# 2 Statistical context

CONTENTS

2.1 Introduction 2.1

2.2 Population 2.2

2.3 Family and household 2.6

2.4 Income, education and employment 2.8

2.5 General economic indicators 2.11

2.6 Statistical concepts used in the Report 2.11

2.7 List of attachment tables 2.24

2.8 References 2.26

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| Attachment tables |
| Attachment tables are identified in references throughout this chapter by an ‘2A’ prefix (for example, table 2A.1). A full list of attachment tables is provided at the end of this chapter, and the attachment tables are available from the website at www.pc.gov.au/rogs/2016. |
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## 2.1 Introduction

This chapter contains contextual information to assist the interpretation of the performance indicators presented in this Report. The following key factors in interpreting the performance data are addressed:

* Australia’s population
* family and household
* income, education and employment
* general economic indicators
* statistical concepts.

All abbreviations used in this Report are available in a complete list in volume A: Approach to performance reporting.

## 2.2 Population

The Australian people are the principal recipients of the government services covered by this Report. The size, trends and characteristics of the population can have significant influences on the demand for government services and the cost of service delivery. This section provides a description of the Australian population, to support the interpretation of performance data provided in the Report.

In this chapter and associated attachment tables, population totals for the same year can vary, because they are drawn from different ABS’ sources depending on the information required. For example, some data are from the *2011 Census of Population and Housing*   
(ABS 2012) and others are from *Australian Demographic Statistics* (ABS 2015a and previous issues).

Most of the service areas covered by the Report use estimated resident population (ERP) data from tables 2A.1–2 for descriptive information (such as expenditure per person in the population) and as denominators for performance indicators (such as calculating participation rates for school education).

### Population size and trends

More than three‑quarters of Australia’s 23.5 million people lived in the eastern mainland states as at 30 June 2014, with NSW, Victoria and Queensland accounting for   
32.0 per cent, 24.9 per cent and 20.1 per cent, respectively, of the nation’s population. WA and SA accounted for a further 11.0 per cent and 7.2 per cent, respectively, while Tasmania, the ACT and the NT accounted for the remaining 2.2 per cent, 1.6 per cent and 1.0 per cent, respectively (table 2A.1). As the majority of Australia’s population lives in the eastern mainland states, data for these jurisdictions generally have a large influence on national averages.

Nationally, the average annual growth rate of the population between 2010 and 2014 was approximately 1.6 per cent. The growth across jurisdictions ranged from 3.0 per cent in WA to 0.3 per cent in Tasmania (table 2A.1). Population data as at December 2014 and earlier years are in table 2A.2.

### Population, by age and sex

As in most other developed economies, greater life expectancy and declining fertility have contributed to an ‘ageing’ of Australia’s population. However, the age distribution of Aboriginal and Torres Strait Islander people is markedly different to that of all Australians (figure 2.1). At 30 June 2014, 9.9 per cent of Australia’s population was aged 70 years or over, compared with just 1.9 per cent of Australia’s Aboriginal and Torres Strait Islander population as at 30 June 2011 (tables 2A.1 and 2A.13). Across jurisdictions, the proportion of all people aged 70 years or over ranged from 11.9 per cent in Tasmania to 3.5 per cent in the NT (table 2A.1).

Half of the population at June 2014 was female (50.2 per cent nationally), though this proportion varies noticeably by age. Nationally, approximately 55.0 per cent of people aged 70 years or over were female, compared with 48.7 per cent of people aged 14 years or under (table 2A.1).

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| Figure 2.1 Population distribution, Australia, by age and sex,  30 June**a** |
| |  |  | | --- | --- | |  | | | **All people (2014)** | **Aboriginal and Torres Strait Islander**  **Australians (2011)** | | Figure 2.1 Population distribution, Australia, by age and sex,  30 June  All people (2014)  More details can be found within the text surrounding this image. | Figure 2.1 Population distribution, Australia, by age and sex,  30 June  Aboriginal and Torres Strait Islander Australians (2011)  More details can be found within the text surrounding this image. | |
| a See tables 2A.1 and 2A.13 for detailed definitions, footnotes and caveats. |
| *Source*: ABS (2014) *Australian Demographic Statistics, June 2014*, Cat. no. 3101.0; ABS (2013) *Estimates and Projections, Aboriginal and Torres Strait Islander Australians, 2001 to 2026*, Cat. no. 3238.0;  tables 2A.1 and 2A.13. |
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### Population, by ethnicity and proficiency in English

New Australians face specific problems when accessing government services. Language and cultural differences can be formidable barriers for otherwise capable people. Cultural backgrounds can also have a significant influence on the support networks offered by extended families. People born outside Australia accounted for 24.6 per cent of the population in August 2011 (8.9 per cent from the main English speaking countries and   
15.7 per cent from other countries). Across jurisdictions, the proportion of people born outside Australia ranged from 30.7 per cent in WA to 11.6 per cent in Tasmania. The proportion from countries other than the main English speaking countries ranged from   
19.6 per cent in Victoria to 5.1 per cent in Tasmania (figure 2.2). Data for 2001 and 2006 are available in tables 2A.6 and 2A.7 respectively.

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| Figure 2.2 People born outside Australia, by country of birth, 2011**a** |
| |  | | --- | | Figure 2.2 People born outside Australia, by country of birth, 2011  More details can be found within the text surrounding this image. | |
| a See table 2A.8 for detailed definitions, footnotes and caveats. |
| *Source*: ABS (2012) *2011 Census of Population and Housing, Australia, States and Territories, Basic Community Profile, Table B09 — Country of birth of person by sex*, Cat. no. 2001.0, Canberra; table 2A.8. |
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Of the population born outside Australia, in August 2011, 89.3 per cent spoke only English, or spoke another language as well as speaking English very well or well. For the 9.7 per cent that did not speak English well or at all, this ranged from 12.3 per cent in NSW to 4.1 per cent in Tasmania (table 2A.5). Data are also available for the subset of those born overseas and who spoke another language, and show a similar pattern across jurisdictions (table 2A.5). Data for 2001 and 2006 are available in tables 2A.3 and 2A.4 respectively.

Approximately 18.2 per cent of Australians spoke a language other than English at home in August 2011. Across jurisdictions, this proportion ranged from 26.7 per cent in the NT to 4.5 per cent in Tasmania (table 2A.11). Apart from English, nationally the most common languages spoken were Chinese languages, Italian and Indo‑Aryan languages. In the NT, 16.3 per cent of people spoke an Aboriginal and Torres Strait Islander language at home (table 2A.11). Data for 2001 and 2006 are available in tables 2A.9 and 2A.10 respectively.

### Population, by geographic location

The Australian population is highly urbanised, with 70.7 per cent of the population located in major cities as at 30 June 2014 (figure 2.3). Across jurisdictions, this proportion ranged from 99.6 per cent in the ACT to 62.2 per cent in Queensland (Tasmania and the NT have no major cities using the ABS classification for remoteness areas (ABS 2015b). In Tasmania, 98.0 per cent of the population live in regional areas. Nationally, 2.3 per cent of people live in remote or very remote areas. The NT was markedly above this average, with 42.7 per cent of people living in remote or very remote areas. Historical data are available in table 2A.12.

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| Figure 2.3 Population, by remoteness area, June 2014**a** |
| |  | | --- | | Figure 2.3 Population, by remoteness area, June 2014  More details can be found within the text surrounding this image. | |
| a See table 2A.12 for detailed definitions, footnotes and caveats. |
| *Source*: ABS (2015) *Regional Population Growth, Australia, 2014*, Cat. no. 3218.0, Canberra  (April release); table 2A.12. |
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### Aboriginal and Torres Strait Islander population profile

There were an estimated 669 881 Aboriginal and Torres Strait Islander people   
(50.2 per cent female, the same as for the total population) in Australia at 30 June 2011, accounting for approximately 3.0 per cent of the total Australian population in 2011 (tables 2A.1 and 2A.13). The proportion of people who identified as Aboriginal and Torres Strait Islander Australians was significantly higher in the NT (29.8 per cent) than in any other jurisdiction, which ranged from 4.7 per cent in Tasmania to 0.9 per cent in Victoria (figure 2.4). Nationally, the Aboriginal and Torres Strait Islander population is projected to grow to 924 953 people in 2026 (table 2A.14).

The majority of Aboriginal and Torres Strait Islander people (82.8 per cent) at   
August 2011 spoke only English at home, while a further 9.0 per cent spoke an Aboriginal and Torres Strait Islander language and also spoke English very well or well. However,   
1.8 per cent did not speak English well or at all (up to 12.1 per cent in the NT)   
(table 2A.17). Data for 2001 and 2006 are available in tables 2A.15 and 2A.16 respectively.

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| Figure 2.4 Aboriginal and Torres Strait Islander people as a proportion of the population, 30 June 2011**a** |
| |  | | --- | | Figure 2.4 Aboriginal and Torres Strait Islander people as a proportion of the population, 30 June 2011  More details can be found within the text surrounding this image. | |
| a See tables 2A.1 and 2A.13 for detailed definitions, footnotes and caveats. |
| *Source*: ABS (2014) *Australian Demographic Statistics, June 2014*, Cat. no. 3101.0; ABS (2013) *Estimates and Projections, Aboriginal and Torres Strait Islander Australians, 2001 to 2026*, Cat. no. 3238.0;  tables 2A.1 and 2A.13. |
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## 2.3 Family and household

### Family structure

For this Report, the most recent available data on family structure was for 2012.

There were 6.4 million families in Australia in 2012.[[1]](#footnote-1) Across jurisdictions, the number of families ranged from 2.1 million in NSW to 63 000 in the NT. The average family size across Australia was 3.0 people, ranging from 3.1 people in the NT to 2.9 people in SA and Tasmania. Nationally, 37.2 per cent of families had at least one child aged under 15 years, and 17.5 per cent of families had at least one child aged under 5 years (table 2A.18).

Lone parent families might have a greater need for government support and particular types of government services (such as child care for respite reasons). Nationally,   
18.6 per cent of all children aged under 15 years lived in lone parent families in 2012 (ranging from 16.5 per cent in Victoria to 25.7 per cent in the NT). Lone mother families made up 17.4 per cent of all families with children aged under 15 years, compared to 3.0 per cent for lone father families (table 2A.19).

Employment status also has implications for the financial independence of families. Nationally in 2011‑12, 13.9 per cent of all children aged under 15 years lived in families where no resident parent was employed, this was 45.1 per cent for lone parent families with children under 15 years (table 2A.20).

### Household profile

There were 9.1 million households in Australia in 2015 (some households may contain more than one family) (table 2A.24). Of these, 24.7 per cent were lone person households. Across jurisdictions, the proportion of lone person households ranged from 21.4 per cent in the NT to 28.6 per cent in Tasmania.

As at 30 June 2015, the proportion of people aged 65 years or over who lived alone   
(24.6 per cent) was around three times higher than that for people aged 15–64 years   
(8.6 per cent). Across jurisdictions, the proportion of people aged 65 years or over who lived alone ranged from 21.7 per cent in the NT to 27.5 per cent in Tasmania. Times series data for household structure for earlier years are available in table 2A.24.

Approximately 16.6 million people in families lived in private dwellings in August 2011 (table 2A.23).[[2]](#footnote-2) The majority of these families comprised couples with children   
(59.0 per cent). Data are available by Indigenous status (table 2A.23) and for 2006 and 2001 (tables 2A.22 and 2A.21 respectively).

Nationally, the majority of occupied private dwellings in August 2011 (67.0 per cent, or 5.2 million dwellings) were owned or were being purchased. Home ownership rates ranged from 46.2 per cent in the NT to 70.4 per cent in Tasmania. Australians rented 2.3 million dwellings, or 29.6 per cent of dwellings (of these, 54.3 per cent were from real estate agents and 13.7 per cent from State or Territory housing authorities) (table 2A.27). Across jurisdictions, the proportion of dwellings that were rented ranged from 26.4 per cent in Tasmania to 49.1 per cent in the NT (figure 2.5). Data for 2006 and 2001 are available in tables 2A.26 and 2A.25 respectively.

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| Figure 2.5 Occupied private dwellings, by tenure type, 2011a |
| |  | | --- | | Figure 2.5 Occupied private dwellings, by tenure type, 2011  More details can be found within the text surrounding this image. | |
| a See table 2A.27 for detailed definitions, footnotes and caveats. |
| *Source*: ABS (2012) *2011 Census of Population and Housing, Australia, States and Territories, Aboriginal and Torres Strait Islander (Indigenous) Profile, Table I10c — Tenure and landlord type by dwelling structure by Indigenous status of household*, Canberra; table 2A.27. |
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## 2.4 Income, education and employment

### Income

Nationally in August 2011, 25.9 per cent of people aged 15 years or over had a relatively low weekly individual income of $299 or less (table 2A.30). The proportion was around three times higher for younger people (74.8 per cent for people aged 15–19 years), higher for Aboriginal and Torres Strait Islander Australians (37.2 per cent), similar for females (30.4 per cent) and lower for older people (20.7 per cent for people aged 85 years or over) (figure 2.6). Data for 2006 and 2001 are available in tables 2A.28–36.

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| Figure 2.6 Weekly individual income of $299 or less, by sex, Indigenous status and age, 2011a |
| |  | | --- | | Figure 2.6 Weekly individual income of $299 or less, by sex, Indigenous status and age, 2011  More details can be found within the text surrounding this image. | |
| a See tables 2A.30, 2A.33 and 2A.36 for detailed definitions, footnotes and caveats. |
| *Source*: ABS (2012) *2011 Census of Population and Housing*, *Australia, States and Territories, Basic Community Profile, Table B17*, Cat. no. 2001.0, Canberra; ABS (unpublished) *2011 Census of Population and Housing*, *Australia*, table generated in 2012 using ABS TableBulider; tables 2A.30, 2A.33 and 2A.36. |
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Nationally, 18.4 per cent of the total population was receiving income support in 2014. The age pension was received by 10.2 per cent of the population, while 3.5 per cent received a disability support pension and 1.1 per cent received a single parent payment. A further   
3.5 per cent of the population received some form of labour market allowance in 2014 (figure 2.7). Annual data back to 2005 are available in table 2A.37.

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| Figure 2.7 Proportion of total population on income support, June 2014a |
| |  | | --- | | Figure 2.7 Proportion of total population on income support, June 2014  More details can be found within the text surrounding this image. | |
| a See table 2A.37 for detailed definitions, footnotes and caveats. |
| *Source*: FaHCSIA (2015) *Payment Type by State and Territory — June 2014 Quarter — DSS Basic Dataset and DEEWR Blue Book Dataset*; table 2A.37. |
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### Education attainment

Employment outcomes and income are closely linked to the education and skill levels of individuals. Tables 2A.38–45 and sector overview B Child care, education and training contain reporting on education and skill levels including highest level of school completed and tertiary education attendance and attainment.

### Employment and workforce participation

There were 12.5 million people aged 15 years or over in the labour force in Australia as at 30 June 2015 — 94.2 per cent were employed and 5.8 per cent were unemployed. The majority of employed people (68.9 per cent) were in full time employment (table 2A.46).

Across jurisdictions, the unemployment rate ranged from 3.5 per cent in the ACT to   
7.9 per cent in SA (table 2A.46). The unemployment rate needs to be interpreted within the context of labour force participation rates (the proportion of the working age population either in employment or actively looking for work). Nationally in June 2015, the labour force participation rate was 64.8 per cent. Labour force participation rates ranged from 60.7 per cent in Tasmania to 76.6 per cent in the NT (figure 2.8).

Data on labour force participation rates and unemployment rates for all people of working age, disaggregated by sex and reported back to 2006, are available in table 2A.46.

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| Figure 2.8 Labour force outcomes for people aged 15 years or over, 30 June 2015 |
| |  | | --- | | Figure 2.8 Labour force outcomes for people aged 15 years or over, 30 June 2015  More details can be found within the text surrounding this image. | |
| *Source*: ABS (2015) *Labour Force, Australia, Detailed — Electronic Delivery, June 2015*,  Cat. no. 6291.0.55.001, Canberra; table 2A.46. |
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## 2.5 General economic indicators

General Government Final Consumption Expenditure (GGFCE) is current expenditure   
(ie, outlays which do not result in the creation of capital assets, or in the acquisition of land and existing buildings or second‑hand capital goods) by general government bodies on services to the community such as defence, education, and public order and safety. Transfer payments (for example, interest payments on government debt securities and social assistance benefits) are not included.

Nationally, the GGFCE was $276.4 billion in 2013‑14. The GGFCE for NSW accounted for 26.9 per cent of national GGFCE, compared with 2.2 per cent for the Tasmania. Growth from the previous year’s GGFCE (in 2013‑14 dollars) was highest for the ACT (3.1 per cent) and lowest for Tasmania (-1.0 per cent) (table 2A.47).

## 2.6 Statistical concepts used in the Report

### General Government Final Consumption Expenditure

The GGFCE deflator is used to convert raw financial data into constant (real) dollars   
(box 2.1).

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| Box 2.1 GGFCE deflator formulas |
| **GGFCE deflator re‑base**  The general formula used to re‑base GGFCE deflators is:  More details can be found within the text surrounding this image.  Where:  More details can be found within the text surrounding this image. is the new index based in year *t; More details can be found within the text surrounding this image.* is the current index for year *t*  More details can be found within the text surrounding this image. is the current index for the year that will be the new base.  **GGFCE deflator application**  The general formula for applying the deflator to convert nominal dollars to real dollars is:  More details can be found within the text surrounding this image.  Where, for year *t*:  More details can be found within the text surrounding this image. is real dollars; More details can be found within the text surrounding this image. is nominal dollars; More details can be found within the text surrounding this image. is the new index |
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Raw or ‘nominal’ financial data are converted to ‘real’ dollars so that comparisons over time are not affected by inflation. (Not all financial data in the Report are deflated using the GGFCE deflator. The exceptions include some health chapters and the Vocational education and training chapter, which use service‑specific deflators to calculate real dollars.)

The calculations to achieve constant (real) dollars are in two steps:

Step 1. Re‑referencing of the GGFCE deflator.

The Report re‑references the period where the GGFCE (published by the ABS) is at 100, as this Report requires a current year deflator (2014‑15 = 100). The ABS publishes the GGFCE to the third most current year only (for example, if the current year is 2014‑15, the available deflator is 2012‑13 = 100). Table 2.1 shows how the GGFCE deflator is re‑based.

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| Table 2.1 Re‑basing the GGFCE deflatora |
| |  |  |  |  | | --- | --- | --- | --- | | Financial year | ABS index value (2012‑13 = 100) | Calculation | Re‑based GGFCE deflator  (2014‑15 = 100) | | 2010‑11 | 97.1 | 97.1/103.1\*100.0 | 94.2 | | 2011‑12 | 98.7 | 98.7/103.1\*100.0 | 95.7 | | 2012‑13 | 100.0 | 100.0/103.1\*100.0 | 97.0 | | 2013‑14 | 101.3 | 101.3/103.1\*100.0 | 98.3 | | 2014‑15 | 103.1 | 103.1/103.1\*100.0 | 100.0 | |
| a Index values from ABS (2015) *Australian National Accounts: National Income, Expenditure and Product, June 2015*, Cat. no. 5206.0, table 36, Expenditure on Gross Domestic Product (GDP), Chain volume measures and current prices, Annual (Series ID. A2304687R). |
| *Source*: ABS (2015) *Australian National Accounts: National Income, Expenditure and Product, June 2015*, Cat. no. 5206.0, Canberra; table 2A.48. |
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Table 2A.48 in the attachment contains GGFCE deflators for 2001‑02 to 2014‑15. Five GGFCE deflator series are published, from 2010‑11 = 100 through to the latest year, where 2014‑15 = 100.

Step 2. Transforming nominal dollars into constant dollars.

Nominal dollars are transformed into real dollars by dividing the nominal dollars with the GGFCE deflator for the applicable financial year and multiplying by 100. The deflator used may vary according to the most current year for which the particular financial data are available. For example, if the most current year for the data is 2013‑14 then the data are deflated using the deflator series for 2013‑14 = 100. If the most current year is 2014‑15 then the data are deflated using the deflator series for 2014‑15 = 100. Table 2.2 shows how the GGFCE deflator for 2014‑15 = 100 is applied.

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| Table 2.2 Applying the GGFCE deflator to derive constant (real) dollarsa |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | Financial year | Nominal data | GGFCE deflator (2014‑15 = 100) | Calculation | Real data | | 2010‑11 | 6 200 | 94.2 | (6 200/94.2)\*100 | 6 582 | | 2011‑12 | 6 300 | 95.7 | (6 300/95.7)\*100 | 6 583 | | 2012‑13 | 6 350 | 97.0 | (6 350/97.0)\*100 | 6 546 | | 2013‑14 | 6 485 | 98.3 | 6 485/98.3)\*100 | 6 597 | | 2014‑15 | 7 020 | 100.0 | (7 020/100.0)\*100 | 7 020 | |
| a Index values from ABS (2015) *Australian National Accounts: National Income, Expenditure and Product, June 2015*, Cat. no. 5206.0, table 36, Expenditure on Gross Domestic Product (GDP), Chain volume measures and current prices, Annual (Series ID. A2304687R). |
| *Source*: ABS (2015) *Australian National Accounts: National Income, Expenditure and Product, June 2015*, Cat. no. 5206.0, Canberra; table 2A.48. |
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### Reliability of estimates

Data for some indicators in this Report are based on samples, either from surveys or from a selection of observations from, for example, administrative data sets. The potential for sampling error — that is, the error that occurs by chance because the data are obtained from a sample and not the entire population — means that the reported estimates might not accurately reflect the true value.

This Report indicates the reliability of estimates based on samples, generally by reporting either relative standard errors (RSEs) or confidence intervals (CIs). RSEs and CIs are calculated based on the standard error (SE). The larger the SE, RSE or CI, the less reliable is the estimate as an indicator for the whole population (ABS 2013).

#### Standard error

The SE measures the sampling error of an estimate (box 2.2). (There can also be non‑sampling error, or systematic biases, in data.) There are several types of SE. A commonly used type of SE in this Report is the SE of the mean (average), which measures how much the estimated mean value might differ from the true population mean value.

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| Box 2.2 Standard error |
| The SE of a method of measurement or estimation is the estimated standard deviation of the error in that method. Specifically, it estimates the standard deviation of the difference between the measured or estimated values and the true values. Standard deviation is a measure of how spread out the data are, that is, a measure of variability.  The SE of the mean (SEM), an unbiased estimate of expected error in the sample estimate of a population mean, is the sample estimate of the population standard deviation (sample standard deviation) divided by the square root of the sample size (assuming statistical independence of the values in the sample):  More details can be found within the text surrounding this image.  Where:  More details can be found within the text surrounding this image. is the SE of the sample estimate of a population mean, More details can be found within the text surrounding this image. is the sample’s standard deviation (the sample based estimate of the standard deviation of the population), and More details can be found within the text surrounding this image. is the size (number of items) of the sample.  Decreasing the uncertainty of a mean value estimate by a factor of two requires the sample size to increase fourfold. Decreasing SE by a factor of ten requires the sample size to increase hundredfold. |
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#### Relative standard error

The RSE is used to indicate the reliability of an estimate (box 2.3). The RSE shows the size of the error relative to the estimate, and is derived by dividing the SE of the estimate by the estimate. As with the SE, the higher the RSE, the less confidence there is that the sample estimate is close to the true value of the population mean. A rule of thumb adopted in this Report is that estimates with an RSE between 25 and 50 per cent are to be used with caution and estimates with an RSE greater than 50 per cent are unreliable for general use.

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| Box 2.3 Relative standard error |
| The SE can be expressed as a proportion of the estimate — known as the RSE. The formula for the RSE of an estimate is:  More details can be found within the text surrounding this image.  Where:  More details can be found within the text surrounding this image. is the estimate and More details can be found within the text surrounding this image. is the SE of the estimate.  The resultant RSEs are generally multiplied by 100 and expressed as a percentage.  Proportions and percentages formed from the ratio of two estimates are also subject to sampling error. The size of the error depends on the accuracy of both the numerator and the denominator. One method for calculating the RSE of a proportion is expressed through the following formula:  More details can be found within the text surrounding this image.  Where:  More details can be found within the text surrounding this image. is the numerator, and More details can be found within the text surrounding this image. is the denominator, of the estimated proportion. |
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#### Confidence intervals

Confidence intervals are used to indicate the reliability of an estimate. A CI is a specified interval, with the sample statistic at the centre, within which the corresponding population value can be said to lie with a given level of confidence (ABS 2013). Increasing the desired confidence level will widen the CIs (figure 2.9). CIs are useful because a range, rather than a single estimate, is more likely to encompass the real figure for the population value being estimated.

Confidence intervals are calculated from the population estimate and its associated SE. The most commonly used CI is calculated for 95 per cent levels of probability. For example, if

the estimate from a survey was that 628 300 people report having their needs fully met by a government service, and the associated SE of the estimate was 10 600 people, then the   
95 per cent CI would be calculated by:

* lower confidence limit = 628 300 – (2 x 10 600) = 628 300 – 21 200 = 607 100
* upper confidence limit = 628 300 + (2 x 10 600) = 628 300 + 21 200 = 649 500.

This indicates that, at the 95 per cent confidence level, the true number of people who perceive that their needs are met by a government service is between 607 100 and 649 500.

The smaller the SE of the estimate, the narrower the CIs and the closer the estimate can be expected to be to the true value.

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| Figure 2.9 Normal distribution with 95 per cent confidence intervals |
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Confidence intervals also test for statistical differences between sample results (box 2.4).

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| Box 2.4 Using confidence intervals to test for statistical significance |
| The CIs — the value ranges within which estimates are likely to fall — can be used to test whether the results reported for two estimated proportions are statistically different. If the CIs for the results do not overlap, then there can be confidence that the estimated proportions differ from each other. To test whether the 95 per cent CIs of two estimates overlap, a range is derived using the following formulas.  More details can be found within the text surrounding this image.  and  More details can be found within the text surrounding this image.  If none of the values in this range is zero, then the difference between the two estimated proportions is statistically significant. |
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For example, assume survey data estimated that 50 per cent of people for jurisdiction A perceived that their needs were met by government services, with a 95 per cent CI of   
± 5 per cent, and 25 per cent of people for jurisdiction B, with a 95 per cent CI of   
± 10 per cent. These results imply that we can be 95 per cent sure the true result for jurisdiction A lies between 55 and 45 per cent, and the true result for jurisdiction B lies between 15 and 35 per cent. As these two ranges do not overlap, it can be said that the results for jurisdiction A and jurisdiction B are statistically significantly different.

### Variability bands

Rates derived from administrative data counts are not subject to sampling error but might be subject to natural random variation, especially for small counts. For mortality data, variability bands are used to account for this variation (box 2.5).

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| Box 2.5 Variability bands |
| The variability bands to be calculated using the standard method for estimating  95 per cent confidence intervals are:  *Crude rate (CR)*  More details can be found within the text surrounding this image.  Where:  *More details can be found within the text surrounding this image.* is the numerator of the estimated proportion  *Age‑standardised rate (ASR)*  More details can be found within the text surrounding this image.  Where:  *More details can be found within the text surrounding this image.* is the proportion of the standard population in age group More details can be found within the text surrounding this image.  *More details can be found within the text surrounding this image.* is the number of deaths in age group More details can be found within the text surrounding this image.  *More details can be found within the text surrounding this image.* is the number of people in the population in age group More details can be found within the text surrounding this image..  *Infant mortality rate (IMR)*  More details can be found within the text surrounding this image.  Where:  More details can be found within the text surrounding this image. is the number of deaths in infants aged less than 1 year. |
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Variability bands accompanying mortality data should be used for the purpose of within jurisdiction analysis at a point in time and over time. They should not be used for comparing mortality rates at a single point in time or over time between jurisdictions as they do not take into account differences in under‑identification of Aboriginal and Torres Strait Islander people’s deaths between jurisdictions.

Typically in this standard method, the observed rate is assumed to have natural variability in the numerator count (for example, deaths) but not in the population denominator count. Variations in Aboriginal and Torres Strait Islander people’s death rates may arise from uncertainty in the recording of Indigenous status on the death registration forms (in particular, under‑identification of Aboriginal and Torres Strait Islander people’s deaths) and in the ABS population census, from which population estimates are derived. These variations are not considered in this method. Also, the rate is assumed to have been generated from a normal distribution (figure 2.9). Random variation in the numerator count is assumed to be centred around the true value — that is, there is no systematic bias.

### Population measures

Data are frequently expressed relative to population in this Report. For example, expenditure per person, or proportion of people who utilise a service or who benefit from a service. This enables comparison of data across populations of different sizes using relative numbers — standardised by population size — as distinct from absolute numbers.

ERP data are available quarterly — that is, at end March, June, September and December of each year. The mid‑point ERP is typically used for the calculation of population rates in this Report — for example, the 30 June ERP for calendar year data (table 2A.1) and the   
31 December ERP for financial year data (table 2A.2). As this Report presents annual data where available and appropriate, the mid‑point ERP was adopted from a number of options predominately due to availability of ERP data.

This Report uses first preliminary ERP data wherever possible and replaces these with final rebased data when available.

#### Estimated resident population rebasing and recasting

Where ERP data are reported they are based on the 2011 Census, backcast over the reported time series. Details of changes to ERP data are explained in the 2014 Report (SCRGSP 2014, pp. 2.26–27).

Some tables contain population data estimates and projections (tables 2A.13–14). Aboriginal and Torres Strait Islander population data up to 2011 are estimates and from 2012 are projections. Population data for all Australians for all years are estimates.

### Growth rates

This Report presents growth rates to facilitate meaningful comparisons of data movements over time (box 2.6). Two methods are generally used: *Average annual growth rate* (AAGR) is the uniform growth rate that would need to have applied each year for the value in the first year to grow to the value in the final year of the period of analysis; *Total growth rate* (TGR) is the growth rate between two periods/years, most commonly calculated by subtracting the value in the first period from the value in the last period, dividing the result by the value in the first period and multiplying by 100.

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| Box 2.6 Growth rates |
| ***Average annual growth rate***  The formula for calculating a compound AAGR is:  More details can be found within the text surrounding this image.  Where:  More details can be found within the text surrounding this image. is the value in the initial period, More details can be found within the text surrounding this image. is the value in the last period and  More details can be found within the text surrounding this image. is the number of periods (which will be one less than the total number of years).  ***Total growth rate***  The formula for calculating the TGR is:  More details can be found within the text surrounding this image.  Where: More details can be found within the text surrounding this image. is the value in the initial period and More details can be found within the text surrounding this image. is the value in the last period.  The formula for calculating the TGR using a composite of growth rates between sub‑periods within the overall period of analysis is:  More details can be found within the text surrounding this image.  That is, the TGR over the period is found by taking the product (More details can be found within the text surrounding this image.) of each More details can be found within the text surrounding this image. and deducting 1. This is multiplied by 100 so the growth rate is expressed as a percentage. If, for example, the sample ranges of growth rates are: 6 per cent in 2010‑11 to 2011‑12; 6 per cent in 2011‑12 to 2012‑13; 8 per cent in 2012‑13 to 2013‑14; then the total growth over the period 2010‑11 to 2013‑14 can be calculated as:  More details can be found within the text surrounding this image. |
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### Age standardisation of data

#### Rationale for age standardisation of data

The age profile of Australians varies across jurisdictions, periods of time, geographic areas and/or population sub‑groups (for example, between Aboriginal and Torres Strait Islander and non‑Indigenous populations). Variations in age profiles are important because they can affect the likelihood of using a particular service (such as a public hospital) or particular ‘events’ occurring (such as death, incidence of disease or incarceration). Age standardisation adjusts for the effect of variations in age profiles when comparing service usage, or rates, of particular events across different populations.

#### Calculating age standardised rates

Age standardisation adjusts each of the comparison/study populations (for example, Aboriginal and Torres Strait Islander and non‑Indigenous populations) against a standard population (box 2.7). The latest standard population used is the final 30 June ERP for the 2001 (AIHW 2015).[[3]](#footnote-3) The result is a standardised estimate for each of the comparison/study populations.

The Review generally reports age standardised rates that have been calculated using either one of two methods, as appropriate. The direct method is generally used for comparisons between study groups, and is recommended by AIHW (2011b) for the purposes of comparing health and welfare outcome measures (for example, mortality rates, life expectancy, hospital separation rates and disease incidence rates) of the Aboriginal and Torres Strait Islander population and non‑Indigenous population. The indirect method is recommended when the age‑specific rates for the population being studied are not known (or are unreliable), but the total number of events is known (AIHW 2015).

The *direct* *method* has three steps:

Step 1: Calculate the age‑specific rate for each age group for the study/comparison group.

Step 2: Calculate the expected number of ‘events’ in each age group by multiplying the age‑specific rates by the corresponding standard population.

Step 3: Sum the expected number of cases in each age group and divide by the total of the standard population.

The *indirect method* has four steps:

Step 1: Calculate the age‑specific rates for each age group in the standard population.

Step 2: Apply the age‑specific rates resulting from step 1 to the number in each age group of the study population and sum to derive the total ‘expected’ number of cases for the study population.

Step 3: Divide the observed number of events in the study population by the ‘expected’ number of cases for the study population derived in step 2.

Step 4: Multiply the result of step 3 by the crude rate in the standard population.

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| Box 2.7 Direct and indirect age standardisation |
| The formula for deriving the age standardised rate using the *direct method* is:  More details can be found within the text surrounding this image.  The formula for deriving the age standardised rate using the *indirect method* is:  More details can be found within the text surrounding this image.  The formula for deriving the age standardised ratio using the *indirect method* is:  More details can be found within the text surrounding this image.  Where:  More details can be found within the text surrounding this image. is the age‑standardised rate for the population being studied  More details can be found within the text surrounding this image. is the standardised ratio for the population being studied  More details can be found within the text surrounding this image. is the age‑group specific rate for age group ***i*** in the population being studied  More details can be found within the text surrounding this image. is the population of age group ***i*** in the standard population  More details can be found within the text surrounding this image. is the observed number of events in the population being studied  More details can be found within the text surrounding this image. is the expected number of events in the population being studied  More details can be found within the text surrounding this image. is the age‑group specific rate for age group ***i*** in the standard population  More details can be found within the text surrounding this image. is the population for age group ***i*** in the population being studied  More details can be found within the text surrounding this image. is the crude rate in the standard population. |
| *Source*: AIHW (2015). |
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Tables 2A.49–50 in the attachment contain examples of the application of direct and indirect age standardisation, respectively. Standardised rates are generally multiplied by 1000 or 100 000 to avoid small decimal fractions. They are then reported as age standardised rates per 1000 or 100 000 population (AIHW 2015).

#### Calculating age standardised ratios

A variation of the *indirect method* is used to calculate age standardised ratios (box 2.7). These ratios express the overall experience of a study population in terms of a standard population, where the standard population is the population to which the study population is being compared.

##### Application of age standardised ratios

Standardised Mortality Ratios (SMRs) have been used to compare death rates between the Aboriginal and Torres Strait Islander and non‑Indigenous populations (table 2.3). The SMR is the ratio between the observed number of deaths in the Aboriginal and Torres Strait Islander population and the expected number of deaths that would have occurred if the Aboriginal and Torres Strait Islander population experienced the same age‑specific death rates as the non‑Indigenous population. Where the number of observed deaths is higher than the number of expected deaths, the SMR is greater than 1 and the difference in deaths is the excess number of deaths of Aboriginal and Torres Strait Islander Australians (AIHW 2011a).

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| Table 2.3 Aboriginal and Torres Strait Islander Australians’ deaths, main causes and standardised mortality ratios, 2004–2008a, b, c |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | |  | Male | | | Female | | | |  | *Observed deaths* | *Expected deaths* | *SMR* | *Observed deaths* | *Expected deaths* | *SMR* | | Diseases of circulatory system | 321 | 107 | 3.0 | 260 | 148 | 1.8 | | Neoplasms | 200 | 120 | 1.7 | 191 | 150 | 1.3 | | External causes | 225 | 61 | 3.7 | 98 | 64 | 1.5 | | Endocrine, metabolic and  nutritional disorders | 86 | 12 | 7.2 | 96 | 15 | 6.4 | | Diseases of the respiratory system | 94 | 24 | 3.9 | 96 | 33 | 2.3 | | Diseases of the digestive system | 70 | 11 | 6.4 | 76 | 14 | 4.2 | | Diseases of the nervous system | 33 | 13 | 2.5 | 59 | 16 | 1.3 | | Conditions originating in the  perinatal period | 31 | 14 | 2.2 | 21 | 14 | 1.6 | | Certain infectious and parasitic  diseases | 27 | 6 | 4.5 | 22 | 7 | 3.1 | | **All causes** | **1 211** | **397** | **3.1** | **957** | **497** | **1.9** | |
| SMR = Standardised Mortality Ratio. a Data for Queensland, WA, SA and the NT combined. b Observed and expected deaths are reported as average number of annual deaths from 2004–2008. Excepted deaths are based on non‑Indigenous death rates. c Standardised mortality ratio is the observed Aboriginal and Torres Strait Islander Australians deaths divided by expected Aboriginal and Torres Strait Islander Australians deaths, based on the age, sex and cause‑specific rates for non‑Indigenous Australians. |
| *Source*: AIHW (2011) *Life expectancy and mortality of Aboriginal and Torres Strait Islander people*, Cat. no. IHW 51, Canberra. |
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## 2.7 List of attachment tables

Attachment tables are identified in references throughout this chapter by a ‘2A’ prefix (for example, table 2A.1). Attachment tables are provided on the Review website (www.pc.gov.au/rogs/2016).

|  |  |
| --- | --- |
| **Population** |  |
| **Table 2A.1** | Estimated resident population (ERP) by age and sex, 30 June |
| **Table 2A.2** | Estimated resident population (ERP) by age and sex, 31 December |
| **Table 2A.3** | Proficiency in spoken English of people born overseas, 2001 |
| **Table 2A.4** | Proficiency in spoken English of people born overseas, 2006 |
| **Table 2A.5** | Proficiency in spoken English of people born overseas, 2011 |
| **Table 2A.6** | People by country of birth, 2001 |
| **Table 2A.7** | People by country of birth, 2006 |
| **Table 2A.8** | People by country of birth, 2011 |
| **Table 2A.9** | People by language spoken at home, 2001 (‘000) |
| **Table 2A.10** | People by language spoken at home, 2006 (‘000) |
| **Table 2A.11** | People by language spoken at home, 2011 (‘000) |
| **Table 2A.12** | Estimated resident population (ERP) by remoteness area |
| **Table 2A.13** | Aboriginal and Torres Strait Islander population estimates, by age and sex, 30 June |
| **Table 2A.14** | Aboriginal and Torres Strait Islander population projections, by age and sex, 30 June |
| **Table 2A.15** | Language spoken at home by Aboriginal and Torres Strait Islander Australians and proficiency in spoken English, by sex, 2001 (number) |
| **Table 2A.16** | Language spoken at home by Aboriginal and Torres Strait Islander Australians and proficiency in spoken English, by sex, 2006 (number) |
| **Table 2A.17** | Language spoken at home by Aboriginal and Torres Strait Islander Australians and proficiency in spoken English, by sex, 2011 (number) |
| **Family and household** | |
| **Table 2A.18** | Family structure, 2003–2012 |
| **Table 2A.19** | Family structure, lone parents, 2003–2012 (per cent) |
| **Table 2A.20** | Families and work, 2003–2012 (per cent) |
| **Table 2A.21** | Families and people in families in occupied private dwellings by Indigenous status and family/household composition, 2001 |
| **Table 2A.22** | Families and people in families in occupied private dwellings by Indigenous status and family/household composition, 2006 |
| **Table 2A.23** | Families and people in families in occupied private dwellings by Indigenous status and family/household composition, 2011 |
| **Table 2A.24** | Household structure, 2011–2015 |
| **Table 2A.25** | Occupied private dwellings by tenure type and landlord type, 2001 (‘000) |
| **Table 2A.26** | Occupied private dwellings by tenure type and landlord type, 2006 (‘000) |
| **Table 2A.27** | Occupied private dwellings by tenure type and landlord type, 2011 (‘000) |
| **Income and employment** | |
| **Table 2A.28** | People aged 15 years or over, by weekly individual income and sex, 2001 |
| **Table 2A.29** | People aged 15 years or over, by weekly individual income and sex, 2006 |
| **Table 2A.30** | People aged 15 years or over, by weekly individual income and sex, 2011 |
| **Table 2A.31** | People aged 15 years or over by weekly individual income and Indigenous status, 2001 |
| **Table 2A.32** | People aged 15 years or over by weekly individual income and Indigenous status, 2006 |
| **Table 2A.33** | People aged 15 years or over by weekly individual income and Indigenous status, 2011 |
| **Table 2A.34** | People aged 15 years or over, by weekly individual income and age, 2001 |
| **Table 2A.35** | People aged 15 years or over, by weekly individual income and age, 2006 |
| **Table 2A.36** | People aged 15 years or over, by weekly individual income and age, 2011 |
| **Table 2A.37** | Income support, June, 2005–2014 |
| **Table 2A.38** | Highest level of schooling completed by people aged 15 years or over, by Indigenous status, 2001 (‘000) |
| **Table 2A.39** | Highest level of schooling completed by people aged 15 years or over, by Indigenous status (excluding people still attending secondary school), 2006 (‘000) |
| **Table 2A.40** | Highest level of schooling completed by people aged 15 years or over, by Indigenous status (excluding people still attending secondary school), 2011 (‘000) |
| **Table 2A.41** | Type of educational institution attending by Indigenous status, 2001 (‘000) |
| **Table 2A.42** | Type of educational institution attending by Indigenous status, 2006 (‘000) |
| **Table 2A.43** | Type of educational institution attending by Indigenous status, 2011 (‘000) |
| **Table 2A.44** | Tertiary education attainment for people aged 18 or over by Indigenous status and sex, 2011 (‘000) |
| **Table 2A.45** | Type of tertiary education institution attending for people aged 18–24 years by Indigenous status and sex, 2011 (‘000) |
| **Table 2A.46** | Labour force profile of the civilian population aged 15 years or over by sex, 30 June |
| **Statistical concepts** | |
| **Table 2A.47** | General Government Final Consumption Expenditure, by jurisdiction (2013‑14 dollars) |
| **Table 2A.48** | General Government Final Consumption Expenditure, Chain price Index (GGFCE) |
| **Table 2A.49** | Age standardisation of data using the direct method |
| **Table 2A.50** | Age standardisation of data using the indirect method |

## 2.8 References

ABS (Australian Bureau of Statistics) 2011, *Census Dictionary*, Cat. no. 2901.0, Canberra.

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—— 2015, Age‑standardised rate, METeOR, meteor.aihw.gov.au/ content/ index.phtml/  
itemId/327276 (accessed 25 September 2015).

SCRGSP (Steering Committee for the Review of Government Service Provision) 2014, *Report on Government Services 2014,* Productivity Commission, Canberra.

1. The ABS *Census Dictionary* (ABS 2011) defines a family as two or more persons, one of whom is aged 15 years or over, who are related by blood, marriage (registered or de facto), adoption, step or fostering; and who are usually resident in the same household. The basis of a family is formed by identifying the presence of a couple relationship, lone parent-child relationship or other blood relationship. Some households contain more than one family. [↑](#footnote-ref-1)
2. The ABS *Census Dictionary* (ABS 2011) defines a dwelling as structure which is intended to have people live in it, and which is habitable on Census Night. Some examples of dwellings are houses, motels, flats, caravans, prisons, tents, humpies and houseboats. Private dwellings are enumerated using household forms, which obtain family and relationship data as well as information on the dwelling itself, such as rent or mortgage payments and ownership. [↑](#footnote-ref-2)
3. See page 2.27 in the 2015 Report for the background on choice of year for the standard population and timeline for revision. [↑](#footnote-ref-3)