Aboriginal and Torres Strait Islander Life Expectancy and Mortality Trend Reporting

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Introduction

The National Indigenous Reform Agreement (NIRA) sets out the objectives, outcomes, outputs, performance indicators and performance benchmarks agreed by the Council of Australian Governments (COAG) to frame the task of Closing the Gap in Indigenous disadvantage (1).

One of the six key targets of COAG’s closing the gap strategy is closing the life expectancy gap within a generation (by 2031). Performance indicators for this target include estimated life expectancy at birth (baseline data 2005–07) and trends in mortality rates (baseline data 2006).

Several reporting series contain data on these indicators, including the Prime Minister’s Annual Report on Closing the Gap, the Productivity Commission’s Overcoming Indigenous Disadvantage Report (OID), the AHMAC Aboriginal and Torres Strait Islander Health Performance Framework report (HPF) and The Health and Welfare of Australia’s Aboriginal and Torres Strait Islander Peoples reports by the Australian Institute of Health and Welfare (AIHW) and/or Australian Bureau of Statistics (ABS).

Life expectancy reporting

Life expectancy estimation for Aboriginal and Torres Strait Islander peoples is undertaken after each 5 yearly population Census by the ABS. The methodology has changed substantially over the years (2). The current ‘direct’ methodology was introduced in 2013, following the 2011 Census (3), and is a modification of the methodology introduced after the 2006 census. This methodology links Census records to death registration records, and adjusts results to correct for Census under enumeration using the Census Post Enumeration Survey. Indigenous life expectancy has only been estimated using these methods since the 2006 Census. The 2006 methodology has been critically discussed (2).

Because the methodology is based on Census estimates that are only available every five years, the next life expectancy estimates will not be available until 2018. As Closing the Gap indicators are reported annually, in four years out of five there is no new information available on life expectancy. All the key indicator reports face the same dilemma. In the most recent reports, the OID, HPF, the Prime Minister’s Report, and the AIHW report all state that there was a small reduction in the life expectancy gap between Aboriginal and Torres Strait Islander peoples and non-Indigenous people between 2005–2007 and 2010–2012, based on the ABS life expectancy reports in 2013 and 2008.
The data presented in the OID(4 p. 141 Table 4.1.1) demonstrate the complexities involved in comparison over time. The Confidence intervals provided for the 2005–2007 (produced in 2008) and 2010–2012 (produced in 2013) life expectancy estimates overlap for both males and females. As well, there have been methodology changes between the 2005-07 estimates and the 2010-12 estimates: two changes were made, which together make only a small difference to the 2005-07 estimates; but each one makes a substantial, but offsetting, difference (3 Appendix 2).

Table 1: Aboriginal and Torres Strait Islander Life Expectancy

<table>
<thead>
<tr>
<th>Years</th>
<th>Male Life Expectancy</th>
<th>Confidence Intervals</th>
<th>Female Life Expectancy</th>
<th>Confidence Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-2007</td>
<td>67.5</td>
<td>66.1-68.9</td>
<td>73.1</td>
<td>71.9-74.3</td>
</tr>
<tr>
<td>2010-2012</td>
<td>69.1</td>
<td>67.8-70.4</td>
<td>73.7</td>
<td>72.5-74.9</td>
</tr>
</tbody>
</table>

**Mortality trend reporting**

In contrast to life expectancy estimates, updated mortality rate estimates, expressed as deaths per 100,000 population, are available annually, because mortality data are published annually.

Reporting of Aboriginal and Torres Strait Islander mortality depends on identification in death records of whether the person was of Aboriginal or Torres Strait Islander origin. Identification was introduced in the 1980s in most jurisdictions, and in 1996 in Queensland. The completeness and quality of identification varies between and across jurisdictions and improvement has been slow, particularly in NSW (2). Data for Victoria, Tasmania and the ACT, are still not considered of sufficient quality to use as a basis for estimating mortality rates (3).

**ABS and AIHW reporting**

Trends in Aboriginal and Torres Strait Islander all-cause mortality have been reported by the ABS and AIHW since 1997, in the reporting series on the Health and Welfare of Australia’s Aboriginal and Torres Strait Islander Peoples.

In 1997, the ABS and AIHW stated that, from 1994 ‘WA, SA and the NT were deemed to have adequate identification of Indigenous people to allow for
reporting’ (5 p. 85). The 1999 report made a similar statement. Neither report included any time series data.

The 2001 report (6 p. 100) includes Queensland data for the first time, stating that ‘For the three year period 1997-99, Queensland’s coverage of Indigenous deaths approached the levels of completeness found in SA, WA and the NT.’ The report points out that, despite improvements, the coverage of Indigenous death registrations in NSW (and other jurisdictions) ‘has not yet reached a level which would allow its inclusion in the … analysis’. The analysis in that report uses 1997-99 data for the four jurisdictions combined, not single year data. Again, no time series data are reported.

In late 2001, the ABS published Deaths 2000 (7) and included time series data on age-specific Aboriginal and Torres Strait Islander death rates based on WA, SA and NT data. The publication summarised as follows: ‘No clear trend over time is evident in Indigenous age-specific death rates.’

The 2003 report (8) also uses Queensland, WA, SA and NT data, repeating the 2001 report’s findings on coverage. Time series data from SA, WA and NT are examined, with the overall conclusion ‘No definitive conclusions about changes in mortality among Indigenous Australians living in the jurisdictions can be made’. The 2005 report (9) also bases its trend analysis on WA, SA and NT, reporting a significant decline in mortality in WA from 1991 to 2002. There were also declines in SA and NT, but these were not significant. In 2008 (10), a time series analysis based on these three jurisdictions is again reported, for the period 1991 to 2005, with similar results (plus a significant decline in female mortality in the NT). The 2011 report (11), (published by AIHW only) used WA, SA and NT data combined, showing a significant decline in mortality rates up to 2005, but rises from then until 2008.

The AIHW produced a further report in 2015 (12), and estimated a 16% decline in mortality between 1998 and 2012, based on NSW, Queensland, WA, SA and NT data combined. There is no discussion of the inclusion of these additional jurisdictions, and details of the basis of the calculations are not provided. Apart from 2015, none of these trend analyses include data from NSW or Queensland. Queensland data had only been found to be of sufficient quality from 1997, so their exclusion from trend analysis reflects the lack of reliable data for the years preceding 1997. Most importantly, NSW data are not considered of adequate quality for trend analysis up to and including the 2011 report, which includes data up to 2008.
Health Performance Framework

Each Health Performance Framework report is supported by an AIHW publication presenting detailed statistical analyses.

The various Health Performance Framework reports up to 2012 (13, 14, 15, 16) present trends in age-standardised mortality from 1991, based on WA, SA and NT data. The data issues and limitations are well discussed. The summary indicator reported is based on percentage change since 1991, a single year starting point. The actual 1991 value is used as the starting point, not the modelled value from the regression analysis, making the percentage decline highly dependent on the starting year.

In 2014, trend data are reported using NSW and Queensland data in addition to WA, SA and NT. No explanation is given for the change.

Table 2 shows summary statistics from the various HPF Detailed Analyses reports up to 2012, based on WA, SA and NT mortality data.

Table 2: Trend in age-standardised mortality rates (persons), WA, SA and NT

<table>
<thead>
<tr>
<th>Year</th>
<th>Table No. (AIHW HPF Detailed Analyses)</th>
<th>Start year rate (R1) (Yr)</th>
<th>End year rate (Yr)</th>
<th>Yearly decline in rate (d)</th>
<th>Percentage decline since start date (N-1) x d/R1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>1.21.3</td>
<td>1668.0 (1991)</td>
<td>1297.2 (2003)</td>
<td>21.8</td>
<td>15.7 (a)</td>
</tr>
<tr>
<td>2010</td>
<td>1.22.4</td>
<td>2114.9 (1991)</td>
<td>1753.7 (2008)</td>
<td>31.6</td>
<td>25.4</td>
</tr>
<tr>
<td>2012 (1)</td>
<td>1.22.4</td>
<td>2117.2 (1991)</td>
<td>1341.4 (2010)</td>
<td>36.6</td>
<td>32.9</td>
</tr>
<tr>
<td>2012 (2)</td>
<td>1.22.4</td>
<td>1656.5 (1998)</td>
<td>1341.4</td>
<td>22.4</td>
<td>16.2</td>
</tr>
<tr>
<td>2012 (3)</td>
<td>1.22.4</td>
<td>1466.0 (2001)</td>
<td>1341.4</td>
<td>10.5</td>
<td>6.5</td>
</tr>
</tbody>
</table>

(a) Calculated from data provided in HPF Detailed Analyses reports

Notes:
1 The substantial increase in the rate of decline reported in the 2010 and 2012 reports may be explained by the following note to table 1.22.4 in the 2010 report: ‘Rates presented in this table may differ from those presented in the 2006 edition of this report for comparable years because of a change from using year of occurrence of death to year of registration of death for mortality analyses.’

2 The slope of a linear regression model using the data points provided in the report.

3 The slope of the regression multiplied by the number of data points minus 1, as a percentage of the starting point.

4 The denominator used in calculating percentage change is the actual mortality rate for the start year in question, rather than the modelled rate, with the result that the estimated percentage change is sensitive to the start year chosen.

Table 3 shows the summary statistics published in the 2014 HPF Detailed Analyses data tables report, based on NSW, Queensland, WA, SA and NT mortality data.

Table 3: Trend in age-standardised mortality rates (persons), NSW, Queensland, WA, SA and NT

<table>
<thead>
<tr>
<th>Year</th>
<th>Table</th>
<th>Start year rate (R1)</th>
<th>End year rate</th>
<th>Yearly decline in rate (d)</th>
<th>Percentage decline since start date ((N-1) x d/R2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1.22.6</td>
<td>1179.8 (1998)</td>
<td>995.7 (2013)</td>
<td>11.9</td>
<td>15.8</td>
</tr>
<tr>
<td>2014</td>
<td>1.22.6</td>
<td>1086.3 (2001)</td>
<td>995.7 (2013)</td>
<td>7.7</td>
<td>8.7</td>
</tr>
<tr>
<td>2014</td>
<td>1.22.6</td>
<td>1018.6 (2006)</td>
<td>995.7 (2013)</td>
<td>5.5</td>
<td>3.8</td>
</tr>
</tbody>
</table>

1. R2 is the modeled linear regression start rate, not the actual start rate
Prime Minister’s Closing the Gap reports

The various Prime Minister’s reports on Closing the Gap have contained a variety of data on trends in all-cause mortality rates.

2010: ‘All-cause mortality rates in the three jurisdictions for which there are good trend data decreased by 13 per cent between 1991 and 2006’ (source: HPF 2008)

2012: ‘The combined age-standardised Indigenous mortality rate for New South Wales, Queensland, South Australia and the Northern Territory (the jurisdictions for which data can be analysed over this period) has declined by 13 per cent between 1998 and 2010’ (source: not stated; it is explained that WA data are not included due to an enumeration problem in the years 2007, 2008 and 2009)

2013 ‘After adjusting for age, Indigenous mortality rates in New South Wales, Queensland, Western Australia, South Australia and the Northern Territory combined (the jurisdictions with adequate data for analysis for recent trends) have shown a significant decline of 12 per cent between 1998 and 2011…. The trend between the 2006 baseline and 2011 also shows a significant decline in the Indigenous mortality rate of 5 per cent, although there has been no significant change in the gap as non-Indigenous rates have also declined.’ (source: AIHW analysis of ABS Mortality Database (unpublished))

2014: No mortality rate data presented. Note that 2010-12 life expectancy estimates were first available for this report

2015: ‘From 1998 to 2013, overall Indigenous death rates have declined significantly (by 16 per cent) and there has been a significant decline in the gap (by 15 per cent). However, no significant change was detected between the 2006 baseline and 2013, and rates are not on track to meet the target.’ (source: ABS and AIHW analysis of National Mortality Database, chart only). 1998 to 2013 trend data include NSW, QLD, WA, SA and the NT.

There are a number of questions surrounding the reporting of trends in mortality rates in the Prime Minister’s reports.

First, the baseline data year for the NIRA indicator ‘Mortality rate by leading cause’ is 2006. In the early years of the Agreement, too short a time had elapsed for any trend to emerge. Why trends with a start year before 2006 were reported is not explained. The 2013 Report is the first to provide a trend from the 2006 baseline to 2011, based on 5 years’ data and showing a 5% decline from 2006 to 2011. The 2015 Report states that there has been ‘no significant change’ since 2006. However, it is notable that it is the trend from
1998 to 2013—a significant decline of 16%—which is headlined in the 2015 report. No justification is given for continuing to report trends from 1998 once trends from the 2006 baseline are available.

Second, over the years 2010 to 2015 there was a change in jurisdictions included. The 2012 Prime Minister’s Report includes Queensland and NSW data, whereas the 2012 HPF Report Detailed Analyses (published in 2013) continues to report trends based on WA, SA and NT data only. The use of NSW data in particular is problematic given the acknowledged poor levels of Indigenous identification in death reporting.

Third, with the exception of the 2010 Report, the mortality data reported are not drawn from published sources, and so cannot be checked.

**Overcoming Indigenous Disadvantage (OID) reports**

The earliest OID reports (2003 and 2005) report on life expectancy and do not report on mortality or mortality trends. The later reports are mixed, with reporting on avoidable mortality, age specific death rates and the age-standardised gap in mortality per 100,000 population between Aboriginal and Torres Strait Islander and non-Indigenous peoples.

2007: From 2001 to 2005 in Qld, WA, SA and NT, for all age groups below 65 years, the age-specific death rates for Aboriginal and Torres Strait Islander people were at least twice the corresponding rate for non-Indigenous people. (Source ABS (2006) Deaths Australia 2005)

2009. From 2002 to 2006 in Qld, WA, SA and NT, the all-cause mortality rate was 2.1 times the rate for non-Indigenous people. (Source AIHW (2009) Health Performance Framework 2008 – detailed analysis Table 4A.1.3)

2011. From 1991 to 2009 in WA, SA and NT the mortality rate declined by 27%. From 1998 to 2009 in NSW, Qld, WA, SA and NT, for people aged under 75, the gap in avoidable mortality decreased from 482.8 per 100,000 to 358.9 per 100,000 population (Source: ABS (unpublished) Causes of Death, Australia 2009, Cat. no. 3303.0; table 7A.3.4.)

2014. From 1998 to 2012 in NSW, Qld, WA, SA and NT, Aboriginal and Torres Strait Islander crude mortality rates decreased from 448.7 to 408.6 deaths per 100,000 population. (Source: ABS (unpublished) Deaths Australia, table 4A.1.6)
Again, we see changes in the jurisdictions included for the reporting of trends in mortality rates, and the use of unpublished data. NSW is included in the trend analysis from the 2011 report onwards, and NSW data from 1998 are used.

Productivity Commission

Regular reports on Performance Assessment under the National Indigenous Reform Agreement have been produced, first by the COAG Council and now by the Productivity Commission. The most recent of these reports was for 2013-14, published in December 2015. In the Life Expectancy chapter the 16% decline in age-standardised mortality rates between 1998 and 2013 is reported. Data sources are not referenced but this is the same percentage decline and period as in the 2015 Prime Minister’s report and 2014 HPF Report, and so is presumably based on NSW, Queensland, WA, SA and NT data combined.

Table 2.3 shows a 4.7% decline in mortality rates from 2006 to 2012 for NSW, Queensland, WA, SA and NT combined. The Statistical attachment to the Life Expectancy chapter includes charts for mortality rates from 2005 to 2013 for NSW, Queensland, SA and NT, and then these four jurisdictions plus WA combined. The graph for the five jurisdictions (Figure 2.5) does not show a downward trend from 2005 to 2013. The two trends—in Table 2.3 and Figure 2.5—cite different source data are not reconciled nor discussed.

Plausible estimation of trends in mortality rates from the 2006 baseline

New life expectancy estimates are only available every five years, between 2 and 3 years after the Census is conducted. In these circumstances, it is reasonable and desirable to use mortality data to monitor changes in Indigenous health, and progress on Closing the Gap targets. But the data used should relate to the period of the NIRA, with trends starting in 2006, NIRA’s base year for mortality reporting.

In this section our aim is to propose an approach to obtaining plausible mortality rate trend estimates, avoiding the problems that have been highlighted above. NSW data show an increasing trend over the period from 2006 to 2013, which may, at least in part, reflect improving identification of Indigenous deaths in the State. Given the doubts over the quality of NSW mortality data, trend reporting should be based on WA, SA and NT data. Queensland data could be included, as quality has been considered acceptable from 1997; however, mortality rate trends reported over many years by the ABS and AIHW were based on WA, SA and NT data only. Mortality trends for NSW, if published at all, should be reported separately and the data quality issues should be clearly stated.
Figure 1 shows NSW crude mortality rates per 100,000 population from 2006 to 2013, and a fitted linear regression line.

Figure 1: NSW crude mortality rates 2006-2013 (per 100,000 population)

Reasons for the upward trend may include the impact of possible increasing Aboriginal and Torres Strait Islander identification in death registrations, which would confound any actual change in death rates. The continuing relatively low rate of identification in death registration records is demonstrated by the results of the 2006 and 2011 census data linkages between deaths and census records, conducted by the ABS. Table A3.2 of the 2013 ABS life expectancy estimates report (3) shows the ratio of Aboriginal and Torres Strait Islander deaths identified in death registrations to the total number of Aboriginal and Torres Strait Islander deaths identified in either death registration records or the Census. The ratio is 0.69 in NSW, 0.80 in Queensland, 0.87 in WA and 0.98 in the NT.

The estimates of trends presented in Figures 2, 3 and 4 use crude mortality rates per 100,000 population (as there is no comparison with the non-Indigenous population, use of age standardised rates is not necessary). Data are sourced from the ABS publication Deaths, Australia 2013 (17). Excess Queensland deaths from 2010 have been removed, as is done in the AIHW reporting. 2014 population projections are used (18).
Figure 2: WA, SA and NT crude mortality rates 2006-2013 (per 100,000 population)

Percentage change since 2006: -3.4%

Figure 3: Qld, WA, SA and NT crude mortality rates 2006-2013 (per 100,000 population)

Percentage change since 2006: -0.1%

Figure 4: NSW, Qld, WA, SA and NT crude mortality rates 2006-2013 (per 100,000 population)

Percentage change since 2006: 4.5%
Figure 5 shows these three trends together, plus the NSW trend. The figure shows that conclusions about mortality rate trends are very much dependent on which jurisdictions are included in the combined data. This is because both mortality rates and trends in mortality rates differ substantially between jurisdictions.

**Figure 5: Mortality trends from Figures 2,3 and 4, plus NSW (per 100,000 population)**

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**Discussion**

Life Expectancy reporting is complex and highly depended upon the underlying assumptions. The Confidence intervals provided for the 2005–2007 and 2010–2012 life expectancy estimates overlap for both males and females and the reported changes are small, there should therefore be caution in drawing any conclusions about changes in the gap in life expectancy.

Trends in Indigenous mortality data were, for many years, reported by ABS and AIHW using data from the three jurisdictions where Indigenous identification in death registrations was considered of acceptable quality. From 1997, Queensland data were deemed to be of acceptable quality but trends continued to be reported using data from WA, SA and NT up to 2012. Indigenous identification in NSW death registrations has continued to be relatively poor. Nevertheless, from 2012, the Prime Minister’s Report, followed progressively by other reports, started reporting trends based on combined data including NSW and Queensland as well as WA, SA and NT. No reasons
were provided for the change. The trends reported were based on unpublished ABS and AIHW analyses.

In addition, the Prime Minister’s Report has tended to focus on trends beginning many years before the NIRA baseline year of 2006. No reasons have been provided. Trends from the baseline year have been available from 2013, but are given less emphasis than trends beginning in earlier years. Trends using earlier baseline years show substantial declines in mortality rates for Aboriginal and Torres Strait Islander peoples, whereas trends beginning in 2006 show smaller declines.

The various indicator reports now all use mortality data from NSW, Queensland, WA, SA and NT to monitor trends. The inclusion of NSW is not justified given the lower rate of Aboriginal and Torres Strait Islander identification in death registration records in that State. Inclusion of NSW data acts to understate the decline in mortality, given the unexplained upward trend in NSW.

We propose that the reporting of trends in mortality rates for Closing the Gap and other indicator reporting should:

- for Closing the Gap, be reported from the NIRA baseline year of 2006 to the latest year reported by ABS;
- be based on WA, SA and NT combined data, or Queensland, WA, SA and NT combined data;
- not include NSW data;
- use crude mortality rates rather than age standardized rates.

Comment is welcome: scatsis@sydney.edu.au
References