Agreements, Treaties and Negotiated Settlements Project

Working Paper Series

Indigenous Population Projections in Mining Regions: Dividend or Dependency?

John Taylor

No. 2/2011

www.atns.net.au

Indigenous Population Projections in Mining Regions: Dividend or Dependency?

John Taylor

ISSN 1839-2717

Published by the Agreements, Treaties and Negotiated Settlements Project in December 2011.

The ATNS Working Paper Series

The Working Paper series allows the ATNS to target emerging research issues relevant to the ATNS Project while maintaining a high academic quality in a size and format that is useful to a range of audiences.

The Working Paper Series is made available electronically via our website: www.atns.net.au.

Enquiries should be addressed to: ATNS Research Team at atns-team@unimelb.edu.au

Acknowledgements

The Agreements, Treaties and Negotiated Settlements Project is grateful for the support of its partners:

INDIGENOUS POPULATION PROJECTIONS IN MINING REGIONS: DIVIDEND OR DEPENDENCY?

JOHN TAYLOR

Professor John Taylor is the Director of the Centre for Aboriginal Economic Policy Research (CAEPR) at the Australian National University.

Abstract

Population projections are increasingly recognised by mining companies and indigenous representative organisations alike as a vital tool of regional planning in remote areas in the context of agreement-making because they focus attention on the likely scale and nature of future needs in what are inevitably dynamic social and economic environments. From a policy perspective, the significant output from projection is a measure of how the composition of population by age is likely to change over time. This paper shows that structural ageing is occurring among indigenous populations in four remote mining regions where Rio Tinto has major operations. While younger adults are entering a phase of potential 'demographic dividend' as the share of population in working-ages expands, they are often less well-equipped for mainstream employment participation than their older adult counterparts who are transitioning into aged dependency. This raises issues regarding the urgency that should be afforded to efforts aimed at raising indigenous skill levels via education and training in order to maximise potential social and economic returns.

Introduction

It is now generally accepted that a fundamental step in establishing mechanisms for the appropriate identification and management of development processes within the context of regional agreement-making associated with resource exploitation is the construction of a baseline profile of social and economic levels and conditions at the outset. Equally understood is the need for some sense of how this profile is likely to change in scale and composition over time in order to be proactive in provisioning for mine expansion or closure planning, to assess requirements for regional development inputs and to make decisions about the allocation of social services (Harvey & Brereton 2005). Partly because of continued uncertainty in the official estimation of indigenous population at the regional level (Wilson & Barnes 2007; Taylor & Biddle 2010; Taylor 2011a: 290), the predictive capacity of applied demography through the use of population projections is seen to provide most utility because, at the very least, it focuses attention on the probable scale and nature of future tasks in what are inevitably dynamic social and economic environments.

The first projections of indigenous population in Australia were developed in the 1960s by Frank Lancaster Jones using data from the 1961 Census (Jones 1970). This involved a 20 year projection to 1981 by which time he predicted a national population of 150,000, remarkably close to the figure of 160,000 recorded for the census of that year. More recent efforts have been less accurate. For example, projections based on 1986 census data were thwarted by the unanticipated rise in population counts in the 1990s leading to a substantial underestimation of growth (Gray & Tesfaghiorghis 1991). While subsequent efforts by the Australian Bureau of Statistics (ABS) seem to have been closer to the mark there remains a substantial gap between the various projection series that they produce. Basically, two sets of projections are created—one based on accounting for demographic factors alone and another that assumes some additional population growth due to non-demographic factors (assumed by the ABS to be related to reporting of identity). The former series tends to underestimate eventual population levels, while the latter tends to overestimate. As mentioned, large and unpredictable variations in base year census counts are one reason why there is inevitable doubt over the reliability of indigenous projections. This is a consequence of the manner in which an 'indigenous population' is constructed via the application of a self-identification question on Aboriginal and Torres Strait origins in official statistical collections (Taylor 2011a).

Despite such shortcomings, the ABS now routinely produces indigenous population projections. Initially, these were only available at national, state and territory level and only for a 10 year period but they are now available for a 20 year period (2001 to 2021) and for 37 indigenous regions as well, although in the latter case not by age and sex (ABS 2009). There have been other attempts to derive estimates for more detailed geographies, such as the recent projections for regions of New South Wales (Khalidi 2008) and more customised regions including the Australian desert (Brown et al. 2008) and Cape York Peninsula (Taylor & Bell 2002), as well as for longer timeframes to 2031 (Biddle & Taylor 2009) and 2051 (Productivity Commission 2005). Policy-wise, projections have been utilised in the development of indigenous employment policy (Taylor & Hunter 1998), in regional needs assessment for service delivery (Taylor 2004), and in driving home the fiscal opportunity-cost message that business as usual in indigenous affairs is not a rational option due to the weight of population momentum (Hunter & Taylor 2002). While there has clearly been an increased production and development of indigenous population projections, official estimates still lack the all-important age-dimension at the regional level that is vital for community planning in the context of agreement-making. To fill this void, it seems that unofficial customised projections may be required for some time to come.

Demographic transition and population ageing

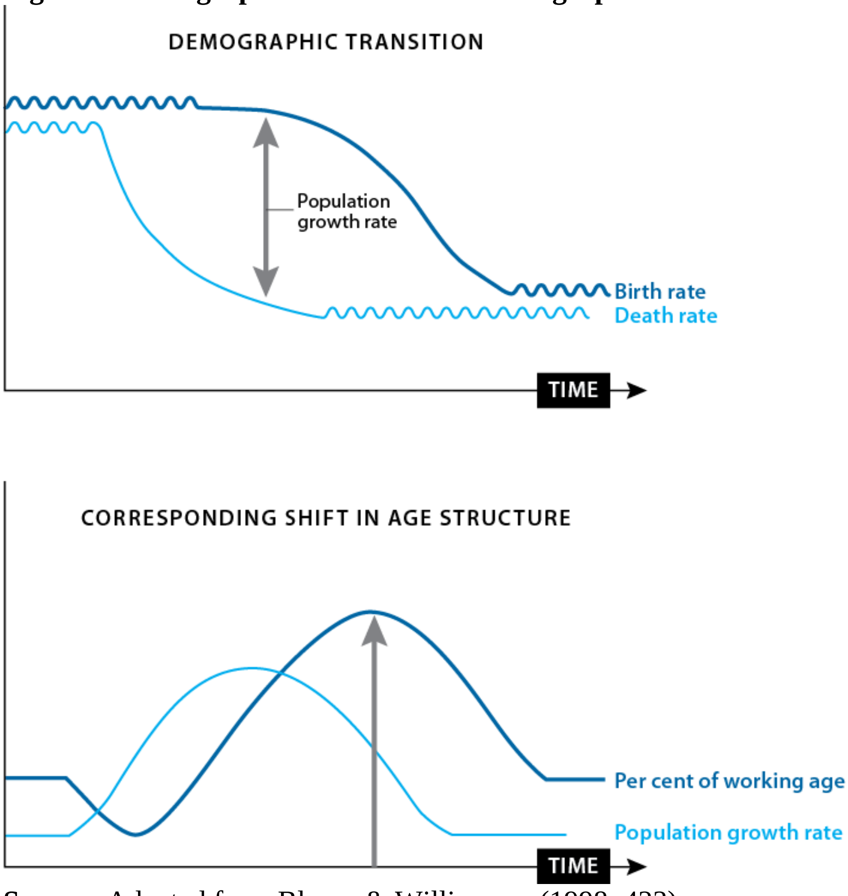
From a policy perspective, the significant output from population projection is not so much the future size of population, nor its distribution (important though these are), rather it is a measure of how the composition of population by age is likely to change over time. To this end, the cohort component methodology that allocates rates of survival, fertility and net migration to relevant cohorts in a base population, accounts for the effects of changes in age structure and the manner in which those changes impact with other demographic processes. Of course, the absolute size and rates of growth of resulting cohorts matters, but for strategic social and economic planning it is the relative change in cohort size that matters more. Of particular note here, in the context of regional development planning, is the balance between future potential producers and consumers in the population; that is, between those of working-age and those who are age-dependent, either young or old. Other dependencies are crucial too, such as those relating to economic burden that measure levels of reliance on those employed, although here these simply serve as a reminder that age alone is no guarantee of economic participation.

The demographic impact of interactions between mortality and fertility over time has been empirically tested using the experience of countries around world to produce an inductive theory of 'demographic transition'. The basic model is shown in the top panel of Figure 1 and can be outlined as follows: as societies modernise (i.e. become less rural and more urban with increased education levels, workforce participation and incomes) this produces a corresponding decline first of all in mortality and then in fertility. Prior to this both mortality and fertility are both high and fluctuating and population growth is accordingly low and fluctuating. Mortality declines first (especially infant mortality) due largely to the direct impacts of health care delivery and improvements in physical infrastructure and nutrition. Further declines in mortality are associated more with improvements in education and training, especially among mothers. Because fertility requires more behavioural change, this remains higher for longer thereby opening a gap between birth rates and death rates resulting in a period of high population growth. This growth gradually recedes as fertility falls to a low fluctuating level just above that of mortality. This decline in fertility corresponds with a shift in marital patterns, gender relations and female education and labour force participation together with an overall change in perceived costs and benefits of large families (Gray 1990; Caldwell 2002).

As we can see from the lower panel in Figure 1, as population growth declines, population ageing proceeds. Along the way, some decades into this process, the share of total population in the working-age group (15–60) increases until it reaches a peak. In other words, a point is reached where the ratio of potential producers in the population compared to consumers (the young under 15 years of age and the old over 60 who are dependent for economic resources on those of working-age) is maximised. This shadow-effect of demographic transition leading to a period of increased ratios of producers to consumers is referred to by demographers and economists as a 'demographic dividend' in the sense that the minimising of age dependency ratios enables a maximising of income, savings and investments, at least potentially (Bloom & Williamson 1998; Jackson 2008). Eventually, this dividend passes as continued ageing in the population leads to an increase in the share of aged-dependent population. Almost every country in the world is expected to have moved into this phase of transition by the middle of the present century (Bloom et al. 2010).

Not surprisingly, this is the situation currently facing Australia as a whole. Indigenous Australians, on the other hand, are at the beginning of such a process as are populations in many other parts of the world, most notably in Africa (Bloom et al. 2010: 588). To varying degrees across the continent, indigenous populations have in recent years experienced a shift towards older age structure as the fertility of indigenous women has declined. At the same time, there has been a persistence of early onset adult mortality. This means that any improvements in overall life expectancy that might now occur (in line with the avowed aims of policy) will contribute along with fertility decline to an expansion in the relative proportion of those in productive age groups for some decades to come. To the extent that this structural shift will proceed, and there is nothing to suggest that it will not, it has profound implications for discussions around regional development and mining agreements since it raises the opportunity for enhanced indigenous economic potential, albeit within the overall context of factors affecting labour demand and supply. The basic issue here, given current levels of indigenous education and productivity, is that the opportunity for indigenous families and communities to 'cash in' on this transitory structural position could be foregone, or at least be less than optimised, for want of adequate skills and work readiness among key implicated cohorts. While there are now signs at the national level of steady improvement in mainstream employment participation (Gray & Hunter 2011), the story for education participation and achievement is less favourable especially in those jurisdictions where mining employment is most concentrated (ACARA 2010; SCRGSP 2011: 6.7, 6.22). The economic impact of the dividend is not to be ignored—economists estimate that it was fully responsible for one-third of East Asian growth in GDP in the 1970s and 1980s, although this did not occur without massive and successful investment in education, training and job creation (Bloom & Williamson 1998). Obviously, the experience in remote Australia is at quite a different order of magnitude, but the same processes and principles apply.

Figure 1. Demographic transition and demographic dividend



Source: Adapted from Bloom & Williamson (1998: 423)

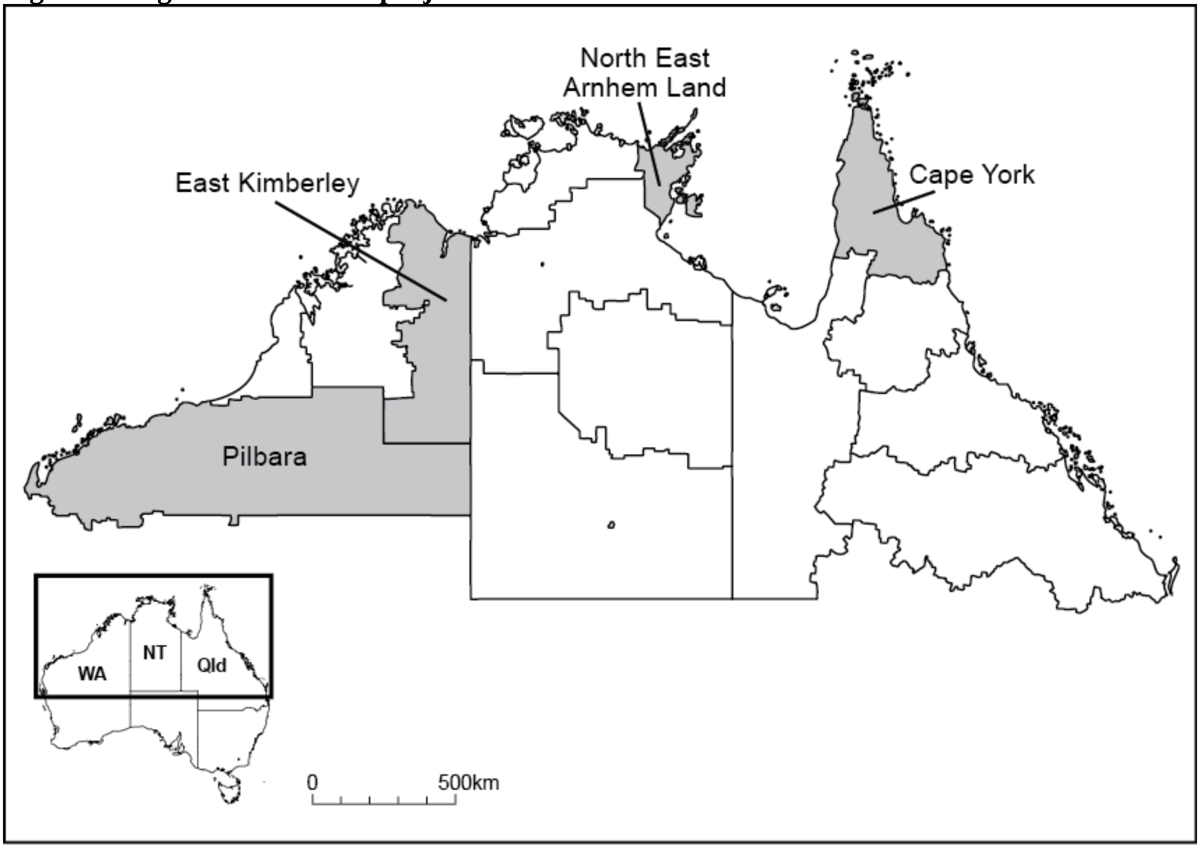
While Figure 1 presents the overall model, the degree to which indigenous populations in various regions are experiencing such a transition remains a moot point and requires careful tracking. It is generally the case that indigenous fertility decline has been most evident in major cities and regional centres and therefore most prominent in the south and east of the country. By comparison, high fertility rates persist in remote areas and in the north and west generally, but even here there has been decline and any regional difference that continues to exist is largely due to sustained high teenage fertility which may be susceptible to downward pressure from enhanced education participation (Kinfu & Taylor 2005; Johnstone 2011). It is also true that remote populations have the most to gain from further reductions in adult mortality given the higher rates evident in jurisdictions that have relatively large proportions of population in remote areas—especially in the Northern Territory, Western Australia and South Australia (ABS 2010a).

Nationally, current forecasts indicate a steady rise in the indigenous population with average annual growth rates above the national average. The latest ABS projections assume this average rate to be almost twice that of the total population over the medium term to 2021 (ABS 2009: 34). As a consequence, the indigenous population will continue to rise as a share of the Australian population with one projection pointing to an increase from 2.5% at present to 3.2% by 2031 (Biddle & Taylor 2009). Indications are that indigenous people will remain a minority population in major cities while elsewhere their relative presence will loom larger and larger with increased distance from cities. By 2031, it is likely that indigenous people will be the majority in very remote areas. However, in terms of absolute numbers the main growth of indigenous population is forecast to be in major cities and in urban areas generally. This results from a combination of net migration gains in most cities (except Sydney and Melbourne) and natural increase *in situ* with the latter augmented in cities more than elsewhere by births of indigenous children to non-indigenous mothers and indigenous fathers. Some idea of the impact of this increase in city numbers is provided by the fact that the combined indigenous population of Brisbane and Sydney will almost double from 93,000 in 2006 to 170,000 by 2031 even without accounting for any net migration gain (Biddle & Taylor 2009). There is no doubt that the indigenous population of Australia is already highly urbanised (76%) and is one of the most urbanised indigenous populations in the world. While this is set to increase, it is also true that indigenous people will remain more widely dispersed than the population as a whole ranging from inner metropolitan suburbs to the remotest parts of the continent. In these latter areas the stakes for demographic dividend are heightened by the spatial localisation of economic activity and a narrow range of available opportunity.

Mining region projections

The Minerals Council of Australia estimates that 'sixty per cent of minerals operations in Australia are neighbours with Indigenous communities' (MCA 2004: 5), mostly in remote areas of the continent. Some of these operations combine in proximity and complexity over large areas to effectively form mineral provinces where the regional economy and population is heavily dependent on mining and related activity. Four such regions have been selected here for closer demographic scrutiny because they comprise the focus of activity of Rio Tinto, one of the key industry partners to the ARC linkage project[1]. These regions, shown in Figure 2, include the whole of the Pilbara (South Hedland Indigenous Region according to ABS classification), East Kimberley (Kununurra Indigenous Region), North East Arnhem Land (Nhulunbuy Indigenous Region) and Cape York (Cape York Indigenous Region).

Figure 2. Regions selected for projection series



[1] 'Poverty in the Midst of Plenty: Indigenous Economic Empowerment in Development of Sustainable Indigenous and Local Communities', Australian Research Council Linkage Project LP0990125.

Projection assumptions

Three projection series are generated for the indigenous populations of these regions for the period 2006 to 2031. The first series (A) assumes no change in existing indigenous demographic parameters and it sets net inter-regional migration to zero. This focuses attention on the effects of variable age structure and regional differences in natural increase under current conditions. The second series (B) also maintains zero net migration but it models the effect of a variation in fertility and survival parameters towards convergence with the rest of the population by 2031. The final series (C) incorporates historic (2001–06) age-specific inter-regional net migration rates into series A. Appendix 1 provides details of the various assumptions applied. It should be noted that each series produces conservative estimates because they do not allow for any future increases in population that are non-demographic in nature and related to administrative processes in the conduct of census counting (Passel 1996). While the series B assumptions are established primarily to test the potential outcome of current national (Council of Australian Government (COAG)) policy settings, they also reflect the idea of sustained indigenous demographic transition in line with long-term observed trends in fertility and mortality (Taylor 2003; Kinfu & Taylor 2005; Condon & Wilson 2007) and observed positive interactions with related social and economic determinants, such as employment, education and income (Gray 1990), that government policy also seeks to influence.

It should be pointed out that there are no formally accepted rules or procedures for demographic projection, though it is true to say that the accuracy of projections diminishes with time and that projections for large populations are more reliable than those for small populations (Keyfitz 1981; Bell 1992). The current exercise therefore runs a risk of contravening these two axioms. However, the aim is not so much to fix future population levels with some sense of feigned precision, rather it is to examine what these regional populations may look like under conditions of continued demographic transition towards a regime of lower natural increase. The basic premise here is that both government and corporate policy have the potential to contribute to a reduction in natural increase and social trends are already in step with this, at least to a degree. Of course, the scenarios presented are heuristic only. They simply reflect the logic of sustaining into the future recently observed demographic parameters compared to a situation where these parameters converge with the rest of the population within the timeframe established by policy.

Base populations

While the focus, then, is more on structural demographic change rather than population levels, the latter do require some comment before proceeding. The base populations used for the projections are the indigenous and non-indigenous estimated resident populations (ERPs) produced by the ABS following the 2006 Census. These are shown in Table 1. Indigenous people constitute more than one-third of the overall population in these regions but this proportion is much lower in the Pilbara and much higher (over half) elsewhere. The other salient point is that the indigenous sex ratio is more or less in balance in all regions in contrast to the non-indigenous population which is prominently male in all regions.

As mentioned, there are on-going concerns about the accuracy of these estimates. Indigenous estimates adjust for census undercount and for non-response to the census question on indigenous status (for a detailed methodology see ABS 2009). To this extent they seek to standardise for geographic variation in census error. From the point of view of establishing relativities between state and territory populations across Australia this is fine, since such comparison requires the application of a consistent methodology where the estimated parts add to equal the whole. But when the purpose is to determine local levels of need, for example in terms of service delivery, workforce planning or local government grants distribution, a far more nuanced approach is required. Significantly, this is often the level at which indigenous social relationships are constructed (Morphy 2010) and it is certainly the level at which many indigenous groups organise for the purposes of agreement-making (Tehan et al. 2006).

Table 1. Estimated Resident Populations (ERPs) by mining region – indigenous and non-indigenous males and females, 2006

	Indigenous ERP		Non-indigenous ERP		Indigenous share of total (%)	
Region	Male	Female	Male	Female	Male	Female
Cape York	3,807	3,919	3,313	2,574	53.5	60.4
East Kimberley	2,566	2,641	2,721	2,145	48.5	55.2
Pilbara	3,946	3,518	21,933	16,906	15.2	17.2
N.E. Arnhem	4,849	5,063	3,299	2,555	59.5	66.5
All regions	15,168	15,141	31,266	24,180	32.7	38.5
Sex ratio	100.1		129.3			

Source: ABS 2008

The point to emphasise here is that the calculation of small area or regional level indigenous estimates using a top–down pro rata distribution of undercount parameters that are derived for much higher-level geographies does not necessarily provide good estimates at every reduction in scale. Ideally, population modelling should be conducted at the level it is intended to be used (e.g. at the shire level). Also, ideally, this should involve the application of local data and intelligence on components of population change. In mining regions that experience major economic shocks, there would preferably be an attempt to account for these effects by using input-output techniques and/or simple demographic-economic impact forecasting (Phibbs 1989). However, this requires a whole-of-region data input, especially in regard to workforce demand and composition (for example in terms of 'fly-in fly-out' and construction-phase components of mining operations), and the compilation of such comprehensive data is invariably thwarted by the commercial-in-confidence practices of competing companies and industries. Nonetheless, where attempts have been made to incorporate local data in the development of estimates, such as in the East Kimberley, it is useful to note that official figures have been found to be possibly up to 13% too low (Taylor 2008: 4–8).

Projection Series A (2006–31)

With the above caveats in mind, the Series A projection which holds current demographic parameters constant indicates that between 2006 and 2031 the indigenous population in these four mineral regions is forecast to grow from 30,309 to 46,322, an increase of 53% or an annualised growth rate of 1.71% with growth slowing in the second half of the projection period due to ageing (Table 2). This overall rate of growth is slightly lower than the 2% figure estimated nationally over the same period, mostly because at the national level there is a greater boost to fertility due to births of indigenous children to non-indigenous mothers (Biddle & Taylor 2009).

Table 2. Series A indigenous population estimates and projections by mining region and annualised percentage change, 2006, 2016 and 2031

Region	2006	2016	2031	Annual growth rate 2006–2016	Annual growth rate 2016–2031
Cape York	7,726	9,310	11,971	1.83	1.74
East Kimberley	5,207	6,345	8,288	2.00	1.91
Pilbara	7,464	8,948	11,297	1.81	1.68
N.E. Arnhem	9,912	11,939	14,816	1.72	1.47
All regions	30,309	36,542	46,322	1.88	1.59

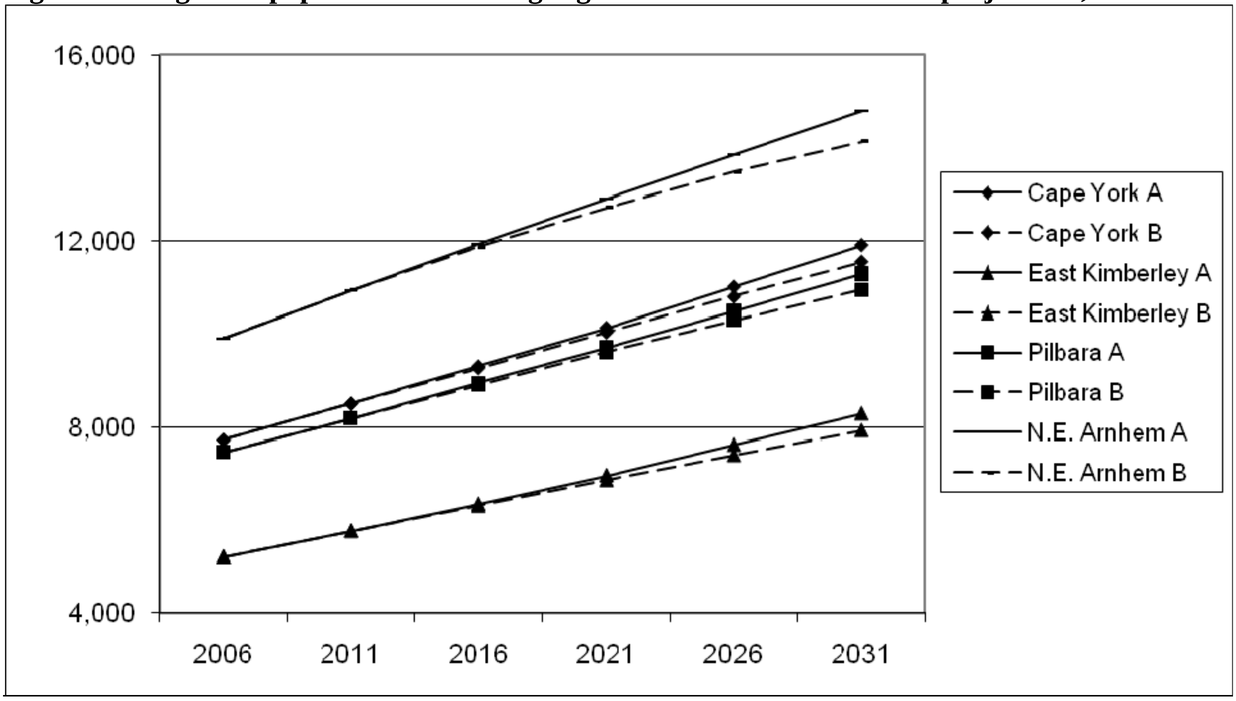
Projection Series B (2006–2031)

Current indigenous affairs policy is constructed around a discourse of 'closing the gap'. It involves the adoption by COAG of a number of explicit targets for reducing disparities between indigenous and non-indigenous Australians. While much of this agenda has potential to impact on demographic outcomes, the centrepiece is a commitment to eliminate the gap between the life expectancy of the two populations within a generation (roughly 2031). Also likely is a further reduction in fertility due to the policy goals of raising education and employment participation given observed negative association between indigenous fertility and these variables (Gray 1990).

While there has been some debate surrounding the ability of governments to achieve these aims and the steps that would be required to do so (Altman et al. 2005; Hoy 2009), there has been less discussion regarding the implications for the size and composition of the indigenous population if they were to be achieved. However, it is clear that a reduction in the life expectancy gap would, by definition, lead to fewer indigenous deaths over a given period. On the other hand, improvements in education and employment would likely serve to reduce the fertility rate of indigenous women as the opportunity cost of children rises (Gray 1990; Caldwell 2002). Thus, there are likely to be competing implications for indigenous population growth if COAG targets are met.

In order to test these implications, the Series B projections incorporate linear convergence of indigenous survival and fertility rates to the (current) non-indigenous rates by 2031. As we have seen, this appears to have little impact on overall projected growth compared to the Series A projections. Between 2006 and 2031, the annual rate of indigenous population growth from the Series B projection is 1.55% which is only slightly lower than the figure of 1.71% derived from Series A. By changing the projection parameters to reflect a convergence in fertility and mortality the overall outcome in terms of future population size is not greatly altered in any of the regions as shown in Figure 3.

Figure 3. Indigenous populations in mining regions: Series A and Series B projections, 2006–2031



Accordingly, the eventual projected population in 2031 of around 44,610 is only slightly less than the Series A projected population of 46,322 meaning that reductions in deaths are counterbalanced by reductions in births. What does change, however, is the relative growth of age as shown in Table 3. The first row in this table shows projected annualised growth rates for selected age groups using the constant survival and fertility rates from Series A. The second row shows the rates based on the Series B convergence scenario.

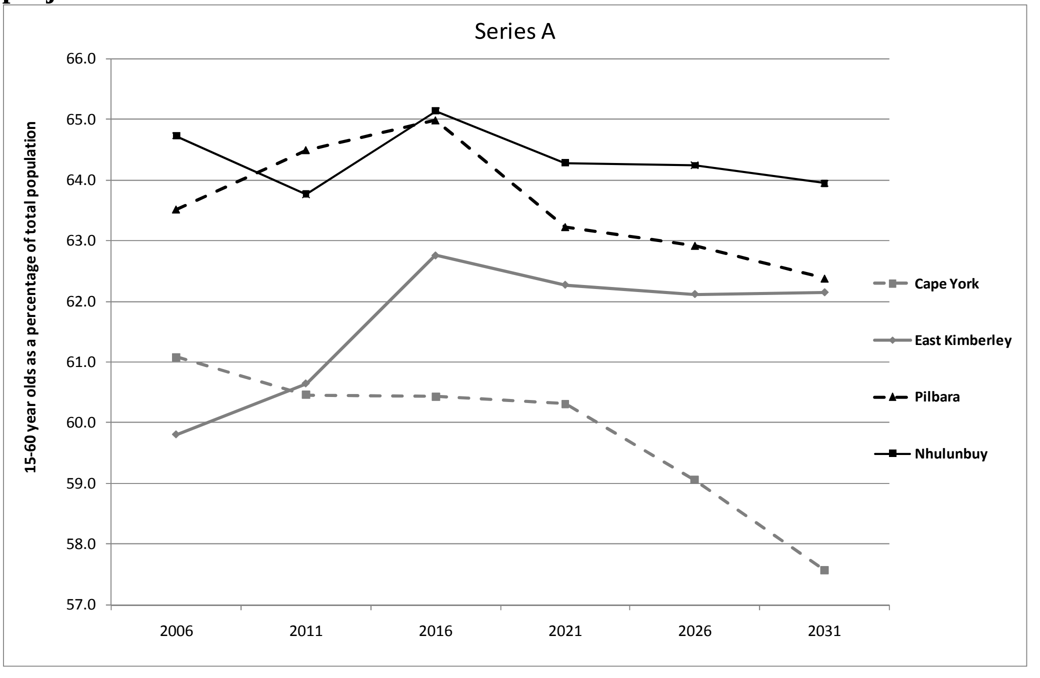
Table 3. Projected annualised indigenous growth rates and indigenous share of by age group in mining regions, Series A and B to 2031

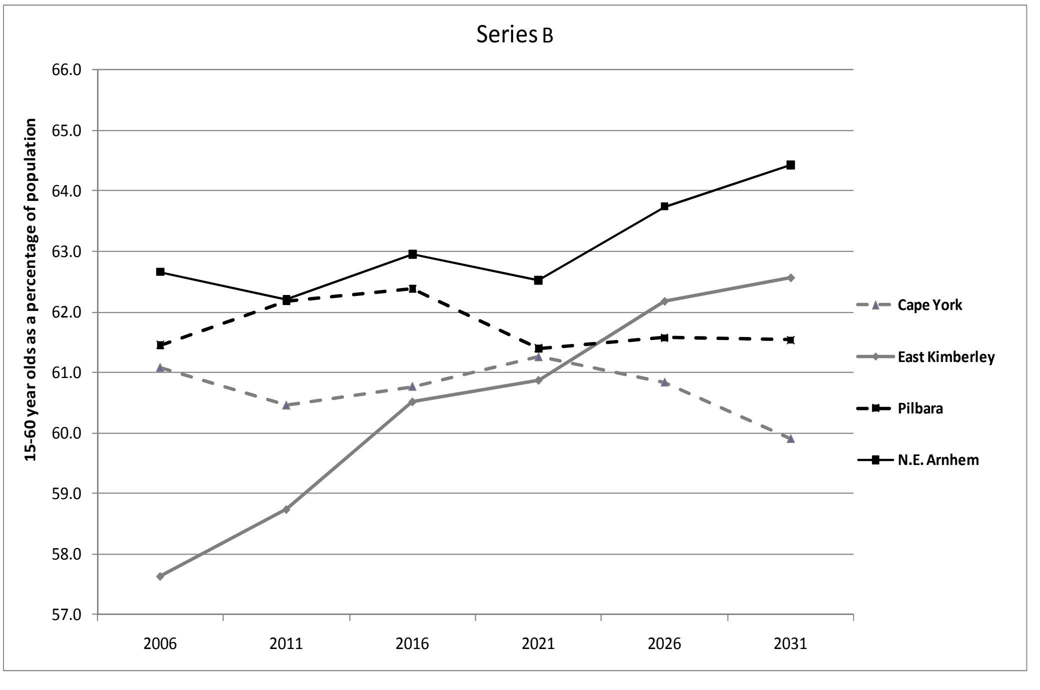
Series	0–4	5–14	15–24	25–54	55 +
Series A (Constant survival/fertility)	1.41	1.16	1.25	1.51	4.49
Series B (Closing the gap)	0.2	0.47	1.13	1.63	4.88

Source: Customised calculations based on the 2006 Census. For full details see http://www.anu.edu.au/caepr/*population*.php.

In both series the highest rate of growth is among older people aged 55 years and over, although this is slightly higher in Series B. This aside, the more noticeable effect of convergence in Series B is to substantially reduce growth at younger ages and to slightly increase growth in prime working ages. The simple message is that 'closing the gap' involves a slowing down of the recent expansion in younger age groups and a corresponding ageing of the indigenous population. Of interest here is the degree to which this opens up a potential demographic dividend due to reduced age dependency. Figure 4 shows the change in proportion of each regional population that is aged 15–60 years and allows comparison between the two series.

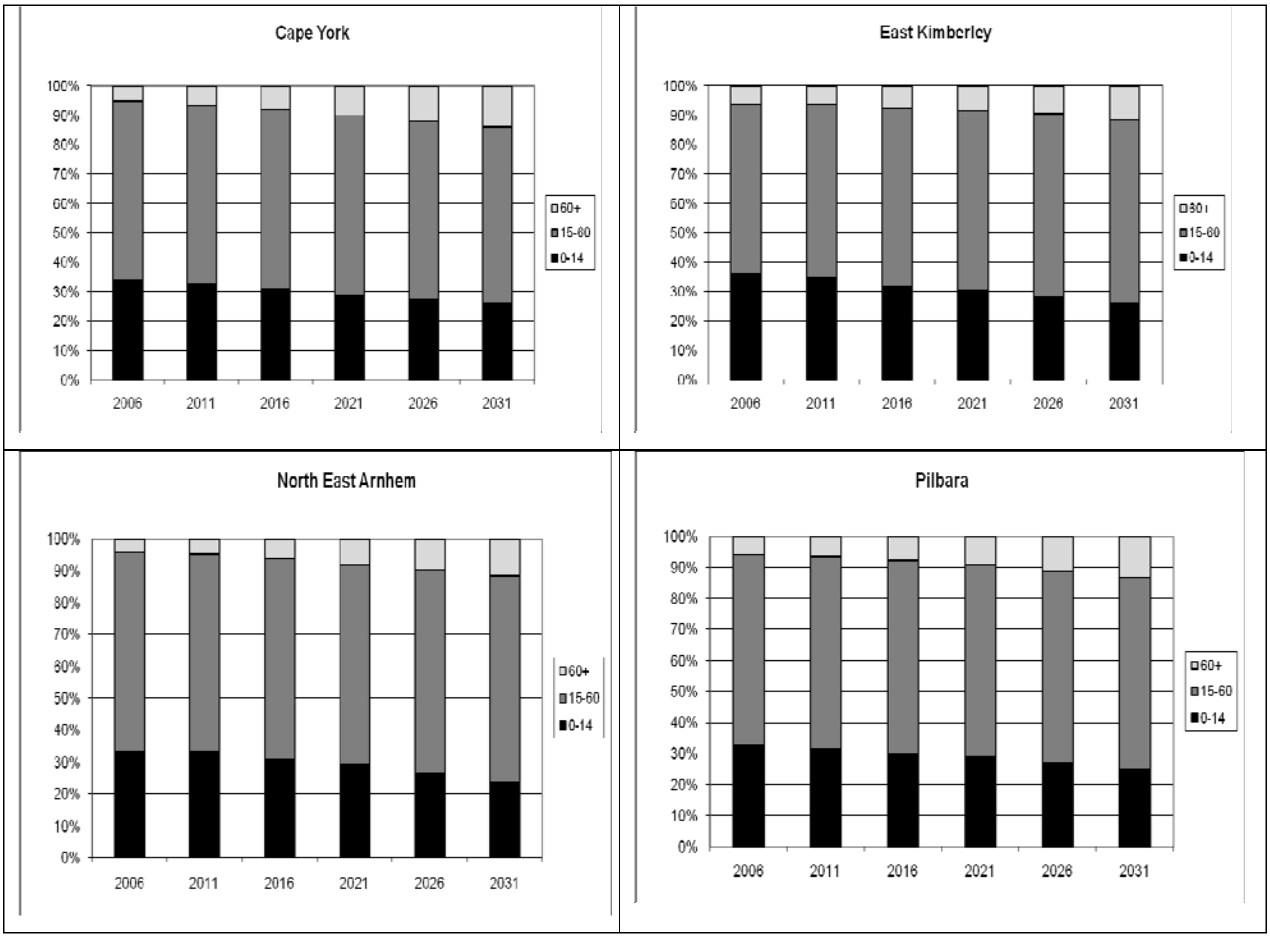
Figure 4. Percentage of regional indigenous populations aged 15–60 years old, Series A and B projections 2006–2031





Clearly, under the Series A assumptions the Cape York population has already peaked in its potential for demographic dividend while all other regions peak around 2106. By contrast, under the ‘closing the gap’ scenario in Series B, the East Kimberley and North East Arnhem regions continue to move into this phase of transition throughout the 25 year period, the Pilbara region, on the other hand, seems to hold steady, while the proportion of population aged 15–60 years declines once again in Cape York from a peak in 2021. As shown in Figure 5, the main reason for this situation in Cape York compared to other regions is a slightly greater expansion of the proportion of older age dependents.

Figure 5. Shifts in broad age structure (Series B): indigenous populations in mining regions 2006–2031



Source: Biddle & Taylor (2009)

If we assume that the most likely scenario for change occurs somewhere between these projected outcomes, the overall message from the results is two-fold. First, the indigenous population in Cape York stands out as being very close already to reaching is peak potential (in purely demographic terms) for an economic return on reduced age dependency while all other regions, especially North East Arnhem and the East Kimberley have some years to go before they reach this point. Second, there is an urgent need to ensure that the indigenous skill level of the younger-aged population in all of these regions is equipped to respond to economic opportunity as the bulge in working-age population emerges.

Projection Series C: 2006–2016

In the Series A and B projections inter-regional migration was assumed to be zero. However, internal migration is a persistent and key component of indigenous population redistribution at the regional level (Taylor & Bell 1996; Biddle 2009). In order to reflect this, a Series C projection is developed to incorporate observed age-specific indigenous and non-indigenous net migration rates for each region using 5-year data from the 2006 Census. These are applied to both the 2006 to 2011 and 2011 to 2016 periods. While this provides a more realistic basis for computing changes in regional populations, the length of the projection period is necessarily shortened for several reasons. First, there are concerns over the quality of census inter-regional migration data, especially in remote areas, given ambiguity over the cross-cultural interpretation of 'change in usual residence' (Morphy 2010). Second, there is no robust behavioural or economic model of indigenous migration with which to build reliable assumptions about future migration levels into any projection series. Finally, net migration is the one demographic variable that can (and does) substantially erode or augment regional population growth (Stilwell et al. 2000). For this reason, simply holding historic observed levels constant in the absence of any model for guidance, is potentially rash.

Table 4 shows the effect on regional growth rates of applying these migration rates to the base case deployed in the Series A projections. In Cape York, North East Arnhem, and especially the East Kimberley, the effect is to lower projected growth rates while in the Pilbara growth is slightly higher. Although this deflationary effect is relatively small in Cape York and North East Arnhem, in the East Kimberley it is quite substantial with a reduction on projected population of over 14%. Clearly, there are risks for projection, even for short time periods, in using census-based net migration, and this is especially so in cases such as the East Kimberley. This problem has been raised before for regions where locally-derived data point to likely problems with census-based migration rates (Taylor 2008). It is for this reason that the Series A and B projections that set inter-regional net migration to zero are to be preferred.

Table 4. Series A and Series C indigenous projections to 2016 by mining region

Region	Base population	Projections to 2016		Annual growth rate	
		Series A	Series C	Series A	Series C
Cape York	7,726	9,310	9,100	1.88	1.65
East Kimberley	5,207	6,345	5,436	2.00	0.43
Pilbara	7,464	8,948	9,079	1.83	1.98
N.E. Arnhem	9,912	11,939	11,719	1.88	1.69
All regions	30,309	36,542	35,334	1.89	1.55

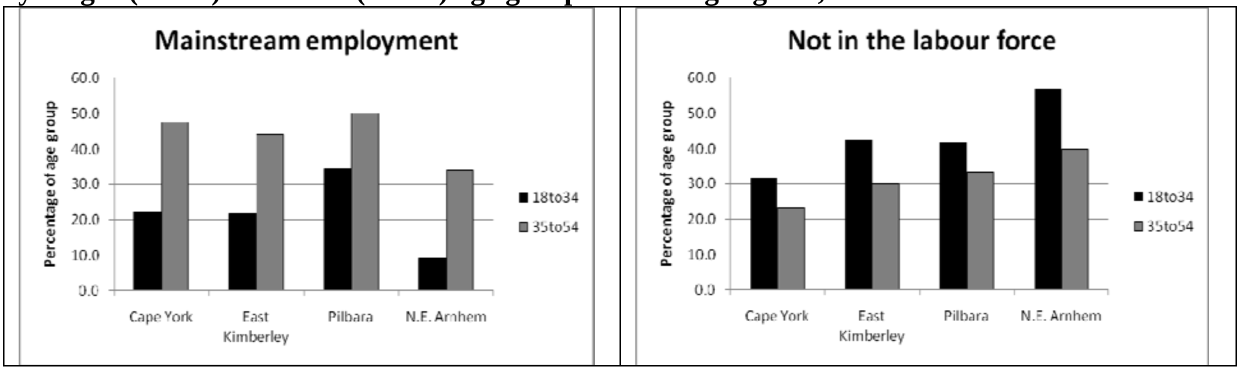
Source: Biddle & Taylor (2009)

Population ageing and labour force status

The structural ageing evident in the regional projections raises a number of issues regarding the urgency that should be afforded to efforts aimed at raising indigenous skill levels via education and training. As Jackson (2008: 225) has pointed out, the non-indigenous population was educated before it became 'old' whereas there is a risk that the indigenous population will become old before it becomes educated. This would clearly have implications for future workforce participation during the very period of demographic transition when indigenous economic status might receive an added boost due to reduced age dependency. However, it is not only the level, but also the nature of workforce participation that requires attention. While it has been argued that higher incidence of poverty and shorter life expectancy may mean that indigenous workers have a greater need to access superannuation early to deal with particular financial situations (Pragnell 2002), the convergence model (Series B) notionally deals with at least the latter part of this case. In the meantime, the key constraint on retirement savings remains the minimal savings impact of the superannuation guarantee due to low indigenous occupational status and intermittent work (Pragnell 2002). What, then, is the education and employment participation profile of the population in each region, especially for those of younger adult age who will be at the vanguard of the bulge in working-age population as it develops?

Figure 6 shows the percentage of younger adults (aged 18–34) in mainstream employment in 2006 (this excludes participation in CDEP—the Community Development Employment Program) and the proportion not in the labour force in each of the mining regions and compares these proportions with older adults (aged 35–54). In terms of future potential economic benefit from demographic dividend, the ideal in each instance would be that participation rates for the younger cohort are higher, or at least not lower, than for the older cohort. However, what we see is the opposite—there is an emphatic pattern in all regions whereby younger adults are far less likely to be in mainstream employment and far more likely not to be in the labour force than older adults of working age. If we consider the gaps in mainstream employment participation, young adults are up to two and three times less likely than older adults to be in mainstream employment in all regions except the Pilbara where the gap is still substantial. One reason for this difference is that younger adults are far more likely than older adults to rely on CDEP for their employment as indicated in Table 5.

Figure 6. Percentage of indigenous adults in mainstream employment and not in the labour force: younger (18–34) and older (35–54) age groups in mining regions, 2006



Source: Customised 2006 Census tables

Table 5. Percentage of indigenous adults in CDEP employment: younger (18–34) and older (35–54) age groups in mining regions, 2006

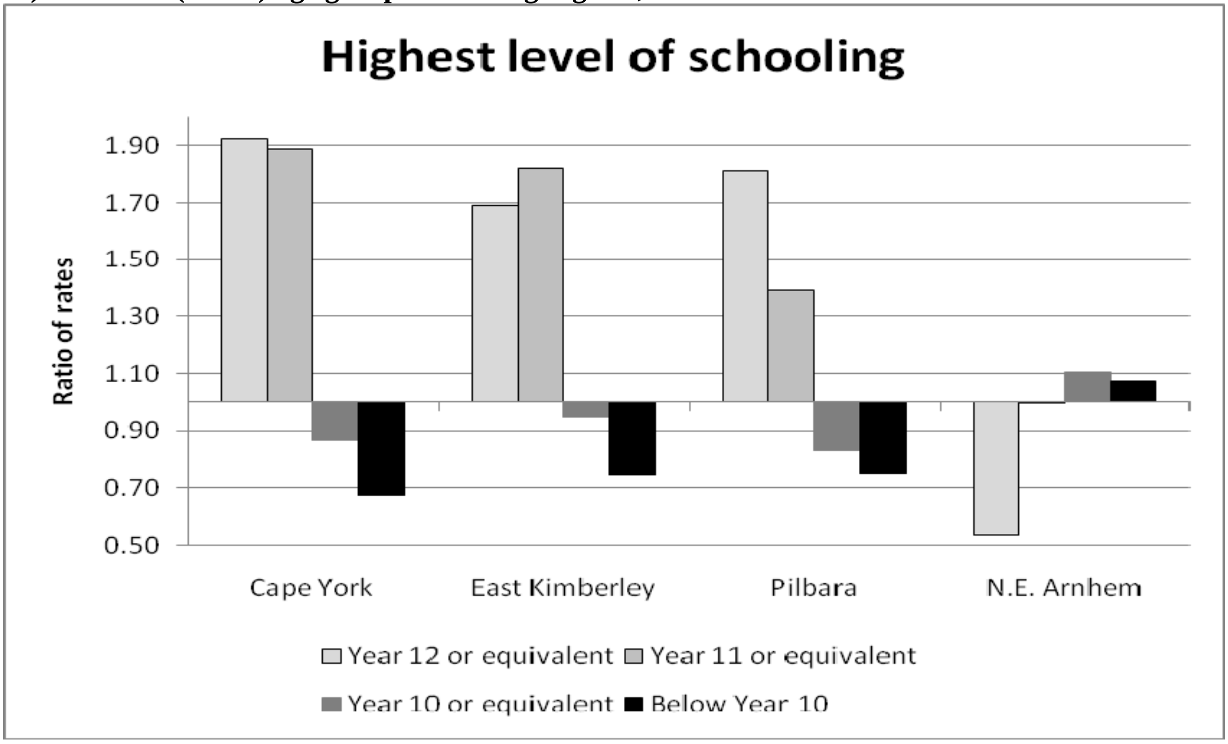
	18–34 (1)	35–54 (2)	Ratio (1/2)
Cape York	64.7	36.2	1.79
East Kimberley	58.7	34.0	1.73
Pilbara	26.6	14.2	1.87
N.E. Arnhem	72.2	38.4	1.88

Source: Customised 2006 Census tables

Of more interest when considering the prospects for demographic dividend is the fact that younger adults are also far more likely than older adults to be inactive in the labour force as indicated in the right hand panel of Figure 6. Once again, this gap is lowest in the Pilbara, but in regions such as North East Arnhem almost two-thirds of indigenous younger adults are not in the labour force compared to around 40% of older adults. Of course, among younger adults, this lower labour force participation may be because individuals are engaged in further education and training. However, this accounts for only 5% overall of younger adults who are not in the labour force with only slight variation on this level evident between regions.

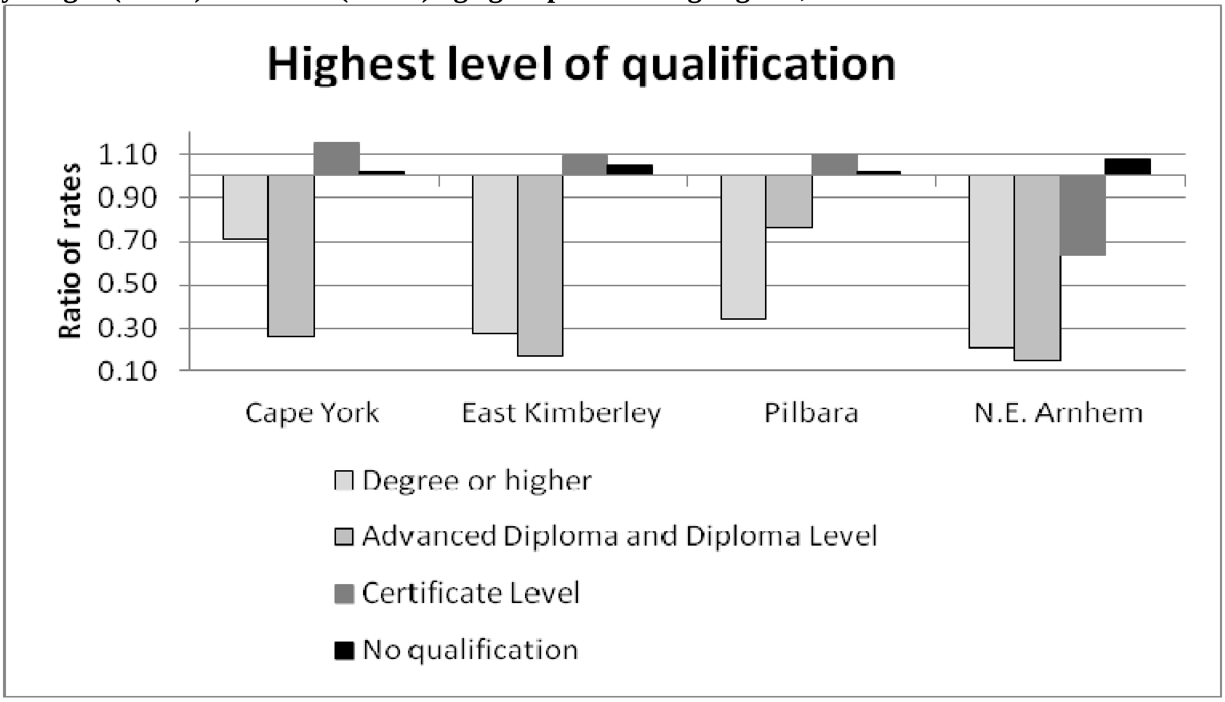
The situation regarding relative schooling outcomes appears more favourable. In Figure 7 scores above 1.0 indicate higher proportions of younger adults with a particular characteristic. Thus, it shows that younger adults achieve Year 12 and Year 11 level of schooling at a substantially higher rate than older adults in Cape York, East Kimberley and the Pilbara but not so in North East Arnhem where younger adults are slightly more likely to have only Year 10 or below education. As for post-school qualifications, younger adults are far less likely in all regions to have degree or diploma qualifications although the numbers involved in this calculation are generally low. Once again, more positive signs emerge in Cape York, East Kimberley and the Pilbara in regard to certificate level qualifications, but in North East Arnhem younger adults are less likely to have this level of qualification and more likely to have no qualification at all.

Figure 7. Ratio of rates for highest levels of schooling and qualification achieved for younger (18–34) and older (35–54) age groups in mining regions, 2006.



Note: scores above 1.0 indicate that a higher proportion of younger adults have this characteristic compared to older adults; scores below 1.0 indicate that a lower proportion of younger adults have this characteristic compared to older adults. **Source:** Customised 2006 Census tables.

Figure 7 (cont'd). Ratio of rates for highest levels of schooling and qualification achieved for younger (18–34) and older (35–54) age groups in mining regions, 2006.



Note: scores above 1.0 indicate that a higher proportion of younger adults have this characteristic compared to older adults; scores below 1.0 indicate that a lower proportion of younger adults have this characteristic compared to older adults. **Source:** Customised 2006 Census tables.

What is missing here, of course, is any comparison of the quality of education and training outcomes in terms of literacy, numeracy and workplace competencies. This is partly because no such systematic data exist for the age groups and regions as presented. However, there is interest also in age cohorts still in the schooling system and what attributes they are likely to bring to future population profiles. Here we have the findings of the 2010 National Assessment Program to draw on with its details of achievement in numeracy and (english) literacy (ACARA 2010). What this shows is that indigenous achievement is substantially below the national average against all standard measures in the remote parts of those states and territories where mining employment is most concentrated and where our four regions of interest are located. Table 6 shows the proportion of indigenous and non-indigenous students in these areas who fell below the national minimum standard in numeracy in 2010. The ratio of results between the two population groups is also shown to aid comparison. What this reveals is a consistent and substantial gap in outcomes across all regions but especially in very remote areas and especially in the Northern Territory. At the extreme, in Year 7, indigenous students are 28 times more likely than non-indigenous students to fall below the national minimum standard. At best (in Queensland) the gap is five times. Of particular concern, from the point of view of the arguments advanced in this paper about cohort progression, is the fact that low levels of achievement are evident for indigenous students at all school years, such that those roughly aged 8 and 9 years (Year 3) perform no better than those roughly aged 14 and 15 years (Year 9). Put another way, there seems to be little cohort improvement over time, although strictly speaking these data do not provide for such an analysis. Equivalent NAPLAN results are available for achievement in reading, writing and language conventions but these are not shown here. Suffice to say, they reveal very similar outcomes.

Table 6. Percentage of indigenous and non-indigenous students below national minimum standard in numeracy in remote parts of Queensland, Western Australia and the Northern Territory, 2010.

Year 3		Indigenous (1)	Non-Indigenous (2)	Ratio (1/2)
QLD	Remote	27.3	4.5	6.1
	Very remote	34.3	6.7	5.1
WA	Remote	25.3	4.2	6.0
	Very remote	39.5	6.2	6.4
NT	Remote	31.6	2.0	15.8
	Very remote	70.2	3.7	19.0
Year 5		Indigenous	Non-Indigenous	Ratio (1/2)
QLD	Remote	42.7	7.6	5.6
	Very remote	53.7	5.9	9.1
WA	Remote	42.3	6.4	6.6
	Very remote	58.1	7.0	8.3
NT	Remote	42.2	4.8	8.8
	Very remote	79.1	6.4	12.4
Year 7		Indigenous	Non-Indigenous	Ratio (1/2)
QLD	Remote	33	3.6	9.2
	Very remote	37.7	2.1	18.0
WA	Remote	27.4	3.4	8.1
	Very remote	50	5.7	8.8
NT	Remote	44.2	2.7	16.4
	Very remote	73.9	2.6	28.4
Year 9		Indigenous	Non-Indigenous	Ratio (1/2)
QLD	Remote	39.9	6.3	6.3
	Very remote	51.0	10.6	4.8
WA	Remote	42.3	8.6	4.9
	Very remote	55.6	8.3	6.7
NT	Remote	52.3	4.4	11.9
	Very remote	78.8	9.1	8.7

Source: ACARA 2010

Given the size and widespread nature of these gaps in outcomes, and the prognosis that they present of little improvement over time, it is surprising to find that hard evidence on the reasons for this state of affairs is generally lacking as indicated by an exhaustive meta-analysis of available studies conducted via the Closing the Gaps Clearinghouse (Purdie and Buckley 2010; Helme and Lamb 2011). Such evidence as is available points to a mix of family circumstances (inter-generational low socioeconomic status, poor housing, lack of role models and an 'us and them' attitude between schools and parents), school circumstances (inadequate welfare support practices especially in the early years of schooling, poor teaching and low expectations of indigenous students, inconsistent approaches to absenteeism between and within schools, unsuitable curriculum for some pupils, too few out-of-school/alternative curriculum places), and individual circumstances (bullying, peer pressure, lack of career aspirations and low self-esteem). Underpinning low achievement is a chronic lack of regular school attendance. In many communities, especially in the Northern Territory, daily attendance at school is no longer the social norm and the accumulation of disengagement represents an educational freefall that is in danger of reaching a point of no return. To the extent that this is so, the burgeoning working-age population that is emerging from a combination of demographic transition with limited exposure to schooling presents a very substantial social policy challenge that could reverberate for decades to come if not urgently addressed (Taylor 2011b).

Summary and implications

Development planning in relation to mining agreements often proceeds with dated population estimates and with little understanding of the likely impact of changing demographic parameters on future indigenous population size and composition. To the extent that agreement-making itself can influence demographic outcomes, this represents a significant deficiency in current methodology, although there is growing recognition at some corporate levels, and in the general discourse around the social licence to operate, of the importance of these demographic issues (Harvey & Nish 2005; Solomon et al. 2008). To explore likely future scenarios in four regions of Australia where Rio Tinto operations are heavily represented, the present analysis models the demographic impacts of a continuation in existing mortality and fertility regimes compared to a situation where indigenous rates converge with non-indigenous rates in line with formal government policy targets. The effects of inter-regional migration are also considered, but mostly to demonstrate that there are risks in applying census-derived migration rates to regional projections of indigenous population.

The analysis shows that if current rates of fertility and mortality were to continue over the 25-year period from 2006 to 2031, then the indigenous population in the four selected mining regions would increase from 30,039 to 46,322, a rise of almost 53%. It also reveals that convergence in demographic parameters with the rest of the population makes little difference to this outcome. Importantly, though, convergence does make a difference to age composition. Basically, regional populations become older in profile as a consequence of 'Closing the Gap' and the expansionary phase of growth among populations of prime working age lasts longer compared to the status quo scenario. Aside from the obvious interest in overall population size in setting the scale and scope of policy liabilities, the major implication from these projections is related to opportunities for demographic dividend—that period in demographic transition where the population in key workforce age groups is maximised, work, savings and investments potentially are at their highest and age-dependency ratios are at their lowest.

Structural ageing of the indigenous population is evident in all of the projections and this raises an issue about the urgency that should be afforded to policy efforts aimed at raising education and employment levels. As noted, there is a risk that the indigenous population might proceed through demographic transition without sufficient education and skills to benefit from the reduced age dependency that this will bring. Some basic measures of this risk are presented by data on labour force and education status for young and old indigenous adults in each of the mining regions. What these show is that younger adults, who are positioned at the vanguard of transition into a period of potential demographic dividend, are often less well-equipped for mainstream employment participation than their older adult counterparts who are now transitioning into aged-dependency. Put simply, those who are about to contribute to an expansionary phase in workforce age groups are currently less likely to be participating in mainstream employment, more likely to be in CDEP, more likely to be out of the labour force altogether and less likely to have post-school qualifications than those they are replacing. Furthermore, those coming up behind them who are currently of school-age are performing well below national standards in key attributes that are prerequisite for successful workforce participation, even in CDEP. A major underlying issue here seems to be widespread disengagement from schooling among key implicated cohorts (Taylor 2010, 2011b).

These findings lend strong empirical support to initiatives within mining agreements that are aimed at raising indigenous school attendance, increasing school retention and enhancing participation in employment, adult education and training. Whether programs in place are adequate to the task of delivering on this intent given the scale and pace of outcomes required as indicated by the projections is another matter. One problem in assessing this is a lack of high-quality evaluations of school attendance and retention programs and of pathways to work that can adequately and comprehensively assess what works and what does not (Purdie & Buckley 2010; Hunter 2010), although there is an emerging view that a combination of strong macro-economic conditions and targeted labour market and work readiness programs is effective in raising indigenous private sector employment not least in the mining sector (Gray & Hunter 2011).

Indigenous levels of skill, knowledge and education vary across the regions, as we have seen, although everywhere they are less than ideal in terms of maximising returns from demographic change. Indeed, in order to avoid this change leading to increased dependence both in the short term and for the long haul, a convergence of socioeconomic status is required to mitigate the effects of demographic convergence, although most population modelling (including that used here) would assume a clear positive association between these (Lutz et al. 1999; Kirk 1996), not least for the indigenous Australian population (Caldwell 2002). The other issue to arise from this is the fact of growing numbers and representation of indigenous population in the oldest age groups, over 60 years. The issues facing Australians as a whole regarding provisioning for retirement and aged care will increasingly face indigenous people who are likely to be far less able to self-manage this life stage due to much lower life-time earnings and savings. Once again this places a premium on the future capacity of those in working-age groups to assist ageing relatives in order to stave off a compounding of structural dependency on transfer income.

As with any projections, resulting estimates are only as good as the data inputs and assumptions applied. One issue that remains uncertain, and which requires more (regionally) focussed demographic analysis, is the proposition that a convergence in fertility and mortality rates will necessarily occur in the decades ahead. At the very least there is need for an improved indication of spatial variation in likely timeframes for this to occur. Determining just when the classic transition is complete for indigenous populations could be difficult as fertility rates can vary markedly between official collections (registration vs. midwives collections – see Johnstone 2011) and even within collections as indicated by the recent upswing in indigenous fertility rates (notably in Queensland and Western Australia) based on official ABS births registration data (ABS 2010b). Also unpredictable is the contribution to indigenous population growth that stems from births of indigenous children to non-indigenous mothers and indigenous fathers except to say that this is likely to steadily increase. In the projections presented here, the impact of this component is low compared to more urbanised areas but that will not necessarily always be the case (Kinfu & Taylor 2005). There is uncertainty too regarding future survival rates. Estimates of the contribution of risk factors to the indigenous disease burden indicate that about half of the health gap between indigenous and non-indigenous populations as measured by the number of healthy years of life lost through disability or death can be accounted for by just 11 selected health risk factors (Vos et al. 2007; AIHW 2011a: 36) and none of these show much sign of receding (AIHW 2011a) with the result that some morbidities are set for precipitous rise (AIHW 2011b). Nonetheless, there are clear indications that socioeconomic status is linked to indigenous health outcomes (AIHW 2011a) and this association is firmly embedded in the logic applied.

References

Altman, J.C., Biddle, N. and Hunter, B. (2005) 'A historical perspective on Indigenous socioeconomic outcomes in Australia, 1971-2001', *Australian Economic History Review*, 45 (3): 273-95.

Australian Institute of Health and Welfare (AIHW) (2011a) *The health and welfare of Australia's Aboriginal and Torres Strait Islander people: an overview 2011*. Cat. no. IHW 42. Canberra: AIHW. Viewed 5 October 2011 <http://www.aihw.gov.au/publication-detail/?id=10737418989>.

Australian Institute of Health and Welfare (AIHW) (2011b) *Projections of the incidence of treated end-stage kidney disease in Australia, 2010–2020*, cat. no. PHE 150, AIHW, Canberra, electronic document available at http://www.aihw.gov.au/publication-detail/?id=10737419875, accessed 16 September 2011.

Australian Bureau of Statistics (ABS) (2007) *Births, Australia, 2006*, cat. no. 3301.0, ABS, Canberra.

Australian Bureau of Statistics (ABS) (2008) *Experimental Estimates of Aboriginal and Torres Strait Islander Australians, Jun 2006*, cat. no. 3238.0.55.001, ABS, Canberra.

Australian Bureau of Statistics (ABS) (2009). *Experimental estimates and projections of Aboriginal and Torres Strait Islander Australians, 1991–2021*, cat. no. 3238.0, ABS, Canberra.

Australian Bureau of Statistics (ABS) (2010a) *Deaths, Australia, 2009*, cat. no. 3302.0, ABS, Canberra.

Australian Bureau of Statistics (ABS) (2010b) *Births, Australia, 2009*, cat. no. 3301.0, ABS, Canberra.

Australian Curriculum, Assessment and Reporting Authority (ACARA) (2010) *NAPLAN achievement in reading, writing, language conventions and numeracy: National report for 2010*, ACARA, Sydney.

Bell, M. (1992) *Demographic projections and forecasts in Australia: A directory and digest*, Australian Government Publishing Service, Canberra.

Biddle, N. (2009) *The geography and demography of Indigenous migration: insights for policy and planning*, CAEPR Working Paper No. 58, Centre for Aboriginal Economic Policy Research, The Australian National University, Canberra.

Biddle, N. & Taylor, J. (2009) *Indigenous population projections, 2006–2031: Planning for growth*, CAEPR Working Paper No. 56, Centre for Aboriginal Economic Policy Research, The Australian National University, Canberra.

Bloom, D.E. & Williamson, J.G. (1998) 'Demographic transitions and economic miracles in emerging Asia', *World Bank Economic Review*, vol 12, pp. 419–465.

Bloom, D.E., Canning, D. & Fink, G. (2010) 'Implications of population ageing for economic growth', *Oxford Review of Economic Policy*, vol 26, no 4, pp. 583–612.

Brown, D., Taylor, J. & Bell, M. (2008) 'The demography of desert Australia', *The Rangeland Journal*, vol 30, no 1, pp. 29–43.

Caldwell, J.C. (2002) 'Aboriginal society and the global demographic transition' in G Briscoe and L Smith (eds) *The Aboriginal population revisited: 70,000 years to the present*, Aboriginal History Monograph No. 10, Aboriginal History Inc., Canberra.

Condon, J. & Wilson, T. (2007) 'Northern Territory indigenous life expectancy improvements, 1967–2004', *Australian and New Zealand Journal of Public Health*, vol 31, no 2, pp. 184–88.

Gray, A. (1990) 'Aboriginal fertility: Trends and prospects', *Journal of the Australian Population Association*, vol 7, no 1, pp. 57–77.

Gray, A. & Tesfaghiorghis, H. (1991) *Social indicators of the Aboriginal population of Australia*, CAEPR Discussion Paper No. 18, Centre for Aboriginal Economic Policy Research, The Australian National University, Canberra.

Gray, M. & Hunter, B. (2011) *Changes in indigenous labour force status: Establishing employment as a social norm?*, CAEPR Topical Issue 2011/7, Centre for Aboriginal Economic Policy Research, The Australian National University, Canberra.

Harvey, B. & Brereton, D. (2005) 'Emerging models of community engagement in the Australian minerals industry', paper presented at the International Conference on Engaging Communities, Brisbane, August 2005.

Harvey, B. & Nish, S. (2005) 'Rio Tinto and indigenous community agreement making in Australia', *Journal of Energy and Natural Resources Law*, vol 23, no 4, pp. 499–510.

Helme, S., & Lamb, S. (2011) 'Closing the school completion gap for Indigenous students', *Resource sheet No. 6* produced for the Closing the Gap Clearinghouse, Australian Institute of Health and Welfare, Canberra.

Hoy, W.E. (2009) '"Closing the gap by 2030": Aspiration versus reality in indigenous health', *The Medical Journal of Australia*, vol 190, no 10, pp. 542–544.

Hunter, B. (2010) 'Pathways for Indigenous school leavers to undertake training or gain employment', *Resource sheet No. 2* produced for the Closing the Gap Clearinghouse, Australian Institute of Health and Welfare, Canberra.

Hunter, B.H. & Taylor, J. (2002) 'An overview of the costs of indigenous unemployment' in P Saunders and R Taylor (eds) *The price of prosperity: The economic and social costs of unemployment*, UNSW Press, Sydney, pp. 109–134.

Jackson, N. (2008) 'Educational attainment and the (growing) importance of age structure: Indigenous and non-indigenous Australians', *Journal of Population Research*, vol 25, no 2, pp. 223–42.

Johnstone, K. (2011) 'Indigenous fertility in the Northern Territory of Australia: Stalled demographic transition?', unpublished PhD thesis, College of Arts and Social Sciences, The Australian National University, Canberra.

Jones, F.L. (1970) *The structure and growth of Australia's Aboriginal population*, Australian National University Press, Canberra.

Keyfitz, N. (1981) 'The limits to population forecasting', *Population and Development Review*, vol 7, no 4, pp. 579–93.

Khalidi, N. (2008) *Indigenous indicative population projections NSW: 2006 to 2021*, New South Wales Aboriginal Housing Office, Sydney.

Kinfu, Y. & Taylor, J. (2005) 'On the components of indigenous population change', *Australian Geographer*, vol 36, no 2, pp. 233–55.

Kirk, D. (1996) 'Demographic transition theory', *Population Studies*, vol 50, pp. 361–387.

Lutz, W., Goujon, A. & Doblhammer-Reiter, G. (1999), Demographic dimensions in forecasting: Adding education to age and sex' in W Lutz, JW Vaupel and DA Ahlburg (eds) *Frontiers of population forecasting*, A Supplement to Volume 24 of Population and Development Review, Population Council, New York.

Minerals Council of Australia (MCA) (2004) *Indigenous relations strategic framework December 2004*, MCA, Canberra.

Morphy, F. (2010) '(Im)mobility: Regional population structures in Aboriginal Australia', *Australian Journal of Social Issues*, vol 45, pp. 363–382.

Passel, J.S. (1996) 'The growing American Indian population, 1969–1990: Beyond demography' in GD Sandefur, RR Rindfuss and B Cohen (eds) *Changing numbers, changing needs: American Indian demography and public health*, National Academy Press, Washington DC.

Phibbs, P. (1989) 'Demographic-economic impact forecasting in non-metropolitan regions: An Australian example' in P Congdon and P Batey (eds) *Advances in regional demography: Information, forecasts, models*, Belhaven Press, London and New York.

Pragnell, B. (2002) 'Superannuation policy issues for indigenous Australians: Scope for reform', *Australian Universities Review*, vol 45, no 1, pp. 33–36.

Productivity Commission (2005) *Economic implications of an ageing Australia*, Productivity Commission Technical Papers, Productivity Commission, Melbourne.

Purdie, N. and Buckley, S. (2010) *School attendance and retention of Indigenous Australian students*, Issues Paper No. 1, Closing the Gap Clearinghouse, AIHW, Canberra.

Steering Committee for the Review of Government Service Provision (SCRGSP) (2011) *Overcoming indigenous disadvantage: Key indicators 2011*, Productivity Commission, Canberra.

Solomon, F., Katz, E. & Lovel, R. (2008) 'Social dimensions of mining: Research, policy and practice challenges for the minerals industry in Australia', *Resources Policy*, vol 33, no 3, pp. 142–9.

Stilwell, J., Bell, M., Blake, M., Duke-Williams, O. & Rees, P. (2000) 'Net migration and migration effectiveness: A comparison between Australia and the United Kingdom, 1976–96 Part 1', *Journal of Population Research*, vol 17, no 1, pp. 17–38.

Taylor, J. (2003) 'Indigenous Australians: The first transformation', in SE Khoo and P McDonald (eds) *The Transformation of Australia's Population: 1970–2030*, UNSW Press, Sydney.

Taylor, J. (2004) *Social indicators for Aboriginal governance: Insights from the Thamarrurr Region, Northern Territory*, ANU E Press, Canberra.

Taylor, J. (2008) *Ord Stage 2 and the socioeconomic status of indigenous people in the East Kimberley region*, CAEPR Working Paper No. 49, Centre for Aboriginal Economic Policy Research, The Australian National University, Canberra.

Taylor, J. (2010) *Demography as destiny: Schooling, work and Aboriginal population change at Wadeye*, CAEPR Working Paper No. 64, Centre for Aboriginal Economic Policy Research, The Australian National University, Canberra.

Taylor, J. (2011a) 'Postcolonial transformation of the Australian indigenous population', *Geographical Research*, vol 49, no 3, pp. 286–300.

Taylor, J. (2011b) 'Indigenous mobility and school attendance in remote Australia: cause or effect?', International Journal of Educational Research, doi:10.1016/j.ijer.2011.11.006.

Taylor, J. & Bell, M. (1996) 'The mobility status of Indigenous Australians' in P.L. Newton and M. Bell (eds.), *Population Shift: Mobility and Change in Australia*, AGPS, Canberra.

Taylor, J. & Bell, M. (2002) *The indigenous population of Cape York Peninsula, 2001–2016*, CAEPR Discussion Paper No. 227, Centre for Aboriginal Economic Research, The Australian National University, Canberra.

Taylor, J. & Biddle, N. (2010) 'Estimating the accuracy of geographic variation in indigenous population counts', *Australian Geographer* vol 41, no 4, pp. 469–484.

Taylor, J. & Hunter, B. (1998) *The job still ahead: Economic costs of continuing indigenous employment disparity*, Office of Public Affairs, Aboriginal and Torres Strait Islander Commission, Canberra.

Tehan, M., Palmer, L., Langton, M. & Mazel, O. (2006) 'Sharing land and resources: Modern agreements and treaties with Indigenous people in settler states' in M Langton, O Mazel, L Palmer, LK Shain and M Tehan (eds) *Settling With Indigenous People*, The Federation Press, Sydney, pp. 1–19.

Vos, T, Barker, B, Stanley, L & Lopez, A (2007) *The Burden of Disease and Injury in Aboriginal and Torres Strait Islander Peoples, 2003,* School of Population Health, Brisbane.

Wilson, T. & Barnes, T. (2007) 'Continuing challenges in attempting to measure the size, and changing size, of Australia's Indigenous population', *People and Place* vol 15, no 3, pp. 12–21.

Appendix 1 Projection Series assumptions (Source: Biddle & Taylor 2009)

Table 1A. Summary of assumptions for Series A projection to 2031

Component	Assumptions
Fertility and projected births[2]	Two birth categories are estimated: births of indigenous children to indigenous mothers and births of indigenous children to non-indigenous mothers. For the first category, 2006 state & territory age-specific fertility rates (ASFRs) (ABS 2007) are applied to indigenous regions and SLAs as appropriate and held constant for the projection period. After excluding births to indigenous mothers, the remainder of the indigenous births are divided first by the indigenous male ERP and then the non-indigenous female ERP. The average of the two is used as the second category of births.
Mortality and projected deaths	Age-specific survival rates are derived from the most recent experimental indigenous life tables (ABS 2009) and held constant. 2006 state & territory age-specific rates are applied to indigenous regions and SLAs as appropriate.
Net overseas migration	Net overseas migration is set to zero.
Net internal migration	Net inter-regional migration is set to zero
Error of closure	No allowance is made for population change via shifts in indigenous identification. This is a conservative assumption and similar to that adopted by the ABS low series indigenous projections.

[2] One caution in using registered births data is the discrepancy that often occurs between year of birth registration and year of birth occurrence leading to uncertainty regarding the actual level of fertility. For Indigenous births, this is especially so in Queensland and least so in the Northern Territory. Fortunately, in 2006, this discrepancy appears to have been minimal (for further details see ABS 2010b).

Table 1B. Summary of assumptions for Series B projection to 2031

Component	Assumptions
Fertility and projected births	Two birth categories are estimated. For births of indigenous children to indigenous mothers, 2006 state & territory age-specific fertility rates (ASFRs) are applied to indigenous regions and SLAs as appropriate for the 2006 to 2011 period. Non-indigenous ASFRs are used for the 2026 to 2031 period with convergence between the two occurring in a linear fashion for the intervening intercensal periods. Births of indigenous children to non-indigenous mothers are calculated as per Series A.
Mortality and projected deaths	Indigenous age-specific survival rates are derived from the most recent 2006 experimental indigenous life tables (ABS 2009) and used for the 2006 to 2011 period. Age specific survival rates based on the non-indigenous population are used for the 2026 to 2031 period. Convergence between the two is assumed to occur in a linear fashion for the intervening inter-censal period.
Net overseas migration	Net overseas migration is set to zero.
Net internal migration	Net inter-regional migration is set to zero
Error of closure	No allowance is made for population change via shifts in indigenous identification. This is a conservative assumption and similar to that adopted by the ABS low series indigenous projections.

Table 1C. Summary of assumptions for Series C projection to 2016

Component	Assumptions
Fertility and projected births	Two birth categories are estimated: births of indigenous children to indigenous mothers and births of indigenous children to non-indigenous mothers. For the first category, 2006 state & territory age-specific fertility rates (ASFRs) (ABS 2007) are applied to indigenous regions and SLAs as appropriate and held constant for the projection period. After excluding births to indigenous mothers, the remainder of the indigenous births are divided first by the indigenous male ERP and then the non-Indigenous female ERP. The average of the two is used as the second category of births.
Mortality and projected deaths	Age-specific survival rates are derived from the most recent experimental indigenous life tables (ABS 2009) and held constant. 2006 state & territory age-specific rates are applied to indigenous regions and SLAs as appropriate.
Net overseas migration	Net overseas migration is set to zero.
Net internal migration	Net inter-regional migration rates are derived from the 2006 Census for indigenous and non-indigenous populations and held constant to 2016.
Error of closure	No allowance is made for population change via shifts in indigenous identification. This is a conservative assumption and similar to that adopted by the ABS low series indigenous projections.