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Paper 7

Education Part 1: Early childhood education

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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 like 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 was funded by the Commonwealth Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) through the Strategic Research Project as well as FaHCSIA and State/Territory governments through the Indigenous Populations Project.

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

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Abstract

The aim of this paper is to provide an updated description of the level of participation of Indigenous children in early childhood education, as well as an analysis of the differences in outcomes between those children who do and do not attend. The five main conclusions from the census analysis are that: there has been a decline over the last intercensal period in the gap between Indigenous and non-Indigenous children in terms of preschool participation; this decline was mainly due to reductions in the non-Indigenous rates, as well as a change in the geographic distribution of the Indigenous population; despite consistency at the national level there were 26 out of 37 Indigenous Regions that experienced a significant increase in preschool participation; many remote regions are catching up to non-remote regions in rates of participation; large gaps still remain between Indigenous and non-Indigenous children once geography and other characteristics are controlled for. Another major finding from the paper is that although Indigenous children who participated in preschool tend to start school with lower rates of developmental vulnerability than those who did not, there are still very large gaps between Indigenous and non-Indigenous students once preschool is controlled for. Preschool participation is important. However, it alone is not sufficient to ensure all Indigenous children start school in the same position as their non-Indigenous peers.

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List of acronyms

ABS	Australian Bureau of Statistics
AEDI	Australian Early Development Index
AIGC	Australian Indigenous Geographic Classification
ANU	Australian National University
ARIA	Accessibility/Remoteness Index of Australia
DEEWR	Commonwealth Department of Education, Employment and Workplace Relations
ECEC	Early childhood education and care
ERP	Estimated resident population
CAEPR	Centre for Aboriginal Economic Policy Research
FaHCSIA	Commonwealth Department of Families, Housing, Community Services and Indigenous Affairs
IRSEO	Index of Relative Indigenous Socioeconomic Outcomes
LDC	Long daycare centre
LORI	Level of Relative Isolation
LSIC	Longitudinal Study of Indigenous Children
OECD	Organisation for Economic Co-operation and Development
RCT	Randomised controlled trial
SUA	Significant Urban Area
WAACHS	Western Australian Aboriginal Child Health Survey

1. Introduction and overview

Children who attend early childhood education have been found to be better off in terms of self-esteem and later social and emotional maturity, as well as being less likely to engage in criminal and antisocial behaviour, teen pregnancy or drug abuse (Hull & Edsall 2001). This can be partly ascribed to the effect of this education on later academic achievement, but also because of direct effects on social skills, maturity and self-confidence (Kronemann 1998).

With regards to health, participation in early childhood education may expose a child to a greater number of potential infections and infectious diseases (Ferson 1997). However, these short-term costs are likely to be counterbalanced by a number of positive effects. Long-term health is likely to be improved through the effect early childhood education has on cognitive development and academic achievement (see Masse & Barnett (2002) for a calculation of the effect on smoking). There are also likely to be direct, immediate effects on nutritional or general health knowledge (Hendricks, Echols & Nelson 1989).

The potential positive effects that early childhood education might have on future academic achievement and broader cognitive development are also important. Early childhood education can improve a child's school readiness and close some of the gap between 'at-risk' and other students in terms of cognitive development and school achievement. Most studies find that, in the short term, there are large effects on both achievement and IQ scores (Barnett 1998; Boocock 1995). Heckman, Stixrud, and Urzua (2006) identify early childhood education as having its greatest effect on non-cognitive ability (motivation, persistence and self-esteem) as opposed to cognitive ability. Furthermore, Heckman, Stixrud and Urzua (2006: 27) identify non-cognitive ability as being 'as important, if not more important' than cognitive ability in explaining future outcomes like school completion and wage levels.

Partly because of these potential benefits, early childhood education in Australia receives considerable support from the government. Each jurisdiction in Australia, however, has slightly different names and rules for the two years that precede Year 1. This is summarised in Table 1 (adapted from ABS 2012a), which gives the name and age of these early childhood education programs at the time of the 2011 Census that existed in the year before full-time schooling (labelled as 'preschool' in the rest of this paper) as well as the first year of full-time schooling (labelled as 'kindergarten'). The second year of full-time schooling is called Year 1 in all States and Territories.

TABLE 1. Name and age of entry of early childhood education programs by State or Territory

State/Territory	Year before full-time schooling (henceforth 'preschool')		First year of full-time schooling	
	Name	**Age of entry**	**Name**	**Age of entry**
New South Wales	Preschool	4 (by 31 July)	Kindergarten	5 (by 31 July)
Victoria	Kindergarten	4 (by 30 April)	Preparatory	5 (by 30 April)
Queensland	Kindergarten/ Pre-Preparatory (Pre-Prep)	4 (by 30 June)	Preparatory	5 (by 30 June)
South Australia	Preschool/ Kindergarten	Continuous entry after 4th birthday	Reception	Continuous entry after 5th birthday
Western Australia	Kindergarten	4 (by 30 June)	Pre-Primary	5 (by 30 June)
Tasmania	Kindergarten	4 (by 1 January)	Preparatory	5 (by 1 January)
Northern Territory	Preschool	4 (by 30 June)	Transition	5 (by 30 June)
Australian Capital Territory	Preschool	4 (by 30 April)	Kindergarten	5 (by 30 April)

Source: ABS (2012a) and discussions with DEEWR.

The descriptions and cut-offs in Table 1 show a complex and varied system of preschool and kindergarten education in Australia. This is further complicated in the Northern Territory and South Australia where Indigenous children can commence preschool at the age of three. Furthermore, in the latter jurisdiction, continuous entry into preschool (in 2013) and Reception (in 2014) has been phased out.

Not all early childhood education occurs within a preschool program or full-time schooling. In addition to that which occurs within the home, many long daycare centres (LDCs) also provide education programs. Wave 3 data from the Longitudinal Study of Australian Children suggests that in 2008 18.6 per cent of the 'Baby Cohort' were attending Kindergarten or Year 1. Given the average age of this cohort at the time of the survey was 58 months (or almost 5 years old), it is not surprising that attendance in full-time schooling at that stage was relatively low. In addition to the 18.6 per cent attending full-time schooling, 49.4 per cent were participating in preschool, 25.8 per cent were utilising an LDC and 6.2 per cent were not using any form of early childhood education.[1]

While it is important to recognise that much education does occur in LDCs, the quality of education provided through LDCs is likely to vary substantially, perhaps to an even greater extent than preschool programs. This is important to recognise, as the evidence suggests that not all early childhood education has the same effect on a child's development. A quality preschool education is likely to be beneficial for a child, but poor quality preschool may in fact have a negative effect on outcomes (Magnuson, Ruhm & Waldfogel 2005).

This has been recognised by government through the adoption of the *National Quality Framework for Early Childhood Education and Care*.[2] This framework has set out a range of minimum standards related to things like curriculum, staffing and qualifications, with the aim of promoting:

- the safety, health and wellbeing of children;
- a focus on achieving outcomes for children through high-quality educational programs; and
- understanding of what distinguishes a quality service.

Aboriginal and Torres Strait Islander or Indigenous Australians have been recognised by governments in Australia as having worse outcomes for many of the measures that preschool has been shown to improve. It is not surprising, therefore, that one of the headline 'Closing the Gap' targets is 'ensuring all Indigenous four-year-olds in remote communities have access to early childhood education within five years' (Department of Families, Housing, Community Services & Indigenous Affairs (FaHCSIA) 2009a). It would appear from available data that this target is on track to being met. However, once infrastructure is in place to ensure geographic access, the policy focus should ideally shift to removing financial and social barriers to participation and also ensuring that the quality of preschool instruction received by the Indigenous population is at least comparable to that of the non-Indigenous population.

To the author's knowledge at least, there have not been any quantitative studies of the benefits of preschool education for Indigenous children. On the one hand, the benefits may be potentially large, given that there is substantial evidence that preschool programs provide the greatest benefit to those who grow up in relatively disadvantaged families (Reynolds & Temple 2008). On the other hand, we know very little about the quality of preschools to which Indigenous students have access. Preschools that are not responsive to the unique culture and needs of Indigenous children may have negative long-term consequences.

While access to preschool is a basic minimum requirement, the fact that it is not compulsory means that more is needed to ensure that all children have a quality early childhood experience. According to their *Closing the Gap Clearinghouse* report, Harrison et al. (2012) argue that the characteristics of effective early learning programs (which includes education in preschools, LDCs and full-time schooling) include:

- an integration of care and education;
- regulatory standards and systems for quality assurance;
- qualified, well resourced and supported early childhood educators;
- a pedagogical framework that guides curriculum planning and practice;
- professional development, training and coaching; and
- programs that support parents, families and communities.

1. A small proportion of the sample were attending both preschool and an LDC, meaning that the percentages do not sum to 100.
2. See <http://deewr.gov.au/national-quality-framework-early-childhood-education-and-care-legislation-standards-and-progress>.

These characteristics are likely to be of benefit to all children. The authors also note that for Indigenous children and their families, it is important that early childhood education provides a culturally safe environment, community partnerships and specific workforce quality, training and support for Indigenous and non-Indigenous staff. It would appear, however, that many of these characteristics are not being achieved or, at least that the parents and guardians of Indigenous children do not feel that these characteristics are being met. This low participation is, however, likely to be due in part to other characteristics of Indigenous children.

Biddle (2007) is the most comprehensive study to date of the factors associated with Indigenous preschool participation. Using data from the 2001 Census, the author looked at the relationship that age, sex and Indigenous status has with preschool participation, as well as the household and geographic factors associated with participation. The main finding from the analysis was that:

> …after controlling for only a limited set of factors associated with preschool attendance, an Indigenous three-year-old is more likely to attend preschool than is a non-Indigenous child of the same age. Although Indigenous four- and five-year-olds are less likely to attend after controlling for the same factors, the marginal effect of being Indigenous is less than the raw probabilities would suggest (Biddle 2007: 14).

What this means is that differences between the socioeconomic and geographic characteristics of the households and areas in which Indigenous children grow up compared to those of non-Indigenous children explained much of the difference in their preschool participation rate. To put this another way, the most important difference is between relatively advantaged Indigenous children and relatively disadvantaged Indigenous children, not between Indigenous and non-Indigenous children from broadly similar backgrounds. A further finding from the census that relates to variation within the Indigenous population was that 'the presence of a preschool worker who identifies as Indigenous and is working in the area where a child lives significantly increases attendance' (Biddle 2007: 14). Indigenous-specific factors appear to matter as well.

The aim of this paper is to provide an updated description of the level of participation of Indigenous children in early childhood education, as well as an analysis of the differences in outcomes between those children who did and did not participate. We start in Section 3 with a geographical analysis of Indigenous preschool participation using the 2006 and 2011 Censuses, making comparisons where possible with data from the annual ABS (Experimental) Estimates of Preschool Education. This is followed in Section 4 by an analysis of the household and family context of those Indigenous (and non-Indigenous children) who do and do not participate in preschool.

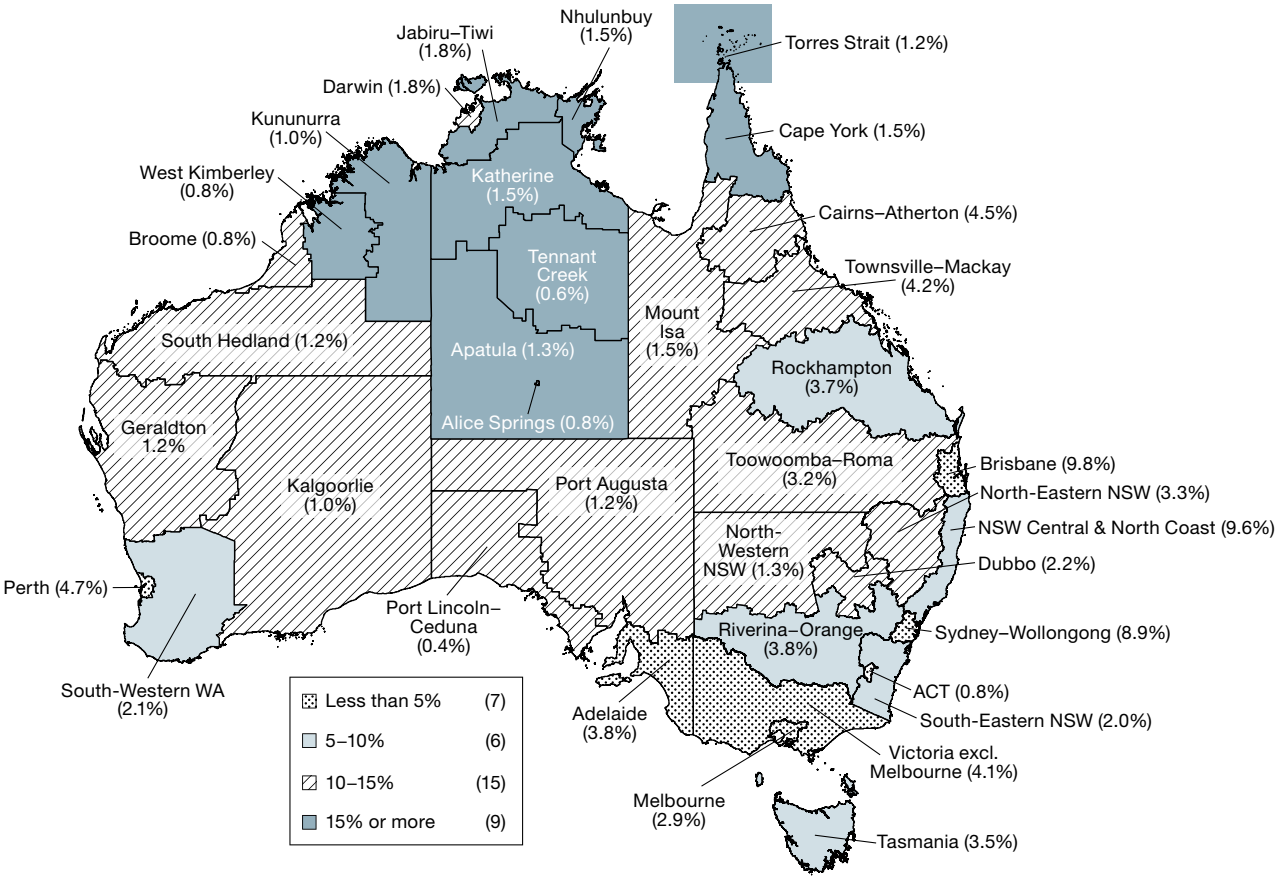
While the census provides considerable insight into the distribution of preschool participation, it is very limited in the Indigenous-specific factors that might explain participation. For this reason, in Section 5 we look at a more detailed survey—the Longitudinal Study of Indigenous Children (LSIC). In Section 6 we exploit another dataset—the Australian Early Development Index (AEDI), to look at the difference in a range of child development outcomes between Indigenous children who did and did not participate in preschool. In Section 7 we return to the census and look at the characteristics of those Indigenous Australians who are identified as working in the preschool industry. The final section provides some concluding comments. However, initially we look at the data used in the analysis.

2. Data

Results presented in this paper are based on analysis of the 2006 and 2011 Censuses of Population and Housing, with comparisons made to a number of other data collections as explained below. In 2006, the estimated resident population (ERP) of Indigenous Australians was around 517,000. By 2011, the preliminary ERP had increased to around 670,000. This population growth was much faster than suggested by the number of births of Indigenous children minus deaths within the population, meaning that some of those people who were identified as being Indigenous in 2011 were either missed from the 2006 Census or were identified as being non-Indigenous. We recommend keeping this above-projected population growth in mind when making conclusions based on the analysis presented in this paper.

Although the range is reasonably arbitrary, those in scope of early childhood education programs range from roughly 0–8 years of age. According to the 2011 Census, there were 119,617 children in this age range who were counted and identified as being Indigenous alongside a total of 2,265,214 children of the same age counted and identified as being non-Indigenous. There is, however, a substantial undercount amongst the Indigenous population and after applying State- or Territory-specific and age-specific undercount factors, it is estimated that there was a total of 146,130 Indigenous children aged 0–8 years, or 5.7 per cent of the relevant Australian population in 2011.

FIGURE 1. Proportion of population aged 0–8 that is Indigenous (shading) by Indigenous Region and proportion of total Indigenous population aged 0–8 in each region (text), 2011



Source: Customised calculations using the 2011 Census.

To undertake analysis at the regional and local level, the 2011 Census Papers series[3] uses the Australian Indigenous Geographic Classification (AIGC).[4] The most aggregated level of geography in the AIGC is Indigenous Regions. There were 57 of these in the 2011 version of the AIGC. After excluding administrative regions, Jervis Bay and the Christmas–Cocos Keeling Island regions (both of which have very few Indigenous Australians in the targeted age range), this leaves 37 Indigenous Regions used in the analysis for this paper.

The 2011 Indigenous Regions are shown in Figure 1. The shading for the regions indicates the percentage of the 0–8-year-old population in the region who were estimated to be Indigenous, ranging from a little under the national average (5.0%) in the lightest shading to more than half of the population in the darkest shading. Estimated Indigenous and non-Indigenous populations are found by applying the age and state-specific undercount adjustment factors to the relevant census count for that region. The numbers after the Indigenous Region name refer to the percentage of the total 0–8-year-old Indigenous ERP who identified that region as their place of usual residence on the night of the census.

There are two key points that emerge from Figure 1. First, it is in more remote regions that the share of the population who identify as being Indigenous is highest. There are nine regions where more than half of the estimated population aged 0–8 years in 2011 were identified as being Indigenous, with the Torres Strait (92.1%), Apatula (92.1%), Jabiru–Tiwi (89.0%), Tennant Creek (84.9%) and the West

3. Other papers in the series can be downloaded from <http://caepr.anu.edu.au/publications/censuspapers.php>.
4. The AIGC is a four-level structure that builds up from the Statistical Area Level 1 which is common to both the AIGC and the Australian Statistical Geography Standard. The next level above the Statistical Area Level 1 in the AIGC is Indigenous Locations, of which there were 1,116. The next level above Indigenous Locations are Indigenous Areas, of which there were 429. This number lowers to 411 substantive areas after excluding administrative codes representing those in a particular State or Territory who did not give any additional detail on their place of usual residence, or who were migratory on the night of the census.

Kimberley (81.8%) all having more than four out of every five usual residents being Indigenous.

While it is remote regions in north, central and western parts of the country that have the highest percentage of the population being Indigenous, the regions with the greatest absolute number of Indigenous Australians are in the south and east of the country. The Brisbane, New South Wales Central and North Coast, and Sydney–Wollongong regions all have an Indigenous population estimate for the 0–8-year age group of 10,000 people or higher, whereas most of the remote regions have populations of around 2,000 Indigenous children or fewer. While a higher proportion of the Indigenous population lives in remote areas than the non-Indigenous population, the majority of the Indigenous population lives in urban areas.

In the 2011 Census, respondents were asked (usually on the behalf of others) 'Is the person attending a school or any other educational institution?'. Instructions were given to those filling out the form to 'include pre-school and external or correspondence students'. The respondents who are identified as attending an institution were then asked about the type of educational institution being attended, with the first option being pre-school and the next being different types of infant/primary schools (government, catholic, other non-government). Although respondents were instructed to 'visit www.abs.gov.au/censushelp for more information about year equivalents', given the variety of names for different levels of early childhood education, it is likely that there is a fair degree of compromised classification, particularly in jurisdictions which do not use the standard preschool/kindergarten labels for the two years preceding Year 1. Furthermore, many respondents may not be clear about whether preschool programs in LDCs constitute 'attendance at an educational institution'.

We will return to the way in which the census question is worded in the concluding section of this paper. However, another alternative data source for Indigenous preschool participation in Australia is the National Early Childhood Education and Care (ECEC) Collection. This collection has a range of detailed information on participation in preschool programs, including the age and Indigenous status of the child. However, this collection is based on administrative data, so there is no information on those children who were not participating in preschool. In order to calculate rates, therefore, it is necessary to use additional information on the size of the relevant population. For all children in Australia, this is a relatively straightforward task, as population estimates are reasonably robust and stable through time. For the Indigenous population, on the other hand, the choice of population data can be problematic and significantly impact on the rates generated.

We also benchmark data to sample surveys which, although lacking the large sample sizes that are contained in the census and administrative data sets, are administered by interviewers and therefore give respondents greater opportunity to seek clarification on whether their child should or should not be classed as attending a preschool. One such survey used in the analysis is the LSIC or *Footprints in Time,* the first large-scale longitudinal survey in Australia to focus on the development of Indigenous children. The first wave of the survey (which is the focus of this paper) was carried out between April 2008 and February 2009, and collected information on 1,687 study children and their families.

The sample for the LSIC was designed around two cohorts—babies (born between December 2006 and November 2007) and children (born between December 2003 and November 2004). The eventual sample comprised of 960 children in the baby cohort and 727 in the child cohort, with the latter being the focus of this paper. While the survey administrators aimed to keep the sample within these birth date ranges, in practice there were a minority of children in the sample who fell outside of them. Specifically, 32.2 per cent of the child cohort were younger than 42 months or older than 54 months. Sensitivity tests showed that results did not change considerably when only those in the target range were included in the analysis.

According to the Commonwealth department that administers the LSIC, the main objective of the study is to provide high quality quantitative and qualitative data that can be used to provide a better insight into how a child's early years affect their development. Specifically, *Footprints in Time* has four key research questions:

- What do Aboriginal and Torres Strait Islander children need to have the best start in life to grow up strong?
- What helps Aboriginal and Torres Strait Islander children to stay on track or get them to become healthier, more positive and strong?
- How are Aboriginal and Torres Strait Islander children raised?
- What is the importance of family, extended family and community in the early years of life and when growing up? (FaHCSIA 2009b)

As future waves of the survey become available, it will be possible to use the LSIC to answer the first two research questions and, in particular, track the association between early childhood education experiences and later outcomes.

The analysis presented in this paper though, is mainly descriptive and focuses on the third and fourth research questions listed above. The specific data items used in the analysis are discussed in the relevant section.

One limitation of the LSIC is that it does not include a non-Indigenous sample. For such comparisons, we use the AEDI. This survey was collected for the first time in 2009 and is based on a checklist completed by the teachers of children in their first year of full-time school (kindergarten, according to the nomenclature used in this paper). The checklist measures five key areas or domains of early childhood development: physical health and wellbeing, social competence, emotional maturity, language and cognitive skills (school-based), and communication skills and general knowledge.

Like the census, the AEDI is designed to be a population collection, with information sought on all children in their first year of full-time school. While coverage is not completely universal, the dataset available for analysis in this paper contained 261,203 children or 97.5% of the estimated national five-year-old population. This response rate is substantially higher than that of the population census, reflecting the large amount of resources devoted to the AEDI and, in particular, the support given to the collection by teachers across Australia.

While the AEDI was not designed exclusively for Indigenous children, there was considerable effort devoted to ensuring that the data collected was also useful in an Indigenous context. In total, there was information available in this paper on 12,452 Indigenous children nationwide. Once again, the usefulness of the AEDI is limited somewhat by its narrow population focus. However, for the population in scope, it provides a very rich source of cross-sectional data.

3. The geographic distribution of Indigenous preschool participation

According to the 2011 Census, 62.9 per cent of Indigenous children aged 4–5 years (who were not attending an infants or primary school) were participating in preschool. This is compared to 72.0 per cent of the non-Indigenous population of the same age. To put this another way— of every 10 Indigenous children who should be participating in preschool (based on non-Indigenous rates of participation), there is at least one child who is not.

In 2006, the comparative figure for the Indigenous population was 62.7 per cent and the comparative figure for the non-Indigenous population was 75.1 per cent. So, while there has only been a small increase in the rate of Indigenous preschool participation, because the non-Indigenous rate actually fell, the relative gap between the two populations has actually declined.

A potential reason for the decline in preschool participation amongst the non-Indigenous population is a shift towards the use of LDCs, which are likely to be poorly captured in the census. According to the 2005 Australian Bureau of Statistics (ABS) Child Care survey (ABS 2008)—the closest collection to the 2006 Census—there were around 86,700 children participating in LDC between the ages of 4 and 5 years. This represented around 16.7 per cent of the relevant population. By 2011, however, the number of 4–5-year-olds participating had increased to around 111,100 or 19.6 per cent of the population (ABS 2012b). At the same time, there was only a small increase in the number of children (of all ages) participating in preschool from 257,000 in 2005 to 265,000 in 2011. While many of the children in LDCs between the ages of 4 and 5 years may be participating in a preschool program there, this is likely to be under-represented in the census.

Given the limitations of the census mentioned above, it is worth benchmarking the results to the National ECEC collection. According to data from this collection provided by the Department of Education, Employment and Workplace Relations, there were 233,128 'Children aged 4 and 5 years enrolled in preschool in the year before full-time schooling' in 2011. Of these, 10,167 were identified as being Indigenous. This latter figure is very similar to the 10,360 Indigenous children aged 4–5 years counted in the census as participating in preschool, although it is quite likely that they do not represent exactly the same children, with biases in the different collections leaving different students out.

In order to turn this total figure from the National ECEC collection into a rate, it is necessary to divide by a population estimate. Until final population estimates are available, one option is to use the projected population based on the 2006 Census. This gives a total of 13,427 Indigenous children aged 4 years and an enrolment rate of 75.7 per cent. However, as has been documented previously in this series (Biddle 2012), the Indigenous population grew much faster between 2006 and 2011 than was projected. The projection-derived rate is therefore probably too high, especially in more urban parts of the country (Biddle 2012).

An alternative to using the projected Indigenous population as the denominator to calculate rates is to use the preliminary population estimates provided by the ABS (2012c). Dividing the national estimate of 0–4-year-olds by five gives an estimated 16,611 Indigenous children aged four in 2011. Using this as the denominator gives

TABLE 2. Percentage of Indigenous children not attending school and aged 4–5 years who were participating in preschool, by Indigenous Region, 2006 and 2011

	2006 Census			2011 Census		
Indigenous Region name	Indigenous	Non-Indigenous	Ratio	Indigenous	Non-Indigenous	Ratio
Dubbo	58.8	75.5	0.780	67.0	75.9	0.882
North-Eastern NSW	61.3	78.9	0.777	64.8	77.5	0.836
North-Western NSW	69.9	76.1	0.918	75.3	78.7	0.958
NSW Central and North Coast	70.1	78.6	0.892	69.9	77.2	0.905
Riverina–Orange	60.5	75.5	0.801	69.4	76.0	0.913
South-Eastern NSW	59.8	77.7	0.769	73.2	76.8	0.954
Sydney–Wollongong	65.3	74.9	0.872	66.9	73.8	0.907
Melbourne	63.1	75.6	0.834	63.6	74.8	0.851
Victoria excl. Melbourne	63.1	71.8	0.879	66.6	72.2	0.922
Brisbane	66.9	72.0	0.928	48.3	58.7	0.822
Cairns–Atherton	63.0	68.8	0.917	44.0	51.3	0.859
Cape York	42.3	74.4	0.569	69.7	57.3	1.216
Mount Isa	51.7	67.8	0.762	50.7	50.9	0.995
Rockhampton	63.3	67.6	0.937	44.1	49.5	0.891
Toowoomba–Roma	66.5	69.0	0.963	42.3	50.3	0.841
Torres Strait	65.5	100.0	0.655	79.4	83.3	0.953
Townsville–Mackay	61.9	68.5	0.904	44.7	51.9	0.862
Adelaide	77.7	84.6	0.918	76.5	83.1	0.920
Port Augusta	60.5	83.8	0.723	76.3	85.2	0.896
Port Lincoln–Ceduna	49.0	87.6	0.559	72.7	88.0	0.827
Broome	59.2	83.6	0.708	78.3	85.1	0.919
Geraldton	71.1	84.8	0.838	80.3	85.1	0.944
Kalgoorlie	67.2	82.2	0.818	77.6	83.8	0.926
Kununurra	52.4	75.0	0.699	70.1	69.6	1.007
Perth	73.6	81.2	0.906	73.9	84.0	0.879
South Hedland	61.0	83.5	0.731	70.6	84.9	0.831
South-Western WA	74.1	82.1	0.903	80.5	82.6	0.974
West Kimberley	49.1	83.3	0.589	71.4	87.5	0.816
Tasmania	52.7	55.5	0.951	51.9	53.9	0.963
Alice Springs	64.6	88.9	0.727	76.4	87.2	0.876
Apatula	35.4	99.7	0.354	58.7	76.9	0.763
Darwin	79.5	90.0	0.883	84.9	86.6	0.980
Jabiru–Tiwi	37.1	82.4	0.450	61.0	79.4	0.768
Katherine	47.8	89.9	0.531	65.7	90.4	0.727
Nhulunbuy	43.6	82.5	0.529	65.6	82.6	0.793
Tennant Creek	38.5	85.2	0.452	49.4	100.0	0.494
Australian Capital Territory	76.5	76.7	0.998	80.0	77.8	1.029

Source: Customised calculations based on the 2006 and 2011 Censuses.

a preschool enrolment rate of 61.2 per cent. This is not only lower than the projection-derived rate, but also lower than the census-based participation rate presented earlier (62.9%).

Such uncertainty around the rate of Indigenous preschool enrolment based on the National ECEC collection is symptomatic of a reliance on administrative data collections to estimate rates for small population subgroups like Indigenous Australians. There are related issues with calculating life expectancy, crime rates, literacy and numeracy rates, as well as a host of other important indicators of Indigenous outcomes. Put simply, we can use administrative data to get a reasonably robust estimate of how many Indigenous children are enrolled in preschool, but this tells us nothing about how many are not enrolled. For this, we are reliant on population estimates which come from different sources (a combination of the census and the Post-Enumeration survey), using a different methodology and in certain instances like when using projections, from a different time period.

Whether we use the census rates or rates based on the National ECEC, all sources of data suggest that Indigenous children are substantially less likely to participate in preschool than their non-Indigenous counterparts. However, these national averages from the census hide considerable variation in participation across the country. Returning to the census data, in the Toowoomba–Roma Indigenous Region only 42.3 per cent of the non-school Indigenous population aged 4–5 years was identified as participating in preschool. At the other end of the distribution, 84.9 per cent of the relevant Indigenous population in Darwin were participating.

This variation in preschool participation is summarised in Table 2. It gives the level of participation for Indigenous and non-Indigenous children aged 4–5 years who were not attending school. The first three columns are for the 2006 Indigenous population and the next three columns for 2011. Given the differences in definitions used in the different States and Territories for the year before full-time schooling, these differences do not necessarily reflect variation in exposure to early childhood education across the country. Instead, it is most informative to look at change through time within regions (keeping in mind that changes in boundaries have been controlled for); variation in preschool participation within each State or Territory; or the differences in ratios between the Indigenous and non-Indigenous rates of participation.

Despite the very small increase in preschool participation at the national level, when looking at individual regions there was a large increase in participation in many parts of the country, most of which were in regional or remote areas. For example, in the Cape York Indigenous Region there was an increase in participation from 42.3 per cent in 2006 to 69.7 per cent in 2011. A similarly large increase was found in Apatula (35.4 to 58.7%) and Jabiru–Tiwi in the Northern Territory (37.1 to 61.0%). While not as large, Nhulunbuy, Port Lincoln–Ceduna, West Kimberley, Katherine, Kununurra and Broome all saw a large increase in the percentage of the Indigenous population participating in preschool.

While there has been minimal reductions in the difference in preschool participation at the national level between Indigenous and non-Indigenous children (with that success only coming from non-Indigenous declines), the focus on remote preschooling in the Closing the Gap targets appears to have led to a significant reduction in the geographic variation within the Indigenous population. Specifically, 26 out of the 37 Indigenous Regions experienced a significant increase in the census-based preschool participation rate between 2006 and 2011.

Despite—or perhaps because of—this improvement in some regions in terms of preschool participation, there is still considerable geographic variation within some jurisdictions. Some of the biggest differences were found in Queensland and the Northern Territory. In the former, the Torres Strait region stands out as having a relatively high rate of participation (79.4%), with many other regions having rates of participation below 50 per cent. In the Northern Territory, there was considerably higher participation in Darwin and Alice Springs than in more remote parts of the Territory.

In terms of preschool participation, not only does Cape York stand out as a region that has witnessed considerable improvement over the last intercensal period, but it is also the only region for which Indigenous participation is considerably higher than that of non-Indigenous participation. This was not the case in 2006, when rates were just a little over half that of the non-Indigenous population. The Australian Capital Territory and Kununurra also have rates that are a little higher for the Indigenous population compared to the non-Indigenous population in those regions.

While there are large differences by jurisdiction and significant regional variation, it is still the case that Indigenous preschool participation in the census is on average higher in less remote regions. This raises the question of the extent to which national differences between Indigenous and non-Indigenous children discussed earlier are driven by the relative geographic distributions of the two populations.

One way to test for the extent to which geography explains differences in Indigenous education participation is to estimate what proportion of Indigenous Australians would be participating in preschool if the Indigenous population had the same geographic distribution as the non-Indigenous population. Similar to age standardisation of disease rates (Ahmad et al. 2000), geographic standardisation uses the proportion of the Indigenous population in each geographic location (in this case Indigenous Areas, the level of geography below Indigenous Regions) as the basis of the calculations, but weights each location by the share of the non-Indigenous population in that region, as opposed to the Indigenous population when calculating national percentages.

Using this approach, if the 2006 Indigenous population had the same geographic distribution as the 2011 non-Indigenous population, then 66.3 per cent of those who were not attending full-time schooling would be participating in preschool. Keeping in mind that the non-standardised rate was 62.7 per cent, it would appear that some but not all of the gap in participation was driven by geography. Moving ahead to the most recent census, if the 2011 Indigenous population had the same geographic distribution as the 2011 non-Indigenous population, then 65.0 per cent of non-school, Indigenous 4–5-year-olds would be participating.

There are two main points from this standardisation. First, less than a quarter of the 2011 gap in preschool participation between Indigenous and non-Indigenous 4–5-year-olds was explained by the area in which they live. This is actually lower than the extent to which geographic standardisation explained the gap in school completion in 2006 (Biddle & Cameron 2012). Geography is important. However, there are additional factors that explain the disparities.

The second point to note from the standardisation process is that, controlling for geography, Indigenous children have actually became slightly less likely to participate in preschool over the last intercensal period. This may reflect broader trends in more urban parts of the country in terms of a movement towards early childhood education as part of LDCs. However, what it does show is that the main reason why the Indigenous population has maintained its level of preschool participation in the census and closed the gap with the non-Indigenous population is because it has become a more urban population (as shown in Biddle 2012).

4. The household and family context of Indigenous preschool participation

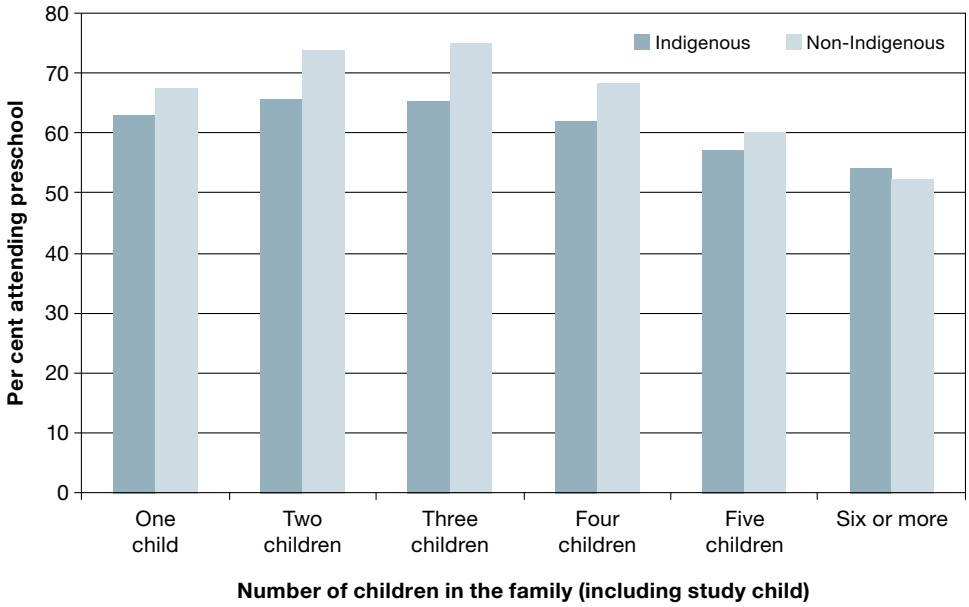
One of the main findings from the previous section was that although geographic variation is important in explaining differences in preschool participation within the Indigenous population, it only explains a small proportion of the difference between Indigenous and non-Indigenous children. In this section, we consider whether other characteristics of the individual child and their family context explain more of the variation.

One potential source of variation suggested by Table 2 is by Aboriginal as opposed to Torres Strait Islander status. The Torres Strait Indigenous Region was found to have the highest level of participation amongst the eight regions in Queensland. An obvious question is whether this difference was driven by differences between Aboriginal children living in Queensland and Torres Strait Islander children or whether it was something to do with the region itself. Looking at the data, it would appear that it is the latter. Specifically, 47.3 per cent of children (aged 4–5 years, not attending preschool) who lived in Queensland and identified as being Aboriginal only were participating in preschool. The relevant percentage for Torres Strait Islander children was 51.3 per cent and for those who were identified as being Aboriginal and Torres Strait Islander it was 49.5 per cent. In essence, Torres Strait Islander children's rates were higher, but not nearly by as much as differences between those living in the Torres Strait and the rest of the State.

Another potential restriction on preschool participation for the Indigenous population is a school system that is not necessarily receptive to their language background. To test properly whether this was inhibiting preschool participation, randomised controlled trials (RCTs) which vary the way in which preschool was delivered would need to be undertaken. We will return to the potential benefit of RCTs in the final section of this paper. In the meantime, we can look at differences in preschool participation between those who do and do not speak an Indigenous language to test for the potential effect.

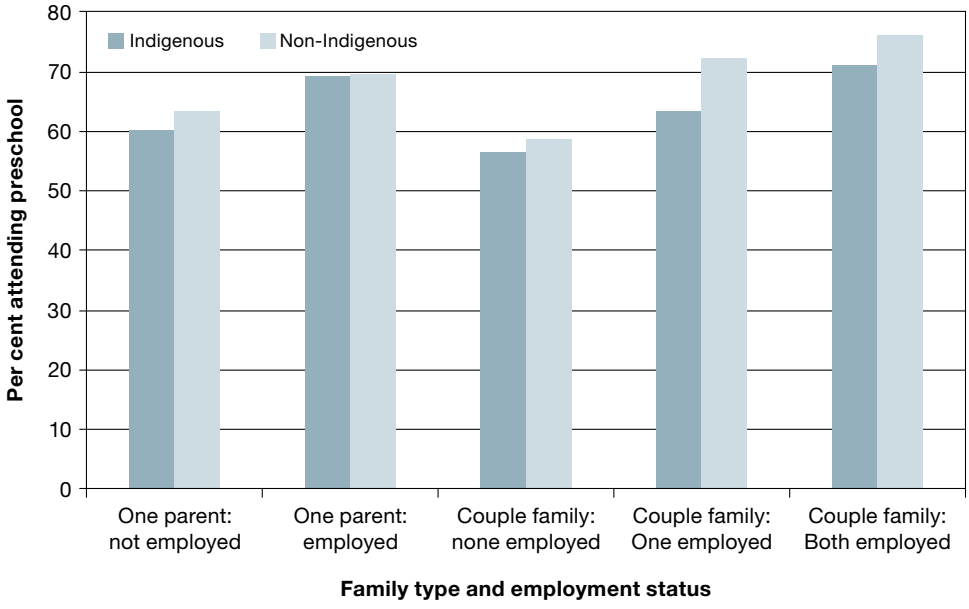
According to the 2011 Census, there were 1,525 Indigenous children aged 4–5 years who were not attending school and who spoke an Indigenous language at home. Of these, 64.9 per cent were participating in preschool. This is actually higher than the percentage of the relevant population who did not speak an Indigenous language who were participating (62.9%). While this does not imply that additional Indigenous language resources in preschool would not improve participation, it does show that the use of Indigenous languages amongst

FIGURE 2. Proportion of 4–5-year-olds not attending school who were attending preschool, by Indigenous status and number of children in the family



Source: Customised calculations based on the 2011 Census.

FIGURE 3. Proportion of 4–5-year-olds not attending school who were attending preschool, by Indigenous status, family status and employment status of parents



Source: Customised calculations based on the 2011 Census.

the Indigenous population is not the main reason for low preschool participation.

One of the differences between the families of Indigenous children and those of other children is that, on average, Indigenous children have a much greater number of other children living in the family. This is mainly because of relatively high rates of fertility amongst Indigenous females (ABS 2009), meaning that Indigenous children have a greater number of siblings on average than non-Indigenous children. For example, according to the 2011 Census, 13.4 per cent of Indigenous children live in a family with five or more children (including themselves) compared to 3.7 per cent of non-Indigenous children in such households.

Figure 2 shows that such large households are associated with low rates of preschool participation.[5] Focusing once again on those children aged 4–5 years who are not attending school, the figure gives the level of preschool participation for those children with only one child in the family (that is, themselves); those with two children; and so on up until those children in families with six or more children.

Results presented in Figure 2 show similar patterns for Indigenous children and non-Indigenous children. Rates start off relatively low when the child is the only child in the family, potentially because the parents of these children feel they have the capacity to give the child a suitable education at home. Rates then increase amongst those families with two or three children, before declining for those with four, five and (especially) six or more children. It is likely that those families with a relatively large number of children are unable to afford to send all their children to formal education or care, with the economies of scale making it relatively efficient to provide the education at home. An important point though is that, apart from those families with six or more children, even within a particular size, Indigenous children are less likely to be participating in preschool.

In a future paper in this series, authors from the Centre for Aboriginal Economic Policy Research will look at the distribution of employment between Indigenous and non-Indigenous Australians and within the Indigenous population by geography and other characteristics.

The analysis will show that while there has been some increase in employment that is not part of the Community Development Employment Projects scheme over the last intercensal period, rates of employment for the Indigenous still lag behind those of the non-Indigenous population. What this means is that Indigenous children are much more likely to be living in a family where one or both parents are not employed. Figure 3 shows a reasonably strong but complicated relationship between parental employment and preschool participation.

For the non-Indigenous population, the family types with the highest rates of preschool participation are, in order, couple families with two parents employed and couple families with one parent employed. While the former also has the highest percentage for the Indigenous population, it is one parent families where the parent is employed that participation is second highest. Indeed, in this family type, Indigenous participation is roughly comparable to non-Indigenous participation.

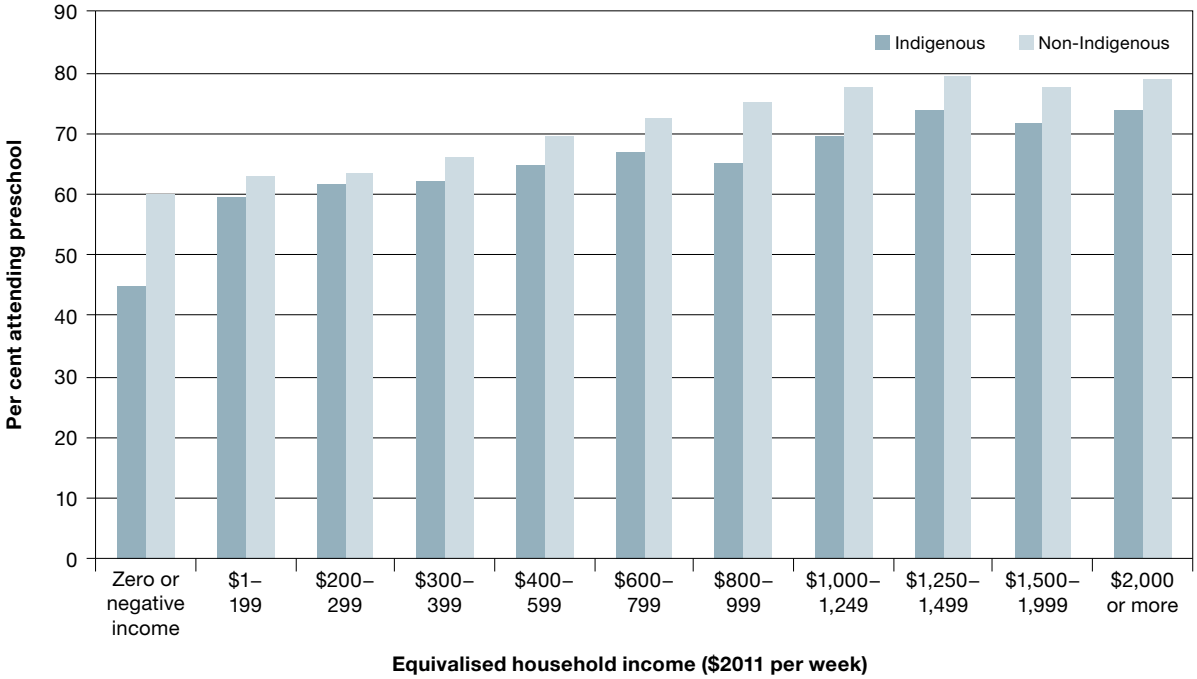
The family type and employment combinations with the lowest level of preschool participation amongst children in that family are those where no one is employed, with particularly low percentages in couple families where both are not employed. Not only are rates even lower for Indigenous children in these family types, but Indigenous children are disproportionally found in them, with a combined 48.7 per cent of Indigenous children falling into these two categories compared to only 13.8 per cent of non-Indigenous children.

One of the potential reasons for why preschool participation varies with the employment status of a child's parents is that preschool can be used as a form of child care, something that is needed more for those who are employed. However, the variation is also likely to be due to variation in income. In some, but not all, jurisdictions, there is a fee for preschool attendance. This potential effect of income is demonstrated in Figure 4, which gives the rate of preschool participation (for 4–5-year-olds not attending school) by the equivalised[6] income of the household in which the child lives.

5. As it is not possible to identify the household and family characteristics of those who were away from their place of usual residence on the night of the census, the analysis summarised in Figures 3 and 4 focuses on those who were at home. However, given that the census was enumerated during school term and young Indigenous children have a relatively low rate of temporary mobility (Biddle 2012), only a relatively small proportion of the population is excluded.

6. Equivalisation takes into account the fact that, for a given level of household income, an additional person in the household will require some additional resources, but not as many resources as the first person in the household. For example, while additional food will need to be purchased, household members are generally able to share the costs of heating. The ABS uses the modified OECD scale which assumes each additional adult costs 0.5 times as much as the first adult and each additional child (under 15 years) 0.3 times as much. Numbers expressed in Figure 4 are therefore equivalent to the income of a single person household.

FIGURE 4. Proportion of 4–5-year-olds not attending school who were attending preschool, by Indigenous status and equivalised household income



Source: Customised calculations based on the 2011 Census.

Figure 4 shows that as equivalised household income increases, so too does participation in preschool. There is a very large difference between Indigenous and non-Indigenous children living in households with zero or negative income. However, it should be noted that this represents only a very small proportion of households (less than 1% in both cases). Across the income distribution, however, Indigenous children have lower rates of participation than non-Indigenous children, with the difference greatest at the middle part of the distribution—$800–$1,249 per week.

5. Factors associated with Indigenous preschool participation

The role of the public sector in supporting Indigenous early childhood education is recognised in the Council of Australian Governments' Closing the Gap targets. Specifically, the third target is to ensure access to early childhood education for all Indigenous four-year-olds in remote communities within five years (FaHCSIA 2009a). That is, by 2013. Although the target is related to access rather than attendance, once infrastructure is in place the focus should ideally shift to removing financial and social barriers to access, not just geographic ones. In terms of social access, the most important barrier to overcome is the parents and guardians of Indigenous children feeling that there is a preschool available that is supportive of their child's needs and aspirations.

In order to overcome the barriers to Indigenous preschool participation, it is important to identify the factors that are currently associated with an Indigenous child attending preschool. The results presented in Section 3 demonstrate that the region in which a child lives is one predictor of whether or not they are likely to be participating in preschool. However, geography explains only a small proportion of the difference between Indigenous and non-Indigenous children. Such broad regional classifications also do not identify specific community-level factors that may be driving these differences. Furthermore, there is likely to be as much variation at the household and family level in terms of participation.

In September 2013, individual-level data will become available from the census through the 5% Census Sample File. This will allow researchers to look at the relationship between geography, demographic characteristics and socioeconomic characteristics (like those presented in Section 4) in a single analysis. The Census Sample File is by definition, however, limited to data collected in the census. It is therefore important to look at the relationship between other characteristics and preschool participation using alternative data sources.

To do so, we use data from the LSIC. The main variable of interest is the probability of an Indigenous three-, four- or five-year-old attending a preschool. This represents the child cohort of the LSIC. In the LSIC, the study child's parents were asked whether the child goes to preschool, kindergarten or school. Options for types of preschool are: preschool program in a school; preschool program in a non-school centre; and mobile preschool. This is a slightly broader definition than that used in the census. Those who are currently attending a Year One or a pre-Year One program in a school are considered out of scope and are excluded from the analysis.

Also utilising the LSIC, Hewitt and Walter (2011) examined the social and economic factors associated with preschool attendance. Significant findings from this analysis include the discovery that families whose main source of income is social support are less likely to have attended preschool, as are children with poor health. Factors underlying patterns of Indigenous early childhood education are likely to be complex and multifaceted. Exploring the reasons for low levels of Indigenous participation, Grace and Trudgett (2011) found that some parents fear that engagement will undermine Aboriginal culture and that children may experience a lack of Aboriginal leadership and involvement. Other parents feel there is a lack of cultural awareness by early childhood staff, involving a lack of respect for kinship networks and Aboriginal ways of knowing.

There are a range of factors available on the LSIC that may be associated with preschool attendance. Some, like age, relate to student readiness. Others, like the characteristics of the area in which the child lives, are related to geographic access. A further set of variables including carer income, employment and education participation are likely to be related in part to the need for preschool as a form of child care and the availability of other formal options. Most of the other variables though are likely to be related to the views the carer and wider family networks have about the potential benefits that preschool might have for the child and whether it is worth the cost (broadly defined).

The relationship these potential factors have with preschool participation is analysed at two levels and via two models. Model 1 uses a set of factors which are based on the characteristics of the child. This includes their sex, their age, whether or not they speak an Indigenous language and a range of variables related to ongoing attachment to Indigenous culture. The final child-level variable is whether or not the child has lived in two or more homes since birth. The first model estimated includes these child-level variables only.

The second model estimated includes characteristics of the child's carer, household and the area in which they live (in addition to the child-level variables from Model 1). Carer characteristics include whether the carer is male, non-Indigenous, their age, whether they are studying, whether or not they are working, whether or not they changed usual residence in the year preceding the survey, and whether or not they were discriminated against due to their Indigenous status. Family- or household-level characteristics include the income of the carer and their spouse, the presence of children's books in the house, and whether or not the family receives extra assistance with household expenses.

The final set of variables in Model 2 relate to the area in which the child lives. The first geographic variable is the Level of Relative Isolation, or the average distance of the area in which the person lives to population centres of various sizes. This variable is a standard output on the LSIC, and according to FaHCSIA:

> *Footprints in Time* uses a classification system of remoteness known as the Level of Relative Isolation (LORI). Previously used in the Western Australian Aboriginal Child Health Survey (WAACHS), LORI is based on an extension of the 18-point ARIA (Accessibility/ Remoteness Index of Australia) called ARIA++. Five categories of isolation have been defined, ranging from None (the Brisbane metropolitan area) to Low (for example, Shepparton), Moderate (for example, Derby), High (for example, Doomadgee) and Extreme (for example, Moa Island) (FaHCSIA 2009b: 33).

The second geographic variable controlled for in the analysis is the Index of Relative Indigenous Socioeconomic Outcomes (IRSEO) presented in Biddle (2009). The IRSEO was calculated based on a principal components analysis of nine variables from the 2006 Census—three related to employment, three related to education, two related to housing and one related to income. It is calculated at the Indigenous Area level, the middle geographic level in the Australian Indigenous Geographic Classification. Unlike the similar and better known Socioeconomic Indexes for Areas, the IRSEO is calculated specifically for Indigenous Australians. A special version of the LSIC was created for this analysis by linking the IRSEO to the individual data on the LSIC based on the Indigenous Area of usual residence.

TABLE 3. Factors associated with attending preschool: Indigenous children aged 3, 4 and 5 years who were not attending a Year One or pre-Year One program at school, Wave 1 (2008–09)

Explanatory variables	Model 1	Model 2
Study child female	0.003	0.047
Study child aged 3 years	–0.193***	–0.202***
Study child aged 5 years	0.299***	0.416***
Study child's dominant language is an Indigenous language	–0.051	0.026
Study child goes to cultural events often or very often	0.121**	0.091
Study child is taught traditional practices often or very often	–0.100	–0.028
Study child is taught traditional arts often or very often	0.099	0.043
Study child identified with a tribal group, a language group or clan	0.100*	0.123
Study child has a connection to a country or place	–0.077	–0.086
Study child has lived in two or more homes since birth	–0.085*	–0.103
There are no children's books in the household		0.195
Main carer is male		0.138
Main carer is non-Indigenous		0.078
Main carer is aged 15–19		–0.072
Main carer is aged 30+		–0.144*
Main carer has a spouse living in the same household		–0.008
Main carer is a current student		0.021
Main carer is employed		0.136
Main carer is employed part-time (as opposed to full-time)		–0.142
Income of carer and partner is less than $250 per week (after deductions)		–0.087
Income of carer and partner is more than $800 per week (after deductions)		0.106
Receives extra assistance with household expenses		–0.112
Changed usual residence in the previous 12 months		–0.183**
Lives in an area with an IRSEO in the second quartile		0.270***
Lives in an area with an IRSEO in the third quartile		0.304***
Lives in an area with an IRSEO in the fourth quartile		0.129
Lives in an area of low relative isolation		–0.090
Lives in an area of moderate relative isolation		–0.116
Lives in an area of high/extreme relative isolation		0.053
Main carer was discriminated against because they are Indigenous		–0.109*
Predicted probability of base case	0.465	0.435
Pseudo R-Squared	0.0600	0.1405
Number of observations	513	343

Note: Variables for which the coefficient is statistically significant at the 1% level of significance are labelled ***; those statistically significant at the 5% level of significance only are labelled **, whereas those statistically significant at the 10% level of significance only are labelled *.

The base case individual for Model 1 is male; aged 4; has English as their dominant language; did not have any of the Indigenous-attachment variables; has lived in only one home since birth. The base case individual in Model 2 has the same characteristics but, in addition; has some children's books in the house; has a carer who is male, Indigenous, aged 20–29; does not have a spouse living in the household; is not currently a student or employed; and did not change usual residence in the last 12 months. Furthermore, the income of the carer and partner is between $250 and $800 per week without receiving any extra assistance for household expenses. Finally, the area in which the child lives is in the most socioeconomically advantaged quartile of areas and in the least isolated set of areas. It also is reported by the carer as being a good community or neighbourhood for little kids, which is safe and has good places to play.

The analysis of factors associated with Indigenous preschool participation is presented in Table 3. Results are presented as marginal effects, or the difference in the predicted probability of attending preschool after changing one characteristic, but keeping all else constant. These changes in probability should be compared to the predicted probability of the base case individual, which is given in the third last line of the table. The characteristics of the base case individual (and their carer, household and community) are given underneath the table, as is the way in which statistical significance is reported.

Looking at the results from Model 1, it is clear that there is a large difference in preschool participation by age, with three-year-olds much less likely to be attending than four-year-olds, and five-year-olds much more likely. While this is not surprising, it is important to keep in mind that the other results hold after controlling for age.

Because of the relatively small sample size, it is quite likely that some of the other variables that were not found to be significant do in fact have an association. Nonetheless, a few interesting results emerge from the analysis. First, going to cultural events and identifying with a tribal group, a language group or clan were both associated with higher rates of participation. While some of the other variables that were related to Indigenous cultural maintenance were negative, it would seem that attendance at preschool and maintenance of Indigenous culture is not mutually exclusive.

The second important result from Model 1 is that those children who have lived in two or more homes since birth are significantly less likely to be participating in preschool than those who had lived in the same household since birth. This implies that disruption from changing households can have a negative effect on early childhood education, not just infants, primary and secondary education.

Although some of the marginal effects for the carer and family variables in Model 2 were reasonably large, few of them were statistically significant. This shows once again that because of the relatively low sample size of the child cohort in the LSIC, it is difficult to be too definitive about all the variables that are associated with preschool attendance.

Interestingly, the areas that are identified as having the highest level of participation are those in the second and third quartile in terms of socioeconomic disadvantage. Access issues may explain why those children in the most disadvantaged areas have relatively low rates of participation and it may be that the parents of children in the most advantaged areas find preschool too expensive or use other forms of childcare or early childhood education than preschool.

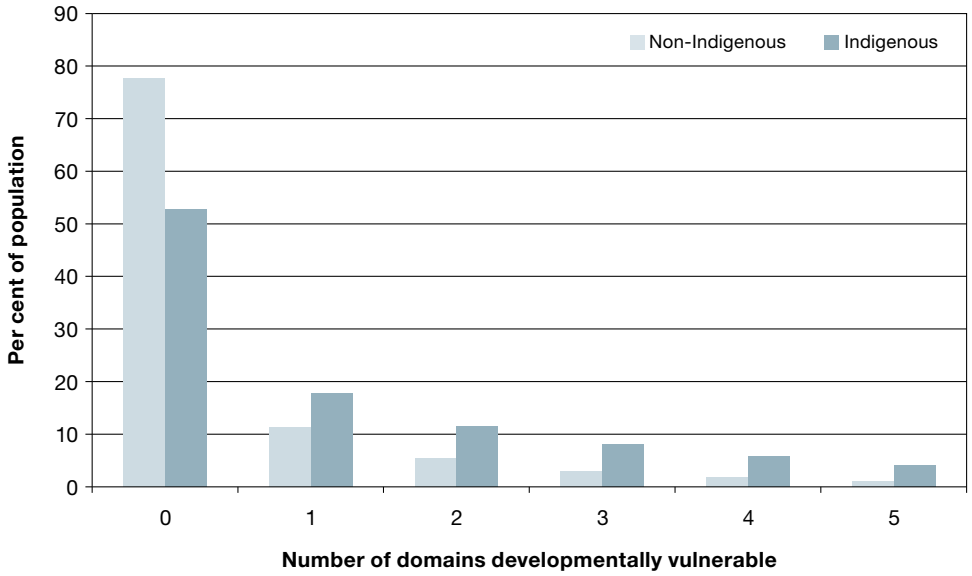
One finding from Table 2 has probably the highest policy relevance—those children who have a carer who felt they were discriminated against because of their Indigenous status are significantly less likely to be attending preschool. Formal, mainstream education has the potential to be alienating for Indigenous students and their families, with Biddle (2007) showing that children who grow up in areas with a greater number of Indigenous preschool workers being more likely to participate. While it is not possible to be too definitive about the causal relationships, the results in Table 3 give circumstantial evidence that ongoing discrimination is a further cause of disengagement from formal education.

6. Difference in outcomes between preschool and non-preschool participants

While the care aspects of preschool have been alluded to in this paper (and are no doubt important for some), one of the main reasons for governments subsidising various forms of early childhood education is the potential improvement in school readiness for those who attend. The second set of individual-level analysis (drawing on the AEDI) included in this paper uses econometric regression models to test explicitly for differences in developmental vulnerability between Indigenous and non-Indigenous children, after controlling for whether or not the child was reported to have participated in preschool or not.

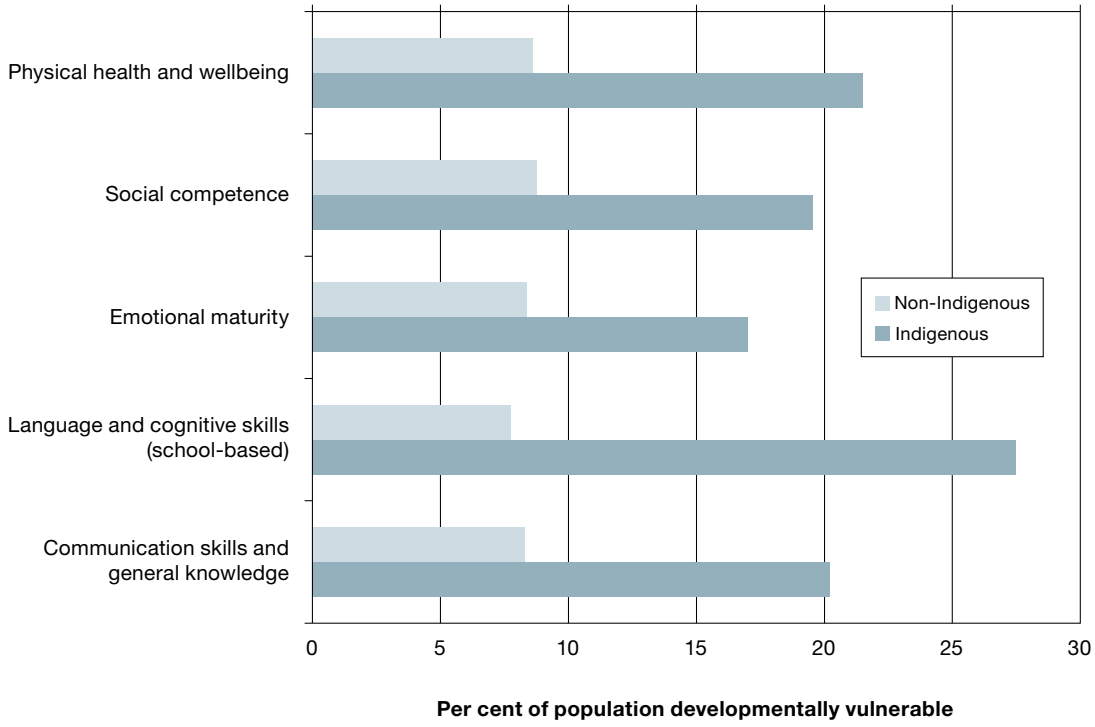
Figure 5 shows that Indigenous children are much more likely to be developmentally vulnerable in one or more domain than non-Indigenous children. Specifically, 47.3 per cent of Indigenous children in the sample were identified as being developmentally vulnerable across one or more domains compared to 22.3 per cent of non-Indigenous children. At the other end of the distribution, 4.1 per cent of Indigenous children are identified as being developmentally vulnerable in all five domains compared to 1.0 per cent of non-Indigenous children. This represents a considerable disadvantage at the start of a child's schooling.

FIGURE 5. Number of domains in which Indigenous and non-Indigenous children in the first year of school are identified as being developmentally vulnerable, 2009



Source: Customised calculations based on the 2009 AEDI.

FIGURE 6. Percentage of Indigenous and non-Indigenous children in first year of school who are identified as being developmentally vulnerable by domain, 2009



Source: Customised calculations based on the 2009 AEDI.

Although they are all important, not all of the domains in the AEDI are likely to have the same effect on later development outcomes. Furthermore, although Indigenous children are more likely to be rated by their teachers as being developmentally vulnerable for each of the five domains, the size of the differences vary considerably by domain. Figure 6 shows that Indigenous children are 2.0 times as likely to be rated as developmentally vulnerable in terms of 'emotional maturity' (17.0% compared to 8.4%). This is clearly a large difference. However, 27.5% of Indigenous children in their first year of school are identified as being developmentally vulnerable in terms of 'language and cognitive skills (school-based)'—3.6 times as high as the percentage for non-Indigenous children (7.7%).

Figures 5 and 6 show that Indigenous children do indeed start school with different strengths and weaknesses than non-Indigenous children. That is not to say that all, or even most Indigenous children start off poorly. While they are more likely to be reported as developmentally vulnerable in all of the domains covered in the AEDI, there is only one domain for which a quarter or more of Indigenous children are listed as being developmentally vulnerable. Nonetheless, the results from the AEDI show that Indigenous children start school with lower levels of cognitive and non-cognitive ability than their non-Indigenous peers.

One obvious explanation for this lower level of ability is that Indigenous children are less likely to participate in preschool than non-Indigenous children (as shown in Sections 3 and 4 of this paper). This raises the question of whether Indigenous children are still more likely to be developmentally vulnerable in each particular domain once preschool participation has been controlled for. The results from the AEDI do show that those who attended preschool appear to have higher measured cognitive and non-cognitive ability than those who did not. On average, a non-Indigenous child who attended preschool was identified as being developmentally vulnerable in 0.4 domains (out of a possible 5). This is significantly lower than the 0.6 domains that a non-Indigenous child who did not attend preschool was identified as being developmentally vulnerable in. This should not be interpreted as a causal effect, as there are other observed and unobserved characteristics that vary by preschool attendance that are not controlled for. Nonetheless, the result does show that preschool is associated with lower levels of developmental vulnerability.

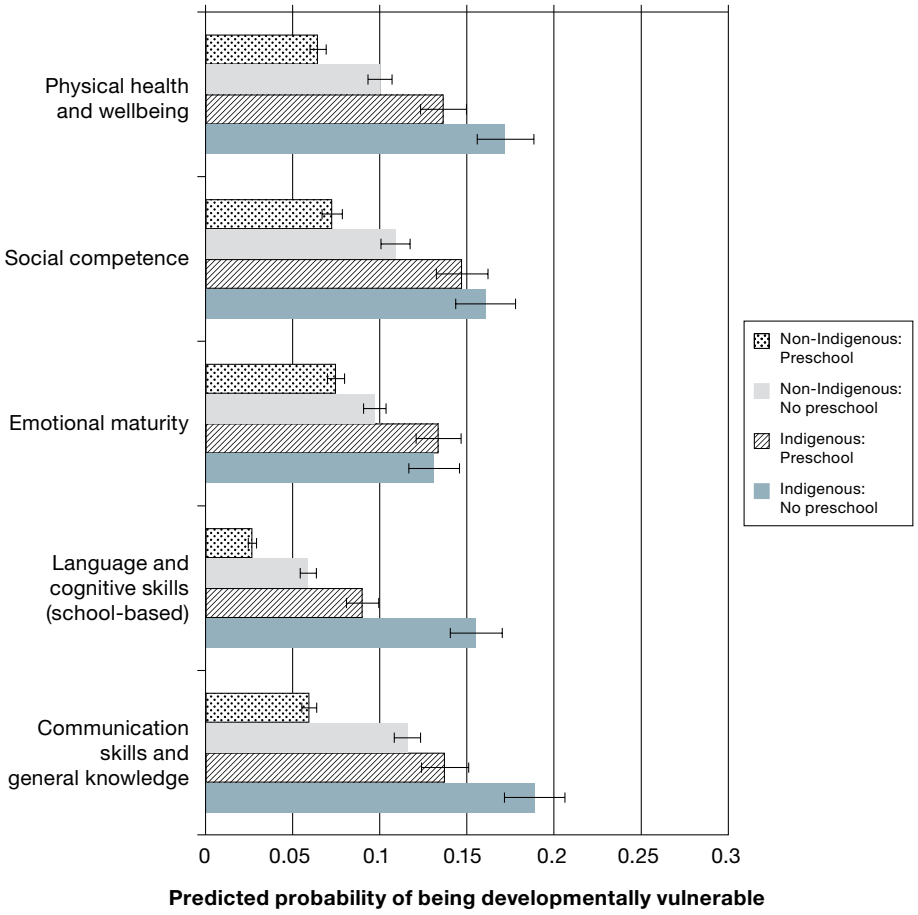
While preschool is associated with better school readiness, preschool participation does not explain all of the difference between Indigenous and non-Indigenous children. The average number of domains for Indigenous children who attended preschool was 1.0. This is significantly lower than the 1.2 domains for those who did not attend preschool, showing that there is an association between preschool and reduced developmental vulnerability for both Indigenous and non-Indigenous children. However, compared to the 0.4 domains for non-Indigenous children who attended preschool, it is clear that preschool attendance is only one aspect of the difference between the two populations in terms of school readiness.

Looking at each of the domains separately, we also control for the child's gender, the month at which they were tested, the level of remoteness of the area in which they lived, the level of socioeconomic advantage or disadvantage, and the State or Territory in which they lived. While there are other data items on the AEDI that may explain developmental vulnerability such as language ability, absence from school or physical disability, we do not control for these factors in the model as they are potentially affected by preschool, our main variable of interest.

Figure 7 shows the percentage of Indigenous and non-Indigenous children who were predicted as being developmentally vulnerable in their first year of school, conditional on whether they attended preschool or not. These predictions are found by holding constant other aspects of the model at a particular base case, as described underneath the figure. The error bars represent the 95 per cent confidence interval for that prediction.

Indigenous children who attended preschool were predicted to be significantly less likely to be developmentally vulnerable than those who did not attend preschool in 3 of the 5 domains, with the biggest differences for the 'language and cognitive skills (school-based)' domain. Once again, this should not be treated as a causal effect, as those who attend preschool are different in other ways not controlled for in the model. Nonetheless, the results do at least demonstrate an association and give *prima facie* evidence that expanding access to preschool education has the potential to improve the school readiness of Indigenous children.

FIGURE 7. Predicted probability of being developmentally vulnerable by domain: Indigenous and non-Indigenous children by preschool status, 2009



Source: Customised calculations based on the 2009 AEDI.

While those Indigenous children who attend preschool are less likely to be developmentally vulnerable in many of the domains than those who did not, comparing Indigenous and non-Indigenous preschool attendees shows that this does not explain much of the gap in school readiness. There are no domains for which Indigenous preschool attendees do not have a significantly higher predicted probability than non-Indigenous preschool attendees. For all the variables, and in particular for 'language and cognitive skills (school-based)', there are still large differences between Indigenous and non-Indigenous children, regardless of previous preschool attendance.

There are a number of possible reasons for why Indigenous children who participated in preschool still had higher levels of developmental vulnerability. One explanation is that the quality of preschool education is likely to vary considerably across institutions. We are not aware of any data that demonstrates whether this is the case or not, but it is a potential avenue of further analysis.

A second possible reason for the remaining differences is that among those Indigenous children who do participate in early childhood education, levels of absenteeism are higher than for non-Indigenous children. Taylor (2010) argues that Indigenous children are disproportionately represented among the most consistent non-attenders and miss a great deal more preschool than non-Indigenous children. Infrequent preschool attendance can result in large gaps in the acquisition and understanding of basic literacy and numeracy.

A third reason is that preschool education, or any type of formal schooling, can only do so much in terms of improving child outcomes and reducing geographic, ethnic and socioeconomic disparities. According to the Longitudinal Study of Australian Children, even amongst those who were attending preschool, the average hours of attendance were only 13.5 hours per week. A much larger proportion of the week is spent at home with the child interacting with parents, siblings and other family members.

In a system where the type of knowledge valued in schools relates more to mainstream than to Indigenous notions of learning, as long as Indigenous parents have lower levels of formal education, gaps between Indigenous and non-Indigenous children are likely to remain. The policy response to this is threefold: continue to work to improve the education outcomes of Indigenous parents; look at additional ways to incorporate Indigenous knowledge in assessment; and ensure the quality of the preschools that Indigenous children attend are as high or even higher than those of non-Indigenous students.

7. Indigenous preschool workers

One of the biggest inputs into a preschool education is the staff who work in them. Given that Indigenous children tend to attend preschool in the areas in which they live (unlike with tertiary education, for example), improvements in the quality of preschool education for Indigenous children is likely to come in part from an increase in the level and quality of Indigenous adults who work in the industry. There were a total of 521 Indigenous adults who were identified in the 2011 Census as working in the preschool industry.[7] This equates to 2.3 per cent of the total number of workers in the preschool industry, substantially higher than the 1.5 per cent of the total workforce identified as being Indigenous. Only a very small proportion of Indigenous preschool workers were identified as being male (4.8%), though this was higher than the proportion of the non-Indigenous preschool workforce.

There are a range of occupations within the preschool industry. There are not only teachers, but also managers or administrators and support staff. Indeed, the majority of non-Indigenous workers in the preschool industry (55.1%) were neither identified as a Manager or a Professional. This figure was much higher for the Indigenous population (71.6%), showing that Indigenous preschool workers were much more likely to be supporting preschool teachers, rather than being teachers themselves. The role that such workers play in preschool education should not be undervalued. However, it is important to recognise that non-Managers/Professionals are less likely to be able to shape the curriculum and mode of instruction within the school in which they work.

This lower occupation status of Indigenous preschool workers in part reflects their lower level of education attainment. According to the 2011 Census, 43.6 per cent of Indigenous preschool workers had completed Year 12. This is substantially lower than for the non-Indigenous population (71.5%). There is also a smaller proportion of Indigenous preschool workers with a degree or higher (17.5%) compared to the non-Indigenous population (36.4%). Those preschool workers without higher degrees are still likely to make a strong contribution to children's learning outcomes. However, given the focus on academic credentials as part of the National Quality Framework mentioned earlier, it is important that Indigenous preschool workers be given the opportunity to improve their formal skills, in order to make sure they are able to continue to contribute to the preschools of the future.

Given these differences in education and occupation, one might expect that Indigenous preschool workers would be more likely to work part-time than their non-Indigenous counterparts in the industry. However, according to the 2011 Census, this does not appear to be the case. Specifically, 55.3 per cent of Indigenous preschool workers were employed part-time (34 hours or less per week) compared to 60.0 per cent of non-Indigenous preschool workers. Despite this higher level of full-time work amongst Indigenous preschool workers, median income is actually lower—$583 for Indigenous workers compared to $640 for non-Indigenous workers.

The final point to note about Indigenous preschool workers is that they are much less likely to be living in an urban area than their non-Indigenous counterparts. Using the Significant Urban Area (SUA) geography developed by the ABS for the 2011 Census, which includes all those urban centres with a population of 10,000 people or more, 83.7 per cent of the non-Indigenous population were living in an SUA on the night of the census. This was substantially higher than the percentage of Indigenous preschool workers—64.2 per cent. This percentage mirrors reasonably closely the percentage of Indigenous children not attending school and aged 4–5 years living in an SUA—63.0 per cent.

7. This is based on the three-digit Australian and New Zealand Standard Industrial Classification. Those in the 'Preschool and School Education, not further defined' category are not included in the analysis.

8. Concluding comments

The analysis presented in this paper was based on four datasets: the 2011 Census of Population and Housing (with some comparisons made to the 2006 Census); the National Early Childhood Education and Care Collection; the Longitudinal Study of Indigenous Children; and the Australian Early Development Index. Each of these datasets have flaws in terms of understanding Indigenous early childhood education. The wording of the census question is likely to exclude a number of children who might otherwise be receiving some form of preschool education. The National ECEC Collection does not have any information on those not participating in preschool. The LSIC does not have a non-Indigenous comparison group. The AEDI lacks a range of background information that would be useful to control for in the analysis of developmental vulnerability. However, together, they provide a partial picture of which Indigenous children are participating in preschool and the extent to which preschool might be minimising the gap in outcomes between Indigenous and non-Indigenous children.

Although through-time comparability is important, some attention needs to be given to the wording of the census question around preschool participation. In particular, some attention needs to be given to a more expansive definition that incorporates the reality of early childhood education occurring across a range of settings. This limitation aside, the five main conclusions from the census analysis are that:

- there has been a decline over the last intercensal period in the gap between Indigenous and non-Indigenous children in terms of preschool participation;
- this decline was mainly due to reductions in the non-Indigenous rates, as well as a change in the geographic distribution of the Indigenous population;
- despite consistency at the national level, there was considerable regional variation, with 26 out of the 37 Indigenous Regions used in the analysis experiencing a significant increase in preschool participation;
- many remote regions are catching up to non-remote regions in rates of participation; but
- large gaps still remain between Indigenous and non-Indigenous children once geography and other characteristics are controlled for.

The third Closing the Gap target is to ensure access to early childhood education for all Indigenous four-year-olds in remote communities within five years (FaHCSIA 2009a). That is, by 2013. Results from the National ECEC Collection presented in the Prime Minister's Closing the Gap report (FaHCSIA 2013) suggest significant progress towards meeting this target. Furthermore, results from the census presented in this paper have also shown that there was considerable improvement in Indigenous preschool participation in a number of remote regions. It would appear that even if the national gap with non-Indigenous children has not reduced substantially, the variation within the Indigenous population by remoteness seems to have done so.

Access is not the same as participation and preschool participation is voluntary. However, to ensure that Indigenous children start full-time schooling with the same chances and opportunities as non-Indigenous children, it is probably going to be necessary for Indigenous children to receive a high quality, formal early childhood education at at least the same rate as the non-Indigenous population and probably even higher. Despite the focus on preschool in the Closing the Gap agenda, of every 10 Indigenous children who should be participating in preschool based on non-Indigenous rates of participation, there is at least one child who is not.

Analysis of individual and family/household characteristics shows that, for the most part, even within family type/employment breakdowns, household income groups and counts of the number of children in the household, Indigenous children participate in preschool at lower rates than their non-Indigenous counterparts. Socioeconomic status and other background characteristics explain some—but not all—of the difference in preschool participation.

Because of the relatively low sample size of the child cohort in the LSIC, it is difficult to be too definitive about all the variables that are associated with preschool participation. In the analysis presented in this paper, going to cultural events and identifying with a tribal group, a language group or clan were both associated with higher rates of participation in early childhood education. Those children who have lived in two or more homes since birth are significantly less likely to be participating in preschool than those who had lived in the same household since birth. Disruption from changing households can have a negative effect on early childhood education.

The analysis of the factors associated with preschool participation also used two new geographic variables to identify the community-level factors that were associated with preschool participation. The areas that are identified as having the highest level of participation are those in the second and third quartile in terms of socioeconomic disadvantage. After controlling for the socioeconomic status of the area, levels of relative isolation did not seem to have an association. Children whose carers felt they were discriminated against because of their Indigenous status are significantly less likely to be attending preschool.

Indigenous children in their first year of school are substantially more likely to be reported to have one of more domains for which they are developmentally vulnerable than non-Indigenous children. Preschool attendance is associated with better school readiness, but does not explain all of the difference between Indigenous and non-Indigenous children. Expanding access to preschool education has the potential to improve the school readiness of Indigenous children. But it alone would not be enough to ensure Indigenous children start school at the same level as their non-Indigenous peers.

In their review of early learning programs for Indigenous children, Harrison et al. state that 'There have been no rigorous trials or evaluations of early childhood programs in Australia, particularly programs for Indigenous and at-risk children' (2012: 2). Observational data (even from longitudinal surveys) and insights from overseas suggest that preschool improves Indigenous child outcomes.

However, there are too many selection issues with early childhood to know whether the associations are causal, or the extent to which the effects hold for the Indigenous population. Those children who are sent to preschool are likely to do better than those who do not for reasons other than the preschool education itself. Furthermore, we know too little about the specific aspects of early childhood education that will encourage Indigenous children to attend and improve the outcomes of those who do attend.

Ultimately, we simply do not have enough information on Indigenous early childhood education to guide policy. RCTs, or interventions that randomly assign children into a treatment or a control group, have real limitations. In many cases, withdrawing or withholding treatment is not always feasible. There are also scalability and spillover effects that lead to uncertainty around whether the results found in the trial will be replicated for the total population. A further limitation is that there are long lead times from when the trial is conceived to when policy conclusions can be made. A final limitation of RCTs is that they are not really useful for testing the effect of policies and interventions at the national level. However, ethical inclusive trials with community support are really the only way to find out (i) what works to get children to preschool and (ii) what works to close the gap in school readiness and life chances.

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