



# **LIFE TABLES FOR ABORIGINAL AND TORRES STRAIT ISLANDER AUSTRALIANS**

AUSTRALIA

EMBARGO: 11.30AM (CANBERRA TIME) FRI 15 NOV 2013

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For further information about these and related statistics, contact the National Information and Referral Service on 1300 135 070 or Holly Cockburn on Canberra (02) 6252 6400.

## NOTES

### ABOUT THIS RELEASE

We thank Australian Aboriginal and Torres Strait Islander peoples for their cooperation and assistance in the collection of data, without whom this analysis would not have been possible.

This release presents life tables for male and female Aboriginal and Torres Strait Islander Australians for the reference period 2010–2012, for New South Wales, Queensland, Western Australia, the Northern Territory and Australia.

### CHANGES IN THIS ISSUE

Since the 2005-07 issue of this publication, an improvement has been made to the method of calculating Aboriginal and Torres Strait Islander life tables at the Australia level. The method now takes age-specific identification rates into account when calculating the underidentification adjustment. Further details on this refinement can be found in *Chapter 3: Data linkage to derive Aboriginal and Torres Strait Islander deaths identification rates*.

This method could not be used for state and territory life tables due to insufficient sample from the Post Enumeration Survey to accurately calculate age-specific identification rates. The estimates for New South Wales, Queensland, Western Australia and the Northern Territory were therefore calculated without an age-specific adjustment, and followed the same methodology that was used for the 2005-2007 life tables. Due to the different methodologies, life expectancy estimates for these states and one territory are not comparable with the headline estimates for Australia, which used an age-specific adjustment. Comparable, non age-adjusted Australia level life tables are provided to enable national and state and territory comparisons.

This release also includes Aboriginal and Torres Strait Islander life tables by remoteness areas for the first time, also without age-specific adjustments.

Comparable 2005-2007 life expectancy estimates, which specifically factor in the statistical impact of this methodological refinement and the improved collection of Indigenous status in the Post Enumeration Survey, can be found in *Appendix 3: Estimating revised life expectancy measures for 2005-2007*.

### UPCOMING RELEASES

Estimates and projections of the Aboriginal and Torres Strait Islander population of Australia for the period 2001 to 2026 will be published in *Estimates and Projections, Aboriginal and Torres Strait Islander Australians, 2001 to 2021* (cat. no. 3238.0), which is scheduled for release on 30 April 2014.

Brian Pink  
Australian Statistician

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## ABBREVIATIONS .....

|       |  |
|-------|--|
| ABS   | Australian Bureau of Statistics            |
| ACT   | Australian Capital Territory               |
| AIHW  | Australian Institute of Health and Welfare |
| ASGS  | Australian Statistical Geography Standard  |
| Aust. | Australia                                  |
| CDE   | Census data enhancement                    |
| DRF   | death registration form                    |
| ERP   | estimated resident population              |
| MCCD  | medical certificate of cause of death      |
| NSW   | New South Wales                            |
| NT    | Northern Territory                         |
| OT    | Other Territories                          |
| PES   | Post Enumeration Survey                    |
| Qld   | Queensland                                 |
| RA    | Remoteness Area                            |
| RTO   | resident temporarily overseas              |
| SA    | South Australia                            |
| SE    | standard error                             |
| Tas.  | Tasmania                                   |
| Vic.  | Victoria                                   |
| WA    | Western Australia                          |

# CHAPTER 1

## MAIN FEATURES

### INTRODUCTION

We thank Australian Aboriginal and Torres Strait Islander peoples for their cooperation and assistance in the collection of data, without whom this analysis would not have been possible.

The ABS would like to recognise the valuable contribution made by key experts to the methods used by the ABS. In particular, the Aboriginal and Torres Strait Islander Demographic Statistics Expert Advisory Group has provided valuable advice to the ABS in the lead-up to producing 2010-2012 estimates.

The compilation of accurate life tables to derive life expectancy estimates for Aboriginal and Torres Strait Islander Australians presents particular challenges. The standard approach to compiling life tables requires complete and accurate data on deaths that occur in a period, and reliable estimates of the population (at the mid-point of the period) exposed to the risk of dying.

In the case of Aboriginal and Torres Strait Islander mortality estimation, the situation is less than perfect. Registration of Aboriginal and Torres Strait Islander deaths and Aboriginal and Torres Strait Islander population estimates have some methodological limitations compared to those for the entire population. For more information see *Chapter 2: Quality issues with Aboriginal and Torres Strait Islander deaths and population data*.

### SUMMARY OF HEADLINE ESTIMATES

At the national level, for 2010–2012, life expectancy at birth for Aboriginal and Torres Strait Islander males was estimated to be 69.1 years, 10.6 years less than life expectancy at birth for non-Indigenous males (79.7 years). Life expectancy at birth for Aboriginal and Torres Strait Islander females was estimated to be 73.7 years, 9.5 years less than life expectancy at birth for non-Indigenous females (83.1 years). Confidence intervals for these estimates are presented in *Appendix 1: Confidence intervals*.

The ABS estimates that life expectancy at birth for Aboriginal and Torres Strait Islander males increased by 1.6 years since 2005-2007, and by 0.6 years for Aboriginal and Torres Strait Islander females. The difference between Aboriginal and Torres Strait Islander and non-Indigenous life expectancy narrowed by 0.8 years for males and 0.1 years for females over the same period. See Appendix 2: Estimating Revised Life Expectancy Measures for 2005-2007 for further information on the 2005-2007 to 2010-2012 change.

### *Use of Aboriginal and Torres Strait Islander life tables*

Estimates of life expectancy at birth for Aboriginal and Torres Strait Islander Australians are commonly used as a measure for assessing Aboriginal and Torres Strait Islander population health and disadvantage.

*Use of Aboriginal and  
Torres Strait Islander life  
tables continued*

The life tables in this release will enable the construction of Australian Bureau of Statistics (ABS) estimates and projections of the Aboriginal and Torres Strait Islander population of Australia for the period 2001 to 2026. These data are produced using the cohort-component method, in which assumptions made about levels of mortality, fertility and migration are iteratively applied to a base population to obtain projections of past and/or future populations.

CHOICE OF METHOD

Since the 2005-2007 issue of this publication, an improvement has been made to the method of calculating Aboriginal and Torres Strait Islander life tables at the Australia level. The method now takes age-specific identification rates into account when calculating the underidentification adjustment. For more information see *Chapter 3: Data linkage to derive Aboriginal and Torres Strait Islander deaths identification rates*.

This method could not be used for state and territory life tables due to insufficient sample from the Post Enumeration Survey to accurately calculate age-specific identification rates. The estimates for New South Wales, Queensland, Western Australia and the Northern Territory were therefore calculated without an age-specific adjustment, and followed the same methodology that was used for the 2005-2007 life tables. Due to the different methodologies, life expectancy estimates for these states and one territory are not directly comparable with the headline estimates for Australia, which used an age-specific adjustment. Comparable Australia level life tables have been calculated without an age-specific adjustment to enable national, state and territory and remoteness area comparisons.

These methods are very similar and both have two key features. First, the use of data linking enables direct calculation of identification rates. Second, by aligning the deaths data to the population estimates derived from the 2011 Census and Post Enumeration Survey the methodology ensures consistency between the numerator (that is, estimates of deaths) and the denominator (estimates of population at risk).

For completeness, a number of alternative approaches to adjust for underidentification of Indigenous status in deaths data and the resulting life expectancy estimates are presented in *Appendix 3: Alternative approaches to adjust deaths*. For the reasons outlined in Appendix 3, in particular the need for consistency between the numerator and denominator, these methods were not adopted.

Life tables for New South Wales, Queensland, Western Australia, the Northern Territory and Australia and life tables for Australia are presented in *Chapter 4: Life tables*. Due to the relatively small number of Aboriginal and Torres Strait Islander deaths in Victoria, South Australia, Tasmania and the Australian Capital Territory, it is not currently possible to construct reliable individual life tables for these states and territory.

Life expectancy estimates in this publication refer to the average number of additional years a person of a given age and sex might expect to live if the age/sex-specific death rates for 2010–2012 were to continue throughout his/her lifetime.

## CHOICE OF METHOD

*continued*

Life expectancy may be compiled for any particular age or age group, thus, life expectancy *at birth* refers to the *average* number of years a group of new-born babies could expect to live, if they experienced the 2010–2012 death rates throughout their lifetimes. This does not equate to the number of years of life any one person or group of persons will *actually* live.

## LIFE EXPECTANCY AT BIRTH OF ABORIGINAL AND TORRES STRAIT ISLANDER AUSTRALIANS

Table 1.1 presents life expectancy at selected ages for Aboriginal and Torres Strait Islander and non-Indigenous Australians. At all ages, for both males and females, life expectancy for Aboriginal and Torres Strait Islander Australians is lower than for non-Indigenous Australians.

**1.1** LIFE EXPECTANCY AT SELECTED AGES, Australia(a)—2010–2012

| LIFE EXPECTANCY                      | Aboriginal and Torres Strait Islander |                      |       | Total | Difference between non-Indigenous and Aboriginal and Torres Strait Islander life expectancy(b) |
|--------------------------------------|---------------------------------------|----------------------|-------|-------|--|
|                                      | years                                 | Non-Indigenous years | years |       |  |
| MALES                                |                                       |                      |       |       |  |
| 0                                    | 69.1                                  | 79.7                 | 79.4  | 10.6  |  |
| 1                                    | 68.7                                  | 79.0                 | 78.8  | 10.3  |  |
| 5                                    | 64.9                                  | 75.1                 | 74.8  | 10.2  |  |
| 25                                   | 45.7                                  | 55.5                 | 55.2  | 9.8   |  |
| 50                                   | 24.5                                  | 31.7                 | 31.5  | 7.2   |  |
| 65                                   | 13.9                                  | 18.6                 | 18.5  | 4.7   |  |
| 85                                   | 4.2                                   | 4.6                  | 4.6   | 0.4   |  |
| FEMALES                              |                                       |                      |       |       |  |
| 0                                    | 73.7                                  | 83.1                 | 82.9  | 9.5   |  |
| 1                                    | 73.2                                  | 82.4                 | 82.2  | 9.2   |  |
| 5                                    | 69.3                                  | 78.5                 | 78.2  | 9.2   |  |
| 25                                   | 49.8                                  | 58.7                 | 58.5  | 8.9   |  |
| 50                                   | 27.2                                  | 34.4                 | 34.2  | 7.1   |  |
| 65                                   | 15.8                                  | 20.6                 | 20.5  | 4.8   |  |
| 85                                   | 4.4                                   | 4.8                  | 4.8   | 0.3   |  |
| DIFFERENCE BETWEEN MALES AND FEMALES |                                       |                      |       |       |  |
| 0                                    | -4.5                                  | -3.4                 | -3.5  | ..    |  |
| 1                                    | -4.4                                  | -3.4                 | -3.4  | ..    |  |
| 5                                    | -4.4                                  | -3.4                 | -3.4  | ..    |  |
| 25                                   | -4.1                                  | -3.2                 | -3.2  | ..    |  |
| 50                                   | -2.7                                  | -2.7                 | -2.7  | ..    |  |
| 65                                   | -1.9                                  | -2.0                 | -2.0  | ..    |  |
| 85                                   | -0.2                                  | -0.1                 | -0.1  | ..    |  |

.. not applicable

(a) Headline estimates for Australia are calculated using an improved methodology (taking into account age-specific identification rates) that could not be applied at the state and territory or remoteness area levels. Therefore this data should not be compared with data for any state or territory, or remoteness area.

(b) Differences are based on unrounded estimates.

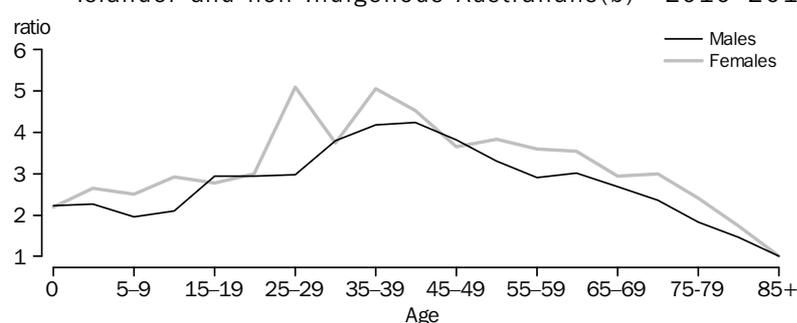
*Ratio of mortality rates*

Graph 1.2 illustrates the differences in mortality rates for Aboriginal and Torres Strait Islander and non-Indigenous Australians for 2010–2012.

For males, the largest differences were in the 35–39 year and 40–44 year age groups, where mortality rates for Aboriginal and Torres Strait Islander males were over four times higher than rates for non-Indigenous males.

For Aboriginal and Torres Strait Islander females, the largest differences were in the 25–29 year to 35–39 year age groups, where mortality rates were around five times higher than rates for non-Indigenous females.

**1.2** RATIO OF MORTALITY RATES(a), Aboriginal and Torres Strait Islander and non-Indigenous Australians(b)—2010–2012



(a) Ratio of Aboriginal and Torres Strait Islander mortality rate ( $q_x$ ) to non-Indigenous mortality rate.  
 (b) Headline estimates for Australia are calculated using an improved methodology (taking into account age-specific identification rates) that could not be applied at the state and territory or remoteness area levels. Therefore this data should not be compared with data for any state or territory, or remoteness area.

*State and territory life expectancy at birth*

State and territory estimates are calculated on a different methodological basis to the headline Australia estimates. For this reason a comparable Australia level series has been calculated without an age-specific adjustment and is included in the table below. Life expectancy at birth differs across the four states and territories for which estimates could be produced. For Aboriginal and Torres Strait Islander males, life expectancy at birth was highest in New South Wales (70.5 years) and lowest in the Northern Territory (63.4 years). A similar pattern exists for Aboriginal and Torres Strait Islander females, with the highest life expectancy at birth in New South Wales (74.6 years) and the lowest in the Northern Territory (68.7 years).

Differences in life expectancy at birth estimates between non-Indigenous and Aboriginal and Torres Strait Islander Australians are largest for males in Western Australia (15.1 years) and for females in the Northern Territory (14.4 years).

State and territory life  
expectancy at birth  
continued

**1.3** LIFE EXPECTANCY AT BIRTH, Indigenous status—2010–2012

|                                      | LIFE EXPECTANCY AT BIRTH                       |                |          | Difference between<br>non-Indigenous<br>and Aboriginal<br>and Torres Strait<br>Islander life<br>expectancy<br>at birth(a) |
|--------------------------------------|--|----------------|----------|---|
|                                      | Aboriginal<br>and Torres<br>Strait<br>Islander | Non-Indigenous | Total(b) |   |
|                                      | years  | years          | years    | years   |
| MALES                                |  |                |          |   |
| NSW                                  | 70.5   | 79.8           | 79.5     | 9.3   |
| Qld                                  | 68.7   | 79.4           | 78.9     | 10.8  |
| WA                                   | 65.0   | 80.1           | 79.5     | 15.1  |
| NT                                   | 63.4   | 77.8           | 74.3     | 14.4  |
| Aust.(c)(d)                          | 67.4   | 79.8           | 79.4     | 12.4  |
| FEMALES                              |  |                |          |   |
| NSW                                  | 74.6   | 83.1           | 82.9     | 8.5   |
| Qld                                  | 74.4   | 83.0           | 82.6     | 8.6   |
| WA                                   | 70.2   | 83.7           | 83.2     | 13.5  |
| NT                                   | 68.7   | 83.1           | 78.9     | 14.4  |
| Aust.(c)(d)                          | 72.3   | 83.2           | 82.9     | 10.9  |
| DIFFERENCE BETWEEN MALES AND FEMALES |  |                |          |   |
| NSW                                  | -4.1   | -3.4           | -3.4     | ..  |
| Qld                                  | -5.7   | -3.6           | -3.7     | ..  |
| WA                                   | -5.2   | -3.6           | -3.7     | ..  |
| NT                                   | -5.3   | -5.3           | -4.6     | ..  |
| Aust.(c)(d)                          | -4.9   | -3.4           | -3.5     | ..  |

.. not applicable

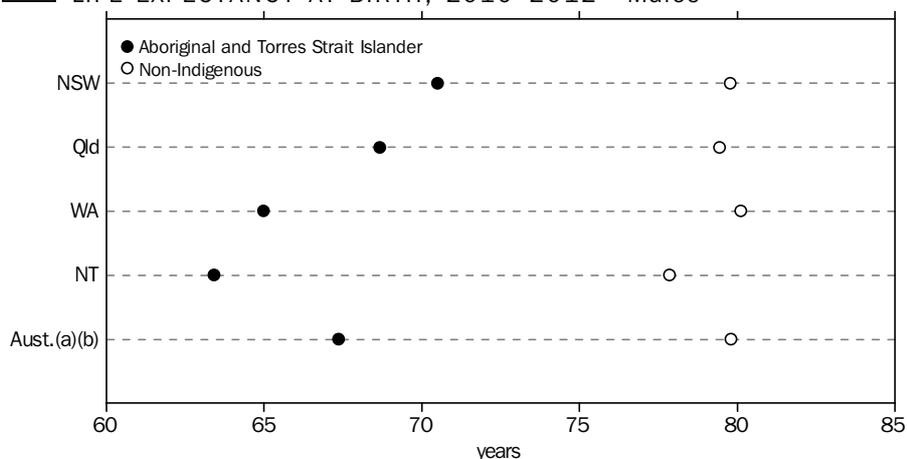
(a) Differences are based on unrounded estimates.

(b) Estimates of life expectancy at birth for the total population presented in this release differ from estimates in Deaths, Australia, 2012 (cat. no. 3302.0). See paragraph 32 of the Explanatory Notes for more information.

(c) These estimates are not the headline estimates for Australia, because they are calculated without an age-adjustment, but are provided to enable effective comparison with the state and territory, and remoteness area estimates.

(d) Includes all states and territories.

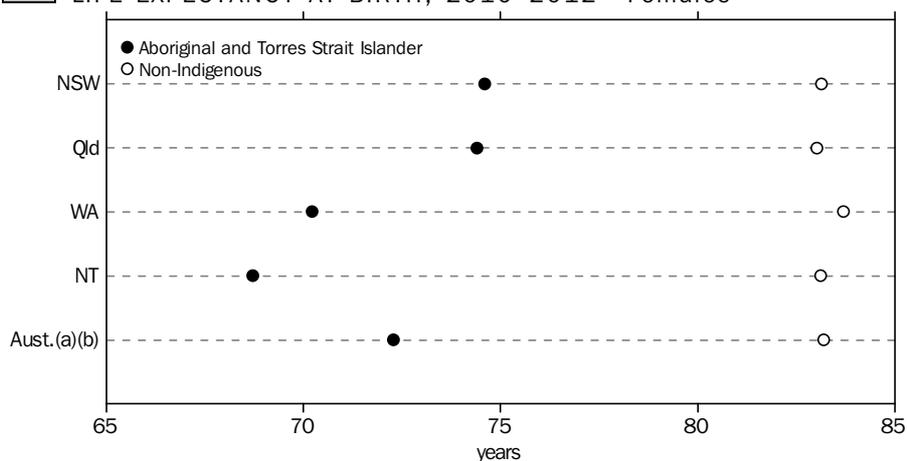
**1.4** LIFE EXPECTANCY AT BIRTH, 2010–2012—Males



(a) These estimates are not the headline estimates for Australia, because they are calculated without an age-adjustment, but are provided to enable effective comparison with the state and territory, and remoteness area estimates.

(b) Includes all states and territories.

**1.5** LIFE EXPECTANCY AT BIRTH, 2010–2012—Females



(a) These estimates are not the headline estimates for Australia, because they are calculated without an age-adjustment, but are provided to enable effective comparison with the state and territory, and remoteness area estimates.

(b) Includes all states and territories.

*Life Expectancy by remoteness areas*

The ABS has produced life expectancy at birth by remoteness area (RA) for the first time. Data has been published by grouping Major Cities and Inner Regional RAs together and Outer Regional, Remote and Very Remote together. The RAs were grouped together due to insufficient data for some RAs to be published individually, particularly at the lower ages. While Major Cities had sufficient data to be published separately, the Inner Regional RA displayed mortality characteristics that were more consistent with Major Cities than the other three RAs of Outer Regional, Remote and Very Remote.

The use of two groupings is less than ideal, given the under-identification of Aboriginal and Torres Strait Islander deaths decreases with each level of remoteness (it is greatest in Major Cities and lowest in Very Remote areas). The estimates will be different to those that would be derived using identification rates specific to each of the five individual

*Life Expectancy by remoteness areas continued*

remoteness areas, were it possible to produce them. The two groupings should therefore not be used as a proxy measure for 'urban' and 'rural' comparisons, but instead only used to illustrate that life expectancy estimates show less of a difference by remoteness than unadjusted mortality data show, reinforcing the importance of adjusted data.

Differences in life expectancy at birth between non-Indigenous and Aboriginal and Torres Strait Islander males was largest in Major Cities and Inner Regional areas (11.9 years). However, for females the difference was largest in Outer Regional, Remote and Very Remote areas (10.2 years).

**1.6** LIFE EXPECTANCY AT BIRTH, Remoteness Areas—2010–2012

|  | <i>Aboriginal and Torres Strait Islander</i> | <i>Non-Indigenous</i> | <i>Total</i> | <i>Difference between non-Indigenous and Aboriginal and Torres Strait Islander life expectancy at birth(a)</i> |
|--|--|-----------------------|--------------|--|
| MALES                                  |  |                       |              |  |
| Major Cities and Inner Regional        | 68.0   | 79.9                  | 79.7         | 11.9   |
| Outer Regional, Remote and Very Remote | 67.3   | 78.5                  | 77.4         | 11.2   |
| FEMALES                                |  |                       |              |  |
| Major Cities and Inner Regional        | 73.1   | 83.0                  | 82.8         | 9.9  |
| Outer Regional, Remote and Very Remote | 72.3   | 82.5                  | 81.5         | 10.2   |
| DIFFERENCE BETWEEN MALES AND FEMALES   |  |                       |              |  |
| Major Cities and Inner Regional        | -5.1   | -3.1                  | -3.1         | ..   |
| Outer Regional, Remote and Very Remote | -5.0   | -3.9                  | -4.1         | ..   |

.. not applicable

(a) Differences are based on unrounded estimates.

INTERNATIONAL COMPARISON

The comparison of life expectancy of Indigenous peoples across countries is problematic for a range of reasons, including differing methodologies, reference periods and definitions of a person's indigenous or ethnic status. There are also issues associated with the accurate measurement of deaths of indigenous persons and indigenous populations. As a result, life expectancy estimates between countries are not directly comparable.

In Canada, the most recently available estimates of life expectancy are for four Inuit-inhabited areas where 80% of the combined populations of these areas are Inuit. The estimates do not distinguish between life expectancy for Inuit and non-Inuit people but use total life expectancy for these areas as an overall indicator. Life expectancy at birth in Inuit-inhabited areas of Canada for 2001 (1999-2003) was 64.4 years for males and 69.8 years for females (Statistics Canada, 2013).

INTERNATIONAL  
COMPARISON *continued*

In New Zealand, a definition based on ethnicity is used in producing life tables for the Maori and non-Maori populations. Ethnicity in this context relates to the ethnic group or groups that people identify with, or perceive they belong to. For 2010–2012, life expectancy at birth was 72.8 years for Maori males and 76.5 years for Maori females (Statistics New Zealand, 2013).

For more information see the Statistics Canada <<http://www.statcan.gc.ca>> and Statistics New Zealand <<http://www.stats.govt.nz>> websites.

**QUALITY ISSUES WITH ABORIGINAL AND TORRES STRAIT ISLANDER DEATHS AND POPULATION DATA** .....

INTRODUCTION

The standard approach to compiling life tables and resulting life expectancy estimates requires complete and accurate data on deaths that occur in a period, and reliable estimates of the population (at the mid-point of the period) exposed to the risk of dying. These data are required by age and sex, so as to calculate age-sex specific death rates.

In the case of Aboriginal and Torres Strait Islander mortality estimation, this situation is less than perfect. Information on death registrations of Aboriginal and Torres Strait Islander Australians has limitations while a number of quality issues associated with Aboriginal and Torres Strait Islander population estimates exist. In combination, these present particular methodological challenges to compiling high quality life tables and making comparisons over time.

This chapter discusses the data challenges associated with death registrations of Aboriginal and Torres Strait Islander Australians and Aboriginal and Torres Strait Islander population estimates in more detail.

DEATHS OF ABORIGINAL AND TORRES STRAIT ISLANDER AUSTRALIANS

The first component necessary for the compilation of life tables for Aboriginal and Torres Strait Islander Australians is information on all Aboriginal and Torres Strait Islander deaths, by age and sex. These are required as numerators in the calculation of age-specific death rates from which life tables are produced.

Death registrations are collected in the form of administrative data from the Registrars of Births, Deaths and Marriages in each state/territory. While Australia maintains a high quality registration system of deaths, the level of Aboriginal and Torres Strait Islander identification can vary across state/territory collections, across geography and over time. For all states and territories, death registration forms use a standard question to elicit information about a person's Aboriginal and Torres Strait Islander origin. However, response to this question can be influenced by a number of factors, including the perception of why such information is required, who completes the question regarding the deceased, and personal and cultural aspects associated with identifying as Aboriginal and Torres Strait Islander. Also, there are significant differences among the state and territory registrars with regards to the way Indigenous status is coded.

It is considered likely that the overwhelming majority of deaths of Aboriginal and Torres Strait Islander Australians are registered. However, some of these deaths are not identified as Aboriginal and Torres Strait Islander when they are registered. This may arise from the failure to report a person's Indigenous status on the death registration form or from an incorrect identification of their Indigenous status (that is, recording non-Indigenous instead of Aboriginal and Torres Strait Islander) on the death certificate. Such mis-identification may occur because some Aboriginal and Torres Strait Islander

DEATHS OF ABORIGINAL AND TORRES STRAIT ISLANDER AUSTRALIANS  
*continued*

people may have non-Indigenous ancestries which may create uncertainty for those completing the death registration form as to how a deceased person should be identified. This issue remains a major challenge in developing Aboriginal and Torres Strait Islander life tables, as well as in estimating the Aboriginal and Torres Strait Islander population between Census years.

*Numbers of Aboriginal and Torres Strait Islander deaths*

Table 2.1 shows Aboriginal and Torres Strait Islander deaths registered from 1996 to 2012. Some observations may be made by a simple assessment of the numbers for each state and territory over time. Since 1996 the numbers of Aboriginal and Torres Strait Islander deaths registered in South Australia and Western Australia have been fairly consistent. For the Northern Territory and Tasmania, 2012 sees the highest number of registered deaths. At the national level, Aboriginal and Torres Strait Islander death registrations increased by around 2.4% in 2012.

**2.1** REGISTERED ABORIGINAL AND TORRES STRAIT ISLANDER DEATHS (a), State/territory of usual residence—1996 to 2012

| Year (b) | New South Wales | Victoria | Queensland(c) | South Australia | Western Australia | Tasmania | Northern Territory | Australian Capital Territory | Australia(d) |
|----------|-----------------|----------|---------------|-----------------|-------------------|----------|--------------------|------------------------------|--------------|
| 1996     | 177             | 49       | 258           | 118             | 370               | np       | 328                | np                           | 1 306        |
| 1997     | 88              | 93       | 531           | 132             | 351               | 5        | 458                | 4                            | 1 662        |
| 1998     | 462             | 123      | 593           | 127             | 378               | 13       | 415                | 3                            | 2 114        |
| 1999     | 435             | 130      | 529           | 116             | 350               | 11       | 399                | 6                            | 1 976        |
| 2000     | 473             | 108      | 535           | 144             | 407               | np       | 450                | np                           | 2 127        |
| 2001     | 481             | 93       | 565           | 125             | 345               | np       | 429                | np                           | 2 072        |
| 2002     | 516             | 64       | 590           | 107             | 371               | 20       | 462                | 4                            | 2 136        |
| 2003     | 485             | 82       | 569           | 137             | 338               | 23       | 435                | 9                            | 2 079        |
| 2004     | 490             | 54       | 579           | 131             | 400               | 20       | 449                | 10                           | 2 136        |
| 2005     | 507             | 71       | 519           | 142             | 406               | 28       | 454                | 11                           | 2 141        |
| 2006     | 530             | 111      | 584           | 124             | 443               | 20       | 452                | 14                           | 2 279        |
| 2007(e)  | 601             | 95       | 594           | 138             | 449               | 24       | 461                | 6                            | 2 368        |
| 2008     | 559             | 97       | 562           | 141             | 486               | 24       | 467                | 16                           | 2 353        |
| 2009     | 591             | 106      | 632           | 160             | 416               | 30       | 431                | 10                           | 2 377        |
| 2010(f)  | 622             | 117      | 948           | 147             | 436               | 37       | 447                | 13                           | 2 767        |
| 2011     | 726             | 128      | 629           | 141             | 454               | 30       | 437                | 12                           | 2 558        |
| 2012     | 635             | 100      | 678           | 151             | 466               | 45       | 539                | 6                            | 2 620        |

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Due to differing levels of identification for the states and territories and over time, care should be taken in interpreting change in numbers of deaths. As a result, data for Australia should not be analysed as a time series.

(b) Deaths are by registration year.

(c) Queensland began to register Aboriginal and Torres Strait Islander deaths as Aboriginal and Torres Strait Islander in 1996.

(d) Includes Other Territories

(e) From 2007, Indigenous status for deaths registered in South Australia Western Australia, Tasmania, Northern Territory and Australian Capital Territory is sourced from both the Death Registration Form and Medical Certificate of Cause of Death.

(f) In 2010, the Queensland Registrar of Births, Deaths and Marriages undertook a deaths registration initiative that resulted in the registration of 374 previously unregistered deaths which occurred between 1992 and 2006. Of these, around three-quarters were deaths of Aboriginal and Torres Strait Islander Australians.

*Deaths for which Indigenous status is unknown*

In addition to those deaths identified as Aboriginal and Torres Strait Islander, a number of deaths occur each year for which Indigenous status is not stated on the death registration form. In 2012, there were 1169 deaths registered in Australia for whom Indigenous status was not stated, representing 0.8% of all deaths registered. While this proportion has decreased over time (from a high of 4.4% in 2001) it is very likely that some Aboriginal and Torres Strait Islander deaths are included in this category, further contributing to the uncertainty as to the true number of Aboriginal and Torres Strait Islander deaths.

*Year of registration and year of occurrence of death*

Deaths and related mortality statistics can be reported according to the period in which the death was registered or the period in which the death occurred. Ideally, mortality statistics should be based on year of occurrence, but ABS data, including life tables, are based on year of registration. This is due to known lags in the time between the occurrence and registration of deaths: while the majority of deaths in Australia are registered in the year they occur, some deaths registered in any given year have occurred in previous years. These delays in registration can arise due to a variety of reasons, and are more common for Aboriginal and Torres Strait Islander deaths than non-Indigenous deaths.

For example, of all non-Indigenous deaths which occurred in Australia in 2011, around 95% were registered in 2011 (table 2.2). The corresponding figure was about 87% for Aboriginal and Torres Strait Islander deaths.

**2.2** PROPORTION OF DEATHS REGISTERED IN THE YEAR OF OCCURRENCE—1996 to 2011(a)

| <i>Year of occurrence</i> | <i>Aboriginal and Torres Strait Islander peoples</i> | <i>Non-Indigenous</i> |
|---------------------------|--|-----------------------|
|                           | %  | %                     |
| 1996                      | 80.3   | 95.7                  |
| 1997                      | 82.8   | 96.2                  |
| 1998                      | 86.6   | 96.0                  |
| 1999                      | 85.4   | 95.9                  |
| 2000                      | 85.4   | 95.5                  |
| 2001                      | 85.5   | 95.3                  |
| 2002                      | 86.0   | 95.8                  |
| 2003                      | 85.6   | 96.0                  |
| 2004                      | 87.3   | 96.1                  |
| 2005                      | 85.4   | 95.5                  |
| 2006                      | 86.0   | 95.1                  |
| 2007                      | 86.5   | 93.9                  |
| 2008                      | 86.2   | 95.0                  |
| 2009                      | 87.0   | 94.6                  |
| 2010(b)                   | 88.0   | 94.9                  |
| 2011                      | 87.4   | 95.2                  |

- (a) Based on deaths registered up to December 2012.
- (b) In 2010, the Queensland Registrar of Births, Deaths and Marriages undertook a deaths registration initiative that resulted in the registration of 374 previously unregistered deaths which occurred between 1992 and 2006. Of these, around three-quarters were deaths of Aboriginal and Torres Strait Islander Australians.

While the proportion of deaths registered in the same year of occurrence is lower for Aboriginal and Torres Strait Islander deaths than non-Indigenous deaths, there is little difference between the number of deaths registered in a given year and the number of deaths that occurred in the same year (see table 2.3). This is because, for each year, the number of deaths not registered in the year they occur are compensated for by deaths that occurred in previous years but were registered late [see also *The Health and*

*Year of registration and year of occurrence of death continued*

*Welfare of Australia's Aboriginal and Torres Strait Islander Peoples, Oct 2010* (cat. no. 4704.0)]. This indicates that Aboriginal and Torres Strait Islander deaths according to year of registration will produce similar death rates and life expectancy estimates as Aboriginal and Torres Strait Islander deaths according to year of occurrence data.

**2.3** ABORIGINAL AND TORRES STRAIT ISLANDER DEATHS BY REGISTRATION AND OCCURRENCE—July 2006 - June 2011

| State/territory | MALES      |          | FEMALES    |          |
|-----------------|------------|----------|------------|----------|
|                 | Registered | Occurred | Registered | Occurred |
| NSW             | 1 646      | 1 659    | 1 313      | 1 326    |
| Vic.            | 298        | 294      | 256        | 256      |
| Qld(a)          | 1 786      | 1 619    | 1 527      | 1 383    |
| SA              | 368        | 367      | 349        | 349      |
| WA              | 1 249      | 1 243    | 965        | 955      |
| Tas.            | 73         | 73       | 66         | 66       |
| NT              | 1 229      | 1 236    | 1 035      | 1 037    |
| ACT             | 33         | 34       | 22         | 21       |
| Aust.           | 6 684      | 6 527    | 5 534      | 5 394    |

(a) In 2010, the Queensland Registrar of Births, Deaths and Marriages undertook a deaths registration initiative that resulted in the registration of 374 previously unregistered deaths which occurred between 1992 and 2006. Of these, around three-quarters were deaths of Aboriginal and Torres Strait Islander Australians.

POPULATION ESTIMATES OF ABORIGINAL AND TORRES STRAIT ISLANDER AUSTRALIANS

The second component necessary for the compilation of life tables for Aboriginal and Torres Strait Islander Australians is information on the relevant population exposed to the risk of dying; that is, the population of Aboriginal and Torres Strait Islander Australians, by age and sex. These are required as denominators in the calculation of age-specific death rates from which life tables are produced.

*Changes in the Aboriginal and Torres Strait Islander population, 2006-2011*

The Census of Population and Housing is the principal source of information about Australia's population. It has been held on a five-yearly basis since 1961, with the most recent conducted in August 2011.

The Census provides the foundation from which Australia's official population figures—estimated resident population (ERP)—is calculated. The Census count of the population is adjusted for:

- estimates of the number of people missed in the Census;
- estimates of those counted more than once in the Census;
- temporary visitors from overseas;
- Australian residents temporarily overseas (RTO) on Census night; and
- backdating from Census night to the ERP reference date of 30 June of the Census year using data on births, deaths, and interstate and overseas migration.

This process results in an estimate of Australia's total population (by age and sex) as at 30 June of the Census year. For intercensal years (that is, years other than the Census year), this Census-based ERP is incremented by adding births and net overseas migration and subtracting deaths. However, estimating the size and composition of the Aboriginal and Torres Strait Islander population is more complicated. In intercensal years this standard

*Changes in the Aboriginal and Torres Strait Islander population, 2006-2011*  
*continued*

approach cannot be used due to the lack of sufficiently reliable data on Aboriginal and Torres Strait Islander births, deaths and migration.

For the five-yearly Census, there are a number of issues that make compilation of Aboriginal and Torres Strait Islander ERP problematic. These include:

- undercount of the Aboriginal and Torres Strait Islander population;
- non-response to the Indigenous status question on the Census form; and
- unexplained growth in Aboriginal and Torres Strait Islander Census counts relative to the previous Census.

#### UNDERCOUNT OF ABORIGINAL AND TORRES STRAIT ISLANDER POPULATION

While every effort is made to ensure full coverage of people and dwellings in the Census, some people are missed (undercount) and others are counted more than once (overcount). In Australia, more people are missed from the Census than are counted more than once. The net effect of overcount and undercount is called net undercount. The ABS conducts a Post Enumeration Survey (PES) about one month after each Census to measure the extent of net undercount in the Census. Estimates of net undercount provide direct information on the quality of population counts in the Census, and enable the necessary adjustment or correction to be made to the raw Census counts.

In addition, for some people, the Indigenous status reported in the PES is different to the Indigenous status recorded in the Census. Accordingly, estimates from the PES include an adjustment for misclassification error.

The net undercount rate in the 2011 Census was estimated at 17.2% for the Aboriginal and Torres Strait Islander population, compared to an undercount of 6.2% for the non-Indigenous population. Corresponding estimates for the 2006 Census were 11.5% for the Aboriginal and Torres Strait Islander population and 8.2% for the non-Indigenous population.

However, it is important to note that the net undercount rates are not strictly comparable over time due to changes in both Census and PES methodologies. The 2011 PES improved the collection of Indigenous status and also utilised the new methodology of Automated Data Linking, which resulted in better linking and matching of PES and Census records, and a better measure of net undercount. For more details on the PES and Aboriginal and Torres Strait Islander undercount, see:

- *Census of Population and Housing - Details of Undercount, 2011* (cat. no. 2940.0)
- *Australian Demographic Statistics, March Quarter 2012* (cat. no. 3101.0);
- *Estimates of Aboriginal and Torres Strait Islander Australians, Jun 2011* (cat. no. 3238.0.55.001); and
- *Census of Population and Housing: Understanding the Increase in Aboriginal and Torres Strait Islander Counts, 2006-2011* (cat. no. 2077.0).

*Changes in the Aboriginal and Torres Strait Islander population, 2006-2011*  
*continued*

NON-RESPONSE TO INDIGENOUS STATUS QUESTION ON THE CENSUS FORM

Despite the best efforts of the Australian Bureau of Statistics (ABS) to collect complete information from all people in Australia on Census night, there will always be a group of people for whom Indigenous status is not known. While some people with an unknown Indigenous status will be Aboriginal and/or Torres Strait Islander people, and some will be non-Indigenous people, the exact proportions cannot be determined from the Census data. This complicates analysis of Census counts, given Indigenous status is not imputed within Census information, but is instead imputed later within the PES for use in producing population estimates (imputation is a statistical process for predicting values where no response was provided to a question and a response could not be derived).

The number of Census records with an unknown Indigenous status in the 2011 Census was 1,058,600 (5% of the total Census count) compared with 1,133,400 records (6% of the total Census count) in 2006. The difference of 74,800 records represents a 7% decrease in records with an unknown Indigenous status between the 2006 and 2011 Censuses. This means that more people had a known Indigenous status in 2011 than in 2006, and this may account for some of the 'unexplained' increase in Census counts of Aboriginal and Torres Strait Islander people between 2006 and 2011.

The Northern Territory had the highest proportion of records with an unknown Indigenous status in 2011 (8%), followed by Western Australia (6%) and Queensland and New South Wales (both 5%).

There are two broad situations which result in a person's Indigenous status being unknown:

- the returned Census form does not have a response to the Indigenous status question (known as item non-response), or
- when no Census form is received from a dwelling the number of males and females and other key demographics variables are imputed. Indigenous status is not imputed for these records, but is coded to 'not stated'.

While some of these records will be for people of Aboriginal and Torres Strait Islander origin and the others for non-Indigenous origin, no imputation was made for Indigenous status in the Census file. However, for compiling Aboriginal and Torres Strait Islander ERP they are allocated as either Aboriginal and Torres Strait Islander or non-Indigenous according to the distribution of stated responses within each geographic area, age group, sex and Census form type. For more details on not stated Indigenous status and how Aboriginal and Torres Strait Islander ERP are derived, see *Estimates of Aboriginal and Torres Strait Islander Australians, Jun 2011* (cat. no. 3238.0.55.001) and *Census of Population and Housing: Understanding the Increase in Aboriginal and Torres Strait Islander Counts, 2006-2011* (cat. no. 2077.0).

*Changes in the Aboriginal and Torres Strait Islander population, 2006-2011*  
*continued*

#### UNEXPLAINED INCREASE IN ABORIGINAL AND TORRES STRAIT ISLANDER CENSUS COUNTS

The way the Indigenous status of a person is recorded in the Census can change over time and in different situations. The recorded status of an individual may move between any of the categories of Indigenous status, including between Aboriginal and Torres Strait Islander and non-Indigenous. This is known as a change in a person's propensity to identify.

Over the past 35 years, there has been a clear upward trend in Aboriginal and Torres Strait Islander Census counts, beginning with the 1971 Census and continuing to the 2011 Census. During this time, large increases in Aboriginal and Torres Strait Islander Census counts have occurred on several occasions. Natural increase (the excess of births over deaths) can account for a proportion, but not all, of these increases, while overseas migration has had an insignificant effect on the size of the Aboriginal and Torres Strait Islander population. It therefore appears that a further component of change exists in regard to Aboriginal and Torres Strait Islander Census counts, referred to as 'error of closure'.

In recent times, there has been particularly large increases between two intercensal periods, 1991-1996 and 2006-2011. Between 1991 and 1996, the Census count of Aboriginal and Torres Strait Islander people increased by 88,000 (33%). The components of this increase were estimated to be 14% due to natural increase, and the remaining 19% due to other factors, including changes in Census procedures and a difference in the identification of people in the Census as being of Aboriginal and Torres Strait Islander origin.

Between 2006 and 2011, the Census count of Aboriginal and Torres Strait Islander people increased by 93,300 (21%). The components of this increase were estimated to be 14% due to natural increase, and the remaining 7% due to other factors, including changes in Census procedures as well as a difference in the identification of people in the Census as being of Aboriginal and Torres Strait Islander origin. For more information on the change in Census counts of Aboriginal and Torres Strait Islander people from 2006 to 2011 see *Census of Population and Housing: Understanding the Increase in Aboriginal and Torres Strait Islander Counts, 2006-2011* (cat. no. 2077.0).

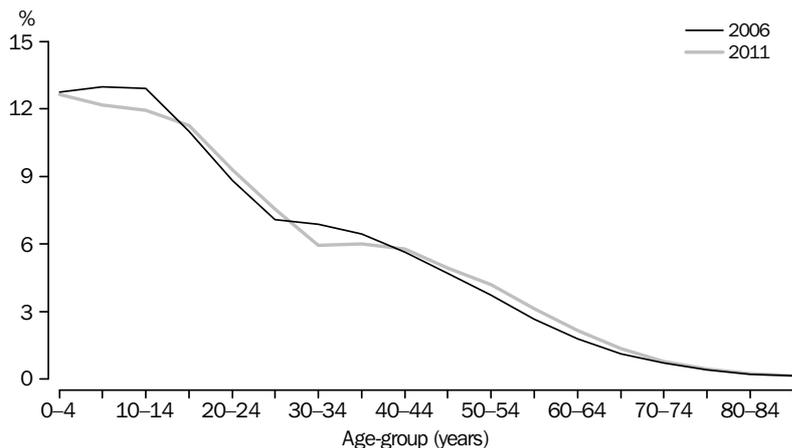
#### AGE/SEX STRUCTURE

For the purposes of compiling life tables it is necessary to have accurate measures of the population according to their age and sex. It is therefore important to make some assessment of the quality of the age/sex structure of Aboriginal and Torres Strait Islander ERP for Australia and the states and territories. The age distributions of the 30 June 2006 and 30 June 2011 Aboriginal and Torres Strait Islander ERP have remained more or less the same (graphs 2.4 and 2.5).

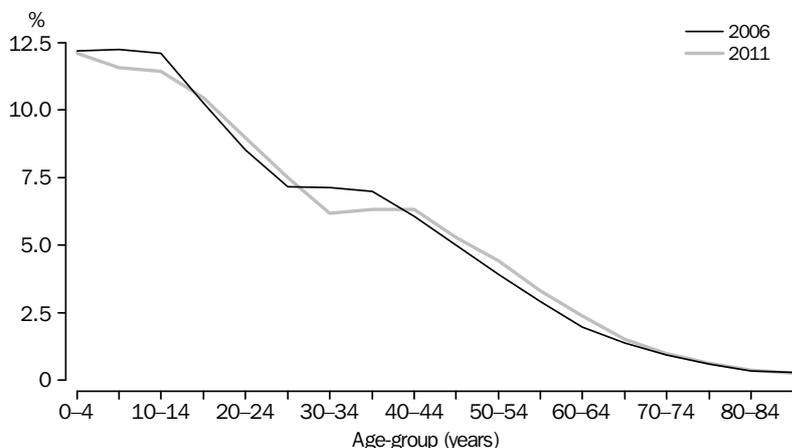
*Changes in the Aboriginal and Torres Strait Islander population, 2006-2011*  
*continued*

AGE/SEX STRUCTURE *continued*

**2.4** AGE STRUCTURE, Australia—Aboriginal and Torres Strait Islander males



**2.5** AGE STRUCTURE, Australia—Aboriginal and Torres Strait Islander females



In terms of the variation in the age distribution between successive Census year ERPs, the index of dissimilarity (Shryock et al., 1976:131) showed quite low values in comparison to its theoretical range of 0 to 100. The smaller the index of dissimilarity values, the more similar are the two age distributions. For the states and territories, most index of dissimilarity values fall around or below 5 except for the Australian Capital Territory, where the index value could be unreliable due to the small size of the Aboriginal and Torres Strait Islander population (table 2.6).

*Changes in the Aboriginal and Torres Strait Islander population, 2006-2011*  
*continued*

AGE/SEX STRUCTURE *continued*

**2.6** INDEX OF DISSIMILARITY BETWEEN ABORIGINAL AND TORRES STRAIT ISLANDER AGE STRUCTURES—30 June 2006 and 30 June 2011

| State/territory | Males | Females |
|-----------------|-------|---------|
|                 | index | index   |
| NSW             | 3.5   | 3.9     |
| Vic.            | 3.7   | 3.6     |
| Qld             | 3.2   | 2.8     |
| SA              | 3.9   | 4.0     |
| WA              | 3.2   | 2.9     |
| Tas.            | 4.5   | 5.0     |
| NT              | 4.0   | 3.2     |
| ACT             | 9.7   | 8.1     |
| Aust.(a)        | 3.3   | 3.1     |

(a) Includes Other Territories.

CONCLUSION

As discussed above, the required inputs for compiling Aboriginal and Torres Strait Islander life tables (that is, numbers of Aboriginal and Torres Strait Islander deaths and estimates of the Aboriginal and Torres Strait Islander population) are subject to a range of data quality issues.

In the main, Aboriginal and Torres Strait Islander ERP compiled from the five-yearly Census provide a sound foundation. However, improvements in methodologies for the Post Enumeration Survey and changing propensities to identify as Aboriginal and Torres Strait Islander make interpretation of changes over time in the Aboriginal and Torres Strait Islander population difficult.

In relation to Aboriginal and Torres Strait Islander death statistics, the non-reporting and/or incorrect reporting of a person's Indigenous status on the death registration form means that death rates calculated using the number of registered Aboriginal and Torres Strait Islander deaths are underestimates of the true death rates prevalent among Aboriginal and Torres Strait Islander Australians. Application of these death rates in a standard life table would result in an overestimate of Aboriginal and Torres Strait Islander life expectancy, see table A2.1 in *Appendix 2*.

For the purposes of compiling Aboriginal and Torres Strait Islander life tables, some method of adjustment is therefore required to adjust the registered number of Aboriginal and Torres Strait Islander deaths for potential underidentification in registration data. The method used by ABS to do so for the Aboriginal and Torres Strait Islander life tables is described in detail in *Chapter 3: Data linkage to derive Aboriginal and Torres Strait Islander deaths identification rates*.

## CHAPTER 3

# DATA LINKAGE TO DERIVE ABORIGINAL AND TORRES STRAIT ISLANDER DEATHS IDENTIFICATION RATES .....

### INTRODUCTION

Chapter 2 described the data required for producing Aboriginal and Torres Strait Islander life tables and life expectancy estimates, and quality issues associated with these data. This chapter details the use of data linkage techniques to derive Aboriginal and Torres Strait Islander deaths identification rates. Specifically, it describes the Census Data Enhancement Indigenous Mortality Study, discusses the analyses undertaken and presents the results. To calculate estimates of life expectancy using direct methods, it is important to ensure that the classification of records as Aboriginal and Torres Strait Islander occurs in a consistent manner in both the numerator (deaths) and the denominator (population).

### CDE INDIGENOUS MORTALITY STUDY

The Indigenous Mortality Study was conducted as part of the ABS Census Data Enhancement (CDE) project. The CDE project consists of a number of studies which brought together data from the 2011 Census of Population and Housing and other specified datasets.

For more information on the CDE project, see the following paper: *Information Paper: Deaths Registration to Census Linkage Project - Methodology and Quality Assessment, Australia, 2011-2012* (cat. no. 3302.0.55.004).

The aims of the CDE Indigenous Mortality Study were to:

- assist in understanding the differences in recording of Indigenous status between death registrations and Census data; and
- assess the under-identification of Aboriginal and Torres Strait Islander deaths in death registrations records.

The CDE Indigenous Mortality Study involved linking Census records with death registration records to examine differences in the reporting of Indigenous status across the two datasets. Specifically the study linked 2011 Census records with all registered deaths that occurred from 10 August 2011 to 27 September 2012.

In the absence of any unique identifier in the Census and deaths datasets, linking was performed using probabilistic methods. Three groups of variables, name (first name and surname), personal characteristics (date of birth, age, sex, place of birth, year of arrival and marital status), and geographic information (street number, street name, suburb, mesh block and postcode) were used to link death records to Census records. Variables common to both datasets were standardised to ensure consistent coding and formatting. The two datasets were linked in a way that was independent of reported Indigenous status so that any future analysis would not be affected by bias introduced in the linking process. For this reason, Indigenous status was not used as a linking variable.

CDE INDIGENOUS  
MORTALITY STUDY  
*continued*

The 2011 Death registrations to Census linkage project expanded on the methods used in the 2006 cycle as described in the research paper *Linking Census Records to Death Registrations* (cat. no. 1351.0.55.030). The main enhancements implemented for the 2011 project included:

- improvements to linking software and hardware
- improvements to data cleaning and standardisation - particularly names
- refinements to the blocking and linking strategy
- use of the Expectation-Maximisation algorithm for estimating linkage model parameters
- increased and targeted clerical review on record pairs where the death registration was for a person identified as being of Aboriginal and Torres Strait Islander descent.

Internationally, similar record linkage studies have been conducted in New Zealand where the 1981, 1986, 1991, 1996 and 2001 Censuses were each anonymously and probabilistically linked to three years of subsequent deaths data, allowing a comparison of ethnicity recording (Ajwani et al., 2003; Blakely et al., 2002a; Blakely et al., 2002b). Large nationally representative studies based on linked Census and deaths data have also been conducted in the United Kingdom, France, Sweden and Netherlands. The results from these studies have been used in various ways including the provision of evidence for policy decisions and the setting of policy targets for special intervention programs.

SUMMARY RESULTS OF  
THE CDE STUDY

The number of Census and death registration records eligible for linking and the percentage of death records linked are presented in Table 3.1. The linking process used 153,455 death records and 20,928,304 Census records. These Census counts are different from estimated resident population, as discussed in Chapter 2. Of the 153,455 death records, 142,697 (93.0%) records were linked to one of 20,928,304 eligible Census records. Of the 2,345 Aboriginal and Torres Strait Islander death records, 1,884 (80.3%) were linked.

**3.1** CENSUS AND DEATH RECORDS, Australia

| <i>Description</i>   | <i>Records</i> |
|--|----------------|
| <b>Number</b>  |                |
| Census records eligible for linking(a)                         | 20 928 304     |
| Aboriginal and Torres Strait Islander Census records           | 548 370        |
| Records on death file(b)                                       | 153 455        |
| Death records linked   | 142 697        |
| Death records not linked                                       | 10 758         |
| Aboriginal and Torres Strait Islander records on death file(c) | 2 345          |
| Aboriginal and Torres Strait Islander records linked(c)        | 1 884          |
| <b>Per cent</b>  |                |
| All death records linked                                       | 93.0           |
| Aboriginal and Torres Strait Islander death records linked     | 80.3           |

- (a) Excludes residents temporarily overseas on Census night, imputed records and Census net undercount adjustment.
- (b) Deaths which occurred between 10 August 2011 and 27 September 2012.
- (c) According to Indigenous status reported on death registration form.

SUMMARY RESULTS OF  
THE CDE STUDY  
*continued*

The number and percentage of death records linked to Census records by selected characteristics of deceased persons are presented in Table 3.2. A slightly higher linkage was achieved for females (94.4%) compared with males (91.7%). The linkage rate varied considerably by age, being lowest for 25–44 year old decedents (76.3%). This may be due to the relatively high Census undercount rate in this age group. The linkage rate was highest for 75 years and older decedents (95.1%).

**3.2** DEATH RECORDS LINKED TO CENSUS RECORDS BY SELECTED CHARACTERISTICS, Australia

| <i>Reported characteristics in death registration</i> | <i>Total death records</i> | <i>Linked records</i> | <i>Linked records</i> |
|---|----------------------------|-----------------------|-----------------------|
|   | no.                        | no.                   | %                     |
| <b>Sex</b>  |                            |                       |                       |
| Males   | 78 522                     | 71 994                | 91.7                  |
| Females   | 74 933                     | 70 703                | 94.4                  |
| <b>Age (years)</b>                                    |                            |                       |                       |
| 0–14  | 599                        | 497                   | 83.0                  |
| 15–24   | 1 211                      | 950                   | 78.5                  |
| 25–44   | 5 246                      | 4 001                 | 76.3                  |
| 45–64   | 20 814                     | 18 297                | 87.9                  |
| 65–74   | 23 626                     | 21 982                | 93.0                  |
| 75 and over   | 101 958                    | 96 970                | 95.1                  |
| <b>Indigenous Status</b>                              |                            |                       |                       |
| Aboriginal and Torres Strait Islander                 | 2 345                      | 1 884                 | 80.3                  |
| Non-Indigenous  | 150 238                    | 140 037               | 93.2                  |
| Not stated  | 872                        | 776                   | 89.0                  |
| <b>State of usual residence</b>                       |                            |                       |                       |
| NSW   | 53 355                     | 49 419                | 92.6                  |
| Vic.  | 37 794                     | 35 399                | 93.7                  |
| Qld   | 28 065                     | 25 954                | 92.5                  |
| SA  | 13 567                     | 12 874                | 94.9                  |
| WA  | 13 683                     | 12 635                | 92.3                  |
| Tas.  | 4 285                      | 4 039                 | 94.3                  |
| NT  | 869                        | 658                   | 75.7                  |
| ACT   | 1 829                      | 1 711                 | 93.6                  |
| <b>Marital status</b>                                 |                            |                       |                       |
| Never married   | 15 081                     | 12 828                | 85.1                  |
| Married   | 61 940                     | 58 566                | 94.6                  |
| Widow   | 56 864                     | 53 977                | 94.9                  |
| Divorced  | 14 275                     | 12 835                | 89.9                  |
| Separated   | 1 294                      | 1 123                 | 86.8                  |
| Not applicable (<15 years)                            | 4 001                      | 3 368                 | 84.2                  |
| <b>Elapsed time between Census and death</b>          |                            |                       |                       |
| Within 6 months of Census                             | 85 192                     | 78 972                | 92.7                  |
| Beyond 6 months of Census                             | 68 263                     | 63 725                | 93.4                  |

The linkage success varied by Indigenous status recorded on the death registration form. People of non-Indigenous origin on the death registration form had a considerably increased linkage success (93.2%) compared with people of Aboriginal and Torres Strait Islander origin (80.3%). The linkage success also varied by state of usual residence as reported on the death registration form. Rates were highest for South Australia (94.9%) and lowest for the Northern Territory (75.7%). All other states and territories had linkage rates between 92.3% and 94.3%. The low linkage rate for the Northern Territory reflects relatively low linkage rates for both the Aboriginal and Torres Strait Islander and non-Indigenous populations. The linkage rate was similar for married and widowed

SUMMARY RESULTS OF  
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*continued*

persons (about 95%). The linkage rate was slightly lower for deaths which occurred within six months of the Census (92.7%) than those which occurred beyond 6 months after the Census (93.4%).

Other aspects of the CDE Indigenous Mortality Study data were analysed by the ABS and results released in *Information Paper: Death Registrations to Census Linkage Project - Methodology and Quality Assessment, Australia, 2011-2012* (cat. no. 3302.0.55.004) on 28 August 2013 and *Information Paper: Death Registrations to Census Linkage Project - Key Findings for Aboriginal and Torres Strait Islander peoples, 2011-2012* (cat. no. 3302.0.55.005) on 15 November 2013.

USE OF THE CDE STUDY  
TO DERIVE ABORIGINAL  
AND TORRES STRAIT  
ISLANDER DEATHS  
IDENTIFICATION RATES

The CDE study allows a direct comparison of Indigenous status recorded on the death registration and the Census data for what is highly likely to be the same individual, and enables estimation of the undercoverage of Aboriginal and Torres Strait Islander deaths in the death registration system. Table 3.3 presents the outcomes of the CDE study for Aboriginal and Torres Strait Islander deaths in Australia. It provides a cross-classification of the linked death registrations and Census records by the Indigenous status and age groups recorded in the respective records. Similar tables for other states and territories (without an age breakdown) where there are sufficient deaths available are in data cube *Table 3: Summary of Aboriginal and Torres Strait Islander deaths by Indigenous status, Selected states and territories and Australia — 2011-2012* (cat. no. 3302.0.55.003).

**3.3** SUMMARY OF LINKED DEATHS BY INDIGENOUS STATUS,  
Australia—2011–2012

| Census classification                 | DEATH REGISTRATION CLASSIFICATION              |                |               | Total   |
|---------------------------------------|--|----------------|---------------|---------|
|                                       | Aboriginal<br>and Torres<br>Strait<br>Islander | Non-Indigenous | Not<br>stated |         |
|                                       | no.  | no.            | no.           | no.     |
| <b>0–14 years</b>                     |  |                |               |         |
| Aboriginal and Torres Strait Islander | 36   | 12             | 2             | 50      |
| Non-Indigenous                        | 2  | 420            | 7             | 429     |
| Not stated                            | 2  | 16             | —             | 18      |
| Total                                 | 40   | 448            | 9             | 497     |
| <b>15–59 years</b>                    |  |                |               |         |
| Aboriginal and Torres Strait Islander | 751  | 206            | 18            | 975     |
| Non-Indigenous                        | 72   | 14 357         | 122           | 14 551  |
| Not stated                            | 22   | 347            | 5             | 374     |
| Total                                 | 845  | 14 910         | 145           | 15 900  |
| <b>60 years and over</b>              |  |                |               |         |
| Aboriginal and Torres Strait Islander | 763  | 360            | 8             | 1 131   |
| Non-Indigenous                        | 201  | 118 242        | 578           | 119 021 |
| Not stated                            | 35   | 6 077          | 36            | 6 148   |
| Total                                 | 999  | 124 679        | 622           | 126 300 |
| <b>All ages</b>                       |  |                |               |         |
| Aboriginal and Torres Strait Islander | 1 550  | 578            | 28            | 2 156   |
| Non-Indigenous                        | 275  | 133 019        | 707           | 134 001 |
| Not stated                            | 59   | 6 440          | 41            | 6 540   |
| Total                                 | 1 884  | 140 037        | 776           | 142 697 |

— nil or rounded to zero (including null cells)

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*continued*

The table highlights a number of features:

- of the 2,156 linked records identified as Aboriginal and Torres Strait Islander on the Census file, only 1,550 (72%) were identified as Aboriginal and Torres Strait Islander on the death registration;
- the 1,550 records identified as Aboriginal and Torres Strait Islander in both datasets represented 82% (that is,  $1,550 / 1,884 * 100$ ) of linked deaths identified as Aboriginal and Torres Strait Islander in death registrations;
- there is misidentification of Indigenous status between the Census and death registrations (for example, Aboriginal and Torres Strait Islander in death registrations but non-Indigenous in Census, and vice versa);
- the overall Aboriginal and Torres Strait Islander deaths identification rate, indicated by these statistics, is 87% (that is,  $1,884 / 2156 * 100$ ).

The above suggests that while there appears to be misidentification of Indigenous status between the Census and death registrations, the overall identification rate in the death registrations collection is quite high at the national level (87%).

At the same time, it needs to be recognised that at the national level, about 20% of Aboriginal and Torres Strait Islander deaths as recorded on the death registration form could not be linked to a Census record. This would occur due to missing or inconsistent information in the fields being used for linking and also undercount of the Aboriginal and Torres Strait Islander population in the Census counts. Despite these issues, it is considered that the linked data provide reasonable estimates of the identification rate of Aboriginal and Torres Strait Islander deaths.

For the purpose of compiling Aboriginal and Torres Strait Islander life tables, the Aboriginal and Torres Strait Islander ERP used was derived from Census counts adjusted by results of the Post Enumeration Survey (PES). The PES provides an independent check on Census coverage and also identifies key demographic characteristics of the population that have been missed or overcounted in the Census. In compiling Aboriginal and Torres Strait Islander ERP, Indigenous status reported by the PES was considered more reliable than that recorded in the Census.

Therefore, to be consistent with Aboriginal and Torres Strait Islander ERP calculations, the number of deaths reported as Aboriginal and Torres Strait Islander in Census in the CDE linked data were adjusted to a PES basis. It should be noted that these adjustments were only in respect of misclassifications of Indigenous status in the linked file. No attempt was, or could be, made for undercount identified in the PES; this is reflected in the non-matched death registrations.

Thus, the Aboriginal and Torres Strait Islander deaths identification rate using the linked data was derived by:

1. calculating the propensities, from PES, of being Aboriginal and Torres Strait Islander in PES given Census Indigenous status (to align the Census Indigenous status with the PES Indigenous status);
2. applying the propensities to counts from the CDE linked data to obtain the expected number of deaths in Census on a PES basis; and
3. taking the ratio of the number of deaths reported as Aboriginal and Torres Strait Islander in death registrations to that reported in Census on a PES basis to calculate the Aboriginal and Torres Strait Islander deaths identification rate.

USE OF THE CDE STUDY  
TO DERIVE ABORIGINAL  
AND TORRES STRAIT  
ISLANDER DEATHS  
IDENTIFICATION RATES  
*continued*

The following step by step example illustrates the calculation of the identification rate of Aboriginal and Torres Strait Islander deaths for Australia using the improved method that include age-specific identification rates when calculating the underidentification adjustment.

*Step 1: Calculation of propensities from PES data given in table 3.4*

The propensities are calculated for persons who matched to Census and responded as Aboriginal and Torres Strait Islander in the PES to the Census Indigenous status question. They were estimated by the three response classes for the Census Indigenous status question: Aboriginal and Torres Strait Islander, non-Indigenous and not stated.

**3.4** INDIGENOUS STATUS AS REPORTED IN 2011 CENSUS AND 2011 POST ENUMERATION SURVEY(a), Australia

|                                       | PES RESPONSE                          |                |        |
|---------------------------------------|---------------------------------------|----------------|--------|
|                                       | Aboriginal and Torres Strait Islander | Non-Indigenous | Total  |
| <i>Census response</i>                | no.                                   | no.            | no.    |
| <b>0–14 years</b>                     |                                       |                |        |
| Aboriginal and Torres Strait Islander | 1 641                                 | 98             | 1 739  |
| Non-Indigenous                        | 59                                    | 15 061         | 15 120 |
| Not stated                            | 32                                    | 290            | 322    |
| Total                                 | 1 732                                 | 15 449         | 17 181 |
| <b>15–59 years</b>                    |                                       |                |        |
| Aboriginal and Torres Strait Islander | 2 497                                 | 141            | 2 638  |
| Non-Indigenous                        | 197                                   | 47 000         | 47 197 |
| Not stated                            | 33                                    | 524            | 557    |
| Total                                 | 2 727                                 | 47 665         | 50 392 |
| <b>60 years and over</b>              |                                       |                |        |
| Aboriginal and Torres Strait Islander | 263                                   | 28             | 291    |
| Non-Indigenous                        | 27                                    | 14 544         | 14 571 |
| Not stated                            | 8                                     | 368            | 376    |
| Total                                 | 298                                   | 14 940         | 15 238 |
| <b>All ages</b>                       |                                       |                |        |
| Aboriginal and Torres Strait Islander | 4 401                                 | 267            | 4 668  |
| Non-Indigenous                        | 283                                   | 76 605         | 76 888 |
| Not stated                            | 73                                    | 1 182          | 1 255  |
| Total                                 | 4 757                                 | 78 054         | 82 811 |

(a) This table uses unweighted data for illustrative purposes. Weighted PES data was used when determining the propensities for calculating life tables.

The following example will refer to data for the 0-14 years age group in table 3.4:

- $P(\text{ATSI}/\text{ATSI}) = \text{propensity of being Aboriginal and Torres Strait Islander in PES given Census Indigenous status is 'Aboriginal and Torres Strait Islander' is } 1,641 / 1,739 = 0.9436$
- $P(\text{ATSI}/\text{NI}) = \text{propensity of being Aboriginal and Torres Strait Islander in PES given Census Indigenous status is 'non-Indigenous' is } 59 / 15,120 = 0.0039$
- $P(\text{ATSI}/\text{NS}) = \text{propensity of being Aboriginal and Torres Strait Islander in PES given Census Indigenous status is 'not stated' is } 32 / 322 = 0.0994$

*Step 1: Calculation of propensities from PES data given in table 3.4 continued*

The above propensities are based on the unweighted PES data. In calculating Aboriginal and Torres Strait Islander ERP, weighted PES information was used. Therefore, to be consistent with Aboriginal and Torres Strait Islander ERP calculations, the propensities were calculated using the weighted PES data. This gave  $P(\text{ATSI}/\text{ATSI}) = 0.9088$ ,  $P(\text{ATSI}/\text{NI}) = 0.0032$  and  $P(\text{ATSI}/\text{NS}) = 0.0882$ .

The Australia level propensities  $P(\text{ATSI}/\text{NI})$  and  $P(\text{ATSI}/\text{NS})$  calculated above are based on relatively small numbers of PES responses (59 and 32 respectively for the 0-14 years age group). These propensities calculated at the state/territory level, while not disaggregated by age, are still unreliable as they are based on considerably smaller numbers of PES responses. To overcome this problem, national level  $P(\text{ATSI}/\text{NI})$  and  $P(\text{ATSI}/\text{NS})$  are used for the states and territories (though without any disaggregation by age, as outlined under *Calculation of adjustment factor for the states and territory*).

*Step 2: Estimation of expected number of deaths in Census in linked data given in table 3.3 using PES Aboriginal and Torres Strait Islander propensities*

The expected number of deaths in the Census in CDE linked data file, for persons aged 0-14 years, using PES Aboriginal and Torres Strait Islander propensities is:

$$\begin{aligned} \blacksquare &= 50 * P(\text{ATSI}/\text{ATSI}) + 429 * P(\text{ATSI}/\text{NI}) + 18 * P(\text{ATSI}/\text{NS}) \\ \blacksquare &= 50 * 0.9088 + 429 * 0.0032 + 18 * 0.0882 \\ \blacksquare &= 48 \end{aligned}$$

where the numbers 50, 429 and 18 are Aboriginal and Torres Strait Islander, non-Indigenous and not stated deaths in Census for the 0-14 years age group (table 3.3).

*Step 3: Calculation of identification rate of Aboriginal and Torres Strait Islander deaths, Australia*

The estimate of the Aboriginal and Torres Strait Islander deaths identification rate is then calculated by taking the ratio of the number of deaths reported as Aboriginal and Torres Strait Islander in death registrations to the number of deaths expected to be recorded as Aboriginal and Torres Strait Islander in Census using the PES Aboriginal and Torres Strait Islander propensities:

$$\begin{aligned} &= 40 / 48 \\ &= 0.83 \end{aligned}$$

where 40 is the Aboriginal and Torres Strait Islander deaths in death registrations for the 0-14 years age group (table 3.3).

*Step 4: Calculation of adjustment factor, Australia*

The adjustment factor is taken to be the reciprocal of the identification rate of Aboriginal and Torres Strait Islander deaths:

$$\begin{aligned} &= 1 / 0.83 \\ &= 1.21 \end{aligned}$$

In the linked data, 40 records for the 0-14 years age group were reported as Aboriginal and Torres Strait Islander on the death registration form (table 3.3). Of deaths linked to the Census, 48 were recorded as Aboriginal and Torres Strait Islander, after adjustment for classifying Indigenous status in the way that PES does. This means that fewer deaths were identified as Aboriginal and Torres Strait Islander in death registrations than were expected in Census on a PES basis. Therefore, for the 0-14 age group, the number of Aboriginal and Torres Strait Islander deaths according to death registrations needed multiplying by an adjustment factor of  $1 / 0.83 = 1.21$  to be comparable to the Aboriginal

Step 4: Calculation of adjustment factor, Australia continued

and Torres Strait Islander deaths expected to be recorded as such in the Census on a PES basis.

Steps 1-4 were repeated to calculate identification rates for the 15-59 and 60+ age groups. Identification rates were 0.89 and 0.78 for the 15-59 and 60+ age groups respectively.

**3.5** ABORIGINAL AND TORRES STRAIT ISLANDER IDENTIFICATION RATES, Headline Australia(a)—2011-2012

|                      | 0-14 | 15-59 | 60+  | Total(b) |
|----------------------|------|-------|------|----------|
| Identification Rate  | 0.83 | 0.89  | 0.78 | 0.82     |
| Adjustment Factor(c) | 1.21 | 1.12  | 1.29 | 1.21     |

- (a) Headline estimates for Australia are calculated using an improved methodology (taking into account age-specific identification rates) that could not be applied at the state and territory or remoteness area levels. Therefore this data should not be compared with data for any state or territory, or remoteness area.
- (b) Total included here as a summary comparison measure, since the rates were applied at the age group level.
- (c) Calculated as the reciprocal of the identification rate.

Calculation of adjustment factor for the states and territory

The procedure described above was used to derive Aboriginal and Torres Strait Islander deaths identification rates at the Australia level only. Identification rates for states, territories and remoteness areas were calculated using a similar method but without using age-specific identification rates. This method is detailed fully in Chapter 3 of *Experimental Life Tables for Aboriginal and Torres Strait Islander Australians 2005-2007* (cat. no. 3302.0.55.003).

Due to small numbers of Aboriginal and Torres Strait Islander deaths in Victoria, South Australia, Tasmania and the Australian Capital Territory, it was not feasible to derive separate Aboriginal and Torres Strait Islander deaths identification rates for these jurisdictions. Therefore, a single Aboriginal and Torres Strait Islander deaths identification rate was derived by grouping these together. The ABS is continuing to explore methodological options for creating life tables for these jurisdictions by combining with, and borrowing strength from, one or more of the published states and territories. This investigation continues with the ambition of using such life tables for backcasting and projections purposes. If a method cannot be determined in time for use in the backcasting and projections due for release in April 2014, the ABS will continue with the established method of using New South Wales measures as a proxy for Victoria, Tasmania and the Australian Capital Territory, and Western Australia as a proxy for South Australia.

There is considerable variation in the identification rates at the state/territory level (table 3.6). The estimate is less than 1.0 for New South Wales, Queensland, Western Australia and the Victoria/South Australia/Tasmania/Australian Capital Territory grouping, which indicates a level of under-identification of Aboriginal and Torres Strait Islander deaths in death registrations relative to the Census on a PES basis. The situation is the opposite for the Northern Territory, indicating a slight over-representation of Aboriginal and Torres Strait Islander deaths in death registrations relative to the Census for linked records; that

*Calculation of adjustment factor for the states and territory continued*

is, persons who are identified as Aboriginal and Torres Strait Islander in the death registrations collection exceed those identified as Aboriginal and Torres Strait Islander in the Census on a PES basis. There is no clear reason as to why this might be the case, although there is evidence that some Aboriginal and Torres Strait Islander deaths have a state of usual residence on the death registration that is different to the Census. It should be noted that the Northern Territory had higher levels of unlinked Aboriginal and Torres Strait Islander death records (21%) than other jurisdictions, which in part is a reflection of the high Census undercount for this jurisdiction. This may indicate that the linked records may not be entirely representative of all death records.

**3.6** ABORIGINAL AND TORRES STRAIT ISLANDER IDENTIFICATION RATES, State/territory and Australia—2011–2012

| <i>State/territory</i>       | <i>Aboriginal and Torres Strait Islander deaths according to death registrations</i> | <i>Expected number of Aboriginal and Torres Strait Islander deaths (a)</i> | <i>Identification rate</i> | <i>Adjustment factor (b)</i> |
|------------------------------|--|--|----------------------------|------------------------------|
|                              | no.  | no.  | no.                        | no.                          |
| NSW                          | 604  | 859  | 0.70                       | 1.42                         |
| Qld                          | 520  | 647  | 0.80                       | 1.24                         |
| WA                           | 276  | 314  | 0.88                       | 1.14                         |
| NT                           | 262  | 251  | 1.04                       | 0.96                         |
| Vic./SA/Tas./ACT/OT combined | 222  | 554  | 0.40                       | 2.49                         |
| Aust. (c) (d)                | 1 884  | 2 625  | 0.72                       | 1.39                         |

- (a) In Census if weighted PES Aboriginal and Torres Strait Islander propensities are used.
- (b) Calculated as the reciprocal of the identification rate.
- (c) These estimates are not the headline estimates for Australia, because they are calculated without an age-adjustment, but are provided to enable effective comparison with the state and territory, and remoteness area estimates.
- (d) Includes all states and territories.

There is quite considerable variation in the identification rates by remoteness (table 3.7). The estimate of 0.56 for Major Cities and Inner Regional remoteness areas indicates a high level of under-identification of Aboriginal and Torres Strait Islander deaths in death registrations. In contrast, the identification rate is just 0.96 for Outer Regional, Remote and Very Remote areas, indicating a much lower level of under-identification.

Calculation of adjustment factor for the states and territory continued

**3.7** ABORIGINAL AND TORRES STRAIT ISLANDER IDENTIFICATION RATES, Remoteness Areas—2011–2012

| Remoteness Area                        | Aboriginal and Torres Strait Islander deaths according to death registrations | Expected number of Aboriginal and Torres Strait Islander deaths(a) | Identification rate | Adjustment factor(b) |
|--|---|--|---------------------|----------------------|
|  | no.   | no.  | no.                 | no.                  |
| Major Cities and Inner Regional        | 919   | 1 627  | 0.56                | 1.77                 |
| Outer Regional, Remote and Very Remote | 965   | 1 003  | 0.96                | 1.04                 |
| Aust.(c)(d)                            | 1 884   | 2 625  | 0.72                | 1.39                 |

- (a) In Census if weighted PES Aboriginal and Torres Strait Islander propensities are used.
- (b) Calculated as the reciprocal of the identification rate.
- (c) This estimate is not the headline estimate for Australia and has been calculated and included to enable effective comparison with the state and territory, and remoteness area estimates.
- (d) Includes all states and territories.

SENSITIVITY ANALYSIS

The following table is used to illustrate the impact on life expectancy at birth when the identification rate is 5% higher or lower than those included in table 3.6. The variation is largest for the Northern Territory where life expectancy varies from 62.7 to 64.3 for males and 67.9 to 69.3 for females.

**3.8** ABORIGINAL AND TORRES STRAIT ISLANDER LIFE EXPECTANCY, Assumed Identification Rates—2010–2012

| State/territory | If death identification rate was 5% less | Estimated death identification rate | If death identification rate was 5% more |
|-----------------|--|-------------------------------------|--|
| <b>MALES</b>    |  |                                     |  |
| NSW             | 69.9                                     | 70.5                                | 71.1                                     |
| Qld             | 68.0                                     | 68.7                                | 69.3                                     |
| WA              | 64.3                                     | 65.0                                | 65.7                                     |
| NT              | 62.7                                     | 63.4                                | 64.3                                     |
| Aust.(a)(b)     | 66.7                                     | 67.4                                | 68.0                                     |
| <b>FEMALES</b>  |  |                                     |  |
| NSW             | 73.7                                     | 74.6                                | 74.7                                     |
| Qld             | 73.7                                     | 74.4                                | 74.8                                     |
| WA              | 69.6                                     | 70.2                                | 70.8                                     |
| NT              | 67.9                                     | 68.7                                | 69.3                                     |
| Aust.(a)(b)     | 71.6                                     | 72.3                                | 72.8                                     |

- (a) These estimates are not the headline estimates for Australia, because they are calculated without an age-adjustment, but are provided to enable effective comparison with the state and territory, and remoteness area estimates.
- (b) Includes all states/territories.

## DISCUSSION

The use of the CDE Indigenous Mortality Study to assess the identification rate of Aboriginal and Torres Strait Islander deaths in death registration data has a number of benefits but at the same time it has limitations. First, the obvious and most substantial benefit is that it enables direct calculation of identification rates. That is, they are derived by directly comparing Indigenous status as reported according to death registrations and Census data for linked records, as opposed to indirect and modelled estimates.

Second, no assumptions were necessary to derive the identification rates from the CDE study, whereas a number of subjective judgements and assumptions were necessary to produce identification rates prior to the 2005-2007 period.

The limitations of the CDE Indigenous Mortality Study relate to three main factors. First, the derived Aboriginal and Torres Strait Islander deaths identification rates relate to a restricted time frame— from 10 August 2011 to 27 September 2012. It is not possible to accurately judge the appropriateness or otherwise of the derived Aboriginal and Torres Strait Islander deaths identification rates for past or future periods.

Second, there remains a relatively high level of unlinked Aboriginal and Torres Strait Islander death records. Of all the unlinked records, 22% were in Western Australia and 21% in the Northern Territory. While not unexpected given the relatively high Census undercount for Aboriginal and Torres Strait Islander Australians, there may be features or characteristics of the unlinked records that are quite different to the linked records and therefore may introduce some bias to the results. Sensitivity analysis (see Appendix 1) indicates this is likely to be small.

Third, as stated above, the propensities of Aboriginal and Torres Strait Islander identification as reported in the 2011 Census and 2011 PES are calculated for persons who matched to Census and PES. While PES is a sample representing the whole population, the current methodology implicitly assumes that the propensities based on the Census-PES match will apply for the death registrations linked to the Census. Appendix 1 provides some indication of the sensitivity of the estimates of Aboriginal and Torres Strait Islander life expectancy at birth to assumptions made when calculating it.

A further assumption relates to the application of identification rates, which assumed uniformity by age and sex – except for the headline Australia estimate (which used three broad age groups).

In spite of these limitations, the CDE Indigenous Mortality Study clearly shows the need to adjust for underidentification in Aboriginal and Torres Strait Islander death registrations.

LIFE TABLES

**4.1** LIFE TABLES FOR ABORIGINAL AND TORRES STRAIT ISLANDER AUSTRALIANS, Headline Australia estimates(a)—2010–2012

| Age               | MALES        |               |              |                | FEMALES      |               |              |                |
|-------------------|--------------|---------------|--------------|----------------|--------------|---------------|--------------|----------------|
|                   | lx(b)<br>no. | qx(c)<br>rate | Lx(d)<br>no. | ex(e)<br>years | lx(b)<br>no. | qx(c)<br>rate | Lx(d)<br>no. | ex(e)<br>years |
| 0                 | 100 000      | 0.00877       | 99 228       | 69.1           | 100 000      | 0.00689       | 99 394       | 73.7           |
| 1–4               | 99 123       | 0.00160       | 396 081      | 68.7           | 99 311       | 0.00153       | 396 845      | 73.2           |
| 5–9               | 98 964       | 0.00100       | 494 575      | 64.9           | 99 159       | 0.00095       | 495 560      | 69.3           |
| 10–14             | 98 866       | 0.00110       | 494 056      | 59.9           | 99 065       | 0.00110       | 495 052      | 64.3           |
| 15–19             | 98 757       | 0.00586       | 492 338      | 55.0           | 98 956       | 0.00293       | 494 055      | 59.4           |
| 20–24             | 98 178       | 0.00837       | 488 837      | 50.3           | 98 666       | 0.00359       | 492 445      | 54.6           |
| 25–29             | 97 356       | 0.01005       | 484 335      | 45.7           | 98 312       | 0.00645       | 489 973      | 49.8           |
| 30–34             | 96 378       | 0.01554       | 478 143      | 41.1           | 97 677       | 0.00699       | 486 680      | 45.1           |
| 35–39             | 94 880       | 0.02163       | 469 268      | 36.7           | 96 994       | 0.01367       | 481 658      | 40.4           |
| 40–44             | 92 828       | 0.02934       | 457 329      | 32.5           | 95 669       | 0.01853       | 473 911      | 35.9           |
| 45–49             | 90 104       | 0.03983       | 441 548      | 28.4           | 93 896       | 0.02347       | 463 970      | 31.5           |
| 50–54             | 86 515       | 0.05181       | 421 369      | 24.5           | 91 692       | 0.03744       | 449 879      | 27.2           |
| 55–59             | 82 032       | 0.07117       | 395 566      | 20.7           | 88 259       | 0.05211       | 429 798      | 23.2           |
| 60–64             | 76 194       | 0.11186       | 359 662      | 17.1           | 83 660       | 0.07900       | 401 778      | 19.3           |
| 65–69             | 67 671       | 0.16087       | 311 139      | 13.9           | 77 051       | 0.10507       | 365 016      | 15.8           |
| 70–74             | 56 785       | 0.23141       | 251 074      | 11.1           | 68 955       | 0.18606       | 312 703      | 12.3           |
| 75–79             | 43 645       | 0.30705       | 184 720      | 8.7            | 56 126       | 0.25653       | 244 634      | 9.6            |
| 80–84             | 30 243       | 0.41828       | 119 591      | 6.4            | 41 728       | 0.34903       | 172 229      | 7.0            |
| 85 years and over | 17 593       | 1.00000       | 74 688       | 4.2            | 27 164       | 1.00000       | 120 443      | 4.4            |

- (a) Headline estimates for Australia are calculated using an improved methodology (taking into account age-specific identification rates) that could not be applied at the state and territory or remoteness area levels. Therefore this data should not be compared with data for any state or territory, or remoteness area.
- (b) lx-number of persons surviving to exact age x.
- (c) qx-proportion of persons dying between exact age x and exact age x+n, where n is the width of the age interval.
- (d) Lx-number of person years lived within the age interval x to x+n.
- (e) ex-expectation of life at exact age x. Age x refers to the first age listed in the five year age group.

LIFE TABLES *continued***4.2** LIFE TABLES FOR ABORIGINAL AND TORRES STRAIT ISLANDER AUSTRALIANS, Australia for comparison(a)—2010–2012

| Age               | MALES               |                               |                              |                                | FEMALES             |                               |                              |                                |
|-------------------|---------------------|-------------------------------|------------------------------|--------------------------------|---------------------|-------------------------------|------------------------------|--------------------------------|
|                   | <i>l</i> (b)<br>no. | <i>q</i> <i>x</i> (c)<br>rate | <i>L</i> <i>x</i> (d)<br>no. | <i>e</i> <i>x</i> (e)<br>years | <i>l</i> (b)<br>no. | <i>q</i> <i>x</i> (c)<br>rate | <i>L</i> <i>x</i> (d)<br>no. | <i>e</i> <i>x</i> (e)<br>years |
| 0                 | 100 000             | 0.00974                       | 99 143                       | 67.4                           | 100 000             | 0.00789                       | 99 305                       | 72.3                           |
| 1–4               | 99 026              | 0.00162                       | 395 692                      | 67.0                           | 99 211              | 0.00156                       | 396 438                      | 71.9                           |
| 5–9               | 98 866              | 0.00091                       | 494 104                      | 63.1                           | 99 056              | 0.00085                       | 495 068                      | 68.0                           |
| 10–14             | 98 776              | 0.00124                       | 493 571                      | 58.2                           | 98 971              | 0.00108                       | 494 589                      | 63.0                           |
| 15–19             | 98 653              | 0.00692                       | 491 556                      | 53.3                           | 98 864              | 0.00380                       | 493 381                      | 58.1                           |
| 20–24             | 97 970              | 0.00949                       | 487 523                      | 48.6                           | 98 488              | 0.00404                       | 491 445                      | 53.3                           |
| 25–29             | 97 040              | 0.01236                       | 482 199                      | 44.1                           | 98 090              | 0.00799                       | 488 491                      | 48.5                           |
| 30–34             | 95 840              | 0.01833                       | 474 808                      | 39.6                           | 97 306              | 0.00827                       | 484 521                      | 43.9                           |
| 35–39             | 94 083              | 0.02598                       | 464 305                      | 35.3                           | 96 502              | 0.01664                       | 478 494                      | 39.2                           |
| 40–44             | 91 639              | 0.03525                       | 450 120                      | 31.2                           | 94 896              | 0.02174                       | 469 321                      | 34.8                           |
| 45–49             | 88 409              | 0.04818                       | 431 395                      | 27.2                           | 92 833              | 0.02873                       | 457 494                      | 30.6                           |
| 50–54             | 84 149              | 0.06353                       | 407 382                      | 23.4                           | 90 165              | 0.04432                       | 440 834                      | 26.4                           |
| 55–59             | 78 803              | 0.08603                       | 377 069                      | 19.9                           | 86 169              | 0.06132                       | 417 634                      | 22.5                           |
| 60–64             | 72 024              | 0.11757                       | 338 952                      | 16.5                           | 80 885              | 0.08301                       | 387 639                      | 18.8                           |
| 65–69             | 63 557              | 0.17430                       | 290 089                      | 13.4                           | 74 171              | 0.11229                       | 350 031                      | 15.3                           |
| 70–74             | 52 479              | 0.24787                       | 229 874                      | 10.7                           | 65 842              | 0.19699                       | 296 783                      | 11.9                           |
| 75–79             | 39 471              | 0.32993                       | 164 798                      | 8.4                            | 52 871              | 0.27978                       | 227 377                      | 9.2                            |
| 80–84             | 26 448              | 0.43994                       | 103 153                      | 6.2                            | 38 079              | 0.37408                       | 154 784                      | 6.8                            |
| 85 years and over | 14 813              | 1.00000                       | 61 779                       | 4.2                            | 23 834              | 1.00000                       | 104 328                      | 4.4                            |

- (a) These estimates are not the headline estimates for Australia, because they are calculated without an age-adjustment, but are provided to enable effective comparison with the state and territory, and remoteness area estimates.
- (b) *l**x*-number of persons surviving to exact age *x*.
- (c) *q**x*-proportion of persons dying between exact age *x* and exact age *x*+*n*, where *n* is the width of the age interval.
- (d) *L**x*-number of person years lived within the age interval *x* to *x*+*n*.
- (e) *e**x*-expectation of life at exact age *x*. Age *x* refers to the first age listed in the five year age group.

LIFE TABLES *continued*
**4.3** LIFE TABLES FOR ABORIGINAL AND TORRES STRAIT ISLANDER AUSTRALIANS, New South Wales—2010–2012

| Age               | MALES               |                               |                              |                                | FEMALES             |                               |                              |                                |
|-------------------|---------------------|-------------------------------|------------------------------|--------------------------------|---------------------|-------------------------------|------------------------------|--------------------------------|
|                   | <i>l</i> (a)<br>no. | <i>q</i> <i>x</i> (b)<br>rate | <i>L</i> <i>x</i> (c)<br>no. | <i>e</i> <i>x</i> (d)<br>years | <i>l</i> (a)<br>no. | <i>q</i> <i>x</i> (b)<br>rate | <i>L</i> <i>x</i> (c)<br>no. | <i>e</i> <i>x</i> (d)<br>years |
| 0                 | 100 000             | 0.00594                       | 99 478                       | 70.5                           | 100 000             | 0.00574                       | 99 495                       | 74.6                           |
| 1–4               | 99 406              | 0.00161                       | 397 200                      | 69.9                           | 99 426              | 0.00111                       | 397 417                      | 74.0                           |
| 5–9               | 99 246              | 0.00060                       | 496 081                      | 66.0                           | 99 316              | 0.00059                       | 496 431                      | 70.1                           |
| 10–14             | 99 187              | 0.00050                       | 495 809                      | 61.1                           | 99 257              | 0.00045                       | 496 172                      | 65.1                           |
| 15–19             | 99 137              | 0.00488                       | 494 475                      | 56.1                           | 99 212              | 0.00226                       | 495 499                      | 60.2                           |
| 20–24             | 98 653              | 0.00531                       | 491 956                      | 51.4                           | 98 988              | 0.00267                       | 494 277                      | 55.3                           |
| 25–29             | 98 129              | 0.00660                       | 489 027                      | 46.6                           | 98 723              | 0.00657                       | 491 993                      | 50.4                           |
| 30–34             | 97 482              | 0.01514                       | 483 719                      | 41.9                           | 98 074              | 0.00484                       | 489 185                      | 45.8                           |
| 35–39             | 96 006              | 0.02097                       | 474 997                      | 37.5                           | 97 600              | 0.01383                       | 484 624                      | 41.0                           |
| 40–44             | 93 993              | 0.02595                       | 463 866                      | 33.3                           | 96 250              | 0.01330                       | 478 050                      | 36.5                           |
| 45–49             | 91 554              | 0.04379                       | 447 745                      | 29.1                           | 94 970              | 0.01782                       | 470 620                      | 32.0                           |
| 50–54             | 87 544              | 0.04585                       | 427 687                      | 25.3                           | 93 278              | 0.03461                       | 458 318                      | 27.5                           |
| 55–59             | 83 531              | 0.06742                       | 403 573                      | 21.4                           | 90 049              | 0.04103                       | 441 010                      | 23.4                           |
| 60–64             | 77 899              | 0.09360                       | 371 265                      | 17.8                           | 86 355              | 0.07875                       | 414 774                      | 19.3                           |
| 65–69             | 70 607              | 0.14854                       | 326 816                      | 14.4                           | 79 555              | 0.11563                       | 374 776                      | 15.7                           |
| 70–74             | 60 119              | 0.20421                       | 269 903                      | 11.4                           | 70 356              | 0.17741                       | 320 575                      | 12.5                           |
| 75–79             | 47 842              | 0.27232                       | 206 639                      | 8.7                            | 57 874              | 0.24274                       | 254 250                      | 9.6                            |
| 80–84             | 34 814              | 0.47738                       | 132 520                      | 6.0                            | 43 826              | 0.36935                       | 178 662                      | 6.9                            |
| 85 years and over | 18 194              | 1.00000                       | 77 507                       | 4.3                            | 27 639              | 1.00000                       | 122 759                      | 4.4                            |

- (a) *l**x*-number of persons surviving to exact age *x*.  
 (b) *q**x*-proportion of persons dying between exact age *x* and exact age *x*+*n*, where *n* is the width of the age interval.  
 (c) *L**x*-number of person years lived within the age interval *x* to *x*+*n*.  
 (d) *e**x*-expectation of life at exact age *x*. Age *x* refers to the first age listed in the five year age group.

LIFE TABLES *continued***4.4** LIFE TABLES FOR ABORIGINAL AND TORRES STRAIT ISLANDER AUSTRALIANS, Queensland—2010–2012

| Age               | MALES               |                               |                              |                                | FEMALES             |                               |                     |                                |
|-------------------|---------------------|-------------------------------|------------------------------|--------------------------------|---------------------|-------------------------------|---------------------|--------------------------------|
|                   | <i>l</i> (a)<br>no. | <i>q</i> <i>x</i> (b)<br>rate | <i>L</i> <i>x</i> (c)<br>no. | <i>e</i> <i>x</i> (d)<br>years | <i>l</i> (a)<br>no. | <i>q</i> <i>x</i> (b)<br>rate | <i>L</i> (c)<br>no. | <i>e</i> <i>x</i> (d)<br>years |
| 0                 | 100 000             | 0.00919                       | 99 191                       | 68.7                           | 100 000             | 0.00773                       | 99 320              | 74.4                           |
| 1–4               | 99 081              | 0.00097                       | 396 086                      | 68.3                           | 99 227              | 0.00096                       | 396 670             | 74.0                           |
| 5–9               | 98 984              | 0.00052                       | 494 791                      | 64.4                           | 99 132              | 0.00045                       | 495 548             | 70.0                           |
| 10–14             | 98 932              | 0.00091                       | 494 437                      | 59.4                           | 99 087              | 0.00056                       | 495 299             | 65.1                           |
| 15–19             | 98 842              | 0.00486                       | 493 010                      | 54.5                           | 99 032              | 0.00273                       | 494 485             | 60.1                           |
| 20–24             | 98 362              | 0.00813                       | 489 808                      | 49.7                           | 98 762              | 0.00377                       | 492 878             | 55.3                           |
| 25–29             | 97 562              | 0.01107                       | 485 109                      | 45.1                           | 98 389              | 0.00625                       | 490 408             | 50.5                           |
| 30–34             | 96 482              | 0.01333                       | 479 195                      | 40.6                           | 97 774              | 0.00768                       | 486 993             | 45.8                           |
| 35–39             | 95 196              | 0.02093                       | 471 000                      | 36.1                           | 97 023              | 0.01300                       | 481 963             | 41.1                           |
| 40–44             | 93 204              | 0.02792                       | 459 512                      | 31.8                           | 95 762              | 0.01554                       | 475 091             | 36.6                           |
| 45–49             | 90 601              | 0.04251                       | 443 377                      | 27.7                           | 94 274              | 0.02003                       | 466 649             | 32.2                           |
| 50–54             | 86 750              | 0.05597                       | 421 610                      | 23.8                           | 92 386              | 0.03028                       | 454 934             | 27.8                           |
| 55–59             | 81 894              | 0.07465                       | 394 187                      | 20.0                           | 89 588              | 0.06690                       | 432 957             | 23.6                           |
| 60–64             | 75 781              | 0.11294                       | 357 507                      | 16.4                           | 83 595              | 0.07265                       | 402 790             | 20.1                           |
| 65–69             | 67 222              | 0.16187                       | 308 908                      | 13.2                           | 77 522              | 0.08480                       | 371 173             | 16.4                           |
| 70–74             | 56 341              | 0.25471                       | 245 828                      | 10.3                           | 70 947              | 0.16555                       | 325 374             | 12.7                           |
| 75–79             | 41 990              | 0.35426                       | 172 762                      | 8.0                            | 59 202              | 0.23923                       | 260 603             | 9.8                            |
| 80–84             | 27 115              | 0.47997                       | 103 038                      | 6.0                            | 45 039              | 0.34863                       | 185 940             | 7.0                            |
| 85 years and over | 14 100              | 1.00000                       | 58 506                       | 4.1                            | 29 337              | 1.00000                       | 131 061             | 4.5                            |

- (a) *l**x*-number of persons surviving to exact age *x*.  
 (b) *q**x*-proportion of persons dying between exact age *x* and exact age *x*+*n*, where *n* is the width of the age interval.  
 (c) *L**x*-number of person years lived within the age interval *x* to *x*+*n*.  
 (d) *e**x*-expectation of life at exact age *x*. Age *x* refers to the first age listed in the five year age group.

LIFE TABLES *continued***4.5** LIFE TABLES FOR ABORIGINAL AND TORRES STRAIT ISLANDER AUSTRALIANS, Western Australia—2010–2012

| Age               | MALES           |                  |                 |                  | FEMALES         |                  |                 |                  |
|-------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
|                   | $l_x(a)$<br>no. | $q_x(b)$<br>rate | $L_x(c)$<br>no. | $ex(d)$<br>years | $l_x(a)$<br>no. | $q_x(b)$<br>rate | $L_x(c)$<br>no. | $ex(d)$<br>years |
| 0                 | 100 000         | 0.01309          | 98 848          | 65.0             | 100 000         | 0.00608          | 99 465          | 70.2             |
| 1–4               | 98 691          | 0.00318          | 393 934         | 64.8             | 99 392          | 0.00216          | 396 990         | 69.6             |
| 5–9               | 98 377          | 0.00260          | 491 245         | 61.1             | 99 177          | 0.00144          | 495 528         | 65.8             |
| 10–14             | 98 121          | 0.00230          | 490 043         | 56.2             | 99 034          | 0.00229          | 494 605         | 60.9             |
| 15–19             | 97 896          | 0.01118          | 486 743         | 51.3             | 98 808          | 0.00467          | 492 885         | 56.0             |
| 20–24             | 96 801          | 0.01187          | 481 135         | 46.9             | 98 346          | 0.00693          | 490 029         | 51.3             |
| 25–29             | 95 653          | 0.01198          | 475 398         | 42.4             | 97 665          | 0.00751          | 486 492         | 46.6             |
| 30–34             | 94 507          | 0.02285          | 467 136         | 37.9             | 96 932          | 0.01145          | 481 884         | 41.9             |
| 35–39             | 92 348          | 0.02544          | 455 865         | 33.7             | 95 822          | 0.01856          | 474 664         | 37.4             |
| 40–44             | 89 998          | 0.04729          | 439 350         | 29.5             | 94 044          | 0.03111          | 462 904         | 33.1             |
| 45–49             | 85 742          | 0.05512          | 416 895         | 25.9             | 91 118          | 0.03823          | 446 880         | 29.0             |
| 50–54             | 81 016          | 0.06322          | 392 275         | 22.2             | 87 634          | 0.05885          | 425 278         | 25.1             |
| 55–59             | 75 894          | 0.11824          | 357 036         | 18.6             | 82 477          | 0.06607          | 398 762         | 21.5             |
| 60–64             | 66 920          | 0.11977          | 314 564         | 15.7             | 77 028          | 0.09690          | 366 480         | 17.9             |
| 65–69             | 58 905          | 0.17185          | 269 219         | 12.5             | 69 564          | 0.12011          | 326 932         | 14.5             |
| 70–74             | 48 782          | 0.30983          | 206 126         | 9.6              | 61 209          | 0.24234          | 268 960         | 11.1             |
| 75–79             | 33 668          | 0.35451          | 138 500         | 7.8              | 46 376          | 0.25433          | 202 391         | 8.9              |
| 80–84             | 21 732          | 0.50638          | 81 149          | 5.7              | 34 581          | 0.46799          | 132 446         | 6.1              |
| 85 years and over | 10 727          | 1.00000          | 43 237          | 4.0              | 18 397          | 1.00000          | 78 461          | 4.3              |

- (a)  $l_x$ -number of persons surviving to exact age  $x$ .  
 (b)  $q_x$ -proportion of persons dying between exact age  $x$  and exact age  $x+n$ , where  $n$  is the width of the age interval.  
 (c)  $L_x$ -number of person years lived within the age interval  $x$  to  $x+n$ .  
 (d)  $ex$ -expectation of life at exact age  $x$ . Age  $x$  refers to the first age listed in the five year age group.

LIFE TABLES *continued*
**4.6** LIFE TABLES FOR ABORIGINAL AND TORRES STRAIT ISLANDER AUSTRALIANS, Northern Territory—2010–2012

| Age               | MALES           |                  |                 |                  | FEMALES         |                  |                 |                  |
|-------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|
|                   | $l_x(a)$<br>no. | $q_x(b)$<br>rate | $L_x(c)$<br>no. | $ex(d)$<br>years | $l_x(a)$<br>no. | $q_x(b)$<br>rate | $L_x(c)$<br>no. | $ex(d)$<br>years |
| 0                 | 100 000         | 0.01611          | 98 583          | 63.4             | 100 000         | 0.01289          | 98 866          | 68.7             |
| 1–4               | 98 389          | 0.00243          | 392 946         | 63.5             | 98 711          | 0.00244          | 394 218         | 68.6             |
| 5–9               | 98 150          | 0.00157          | 490 364         | 59.6             | 98 470          | 0.00155          | 491 970         | 64.8             |
| 10–14             | 97 996          | 0.00305          | 489 233         | 54.7             | 98 318          | 0.00300          | 490 852         | 59.9             |
| 15–19             | 97 697          | 0.01214          | 485 522         | 49.9             | 98 023          | 0.00432          | 489 059         | 55.0             |
| 20–24             | 96 511          | 0.02110          | 477 465         | 45.4             | 97 600          | 0.00668          | 486 371         | 50.3             |
| 25–29             | 94 475          | 0.01745          | 468 251         | 41.4             | 96 948          | 0.00976          | 482 374         | 45.6             |
| 30–34             | 92 826          | 0.02540          | 458 234         | 37.1             | 96 001          | 0.01057          | 477 471         | 41.0             |
| 35–39             | 90 468          | 0.03681          | 444 015         | 33.0             | 94 987          | 0.02055          | 470 055         | 36.4             |
| 40–44             | 87 138          | 0.04643          | 425 577         | 29.1             | 93 035          | 0.03822          | 456 285         | 32.1             |
| 45–49             | 83 093          | 0.05422          | 404 200         | 25.4             | 89 479          | 0.04621          | 437 058         | 28.3             |
| 50–54             | 78 587          | 0.08776          | 375 695         | 21.7             | 85 344          | 0.07564          | 410 582         | 24.6             |
| 55–59             | 71 691          | 0.10396          | 339 820         | 18.6             | 78 889          | 0.09493          | 375 721         | 21.4             |
| 60–64             | 64 237          | 0.17689          | 292 779         | 15.4             | 71 400          | 0.09538          | 339 975         | 18.4             |
| 65–69             | 52 874          | 0.20367          | 237 449         | 13.2             | 64 590          | 0.13389          | 301 330         | 15.0             |
| 70–74             | 42 105          | 0.25530          | 183 654         | 11.0             | 55 942          | 0.23886          | 246 305         | 12.0             |
| 75–79             | 31 356          | 0.32488          | 131 313         | 8.9              | 42 580          | 0.24274          | 187 060         | 9.9              |
| 80–84             | 21 169          | 0.33403          | 88 168          | 6.9              | 32 244          | 0.29896          | 137 121         | 7.3              |
| 85 years and over | 14 098          | 1.00000          | 58 495          | 4.1              | 22 604          | 1.00000          | 98 424          | 4.4              |

- (a)  $l_x$ -number of persons surviving to exact age  $x$ .
- (b)  $q_x$ -proportion of persons dying between exact age  $x$  and exact age  $x+n$ , where  $n$  is the width of the age interval.
- (c)  $L_x$ -number of person years lived within the age interval  $x$  to  $x+n$ .
- (d)  $ex$ -expectation of life at exact age  $x$ . Age  $x$  refers to the first age listed in the five year age group.

## EXPLANATORY NOTES

### INTRODUCTION

#### *Use of Aboriginal and Torres Strait Islander life tables*

**1** This release contains abridged life tables for male and female Aboriginal and Torres Strait Islander Australians for the reference period 2010–2012.

**2** Estimates of life expectancy at birth for Aboriginal and Torres Strait Islander Australians are commonly used as a measure for assessing Aboriginal and Torres Strait Islander population health and disadvantage.

**3** The life tables in this release have been produced to enable the construction of ABS estimates and projections of the Aboriginal and Torres Strait Islander Australians for the period 2001 to 2026. These data are produced using the cohort-component method, in which assumptions made about levels of mortality, fertility and migration are iteratively applied to a base population to obtain past and/or future populations.

### SCOPE

**4** Life tables in this release relate to the resident populations of New South Wales, Queensland, Western Australia, Northern Territory and Australia (which includes all states and territories). Due to the small number of Aboriginal and Torres Strait Islander deaths in Victoria, South Australia, Tasmania and the Australian Capital Territory, it is not appropriate to construct life tables for these jurisdictions (see paragraphs 26–28).

### CLASSIFICATIONS

#### *Indigenous status*

**5** ABS Aboriginal and Torres Strait Islander population statistics are based on responses to the ABS standard question for Indigenous identification (Question 7 of the 2011 Census), as below:

|   |   |
|---|---|
| <p><b>7</b> Is the person of Aboriginal or Torres Strait Islander origin?<br/>         • For persons of both Aboriginal and Torres Strait Islander origin, mark both 'Yes' boxes.</p> | <p><input type="radio"/> No</p> <p><input type="radio"/> Yes, Aboriginal</p> <p><input type="radio"/> Yes, Torres Strait Islander</p> |
|---|---|

#### *Remoteness Structure*

**6** The Remoteness Structure divides each state and territory into several regions on the basis of their relative access to services. Remoteness Areas (RA) are the spatial units that make up the Australian Statistical Geography Standard (ASGS) Remoteness Structure. There are six classes of Remoteness Area in the Remoteness Structure: Major Cities of Australia, Inner Regional Australia, Outer Regional Australia, Remote Australia, Very Remote Australia and Migratory.

**7** Within a state/territory, each RA represents an aggregation of non-contiguous geographical areas which share common characteristics of remoteness.

**8** While statistical data classed to this structure may be available by state/territory, characteristics of remoteness are determined in the context of Australia as a whole. Therefore, not all RAs are represented in all states and territories.

**9** For further information see *Australian Statistical Geography Standard (ASGS): Volume 5 - Remoteness Structure, July 2011* (cat. no. 1270.0.55.005).

### METHOD FOR PRODUCING LIFE TABLES

**10** A life table is a statistical model used to represent mortality of a population. In its simplest form, a life table is generated from age-specific death rates and the resulting values are used to measure mortality, survivorship and life expectancy.

METHOD FOR PRODUCING  
LIFE TABLES *continued*

**11** A life table may be complete or abridged, depending on the age intervals used in their compilation. Life tables in this release are abridged life tables – they contain data for five-year age groups – and are presented separately for males and females. Abridged life tables were chosen as age-specific death rates for 5-year age groups were considered more reliable than those for single years of age due to the small annual numbers of Aboriginal and Torres Strait Islander deaths in the states and territories.

**12** To construct a life table, data on deaths that occur in a period and estimates of the population (at the mid-point of the period) exposed to the risk of dying are required, disaggregated by age and sex.

**13** The first step in the compilation of a life table involves the calculation of age-specific death rates (ASDRs) for the population of interest. ASDRs are calculated as:

- $ASDR_{a,s} = Deaths_{a,s} / Population_{a,s}$  where
  - $ASDR_{a,s}$  is the age-specific death rate for age group  $a$  and sex  $s$ ;
  - $Deaths_{a,s}$  is the number of deaths for age group  $a$  and sex  $s$  over the specified period of time; and
  - $Population_{a,s}$  is the population of the age group  $a$  and sex  $s$  at the mid-point of the specified period.

**14** The next step is to derive mortality rates (the proportion of people of a given age who die within one year, denoted by  $qx$ ) from ASDRs. The mortality rates are then applied to a hypothetical group of newborn babies (typically 100,000 in size) until the population has died out. This results in a range of related functions, of which the life tables in this release include:

- $lx$ —the number of persons surviving to exact age  $x$ ;
- $qx$ —the proportion of persons dying between exact age  $x$  and exact age  $x+n$  (where  $n$  is the width of the age interval). It is the mortality rate, from which all other functions of the life table are derived;
- $Lx$ —the number of person years lived within the age interval  $x$  to  $x+n$ ; and
- $ex$ —life expectancy at exact age  $x$ .

**15** The life tables in this release are period life tables, based on mortality rates for 2010–2012. Period life tables assume that as a group of new-born babies pass through life it will experience the mortality rates of the specific period which do not change from year to year. Period life tables thus constitute a hypothetical model of mortality, and, although based upon mortality rates from a real population during a particular period of time, do not describe the future mortality of this group.

*Life tables for the Aboriginal  
and Torres Strait Islander  
population*

**16** To produce life tables for the Aboriginal and Torres Strait Islander Australians, information on the number of Aboriginal and Torres Strait Islander deaths and the Aboriginal and Torres Strait Islander population are required. Data quality issues are discussed in *Chapter 2: Quality issues with Aboriginal and Torres Strait Islander deaths and population data*.

**17** The life tables in this release are based on the number of Aboriginal and Torres Strait Islander deaths registered in 2010–2012 and final Aboriginal and Torres Strait Islander population estimates for 30 June 2011 based on the 2011 Census results.

**18** To account for underidentification of Aboriginal and Torres Strait Islander deaths in death registrations, the numbers of Aboriginal and Torres Strait Islander deaths were adjusted according to the adjustment factors derived from the Census Data Enhancement Aboriginal and Torres Strait Islander Mortality Study (see table 3.5). This is described in *Chapter 3: Data linkage to derive Aboriginal and Torres Strait Islander deaths identification rates*.

*Life tables for the Aboriginal and Torres Strait Islander population continued*

**19** The adjusted numbers of Aboriginal and Torres Strait Islander deaths in 2010, 2011 and 2012 were divided by three to obtain the average annual number of Aboriginal and Torres Strait Islander deaths over the period 2010–2012, and in conjunction with 30 June 2011 Aboriginal and Torres Strait Islander population estimates were used to calculate age-specific death rates for the Aboriginal and Torres Strait Islander population. Life tables were then derived as described in paragraphs 13 and 14 above.

*Life tables for the non-Indigenous population*

**20** Life tables for the non-Indigenous population were produced to enable a comparison of life expectancy at birth and other ages between the Aboriginal and Torres Strait Islander and non-Indigenous populations of Australia.

**21** Numbers of non-Indigenous deaths were obtained by subtracting the adjusted numbers of Aboriginal and Torres Strait Islander deaths from the total number of deaths registered in 2010–2012 and dividing by three to obtain the average annual number of non-Indigenous deaths.

**22** Final estimates of the non-Indigenous population for 30 June 2011 from *Estimates of Aboriginal and Torres Strait Islander Australians, Jun 2011* (cat. no. 3238.0.55.001) were used as denominators in the calculation of age-specific death rates for the non-Indigenous population, and life tables derived from these.

*Graduation of life tables*

**23** Graduation refers to a standard demographic technique of smoothing to remove the effect of year to year volatility in numbers of deaths (by age and sex) on mortality rates (qx). This ensures that implausible results do not occur in the life tables, such as female mortality rates exceeding male mortality rates.

**24** Life tables were first produced for the Aboriginal and Torres Strait Islander and non-Indigenous populations as described above. While numbers of deaths were averaged for 2010–2012, the resulting mortality rates still contained some volatility across age groups. Mortality rates were therefore adjusted so that the rates were smooth across age groups. This was done for both Aboriginal and Torres Strait Islander and non-Indigenous life tables, for all states and territories and both sexes.

**25** The graduation of life tables was performed so that life expectancy at birth estimates were unaffected, but minor changes to life expectancy at other ages occurred.

*Victoria, South Australia, Tasmania and Australian Capital Territory*

**26** The compilation of life tables requires sufficient numbers of deaths to allow the calculation of reliable ASDRs for each age group. With small numbers of deaths the resulting ASDRs are likely to be volatile, and, particularly at younger ages, may be zero.

**27** Due to the small Aboriginal and Torres Strait Islander populations of Victoria, South Australia, Tasmania and the Australian Capital Territory, these jurisdictions record very small numbers of Aboriginal and Torres Strait Islander deaths annually (around 115, 146, 37 and 10 Aboriginal and Torres Strait Islander deaths per year on average for 2010–2012 respectively).

**28** For abridged life tables with an upper age group of 85 years and over, there are 19 age groups in total. Disaggregating the numbers of Aboriginal and Torres Strait Islander deaths in these jurisdictions by age and sex results in extremely small numbers of deaths for any age group and sex, from which it is not possible to calculate reliable age-specific death rates. For this reason it is not appropriate to produce life tables for the Aboriginal and Torres Strait Islander populations of these jurisdictions.

*Life expectancy in Deaths, Australia (cat. no. 3302.0)*

**29** Estimates of life expectancy at birth for the total population presented in this release differ from estimates published in *Deaths, Australia, 2012* (cat. no. 3302.0). Estimates presented in this release are derived from abridged life tables with an upper age limit of 85 years and over, using adjusted numbers of deaths registered in 2010–2012 and the population as at 30 June 2011, while life expectancy estimates in *Deaths, Australia, 2012* (cat. no. 3302.0) are based on complete life tables with an upper age

*Life expectancy in Deaths,  
Australia (cat. no. 3302.0)  
continued*

group of 120 years and over, using deaths according to month of occurrence in 2010–2012 and quarterly population estimates. In addition, graduation processes applied to both sets of life tables differ.

#### CONFIDENTIALITY

**30** The *Census and Statistics Act 1905* provides the authority for the ABS to collect statistical information, and requires that statistical output shall not be published or disseminated in a manner that is likely to enable the identification of a particular person or organisation. This requirement means that the ABS must take care and make assurances that any statistical information about individual respondents cannot be derived from published data.

**31** Where necessary, tables in this release have had small values suppressed or randomised to protect confidentiality. As a result, sums of components may not add exactly to totals.

#### ROUNDING

**32** Calculations as shown in the commentary sections of this release are based on unrounded figures. Calculations using rounded figures may differ from those released. Where figures have been rounded in tables, discrepancies may occur between sums of component items and totals.

#### ACKNOWLEDGEMENTS

**33** The ABS releases draw extensively on information provided freely by individuals, business, governments and other organisations. Their continued cooperation is very much appreciated; without it, the wide range of statistics released by the ABS would not be available. Information received by the ABS is treated in strict confidence as required by the *Census and Statistics Act 1905*.

#### RELATED PRODUCTS

**34** Other ABS products which may be of interest to users include:

- *Census Data Enhancement Project: An Update, Oct 2010* (cat. no. 2062.0)
- *Census of Population and Housing - Details of Undercount, 2011* (cat. no. 2940.0)
- *Census of Population and Housing: Understanding the increase in Aboriginal and Torres Strait Islander Counts, 2006-2011* (cat. no. 2077.0)
- *Deaths, Australia* (cat. no. 3302.0)
- *Demography Working Paper 2004/3 - Calculating Experimental Life Tables for Use in Population Estimates and Projections of Aboriginal and Torres Strait Islander Australians, 1991 to 2001* (cat. no. 3106.0.55.003)
- *Discussion Paper: Assessment of Methods for Developing Life Tables for Aboriginal and Torres Strait Islander Australians, 2006* (cat. no. 3302.0.55.002)
- *Estimates of Aboriginal and Torres Strait Islander Australians, Jun 2011* (cat. no. 3238.0.55.001)
- *Experimental Estimates and Projections of Aboriginal and Torres Strait Islander Australians, 1991–2021* (cat. no. 3238.0)
- *Information Paper: Census Data Enhancement - Indigenous Mortality Quality Study, 2006–07* (cat. no. 4723.0)
- *Information Paper: Death registrations to Census linkage project - Methodology and Quality Assessment, 2011-2012* (cat. no. 3302.0.55.004)
- *Information Paper: Death registrations to Census linkage project - Key Findings for Aboriginal and Torres Strait Islander peoples* (cat. no. 3302.0.55.005)
- *Life Tables, States and Territories* (cat. nos. 3302.0.55.001–3302.8.55.001)
- *Population Distribution, Aboriginal and Torres Strait Islander Australians, Australia, 2006* (cat. no. 4705.0)
- *The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples, Oct 2010* (cat. no. 4704.0)

#### ADDITIONAL STATISTICS AVAILABLE

**35** The abridged life tables in chapter 4 are also available as a data cube (in Microsoft Excel format) available for download from the ABS website in *Life Tables for Aboriginal and Torres Strait Islander Australians, 2010–2012* (cat. no. 3302.0.55.003):

## ADDITIONAL STATISTICS

AVAILABLE *continued*

- Table 1: *Life Tables for Aboriginal and Torres Strait Islander Australians, Selected States and Territories and Australia—2010–2012*
- Table 2: *Life Tables for Aboriginal and Torres Strait Islander Australians, Remoteness Areas, Australia— 2010–2012*
- Table 3: *Summary of Linked Deaths by Indigenous Status, Deaths Registrations and Census Identification, Selected States and Territories and Australia—2010–2012*
- Table 4: *Summary of Indigenous Status, Census and PES identification, Unweighted and Weighted data, Selected States and Territories and Australia—2010–2012*
- Table 5: *Summary of Linked Deaths by Indigenous Status, Deaths Registrations and Census identification, Remoteness Areas—2010–2012*
- Table 6: *Summary of Indigenous Status, Census and PES identification, Unweighted and Weighted data, Remoteness Areas—2010–2012*

**36** Additional demographic information is available on the ABS website <<http://www.abs.gov.au>>; click Themes, then under People click on Demography. Users can also access the full range of electronic ABS data from the ABS website.

**37** As well as the statistics included in this and related releases, the ABS may have other relevant data available on request. Inquiries should be made to the National Information and Referral Service on 1300 135 070.

**38** The ABS also issues a daily Release Advice on the website which details the products to be released in the week ahead.

## ESTIMATING SAMPLE ERROR

This appendix describes the basis for estimating the sample error of estimates of Aboriginal and Torres Strait Islander life expectancy at birth and for assessing the sensitivity of this life expectancy to assumptions made when calculating it. Broadly, a process of replication was used where the inputs to the Aboriginal and Torres Strait Islander life expectancy calculations were replicated based on sample error information obtained from the Post Enumeration Survey (PES) and on plausible deviations from the assumptions. Variation between the replicate estimates of Aboriginal and Torres Strait Islander life expectancy corresponding to replicate estimates from PES gave estimates of the sample error of life expectancy and the additional variation from deviations from the assumptions measured the sensitivity of the method to the assumptions.

The immediate inputs to Aboriginal and Torres Strait Islander life expectancy are:

- Aboriginal and Torres Strait Islander estimated resident population (ERP) at 30 June 2011 by 5-year age groups; and
- Aboriginal and Torres Strait Islander deaths for 2010–2012 adjusted for differences in reporting Indigenous status.

The method of calculating Aboriginal and Torres Strait Islander ERP is described in *Estimates of Aboriginal and Torres Strait Islander Australians, Jun 2011* (cat. no. 3238.0.55.001). The method of adjusting Aboriginal and Torres Strait Islander deaths for differential identification is given in *Chapter 3: Data linkage to derive Aboriginal and Torres Strait Islander deaths identification rates*.

The inputs to the calculation of Aboriginal and Torres Strait Islander ERP are:

- Census counts at fine levels;
- estimates of total population (both Aboriginal and Torres Strait Islander and non-Indigenous) at intermediate levels; and
- estimates of Aboriginal and Torres Strait Islander population at broad levels.

The main input for adjusted Aboriginal and Torres Strait Islander deaths are Aboriginal and Torres Strait Islander deaths registered during 2010–2012, modified using the Aboriginal and Torres Strait Islander deaths identification rate. This adjusts the Indigenous status of death registrations to correspond to the Indigenous status in ERP, which is as reported in PES. The identification rate is calculated from a probabilistic linking of death registrations between August 2011 and September 2012 to the 2011 Census and from PES data. The inputs are:

- number of deaths in linked records reported as Aboriginal and Torres Strait Islander in death registrations, by state/territory and age groups;
- number of deaths in linked records by Census Indigenous status, by state/territory and age groups;
- propensity of being Aboriginal and Torres Strait Islander in PES given Census Indigenous status is 'Aboriginal and Torres Strait Islander', by state/territory and age groups; and
- propensities of being Aboriginal and Torres Strait Islander in PES given Census Indigenous status is 'non-Indigenous' and 'not stated' by age groups.

## ESTIMATING SAMPLE ERROR

*continued*

Estimates of the total and Aboriginal and Torres Strait Islander populations incorporate components of PES undercount adjustment and the propensities are calculated from PES, and so the sample error in PES generates sample error in Aboriginal and Torres Strait Islander life expectancy. Standard errors (SEs) were calculated by replication of PES inputs, based on estimated PES sampling error.

Note that PES data are weighted to estimate the propensities but unweighted data were used to illustrate the methodology in *Chapter 3: Data linkage to derive Aboriginal and Torres Strait Islander deaths identification rates*.

ESTIMATING SENSITIVITY  
ERROR

In calculating and applying the identification rate the following assumptions were made:

- identification rates for unlinked deaths were assumed to be the same as those for linked deaths;
- identification rates for 2010–2012 were assumed to be the same as those observed for August 2011 to September 2012;
- identification rates were assumed to apply uniformly across sex and within each broad age group;
- propensities for Aboriginal and Torres Strait Islander identification in the Census and PES were assumed to be applicable to death registrations, in spite of the different age distributions; and
- Census/PES non-Indigenous and not stated propensities for Australia were assumed to apply uniformly across states/territories.

*There was no direct information on possible deviation from the first two assumptions, but deviations within plus or minus five percentage points of identification rate for each state were used for the first assumption, and within plus or minus two percentage points for each sex and state for the second assumption. Data from the linked file and PES were analysed to give ranges of deviations in identification rates for the last three assumptions.*

## RESULTS

The 95% confidence intervals for Aboriginal and Torres Strait Islander life expectancy at birth estimates from the sensitivity analysis and sample error are given in Table A1.1 and Table A1.2 below.

RESULTS *continued*
**A1.1** CONFIDENCE INTERVALS FOR ABORIGINAL AND TORRES STRAIT ISLANDER LIFE EXPECTANCY AT BIRTH—2010–2012

| State/territory             | Life expectancy at birth<br>years | 95% CONFIDENCE INTERVALS      |                       |
|-----------------------------|-----------------------------------|-------------------------------|-----------------------|
|                             |                                   | Sensitivity error(a)<br>years | Sample error<br>years |
| <b>Males</b>                |                                   |                               |                       |
| NSW                         | 70.5                              | 69.0-72.0                     | 69.8-71.2             |
| Qld                         | 68.7                              | 67.3-70.1                     | 68.0-69.4             |
| WA                          | 65.0                              | 63.4-66.6                     | 64.1-65.9             |
| NT                          | 63.4                              | 61.3-65.5                     | 62.4-64.4             |
| Aust.(b)(c)                 | 67.4                              | 66.1-68.7                     | 67.1-67.7             |
| <b>Headline Aust.(c)(d)</b> | <b>69.1</b>                       | <b>67.8-70.4</b>              | <b>68.8-69.4</b>      |
| <b>Females</b>              |                                   |                               |                       |
| NSW                         | 74.6                              | 73.3-75.9                     | 74.0-75.2             |
| Qld                         | 74.4                              | 73.2-75.6                     | 73.9-74.9             |
| WA                          | 70.2                              | 68.8-71.6                     | 69.4-71.0             |
| NT                          | 68.7                              | 66.8-70.6                     | 67.8-69.6             |
| Aust.(b)(c)                 | 72.3                              | 71.2-73.4                     | 72.0-72.6             |
| <b>Headline Aust.(c)(d)</b> | <b>73.7</b>                       | <b>72.5-74.9</b>              | <b>73.4-74.0</b>      |

- (a) Sensitivity to assumptions, includes sample error.
- (b) These estimates are not the headline estimates for Australia, because they are calculated without an age-adjustment, but are provided to enable effective comparison with the state and territory, and remoteness area estimates.
- (c) Includes all states and territories.
- (d) Headline estimates for Australia are calculated using an improved methodology (taking into account age-specific identification rates) that could not be applied at the state and territory or remoteness area levels. Therefore this data should not be compared with data for any state or territory, or remoteness area.

**A1.2** CONFIDENCE INTERVALS FOR ABORIGINAL AND TORRES STRAIT ISLANDER LIFE EXPECTANCY AT BIRTH, Remoteness Areas—2010–2012

| Remoteness Area                        | Life expectancy at birth<br>years | 95% CONFIDENCE INTERVALS      |                       |
|--|-----------------------------------|-------------------------------|-----------------------|
|  |                                   | Sensitivity error(a)<br>years | Sample error<br>years |
| <b>Males</b>                           |                                   |                               |                       |
| Major Cities and Inner Regional        | 68.0                              | 67.1-68.9                     | 67.7-68.3             |
| Outer Regional, Remote and Very Remote | 67.3                              | 66.2-68.4                     | 66.9-67.7             |
| <b>Females</b>                         |                                   |                               |                       |
| Major Cities and Inner Regional        | 73.1                              | 72.2-74.0                     | 72.8-73.4             |
| Outer Regional, Remote and Very Remote | 72.3                              | 71.3-73.3                     | 72.0-72.6             |

- (a) Sensitivity to assumptions, includes sample error.

The 95% confidence intervals for Aboriginal and Torres Strait Islander deaths identification rates from the sensitivity analysis and sample error are given in Table A1.3 below. These are the final estimates of the confidence intervals and replace the preliminary estimates published on 15 November 2013.

RESULTS *continued*

These errors are produced during the process of calculating the errors for life expectancy, but because the sensitivity errors are applied at a finer level than the sample errors, the process for aggregating them to state level was slightly different.

**A1.3** CONFIDENCE INTERVALS FOR ABORIGINAL AND TORRES STRAIT ISLANDER DEATHS IDENTIFICATION RATES—2010–2012

|                                | Identification rate | 95% CONFIDENCE INTERVALS |                  |
|--------------------------------|---------------------|--------------------------|------------------|
|                                |                     | Sensitivity error(a)     | Sample error     |
| <i>State/territory</i>         | no.                 | no.                      | no.              |
| NSW                            | 0.70                | 0.59-0.81                | 0.64-0.76        |
| Qld                            | 0.80                | 0.69-0.91                | 0.74-0.86        |
| WA                             | 0.88                | 0.75-1.01                | 0.82-0.94        |
| NT                             | 1.04                | 0.99-1.09                | 1.03-1.05        |
| Aust.(b)(c)                    | 0.72                | 0.63-0.81                | 0.67-0.77        |
| <b>Headline Aust.(c)(d)(e)</b> | <b>0.82</b>         | <b>0.71-0.93</b>         | <b>0.76-0.88</b> |

- (a) Sensitivity to assumptions. Includes sample error.
- (b) These estimates are not the headline estimates for Australia, because they are calculated without an age-adjustment, but are provided to enable effective comparison with the state and territory, and remoteness area estimates.
- (c) Includes all states and territories.
- (d) Headline estimates for Australia are calculated using an improved methodology (taking into account age-specific identification rates) that could not be applied at the state and territory or remoteness area levels. Therefore this data should not be compared with data for any state or territory, or remoteness area.
- (e) This identification rate is included for comparison purposes only. refer to table 3.5 for age-specific identification rates.

## INTRODUCTION

In 2008, the Council of Australian Governments (COAG) agreed to six ambitious targets to help remove some of the disadvantages faced by Aboriginal and Torres Strait Islander Australians. One of these targets was to close the gap in life expectancy within a generation (by 2031). The estimates of Aboriginal and Torres Strait Islander and non-Indigenous life expectancy are used to measure progress against this indicator. For this reason it is important that the ABS provides comparable estimates over time, as far as possible.

However, the ABS also commits to providing the most accurate measure of life expectancy using the best available data and methodologies. Two improvements (detailed below) have been made for the official 2010-2012 Aboriginal and Torres Strait Islander life tables and so a comparative set of 2005-2007 life tables has been compiled in order to be able to effectively measure the change in life expectancy over time.

It must, however, be recognised that the people identified as Aboriginal and Torres Strait Islander in one Census to the next will be slightly different populations. This is particularly true for the 2006 and 2011 Census where the population identified increased by 21%. For more information, see *Census of Population and Housing: Understanding the Increase in Aboriginal and Torres Strait Islander Counts, 2006-2011* (cat. no. 2077.0).

*Changes to 2010-2012 life table methodology*

Two improvements made to the data and methodology have affected the comparability of the 2010-2012 estimates with the 2005-2007 estimates released previously.

The first improvement was only able to be made at the Australia level and only affects the headline national estimates. Age-specific identification rates were included in the calculation of the adjustment used to enhance the numbers of Aboriginal and Torres Strait Islander deaths to account for underidentification in death registrations. For more information, see *Chapter 3: Data linkage to derive Aboriginal and Torres Strait Islander deaths identification rates*.

The other improvement, affecting all estimates, was an improvement to the Post Enumeration Survey (PES) methodology and procedures. This has affected both the underlying population estimates and the propensities used to estimate identification of Aboriginal and Torres Strait Islander deaths. For further information on the changes to methodology and procedures in the PES, see *Census of Population and Housing - Details of Undercount, 2011* (cat. no. 2940.0).

*Estimating the statistical impact on 2010-2012 life expectancy*

After each Census, the ABS destroys all source data relating to the Census, including data from the Census to Deaths linkage study. For this reason, the 2005-2007 life tables are unable to be recalculated directly. In order to determine a comparable set of life tables for 2005-2007, the statistical impact of the improvements for 2010-2012 was calculated and applied to the previously released 2005-2007 life expectancy estimates.

To determine the statistical impact of the two improvements mentioned above, a comparative set of 2010-2012 life tables was calculated. This set was produced without the age-specific adjustment in order to assess the impact of the improved methodology for the headline Australian estimates. To remove the impact of the change in PES methodology, the comparative set of life tables also used the 2006 PES propensities (i.e.

*Estimating the statistical impact on 2010-2012 life expectancy continued*

P(ATSI/ATSI), P(ATSI/NI) and P(ATSI/NS)) and also made an allowance for the PES contribution to estimated resident population data.

A comparison of the headline 2010-2012 life expectancy estimates and the comparative set are presented in table A2.1.

**A2.1** ABORIGINAL AND TORRES STRAIT ISLANDER LIFE EXPECTANCY, Headline and Comparison Estimates—2010–2012

|                             | 2010-2012 ESTIMATES |             | 2010-2012 COMPARISON ESTIMATES |             | DIFFERENCE(a) |            |            |            |
|-----------------------------|---------------------|-------------|--------------------------------|-------------|---------------|------------|------------|------------|
|                             | Males               | Females     | Males                          | Females     | Males         | Females    | Males      | Females    |
|                             | years               | years       | years                          | years       | years         | years      | %          | %          |
| NSW                         | 70.5                | 74.6        | 72.1                           | 75.6        | -1.6          | -1.0       | -2.3       | -1.4       |
| Qld                         | 68.7                | 74.4        | 69.9                           | 75.4        | -1.2          | -1.0       | -1.8       | -1.3       |
| WA                          | 65.0                | 70.2        | 65.5                           | 70.6        | -0.5          | -0.4       | -0.8       | -0.5       |
| NT                          | 63.4                | 68.7        | 63.4                           | 68.5        | —             | 0.2        | —          | 0.3        |
| Aust.(b)(c)                 | 67.4                | 72.3        | 68.8                           | 73.5        | -1.5          | -1.2       | -2.2       | -1.7       |
| <b>Headline Aust.(c)(d)</b> | <b>69.1</b>         | <b>73.7</b> | <b>68.8</b>                    | <b>73.5</b> | <b>0.3</b>    | <b>0.2</b> | <b>0.4</b> | <b>0.2</b> |

— nil or rounded to zero (including null cells)

- (a) Based on unrounded estimates.
- (b) These estimates are not the headline estimates for Australia, because they are calculated without an age-adjustment, but are provided to enable effective comparison with the state and territory, and remoteness area estimates.
- (c) Includes all states and territories.
- (d) Headline estimates for Australia are calculated using an improved methodology (taking into account age-specific identification rates) that could not be applied at the state and territory or remoteness area levels. Therefore this data should not be compared with data for any state or territory, or remoteness area.

*Revised 2005-2007 estimates*

Comparative life expectancy estimates for 2005-2007 were obtained by applying the relative statistical impacts to the estimates of life expectancies for Aboriginal and Torres Strait Islander Australians that were previously released. These estimates were in turn used to determine the adjusted Aboriginal and Torres Strait Islander deaths, enabling the estimation of non-Indigenous deaths and the non-Indigenous life expectancy at birth.

Comparative life expectancy estimates for Aboriginal and Torres Strait Islander Australians, non-Indigenous Australians and the revised gap in life expectancy for 2005–2007 are presented in table A2.2

*Estimate of change in life expectancy over the 5 years with revised 2005-2007 data*

The revised 2005-2007 life expectancy estimates make it possible to examine the change in life expectancy over time and estimate the resulting change in the gap in life expectancy between Aboriginal and Torres Strait Islander and non-Indigenous Australians. Table A2.2 shows the revised life expectancies for 2005-2007 and the current estimates for 2010-2012. At the national level, the gap in life expectancy has improved from 11.4 years for males and 9.6 years for females in 2005-2007 to 10.6 years and 9.5 years respectively in 2010-2012.

**A2.2** ABORIGINAL AND TORRES STRAIT ISLANDER AND NON-INDIGENOUS LIFE EXPECTANCY, Revised 2005–2007 estimates and official 2010–2012 estimates

|                             | ABORIGINAL AND TORRES STRAIT ISLANDER |             | NON-INDIGENOUS |             | DIFFERENCE BETWEEN NON-INDIGENOUS AND ABORIGINAL AND TORRES STRAIT ISLANDER LIFE EXPECTANCY AT BIRTH(a) |            |
|-----------------------------|---------------------------------------|-------------|----------------|-------------|---|------------|
|                             | Males                                 | Females     | Males          | Females     | Males   | Females    |
|                             | years                                 | years       | years          | years       | years   | years      |
| REVISED 2005–2007 ESTIMATES |                                       |             |                |             |   |            |
| NSW                         | 68.3                                  | 74.0        | 78.8           | 82.6        | 10.5  | 8.6        |
| Qld                         | 67.1                                  | 72.7        | 78.8           | 82.7        | 11.8  | 10.0       |
| WA                          | 64.5                                  | 70.0        | 79.2           | 82.9        | 14.7  | 12.9       |
| NT                          | 61.5                                  | 69.4        | 75.5           | 81.0        | 14.0  | 11.6       |
| Aust.(b)(c)                 | 65.7                                  | 71.7        | 78.9           | 82.7        | 13.1  | 11.0       |
| <b>Headline Aust.(c)(d)</b> | <b>67.5</b>                           | <b>73.1</b> | <b>78.9</b>    | <b>82.6</b> | <b>11.4</b>   | <b>9.6</b> |
| 2010–2012 ESTIMATES         |                                       |             |                |             |   |            |
| NSW                         | 70.5                                  | 74.6        | 79.8           | 83.1        | 9.3   | 8.5        |
| Qld                         | 68.7                                  | 74.4        | 79.4           | 83.0        | 10.8  | 8.6        |
| WA                          | 65.0                                  | 70.2        | 80.1           | 83.7        | 15.1  | 13.5       |
| NT                          | 63.4                                  | 68.7        | 77.8           | 83.1        | 14.4  | 14.4       |
| Aust.(b)(c)                 | 67.4                                  | 72.3        | 79.8           | 83.2        | 12.4  | 10.9       |
| <b>Headline Aust.(c)(d)</b> | <b>69.1</b>                           | <b>73.7</b> | <b>79.7</b>    | <b>83.1</b> | <b>10.6</b>   | <b>9.5</b> |

(a) Based on unrounded estimates

(b) These estimates are not the headline estimates for Australia, because they are calculated without an age-adjustment, but are provided to enable effective comparison with the state and territory, and remoteness area estimates.

(c) Includes all states and territories.

(d) Headline estimates for Australia are calculated using an improved methodology (taking into account age-specific identification rates) that could not be applied at the state and territory or remoteness area levels. Therefore this data should not be compared with data for any state or territory, or remoteness area.

## INTRODUCTION

In *Experimental Life Tables for Aboriginal and Torres Strait Islander Australians, 2005-2007* (cat. no. 3302.0.55.003) the ABS presented six alternative approaches for adjusting deaths data as an input to compilation of life tables. While not the best method each of these approaches does provide useful insights into the official method and where it adds particular value. Four methods have been included for 2010-2012.

ALTERNATIVE APPROACHES  
TO ADJUST DEATHS

The four alternative approaches for which illustrative estimates were produced were:

1. using deaths identified as Aboriginal and Torres Strait Islander in death registrations without any adjustment;
2. using deaths identified as Aboriginal and Torres Strait Islander in either the Census or death registrations in the CDE linked data only;
3. using deaths identified as Aboriginal and Torres Strait Islander in either the Census or death registrations in the CDE linked and unlinked data; and
4. using Aboriginal and Torres Strait Islander identification based on the 2011 Census.

The first approach shows what life expectancy would have been if no adjustment was made for the underidentification of Indigenous status in deaths registration data.

The second and third approaches are provided here as approaches that were explored by the ABS for the previous 2005-2007 estimates but were considered to be unsuitable for estimating Aboriginal and Torres Strait Islander mortality. The main reason for this is that the identification of Indigenous status in the numerator (deaths) and the denominator (population estimates) are not consistent with each other, thus introducing bias to life expectancy estimates.

The fourth approach was also explored by the ABS, but the resultant life expectancy at birth estimates were considerably higher than the other estimates and not considered to be plausible.

A brief discussion of each of the different approaches and the results obtained are presented below.

1. Deaths identified as Aboriginal and Torres Strait Islander in death registrations without any adjustment

This method produces life expectancy estimates based on no adjustment made to the number of Aboriginal and Torres Strait Islander deaths to account for underidentification. This shows that no adjustment to the number of deaths leads to higher life expectancy for New South Wales, Queensland and Australia and lower life expectancy for Western Australia and the Northern Territory.

**A3.1** ABORIGINAL AND TORRES STRAIT ISLANDER LIFE EXPECTANCY AT BIRTH, based on unadjusted death registrations—2010–2012

| State/territory | Males | Females |
|-----------------|-------|---------|
|                 | years | years   |
| NSW             | 74.6  | 77.7    |
| Qld             | 71.4  | 76.6    |
| WA              | 66.9  | 71.8    |
| NT              | 62.9  | 68.0    |
| Aust.(a)        | 71.5  | 75.7    |

(a) Includes all states and territories.

2. Deaths identified as Aboriginal and Torres Strait Islander in either Census or death registrations in the CDE linked data only

For the previous 2005-2007 estimates, ABS explored an option to derive identification rates for Aboriginal and Torres Strait Islander deaths and life expectancy estimates using the CDE linked data only.

This approach uses a concept of Indigenous status which is different from that used for the denominator for death rates; that is, population estimates where Indigenous status is as reported in PES only but not augmented by other sources of information. In calculating life expectancy estimates, it is important to ensure that the classification of records as Aboriginal and Torres Strait Islander occurs in a consistent manner in the numerator (deaths) and the denominator (population estimates) as different population scopes feed directly into bias in death rates.

**A3.2** CDE LINKED DATA(a), Identification rates and life expectancy estimates based on Aboriginal and Torres Strait Islander deaths—2010–2012

| State/territory | Aboriginal and Torres Strait Islander deaths in death registrations | Additional Aboriginal and Torres Strait Islander deaths identified in Census only | Total Aboriginal and Torres Strait Islander deaths by registrations or Census | Aboriginal and Torres Strait Islander deaths identification rate(b) | LIFE EXPECTANCY AT BIRTH |         |
|-----------------|---|---|---|---|--------------------------|---------|
|                 | no.   | no.   | no.   | no.   | Males                    | Females |
| NSW             | 604   | 268   | 872   | 0.69  | 70.3                     | 74.1    |
| Qld             | 520   | 130   | 650   | 0.80  | 68.6                     | 74.2    |
| WA              | 276   | 40  | 316   | 0.87  | 65.0                     | 70.1    |
| NT              | 262   | 4   | 266   | 0.98  | 62.6                     | 67.8    |
| Aust.(c)        | 1 884   | 606   | 2 490   | 0.76  | 67.8                     | 72.6    |

- (a) Deaths identified in either Census or registration in the CDE linked data.
- (b) Ratio of Aboriginal and Torres Strait Islander deaths identified in death registrations to the total Aboriginal and Torres Strait Islander deaths identified in either registration and Census.
- (c) Includes all states and territories.

3. Deaths identified as Aboriginal and Torres Strait Islander in either Census or death registrations in the CDE linked and unlinked data

This approach, like the previous approach, is based on Aboriginal and Torres Strait Islander deaths identified in either the Census or death registrations, but uses the Aboriginal and Torres Strait Islander deaths identified in the CDE linked file plus those Aboriginal and Torres Strait Islander deaths which were unable to be linked to a Census record.

**A3.3** CDE LINKED AND UNLINKED DATA(a), Identification rates and life expectancy estimates based on Aboriginal and Torres Strait Islander deaths—2010–2012

| State/territory | Aboriginal and Torres Strait Islander deaths from death registrations prior to linkage<br>no. | Aboriginal and Torres Strait Islander deaths after linkage<br>no. | Aboriginal and Torres Strait Islander deaths identification rate (b)<br>no. | LIFE EXPECTANCY AT BIRTH ESTIMATES |                  |
|-----------------|---|---|---|------------------------------------|------------------|
|                 |   |   |   | Males<br>years                     | Females<br>years |
| NSW             | 718   | 985   | 0.73  | 71.0                               | 74.6             |
| Qld             | 608   | 739   | 0.82  | 69.0                               | 74.5             |
| WA              | 379   | 419   | 0.90  | 65.5                               | 70.6             |
| NT              | 360   | 364   | 0.99  | 62.7                               | 67.8             |
| Aust.(c)        | 2 345   | 2 951   | 0.79  | 68.4                               | 73.1             |

- (a) Deaths identified in either Census or registration in the CDE linked and unlinked data.
- (b) Ratio of Aboriginal and Torres Strait Islander deaths prior to linkage to Aboriginal and Torres Strait Islander deaths after linkage.
- (c) Includes all states and territories.

Like the previous approach, this approach also produces life expectancy estimates which are biased as the identification of Indigenous status in the numerator and the denominator are inconsistent.

4. Direct method using identification based on the 2011 Census

The CDE linked dataset can be used to derive direct estimates of mortality of the Aboriginal and Torres Strait Islander population counted in the 2011 Census. The method of estimation involves a three stage process.

Firstly, people who identified themselves as Aboriginal and Torres Strait Islander in the 2011 Census were selected from the Census.

Secondly, only those death records for which Indigenous status was reported as Aboriginal and Torres Strait Islander in the Census were taken from the linked file.

Thirdly, age-specific death rates were calculated by dividing the Aboriginal and Torres Strait Islander deaths by the Aboriginal and Torres Strait Islander Census counts. These rates were then used to derive Aboriginal and Torres Strait Islander life tables. No adjustments were made to the death rates to account for potential undercoverage of deaths, hence the method is referred to as 'direct'.

This approach was intended to make Aboriginal and Torres Strait Islander counts for deaths and for the population at risk (that is, Aboriginal and Torres Strait Islander usual residents of Australians) consistent. However, this is not the case. Due to undercount in Census a proportion of death records could not be linked, as there was no corresponding Census record to link with. Such people are removed from the counts of deaths and from the counts of the population at risk. However, people whose information from death registrations or Census is not accurate enough to make a link are not included in the death counts, but it is not possible to remove from the Census count the corresponding count of people with unlinkable information in Census or what would have been unlinkable information from death registrations, had they died.

## GLOSSARY

|  |   |
|--|---|
| <b>Aboriginal and Torres Strait Islander death</b> | The death of a person who is recorded as being an Aboriginal, Torres Strait Islander or both on the Death Registration Form (DRF). From 2007, Indigenous status for deaths registered in South Australia, Western Australia, Tasmania, the Northern Territory and the Australian Capital Territory is also derived from the Medical Certificate of Cause of Death (MCCD).   |
| <b>Age-specific death rates</b>                    | The number of deaths (occurred or registered) during the calendar year, at a specified age, per 1,000 of the estimated resident population of the same age at the mid-point of the year (30 June). Pro rata adjustment is made in respect of deaths for which the age of the deceased is not given.   |
| <b>Census</b>                                      | The complete enumeration of a population or groups at a point in time with respect to well-defined characteristics (eg Population, Manufacturing, etc.). In this release the word "Census" refers to the ABS Census of Population and Housing.  |
| <b>Death</b>                                       | The permanent disappearance of all evidence of life after birth has taken place. The definition excludes deaths prior to live birth. For the purposes of the ABS Death Registration collection, a death refers to any death which occurs in, or en route to Australia and is registered with a state or territory Registry of Births, Deaths and Marriages.   |
| <b>Estimated Resident Population (ERP)</b>         | <p>The official measure of the population of Australia is based on the concept of usual residence. It refers to all people, regardless of nationality, citizenship or legal status, who usually live in Australia, with the exception of foreign diplomatic personnel and their families. It includes usual residents who are overseas for less than 12 months over a 16 month period. It excludes overseas visitors who are in Australia for less than 12 months over a 16 month period.</p> <p>Estimates of the Australian resident population are generated on a quarterly basis by adding natural increase (the excess of births over deaths) and net overseas migration (NOM) occurring during the period to the population at the beginning of each period.</p>   |
| <b>Identification rate</b>                         | The ratio of observed to expected deaths.   |
| <b>Imputation</b>                                  | A statistical process for predicting values where no response was provided to a question and a response could not be derived.   |
| <b>Life expectancy</b>                             | The average number of additional years a person of a given age and sex might expect to live if the age-specific death rates of each period continued throughout his/her lifetime.   |
| <b>Life table</b>                                  | <p>A tabular, numeric representation of mortality and survivorship of a cohort of births at each age of life. The conventional life table is based on the assumption that as the cohort passes through life it experiences mortality at each age in accordance with a predetermined pattern of mortality rates which do not change from year to year. The life table this is a hypothetical model of mortality, and even though it is usually based upon death rates from a real population during a particular period of time, it does not describe the real mortality which characterises a cohort as it ages.</p> <p>Life tables may be complete or abridged, depending on the age interval used in their compilation. Complete life tables such as those for the Australian population contain data by single years of age, while abridged life tables, such as those for the Aboriginal and Torres Strait Islander population, contain data for five-year age groups. Due to differences in mortality patterns between males and females at different ages, life tables are generally constructed separately for each sex.</p> |

|                                      |   |
|--------------------------------------|---|
| <b>Natural increase</b>              | Excess of births over deaths.   |
| <b>Net undercount</b>                | The difference between the actual Census count (including imputations) and an estimate of the number of people who should have been counted in the Census. This estimate is based on the Post Enumeration Survey (PES) conducted after each Census. For a category of person (e.g. based on age, sex and state of usual residence), net undercount is the resultant of Census undercount, overcount, misclassification and imputation error.                      |
| <b>Non-sampling error</b>            | Error which arises from inaccuracies in collecting, recording and processing the data. Every effort is made to minimise non-sampling error by the careful design of questionnaires, intensive training and supervision of interviewers, and efficient data processing procedures. Non-sampling error also arises because information cannot be obtained from all people selected in the collection.   |
| <b>Other Territories</b>             | Following the 1992 amendments to the Acts Interpretation Act to include the Indian Ocean Territories of Christmas Island and the Cocos (Keeling) Islands as part of geographic Australia, another category of the state and territory level has been created, known as Other Territories. Other Territories include Jervis Bay Territory, previously included with the Australian Capital Territory, as well as Christmas Island and the Cocos (Keeling) Islands. |
| <b>Post Enumeration Survey (PES)</b> | A household survey conducted three to four weeks after the Census. The PES allows the ABS to estimate the number of people who should have been counted in the Census compared to the number who were. Results from the PES contribute to a more accurate calculation of the estimated resident population (ERP) for Australia and the states and territories which is then backdated to 30 June of the Census year.  |
| <b>Sampling error</b>                | Error which occurs because a sample, rather than the entire population, is surveyed. One measure of the likely difference resulting from not including all dwellings in the survey is given by the standard error.  |
| <b>Standard error</b>                | A measure of the spread of the difference between the Census value and an estimate. There are about two chances in three that a sample estimate will differ by less than one standard error from the figure that would have been obtained from a Census, and about nineteen chances in twenty that the difference will be less than two standard errors.  |
| <b>Unexplained growth</b>            | The intercensal growth in the Indigenous population counts that cannot be fully explained by births, deaths and migration.  |
| <b>Year of occurrence</b>            | The year the death occurred.  |
| <b>Year of registration</b>          | The year the death was registered.  |

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