A Statistical appendix

CONTENTS

Attachment tables

Attachment tables are identified in references throughout this appendix by an 'AA' suffix (for example, table AA.3). A full list of attachment tables is provided at the end of this appendix, and the attachment tables are available from the Review website at www.pc.gov.au/gsp.

A.1 Introduction

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

- Australia's population
- family and household
- income, education and employment
- statistical concepts used in the Report.

A.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 a significant influence on the demand for government services and the cost of delivery. This section provides a limited description of the Australian population to support the interpretation of performance data provided in the Report. More detail is provided in the Australian Bureau of Statistics (ABS) quarterly publication Australian Social Trends (ABS 2010b and previous issues).

In this appendix 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 Census of Population and Housing (ABS 2007) and others from the Australian Demographic Statistics (ABS 2010a).

Most of the service areas covered by the Report use estimated resident population (ERP) data from tables AA.1 and AA.2 for descriptive information (such as expenditure per person in the population) and performance indicators (such as participation rates for vocational education and training [VET]).

Population size and trends

More than three quarters of Australia's 21.9 million people lived in the eastern mainland states as at 30 June 2009, with NSW, Victoria and Queensland accounting for 32.5 per cent, 24.8 per cent and 20.1 per cent, respectively, of the nation's population. Western Australia and SA accounted for a further 10.2 per cent and 7.4 per cent, respectively, of the population, while Tasmania, the ACT and the NT accounted for the remaining 2.3 per cent, 1.6 per cent and 1.0 per cent, respectively (table AA.1).

Nationally, the average annual growth rate of the population between 2005 and 2009 was approximately 1.9 per cent. The growth across jurisdictions ranged from 2.7 per cent in WA to 0.9 per cent in Tasmania (table AA.2, 31 December estimates).

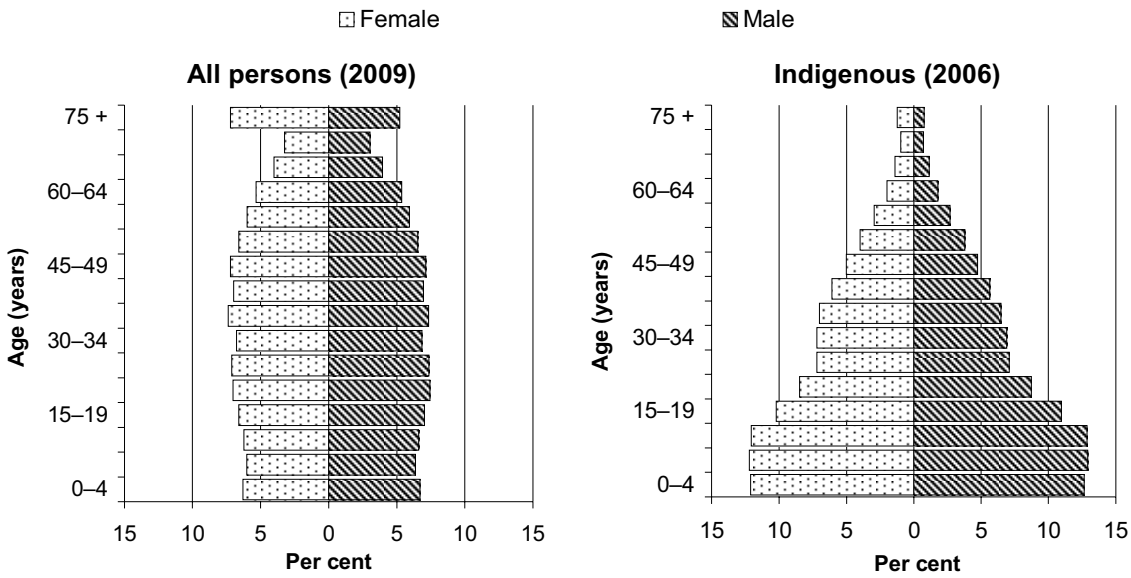
Population, by age and sex

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 Indigenous Australians is markedly different (figure A.1). At

30 June 2009, 9.4 per cent of Australia's population was aged 70 years or over, in contrast to 1.8 per cent of Australia's Indigenous population, as at 30 June 2006 (tables AA.1 and AA.7). Across jurisdictions, the proportion of all people aged 70 years or over ranged from 11.2 per cent in SA to 2.9 per cent in the NT (table AA.1).

Half of the population at June 2009 was female (50.2 per cent). This distribution was similar across all jurisdictions except the NT, which had a slightly lower representation of women in its population (48.1 per cent) (table AA.1). The proportion of women in the population varies noticeably by age. Nationally, approximately 56.1 per cent of people aged 70 years or over were female, compared with 48.7 per cent of people aged 14 years or less (table AA.1).

Figure A.1 **Population distribution, Australia, by age and sex, 30 June[a, b]**



a Includes other territories. **b** Experimental estimates at 30 June 2006 are preliminary rebased estimates and are based on the *2006 Census of Population and Housing*.

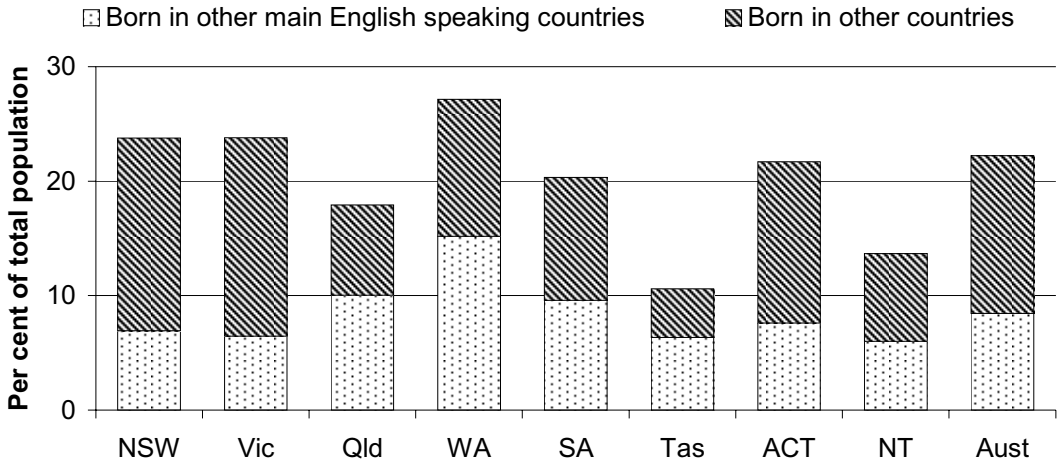
Source: ABS (2009) *Population by Age and Sex, Australian States and Territories, June 2009,* Cat. no. 3201.0; ABS (2007) *Australian Demographic Statistics, March 2007,* Cat. no. 3101.0; tables AA.1 and AA.7.

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

22.2 per cent of the population in August 2006 (8.4 per cent from the main English speaking countries and 13.8 per cent from other countries). Across jurisdictions, the proportion of people born outside Australia ranged from 27.1 per cent in WA to 10.6 per cent in Tasmania. The proportion from countries other than the main English speaking countries ranged from 17.3 per cent in Victoria to 4.2 per cent in Tasmania (figure A.2).

Figure A.2 **People born outside Australia, by country of birth, 2006[a, b]**



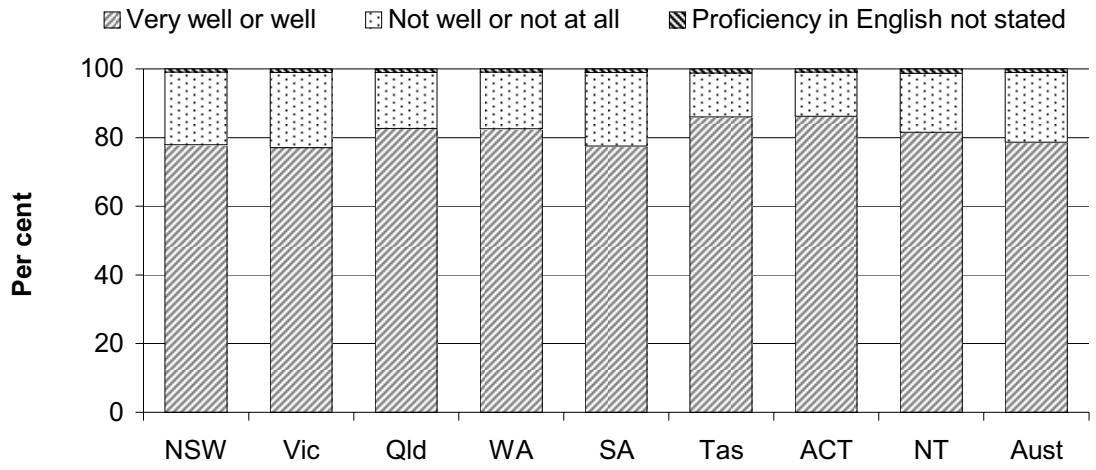
a 'Australia' includes other territories. **b** The ABS defines the other main English speaking countries as Canada, Ireland, New Zealand, South Africa, the United States of America and the United Kingdom.

Source: ABS (unpublished) *2006 Census of Population and Housing,* Cat. no. 2068.0; table AA.4.

Of the population born outside Australia, in August 2006, 89.0 per cent spoke only English, or spoke another language as well as speaking English very well or well. Figure A.3 shows proficiency in English of people born overseas who speak a language other than English at home. Of those people born overseas who spoke another language, 78.6 per cent also spoke English very well or well. The proportion of people born overseas who spoke another language and who did not speak English well or at all, ranged from 21.9 per cent in Victoria to 12.8 per cent in Tasmania (table AA.3).

The proportion of all people born overseas who did not speak English well or at all was 10.0 per cent nationally, and ranged from 12.9 per cent in Victoria to 3.1 per cent in Tasmania (table AA.3).

Figure A.3 **People born overseas who spoke a language other than English at home, by proficiency in English, 2006[a]**



[a] Excludes people who did not state their country of birth.

Source: ABS (2007) *2006 Census of Population and Housing*, Cat. no. 2068.0; table AA.3.

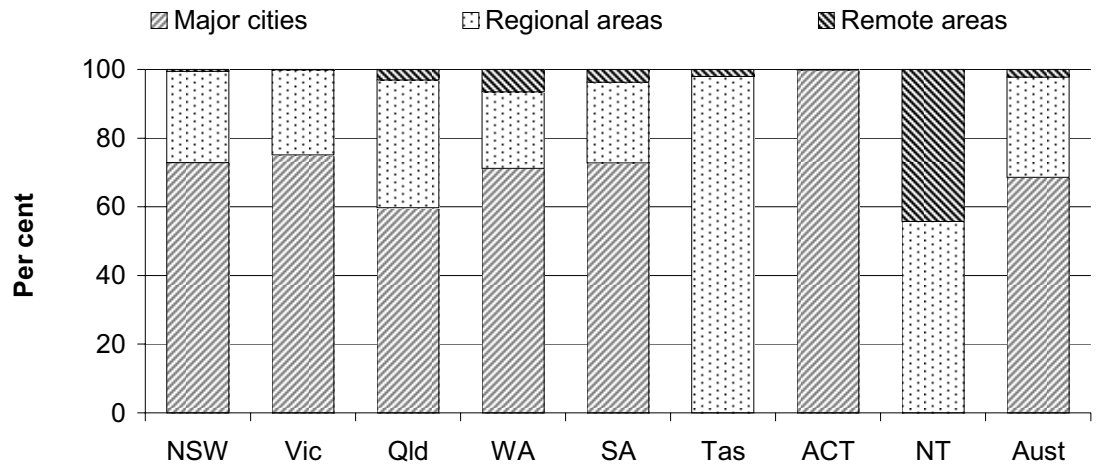
Approximately 15.8 per cent of Australians spoke a language other than English at home in August 2006. Across jurisdictions, this proportion ranged from 23.2 per cent in the NT to 3.5 per cent in Tasmania (table AA.5). Apart from English, the most common languages spoken were Chinese languages, Italian, Greek and Arabic.

In the NT, 15.1 per cent of people spoke an Australian Indigenous language (65.3 per cent of the total people in the NT who spoke a language other than English in their homes) (table AA.5).

Population, by geographic location

The Australian population is highly urbanised, with 68.6 per cent of the population located in major cities as at 30 June 2009 (figure A.4). Across jurisdictions, this proportion ranged from 99.9 per cent in the ACT to 59.8 per cent in Queensland (table AA.6). Tasmania and the NT, by definition, have no major cities. In Tasmania, 97.9 per cent of the population lived in regional areas. Australia-wide, 2.3 per cent of people lived in remote areas. The NT was markedly above this average, with 44.3 per cent of people living in remote areas.

Figure A.4 **Population, by remoteness area, June 2009[a, b]**



a Preliminary ERP data based on the *Australian Standard Geographical Classification 2006*. **b** 'Australia' includes other territories.

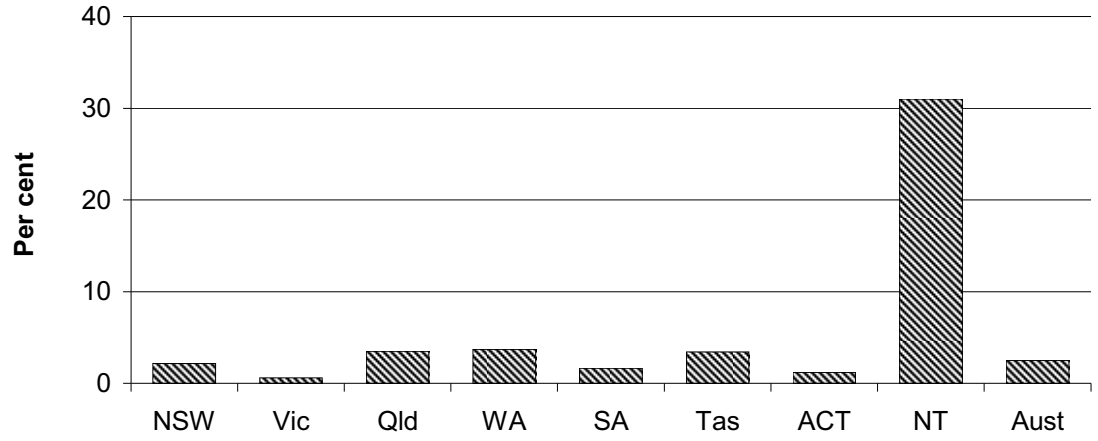
Source: ABS (2010) *Regional Population Growth, Australia, 2008-09*, Cat. no. 3218.0; table AA.6.

Indigenous population profile

There were an estimated 517 174 Indigenous people (259 693 female and 257 481 male) in Australia at 30 June 2006, accounting for approximately 2.5 per cent of the total population (tables AA.2 and AA.7). The proportion of people who are Indigenous was significantly higher in the NT (31.6 per cent) than in any other jurisdiction. Across the other jurisdictions, the proportion ranged from 3.8 per cent in WA to 0.6 per cent in Victoria (figure A.5). Nationally, the Indigenous population is projected to grow to 615 309 people in 2014 (table AA.8).

The majority of Indigenous people (81.8 per cent) at August 2006 spoke only English at home, while a further 9.0 per cent spoke an Indigenous language and also spoke English very well or well. However, 2.2 per cent did not speak English well or at all (up to 12.2 per cent in the NT). Nationally, 5.2 per cent of Indigenous people did not state whether they spoke a language other than English at home (table AA.9).

Figure A.5 **Indigenous people as a proportion of the population, 30 June 2006**[a, b, c]



[a] 'Australia' includes other territories. [b] Experimental estimates of the Australian Indigenous population at 30 June 2006 are preliminary rebased estimates and are based on the *2006 Census of Population and Housing*. [c] Historical rates in table AA.2 may differ from those in reports prior to 2010, as historical data have been revised using final rebased ERP data following the *2006 Census of Population and Housing* (for 30 June 2006).

Source: ABS (2010) *Australian Demographic Statistics, December Quarter 2009*, Cat. no. 3101.0; ABS (2007) *Australian Demographic Statistics, March Quarter 2007*, Cat. no. 3101.0; tables AA.2 and AA.7.

A.3 Family and household

Family structure

There were 6.2 million families in Australia in 2009.[1] Across jurisdictions, the number of families ranged from 2.0 million in NSW to 59 400 in the NT. The average family size across Australia was 3.0 people. Across jurisdictions, the average family size ranged from 3.2 people in the NT to 2.9 people in SA and Tasmania. Nationally, 37.4 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 AA.10).

[1] The ABS *Census Dictionary* (ABS 2006) 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.

Lone parent families may have a greater need for government support and particular types of government services (such as child care for respite reasons). Nationally, 18.9 per cent of children aged under 15 years lived in one parent families in 2009. Lone mother families made up 17.4 per cent of families with children aged under 15 years. Lone father families made up 3.1 per cent of families with children aged under 15 years. Across jurisdictions, the proportion of children aged under 15 years living in lone parent families ranged from 25.1 per cent in the NT to 19.3 per cent in WA (table AA.11).

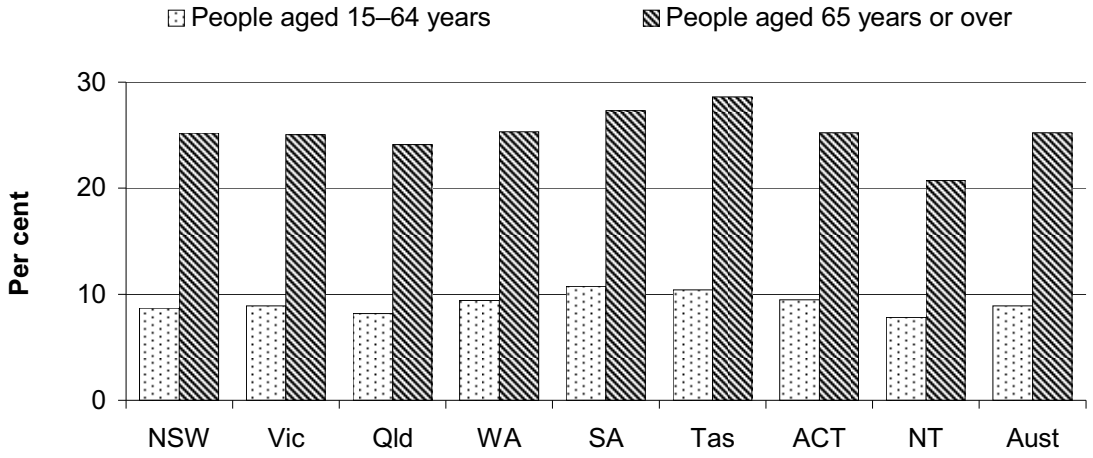
Employment status also has implications for the financial independence of families. Nationally, 12.6 per cent of children aged under 15 years, lived in families where no resident parent was employed in 2007-08 (table AA.12).

Household profile

There were 8.2 million households in Australia in 2009 (some households may contain more than one family) [table AA.14 (b)]. Almost one quarter (24.8 per cent) of these were lone person households. Across jurisdictions, the proportion of lone person households ranged from 28.2 per cent in SA to 21.5 per cent in the NT.

In June 2009, the proportion of people aged 65 years or over who lived alone (25.2 per cent) was considerably higher than that for people aged 15–64 years (8.9 per cent). Across jurisdictions, the proportion of people aged 65 years or over who lived alone ranged from 28.6 per cent in Tasmania to 20.7 per cent in the NT (figure A.6). Times series data for household structure for earlier years are available in table AA.14 (a).

Figure A.6 **Proportion of population who lived alone, by age group, June 2009**



Source: ABS (2010) *Household and Family Projections, 2006 to 2031,* Cat. no. 3236.0; table AA.14 (b).

Approximately 15.4 million people in families lived in private dwellings in August 2006 (table AA.13).[2] Home ownership can reflect on a family's wealth and savings, and is often positively related to employment and income.

Nationally, the majority of occupied private dwellings (68.1 per cent, or 4.9 million dwellings) in August 2006 were owned or were being purchased. Home ownership was highest in Victoria (71.6 per cent) and lowest in the NT (47.6 per cent). Australians rented 2.0 million dwellings, or 28.1 per cent of dwellings (of these, 50.9 per cent were from real estate agents and 15.1 per cent from State or Territory housing authorities) (table AA.15). Across jurisdictions, the proportion of dwellings that were rented was highest in the NT (47.8 per cent) and lowest in Victoria (24.6 per cent) (figure A.7).

[2] The ABS *Census Dictionary* (ABS 2006) defines an occupied private dwelling as a private dwelling occupied by one or more people. A private dwelling is normally a house, flat, or even a room. It can also be a caravan, houseboat, tent or a house attached to an office, or rooms above a shop.

Figure A.7 **Occupied private dwellings, by tenure type, 2006**[a, b, c]

[a] 'Australia' includes other territories. [b] 'Owned or being purchased' includes dwellings being purchased under a rent/buy scheme. [c] 'Other tenure type' includes dwellings being occupied under a life tenure scheme.

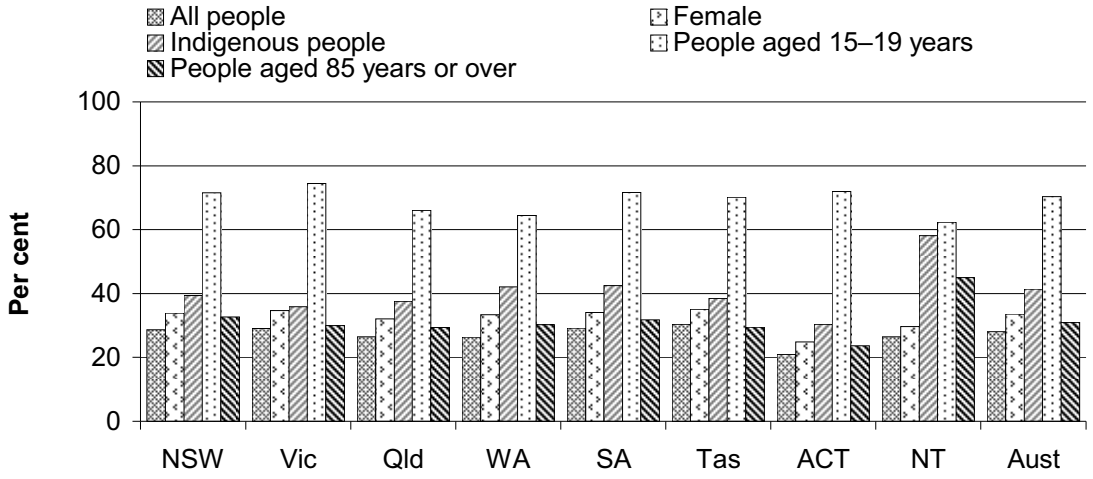
Source: ABS (2007) *2006 Census of Population and Housing*, Cat. no. 2068.0; table AA.15.

A.4 Income, education and employment

Income

Nationally, 28.0 per cent of people aged 15 years or over in August 2006 had a relatively low weekly individual income of $249 or less (table AA.16). The proportion was considerably higher for younger people (70.3 per cent for people aged 15–19 years), Indigenous people (41.4 per cent) and females (33.5 per cent) but similar for older people (30.9 per cent for people aged 85 years or over) (figure A.8).

Figure A.8 **Weekly individual income of $249 or less, by sex, Indigenous status and age, 2006[a]**



a 'Australia' includes other territories.

Source: ABS (2007 and unpublished) *2006 Census of Population and Housing*, Cat. no. 2068.0; tables AA.16–AA.18.

Nationally, 17.3 per cent of the total population was receiving income support in 2009. The age pension was received by 9.6 per cent of the population, while 3.4 per cent received a disability support pension and 1.6 per cent received a single parent payment. A further 2.7 per cent of the population received some form of labour market allowance in 2009 (figure A.9).

Figure A.9 **Proportion of total population on income support, June 2009[a, b]**

[a] Data for 'Australia' include recipients living overseas and recipients whose residential location was not known. [b] Data include recipients of Newstart Allowance (excluding Community Development Employment Projects participants and those who did not receive a payment) and recipients of Youth Allowance for jobseekers.

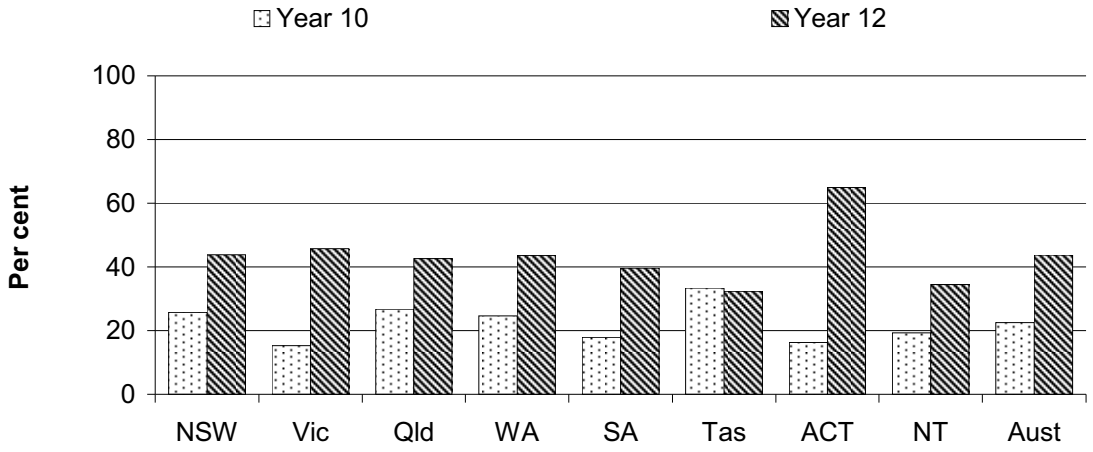
Source: ABS (2010) *Australian Social Trends, September 2010*, Cat. no. 4102.0; table AA.19.

The proportion of the population receiving the age pension in 2009 ranged from 11.7 per cent in Tasmania to 3.1 per cent in the NT; the proportion receiving a disability support pension ranged from 5.2 per cent in Tasmania to 2.1 per cent in the ACT; and the proportion receiving a single parent payment ranged from 2.0 per cent in Tasmania to 0.9 per cent in the ACT. The proportion receiving a labour market allowance in 2009 ranged from 4.6 per cent in the NT to 1.4 per cent in the ACT.

Educational attainment

Employment outcomes and income are closely linked to the education and skill levels of individuals. At August 2006, 43.7 per cent of people aged 15 years and over (approximately 6.7 million people) had completed year 12. A further 22.6 per cent (3.4 million people) had a highest level of schooling of year 10. Across jurisdictions, the proportion of people aged 15 years and over who had completed year 12 schooling ranged from 64.9 per cent in the ACT to 32.4 per cent in Tasmania (figure A.10).

Figure A.10 **Proportion of people aged 15 years and over whose highest level of schooling was year 10 and year 12, 2006[a]**

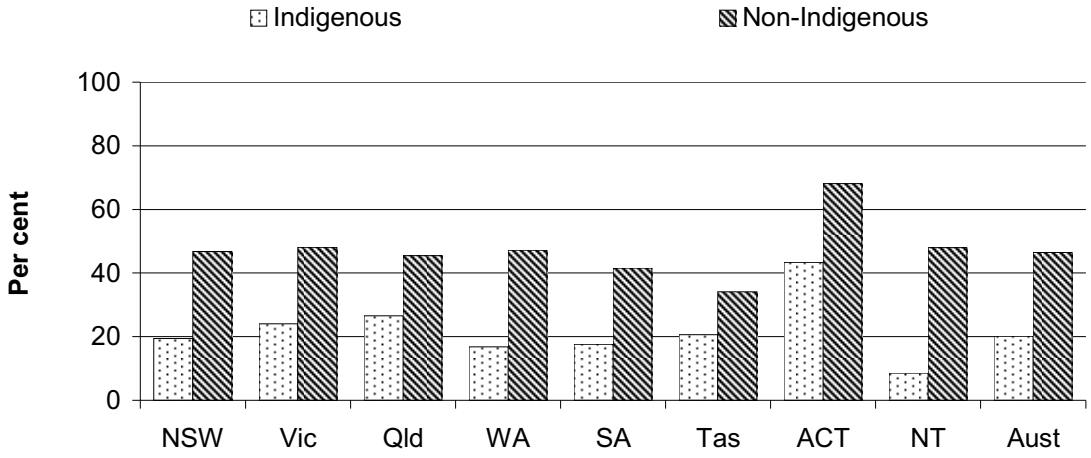


a 'Australia' includes other territories.

Source: ABS (unpublished) *2006 Census of Population and Housing*, Cat. no. 2068.0; table AA.20.

At August 2006, a much higher proportion of non-Indigenous people (46.5 per cent) aged 15 years or over had completed year 12 as their highest year of school (this is the highest level of primary or secondary school a person has completed) than Indigenous people (20.1 per cent). Across jurisdictions, the proportions of Indigenous people aged 15 years or over who had completed year 12 schooling ranged from 43.4 per cent in the ACT to 8.6 per cent in the NT. The proportion of non-Indigenous people who had completed year 12 schooling was highest in the ACT (68.1 per cent) and lowest in Tasmania (34.1 per cent) (figure A.11).

Figure A.11 **Proportion of people aged 15 years and over who have completed year 12, by Indigenous status, 2006**[a, b, c]



[a] 'Australia' includes other territories. [b] Includes people who did not state their highest year of school completed. [c] Includes 'Aboriginal', 'Torres Strait Islander' and 'both Aboriginal and Torres Strait Islander'.

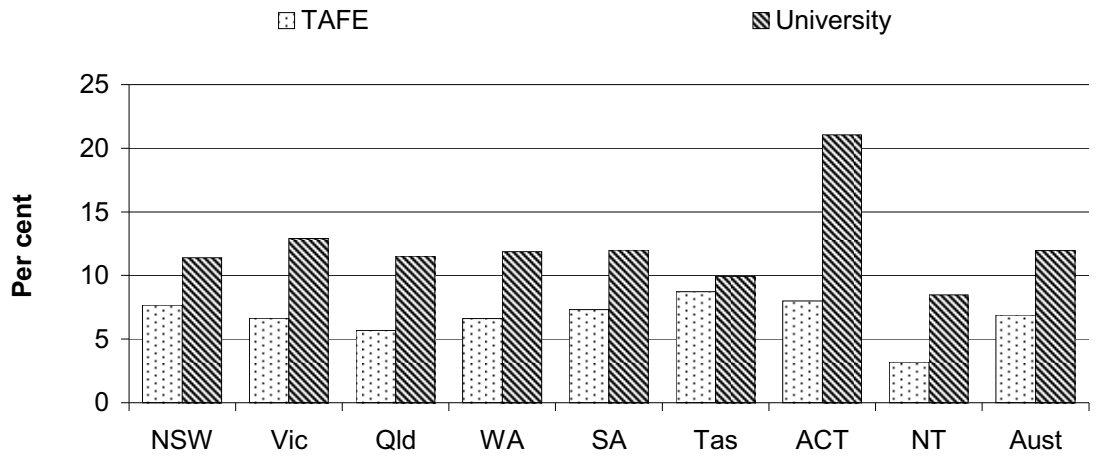
Source: ABS (unpublished) *2006 Census of Population and Housing*, Cat. no. 2068.0; table AA.20.

Tertiary education in Australia is principally provided by universities and technical and further education (TAFE) institutes. Nationally, 18.9 per cent of those attending an educational institution[3] were attending university or TAFE in August 2006 (12.0 per cent at university and 6.9 per cent at TAFE). Across jurisdictions, the proportion of students attending TAFE ranged from 8.7 per cent in Tasmania to 3.2 per cent in the NT; the proportion attending university ranged from 21.1 per cent in the ACT to 8.5 per cent in the NT (figure A.12).

In August 2006, the proportion of Indigenous tertiary students who were attending TAFE was highest in Tasmania (9.5 per cent) and lowest in the NT (2.0 per cent). The proportion of non-Indigenous students attending university (14.4 per cent) was considerably higher than the proportion of Indigenous students (3.7 per cent). Across jurisdictions, the proportion of non-Indigenous students attending university ranged from 24.0 per cent in the ACT to 11.7 per cent in Tasmania. For Indigenous students the proportion ranged from 10.0 per cent in the ACT to 2.2 per cent in the NT (figure A.13).

[3] Educational institutions include pre-school, infants/primary school, secondary school, tertiary institutions and other educational institutions.

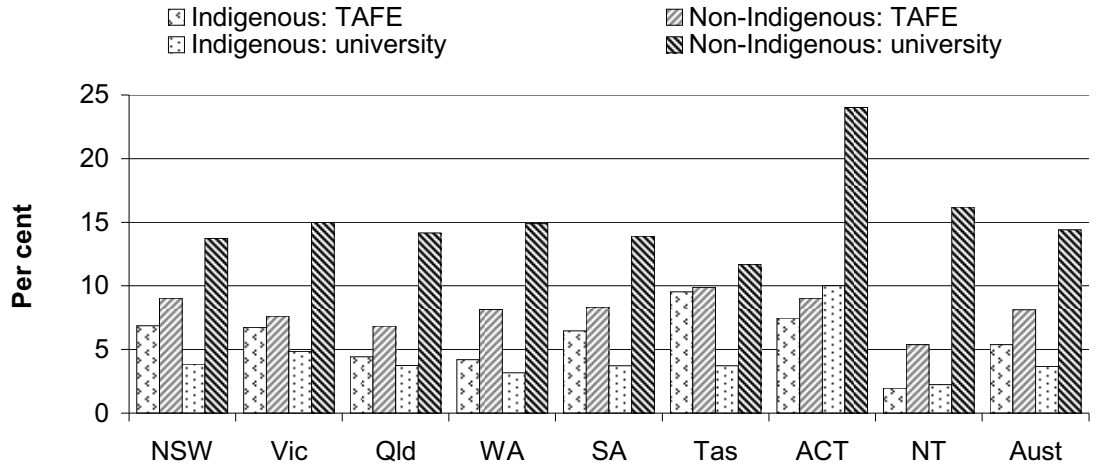
Figure A.12 **Proportion of students attending tertiary education institutions, 2006[a, b]**



a 'Australia' includes other territories. **b** Includes 'technical and further educational institution (including TAFE colleges)'.

Source: ABS (2007) *2006 Census of Population and Housing*, Cat. no. 2068.0; table AA.21.

Figure A.13 **Proportion of students attending tertiary education institutions, by Indigenous status, 2006[a, b]**



a 'Australia' includes other territories. **b** Includes 'technical and further educational institution (including TAFE colleges)'.

Source: ABS (2007) *2006 Census of Population and Housing*, Cat. no. 2068.0; table AA.21.

Employment and workforce participation

There were 11.7 million people aged 15 years or over in the labour force in Australia in June 2010. Of these, 95.0 per cent were employed, therefore 5.0 per cent of the participating labour force were unemployed, at June 2010. The majority of employed people (69.6 per cent) were in full time employment. Of the 588 500 people looking for work, 72.4 per cent were seeking full time work and 27.6 per cent were seeking part time work (table AA.22).

Across jurisdictions, the proportion of employed people in full time employment in June 2010 ranged from 80.3 per cent in the NT to 63.7 per cent in Tasmania. The unemployment rate ranged from 6.0 per cent in Tasmania to 2.9 per cent in the NT. The proportion of unemployed people looking for full time work ranged from 75.0 per cent in the NT to 59.1 per cent in the ACT (tables AA.22 and AA.24).

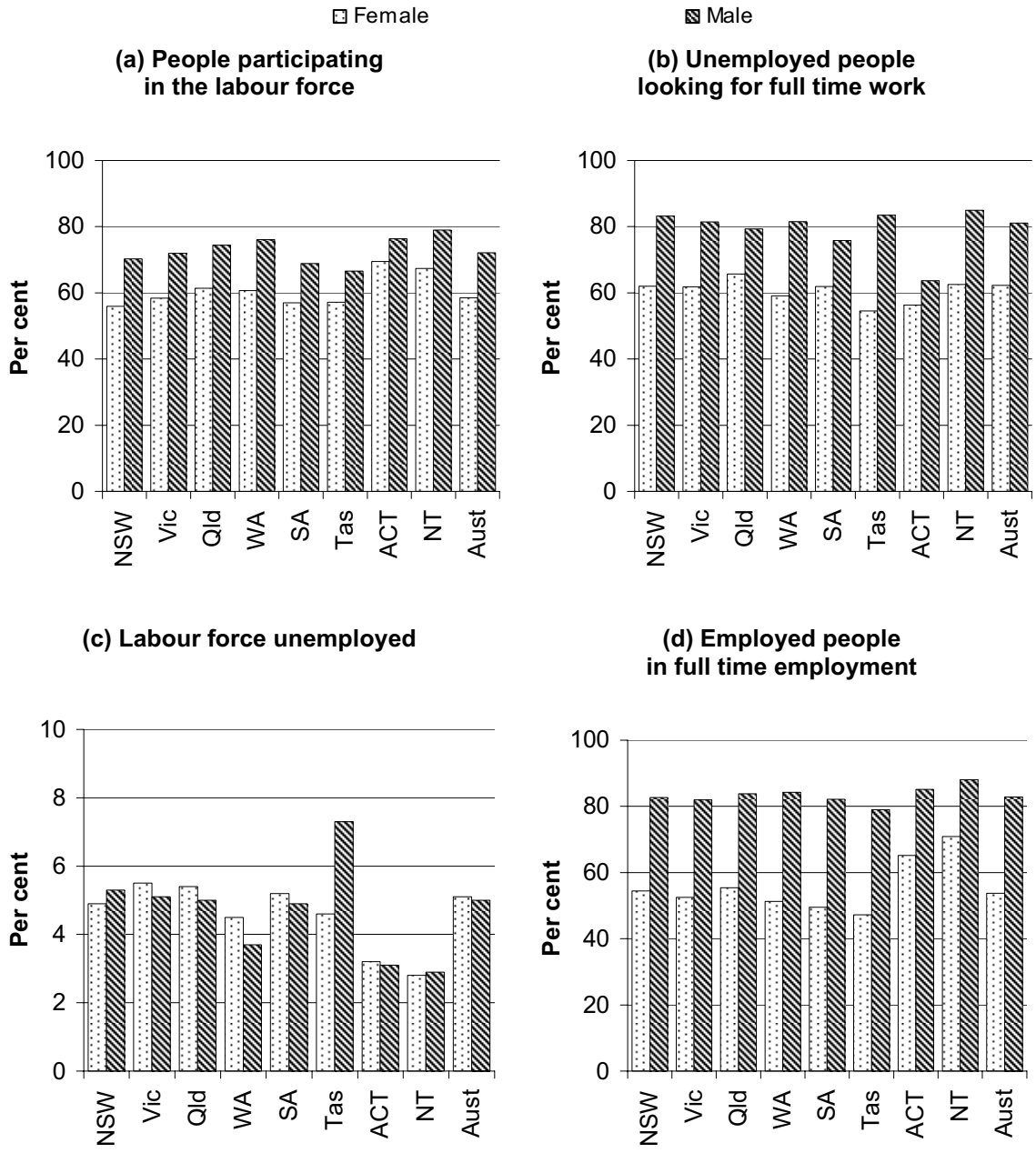
The unemployment rate needs to be interpreted within the context of labour force participation rates, which were higher for males than for females in all jurisdictions (figure A.14a). In all jurisdictions, fewer unemployed females were looking for full time work than males (62.3 per cent and 81.1 per cent respectively) (figure A.14b).

The unemployment rate for females was higher than that for males in all jurisdictions except for NSW, Tasmania and the NT (figure A.14c). A greater proportion of employed males than of employed females had full time employment in all jurisdictions. The difference between male and female full time employment ranged from 32.9 percentage points in WA to 17.1 percentage points in the NT (figure A.14d).

General economic indicators

Gross Domestic Product (GDP) is the total net market value of goods and services produced in Australia within a given period. Australia's GDP is the total of all State and Territory Gross State Product (GSP). Gross State Product is the same as GDP, except that it relates to production in a State or Territory. In 2008-09, the GSP for NSW accounted for 32.1 per cent of national gross product, compared with 1.4 per cent for the NT. Growth from the previous year's GSP (in 2008-09 dollars) was highest for WA (4.2 per cent) and lowest for SA (-2.1 per cent). Across Australia, the GSP per person was $57 903 in 2008-09 (table AA.25).

Figure A.14 **Labour force outcomes for people aged 15 years or over, by sex, June 2010**



Source: ABS (2010) *Labour Force, Australia, Detailed – Electronic Delivery, June 2010*, Cat. no. 6291.0.55.001; tables AA.22–AA.24.

A.5 Statistical concepts used in the Report

Reliability of estimates

Data for some outcome and quality 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, 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 2008a, 2008b).

Standard error

The SE measures the sampling error of an estimate (box A.1). (There can also be non-sampling error, or systematic biases, in the data.) There are several types of SE. A commonly used type of SE in this Report is the SE of the mean (average). Sampling error results from using a sample of the population to derive an estimate of the whole population mean — the SE measures how much the estimated mean value might differ from the true population mean value.

Box A.1 **Technical concepts and formulas — 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):

$$SE_{\bar{x}} = \frac{s}{\sqrt{n}} \qquad \text{(equation A.1)}$$

Where:

$SE_{\bar{x}}$ is the SE of the sample estimate of a population mean

s is the sample's standard deviation (the sample based estimate of the standard deviation of the population)

n 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.

Relative standard error

The RSE is used to indicate the reliability of an estimate (box A.2). 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.

The RSE is useful for comparing the size of the SE across different sample estimates. As with the SE, the higher the RSE, the less confidence there is that the estimate from the sample is close to the true value of the population mean.

Box A.2 Technical concepts and formulas — reliability of estimates

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:

$$\mathrm{RSE}(x) = \frac{\mathrm{SE}(x)}{x} \qquad \text{(equation A.2)}$$

Where:

x is the estimate
SE*(x)* 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:

$$\mathrm{RSE}\left(\frac{x}{\mathrm{y}}\right) = \sqrt{[\mathrm{RSE}(x)]^2 - [\mathrm{RSE}(\mathrm{y})]^2} \qquad \text{(equation A.3)}$$

Where:

x is the numerator of the estimated proportion
y is the denominator of the estimated proportion.

Confidence intervals

The formula for calculating CIs is:

$$\begin{aligned} \mathrm{LCL} &= \mathrm{x} - \mathrm{z_i SE(x)} \\ \mathrm{UCL} &= \mathrm{x} + \mathrm{z_i SE(x)} \end{aligned} \qquad \text{(equation A.4)}$$

Where:

LCL is the lower confidence limit
UCL is the upper confidence limit
x is the estimate
SE(x) is the SE of the estimate
z_i is the factor used to determine the CI (the factor varies according the level of confidence required).

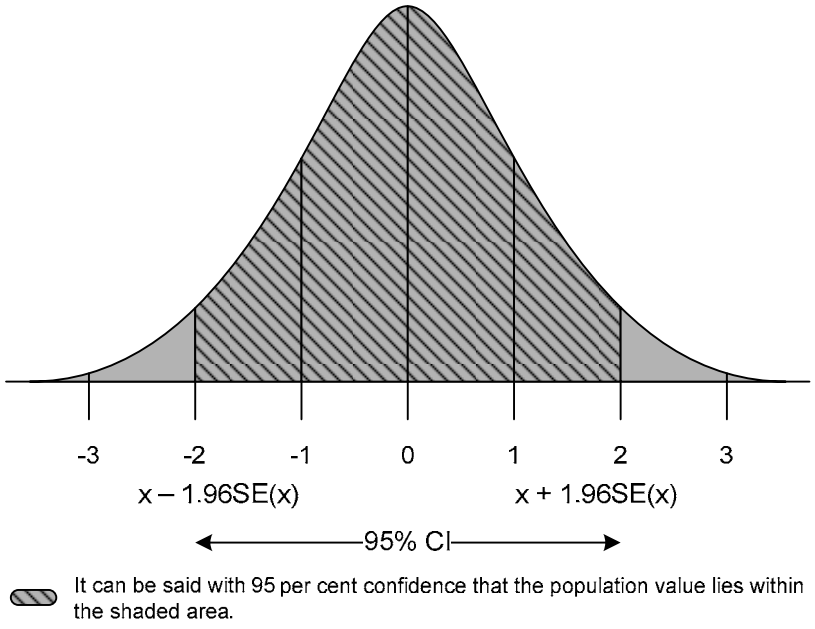
The most commonly used CIs are calculated for the 95 per cent (p = 0.05; z = 1.96) level of probability. That is, there is a 95 per cent likelihood that the true value lies within the estimate confidence interval.

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.

Confidence intervals

Confidence intervals are used to indicate the reliability of an estimate (ABS 2008a). 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 2008b). Increasing the desired confidence level will widen the CIs (figure A.15). 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.

Figure A.15 **Normal distribution with 95 per cent confidence intervals**



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.

Confidence intervals also test for statistical differences between sample results (box A.3). 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 (figure A.16). 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.

Box A.3 Technical concepts and formulas — statistical significance

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.

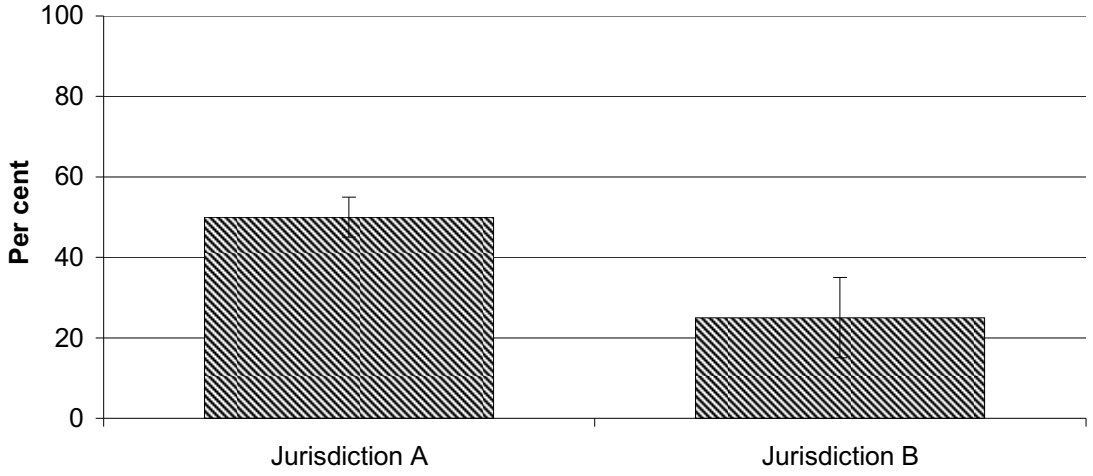
$$R_1 = \left(\frac{x_2}{y_2} - \frac{x_1}{y_1}\right) - 1.96\sqrt{\left(\mathrm{RSE}\left(\frac{x_2}{y_2}\right) \times \left(\frac{x_2}{y_2}\right)\right)^2 + \left(\mathrm{RSE}\left(\frac{x_1}{y_1}\right) \times \left(\frac{x_1}{y_1}\right)\right)^2} \quad \text{(equation A.5)}$$

and

$$R_2 = \left(\frac{x_2}{y_2} - \frac{x_1}{y_1}\right) + 1.96\sqrt{\left(\mathrm{RSE}\left(\frac{x_2}{y_2}\right) \times \left(\frac{x_2}{y_2}\right)\right)^2 + \left(\mathrm{RSE}\left(\frac{x_1}{y_1}\right) \times \left(\frac{x_1}{y_1}\right)\right)^2} \quad \text{(equation A.6)}$$

If none of the values in this range is zero, then the difference between the two estimated proportions is statistically significant.

Figure A.16 **Using confidence intervals to test for statistical significance**



Confidence intervals do not overlap so the difference is statistically significant.

Population measures

Measures expressed per person (that is, as a proportion of the population) are often presented in this Report. This is to make it easier to compare relative numbers, essentially standardised by size of population, as distinct from absolute numbers.

This Report typically includes annual data. Population data are available quarterly. As the population changes over time, an issue arises as to which population figure to use — the population at the start of the period, at the end of the period, or some average level.

This Report uses mid point population data — using the mid point (second quarter) population level as a proxy for the average population level. The current estimates at mid point are available in time for this Report.

Three other options were considered but not preferred.

1. *Average population data.* The most statistically robust approach would be to use the average population level across the four quarters. However, while this is possible for calendar year data, current estimates for the fourth quarter of the financial year are not available in time for this Report.
2. *End point population data.* This approach would use the population level at the end of the period. However, this is not a suitable proxy for the average population level, and again, current estimates for the end point of the financial year are not available in time for this Report.

3. *Use of population projections.* This approach would use population projections (as distinct from estimates) for the fourth quarter population level. Population projections are less accurate than estimates.

Growth rates

The Review uses growth rates to facilitate meaningful comparisons of data movements over time (box A.4). Two growth rates methods are generally used:

1. *Average annual growth rate* (AAGR). The 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. This method is also called a compound annual growth rate, as it allows for the 'cumulative' effect of growth in later periods 'compounding' growth in earlier periods.
2. *Total growth rate* (TGR). The TGR is the growth rate between two periods/years. Two methods can be used to calculate TGR.

   The first and most commonly used method calculates TGR by subtracting the value in the first period from the value in the last period then dividing the result by the value in the first period. This is generally multiplied by 100 to express the growth rate as a percentage (equation A.8).

   The second method uses a composite of the growth rates between each of the sub-periods within the overall period of analysis. For example, for the period 2006-07 to 2009-10, a composite of the growth rates between 2006-07 to 2007-08, 2007-08 to 2008-09 and 2008-09 to 2009-10 would be used. Box A.4 includes an example of how sub-period growth rates can be used to derive the TGR.

Box A.4 **Technical concepts and formulas — growth rates**

Growth rate formulas

Average annual growth rate

The formula for calculating a compound annual growth rate (AAGR) is:

$$AAGR(t_0, t_n) = \left[\left(\frac{P_{(t_n)}}{P_{(t_0)}} \right)^{\left(\frac{1}{t_n - t_0} \right)} - 1 \right] \times 100 \qquad \text{(equation A.7)}$$

Where:

$P_{(t_0)}$ is the value in the initial period

$P_{(t_n)}$ is the value in the last period

$t_n - t_0$ is the number of periods.

Total growth rate

The formula for calculating the total growth rate (TGR) is:

$$TGR = \frac{P_{(t_n)} - P_{(t_0)}}{P_{(t_0)}} \times 100 \qquad \text{(equation A.8)}$$

Where:

$P_{(t_0)}$ is the value in the initial period

$P_{(t_n)}$ is the value in the last period

The formula for calculating a total growth rate (TGR) using a composite of growth rates between sub-periods within the overall period of analysis is:

$$TGR = \left(\prod_t (1 + r_t) - 1 \right) \times 100 \qquad \text{(equation A.9)}$$

That is, the TGR over the period is found by taking the product ($\prod_t$) of each $(1 + r_t)$ 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 2006-07 to 2007-08
6 per cent in 2007-08 to 2008-09
8 per cent in 2008-09 to 2009-10

then the total growth over the period 2006-07 to 2009-10 can be calculated as:

$$\begin{aligned} TGR &= \left[(1.06) \times (1.06) \times (1.08) - 1 \right] \times 100 \\ &= (1.213488 - 1) \times 100 \\ &= 21.3 \text{ per cent.} \end{aligned}$$

Gross domestic product deflators

The GDP deflator is used to convert raw financial data into constant (real) dollars (box A.5). 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 GDP Implicit Price Deflator (IPD). The exceptions include some health chapters and the chapter on VET, 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 GDP deflators.

The Review re-references the period where the GDP IPD (published by the ABS) is at 100, as this Report requires a current year deflator (2009-10 = 100). The ABS publishes the GDP IPD to the third most current year only (for example, if the current year is 2009-10, the available deflator is 2007-08 = 100). Table A.1 shows how the GDP deflator is re-based.

Table A.1 **Re-basing the GDP deflator**

Financial year	*ABS index value (2007-08 = 100)*[a]	*Calculation*	*Re-based GDP deflator (2009-10=100)*
2005-06	91.2	91.2/106.3*100	85.8
2006-07	95.8	95.8/106.3*100	90.1
2007-08	100.0	100.0/106.3*100	94.1
2008-09	104.9	104.9/106.3*100	98.7
2009-10	106.3	106.3/106.3*100	100.0

[a] Index values from ABS (2010), *Australian National Accounts: National Income, Expenditure and Product, June 2010*, Cat. no. 5206.0, table 32, Expenditure on Gross Domestic Product (GDP), Chain volume measures and Current prices, Annual (Series ID. A2304682C).

Source: ABS (2010) *Australian National Accounts: National Income, Expenditure and Product*, *June 2010*, Cat. no. 5206.0; table AA.26.

Table AA.26 in the attachment contains GDP deflators for 2000-01 to 2009-10. Five GDP deflator series are published, from 2005-06 = 100 through to the latest year, where 2009-10 = 100.

Step 2. Transforming nominal dollars into constant dollars.

Nominal dollars are transformed into constant (or real) dollars by dividing the nominal dollars with the GDP 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 2008-09 then the data are deflated using the deflator series for

2008-09 = 100. If the most current year is 2009-10 then the data are deflated using the deflator series for 2009-10 = 100. Table A.2 shows how the GDP deflator for 2009-10 = 100 is applied.

Table A.2 **Applying the GDP IDP to derive constant (real) dollars**

Financial year	*Nominal data*	*GDP deflator (2009-10 = 100)*	*Calculation*	*Real data*
2005-06	6 200	85.8	(6 200/85.8)*100	7 226
2006-07	6 300	90.1	(6 300/90.1)*100	6 992
2007-08	6 350	94.1	(6 350/94.1)*100	6 748
2008-09	6 485	98.7	(6 485/98.7)*100	6 570
2009-10	7 020	100.0	(7 020/100.0)*100	7 020

Box A.5 Technical concepts and formulas — GDP deflator formulas

Gross Domestic Product deflator re-base

The general formula used to re-base GDP deflators is:

$$N_t = 100 \times \frac{O_t}{B} \qquad \text{(equation A.10)}$$

Where:

N_t is the new index based in year *t*

O_t is the current index for year *t*

B is the current index for the year that will be the new base.

GDP deflator application

The general formula for applying the deflator to convert nominal dollars to real dollars is:

$$R_t = \frac{D_t}{N_t} \times 100 \qquad \text{(equation A.11)}$$

Where:

R_t is real dollars in year *t*

D_t is nominal dollars in year *t*

N_t is the new index based in year *t.*

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 Indigenous 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, Indigenous and non-Indigenous) against a standard population (box A.6). The standard population generally used is the final 30 June estimated Australian resident total population for the most recent year ending in '1' (for example, 1991 and 2001) (AIHW 2008). 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. 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 2008).

- 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 (box A.6, equation A.12).

- 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 (box A.6, equation A.13).

Box A.6 Technical concepts and formulas — direct and indirect age standardisation

The formula for deriving the age standardised rate using the direct method is:

$$SR = \frac{\sum(r_i P_i)}{\sum P_i} \qquad \text{(equation A.12)}$$

The formula for deriving the age standardised rate using the indirect method is:

$$SR = \frac{C}{\sum(R_i p_i)} \times R \qquad \text{(equation A.13)}$$

The formula for deriving the age standardised ratio using the indirect method is:

$$SR_a = \frac{C}{\sum(R_i p_i)} \qquad \text{(equation A.14)}$$

Where:

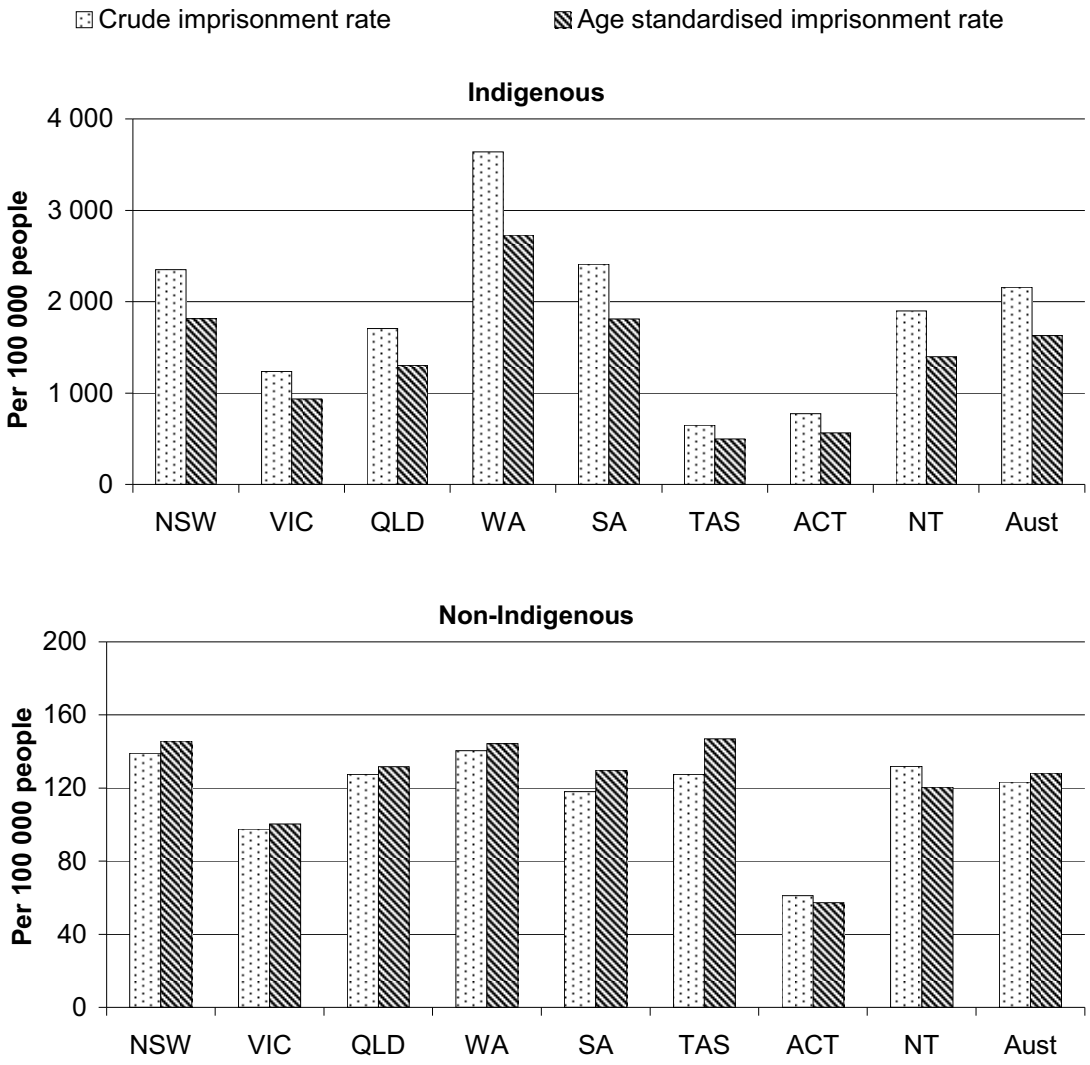
SR is the age-standardised rate for the population being studied
SR_a is the standardised ratio for the population being studied
r_i is the age-group specific rate for age group ***i*** in the population being studied
P_i is the population of age group ***i*** in the standard population
C is the observed number of events in the population being studied
$\sum(R_i p_i)$ is the expected number of events in the population being studied
R_i is the age-group specific rate for age group ***i*** in the standard population
p_i is the population for age group ***i*** in the population being studied
R is the crude rate in the standard population.

Source: AIHW (2008).

Tables AA.27 and AA.28 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 2008).

Figure A.17 compares crude imprisonment rates and imprisonment rates standardised against the age profile of the total Australian prisoner population for Indigenous and non-Indigenous people.

Figure A.17 Indigenous and non-Indigenous crude and age standardised imprisonment rates, 2007-08[a, b]



a For detailed notes relating to these figures, please see the *Report on Government Services 2009*, table 8A.4. **b** Rates are based on the indirect standardisation method, applying age-group imprisonment rates derived from Prison Census data.

Source: ABS (unpublished) *Australian Demographic Statistics, December 2007*, Cat. no. 3101.0; ABS (unpublished) *Experimental Projections Aboriginal and Torres Strait Islander Population*, Cat. no. 3231.0; ABS (unpublished) *Prisoners in Australia*, Cat. no. 4517.0; State and Territory governments (unpublished); SCRGSP (2009) *Report on Government Services 2009*, table 8A.4; table AA.28.

Calculating age standardised ratios

A variation of the *indirect method* is used to calculate age standardised ratios (box A.6). 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 Indigenous and non-Indigenous populations (table A.3). The SMR is the ratio between the observed number of deaths in the Indigenous population and the expected number of deaths that would have occurred if the Indigenous population experienced the same age-specific death rates as the non-Indigenous population. If the SMR is greater than 1.0, there were more deaths than expected; if the ratio is less than 1.0, there were fewer deaths than expected (ABS and AIHW 2008).

Table A.3 Indigenous deaths, main causes and standardised mortality ratios, 2001–2005[a, b]

	Male			*Female*		
	Number Observed	*Number Expected*	*SMR*	*Number Observed*	*Number Expected*	*SMR*
Diseases of the circulatory system	1 150	360	3.2	856	320	2.7
External causes	851	292	2.9	369	105	3.5
Neoplasms	592	406	1.5	547	351	1.6
Endocrine, nutritional and metabolic diseases	315	42	7.5	367	36	10.1
Diabetes	281	26	10.8	319	22	14.5
Diseases of the respiratory system	378	88	4.3	281	77	3.6
Diseases of the digestive system	251	43	5.8	182	36	5.1
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	169	28	6.0	85	19	4.6
Certain conditions originating in the perinatal period	126	44	2.9	82	36	2.3
Diseases of the genitourinary system	79	16	4.8	119	20	6.0
Diseases of the nervous system	122	42	2.9	69	44	1.6
Certain infectious and parasitic diseases	102	20	5.1	72	14	5.0
Mental and behavioural disorders	101	17	5.8	72	23	3.1
All causes	**4329**	**1438**	**3.0**	**3215**	**1123**	**2.9**

SMR = Standardised Mortality Ratio. [a] Data for Queensland, WA, SA and NT combined. Deaths are based on year of registration of death. Disease groupings are based on ICD-10 chapter. [b] Standardised mortality ratio is the observed Indigenous deaths divided by expected Indigenous deaths, based on the age, sex and cause-specific rates for non-Indigenous people.

Source: ABS and AIHW (2008) *Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples, 2008*, Cat. no. 4704.0.

A.6 List of attachment tables

Attachment tables are identified in references throughout this appendix by an 'AA' suffix (for example, table AA.3 is table 3). Attachment tables are provided on the Review website (www.pc.gov.au/gsp). Users without access to the website can contact the Secretariat to obtain the attachment tables (see contact details on the inside front cover of the Report).

Population

Table AA.1	Estimated resident population by age and sex, 30 June 2009
Table AA.2	Estimated resident population (ERP) by calendar and financial year
Table AA.3	Proficiency in spoken English of people born overseas, 2006
Table AA.4	People by country of birth, 2006
Table AA.5	People by language spoken at home, 2006 ('000)
Table AA.6	Estimated resident population (ERP) by remoteness area, 30 June 2009
Table AA.7	Experimental estimated resident Australian Indigenous population, 30 June 2006
Table AA.8	Experimental projection of the Indigenous population, 2006 to 2014, (number)
Table AA.9	Language spoken at home by Indigenous people and proficiency in spoken English, by sex, 2006 (number)

Family and household

Table AA.10	Family structure, 2005–2009
Table AA.11	Family structure: lone parents, 2005–2009 (per cent)
Table AA.12	Families and work (per cent)
Table AA.13	Families and people in families in occupied private dwellings by Indigenous status and family/household composition, 2006
Table AA.14 (a)	Household structure, 2001–2005
Table AA.14 (b)	Household structure, 2006–2009
Table AA.15	Occupied private dwellings by tenure type and landlord type, 2006 ('000)

Income, education and employment

Table AA.16	People aged 15 years and over, by weekly individual income and sex, 2006
Table AA.17	People aged 15 years and over by weekly individual income and Indigenous status, 2006
Table AA.18	People aged 15 years and over, by weekly individual income and age, 2006
Table AA.19	Income support, June, 2005–2009
Table AA.20	Highest level of schooling completed by people aged 15 years and over (excluding people still attending secondary school), 2006 ('000)
Table AA.21	Type of educational institution attending by Indigenous status, 2006 ('000)
Table AA.22	Labour force profile of the civilian population aged 15 years or over by sex, June 2010

A.7 References

ABS (Australian Bureau of Statistics) 2006 (Reissue), *Census Dictionary*, Cat. no. 2901.0, Canberra.

—— 2007, *2006 Census of Population and Housing*, Cat. no. 2068.0, Canberra.

—— 2008a, *Confidence intervals*, www.abs.gov.au/AUSSTATS/abs@.nsf/ProductsbyReleaseDate/8BDFEF442F3901B0CA2572E500833358?OpenDocument#Confidence%20Intervals (accessed 5 January 2011).

—— 2008b, *Glossary of statistical terms*, www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/FD3022B4068E7C39CA2571FE007D69E7 (accessed 5 January 2011).

—— 2010a, *Australian Demographic Statistics December Quarter 2009*, Cat. no. 3101.0, Canberra.

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ABS and AIHW (Australian Institute of Health and Welfare) 2008, *Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples*, Cat. no. 4704.0, Canberra.

AIHW 2008, *Age-standardised rate*, METeOR, meteor.aihw.gov.au/content/index.phtml/itemId/327276 (accessed 10 September 2008).