1	97.2
No	0.8	2.7	96.5
Not stated	8.0	5.2	86.8
Was away from home on census night			
Yes	0.9	2.8	96.3
No	1.4	4.6	94.0
Total	0.9	2.9	96.2

Notes: All tabulations are for non-imputed people enumerated in private dwellings. Items are presented in the order of their appearance on the 2016 Census Household Form. Indigenous status appears on the form between the questions about marital status and language spoken at home. Questions on marital status, high-school completion, personal income and unpaid care were only asked of those aged 15 or older.

TABLE 5. Percentage of unit nonresponse in private dwellings, by SA1 characteristics, 2016

Characteristics of SA1s in the 2016 Census	Average household imputation rate, 2016 (%)		Change in average household imputation rate, 2011–16 (%)	
	Unadjusted	Adjusted	Unadjusted	Adjusted
Indigenous people				
0.0–2.8%	4.0	4.0	0.9	1.4
2.8–10.0%	5.0	4.5	1.7	1.2
10.0–33.3%	7.4	5.2	2.2	0.8
33.3–100%	5.8	3.7	2.2	–0.3
Remoteness				
Major city	3.9	3.9	0.7	1.0
Inner regional	4.9	4.8	2.1	1.7
Outer regional	6.3	5.5	2.6	2.1
Remote	8.8	6.9	2.7	2.4
Very remote	5.9	5.1	2.0	2.0
People who speak a non-Indigenous language at home other than English				
0.0–6.2%	4.7	4.0	2.1	1.5
6.2–21.8%	3.3	4.4	1.1	1.3
21.8–100%	3.3	4.4	0.5	1.0
Households in income poverty				
0.0–9.6%	3.7	4.0	0.7	1.2
9.6–15.6%	4.2	4.2	1.1	1.2
15.6–100%	5.4	4.6	1.6	1.5
Adults who have completed Year 12				
0.0–48.7%	5.2	4.3	2.2	1.3
48.7–65.2%	4.0	4.4	1.1	1.3
65.2–100%	4.1	4.0	0.4	1.3
Nonfamily households				
0.0–20.3%	3.0	3.6	0.8	1.4
20.3–32.7%	4.2	4.3	1.2	1.3
32.7–100%	6.1	5.1	1.4	1.2
Households living in apartments in three-story or higher buildings				
0.0%	4.0	4.0	1.3	1.3
0.1–32.6%	5.1	5.0	0.8	1.3
32.6–100%	7.4	6.8	0.0	0.9
Households with internet				
0.0–82.7%	5.6	4.2	2.0	1.5
82.7–90.7%	4.3	4.3	1.0	1.2
90.7–100%	3.6	4.2	0.5	1.1
Total	4.4	4.4	1.3	1.3

Notes: Cell values indicate the percentage of census records of people in private dwellings in each category that are imputed. Unadjusted figures report the crude cross-tabulations. Adjusted figures report the results of a series of generalised linear models (GLMs). The adjusted cell values report the average modelled percentages, holding other variables constant at their means. SA1s, weighted by the number of residents in private dwellings, were used as the units of analysis for these models. Because of the large number of SA1s in the analysis, all variables in GLMs were significant, even when the effect sizes were very small. Consequently, only predicted values are displayed.

change for each region. Because some of this population change will be explained by changing migration patterns between 2011 and 2016, we term this population change 'unexpected' rather than 'unexplained'. However, internal migration data will not be available until the second release of census data later this year.

Estimates of unexpected population change are displayed in Fig. 7 and Table 6. Much of the unexpected population increase occurred in southeastern Australia. In particular, more than 75% of the unexpected population increase occurred in just five regions: New South Wales Central and North Coast (14 844), Sydney–Wollongong (7412), Brisbane (5813), Riverina–Orange (4713), and North-Eastern New South Wales (3600). While these regions

were projected to experience substantial population increase, the actual population increase substantially exceeded expectations. However, not all regions saw greater than expected population growth between 2011 and 2016. For example, the sixth most rapidly growing region, Townsville–Mackay, had an estimated Indigenous population increase of 4800 people, very close to the projected increase of 4600. Other regions experienced population changes that were substantially less than projected. For example, the Indigenous population of Perth was projected to increase by 5628 between 2011 and 2016, but instead grew by only 1734 people. Similarly, the Indigenous population of Alice Springs was projected to increase by 817 people, but our estimates suggest that it decreased by 745 people.

FIG. 7. Unexpected population change by Indigenous region, 2011–16

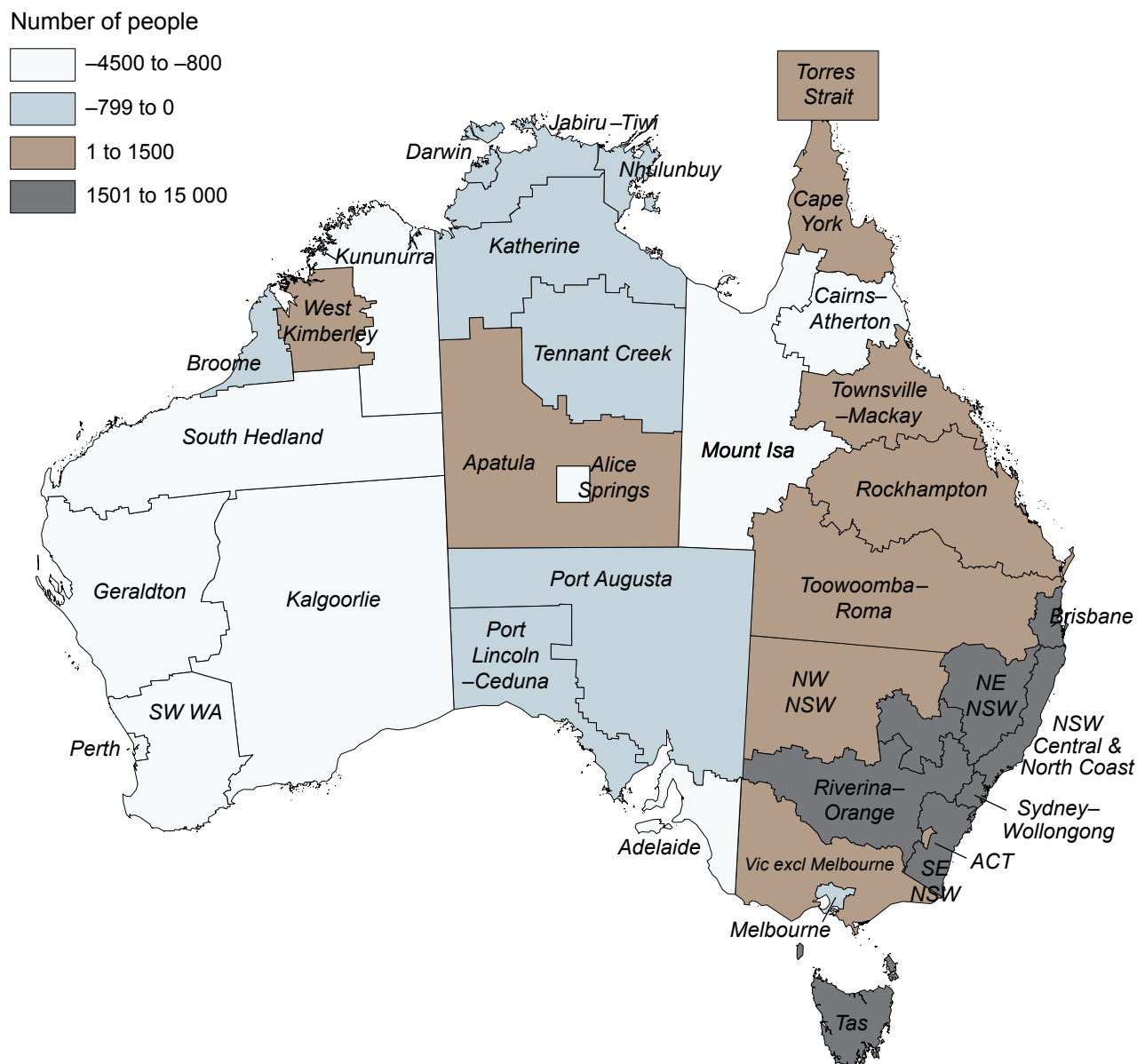


TABLE 6. Provisional estimates of the 2016 Indigenous population of regions based on the 2016 Census, compared with projections of the 2016 Indigenous population based on the 2011 Census and natural increase

Region	Provisional estimate of 2016 population based on the 2016 Census count	Projected 2016 population based on the 2011 Census	Estimated 2011 population based on the 2011 Census	Unexplained population change
NSW Central and North Coast	84 811	69 967	62 896	14 844
Sydney–Wollongong	77 878	70 466	64 184	7 412
Brisbane	84 929	79 116	64 993	5 813
Riverina–Orange	30 961	26 248	24 311	4 713
Northeastern NSW	25 575	21 975	20 790	3 600
Tasmania	28 599	26 068	24 165	2 531
Southeastern NSW	16 498	14 365	13 178	2 133
Dubbo	15 897	14 341	13 625	1 556
Toowoomba–Roma	22 197	20 775	18 389	1 422
Cape York	11 346	10 631	9 812	715
West Kimberley	5 932	5 278	4 930	654
Victoria excl. Melbourne	29 152	28 531	24 872	621
Rockhampton	27 810	27 200	22 822	610
Torres Strait	7 845	7 360	6 885	485
Australian Capital Territory	7 569	7 196	6 160	373
Townsville–Mackay	32 413	32 214	27 607	199
Apatula	10 347	10 182	9 894	165
Northwestern NSW	9 849	9 775	9 492	74
Melbourne	26 026	26 289	22 461	–263
Broome	5 849	6 175	5 481	–326
Port Augusta	9 213	9 614	8 863	–401
Tennant Creek	4 210	4 616	4 473	–406
Katherine	10 406	10 899	10 543	–493
Port Lincoln – Ceduna	2 621	3 154	2 827	–533
Darwin	15 848	16 442	14 660	–594
Nhulunbuy	11 071	11 719	10 896	–648
Jabiru–Tiwi	12 301	13 086	12 151	–785
Mount Isa	9 202	10 009	9 358	–807
Kalgoorlie	7 034	7 848	7 180	–814
Adelaide	28 765	29 680	25 718	–915
South Hedland	10 814	11 776	10 014	–962
Southwestern Western Australia	14 505	15 531	13 162	–1 026
Geraldton	7 837	8 922	8 055	–1 085
Kununurra	5 957	7 112	6 611	–1 155
Alice Springs	5 488	7 050	6 233	–1 562
Perth	34 571	38 465	32 837	–3 894
Cairns–Atherton	30 315	34 707	29 088	–4 392

NSW = New South Wales

Table 6 suggests that, on average, regions with a larger population in 2011 had a greater proportion of unexpected population growth. However, this pattern should not be overinterpreted. The three most populous Indigenous regions, New South Wales Central and North Coast, Sydney–Wollongong, and Brisbane, recorded the greatest amount of unexpected population growth. After these three regions are set aside, however, there is no relationship between a region's population in 2011 and the level of unexpected 2011–16 population change. Further research is needed to understand the spatial concentration of unexpected population change, estimating the relative contributions of changing rates of 'out-marriage', changing migration patterns and geographically uneven identification change to the observed patterns of unexpected population growth.

Identification change and socioeconomic outcomes

It is important to note that identification change may play a role in changes to socioeconomic indicators for the Indigenous population between 2011 and 2016 that will be described in future CAEPR 2016 Census Papers. Previous research using the Australian Census Longitudinal Dataset (ACL D) to examine the socioeconomic position of those who did not identify as Indigenous on the 2011 Census but did identify as Indigenous in the 2016 Census found that this group of 'new identifiers' occupied an intermediate socioeconomic position between those who identified as Indigenous in both censuses and those who identified as non-Indigenous in both censuses (Biddle & Crawford 2015). This implies that identification change is likely to confound apparent socioeconomic changes for the Indigenous population between censuses. In other words, there is a risk that we can misinterpret changes to the aggregate socioeconomic position of the Indigenous population between the 2011 and 2016 censuses as meaning that the life chances of the cohort are improving. This is not necessarily the case if some of that improvement may be the result of the changing composition of the group of people who are identified as Indigenous in the census.

Figs 8 and 9 illustrate this phenomenon. In Fig. 8, the percentage of the population that stated that both of their parents were born in Australia is plotted by age for Indigenous and non-Indigenous people. Because the actual birthplace of parents for individuals will rarely change over time, we can compare the population percentages for 2016 with those for 2006 and 2011 by calculating the 2016 age of 2006 and 2011 respondents. Consequently, the horizontal axis of this graph shows the population age in 2016, while separate lines are drawn to

indicate responses to the 2006, 2011 and 2016 censuses. Those who arrived in Australia during intercensal periods are excluded. If respondents answered the birthplace of parents consistently over time and the same respondents were consistently classified as Indigenous across multiple censuses, we would expect these lines to coincide. However, it is evident that there are gaps between the lines for 2006 and 2016.

We can suggest four possible mechanisms that might contribute to the change in the percentage of the Indigenous population reporting that both of their parents were born in Australia. First, people may have changed their responses to the birthplace of parents' question between censuses. We can think of few reasons to expect a systematic change in answers to this question for Indigenous people but not for non-Indigenous people, however. Second, Indigenous people with both parents born in Australia may have had a higher mortality rate between censuses than those with a parent born overseas. This may be a plausible contribution to the intercensal change in outcomes, but it is of unknown magnitude. Third, it is possible that those with both parents born in Australia may be more likely to emigrate. However, this is unlikely given that having overseas relatives seems likely to increase propensity to emigrate (cf. Conway & Potter 2009). Finally, and most relevant to this paper, there is likely to be a greater proportion of people with a parent born overseas among members of the population who identified as Indigenous for the first time in 2016, compared with the population that identified as Indigenous in 2011.

Fig. 8 suggests that several of these phenomena are likely to be occurring. In particular, younger non-Indigenous people appear to be more likely over time to report that one of their parents was not born in Australia, indicative of changing answers to the parents' birthplace question. More importantly for the purposes of this paper, between 2006 and 2016, Indigenous people across the age spectrum have become more likely to report that at least one of their parents was born overseas. This shift is likely to reflect a change in the composition of the Indigenous population, with those who identified as Indigenous for the first time in 2016 being more likely to have a parent born overseas than those who have identified as Indigenous since 2006.

Fig. 9 illustrates a similar pattern but with respect to high-school attainment. Here we plot the proportion of the population that has not completed Year 10 or higher by age in 2016 for Indigenous and non-Indigenous identifiers in the 2006, 2011 and 2016 censuses. Those who arrived in Australia during intercensal periods are

excluded. Here the non-Indigenous population shows almost no change in high-school attainment over time, suggesting that individuals are answering this question consistently over time. Large differences appear for the Indigenous population, however. Specifically, the Year 10 attainment rate increased by around 5% between 2006 and 2016 across the life course. Such an increase is unlikely to be explained by either Indigenous people of all ages returning to high school or by changing responses to the educational attainment questions on the census.

FIG. 8. Change in the percentage of the population with both parents born in Australia for Indigenous and non-Indigenous Australians, by age in 2016

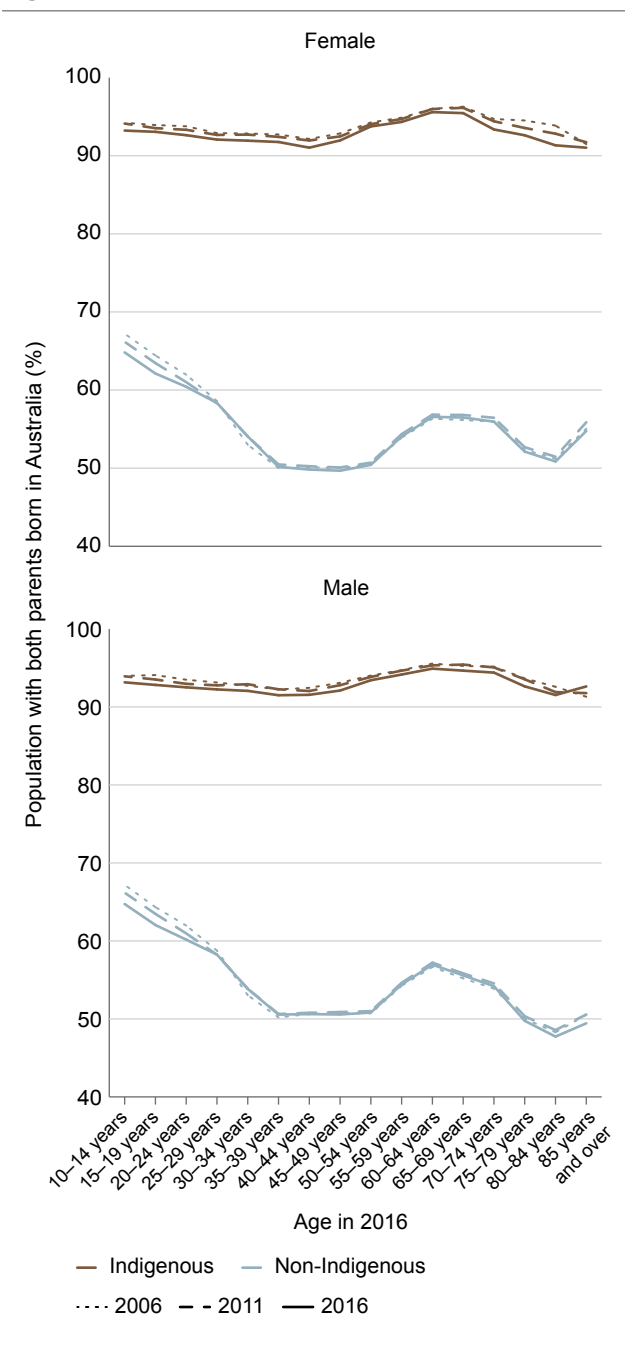
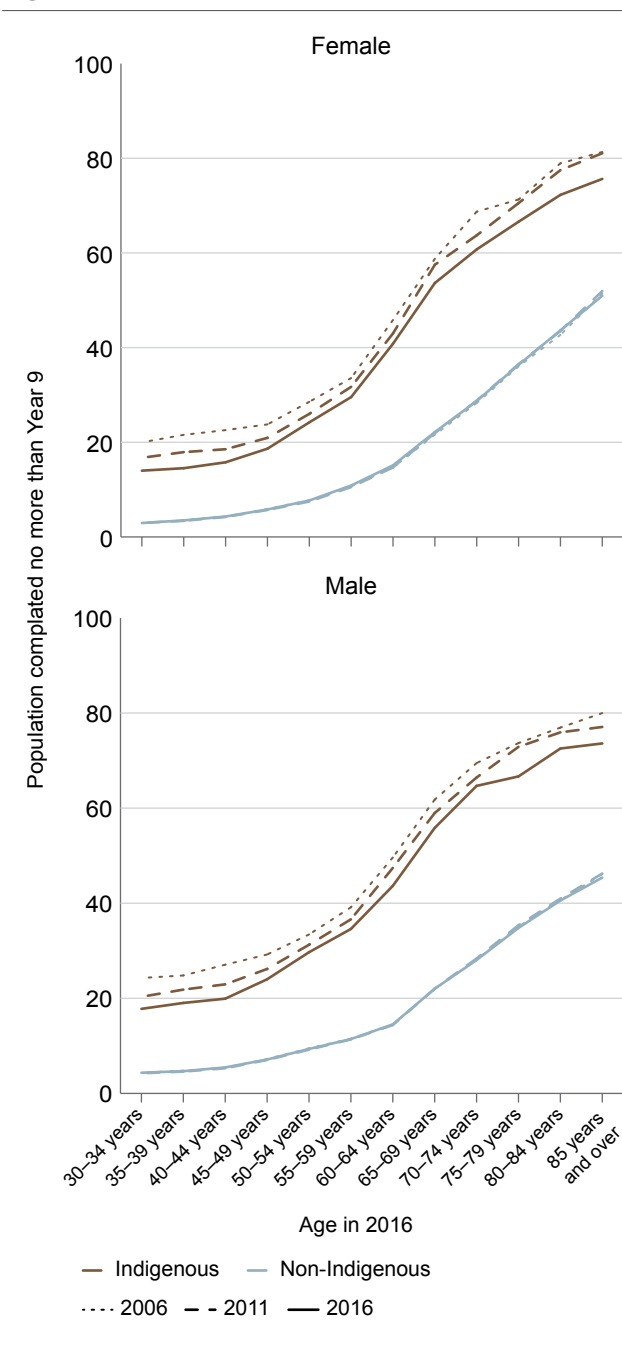


FIG. 9. Change in the percentage of the population that left high school after Year 9, for Indigenous and non-Indigenous Australians, by age in 2016



Rather, they are likely to indicate that those who changed their Indigenous identification between 2006 and 2011 or between 2011 and 2016 have a substantially greater high-school attainment rate than those who have always identified as Indigenous. Furthermore, because education is a determinant of health for Indigenous and non-Indigenous Australians (Marmot 2011, Shepherd et al. 2012, Crawford & Biddle 2017), it is likely that some of the apparent increase in the education levels of Indigenous people is a result of the premature deaths of the less well educated.

These observations are important because they indicate that improvements to socioeconomic indicators between censuses are not always the result of improved life circumstances for Indigenous people. Rather, improving social indicators are likely to partly be a result of a change to the type of people who are categorised as 'Indigenous' and potentially higher mortality rates among the socioeconomically disadvantaged. Specifically, these results confirm that newly identifying Indigenous people are likely to be better educated than always-identifying Indigenous people. The interpretation of this finding is complex. It could be understood to say that educational gaps between Indigenous and non-Indigenous people are closing more slowly than the census appears to indicate. Conversely, it could be that the gaps between Indigenous and non-Indigenous Australians were smaller than initially thought. Either way, the extent to which identification change and differential mortality rates are driving changes in social indicators for Indigenous people is an important topic for further investigation after the 2006–16 ACLD is released.

Concluding comments

There are a number of reasons for wanting to understand the changing size and composition of the Indigenous population. Indigenous population estimates are used as denominators for creating rates from administrative data (including life expectancy), to create weights for relevant sample surveys, and to allocate revenue to states and territories. More importantly, the changing size and composition of the Indigenous population tell us a lot about who we are as a country.

The quinquennial Census of Population and Housing remains the best source of information on Indigenous population change. The aim of this paper was to provide an overview of the changing size and spatial distribution of the Indigenous population of Australia, comparing the results of the 2011 and 2016 censuses.

The first set of analyses focused on the growth in the estimated population of Indigenous Australians. We showed, as has been reported by a number of media outlets, that the Indigenous population grew rapidly between 2011 and 2016, reaching around 3.3% of the total population estimate, or 786 689 people. It is more than just a historical footnote to reflect on the fact that this is similar to the accepted population estimate of the Indigenous population at the time of European colonisation (Mulvaney 2002), up from a low of around 72 000 at the time of the 1921 Census. Like other Indigenous groups internationally, the Indigenous population has rebounded substantially from the destruction wrought by frontier violence, disease and other forms of colonial domination.

The geographic distribution of the Indigenous population is also changing. Between 2011 and 2016, the most rapid growth in the Indigenous population count occurred in more urban parts of the country, with three regions (Brisbane, the New South Wales Central and North Coast, and Sydney–Wollongong) accounting for almost half of the recorded gross Indigenous population growth. There continues to be a policy focus on Indigenous Australians living in remote areas. In future papers in this series, we will consider the socioeconomic implications of this focus. The results of this paper suggest that a remote focus is becoming less justifiable on the basis of population geography alone, and that resources should be focused on those who are most disadvantaged.

While there is much we can learn about the changing Indigenous population from census data released thus far, there remains considerable uncertainty. Part of this uncertainty is due to the growth in the number of census records with indeterminate Indigenous status. This includes those who did not answer the Indigenous status question (but answered other questions) and those whose census records were wholly imputed. Much care needs to be taken with analysis of the census to take these missing data into account. However, the findings of this Census Paper suggest that the increase in the number of records with no response to the Indigenous origin question appears to mostly result from changing enumeration methods and is unlikely to reflect an increased refusal to return census forms. Indeed, people who did return a census form are more likely to complete the Indigenous origin question than in previous years.

A more consequential source of uncertainty relates to growth in the population that cannot be explained by the excess of births over deaths. Much of this excess or unexplained growth is likely to be caused by people changing their identification (or by their identification being given differently by those who respond to the census on their behalf). We will consider this issue in more depth after data detailing demographic components (births, deaths, mortality) become available. However, by comparing the 2016 Census data with population projections based on 2011 data, we have shown that unexplained growth accounts for around 34% of intercensal population growth – a considerable proportion, but slightly reduced from the 2011 Census (in which around 59% of intercensal growth was unexplained).

This unexplained growth was not spatially or demographically consistent. Much of the unexplained growth occurred in three urban regions (Sydney–Wollongong, New South Wales North and Central Coast, and Brisbane); however, there were also large urban regions such as Perth where the population increased

more slowly than expected. Perhaps more importantly, it seems that those who were newly identified were more likely to have had a parent born overseas and were more likely to have completed Year 10 or above than the rest of the Indigenous population. This is likely to lead to a convergence in the outcomes between the observed Indigenous and observed non-Indigenous populations through time, without there necessarily being any improvement in the life circumstances of individual Indigenous Australians.

The socioeconomic unevenness of unexplained Indigenous population growth has implications for monitoring the socioeconomic circumstances of the Indigenous population. We suggest that attempts to monitor the socioeconomic status of the Indigenous population should make extensive use of the ACLD. Because of its longitudinal design, the ACLD will allow fractional indicators to be derived that may assist in apportioning socioeconomic changes between changing life circumstances and identification change.

This is the first paper in the 2016 Census Paper series. Future papers will look in more detail at demographic change, including making use of migration data, and delve into changes in education, income, employment and other socioeconomic characteristics. What this paper has shown, however, is that, when looking at changes in outcomes for the Indigenous population, researchers and policy makers need to take great care, and reflect on the uncertainty underlying census data. For the Indigenous population in particular, erroneous conclusions have the potential to lead to poor policy choices.

Notes

1. These data were extracted from ABS TableBuilder, a web-based platform that allows the extraction of arbitrary, confidentialised census cross-tabulations. There is no imputation flag available in TableBuilder to identify census records with individual imputation. Consequently, this category is approximated by identifying those individuals in nonprivate dwellings, as well as those in shipping, offshore and migratory census collections, who had both their age and registered marital status imputed. This method is consistent for identifying change over time, but may incorrectly misclassify a small number of partially completed census form records as being individually imputed.

References

- ABS (Australian Bureau of Statistics) (1986). *Australian demographic trends*, cat. no. 3102.0, ABS, Canberra.
- (1994). *Experimental estimates of the Aboriginal and Torres Strait Islander population, June 1986 to June 1991*, cat no. 3230.0, ABS, Canberra.
- (1996). *Australian demographic statistics*, cat no. 3101.0, March, June, September and December, ABS, Canberra.
- (1998). *Experimental projections of the Aboriginal and Torres Strait Islander population, 1996 to 2006*, cat no. 3231.0, ABS, Canberra.
- (2004). *Year book Australia*, cat no. 1301.0, ABS, Canberra.
- (2011). *Reflecting a nation: stories from the 2011 Census, July 2011*, cat no. 2071.0, ABS, Canberra.
- (2014). *Australian historical population statistics*, cat no. 3105.0.65.001, ABS, Canberra.
- (2014b). *Estimates and projections, Aboriginal and Torres Strait Islander Australians, 2001 to 2026*, cat no. 3238.0, ABS, Canberra.
- (2017a). *Census of population and housing: details of overcount and undercount, Australia, 2016*, cat no. 2940.0, ABS, Canberra.
- (2017b). *Australian Demographic Statistics, Mar 2017*, cat no. 3101.0, ABS, Canberra.
- Arcioni E (2012). Excluding Indigenous Australians from the people: a reconsideration of Sections 25 and 127 of the Constitution. *Federal Law Review* 40:287–316.
- Biddle N (2012). *Population and age structure, 2011 Census Paper 5*, Centre for Aboriginal Economic Policy Research, Australian National University, Canberra.
- (2013). *Population projections, 2011 Census Paper 14*, Centre for Aboriginal Economic Policy Research, Australian National University, Canberra.

- & Crawford H (2015). *The changing Aboriginal and Torres Strait Islander population: evidence from the 2006–11 Australian Census Longitudinal Dataset*, 2011 Census Paper 18. Centre for Aboriginal Economic Policy Research, Australian National University, Canberra.
- Khoo S-E & Taylor J (2015). Indigenous Australia, white Australia, multicultural Australia: the demography of race and ethnicity in Australia. In: Sáenz R, Embrick DG & Rodríguez NP (eds), *The international handbook of the demography of race and ethnicity*, Springer, Dordrecht, 599–622.
- Calma T (2006). Social justice and human rights: using Indigenous socioeconomic data in policy development. In: Hunter B (ed), *Assessing the evidence on Indigenous socioeconomic outcomes*, ANU Press, Canberra, 299–310, <http://press.anu.edu.au?p=119431>.
- CBCS (Commonwealth Bureau of Census and Statistics) (1917). *Census of the Commonwealth of Australia, 1911*, ABS cat no. 2112.0, CBCS, Melbourne.
- (1927). *Census of the Commonwealth of Australia, 1921*, ABS cat no. 2111.0, CBCS, Melbourne.
- (1940). *Census of the Commonwealth of Australia, 1933*, ABS cat no. 2110.0, CBCS, Canberra.
- (1952). *Census of the Commonwealth of Australia, 1947*, ABS cat no. 2109.0, CBCS, Canberra.
- (1962). *Census of the Commonwealth of Australia, 1954*, ABS cat no. 2108.0, CBCS, Canberra.
- (1967). *Census of the Commonwealth of Australia, 1961*, ABS cat no. 2107.0, CBCS, Canberra.
- (1971). *Census of population and housing, 1966*, ABS cat no. 2106.0, CBCS, Canberra
- Chesterman J & Galligan B (1997). *Citizens without rights: Aborigines and Australian citizenship*, Cambridge University Press, Cambridge.
- Conway D & Potter RB (eds) (2009). *Return migration of the next generations: 21st century transnational mobility*, Ashgate, Aldershot.
- Crawford H & Biddle N (2017). *Changing associations of selected social determinants with Aboriginal and Torres Strait Islander health & wellbeing, 2002 to 2012–13*, Working Paper 113, Centre for Aboriginal Economic Policy Research, Australian National University, Canberra.
- Dodson M (2003). The end in the beginning: re(de)finding Aboriginality. In: Grossman M (ed), *Blacklines: contemporary critical writing by Indigenous Australians*, Melbourne University Press, Melbourne, 25–42.
- Harding S, Jackson Pulver L, McDonald P, Morrison P & Trewin D (2017). *Report on the quality of 2016 Census data*, Census Independent Assurance Panel, Canberra www.abs.gov.au/websitedbs/d3310114.nsf/Home/Independent+Assurance+Panel.
- Kukutai T & Taylor J (eds) (2016). *Indigenous data sovereignty*, ANU Press, Canberra.
- Marmot M (2011). Social determinants and the health of Indigenous Australians. *Medical Journal of Australia* 194(10):512–513.
- Mulvaney J (2002). ‘Difficult to found an opinion’: 1788 Aboriginal population estimates. In: Briscoe G & Smith L (eds), *The Aboriginal population revisited: 70 000 years to the present*, Aboriginal History, Canberra, 1–8.
- Rowse T (2006). Towards a history of Indigenous statistics in Australia. In: Hunter B (ed), *Assessing the evidence on Indigenous socioeconomic outcomes*, ANU Press, Canberra, 1–10.
- Shepherd CCJ, Li J, & Zubrick SR (2012). Social gradients in the health of Indigenous Australians. *American Journal of Public Health* 102(1):107–117.
- Walter M & Andersen C (2013). *Indigenous statistics: a quantitative research methodology*, Left Coast Press, Walnut Creek, California.

CONTACT US

Centre for Aboriginal Economic Policy Research
Research School of Social Sciences
ANU College of Arts & Social Sciences

Copland Building #24
The Australian National University
Canberra ACT 0200
Australia

T +61 2 6125 0587
W caepr.cass.anu.edu.au

ANU CRICOS Provider Number: 00120C