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Limited progress in closing the mortality gap for Aboriginal and Torres Strait Islander Australians of the Northern Territory

Tom Wilson,¹ Yuejen Zhao,² John Condon³

The long-standing health and mortality disadvantage of Aboriginal and Torres Strait Islander Australians is well known¹⁻³ and is generally worse in the Northern Territory than in other states and territories. As part of efforts to monitor progress with mortality and life expectancy and help inform appropriate policy and service responses, it is useful to construct life tables on a regular basis to obtain life expectancy and other mortality statistics. Life expectancy at birth is a valuable summary indicator – not only of mortality conditions, but also of the general health and wellbeing of a population – and it is one of the key ‘Closing the Gap’ indicators.⁴ When the Closing the Gap targets were announced by the Council of Australian Governments in 2008, the aim was to close the life expectancy gap within a generation (by 2031) and halve the under-five mortality rate within 10 years (by 2018).⁵

Unfortunately, creating life tables for the Aboriginal and Torres Strait Islander population is not straightforward. The disadvantage of Aboriginal and Torres Strait Islander Australians with regards to health and mortality is compounded by a statistical disadvantage in which the coverage, consistency and quality of population data is far from ideal. The Australian Bureau of Statistics (ABS) advises that most births and deaths of Aboriginal and Torres Strait Islander Australians are likely to be recorded, but not all are specifically identified as Indigenous.³ Aboriginal and Torres Strait Islander

Abstract

Objectives: To assess whether progress is being made towards reducing Aboriginal and Torres Strait Islander inequality in life expectancy and under-five mortality in the Northern Territory.

Methods: Life tables for five-year periods from 1966–71 to 2011–16 were calculated using standard abridged life table methods with Aboriginal and Torres Strait Islander deaths and population estimates as inputs. The latter were calculated using reverse cohort survival.

Results: In 2011–16, life expectancy at birth for the Aboriginal and Torres Strait Islander population was 68.2 years for females and 64.9 years for males. Limited progress in under-five mortality rates has been made in recent years.

Conclusions: Although Aboriginal and Torres Strait Islander life expectancy has increased in the long run, the gap with all-Australian life expectancy has not narrowed. The gap in under-five mortality rates is much lower than it was in the 1960s and 1970s, but progress has been limited over the past decade.

Implications for public health: The ‘Closing the Gap’ target of halving the gap in under-five mortality by 2018 will not be met in the Northern Territory, and there is no evidence yet of progress on the target to eliminate the gap in life expectancy by 2031.

Key words: Aboriginal and Torres Strait Islander, life expectancy, Northern Territory, mortality, Closing the Gap

Estimated Resident Populations (ERPs), which form the denominators of a wide range of demographic and socioeconomic measures, are also likely to have problems. They originate from census counts that miss about one-in-six Aboriginal and Torres Strait Islander people and, although ERPs are corrected for census net undercount, they still contain some limitations including age heaping, a limited available time series, and inconsistency over time.

Creating robust life tables is therefore challenging in this difficult data environment and adjustments must be made to data to rectify the deficiencies. In calculating

2010–12 Aboriginal and Torres Strait Islander life tables for Australia, the ABS applied adjustment factors to account for the under-identification of Aboriginal and Torres Strait Islander deaths.³ The adjustment factors were calculated from the Census Data Enhancement Indigenous Mortality Project, a study undertaken by the ABS that linked 2011 Census records with deaths recorded in the 12 months following the Census.⁶ Unfortunately, adjustment factors could not be applied to individual states and territories due to small numbers by age group.

The Northern Territory is the one jurisdiction where the coverage and quality of Aboriginal

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and Torres Strait Islander demographic data is good, and the application of under-identification adjustment factors is unnecessary. Available evidence suggests there is very good coverage of Aboriginal and Torres Strait Islander deaths.^{3,7} The ABS Indigenous Mortality Project discovered the Northern Territory had the highest rate of consistent reporting between census and death registrations, compared to the other states and territories; 95% of linked records had consistent Indigenous identification across both sources (compared to 62%, nationally). The number of deaths recorded as Indigenous in death registrations was actually 2% higher than the number of deaths identified as Indigenous from the linked census records. Northern Territory death registration forms have recorded Indigenous status since September 1988 and Aboriginal and Torres Strait Islander deaths data are available from the ABS from this time. Death counts for earlier years back to 1967 were estimated by Condon et al.⁷ by inferring Indigenous status from other information supplied on death registration forms. A blind test of this method for a period where Indigenous status was officially recorded in death records found that 95% of recorded Indigenous deaths were correctly inferred as such.

The time series of deaths for the Northern Territory Aboriginal and Torres Strait Islander population now stretches half a century. The aim of this paper is to summarise life expectancy and under-five mortality trends for the Northern Territory Aboriginal and Torres Strait Islander population over this period, in part updating earlier work.^{2,8,9} Our statistics differ from those of the ABS and other researchers by covering a longer period – from mid-1966 to mid-2016 – and by the creation of life tables based on a set of population estimates that are consistent over the whole study period. We also examine life expectancy across the age spectrum and not just at birth.

Data and Methods

Life tables were calculated using the standard abridged life table method,¹⁰ which requires age-sex-specific deaths and populations as input data. We used the usual ages of 0, 1–4, and then five-year age groups up to the highest open-ended age group of 85-plus. To reduce random variation, we calculated life tables for five-year periods from 1966–71

to 2011–16 (from 1 July in one year to 30 June five years later). The number of deaths was obtained directly from the ABS and the Condon et al. dataset. ABS Aboriginal and Torres Strait Islander ERPs were used as population estimates for 2016, but those for earlier years were calculated specifically for this study. The reason for doing so is because Aboriginal and Torres Strait Islander ERPs are inconsistent from one census year to another and are not available prior to 1986. For comparative purposes, abridged life tables were calculated for the Australian population as a whole for the same five-year time periods. We also decomposed Aboriginal and Torres Strait Islander life expectancy improvements between 1966–71 and 2011–16 to determine which age-specific mortality rates contributed the most to life expectancy changes. The decomposition method of Arriaga was applied.¹¹

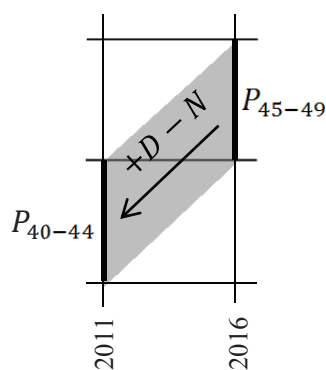
Counts of deaths to Aboriginal and Torres Strait Islander residents of the Northern Territory by sex and ages 0, 1–4, and then five-year age groups up to 85+ for individual years 1967 to 2001 were obtained from the Condon et al. dataset. Deaths for the second half of 1966 were assumed to be the same as those for the first half of 1967. Aboriginal and Torres Strait Islander deaths for five-year periods from 1 July to 30 June for 2001–06, 2006–11 and 2011–16 were obtained from the ABS for the same age and sex groups. Deaths from the ABS were also obtained in five-year period-cohort form (e.g. the cohort aged 25–29 in 2011 and aged 30–34 in 2016) for population estimation calculations. Aboriginal and Torres Strait Islander ERPs for 30 June 2016 by sex and five-year age group were obtained from the ABS.¹² Census net interstate migration counts for five-year

periods from 1966–71 to 2011–16 by sex and five-year period-cohort were also obtained from the ABS.

Aboriginal and Torres Strait Islander population estimates were calculated using reverse survival from 30 June 2016 ERPs going back in five-year increments to 30 June 1966. Zero net overseas migration and zero net change in Indigenous identification were assumed. Figure 1 illustrates the principle of the calculations for one cohort over one five-year period. In this example, the population aged 40–44 in 2011 was calculated as the population of the same cohort in 2016 (then aged 45–49) plus the deaths that occurred to the cohort over the 2011–16 period minus cohort net migration. The shaded parallelogram represents the cohort deaths and net migration while the thick vertical lines are the cohort populations in 2011 and 2016. This calculation was applied to all cohorts by sex for all periods from 2011–16 back to 1966–71 – with one exception. An adjustment was made to the ‘starting’ 2016 populations aged 0–4. The number of Aboriginal and Torres Strait Islander 0–4-year-olds obtained from reverse survival for earlier years was found to be higher than Aboriginal and Torres Strait Islander ERPs published for those years, indicating a systematic under-estimation of the population in the 0–4 age group. We therefore increased the 0–4-year-old ERP in 2016 by a factor of 1.02 for females and 1.05 for males; the average ratios of reverse survived population estimates to ERPs for this age group over the years 1996 to 2011. The effect of this adjustment on life expectancy at birth was less than 0.1 years.

The resulting population estimates dataset spans 50 years and is fully consistent with the 2016 ERPs for ages 5+ and the demographic components of change over that period. However, it should be noted that the population estimates and life tables used for this study are not perfect. The 2016 ERPs that provide the starting point for the earlier population estimates are not precise figures but are estimates based on census counts adjusted for net under-enumeration, people temporarily away from their usual residence on census night, plus the small timing difference between the census in August and the 30 June reference date of the ERP. There is almost certainly some degree of error in these data. Population estimates for earlier years are based on the assumption that all components of demographic change in the calculations are accurate, including the

Figure 1: Illustration of reverse survival.



Note: P denotes population, D deaths and N net migration

assumption of zero net overseas migration and zero net identification change. This last assumption is the most uncertain for recent years. Available evidence from the Australian Census Longitudinal Dataset (ACL D) suggests net identification change between 2011 and 2016 was low for the Northern Territory¹³ and much lower than in any other jurisdiction in Australia. Due to the small sample size and census errors, we are not fully convinced of the existence of this phenomenon in the Northern Territory, but careful attention will need to be paid to future updates to the ACL D when 2021 Census data are added. ACL D data suggests no net identification change occurred in the Northern Territory between 2006 and 2011.

It is also assumed that all data inputs for the population estimates and life tables refer to the Aboriginal and Torres Strait Islander population defined in exactly the same way, although it is known that indigeneity is identified or recorded in slightly different ways in different data collections.¹⁴ Our assumptions almost certainly do not hold precisely.

Results

Life expectancy at birth

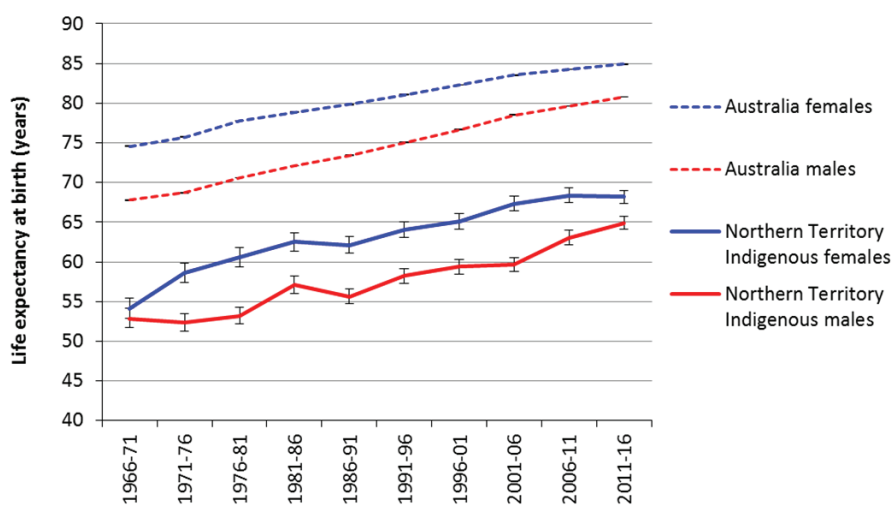
Figure 2 presents life expectancy at birth estimates for the Northern Territory Aboriginal and Torres Strait Islander population from 1966–71 to 2011–16. Equivalent statistics for the Australian population as a whole are also shown (by the dashed lines). In 2011–16, life expectancy stood at 68.2 years for Aboriginal and Torres Strait Islander females in the Northern Territory and 64.9 years for males. For Australia as a whole, life expectancy in 2011–16 reached 84.9 years for females and 80.8 years for males. Over the entire study period of 1966–71 to 2011–16, Aboriginal and Torres Strait Islander life expectancy at birth in the Northern Territory increased by an average of 3.1 years per decade for females and 2.7 years per decade for males. Most recently, between 2006–11 and 2011–16, male life expectancy increased by an impressive 1.9 years, although there was no significant change for females.

The new Northern Territory Aboriginal and Torres Strait Islander life expectancy figures presented here are very close to estimates published previously for 1966–71 to 2006–11 using the same methods.⁸ Minor differences are due to slight changes in the population

estimates that form the denominators of age-specific death rates. The new Aboriginal and Torres Strait Islander life expectancy figures are also similar to equivalent statistics published by the ABS. ABS Aboriginal and Torres Strait Islander life expectancy at birth estimates for the Northern Territory for 2010–12 were 68.7 years for females and 63.4 for males.³ Our estimates, interpolated to the same reference dates, are close to these at 68.3 and 64.0 years, respectively.

A decomposition of increases in Aboriginal and Torres Strait Islander life expectancy at birth between 1966–71 and 2011–16 was undertaken to reveal which age-specific mortality rates contributed most to the increases (Table 1). For females, 45% of the increase was due to improvements in under-five mortality, while for males it was about 50%. Other contributions to life expectancy increases were distributed across other age groups, although with relatively smaller

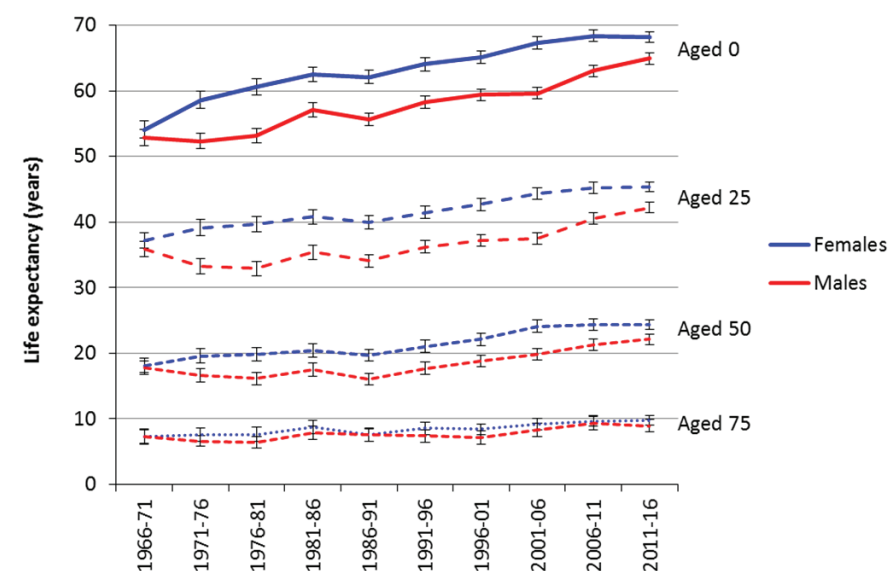
Figure 2: Northern Territory Aboriginal and Torres Strait Islander and all-Australian life expectancy at birth, 1966–71 to 2011–16.



Source: authors' calculations

Note: 95% confidence intervals shown for Aboriginal and Torres Strait Islander life expectancy

Figure 3: Northern Territory Aboriginal and Torres Strait Islander life expectancy at selected ages by sex, 1966–71 to 2011–16.



Source: authors' calculations

Note: 95% confidence intervals shown

contributions from the childhood ages of 5–14 and younger adult age groups. In contrast, for the Australian population as a whole, most life expectancy gains over this period have been contributed by mortality declines in the older adult age groups.

Aboriginal and Torres Strait Islander life expectancy at ages other than birth have also increased over the long run. Figure 3 illustrates trends in life expectancy at birth (age 0) and at ages 25, 50 and 75 over the study period. For example, female life expectancy at age 50 has increased from 18.1 years in 1966–71 to 24.4 years by 2011–16 (+6.3 years), while for males of the same age it has increased from 17.8 years to 22.1 (+4.3 years). For both genders, most of the increase in the adult ages has occurred since the early 1990s, reflecting sustained declines in mortality rates across most age groups above age 50 since then.

These increases in Aboriginal and Torres Strait Islander life expectancy are undoubtedly positive developments but, if the Closing the Gap goal is to be met, life expectancy not only needs to be increasing, but increasing at a much faster rate than all-Australian life expectancy. Figure 4 illustrates the gap in life expectancy at birth and selected other ages. In 2011–16, the difference in life expectancy at birth between the Northern Territory Aboriginal and Torres Strait Islander population and the Australian population as a whole stood at 16.7 years for females and 15.9 years for males. Aside from a narrowing of the gap for Aboriginal and Torres Strait Islander females between 1966–71 and 1971–76, both male and female Aboriginal and Torres Strait Islander life expectancy at birth has remained

between 15 and 19 years below all-Australian life expectancy.

As the graphs in Figure 4 show, the life expectancy gaps vary by age. For females, the life expectancy gap at age 25 has fluctuated over time but was not appreciably different in 2011–16 and 1966–71. At ages 50 and 75, the gap has increased slightly. In contrast, male life expectancy gaps for ages 25, 50 and 75 were larger in 2011–16 than in 1966–71. In part, this is due to substantial gains in all-Australian male life expectancy over the past 50 years.

Childhood mortality

The other mortality-related target of Closing the Gap was to halve the gap in under-five mortality within 10 years. Figure 5 shows the mortality rates for 0–4-year-old Aboriginal and Torres Strait Islander children in the Northern Territory from 1966–71 to 2011–16 alongside equivalent rates for Australia as a whole (shown by the dashed lines). The steep decline in childhood mortality rates in the 1960s, 1970s and 1980s represents great success in combating perinatal, respiratory and infectious causes of death.¹⁵ However, progress in lowering under-five mortality appears to have stalled between 2006–11 and 2011–16, with mortality rates for females changing from 0.00290 (95%CI 0.00248–0.00332) to 0.00328 (0.00285–0.00371), and from 0.00322 (0.00277–0.00366) to 0.00317 (0.00275–0.00360) for males. In 2011–16, these rates were still approximately four times those of the Australian population as a whole, which were 0.00076 for females and 0.00087 for males. Over this most recent period, the gap in the under-five mortality rate widened,

increasing from 0.00198 to 0.00253 for females and from 0.00204 to 0.00230 for males.

Discussion and conclusions

The updated life expectancy and under-five mortality rates for the Northern Territory Aboriginal and Torres Strait Islander population presented here mostly show limited amounts of improvements in recent years, especially for females. Although Aboriginal and Torres Strait Islander life expectancy has increased in the long run, the gap has failed to narrow. In fact, for males, the gap across the adult ages has increased over time. The original target of completely closing the life expectancy at birth gap within a generation (by 2031) was ambitious at the time of its announcement, and probably unachievable. It not only requires improvement in absolute terms but improvement at a faster rate than all-Australian life expectancy; this would need to happen at a very rapid pace to completely close the gap by 2031.

Among the disappointing statistics overall, there is some good news. Male life expectancy at birth in the Northern Territory increased by 1.9 years between 2006–11 and 2011–16. In addition, the Aboriginal and Torres Strait Islander infant mortality rate has fallen dramatically over the past half century – by 86% from 1966–71 to 2011–16. The probability of a newly born Aboriginal and Torres Strait Islander child in the Northern Territory dying before their first birthday is now 1.2% for females and 1.3% for males. Nonetheless, these statistics are still above

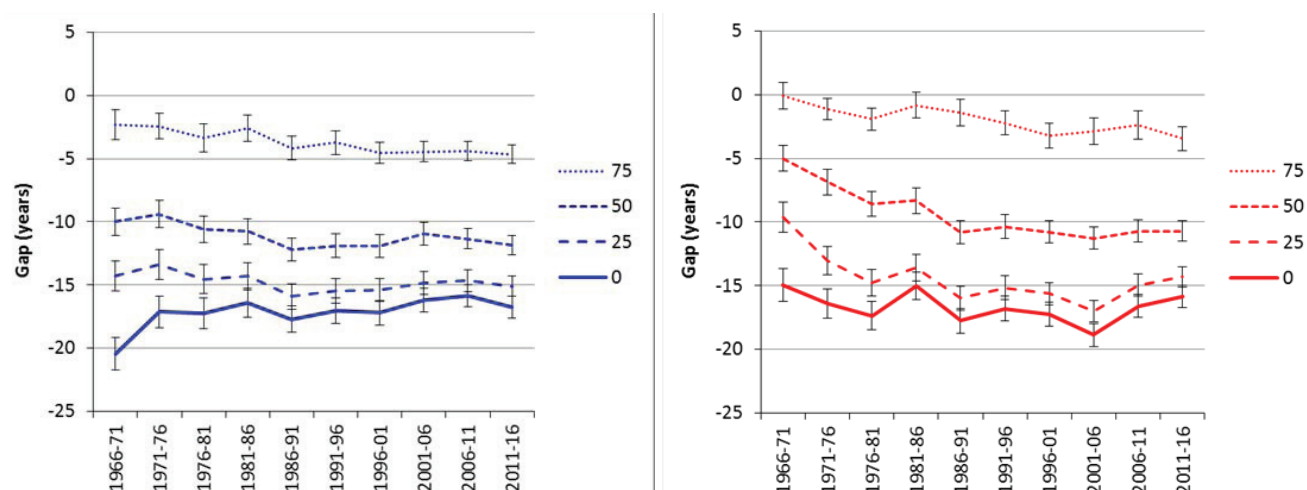
Table 1: Contribution to life expectancy at birth increases between 1966-71 and 2011-16 from mortality changes by age group, Northern Territory Aboriginal and Torres Strait Islander population and Australian population.

Ages	Northern Territory Aboriginal and Torres Strait Islander population				Australian population			
	Females		Males		Females		Males	
	Δe_0 (%)	95% CI	Δe_0 (%)	95% CI	Δe_0 (%)	95% CI	Δe_0 (%)	95% CI
0–4	6.35 (45.2%)	6.16-6.54	6.04 (50.1%)	5.87-6.22	1.27 (12.2%)	1.26-1.28	1.58 (12.2%)	1.58-1.59
5–14	0.09 (0.7%)	0.02-0.17	0.16 (1.3%)	0.08-0.23	0.16 (1.6%)	0.16-0.17	0.25 (1.9%)	0.24-0.25
15–24	0.63 (4.5%)	0.51-0.76	0.45 (3.7%)	0.33-0.57	0.22 (2.1%)	0.22-0.23	0.65 (5.0%)	0.64-0.66
25–34	0.66 (4.7%)	0.54-0.77	0.92 (7.6%)	0.8-1.04	0.23 (2.2%)	0.22-0.23	0.35 (2.7%)	0.35-0.36
35–44	1.45 (10.3%)	1.33-1.56	1.23 (10.2%)	1.12-1.34	0.48 (4.6%)	0.47-0.49	0.64 (4.9%)	0.64-0.65
45–54	1.27 (9.0%)	1.2-1.33	1.18 (9.8%)	1.13-1.23	0.98 (9.5%)	0.97-0.99	1.51 (11.7%)	1.51-1.52
55–64	2.12 (15.1%)	2.08-2.16	0.75 (6.2%)	0.7-0.79	1.62 (15.7%)	1.62-1.63	2.85 (21.9%)	2.84-2.85
65–74	1.05 (7.5%)	0.88-1.22	1.09 (9.0%)	0.89-1.29	2.44 (23.6%)	2.44-2.44	3.17 (24.4%)	3.17-3.17
75+	0.44 (3.1%)	0.08-0.79	0.25 (2.1%)	-0.1-0.61	2.94 (28.5%)	2.93-2.96	1.97 (15.2%)	1.96-1.98
Total	14.06 (100%)	13.57-14.56	12.07 (100%)	11.57-12.57	10.35 (100%)	10.33-10.37	12.99 (100%)	12.96-13.01

Source: authors' calculations

Note: Δe_0 denotes change in life expectancy at birth

Figure 4: The Northern Territory Aboriginal and Torres Strait Islander life expectancy gap at selected ages by sex, 1966-71 to 2011-16.



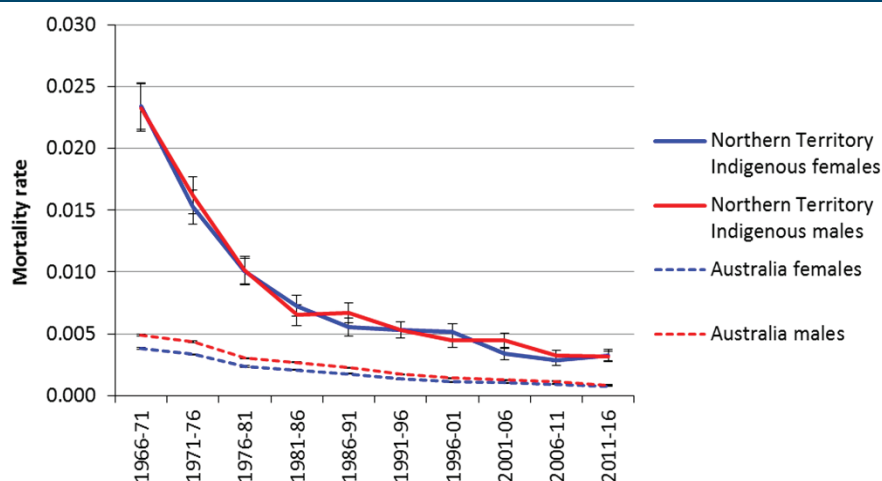
Note: Gap calculated as Northern Territory Aboriginal and Torres Strait Islander life expectancy minus that for Australia as a whole. 95% confidence intervals shown.

the equivalent all-Australian probabilities (0.3% for females and 0.4% for males), leaving room for improvement.

How can life expectancy at birth be increased? If Aboriginal and Torres Strait Islander childhood mortality (across ages 0–14 years) were to fall to the same rates experienced by the Australian population as a whole in 2011–16, the gain in life expectancy at birth would be about one year for both males and females. So, future life expectancy gains must come from the adult age groups. Halving the difference in 2011–16 age-specific mortality rates between the Northern Territory Aboriginal and Torres Strait Islander population and the Australian population as a whole at ages 15 and above would add about six years to both male and female Aboriginal and Torres Strait Islander life expectancy at birth. That is the scale of improvement that would clearly indicate a move towards closing the gap.

Our findings suggest that current approaches to tackling Aboriginal and Torres Strait Islander mortality inequalities are struggling to make headway. Previous research shows a combination of six selected risk factors explain 60–70% of the Aboriginal and Torres Strait Islander life expectancy gap in the Northern Territory: socioeconomic disadvantage, smoking, alcohol abuse, obesity, pollution and intimate partner violence.¹⁶ Socioeconomic disadvantage (such as relatively poor education, housing, hygiene, nutrition and income) is the largest contributor, responsible for between one-third and one-half of the gap in life expectancy at birth.

Figure 5: The mortality rates of 0–4 year-old Aboriginal and Torres Strait Islander children in the Northern Territory, 1966-71 to 2011-16.



Source: authors' calculations

Note: 95% confidence intervals shown for Aboriginal and Torres Strait Islander mortality rates

The other Closing the Gap targets focused on education and employment, which are fundamentally necessary (albeit not sufficient on their own) to an individual's capacity to control their own destiny and contribute to the wellbeing of their family, community and environment. Substantial progress in housing, education, hygiene, nutrition, employment and income is required to improve the mortality outcomes of the Northern Territory's Aboriginal and Torres Strait Islander population as measured by life expectancy at birth and under-five mortality. The inequality in mortality between Aboriginal and Torres Strait Islander and other Australians is the cumulative effect of disadvantage in almost every stage and aspect of life. Closing the

mortality gap depends on, and can only follow, substantial and sustained progress in the social, economic and environmental circumstances of Aboriginal and Torres Strait Islander Australians.

Acknowledgement

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Ethical standards

The study was ruled exempt from ethics review by the Human Research Ethics Committee of Charles Darwin University.

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