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# **CAEPR Indigenous Population Project**

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Paper 18

### **The changing Aboriginal and Torres Strait Islander population: Evidence from the 2006–11 Australian Census Longitudinal Dataset**

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## The 2011 Census Paper Series

In July 2012, the Australian Bureau of Statistics began releasing data from the 2011 Census of Population and Housing. One of the more important results contained in the release was the fact that the number of people who identified as being Aboriginal and/or Torres Strait Islander (Indigenous) had increased by 20.5 per cent since the 2006 Census. There were also significant changes in the characteristics of the Indigenous population across a number of key variables including language spoken at home, housing, education, and other socioeconomic variables.

In this series, authors from the Centre for Aboriginal Economic Policy Research (CAEPR) document the changing composition and distribution of a range of Indigenous outcomes. The analysis in the series is funded by the Australian Government Department of Prime Minister and Cabinet (PM&C) and formerly by the then Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) through the Strategic Research Project, as well as PM&C/FaHCSIA and State/Territory governments through the Indigenous Population Project.

The opinions expressed in the papers in this series are those of the authors alone and should not be attributed to PM&C or any other government departments.

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## Contents

Abstract	ii
Acronyms	ii
Acknowledgment	ii
Introduction and overview	1
Key findings	2
The newly identifying Indigenous population	3
Causes and consequences of mobility and migration	8
Caring responsibilities	18
Fertility decisions	24
Summary and concluding comments	27
References	29

## Abstract

Populations change and grow through time. Keeping track of this change and associated improvements or worsening in outcomes is a key role for statistical agencies and researchers, and is necessary for an informed and evidence-based policy debate. This is no truer than for Aboriginal and Torres Strait Islander Australians (generally referred to as Indigenous Australians throughout the rest of this paper). Despite making up only a small percentage of the total Australian population, Indigenous people are a key focus of policy discussion in Australia, with a number of targets set by government against which progress is evaluated. The release of the Australian Census Longitudinal Dataset (ACL D) by the Australian Bureau of Statistics in the form of aggregate data in late 2013 and individual data in late 2014 provides an opportunity to better understand and evaluate the changing nature of the Indigenous population between 2006 and 2011. For the first time, it is possible to compare the identified Indigenous status for an individual in one year with their identified status in previous years using census data. Furthermore, the ACL D provides the first opportunity to look at the changing socioeconomic circumstances of Indigenous Australians, and compare these circumstances with the rest of the population. This paper provides a summary of such an analysis with the aim of spurring additional research and policy discussion.

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## Acronyms

ABS     Australian Bureau of Statistics

ACL D     Australian Census Longitudinal Dataset

COAG     Council of Australian Governments

LSIC     Longitudinal Survey of Indigenous Children

## Introduction and overview

In June 2011, the Aboriginal and Torres Strait Islander population was estimated to be 669 736, or 3.0% of the total Australian population. A previous publication in this series (Biddle 2013a) reported initial projections that suggested that the population would grow to a little over 1 million by 2031.

Gaining a greater understanding of demographic change and the socioeconomic and health dynamics of the Indigenous population through collecting and analysing data is important from a number of perspectives. One of the most important uses of data about the Indigenous population is that Indigenous people themselves can use it to tell their own story and advocate for change. This has the potential to empower communities to shape their own future.

Such data are also important because the allocation of funds from the Australian Government to state and territory governments is partly influenced by how many Indigenous Australians are estimated to be living in each jurisdiction. Furthermore, at both the national and state/territory levels, the Council of Australian Governments (COAG) has devoted considerable resources to a set of policies aimed at 'closing the gap' between Indigenous and non-Indigenous Australians in a number of outcomes. Progress against these targets is monitored each year through the Prime Minister's *Closing the gap* report (PM&C 2015), and through the National Indigenous Reform Agreement performance information report (SCRGSP 2013) and the *Overcoming Indigenous disadvantage* report (SCRGSP 2014), which are both produced by the Steering Committee for the Review of Government Service Provision (SCRGSP).

Data about Indigenous Australians at the local level are also crucial. Governments that provide services that are specific to, or tailored towards, the Indigenous population need to know where Indigenous Australians live, and how the local Indigenous population is changing and expected to change in the future.

Many organisations analyse Indigenous population and socioeconomic change. Within government, they include the Australian Bureau of Statistics (ABS); the Australian Institute of Health and Welfare; the Productivity Commission, which supports the monitoring activities of the SCRGSP; and various Australian Government and state/territory policy departments. Within academia, there is the new Sydney Centre for Aboriginal and Torres Strait Islander Statistics and the Centre for Aboriginal Economic Policy Research at the Australian National University, which has

had a leading and longstanding interest in the measurement and analysis of change in the population.

Despite this wide and longstanding interest, analysis of Indigenous demographic and socioeconomic change has been hamstrung by a lack of longitudinal data on the population. Looking at repeated cross-sections of data gives a reasonable picture of net changes over time in characteristics of a population, but to gain a better understanding of individual changes, information for the same individuals over a period of time is needed. Such longitudinal information supports analyses of transitions between states (e.g. unemployment and employment) that can give more detailed insights into social change (Rose 2002). In the absence of longitudinal information, it is not possible to tell whether the outcomes of individuals are getting better or worse, or to inquire into the potential drivers of such change in the form of policies or processes.

This uncertainty is magnified by the fact that the Indigenous population is self-identified. When comparing average outcomes of the population in 2011 with 2006 (for example), we do not know the extent to which those who identified as being Indigenous in 2011 are the same people (plus births and minus deaths) as those who identified as being Indigenous in 2006. Changes in identification might therefore be driving any observed change in average outcomes for the population, resulting in misleading conclusions as to whether outcomes really are improving or worsening. Longitudinal information could help to address this problem because, even if people change identification, groups (however these groups are delineated) comprising the same individuals over time can be analysed.

### Overview of the Australian Census Longitudinal Dataset

One promising source of data that may shed light on changing outcomes is the Australian Census Longitudinal Dataset (ACL), released by the ABS in late 2013. According to the ABS (2013a), 'a sample of almost one million records from the 2006 Census (wave 1) was brought together with corresponding records from the 2011 Census (wave 2) to form the largest longitudinal dataset in Australia'. To produce the ACL, 5% of records from the 2006 Census were linked probabilistically with available data from the 2011 Census based on the most likely match, given observed characteristics. Because this linking was done without knowing the individual's exact name and address, a minority of linked pairs will not, in reality, be the same individual. This needs to be kept in mind when making conclusions based on the data. However, for the first time in Australia, we have a large dataset with information on a person's Indigenous status in both 2006 and 2011, as well

as their socioeconomic and demographic characteristics in both years.

The aim of this paper is to use both aggregate and individual (unit record) data from the ACLD to analyse the patterns, determinants and outcomes of the change through time in the Indigenous population. Most sections of the paper are structured around a single research question or set of questions that focus on key aspects of Indigenous population change, including identification, migration and family structure, as well as some of the determinants and outcomes of that change (e.g. education, labour force status and caring). Specifically, we consider the following:

- What factors predicted changes in Indigenous identification between 2006 and 2011?
- What factors predicted whether or not a person changed their place of usual residence between 2006 and 2011?
- How is migration from a more remote area to a less remote area associated with changes in employment for Indigenous Australians?
- To what extent do caring responsibilities predict education and employment outcomes?
- To what extent do observable characteristics explain differences in fertility decisions between Indigenous and non-Indigenous women?

Except for the analysis of Indigenous identification change, which explores Indigenous status in more detail, our analysis focuses on those who identified as Indigenous in 2006 and examines the associations between their characteristics at that time and their outcomes in 2011. This approach controls for the potentially confounding effect of the increase in those identified as Indigenous between 2006 and 2011.

## Key findings

Some key findings from our analyses are summarised in this section.

### Indigenous identification change

Between 2006 and 2011, there was a net increase in the Indigenous population resulting from changed Indigenous identification.

People whose identification changed to Indigenous in 2011 were a much more urban population than those who identified as Indigenous in both 2006 and 2011.

Those aged 5–14 years in 2006 were more likely to have a different Indigenous identification in 2011 than those aged 15–24 years (in 2006).

People aged 60 years and over who identified as Indigenous in 2006 were more likely than their younger counterparts (15–24 years) to be identified as non-Indigenous/not stated in 2011. In contrast, among those identified as non-Indigenous/not stated in 2006, older people were no more likely than 15–24-year-olds to be differently identified as Indigenous in 2011.

People identified as non-Indigenous/not stated in 2006 were more likely to be identified as Indigenous in 2011 if they had relatively poor socioeconomic outcomes—that is, they were not employed or had not completed Year 12. For those identified as Indigenous in 2006, better socioeconomic outcomes were associated with a higher probability of identification change to non-Indigenous/not stated.

### Mobility and migration

Indigenous Australians were significantly less likely to change usual residence than non-Indigenous Australians between 2006 and 2011, after controlling for a reasonably small set of observable demographic and other characteristics, including gender, age, marital status, remoteness, income, housing tenure, education and employment, caring responsibilities and mobility history.

For both Indigenous and non-Indigenous people who were not employed in 2006, migration from a regional area to either a major city or to a remote/very remote area by 2011 was associated with a transition into employment (after controlling for a small set of observable characteristics). In contrast, those living in a remote/very remote area who were not employed in 2006 and had migrated to a less remote area by 2011 were no more likely to be employed in 2011 than those who had not moved.

### Caring responsibilities

Compared with their non-Indigenous counterparts, larger percentages of Indigenous people aged under 35 years, particularly women, had child-caring responsibilities or cared for someone with a disability.

Caring for children in 2006 was negatively associated with attaining an educational qualification by 2011 but positively associated with moving from non-employment to employment over the same period, for both Indigenous and non-Indigenous people (and controlling for other demographic and socioeconomic factors).

In contrast, caring for someone with a disability in 2006 was positively associated with gaining an educational qualification but negatively associated with moving into employment over the subsequent five years (again for both groups but with a larger effect for the Indigenous group).

### **Fertility decisions**

Indigenous women were much more likely than their non-Indigenous counterparts to have had a first child between 2006 and 2011, even after controlling for a range of observable characteristics. Indigenous women living in remote areas in 2006 were more likely to have had a first child than those living in less remote areas, while those with higher levels of education or in employment were less likely to have had a child.

### **The newly identifying Indigenous population**

In an earlier paper in this series, Biddle (2012a) discussed the change in the size and age structure of the Indigenous population between 2006 and 2011. The main findings were that, based on census counts, the number of people who were identified as being Indigenous increased by 20.5% over the period, whereas the estimated Indigenous population (which takes into account those who did not state their Indigenous status in the census and those who were missed from the census entirely) grew by 29.5% between 2006 and 2011.

That paper compared the 2011 Indigenous population estimates by age cohort with a set of population projections for that year, based on the 2006 Census. The population projections provide a good indication of natural population increase (excess of births over deaths) because they are based on cohort-component methodologies that apply known demographic parameters to the base Indigenous population. When making that comparison, Biddle showed that 'the 2011 population estimates were 16.5% higher than the ABS Series A projections [which are based on a high population growth rate]' and that 'half (50.3%) of the higher than projected increase in the Indigenous population (that is, the difference between the ABS Series A projection and the eventual estimate) was estimated to have occurred amongst those aged 0–19 years' (Biddle 2012a:8).

One of the main drivers of that above-projected change is likely to be individuals who were not identified as being Indigenous in 2006, but were in 2011. This has been labelled, especially in the North American literature, as 'ethnic mobility' (Guimond 1999). We can further delineate this concept into 'self-ethnic mobility' and 'statistical-ethnic mobility'. Self-ethnic mobility occurs when the individual

changes the way in which they view their own identity, or, in the case of children, the way in which their identity is viewed by their carers. This may be driven by new information or new social circumstances. Statistical-ethnic mobility, on the other hand, involves individuals maintaining their own internal identity, but being recorded differently in different collections. This could be because they did not answer the Indigenous status question in one of the collections; because they were missed entirely from one of the collections; or because they were coded incorrectly by themselves, by someone else filling out the form or by the statistical agency collecting the data.

Conceptually, the two forms of ethnic mobility are quite different, but it is very difficult to separate them empirically. Either way, until now it has not been possible to analyse the drivers of this form of population change using a representative sample of the population. This is mainly because the census, an important source of data about Indigenous Australians, is cross-sectional. In the case of the available longitudinal survey datasets, the Indigenous samples have been reasonably small (e.g. in the Household Income and Labour Dynamics in Australia [HILDA] survey) or Indigenous status has been collected only in wave 1 (e.g. in the Longitudinal Study of Indigenous Children [LSIC] or the Longitudinal Survey of Australian Youth [LSAY]). Linking data from administrative collections has provided insights into the quality of Indigenous identification information, the implications for measuring outcomes and methods to improve the data quality (e.g. AIHW & ABS 2012, Thompson et al. 2012), but such datasets are not drawn from nationally representative samples of the population. The ACLD is a large, nationally representative sample that not only links individuals across time, but also has information on Indigenous status at more than one point in time.

### **Research question 1: What factors predicted changes in Indigenous identification between 2006 and 2011?**

#### ***Changes in Indigenous identification and Indigenous population growth, 2006–11***

Records for 14 802 individuals identified as being Indigenous in 2006 were linked with a 2011 Census record, representing 1.8% of the linked sample. A further 1.3% of the linked sample did not state their Indigenous status in 2006. Both of these percentages are lower than the corresponding percentages of the total population (as counted by the 2006 Census), highlighting the difficulty in linking a highly mobile population.

Of those individuals with linked records who were identified as being Indigenous in 2006, 9.2% or 1367 were identified

as being non-Indigenous in 2011, and a further 1.1% or 163 did not state their Indigenous status in 2011. This shows the large scope for identification change across data collections. Counterbalancing this, 1697 individuals were identified as being non-Indigenous in 2006 but Indigenous in 2011, and another 226 changed from being not stated to Indigenous. Analysis of the ACLD therefore shows a net increase in the Indigenous population from changing identification between 2006 and 2011, a finding that is supported by the rapid nondemographic population change reported elsewhere (ABS 2013b).

### ***Comparing characteristics of those who changed/ did not change identification***

The obvious question that arises is whether those whose identification changed in 2011 have similar characteristics to those whose identification remained constant from 2006 to 2011, and whether any variables predict change in Indigenous identification.

To analyse this (and for the rest of the analysis in the paper), population weights were used to help compensate for the underrepresentation of Indigenous people in the sample. The analysis first looked at four groups of individuals, which refer to the individual's recorded Indigenous status in 2006 and 2011:

- always identified—those who were identified as being Indigenous in 2006 and 2011
- never identified—those who were identified as being non-Indigenous or not stated in 2006 and 2011
- newly identified—those who were identified as being Indigenous in 2011 but not in 2006
- formerly identified—those who were identified as being Indigenous in 2006 but not in 2011.

Note that there may be differences between an individual's actual and recorded Indigenous status due to coding errors, false links or individuals being reluctant to convey their true status for one of the data collections.

### ***Gender***

Some demographic differences are apparent in these four populations. The first two groups, whose status did not change, were more likely to be female than those whose status did change. Specifically, 53.6% of the always identified and 50.5% of the never identified were female compared with 48.6% and 48.5% of the newly and formerly identified groups, respectively.

### ***Age***

Average age was also different, although that tended to reflect the different age distribution of the Indigenous and non-Indigenous populations. The never identified population group was much older than the other three groups, with an average age in 2006 of 36.8 years. The formerly identified group was much younger (21.1 years), but there was very little difference between the always and newly identified populations (24.1 and 24.5 years, respectively).

### ***Geography***

While the newly identified Indigenous population had a similar age distribution to the population always identified as being Indigenous, the geographic distributions of the two groups were different (Fig. 1).

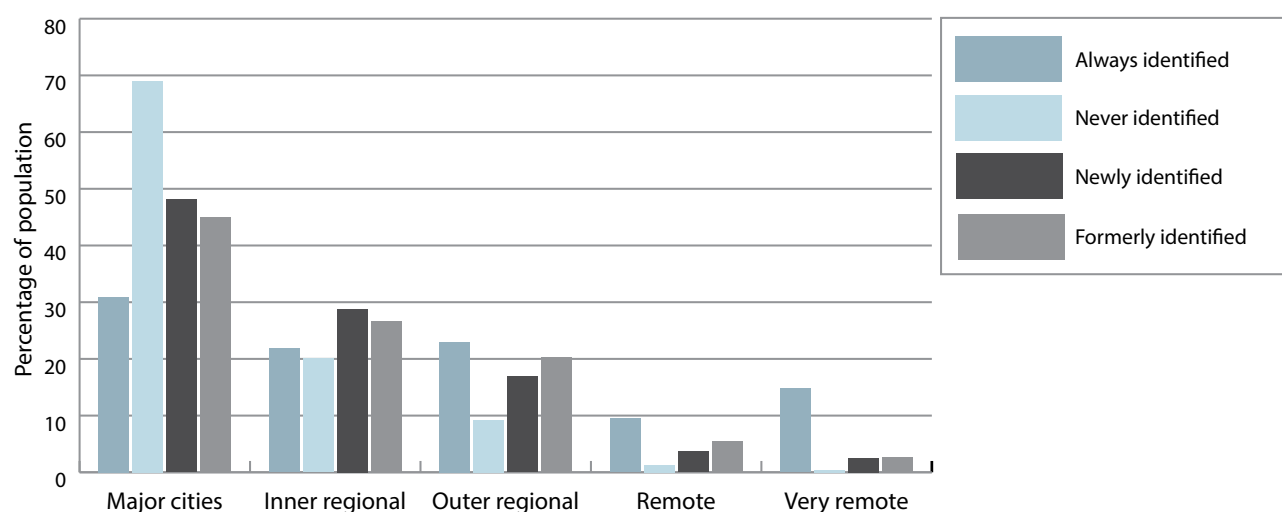
The always identified population was much more likely to have been living in remote areas in 2006 than the never identified population, and much less likely to have been living in major cities. However, results for those whose Indigenous status changed between 2006 and 2011 fell somewhere in between. Those who were newly identified as Indigenous in 2011 were a much more urban population than those who were identified as Indigenous in both years. For example, 48% of the newly identified had been living in a major city in 2006 (and 92% of these were living in a major city in both 2006 and 2011), compared with 31% of the always identified. At the other extreme, just 6% of those newly identified as Indigenous were living in a remote or very remote area in 2006, compared with 24% of the always identified population.

### ***Predictors of Indigenous identification change—multivariate analysis***

Knowing what characteristics predict identification change is vital for building accurate population models in the future. Taylor (2013) showed (in Table 8.1) that the 'forecast accuracy' or ratio of Indigenous projections to estimates varied considerably across census years. This suggests that there are idiosyncratic or year-to-year drivers of ethnic mobility. One suggested cause of ethnic mobility among the Indigenous population between 2006 and 2011 was the Apology to Australia's Indigenous Peoples in 2008, made by then prime minister Kevin Rudd, which may have made some Indigenous Australians more comfortable about identifying as such in the 2011 Census. Such drivers of ethnic mobility will affect the level of change in a given year or intercensal period. However, there are also likely to be drivers of ethnic mobility that are consistent across years but vary within the Indigenous population. To identify these, individual data from the ACLD are quite informative.



FIG. 1. Geographic location in 2006, by Indigenous identification



Source: Australian Bureau of Statistics customised data from the 2006–11 Australian Census Longitudinal Dataset

In recent research (Malenfant et al. 2012), logistic regression was used to analyse the factors associated with four types of ethnic mobility in Canada: North American Indian (2001) to non-Aboriginal identity (2006), Métis (2001) to non-Aboriginal identity (2006), non-Aboriginal identity (2001) to North American Indian (2006) and non-Aboriginal identity (2001) to Métis (2006). The authors found that living in an urban area and having a high-school diploma was positively associated with the first two identification changes (similar to the formerly identified category described in 'Comparing characteristics of those who changed/did not change identification'), but negatively associated with the latter two changes (similar to the newly Indigenous category).

Table 1 summarises similar analyses for the Australian population between 2006 and 2011, using models to estimate:

- the probability of a person who was not identified as being Indigenous in 2006 being identified as Indigenous in 2011 (the newly identified)
- the probability of a person identified as being Indigenous in 2006 not being identified as Indigenous in 2011 (the formerly identified).

In each case, one model was estimated for the total relevant sample aged 5 years and over in 2006 (those younger than 5 were excluded as there is no information on their usual residence in 2001, which is used as one of the main explanatory variables in the model). A second model was estimated only for those aged 15–64 years in 2006, so that education and labour market characteristics could be

included. The explanatory variables are all based on 2006 Census data and are constructed as follows:

- Indigenous status in 2006. In the model for the newly identified population, this variable contains the two categories non-Indigenous (the base case) and not stated. In the model for the formerly identified population, the variable contains the two categories Aboriginal only (the base case) and Torres Strait Islander/both Aboriginal and Torres Strait Islander.
- Age in 2006. To account for any potential nonlinear relationships across the lifecourse, age in 2006 is included as a set of binary variables. Since one of the explanatory variables is migration between 2001 and 2006 (see below), those aged 0–4 years in 2006 were excluded from the analysis. The remaining population was divided into separate age categories : 5–14, 25–34, 35–59, and 60 years and over.
- Gender in 2006. The base case for the analysis is male.
- Changed usual residence between 2001 and 2006. The 'place of usual residence five years ago' question from the 2006 Census was used to construct a binary variable for whether or not a person changed their usual residence over the five years leading up to the 2006 Census.
- Remoteness category of usual residence in 2006. The geographic location of the individual's place of usual residence in 2006 was represented across three categories: lived in a major city (the base case), lived in a regional area (including inner regional or outer regional) and lived in a remote area (including remote and very remote).

- Indigenous status of partner in 2006. Based on responses of other people in the household, a variable was constructed by the ABS to indicate whether the individual's partner was Indigenous or not. The base case is someone who did not have a partner in 2006, with separate variables constructed for a person with a partner who was non-Indigenous or did not state their Indigenous status, and a person whose partner was Indigenous.
- Employment status in 2006. The base case category was someone who was employed in 2006, with a variable created for those who were not employed.
- High-school completion as of 2006. Those who were currently attending school were excluded from the analysis, with a separate variable created for those who had completed Year 12. The base case was someone who had left school but not completed Year 12.

For most of the variables in Table 1, the results presented are expressed as the standardised difference in probability of changing one's Indigenous status. The probability of a person not identified as being Indigenous in 2006 changing their status between 2006 and 2011 (the formerly

identified) is substantially lower than the probability of a person identified as being Indigenous changing their status (the newly identified). Because of this, the probabilities are expressed relative to the base-case individual. Leaving aside scale, it should be kept in mind that negative values signify that a person with that characteristic has a lower probability than the base case, whereas positive values (even if they are less than 1) indicate a higher probability.

Because the results in Table 1 are not completely intuitive, it is worth working through an example. The estimated probability of the base-case individual (second-last line) who was not identified as being Indigenous in 2006 being identified as Indigenous in 2011 (the first model) is 0.0013. The probability of an otherwise identical person (based on observed characteristics) who did not state their Indigenous status in 2006 (as opposed to stating that they were non-Indigenous) being identified as Indigenous in 2011 is 0.0140, with the marginal effect therefore being 0.0127 (these results are not included in Table 1). Dividing this marginal effect by the probability of the base case gives the relative marginal effect of 9.7737 shown in Table 1. This means that

TABLE 1. Factors associated with the probability of changing Indigenous status between 2006 and 2011, by Indigenous status in 2006

Explanatory variable	Probability of changing from non-Indigenous to Indigenous				Probability of changing from Indigenous to non-Indigenous			
	Total		15–64 years		Total		15–64 years	
Indigenous status in 2006 not stated	9.7737	***	8.9752	***	na		na	
Indigenous status in 2006 Torres Strait Islander <sup>a</sup>	na		na		0.8889	***	0.8627	***
Aged 5–14 in 2006	3.5817	***	na		1.5468	***	na	
Aged 25–34 in 2006	0.4632	***	0.7710	***	0.2933	*	0.2573	
Aged 35–59 in 2006	0.3833	***	0.2446	**	0.7937	***	0.6897	***
Aged 60 and over in 2006	–0.1479		na		1.5048	***	na	
Female	–0.0744		–0.0837		–0.1767	**	–0.2708	***
Changed usual residence between 2001 and 2006	0.2108	***	0.0523		0.3504	***	0.1660	
Lived in a regional area in 2006	1.1425	***	0.8437	***	–0.2979	***	–0.2317	**
Lived in a remote area in 2006	4.3092	***	3.5657	***	–0.8095	***	–0.8168	***
Non-Indigenous partner in 2006 (including partner's status not stated)	–0.2955	***	–0.2110	***	–0.0735		–0.1574	
Indigenous partner in 2006	4.0780	***	2.3263	***	–0.4472	***	–0.5398	***
Not employed			0.3002	***			–0.1425	
Completed Year 12			–0.6250	***			0.0530	
Probability of the base case	0.0013		0.0019		0.0456		0.0598	
Number of observations	689 290		447 776		11 946		6 968	

\*\*\* = coefficients statistically significant at the 1% level of significance; \*\* = coefficients statistically significant only at the 5% level of significance;

\* = coefficients statistically significant only at the 10% level of significance; na = not applicable

a Includes those identified as both Aboriginal and Torres Strait Islander

Note: The base-case individual for all models was aged 15–24, was male, did not change usual residence between 2006 and 2011, lived in a major city in 2006 and did not have a partner in 2006. For the model estimating the probability of changing to Indigenous, the base case is defined as someone who stated their Indigenous status as non-Indigenous (as opposed to not stated). For the model estimating the probability of changing to non-Indigenous, the base case is defined as someone who identified as being 'Aboriginal only' (as opposed to 'Torres Strait Islander' or 'Both Aboriginal and Torres Strait Islander'). For the models on the 15–64-year-old population, the base case is someone who was employed in 2006 and had not completed Year 12.

someone who did not state their Indigenous status in 2006 was significantly and many times more likely to be identified as Indigenous in 2011 than someone who stated that they were non-Indigenous in 2006.

Looking at the last two columns of results, although the relative marginal effect was not as large as in the previous example, a person's specific Indigenous status in 2006 was also associated with the probability of changing from Indigenous to non-Indigenous. Those identified as being 'Torres Strait Islander' or 'Both Aboriginal and Torres Strait Islander' in 2006 were significantly and substantially more likely to have a different Indigenous status in 2011 than those who identified as 'Aboriginal only' in 2006.

### **Age**

The relationship between age and identification change is highly nonlinear. The base-case category (15–24-year-olds) tends to have the lowest probability of identification change, with a relatively small difference between that group and the next two oldest age groups. In the younger age range, however, those aged 5–14 years were significantly and substantially more likely to have a different Indigenous identification in 2011 compared with 2006. Among those who were aged 60 years and over in 2006, however, there were differences between those who identified as being Indigenous in 2006 and those who were not. Older people who were identified as Indigenous in 2006 were more likely than the base case to be identified as non-Indigenous in 2006 (with a probability that was similar to those aged 5–14 years). In contrast, for older people who were identified as non-Indigenous in 2006, the probability of having a different identification in 2011 was not significantly different from the base case.

### **Gender**

The other main demographic variable in the model—gender—is also interesting. Despite the very large sample size, no significant difference was found between a female who was not identified as Indigenous changing status and a male doing so. This was not the case for the Indigenous population, however. For this population, females were significantly less likely to change status than males.

### **Mobility history**

A history of geographic mobility was also significantly associated with identification change (although not for the working-age population). Those who had changed usual residence between 2001 and 2006 were more likely to change Indigenous status than those who had not. It is possible that such mobility provides a motivation to

consider one's own identity over the subsequent five-year period, but this is difficult to demonstrate using the available data.

### **Geography**

Not surprisingly, given the results presented in Fig. 1, there is a different association with geography, depending on a person's baseline Indigenous status. Those who were not identified as being Indigenous in 2006 and who lived in a regional or, in particular, a remote area were much more likely to change their Indigenous status than those who lived in a major city. For those who were identified as being Indigenous, on the other hand, living outside a major city was associated with a significantly lower probability of changing their Indigenous status. It is quite likely that the Indigenous share of the area in which a person lived was a major driver of these patterns, although it is difficult to explore this because of the way the publicly available individual ACLD dataset is constructed.

### **Family structure**

The potential influence of the social environment could be tested at the family level and was found to have an effect. People who were not identified as being Indigenous who had a partner who was also not identified as being Indigenous (in 2006) were found to be less likely to have a different Indigenous status in 2011 than those who did not have a partner. On the other hand, those who had an Indigenous partner were significantly and substantially more likely to have changed to being identified as Indigenous. Not surprisingly, among those identified as Indigenous in 2006, having an Indigenous partner in 2006 was associated with a lower probability of changing identification to non-Indigenous in 2011, whereas having a partner who was non-Indigenous (or whose Indigenous status was not stated) was not significantly associated with the probability of changing identification.

These last three sets of variables (mobility, remoteness and partnership) show that it is important to build demographic and behavioural models that take into account geography and family structure. The final two variables in the model show that it is also important to take into account employment and education characteristics. Taking the two results together, non-Indigenous Australians and those who did not state their status in 2006 were more likely to change to being identified as Indigenous in 2011 if they had relatively low socioeconomic outcomes (not employed, had not completed Year 12). The opposite was true for those identified as being Indigenous in 2006, with higher socioeconomic status associated with a higher probability of identification change in 2011.

## Causes and consequences of mobility and migration

Changes in identification have the potential to significantly affect future Indigenous population growth. At the local level, however, population change is mainly driven by population movement.

The demographic and geographic literature makes a clear distinction between mobility and migration (Bell et al. 2015). Mobility includes any change of usual residence—from moving down the road or across the city, to moves across state/territory or national borders. It can also include temporary mobility—either within a day for work or study, or overnight. Migration, on the other hand, is a specific type of mobility that involves permanent changes in usual residence from one spatial location to another. The causes and consequences of migration are likely to be very different from those associated with mobility.

Dockery (2014) notes that contemporary factors such as the location of services and infrastructure are becoming increasingly important as contemporary drivers of mobility, but that traditional drivers such as connection to country, kinship networks and culture remain strong. In the context of ‘ongoing public debates about economic viability and community size’ (Altman 2010:265)—such as the recent announcement that responsibility for providing essential services to remote Indigenous communities would be shifted from the Australian Government to some states (Minister for Indigenous Affairs 2014)—Indigenous migration to less remote areas is viewed by some as a potential solution to socioeconomic disadvantage in remote parts of the country. From other perspectives, however, the migration of people from remote Indigenous communities is problematic because it takes Indigenous Australians away from country to which they have an ongoing connection and may put pressure on services in the areas where Indigenous Australians move to, without guaranteeing positive outcomes for those migrating (Biddle 2010a,b, Biddle & Swee 2012, Trzepacz et al. 2014).

One of the most important findings from previous census analyses of the Indigenous population is that the population has a relatively high rate of mobility. Using cross-sectional census and survey data at both the individual and aggregate levels, it has been shown across a number of censuses that, without controlling for background characteristics, Indigenous Australians are more likely to change usual residence over one-year and five-year periods, and are also more likely to be away from their place of usual residence at a given point in time (Taylor & Kinfu 2002, Taylor & Bell 2004, Biddle & Hunter 2006, Biddle & Prout 2009).

Consider the following averages presented in an earlier paper in this series (Biddle & Markham 2013). Around 6.9% of Indigenous Australians were away from their place of usual residence on the night of the 2011 Census, compared with 4.4% of non-Indigenous Australians. Around 43.7% of Indigenous Australians (who were in Australia on the night of the 2006 Census) changed their usual residence between 2006 and 2011, compared with 37.7% of non-Indigenous Australians.

We know a reasonable amount about the patterns of Indigenous migration—who moves (by age and gender), where people who move into a certain area are coming from and where people who move out of particular areas are moving to (Biddle & Markham 2013). However, we know much less about the causes and consequences of this migration.

The census lacks information on people’s reasons for moving (Dockery 2014), and a lack of longitudinal data means that we have only really known the outcomes of Indigenous Australians’ movements after migration has taken place. We have not, therefore, been able to look at what predicts a move (i.e. what the circumstances were before the movement took place) or what a move predicts (the change in outcomes from movement). The analysis of the ACLD presented in this section goes some way towards filling this gap in the research.

### **Research question 2: What factors predicted whether or not a person changed their place of usual residence between 2006 and 2011?**

#### ***Previous findings about factors associated with mobility***

Biddle and Yap (2010) modelled the probability of changing residence between the 2001 and 2006 censuses. They found that the likelihood of moving was highest for people in their 20s and early 30s, and declines steadily as people age. While the pattern was similar for Indigenous and non-Indigenous Australians, the peak likelihood of moving among young Indigenous people was lower than for their non-Indigenous counterparts. For the population as a whole, people living in major cities were less likely to change residence than those in rural and regional areas; however, no significant difference according to place of residence was found for Indigenous Australians. Overall, Indigenous people were slightly more likely than non-Indigenous people to move, but after controlling for age this effect reversed.

That is all we really know about predictors of Indigenous mobility from quantitative analysis of cross-sectional data. As far as we are aware, only one published paper uses

longitudinal data to look at the determinants of Indigenous mobility (Biddle 2012b). Using data from the LSIC, Biddle identified four main factors associated with the mobility of Indigenous carers and their children:

First, those carers of Indigenous children who changed usual residence in the year leading up to Wave 1 of the LSIC were more likely to change usual residence again in the year (or so) that followed. Second, the older the carer, the lower the probability of moving, reflecting the lifecourse patterns of mobility. Third, those who lived in mixed Indigenous and non-Indigenous households had higher levels of mobility than those who lived in Indigenous-only households. The fourth main insight was that the characteristics of one’s dwelling seem to be more important factors in explaining population movement than the characteristics of the area in which one lives. (Biddle 2012b:141)

The main limitation of the analysis presented in Biddle (2012b) was that the data in the LSIC are limited to Indigenous carers and their children, and do not have a non-Indigenous comparison. The ACLD gives us some insight into the rest of the Indigenous population and whether the predictors of mobility are different for Indigenous Australians and non-Indigenous Australians.

**Mobility and structural factors—employment, education, income, housing tenure**

We began by looking at the relationship between employment, education and mobility. Fig. 2 shows the percentages of Indigenous and non-Indigenous males and females who changed usual residence between 2006 and

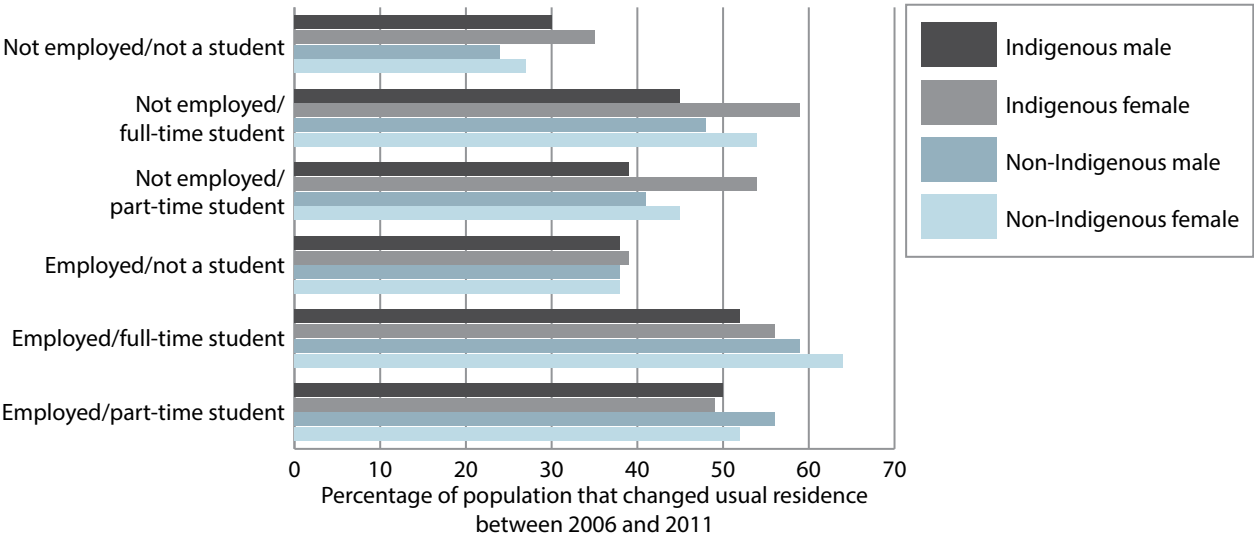
2011, given separately by their employment status and education participation in 2006.

The most important thing to note from Fig. 2 is that there is more variation across the employment and education categories than there is between Indigenous and non-Indigenous people within each category. An Indigenous male or female who was employed and studying full-time in 2006 was between 60% and 70% more likely to move during the next five years than someone who was not employed and not studying. The biggest difference by Indigenous status within the categories is for those who were not employed and not studying, with Indigenous males and females being about 28% more likely to have moved than their non-Indigenous counterparts.

The other thing to note from Fig. 2 is that there appears to be more variation by education and employment for non-Indigenous Australians than for Indigenous Australians. An Indigenous Australian who was not employed and not studying was found to be more likely to move than a non-Indigenous Australian in the same category. The reverse was true for those who were employed and studying (full-time or part-time).

Two potential reasons may explain why current employment status might influence future mobility patterns. Some people may be motivated to move to seek better employment prospects, either because they are currently not employed or because they are not satisfied with their current employment. Counterbalancing this is the possibility that employment gives people the means to move. We explored the latter effect by looking at how employment probabilities

FIG. 2. Mobility between 2006 and 2011 for Indigenous and non-Indigenous males and females aged 15 and over, by baseline education participation and employment



Source: Australian Bureau of Statistics customised data from the 2006–11 Australian Census Longitudinal Dataset

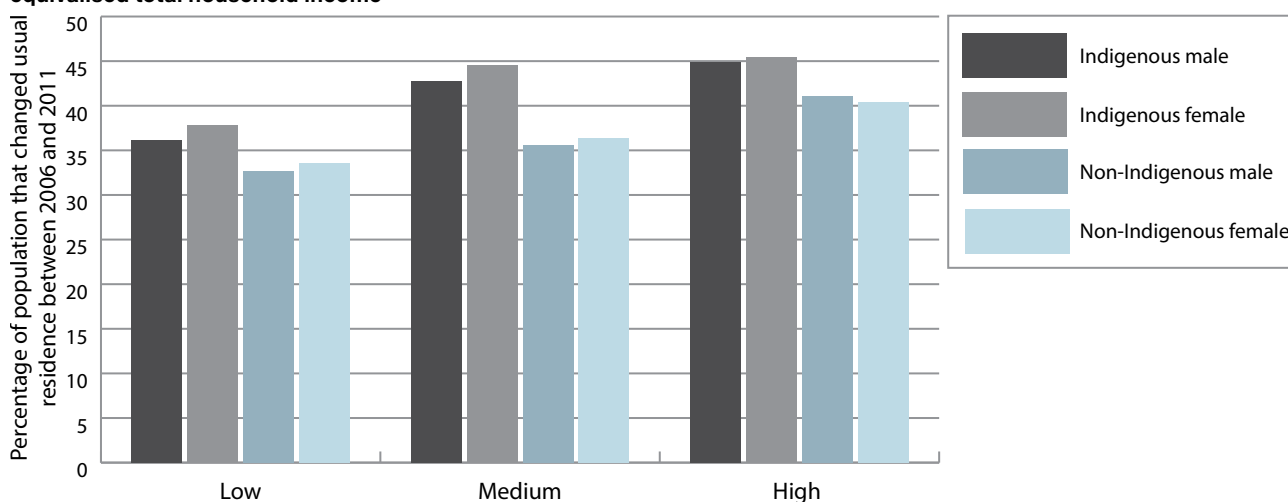
changed with the income of the household in which a person lived in 2006.

Household income clearly affects the probability of subsequent mobility (Fig. 3). People with relatively low equivalised household income (less than \$400 per week in 2006) were substantially less likely to move over the subsequent five years than those with medium income (\$400 to less than \$1000), who were in turn less likely to move than those who lived in households with relatively high equivalised income (\$1000 per week or more). This is an early indication that access to economic resources is an enabler for mobility.

What is perhaps most interesting is the large and consistent gap between Indigenous and non-Indigenous Australians within each household income group (Fig. 3). Indigenous Australians in each income category are more likely to move than non-Indigenous Australians in the same category. On the other hand, because Indigenous Australians are more likely to live in households in the lowest income band (Biddle 2013b), this group has fewer resources to move.

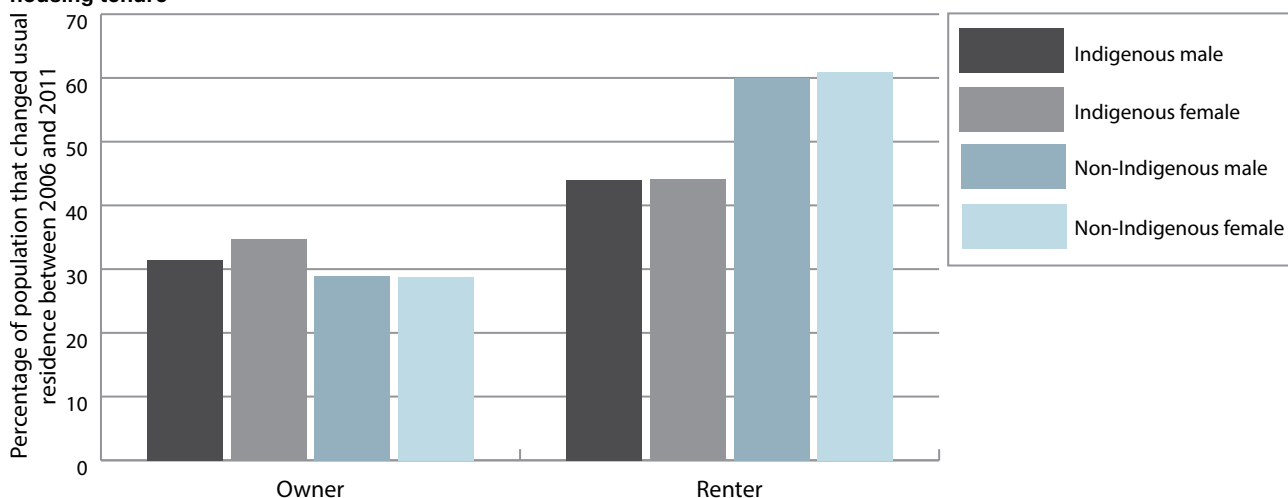
While the relative income distributions of the two populations appear to be having the effect of dampening Indigenous mobility, it appears that housing tenure might be having the opposite effect (Fig. 4).

**FIG. 3. Mobility between 2006 and 2011 for Indigenous and non-Indigenous males and females aged 15 and over, by baseline equivalised total household income**



Source: Australian Bureau of Statistics customised data from the 2006–11 Australian Census Longitudinal Dataset

**FIG. 4. Mobility between 2006 and 2011 for Indigenous and non-Indigenous males and females aged 15 and over, by baseline housing tenure**



Source: Australian Bureau of Statistics customised data from the 2006–11 Australian Census Longitudinal Dataset

Previous research in this series has shown that Indigenous Australians are much more likely to live in rental houses than the non-Indigenous population (Biddle 2013c). This tenure type is strongly associated with higher rates of mobility (Fig. 4). It is true that among renters Indigenous Australians are much less likely to move than non-Indigenous Australians (partly due to the different landlord types, which is covered below in ‘Predictors of mobility—multivariate analysis’). However, the composition effect still dominates.

### *Mobility—association with previous moves*

Figs 2–4 highlight some of the structural reasons driving Indigenous (and non-Indigenous) mobility. However, these factors only affect the probability of moving. The actual decision to move is likely to be influenced by highly individual circumstances—for example, a new job offer, neighbourhood conflict, relationship breakdown or a desire to move closer to extended family. The census is not designed to capture such factors. Also, individuals and families still have agency and respond to circumstances (and the structural factors) in very different ways. Frieze and Li (2010) discuss some of the psychological factors that may influence the decision to move, including those that predict a preference for moving (such as achievement motivation and power motivation) and others that predict a preference for staying (affiliation motivation). Once again, these characteristics are not captured in the census. What the ACLD does allow us to do is to look at the relationship between previous moves and future ones, as a potential indicator of dispositional traits (Fig. 5).

Clearly, and not surprisingly, people who changed usual residence between 2001 and 2006 were much more likely

to change usual residence again between 2006 and 2011. This might be an indication of dispositional traits, or it might simply be that those characteristics that predicted moves between 2001 and 2006 were still present for that individual. This includes time-invariant characteristics such as gender and when the individual was born. However, in many cases, even time-variant characteristics such as employment, education, income and housing change only slowly across time. Detailed insight could be gained into this issue if the 2006–11 ACLD is linked to the 2016 Census.

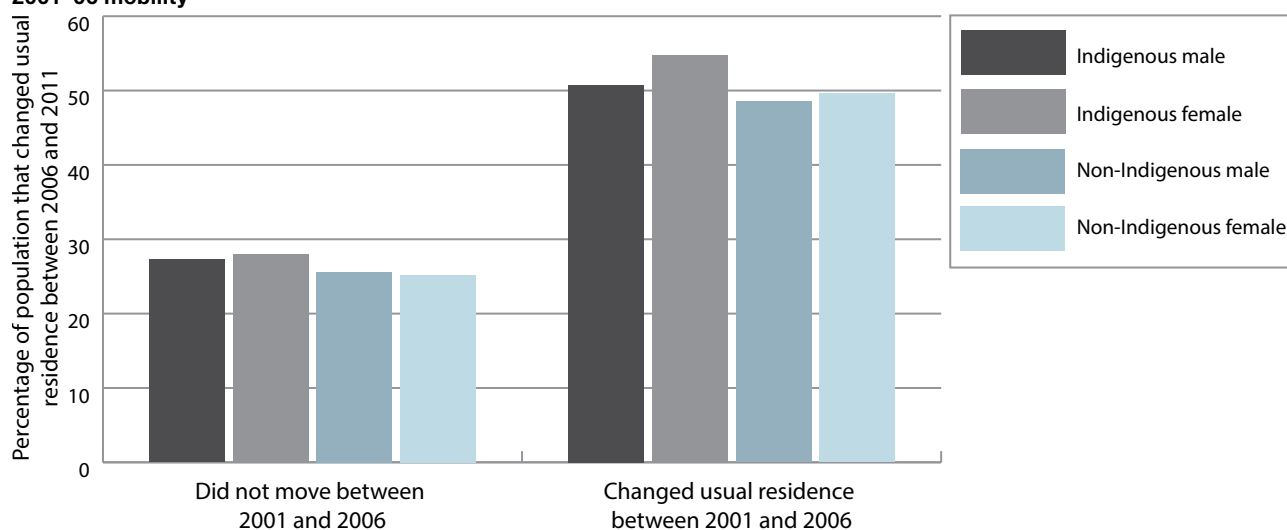
### *Predictors of mobility—multivariate analysis*

Analysis of individual-level data allows for observed characteristics to be held constant. We used this type of analysis to test whether some of the findings from Figs 2–5 still hold after characteristics such as age, geography and other predictors of mobility are accounted for.

Results from the analysis are summarised in Table 2. Results are presented as marginal effects—that is, the difference in the probability of changing usual residence between 2006 and 2011 from a change in each explanatory variable, while holding all other variables constant. Unlike most previous analyses of Indigenous mobility, the explanatory variables are defined for 2006—that is, before the move occurred.

Six separate models were used. The first three were for the total population, with the first explanatory variable being the individual's Indigenous status. Model 1 was for the total age distribution. Models 2 and 3 were estimated for the population aged 15 years and over in 2006. This allowed a range of explanatory variables to be included that are only

FIG. 5. **Mobility between 2006 and 2011 for Indigenous and non-Indigenous males and females aged 15 and over, by 2001–06 mobility**



Source: Australian Bureau of Statistics customised data from the 2006–11 Australian Census Longitudinal Dataset

TABLE 2. Factors associated with the probability of changing usual residence between 2006 and 2011

Explanatory variables	Total sample			Indigenous sample		
	Model 1 (all ages)	Model 2 (aged 15+)	Model 3 (aged 15+)	Model 4 (all ages)	Model 5 (aged 15+)	Model 6 (aged 15+)
Indigenous	-0.023 ***	-0.041 ***	-0.032 ***	0.022 ***	0.028 **	0.020 *
Female	0.008 ***	0.009 ***	0.009 ***	0.106 ***		
Aged 0–14	0.084 ***					
Aged 15–29	0.224 ***	0.214 ***	0.205 ***	0.189 ***	0.168 ***	0.141 ***
Aged 50 and over	-0.107 ***	-0.100 ***	-0.076 ***	-0.094 ***	-0.090 ***	-0.070 ***
Lived in a regional area	0.044 ***	0.046 ***	0.037 ***	0.021 **	0.019	0.016
Lived in a remote area	0.033 ***	0.030 ***	0.025 ***	-0.093 ***	-0.099 ***	-0.079 ***
Lived in private rental accommodation	0.333 ***	0.325 ***	0.266 ***	0.338 ***	0.322 ***	0.257 ***
Lived in public rental accommodation	0.051 ***	0.042 ***	0.030 ***	0.024 **	0.014	0.019
Lived in low equivalised income household (\$0–400 per week)	-0.026 ***	-0.023 ***	-0.019 ***	-0.028 ***	-0.030 **	-0.024 *
Lived in high equivalised income household (\$1000–2000 per week)	0.052 ***	0.048 ***	0.040 ***	0.056 ***	0.050 **	0.037 *
Lived in very high equivalised income household (>\$2000 per week)	0.103 ***	0.097 ***	0.079 ***	0.009	-0.019	-0.023
School or preschool student	-0.061 ***	-0.038 ***	-0.027 ***	0.005	0.068 **	0.075 ***
Tertiary student	0.046 ***	0.042 ***	0.046 ***	0.057 ***	0.047 **	0.033
Married		-0.023 ***	-0.030 ***		-0.002	-0.007
Had a core activity need for assistance		0.015 ***	0.015 ***		-0.035	-0.018
Had completed Year 12		0.031 ***	0.023 ***		0.032 **	0.032 **
Employer		-0.011 ***	-0.005 **		-0.023	-0.031
Not employed		-0.030 ***	-0.026 ***		0.021	0.011
Nonmanager and nonprofessional employee		-0.006 ***	-0.003 *		0.015	0.014
Provided unpaid child care		0.008 ***	0.004 **		0.018	0.008
Provided unpaid care for someone with a disability or problem related to old age		-0.019 ***	-0.014 ***		-0.047 ***	-0.045 ***
Changed usual residence between 2001 and 2006			0.107 ***			0.131 ***
Predicted probability of base case	0.254	0.267	0.230	0.243	0.232	0.198
Sample size	653 106	477 457	454 478	10 942	5 572	5 456

\*\*\* = coefficients statistically significant at the 1% level of significance; \*\* = coefficients statistically significant only at the 5% level of significance; \* = coefficients statistically significant only at the 10% level of significance

Note: The base-case individual for all models was male, was aged 30–49, lived in a major city, lived in a dwelling that was owned or being purchased by the usual residents, lived in a household with equivalised income of \$400 to less than \$1000 per week, and was not a student. For models 1–3, the base case is further defined as being non-Indigenous. For models 2, 3, 5 and 6, the base case is further defined as not married, without a core activity need for assistance, had not completed Year 12, employed as a manager or professional, and did not provide unpaid child care or care for someone with a disability. Finally, for models 3 and 6, the base-case individual is further defined as not having changed usual residence between 2001 and 2006.



defined for adults (school completion, employment, caring, etc.). The only difference between model 2 and model 3 was the addition of a final explanatory variable for whether or not the individual changed usual residence between 2001 and 2006.

These three models allowed us to test whether differences occur between Indigenous and non-Indigenous Australians in the probability of changing usual residence, once a range of explanatory variables are controlled for. Models 4–6 have the same explanatory variables as models 1–3, respectively. The only difference is that they are estimated only for the Indigenous population.

Perhaps the most important finding from Table 2 is that, after controlling for a reasonably limited set of characteristics, Indigenous Australians were significantly less likely to change usual residence than non-Indigenous Australians over the five-year period 2006–11. This was true for the full age distribution (model 1), those aged 15 years and over (model 2), and those aged 15 years and over after controlling for previous patterns of mobility (model 3). This reinforces the finding from Biddle and Yap (2010) that Indigenous Australians are not more mobile than non-Indigenous Australians because they are Indigenous, but rather that the observed high rate of mobility is driven by the distribution of other characteristics that predict mobility.

Most of the variables associated with Indigenous mobility (models 4–6) are also associated with mobility for the total population in a similar way. Many of those that were not significant for the Indigenous population had a roughly equivalent marginal effect to that of the total population, but a larger standard error due to the much smaller Indigenous sample size. There were, however, a few variables that had a somewhat different predictive association across the two populations.

Females, for example, were more likely to move than males—slightly more so in the total population, but to a greater extent in the Indigenous population. Associations between remoteness and mobility also differed for the Indigenous population and the total population. Indigenous Australians living in a remote area in 2006 were significantly and substantially less likely to move in the next five years than Indigenous Australians living in a nonremote area. The reverse was true for the total population. This may reflect difficulties with measuring usual residence for those who have a more traditional Indigenous way of life, with high temporary mobility but long-term attachment to an area (Morphy 2007). It is also likely to reflect the fact that non-Indigenous Australians who live in remote areas are likely to be there for short-term work opportunities or are so-called fly-in fly-out workers (McKenzie 2010). However, it does

show that geography can have very different implications for different types of individuals.

The final major difference between the Indigenous and total population estimates is that, for the former, being a school student aged 15 years and over (models 5 and 6) was significantly and substantially associated with a higher probability of moving than those who were not students (the base case). There was no significant difference for the full age range. For the total population, however, being a school or preschool student was associated with a lower probability of moving, with the marginal effect quite large relative to the base case in model 1. In other contexts (Biddle & Hunter 2006, Biddle & Yap 2010), school attendance puts less of a constraint on mobility for Indigenous Australians. This difference is further reinforced when using longitudinal data.

Leaving aside the differences between the Indigenous and total population estimates, there are key predictors of future mobility that are of considerable relevance for policy. Housing tenure is far and away the biggest predictor of future mobility. Indigenous Australians who lived in private rental (i.e. renting privately from a real estate agent or a person not living in the same household) were substantially more likely to change usual residence over a subsequent five-year period than those who lived in a house owned or being purchased by its usual residents. Holding other characteristics constant, including whether the person moved in the five years leading up to the start of the period, the probability of changing usual residence between 2006 and 2011 among those in private rental was more than double that for those in owner-occupied housing. Since Indigenous Australians are much more likely to live in a private rental (Biddle & Prout 2014), this is one of the main explanations for high rates of mobility.

It has been argued that low-cost public housing may be a constraint on mobility for Indigenous people, particularly those living in remote areas (Forrest 2014). The results of our model show that, after controlling for remoteness (among other factors), for both the Indigenous and the total population, those living in public rental housing (i.e. a house rented from a state or territory housing authority or from a housing cooperative, community or church group) were more likely to move than owner-occupiers (although the results are not statistically significant for the Indigenous population aged 15 years and over). This does not provide strong supporting evidence one way or the other on the question of whether low-cost public housing is a disincentive for Indigenous people living in remote areas to move. However, the finding that people with the lowest incomes were significantly less likely to move than those on higher incomes supports the interpretation that those with

fewer resources have less capacity to move. More research on this issue would be required to examine the effect of other factors relevant to Indigenous people living in remote areas, including the availability of different types of housing in different locations, their connection to country, and their traditional way of life and cultural practices.

Lifecourse patterns are also clearly important, with large and significant marginal effects. Younger people (whether or not Indigenous) were more likely to move than those aged 30–49 years, while older people were less likely to move.

A final important finding is that those Indigenous Australians who provided unpaid care for someone with a disability were significantly less likely to move than those who did not. The coefficient was also statistically significant for the total population, but the marginal effect was much smaller. Given that we are controlling for age and paid employment in our model, caring responsibilities would appear to inhibit mobility. The fact that the association was so much larger for the Indigenous population may reflect the greater focus on kinship-caring for this group and/or the lack of other caring options if that carer moved away (Biddle et al. 2014).

### Research question 3: How is migration from a more remote area to a less remote area associated with changes in employment for Indigenous Australians?

In Australia, the non-Indigenous population is highly concentrated in major cities, and the majority of Indigenous

Australians live outside major cities. A larger percentage (20%) of Indigenous Australians were living in remote or very remote areas at the time of the 2011 Census, compared with non-Indigenous Australians (2%). The ABS remoteness area classification designates five main remoteness areas on the basis of their road distance from service centres of different population sizes, and so essentially captures the level of access to services. These remoteness areas are major cities, inner regional areas, outer regional areas, remote areas and very remote areas (ABS 2014a).

### Changes in remoteness area of usual residence, 2006–11

The ABS changed the remoteness categories of some of the smaller geographical areas (urban centres and localities) that make up the broader remoteness areas between 2006 and 2011 (ABS 2011). The effect of these changes on our analysis of how migration from more remote to less remote areas is associated with changes in employment is considered to be small, particularly since we combined inner and outer regional areas, and remote and very remote areas.

Changes in remoteness area of usual residence between the 2006 and 2011 censuses differed for Indigenous and non-Indigenous Australians (Table 3). Indigenous Australians living outside major cities in 2006 were less likely than their non-Indigenous counterparts to be living in a less remote area in 2011. Around 11% of Indigenous Australians living

TABLE 3. Percentage of people living in each remoteness area in 2006 who were living in each remoteness area in 2011, by Indigenous status

Status	Remoteness, 2006	Remoteness, 2011					Total
		Major cities	Inner regional	Outer regional	Remote	Very remote	
Indigenous	Major cities	90.4	5.2	2.6	1.1	0.7	100.0
	Inner regional	10.7	80.1	7.9	0.8	0.5	100.0
	Outer regional	6.3	6.6	82.9	2.6	1.6	100.0
	Remote	5.2	3.7	9.1	66.1	15.9	100.0
	Very remote	2.1	1.0	4.4	5.6	87.0	100.0
	Total	33.4	21.4	22.9	8.0	14.3	100.0
Non-Indigenous	Major cities	94.8	3.5	1.3	0.3	0.1	100.0
	Inner regional	15.0	79.2	5.0	0.6	0.3	100.0
	Outer regional	9.4	11.9	76.5	1.7	0.5	100.0
	Remote	11.7	9.8	14.4	58.7	5.3	100.0
	Very remote	11.6	8.4	13.6	8.6	57.8	100.0
	Total	69.4	19.6	9.2	1.3	0.5	100.0

Source: Australian Bureau of Statistics customised data from the 2006–11 Australian Census Longitudinal Dataset

Note: Excludes people living in areas classified as migratory–offshore–shipping and those with no usual address

in inner regional areas in 2006 were living in major cities by 2011, compared with 15% of non-Indigenous Australians. The difference between the two groups widened among those who were living in more remote areas in 2006, with even larger percentages of non-Indigenous Australians migrating to less remote areas. About 18% of Indigenous Australians living in a remote area in 2006 were living in a less remote area in 2011, half the corresponding percentage (36%) of non-Indigenous Australians.

The overall pattern of lower migration to less remote areas among the Indigenous population was due partly to greater migration to more remote areas offsetting migration to less remote areas and partly to lower rates of migration between remoteness areas outside the major cities, compared with the non-Indigenous population.

In total, however, according to the ACLD, nearly 6 million Australians were living outside the major cities in 2006, in areas ranging from very remote to inner regional. Of these, more than 1 million—nearly 18%—were living in a less remote area in 2011.

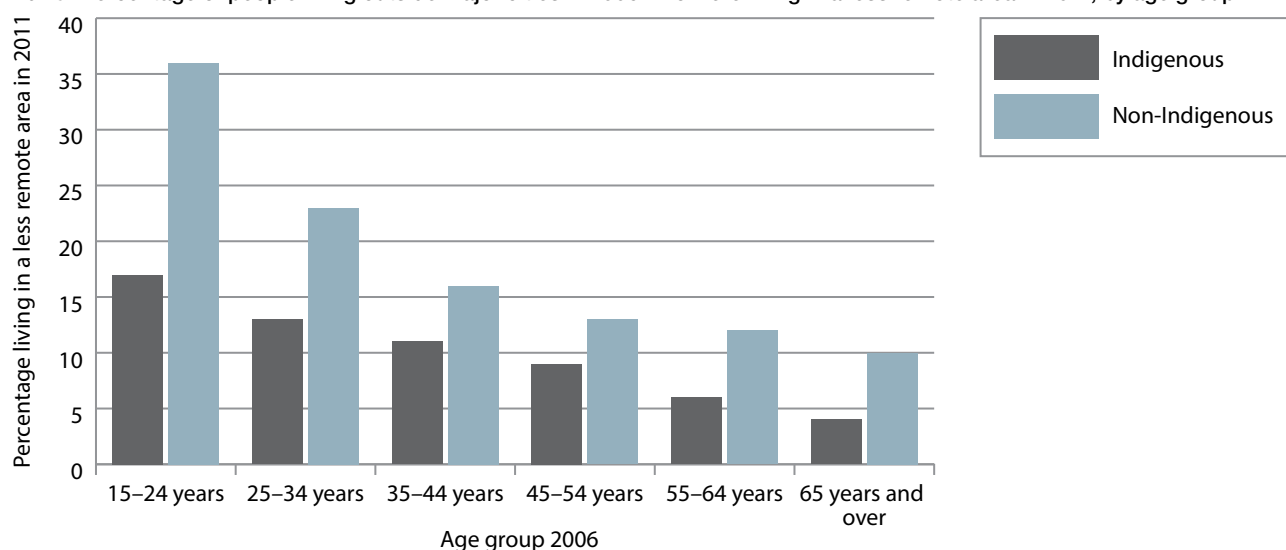
Migration to a less remote area was most common among people aged 15–24 years, and then decreased in each older age group for both Indigenous and non-Indigenous Australians (Fig. 6). In addition, this migration was less common among the Indigenous population than among the non-Indigenous population in every age group. This difference is most striking in the 15–24-year age group—17% of 15–24-year-old Indigenous people living outside the major cities in 2006 had migrated to a less

remote area by 2011, compared with 36% of the non-Indigenous population in this age group.

By using the person's response to the place of usual residence five years ago (with suitable re-coding), a similar analysis to that presented in Table 3 and Fig. 6 could have been done using the cross-sectional censuses. We have not been able to look at the effect that movement has on various outcomes. While it was possible using cross-sectional census data to identify an individual's employment, income or education outcomes after migration had occurred, there is no accompanying information in a single census about their characteristics before the move. This is problematic because the results presented in Table 2 clearly show that such characteristics are strong predictors of mobility. A finding based on analysis of a single census that moving from a remote to a nonremote area was associated with a particular outcome is as likely to have been explained by the different characteristics of those who moved before the move occurred.

The analysis presented here, however, draws on the longitudinal element of the ACLD to compare the employment outcomes of Indigenous and non-Indigenous Australians whose remoteness area in the 2011 Census was different from that in the 2006 Census. We focused on people who were not employed in 2006 and controlled for a range of observable characteristics to see whether the particular form of migration was associated with a change from not employed to employed. Specifically, these analyses seek to determine whether migration to a less remote area was a significant factor in gaining employment among those who were not previously employed, after accounting for

FIG. 6. Percentage of people living outside major cities in 2006 who were living in a less remote area in 2011, by age group



Source: Australian Bureau of Statistics customised data from the 2006–11 Australian Census Longitudinal Dataset

Note: Excludes people living in areas classified as migratory–offshore–shipping and those with no usual address

characteristics such as gender, age, education and having children to care for, whose association with Indigenous employment has previously been established (Hunter 1997, Stephens 2010).

#### *Migration and employment outcomes— multivariate analysis*

The following analyses focus on the population aged 15–54 years in 2006 who were not employed at that time, excluding those who were full-time students. This age range was used to exclude those who would turn 60 and over before 2011, because in these older age groups many in the ‘not employed’ category would be retirees. Four groups were analysed separately: Indigenous people living in regional areas in 2006, Indigenous people living in remote areas in 2006, non-Indigenous people living in regional areas in 2006 and non-Indigenous people living in remote areas in 2006.<sup>1</sup> The dependent variable is the probability of being employed in 2011.

Our main focus in the analyses was the association between changes in remoteness area and changes in employment (from not employed to employed) between 2006 and 2011. The base-case individual is someone who did not change remoteness area. For those living in remote (including very remote) areas in 2006, the main explanatory variable relating to migration has two categories: remained in a remote area or moved to a less remote area (regional area or major city). For those living in regional areas, the

main explanatory variable has three categories: remained in a regional area, moved to a more remote area or moved to a less remote area.

The decision to move is clearly not random (see Table 2), and therefore we cannot claim that our results capture causality. However, we can control for other characteristics of the individual before the decision to move or not move is made. Since sample sizes are quite small, we used a parsimonious specification. In particular, we controlled for the following variables, as measured in the 2006 Census: gender, age in 10-year age groups, whether the individual had completed Year 12 and whether they had spent time looking after their own children (in the two weeks before the census).

Table 4 summarises the results of these analyses. Results are expressed as marginal effects, or the difference between the probability of being employed for someone with that particular characteristic and someone with the base-case characteristics, while holding all other characteristics constant. Negative values mean that a person with that characteristic has a lower probability of being employed than the base case, while positive values (even if they are less than 1) indicate a higher probability.

The results presented for the demographic, education and caring variables have the same signs, as we might have expected a priori, although, as a result of some small sample sizes, they are not always statistically significant.

**TABLE 4. Factors associated with the probability of being employed in 2011 for 15–54-year-olds who were not employed in 2006, by Indigenous status and broad remoteness category of usual residence**

Explanatory variable	Lived in regional area in 2006				Lived in remote area in 2006			
	Indigenous		Non-Indigenous		Indigenous		Non-Indigenous	
Female	–0.075	**	–0.074	***	–0.134	***	–0.063	
25–34 years	–0.021		–0.063	***	0.071		–0.085	
35–44 years	0.010		–0.081	***	0.050		–0.068	
45–54 years	–0.124	***	–0.216	***	0.021		–0.270	***
Completed Year 12 or equivalent	0.216	***	0.104	***	0.124	*	0.092	***
Provided unpaid child care	0.013		0.089	***	0.084	*	0.002	
Moved to less remote area in 2011	0.108	*	0.074	***	–0.020		–0.086	**
Moved to more remote area in 2011	0.174		0.150	***	na		na	
Probability of the base case	0.332	**	0.507		0.363	***	0.668	***
Number of observations	969		18 959		574		831	

\*\*\* = coefficients statistically significant at the 1% level of significance; \*\* = coefficients statistically significant only at the 5% level of significance;

\* = coefficients statistically significant only at the 10% level of significance

Note: The base-case individual was male, was aged 15–24 years, had not completed Year 12, had not spent time looking after their own children, and had not migrated to a different remoteness area category between 2006 and 2011.

1. Regional areas were those classified as inner regional or outer regional according to the ABS remoteness areas geographical structure, and remote areas were those classified as remote or very remote.

Compared with the base-case individual who was not employed in 2006, females and people aged 45–54 years were less likely to be employed in 2011. Those with relatively high levels of education and those with caring responsibilities in the base period were more likely to be employed.

Being female was a significant negative predictor of moving into employment between 2006 and 2011, after controlling for other factors in the model. Ideally, separate models for gender would be presented here, since the characteristics of working-age men and women who are not employed may be quite different. For example, many women exit the labour force, even if temporarily, while raising children. They are not employed, but nor are they necessarily seeking paid employment. While analysis was undertaken separately for females and males, the sample sizes for remote areas were very small, and so the results should be considered indicative rather than conclusive. The results showed that, for Indigenous men aged 15–54 and not employed in 2006, none of the factors included in the model, including migration to a less remote area, were significant predictors of being employed in 2011. For Indigenous women aged 15–54 living in remote areas in 2006, migration to a less remote area was not a significant predictor of employment in 2011, but being aged 35–44 and having spent time caring for their own children in 2006 were significant predictors. These factors are suggestive of a typical lifecourse progression for women of having time out of the labour force to care for young children, followed by a return to employment as children grow older. Results of the analysis described under ‘Caring responsibilities’ provide further insights into the associations between gender, remoteness (although not migration between remoteness areas) and employment. These results for gender, age, education and child-care responsibilities are important in their own right but, in the context of this analysis, the important thing is that they are controlled for.

The main findings relate to the association with migration. For those living in *regional* areas in 2006, moving either to a more remote or to a less remote area by 2011 was associated with a higher probability of employment. This may be because those individuals were moving for the very reason of taking up employment opportunities. That is, the employment may be driving the mobility. Given this upward bias in terms of causal inference, it is an even more important finding that, for those living in remote areas in 2006, those who moved to a less remote area were no more likely to be employed than those who stayed in remote Australia between 2006 and 2011. If anything, the marginal effect is slightly negative (although not statistically significant for the Indigenous population).

The major contribution of the research reported in Table 4 is to draw on longitudinal Australian census data to examine whether moving to a less remote area is associated with moving into employment for Indigenous and non-Indigenous Australians who were previously not employed. The key finding is that, for Indigenous people living in remote areas who were not employed in 2006, moving to a less remote area was not a panacea—it was not significantly associated with being employed in 2011, after controlling for other factors such as gender, age, education and child-caring responsibilities.

Several reasons could explain the lack of a positive effect—and even possibly a negative effect—on employment among those who migrated from a remote area to a less remote area. Firstly, some evidence suggests that no more jobs are available in nonremote areas than in remote ones (relative to the usual resident population). Biddle (2010a:183) showed that ‘when the average number of jobs within the local area is divided by the total number of usual residents aged 15 to 64 years’ using 2006 Census data, ‘Indigenous Australians in fact live in areas that have a slightly higher number of jobs per usual resident (0.689) than do non-Indigenous Australians (0.660 jobs)’. Based on the analysis in that paper, Biddle also observed, however, that ‘the size of the local labour market relative to the usual resident population has the strongest association with Indigenous employment outcomes in nonremote Australia’ (2010a:187), and concluded that the major constraint to better employment outcomes for Indigenous people was not a lack of available jobs but their ability to take up those jobs, whether because of a lack of education and skills, discrimination or other factors. To the extent that education, skills and relevant experience prevent Indigenous people in more remote areas from accessing job opportunities within their local areas, the same factors are likely to apply when people move from more remote to less remote areas. When Indigenous Australians do move from a remote to a nonremote area, they are competing in very different labour markets without the educational qualifications or area- or industry-specific human capital held by others, and with the possibility of experiencing considerable labour market discrimination (Biddle et al. 2013).

Secondly, people who move from remote to nonremote areas may do so for a variety of reasons not necessarily related to seeking employment, including to access other services such as education or health (see, for example, Morrison & Clark 2011).

This analysis has a number of limitations. The not employed includes people who are not in the labour force (people who are not actively looking for work—for example, parents caring for young children) and those who are

unemployed (i.e. actively seeking work); however, the sample of unemployed people was too small to support a separate analysis. However, as Biddle (2010a) notes, many Indigenous Australians (particularly in the age group of focus for our analysis) who are not in the labour force may be discouraged jobseekers who would actively seek work if they felt they could gain employment. The COAG Closing the Gap target refers to halving the gap in employment/population ratios, not unemployment rates.

Another limitation is that the analysis does not capture mobility within remoteness areas—that is, people who changed address but remained in the same remoteness area. Such moves could be local (e.g. to a different suburb of inner Sydney) or interstate (e.g. from Sydney to Perth). A similar issue is that the remoteness of some areas changed between the 2006 and 2011 censuses. In addition, the analysis does not capture multiple changes of address between censuses. For example, someone living in Alice Springs in 2006 might have spent three years working in Sydney before returning to Alice Springs by 2011. Nor does the analysis capture any long-term effects of movement, beyond the five-year interval. Finally, the analysis does not capture regional variation. Nonetheless, the results provide a very strong caution against assuming that encouraging (let alone compelling) Indigenous people to move out of remote Australia will have a positive effect on their employment and help achieve the Closing the Gap target of halving employment disparities between Indigenous and non-Indigenous Australians.

## Caring responsibilities

Questions about the extent to which caring responsibilities—whether for children or for someone with a disability or long-term health condition, or the frail aged—affect socioeconomic outcomes such as education and employment are of central importance to a number of policy areas. Policy development in the areas of formal child care, aged care, disability services, paid parental leave, family-friendly policies in workplaces, female labour force participation and gender equity more broadly needs to be informed by research into the effects of caring on education and employment outcomes for individuals, particularly women, who bear the largest share of responsibility for the provision of unpaid care. Longitudinal data are once again essential for such analysis.

### Research question 4: To what extent do caring responsibilities predict education and employment outcomes?

We began our analysis by focusing on people aged 15–54 years who did not have at least a Certificate II-level qualification in 2006. The analysis explored this group's attainment of Certificate II level or higher by 2011. Certificate I-level qualifications are not considered to be equivalent to Year 12 completion. Although it has been argued that Certificate II-level is not equivalent to Year 12 completion either, and COAG indicators of educational attainment are moving to include indicators of educational attainment measured by attainment of Certificate III level or higher (COAG 2014), for this analysis we focused on attainment of Certificate II-level qualifications or higher. Given the gendered nature of caring responsibilities, the data for men and women were analysed separately.

Questions on the topic of caring were introduced into the census for the first time in 2006. One question obtains information about whether people were engaged in caring for children, as follows:

In the last two weeks did the person spend time looking after a child, without pay?

The responses offered are:

- No
- Yes, looked after my own child
- Yes, looked after a child other than my own.

Respondents are instructed to only include children who were less than 15 years of age, and to mark all applicable responses.

Another question asks:

In the last two weeks did the person spend time providing unpaid care, help or assistance to family members or others because of a disability, a long term illness or problems related to old age?

The responses offered are:

- No, did not provide unpaid care, help or assistance
- Yes, provided unpaid care, help or assistance.

Respondents are given the following instructions:

Recipients of Carer Allowance or Carer Payment should state that they provided unpaid care.

Ad hoc help or assistance, such as shopping, should only be included if the person needs this sort of assistance because of his/her condition.

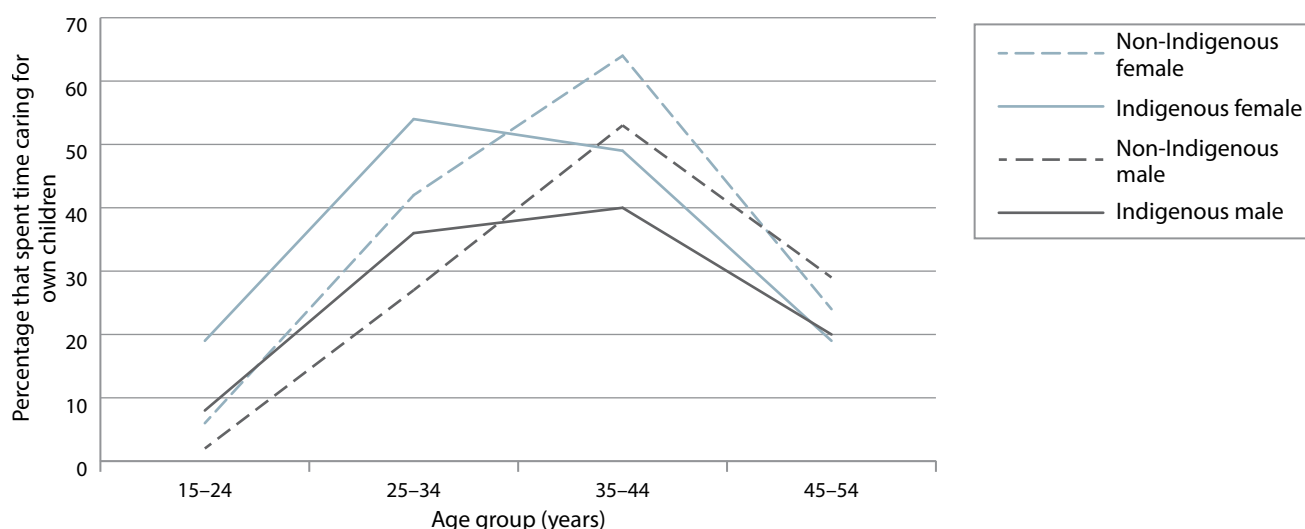
Do not include work done through a voluntary organisation or group.

### Caring responsibilities by age group

Drawing on this information, Figs 7 and 8 illustrate differences in the percentages of Indigenous and non-Indigenous men and women with responsibility for caring for their own children.

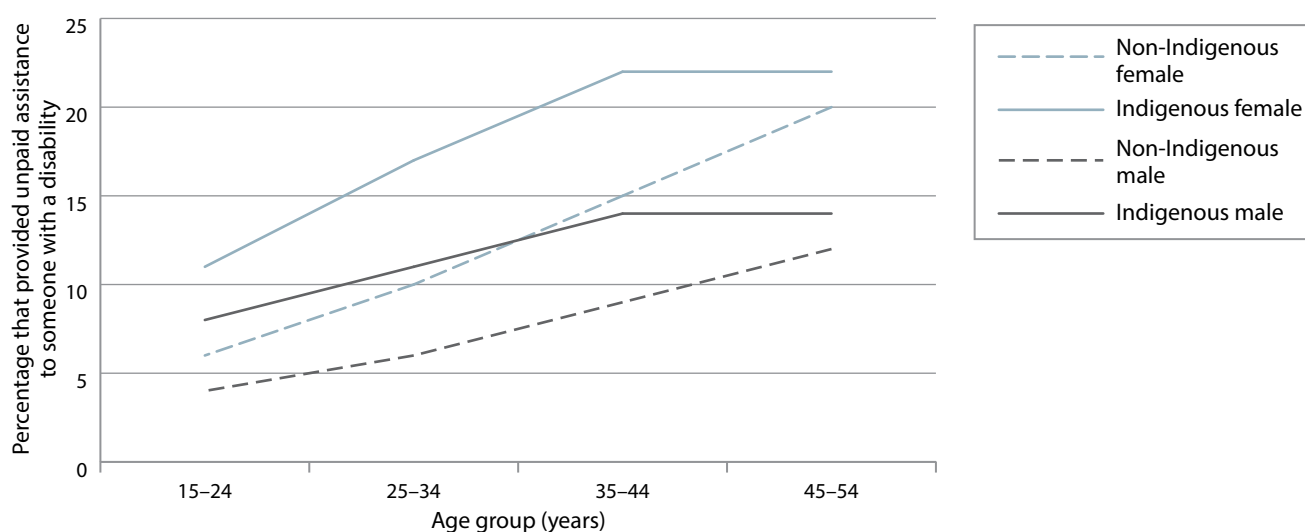
Fig. 7 shows distinct patterns of child-care responsibilities by age among Indigenous and non-Indigenous Australians, as indicated by the different shapes of the solid lines (Indigenous females and males) compared with the dotted lines (non-Indigenous females and males). Most notably, the percentage of Indigenous women with child-care responsibilities is 19% for those aged 15–24 years (more than three times that of non-Indigenous women) and peaks in the 25–34-year age group, in contrast to Indigenous men and non-Indigenous men and women, for whom the peak occurs in the 35–44-year age group.

FIG. 7. Percentage in each age group who spent time looking after their own children, by Indigenous status and gender, 2011



Source: Australian Bureau of Statistics customised data from the 2011 Census

FIG. 8. Percentage of people who provided unpaid assistance to someone with a disability, by Indigenous status and gender, 2011



Source: Australian Bureau of Statistics customised data from the 2011 Census

Given that Indigenous people, especially women, are more likely than their non-Indigenous counterparts to take on a parenting role at a younger age, including in the 15–24-year age group, when direct transitions from secondary to tertiary education would occur, it would not be surprising if their caring responsibilities were associated with differences between the two populations in their education and employment transitions and outcomes.

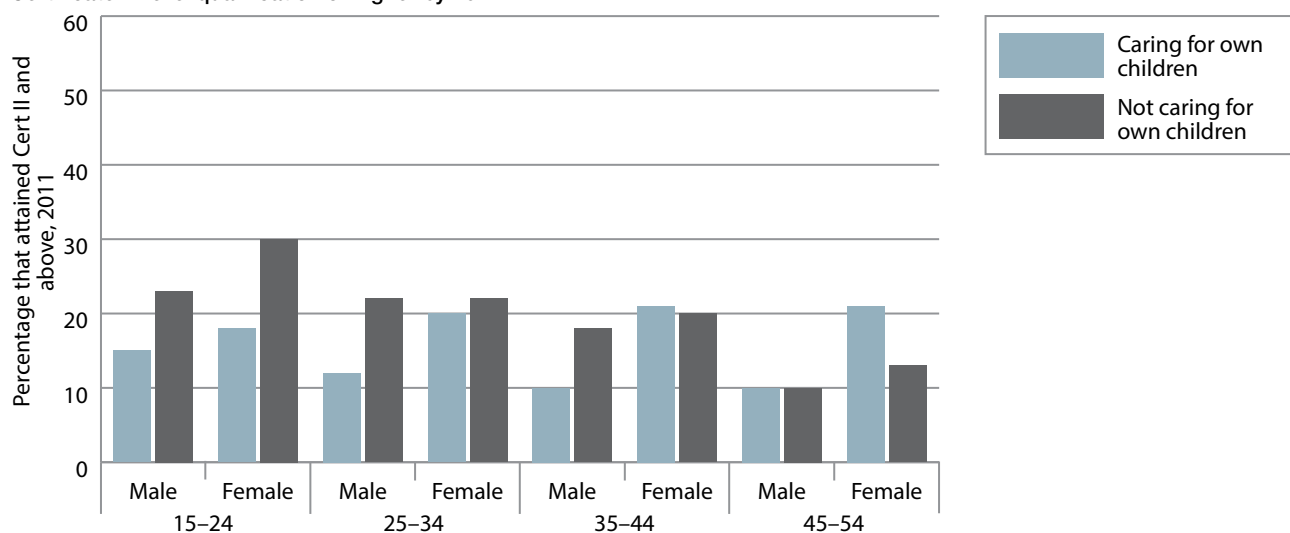
Similarly, Fig. 8 shows that, compared with Indigenous men and non-Indigenous men and women, larger percentages of Indigenous women in every age group among the working-age population provided unpaid assistance to someone

with a disability. The difference between Indigenous women and any other group was widest among those in the 25–34-year and 35–44-year age groups.

### ***Child-care responsibilities and educational attainment***

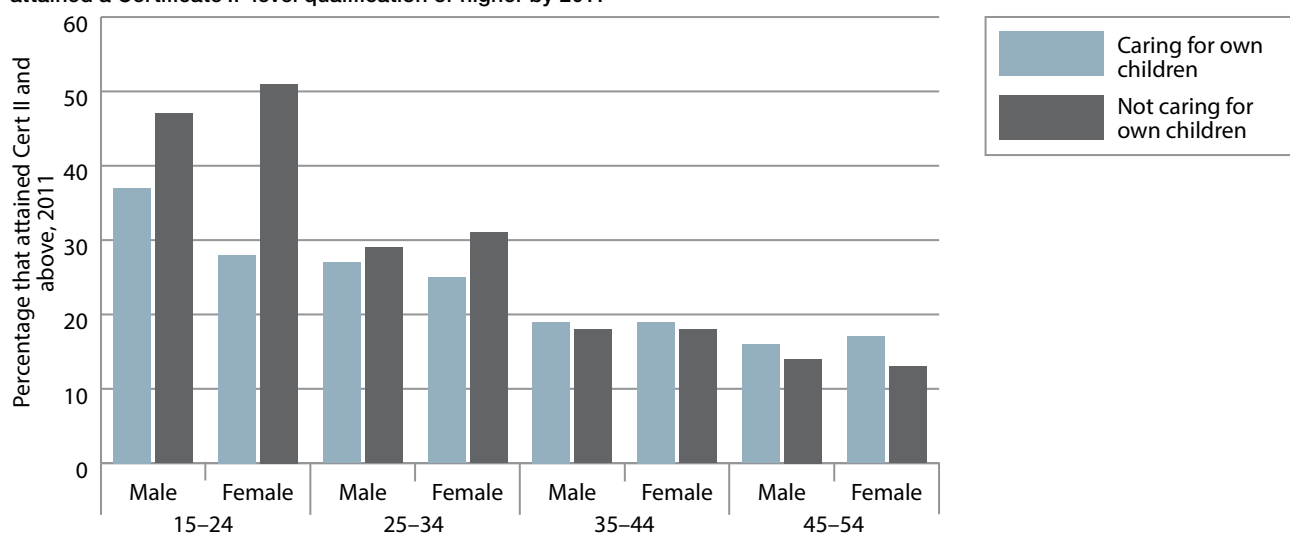
Next we focused on people who had not attained a Certificate II-level qualification in 2006, and compared the percentages of those with and without child-caring responsibilities who had attained a Certificate II-level qualification or higher by 2011, within gender by age categories. The results are presented in Figs 9 and 10.

FIG. 9. **Percentage of Indigenous people aged 15–54 years without a Certificate II-level qualification in 2006 who had attained a Certificate II-level qualification or higher by 2011**



Source: Australian Bureau of Statistics customised data from the 2006–11 Australian Census Longitudinal Dataset

FIG. 10. **Percentage of non-Indigenous people aged 15–54 years without a Certificate II-level qualification in 2006 who had attained a Certificate II-level qualification or higher by 2011**



Source: Australian Bureau of Statistics customised data from the 2006–11 Australian Census Longitudinal Dataset



A number of key findings are illustrated. First, the peak in the percentage attaining higher-level post-school qualifications among 15–24-year-olds is much smaller among Indigenous Australians than non-Indigenous Australians. The greatest difference in levels of educational attainment between people with child-care responsibilities and those with none occurs in the 15–24-year age group, for both Indigenous and non-Indigenous Australians, and more so for women than men. Among those aged 25–34 years, child-care responsibilities still have a noticeable effect on the educational attainment of Indigenous men. Among those aged 35–44 and 45–54, Indigenous men in general, and particularly those with child-caring responsibilities, were least likely to attain higher levels of educational attainment. Rates of higher-level educational attainment among Indigenous women in these older age groups, however, were on a par with, or exceeded, those of their non-Indigenous counterparts.

As well as gender and age, a number of other characteristics have been shown to be associated with post-school educational attainment for Indigenous Australians, including remoteness, secondary school completion, income and caring responsibilities (see, for example, Bradley et al. 2008, Pechenkina & Anderson 2011, Crawford & Biddle 2015).

Focusing on these characteristics, Table 5 highlights a number of differences between Indigenous and non-Indigenous people aged 15–54 years with a relatively low level of post-school education. Compared with their non-Indigenous counterparts, Indigenous people with a lower level of education tended to be younger, much more likely to be living outside the major cities, less likely to have completed Year 12 and more likely to be living in households with lower incomes. The percentage of Indigenous people in this group that had informal child-care responsibilities was 27%, substantially larger than the corresponding percentage of 19% among non-Indigenous

**TABLE 5. Percentage of people aged 15–54 years without a Certificate II–level qualification in 2006 who were in selected categories, by Indigenous status**

Characteristic	Category	Indigenous	Non-Indigenous
Gender	Male	47	47
	Female	53	53
Age	15–24 years	37	35
	25–34 years	23	18
	35–44 years	23	23
	45–54 years	16	24
Remoteness area of usual residence	Major cities of Australia	30	67
	Inner or outer regional Australia	45	31
	Remote or very remote Australia	24	2
Highest year of school completed	Less than Year 12	82	67
	Year 12 or equivalent	18	33
Equivalised weekly household income	Nil or negative	1	1
	\$1–399	59	30
	\$400–999	35	52
	\$1000 or more	5	18
Unpaid assistance to a person with a disability	Provided unpaid assistance	13	11
	No unpaid assistance provided	87	89
Informal child care	Spent time looking after own children	27	19
	Did not spend time looking after own children	73	81
	Total	100	100
Population estimate (number)		447 573	10 503 016

Source: Australian Bureau of Statistics customised data from the 2006–11 Australian Census Longitudinal Dataset

people. The difference between the percentages of people who had provided assistance to someone with a disability was much smaller (13% among Indigenous in this group, 11% among non-Indigenous).

**Caring responsibilities and educational attainment—multivariate analysis**

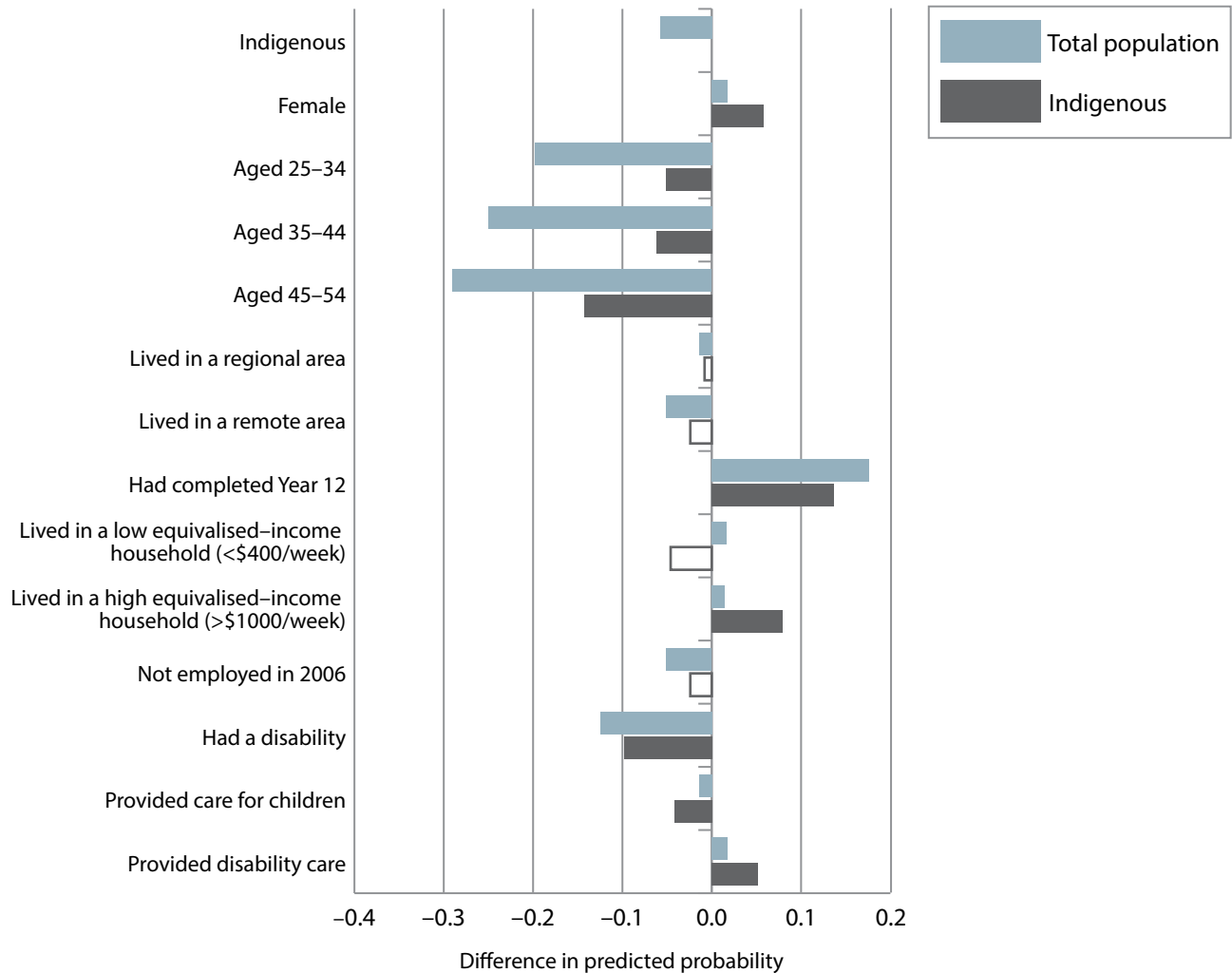
To control for caring responsibilities and educational attainment and be able to compare the extent to which caring responsibilities predict educational outcomes for Indigenous and non-Indigenous Australians, a multivariate analysis was done. The first dependent variable is whether a post-school qualification at Certificate II level or higher had been attained by 2011.

The analysis included two main explanatory variables related to caring responsibilities, one focusing on child care (care of own children and unpaid care of other children)

and the other on assistance provided to someone with a disability, long-term illness or problems related to old age. In addition, we controlled for a person’s gender, age, level of remoteness, Year 12 completion, employment status, income of the house in which they lived and disability status. The first model was estimated for the total population (who did not have a relevant post-school qualification), with an additional explanatory variable for whether or not they identified as being Indigenous in 2006. The second model was for Indigenous Australians only.

The results of this analysis are summarised in Fig. 11. Results are expressed as marginal effects, or the difference between the probability of obtaining a qualification for someone with that particular characteristic and someone with the base-case characteristics. Negative values mean that a person with that characteristic has a lower probability than the base case of having a qualification at Certificate II level or above, while positive values indicate

**FIG. 11. People aged 15–54 in 2006 without a Certificate II-level qualification in 2006: Factors associated with the probability of attaining a Certificate II-level qualification or higher between 2006 and 2011**



Note: The base-case individual was aged 15–24 years, lived in a major city, had not completed Year 12, lived in a low equivalised-income household, had not provided care to someone with a disability in either 2006 or 2011, and had not spent time looking after their own children in either 2006 or 2011. Hollow bars indicate effects that are not statistically significant.

a higher probability. Bars with solid fill indicate results that are statistically significant at the 5% level, while hollow bars indicate effects that are not statistically significant.

After controlling for a range of characteristics, Indigenous Australians were significantly less likely than non-Indigenous Australians to obtain a post-school qualification over this five-year period. Looking at the rest of the results broadly, there are some similar (and unsurprising) predictors of higher-level educational attainment for Indigenous Australians that are in a similar direction for the total population. Females and those who had completed Year 12 had a higher probability of gaining a post-school qualification, while increasing age and having a disability were associated with lower probabilities.

The scale of the marginal effects was, however, occasionally different in ways that are policy relevant and reflective of other research on Indigenous tertiary education (Crawford & Biddle 2015). Gender had a larger association for Indigenous Australians than for the rest of the population, reflecting the greater difference in educational attainment between Indigenous men and women than between non-Indigenous men and women. Age had a smaller association, reflecting the older age profile of Indigenous students. Somewhat surprisingly, after controlling for observable characteristics, there was no significant difference by remoteness in qualification attainment for Indigenous students (while this may be partly due to the small sample size, the marginal effects of living in more remote areas are smaller for Indigenous than for non-Indigenous people).

The income of the households in which Indigenous Australians lived had a larger and different association with their educational attainment than it did for the rest of the population. For the total population, those in low-income households had a slightly higher probability of obtaining qualifications. The reverse was true for Indigenous Australians in similar households. Living in a high-income household had a similar association (a higher probability of obtaining qualifications) for both estimates, but the marginal effect was much larger for the Indigenous population.

The focus of the analysis, however, was on the association between caring responsibilities and educational attainment. It appears from the results that the type of care matters. Providing care for children was associated with a lower probability of obtaining qualifications for both models, with a slightly larger marginal effect for the Indigenous estimates. Not only are Indigenous Australians more likely to be providing unpaid child care (either for their own children or for other children), the negative association with their educational attainment is larger.

The association with providing care for those with a disability is in the opposite direction—those providing such care had a higher probability of gaining an educational qualification—although once again the marginal effect for the Indigenous estimates was larger. This finding was perhaps a little surprising. There are a few potential explanations for this association. It may be that the qualifications obtained relate to disability care. It may also be that the care provided is intermittent enough to allow for study, unlike child care, which may be more intensive. Given the policy focus on disability care through the National Disability Insurance Scheme, this finding is worth investigating in more detail (Biddle et al. 2014).

### ***Caring responsibilities and employment— multivariate analysis***

The second part of the analysis in this section addressed the question: to what extent do caring responsibilities predict employment outcomes? The analysis examined the extent to which caring responsibilities predicted employment in 2011 among people aged 15–54 years who were not employed in 2006. We controlled for key sociodemographic variables previously shown to be associated with Indigenous employment, including gender, age and education (see, for example, Hunter 1997, Stephens 2010, Gray et al. 2012), with a similar specification to the qualification estimates presented above. The only difference was that, rather than controlling for previous employment, we controlled for qualifications. One limitation of this analysis is that the census collects information about labour force status at one point in time and does not contain information about the number, duration or timing of employment episodes that may have occurred between 2006 and 2011. Results are presented in a similar way to those for the qualification estimates, and are summarised in Fig. 12.

Indigenous status is once again associated with a lower probability (this time of becoming employed), even after controlling for a range of characteristics. Some similarities are apparent across the two models, with gender, age, education and, in particular, disability status having large associations with employment. This time, however, the associations are negative. Once again, the size of the marginal effects varies. Age is a less salient predictor of employment for the Indigenous population than for the non-Indigenous population, education much more so.

The association with caring responsibilities once again varied depending on the type of care. Caring for children was associated with a higher probability of becoming employed over the subsequent five years. Keeping in mind that the focus of the analysis is on those who were

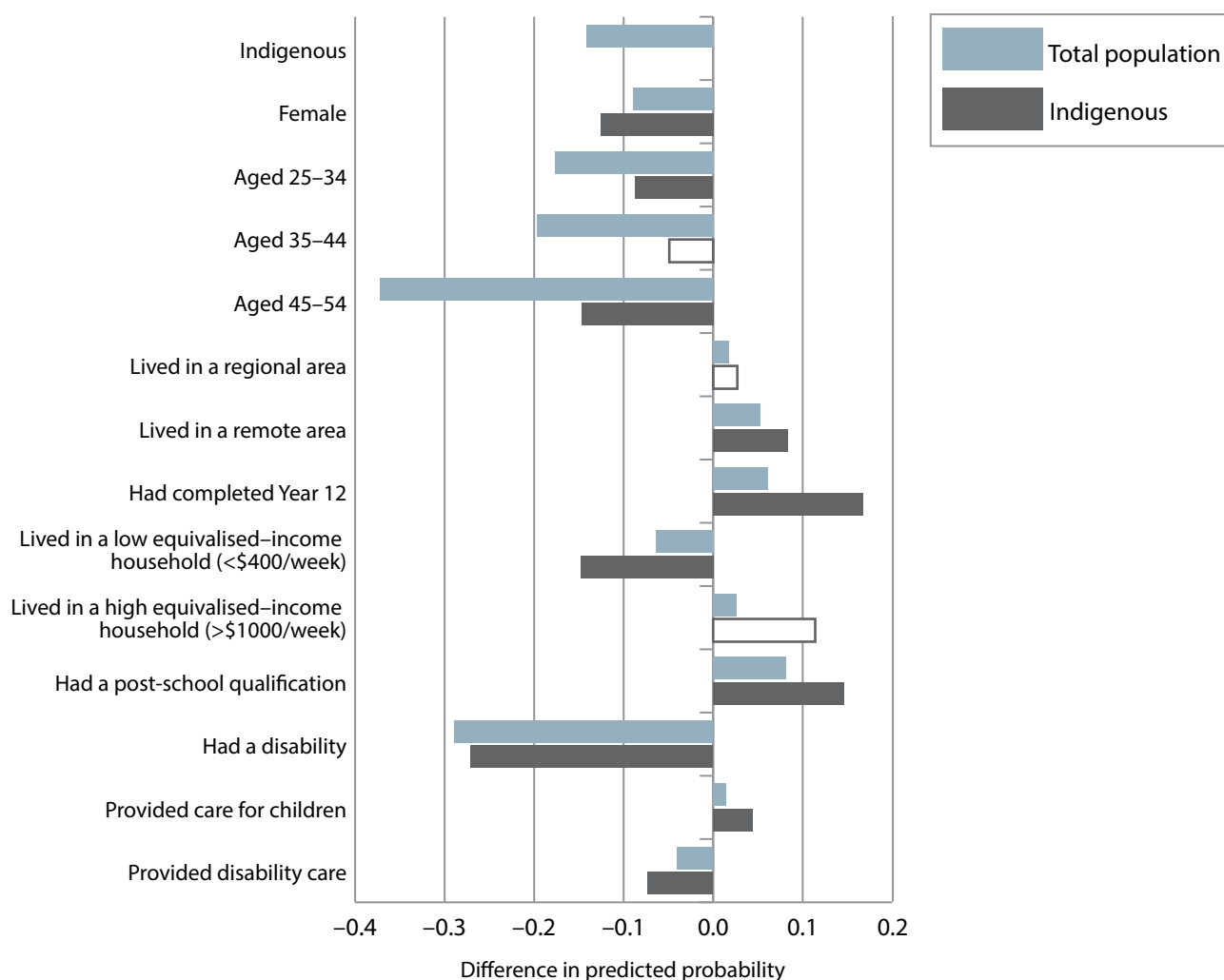
not employed in 2006, it is somewhat encouraging that providing child care was not a significant barrier to future employment. This may reflect the more transient nature of child care. Providing care for those with a disability, on the other hand, had a negative association for both Indigenous Australians and the total population, with the association much larger for Indigenous people. Providing care for someone with a disability appears to be a significant barrier to obtaining employment.

## Fertility decisions

In a previous paper in this series, Biddle (2013a) identified six potential reasons why the Indigenous population has grown so rapidly over the last intercensal period and might continue to grow over the next few decades:

- Indigenous Australians are concentrated in the main child-bearing years (at least relative to the non-Indigenous population).
- Indigenous females continue to have a greater number of children than non-Indigenous females, especially when they are relatively young.
- In urban areas in particular, there is a high partnering rate between Indigenous males and non-Indigenous females, with the children of these partnerships tending to be identified as being Indigenous.
- The ABS may be getting better at counting Indigenous Australians in the census.
- The ABS may have historically underestimated the number of Indigenous people who were missed by the census in previous years.

FIG. 12. People aged 15–54 who were not employed in 2006: Factors associated with being employed in 2011



Note: The base-case individual was aged 15–24 years, lived in a major city, had not completed Year 12, did not have a post-school qualification higher than Certificate I, did not have a disability in either 2006 or 2011, had not provided care to someone with a disability in either 2006 or 2011, and had not spent time looking after their own children in either 2006 or 2011. Hollow bars indicate effects that are not statistically significant.

- A significant number of people may not have previously identified as being Indigenous in the census but now feel more comfortable in doing so.

In answering the first research question in this paper, we gave strong evidence for the last of these potential explanations. It is clear, from the ACLD at least, that there are a number of people whose Indigenous identification is different across census years. In net terms, this leads to a net increase in the Indigenous population count and estimates. Internal mobility and migration, another focus of this paper, is also a strong predictor of population growth for particular areas. By definition, however, it has no effect at the national level.

The ACLD is also useful for understanding the contribution to Indigenous population growth of relatively high rates of fertility. The administrative data, summarised in ABS (2014b), highlights three main things about Indigenous fertility:

- Indigenous females have more children on average across their reproductive years than non-Indigenous females, with a total fertility rate (TFR) of 2.344 for Indigenous females compared with 1.882 for the total population.<sup>2</sup>
- Births to Indigenous females occur at a much younger age than for non-Indigenous females (with a median age of mothers of 24.9 years compared with 30.8 years for the total population).
- The fertility rate for Indigenous females has stayed remarkably consistent across the last half decade, with only a small decline from 2009 onwards (with Indigenous TFRs of 2.368, 2.433, 2.459, 2.408, 2.383 and 2.344 for 2008–2013, respectively).

The decision to have children is one of the most consequential decisions that a person can make, with the timing of that decision having far-ranging implications for the economic and social wellbeing of the child's parents, as well as those around them. A recent book by Senior (2014) titled *All joy and no fun* summarises a range of literature that shows that, while there are costs in the short term in terms of emotional wellbeing and access to financial resources, there is also some evidence for a significant positive effect on more long-term measures of wellbeing, such as a person's life evaluation.

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2. The total fertility rate represents the number of children a woman would bear during her lifetime if she experienced current age-specific fertility rates at each stage of her reproductive life (ages 15–49).

Recognising these mixed costs and benefits, standard models tend to view the parenting decision as being an interaction between a couple's biological ability to conceive and carry a child to term, preferences for children as influenced by the wider social setting, and the costs of having children (Hotz et al. 1997). Or, according to Testa et al. (2011:2), 'beyond crucial factors related to partnership, education, employment and housing conditions as well as to work-life balance, fertility decisions are influenced by the normative pressure of relatives and friends as well as by personal attitudes towards having a child which are especially important when the decision concerns the first child'. The costs of having children include not only direct costs (which are less important for the relatively well-off) but also the opportunity costs of having children, which tend to be higher for those with higher earnings capacity.

Others have challenged this very rational approach to understanding fertility decisions (known among demographers as the 'theory of planned behaviour'). Morgan and Bachrach (2011:12), for example, point out that 'over the last few decades roughly one-half of all pregnancies in the US were unintended', with similar results in other countries. Here, the behavioural economics and psychological research are useful, with the availability of information and contraceptives having some effect on fertility decisions (Gertler & Molyneaux 1994), and arousal shown in experimental settings having significant impacts on a person's present biases (Ariely & Loewenstein 2006).

Most of the models of fertility decisions have some predictive power for the differences in fertility rates between Indigenous and non-Indigenous females and within the Indigenous population outlined above. Models that focus on the opportunity costs of having children suggest that the lower rates of education and employment for Indigenous females lead to a lower opportunity cost. Given the very different historical experience and cultural background of Indigenous and non-Indigenous Australians, preferences may also vary. Finally, the behavioural literature is also useful, with the geographic distribution, education background and literacy levels of the Indigenous population likely to affect the availability and accessibility of information on family planning and the ability to make informed decisions.

Despite this theoretical potential, little research has attempted to construct formal models of Indigenous fertility decisions. This may be explained by the reticence of researchers from an anthropological background to use such frameworks, with anthropology the most prolific discipline until now in understanding Indigenous family patterns. It is, however, also partly due to the lack of good-quality longitudinal data. Because having children

has such a dramatic effect on a person's circumstances, contemporaneous data are next to useless in explaining a person's previous fertility decisions.

It is beyond the scope of this paper to develop such a theoretical model. However, the ACLD could influence the development of such a model because it is the only dataset with information on Indigenous (and non-Indigenous) females without children who end up having children within a given timeframe, and on those females who do not end up doing so.

### **Research question 5: To what extent do observable characteristics explain differences in fertility decisions between Indigenous and non-Indigenous women?**

#### ***Predictors of fertility—multivariate analysis***

To answer this question, we focused on a specific group of women, those aged 15–24 years in 2006 who did not at that stage have any children (according to the question on the census on number of children ever born). We focused on women without children because the effect on outcomes of a first child is likely to be much larger than the effect of subsequent children (due to economies of scale), and the decision to have additional children is likely to be made very differently from the decision to have a first child. We focused on women aged 15–24 years in 2006 because the implied observation window (those aged 15–29) captures the peak fertility years for Indigenous females (ABS 2014b).

The outcome variable for this group of females was the probability of having had at least one child by 2011. We analysed the factors associated with this probability across four models:

- Model 1 (48 901 observations)—estimated for Indigenous and non-Indigenous females together, with the only explanatory variables being whether or not the person is Indigenous and their age (as a linear variable).
- Model 2 (48 881 observations)—the same as model 1, with an additional set of binary variables for whether or not the person lived in a remote or regional area (as opposed to a major city).
- Model 3 (42 164 observations)—the same as model 2, with the addition of variables for whether the person was studying, had completed Year 12, was employed, provided unpaid child care, provided care for someone with a disability, and was in a registered or de facto marriage.
- Model 4 (874 observations)—the same as model 3, but estimated for Indigenous females only.

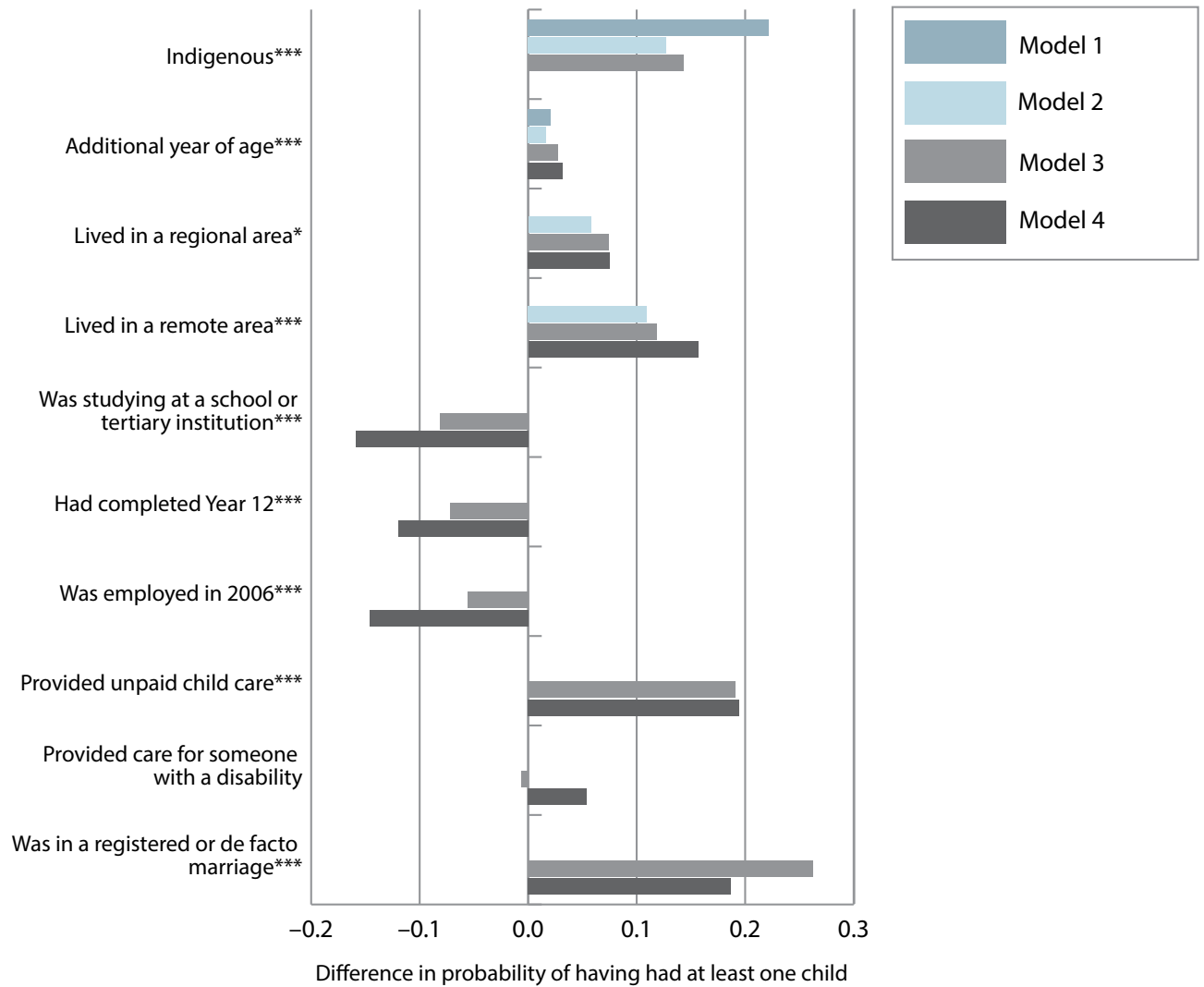
Results are summarised in Fig. 13 and are presented as marginal effects—that is, the difference in probability after changing that characteristic while holding all other characteristics constant. The only difference across the models is that living in a regional area was significant at the 1% level of significance for models 1–3, but at the 10% level only for model 4.

Fig. 13 shows that, controlling only for age (model 1), Indigenous women were much more likely than their non-Indigenous counterparts to have children over the five-year period. A large and statistically significant reduction in the marginal effect occurs when remoteness is controlled for (model 2), but no further change in the marginal effect occurs when the socioeconomic and other variables are included in the model (model 3). What this means is that, even with longitudinal data and even with a large set of control variables, Indigenous females aged 15–24 without any children were significantly and substantially more likely to have children over a five-year period than their non-Indigenous counterparts. It is true that some of the other elements of fertility models are also important (as explained below), but those models still leave room for Indigenous preferences and/or other behavioural factors.

So, what are the main predictors of Indigenous fertility (in model 4)? The first thing to note is that, despite a relatively small sample size (874 females), most of the variables are statistically significant. This includes geography, with Indigenous females living in regional and (especially) remote areas in 2006 more likely to have had children over the subsequent five years. Socioeconomic status is also important, with many aspects of a person's education and employment having an association. Females who were studying, those with relatively high levels of education and those who were working were all less likely to have children. These variables can be interpreted in several ways, with females who are employed and those with high levels of education having a higher opportunity cost of having children and a greater ability to control their own fertility. This aside, these results do show that employment and education are key predictors of fertility decisions, as well as being influenced by whether a woman has children (Cygan-Rehm & Maeder 2013). Furthermore, the marginal effect is much larger for the Indigenous population than for the total population.

Indigenous females who provided unpaid child care in 2006 (despite at that stage having no children of their own) were more likely to have children between 2006 and 2011. This may reflect a preference for having children, or that it is

FIG. 13. Factors associated with the probability of having had at least one child between 2006 and 2011 for females aged 15–24 with no children in 2006



\*\*\* = coefficients statistically significant at the 1% level of significance; \*\* = coefficients statistically significant only at the 5% level of significance;  
 \* = coefficients statistically significant only at the 10% level of significance

Note: The base-case individual for all models was aged 15 years, lived in a major city and did not have any of the other characteristics in the model.

easier to incorporate the care of one's own children with the care of other children than it might be to incorporate it with paid employment. The final variable in the model—being in a de facto or registered marriage—was both positive and statistically significant. However, it is interesting that the marginal effect for the Indigenous estimates is somewhat smaller than for the total population.<sup>3</sup>

### Summary and concluding comments

It has been said many times, including in the context of the regular Intergenerational Reports, that demography is

destiny. There may be some truth to this. However, it is also true that demography is highly contingent on a person's current circumstances, which have a large effect on future demographic processes. The focus of this paper has been to analyse the extent of this for the Indigenous population, as well as the specific patterns.

We showed in 'The newly identifying Indigenous population' that a large number of people who were not identified as being Indigenous in 2006 identified as being Indigenous in 2011. While there was also a sizeable number of people whose identification changed in the opposite direction (from non-Indigenous or not stated to Indigenous), in net terms identification change led to an increase in the size of the Indigenous population over the last intercensal period.

3. Although not included in Fig. 13, the marginal effect is larger for a model similar to model 4, which is estimated on the non-Indigenous population only.

Net identification change has been demonstrated using other sources of data (Zhang 2014). However, we were able to show that there were individual and area-level predictors of that change. Understanding the patterns of identification change, not just the levels, is vital for projecting the size and composition of the population in the future.

One of the determinants of population change at a local level is migration. Although it is often stated that Indigenous Australians are a highly mobile population, the analysis presented in this paper showed that this is entirely driven by observable characteristics. When these characteristics were controlled for, Indigenous Australians were in fact less likely to have changed their place of usual residence than otherwise identical non-Indigenous Australians.

In addition to population change, mobility and migration could also influence the outcomes of individuals and the household in which they lived. We showed, however, that movement cannot automatically be assumed to improve policy-relevant outcomes. It is true that we showed that Indigenous Australians who moved from regional areas to major cities had a higher probability of being employed than those who did not move. However, there was no such association for those who moved out of remote areas, with the probability, if anything, being lower. Employment is driven more by a person's human capital characteristics than where a person lives, or where they move from or to.

We also showed that caring responsibilities were a significant predictor of employment, as well as education completion. The association, however, was somewhat complex. Providing care for someone with a disability was associated with a higher probability of future education, but a lower probability of future employment. The reverse was true for providing unpaid child care.

One of the determinants of providing unpaid child care, of course, is having children. High rates of fertility are also one of the key reasons why the Indigenous population is projected to continue to grow faster than the non-Indigenous population and continue to stay relatively young. Even after controlling for observable characteristics, an Indigenous female aged 15–24 who did not have any children was significantly and substantially more likely than a non-Indigenous female to have had at least one child over the subsequent five years. What we were also able to show is that the education and employment characteristics of Indigenous females had a much larger association with their subsequent fertility than for non-Indigenous females.

This is the first time that researchers have had access to a large, reasonably representative sample of Indigenous Australians across the lifecourse, with information at

more than one point in time. This includes information on Indigenous identification at more than one point in time. A range of policy-relevant research questions can only be answered by such longitudinal data.

The ACLD is not a true longitudinal dataset such as the Household Income and Labour Dynamics in Australia (HILDA) survey, the Longitudinal Survey of Australian Youth (LSAY), the Longitudinal Study of Australian Children (LSAC) or the Longitudinal Study of Indigenous Children (LSIC). The ACLD is constructed by probabilistically linking individuals using observed information, rather than tracking individuals through time. This creates a degree of uncertainty, with a strong possibility of false links (individual observations being linked that should not be) or missed links (observations that should be linked not being linked).

However, other longitudinal datasets also have limits. Nonrandom sample attrition affects all survey-based longitudinal datasets, with individuals whose circumstances have changed over time (through mobility, family breakdown, school completion, etc.) being more likely to drop out of such surveys than those whose characteristics are more consistent (Watson & Wooden 2004). Plus, specially targeted longitudinal surveys are expensive and place an additional respondent burden on a population that is already heavily surveyed (Biddle 2014). It is important, therefore, that we make use of the data that have already been collected.

Ultimately, the analysis presented in this paper has raised more questions than it has answered. Ideally, results from the ACLD should be compared and contrasted with information from other quantitative data collections, administrative data, and in-depth qualitative studies, to obtain a more rounded picture of Indigenous demographic and socioeconomic change.



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