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 themselves are available on the CD-ROM enclosed with the Report or 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) annual publication *Australian Social Trends* (ABS 2008b).

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 2006b) and others from the *Australian Demographic Statistics* (ABS 2008a).

Most of the service areas covered by the Report use population 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).

Population size and trends

More than three quarters of Australia's 21.0 million people lived in the eastern mainland states as at 30 June 2007, with NSW, Victoria and Queensland accounting for 32.8 per cent, 24.8 per cent and 19.9 per cent, respectively, of the nation's population. Western Australia and SA accounted for a further 10.0 per cent and 7.5 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 2003 and 2007 was approximately 1.4 per cent. The growth across jurisdictions ranged from 2.3 per cent in Queensland to 0.8 per cent in Tasmania (table AA.2, 31 December estimates).
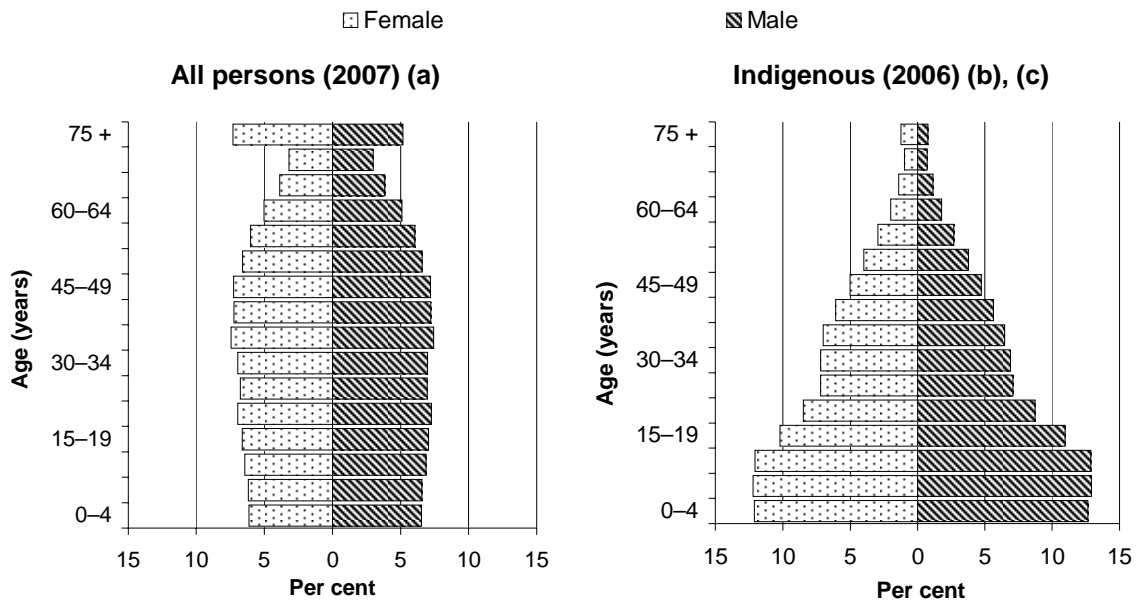
Population, by age and sex

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 2007, 9.3 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 11.1 per cent in SA to 2.7 per cent in the NT (table AA.1).

Half of the population at June 2007 was female (50.3 per cent). This distribution was similar across all jurisdictions except the NT, which had a 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 56.5 per cent of people aged 70 or over were female, compared with 48.7 per cent of people aged 14 years or younger (table AA.1).

Figure A.1   **Population distribution, Australia, by age and sex, 30 June**

a Totals may not add as a result of rounding. **b** Includes other territories. **c** Experimental estimates at 30 June 2006 are preliminary rebased estimates and are based on the *2006 Census of Population and Housing*.

Source: ABS (2008), *Population by Age and Sex, Australian States and Territories, June 2002-2007*, Cat. no. 3201.0; ABS (2007), *Australian Demographic Statistics, March Quarter 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 culture 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).[1] 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, August 2006[a, b]**
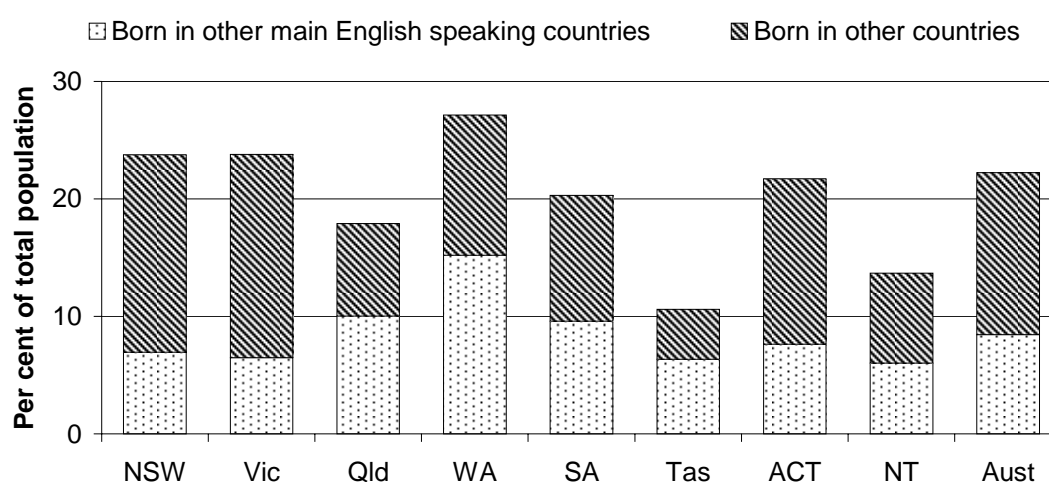
a 'Australia' includes other territories. **b** The ABS defines the other main English speaking countries as Canada, Ireland, New Zealand, South Africa, the United States of America and the United Kingdom.

Source: ABS (unpublished), derived from *2006 Census of Population and Housing*; 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 another language. 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, 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).

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[1] 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.

Figure A.3 **People born overseas who spoke another language, by proficiency in English, August 2006[a]**
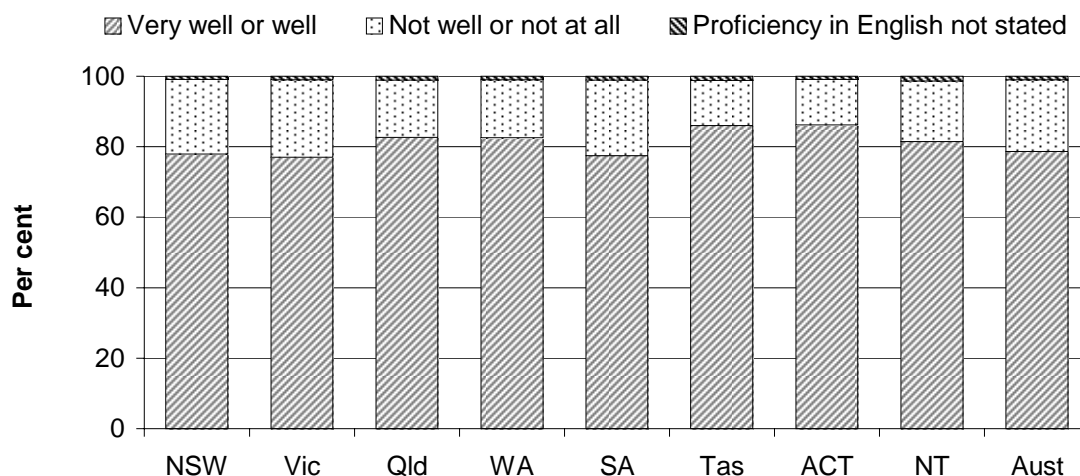
a Excludes persons who did not state their country of birth.

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). The most common languages spoken were Chinese languages, Italian, Greek and Arabic.

The most and least common languages other than English spoken in people's homes varied across jurisdictions in August 2006. The most extreme variation was in the NT, where 15.1 per cent of people spoke an Australian Indigenous language (65.3 per cent of the total persons 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 68.5 per cent of the population located in major cities as at 30 June 2007 (figure A.4). Across jurisdictions, this proportion ranged from 99.9 per cent in the ACT to 59.7 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 44.9 per cent of people living in remote areas.

Figure A.4   **Population, by remoteness area, June 2007^{a, b}**
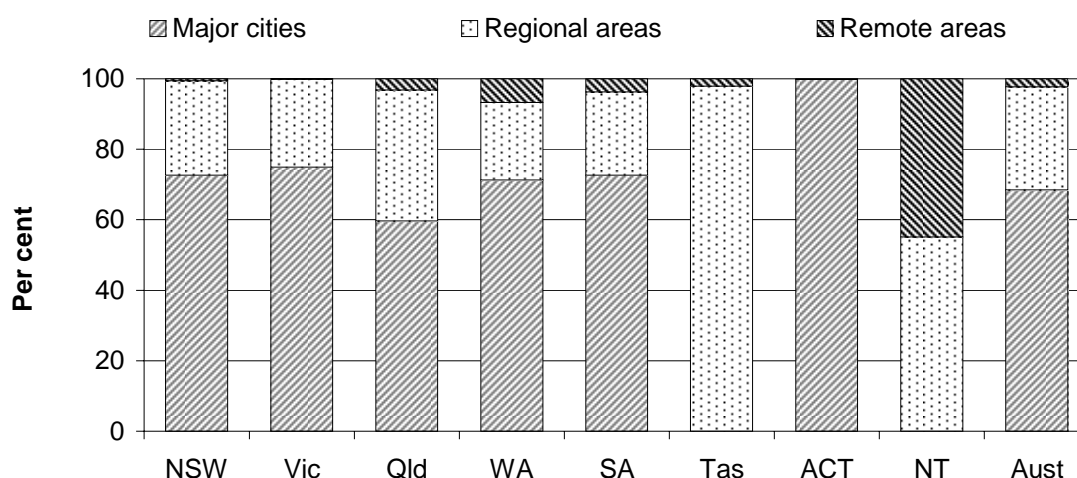
a Preliminary estimated resident population based on the *Australian Standard Geographical Classification 2006*. **b** 'Australia' includes other territories.

Source: ABS (unpublished), derived from *Regional Population Growth, Australia, 2006-07*, 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 were Indigenous was significantly higher in the NT (31.0 per cent) than in any other jurisdiction. Across the other jurisdictions, the proportion ranged from 3.7 per cent in WA to 0.6 per cent in Victoria (figure A.5). Nationally, the Indigenous population is projected to grow to 528 645 people in 2009 (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 English very well or well. However, 2.2 per cent spoke English not well or not at all (up to 12.2 per cent in the NT). Nationally, 5.2 per cent of Indigenous people did not state their language proficiency (table AA.9).

Figure A.5 **Indigenous people as a proportion of the population, 30 June**[a, b, c]
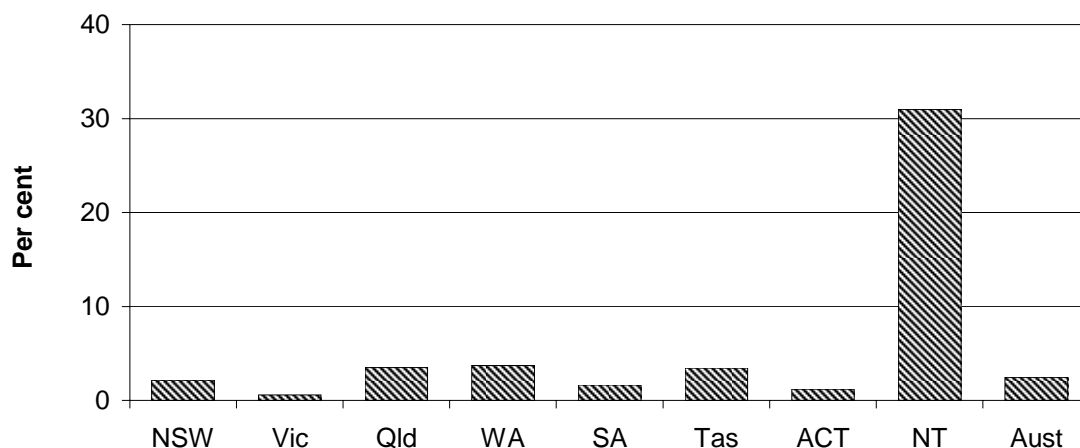
A.3 Family and household

Family structure

There were 5.8 million families in Australia in 2007.[2] Across jurisdictions, the number of families ranged from 1.9 million in NSW to 41 000 in the NT. The average family size across Australia was 3.0 people. Across jurisdictions, the average family size was the same as the national average except for SA, Tasmania and the NT, where the average family size was 2.9 people. Nationally, 38.9 per cent of families had at least one child under 15 years, and 17.6 per cent of families had at least one child under 5 years (table AA.10).

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, 19.5 per cent of children aged under 15 years lived in one parent families in 2007.

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[2] The ABS *Census Dictionary* (ABS 2006a) 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 mother families made up 18.8 per cent of families with children aged under 15 years. Lone father families made up 2.9 per cent of families with children under 15 years. Across jurisdictions, the proportion of children aged under 15 years living in lone parent families ranged from 25.7 per cent in the NT to 17.0 per cent in Victoria (table AA.11).

Employment status also has implications for the financial independence of families. Nationally, 15.8 per cent of children aged under 15 years in 2005-06 lived in families where no parent was employed (table AA.12).

Household profile

There were 8.2 million households in Australia in 2007 (some households may contain more than one family) (table AA.14). Over one quarter (26.7 per cent) of these were lone person households. Across jurisdictions, the proportion of lone person households ranged from 31.1 per cent in Tasmania to 23.8 per cent in the NT.

In June 2007, the proportion of people aged 65 years or over who lived alone (25.8 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 29.1 per cent in SA to 21.9 per cent in the NT (figure A.6).

Figure A.6 **Proportion of population who lived alone, by age group, June 2007**
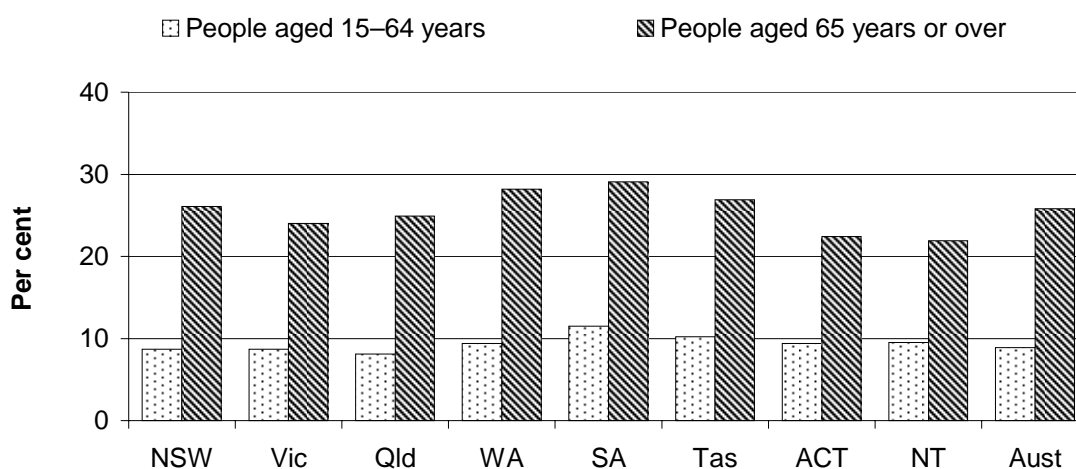

Source: ABS (2008), *Australian Social Trends 2008*, Cat. no. 4102.0; table AA.14.

Approximately 15.4 million people in families lived in private dwellings in August 2006 (table AA.13).[3] 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).

Figure A.7   **Occupied private dwellings, by tenure type, August 2006[a, b, c]**
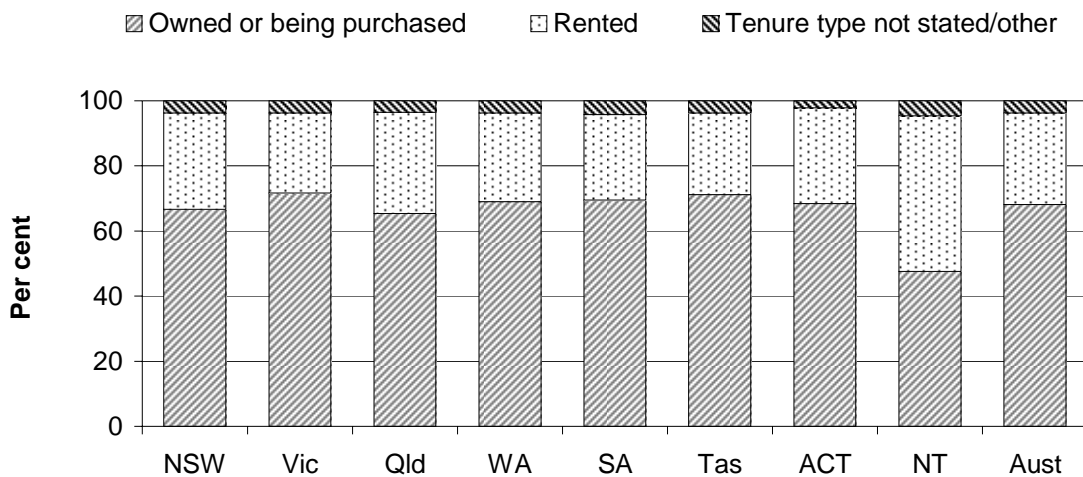
a 'Australia' includes other territories. **b** 'Owned or being purchased' includes dwellings being purchased under a rent/buy scheme. **c** 'Other tenure type' includes dwellings being occupied under a life tenure scheme.

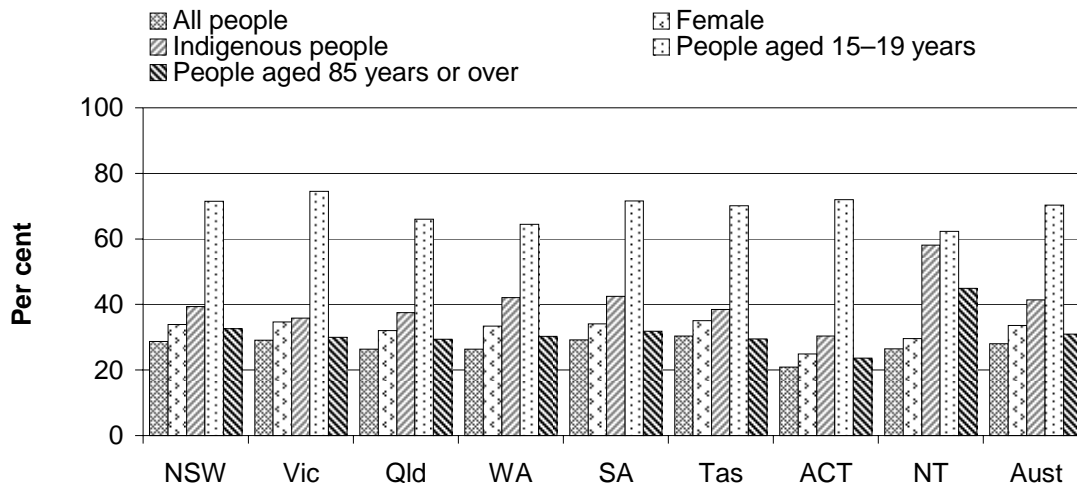*Source*: ABS (2007), *2006 Census of Population and Housing*, Cat. no. 2068.0; table AA.15.

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[3] The ABS *Census Dictionary* (ABS 2006a) 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.

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), 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, August 2006[a]**

a 'Australia' includes other territories.

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

Nationally, 16.9 per cent of the total population was receiving income support in 2007. The age pension was received by 9.3 per cent of the population, while 3.4 per cent received a disability support pension and 1.9 per cent received a single parent payment. A further 2.3 per cent of the population received some form of labour market allowance in 2007 (figure A.9).

Figure A.9   **Proportion of total population on income support, June 2007^a**

a Components do not add to Australian total because total for Australia includes payments to people living overseas and where valid geographic data were not available. **b** Data include current Newstart and Youth Allowance (other) customers. Newstart component of data excludes CDEP participants and those who did not receive a payment.

Source: ABS (2008), *Australian Social Trends 2008*, Cat. no. 4102.0; table AA.19.

The proportion of the population receiving the age pension in 2007 ranged from 11.2 per cent in SA to 3.3 per cent in the NT; the proportion receiving a disability support pension ranged from 5.0 per cent in Tasmania to 2.0 per cent in the ACT; and the proportion receiving a single parent payment ranged from 2.5 per cent in the NT to 1.2 per cent in the ACT. The proportion receiving a labour market allowance in 2007 ranged from 5.2 per cent in the NT to 1.1 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, 42.2 per cent of people aged 15 years and over (approximately 6.7 million people) had completed year 12 or equivalent. A further 22.9 per cent (3.6 million people) had a highest level of schooling of year 10 or equivalent. Across jurisdictions, the proportion of people aged 15 years and over who had year 12 or equivalent schooling ranged from 62.1 per cent in the ACT to 31.3 per cent in Tasmania (figure A.10).

Figure A.10   **People aged 15 years or over, by highest year of school completed, August 2006a**
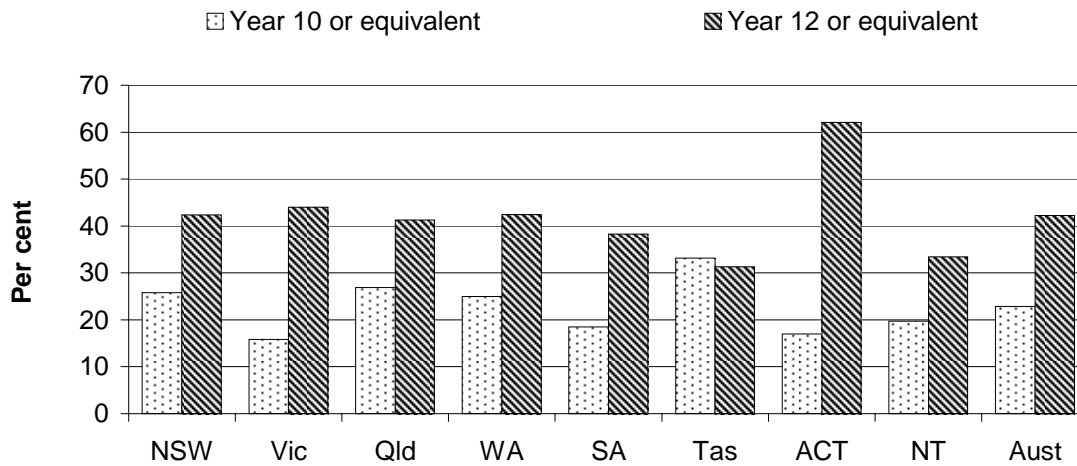
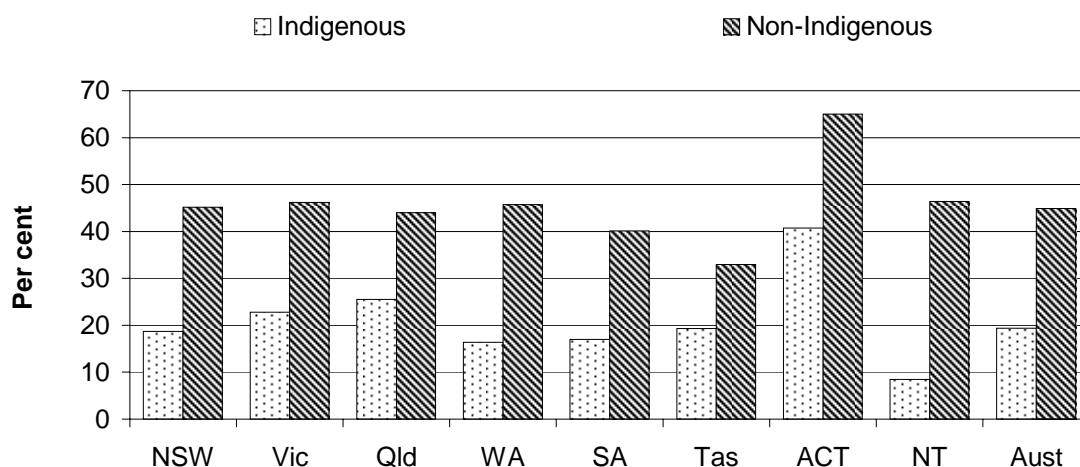⊡ Year 10 or equivalent   ⧄ Year 12 or equivalent

a 'Australia' includes other territories.

Source: ABS (2007), *2006 Census of Population and Housing*, Cat. no. 2068.0; table AA.20.

At August 2006, a much higher proportion of non-Indigenous people (44.9 per cent) aged 15 years or over had completed year 12 or equivalent as their highest year of school (this is the highest level of primary or secondary school a person has completed) than Indigenous people (19.4 per cent). Across jurisdictions, the proportion of Indigenous people aged 15 years or over who had completed year 12 or equivalent schooling ranged from 40.7 per cent in the ACT to 8.5 per cent in the NT. The proportion of non-Indigenous people who had completed year 12 or equivalent schooling was highest in the ACT (65.0 per cent) and lowest in Tasmania (33.0 per cent) (figure A.11).

Figure A.11 **People aged 15 years or over who had completed year 12 or equivalent as highest year of school, by Indigenous status, August 2006ᵃ**
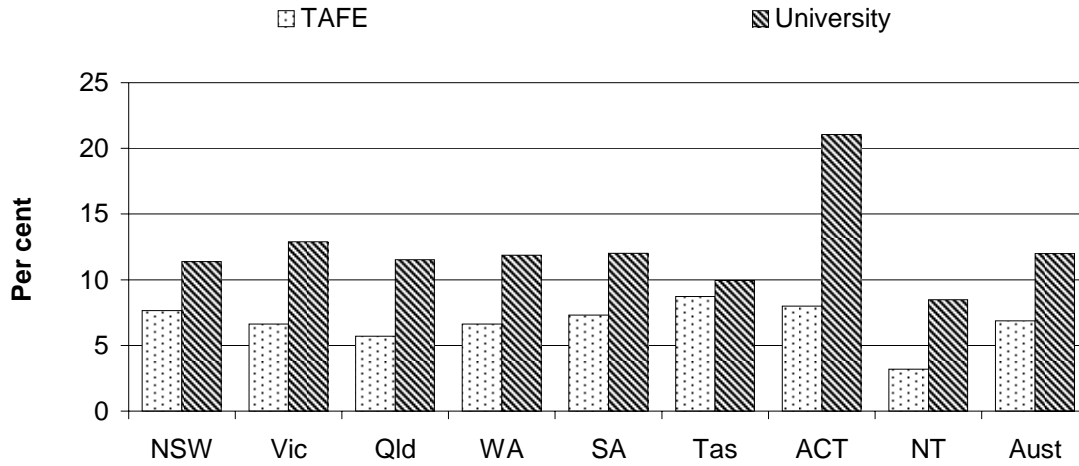

a 'Australia' includes other territories.

Source: ABS (2007), derived from *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[4] 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 the Indigenous tertiary students who were attending TAFE was highest in Tasmania (9.5 per cent) and lowest in the NT (2.0 per cent). At August 2006, the proportion of non-Indigenous students (14.4 per cent) attending university 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).

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[4] 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, August 2006[a, b, c]**

a 'Australia' includes other territories. **b** Includes 'technical and further educational institution (including TAFE colleges)'. **c** Totals may not add as a result of rounding.

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, August 2006[a, b, c]**
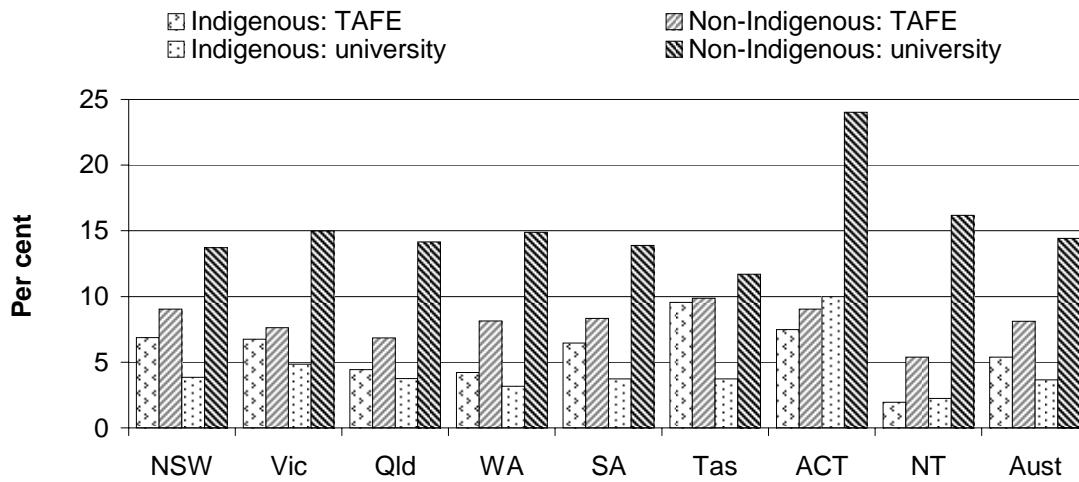
a 'Australia' includes other territories. **b** Includes 'technical and further educational institution (including TAFE colleges)'. **c** Totals may not add as a result of rounding.

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

Employment and workforce participation

There were 11.2 million people aged 15 years or over in the labour force in Australia in June 2008. Of these, 95.9 per cent were employed. This means 4.1 per cent of the participating labour force were unemployed at June 2008. The majority of employed persons (71.0 per cent) were in full time employment. Of the 461 000 people looking for work, 67.9 per cent were seeking full time work and 32.1 per cent were seeking part time work (table AA.22).

Across jurisdictions, the proportion of employed people in full time employment in June 2008 ranged from 76.6 per cent in the NT to 67.3 per cent in Tasmania. The unemployment rate ranged from 4.5 per cent in NSW and SA to 2.3 per cent in the ACT. The proportion of unemployed people looking for full time work ranged from 74.2 per cent in Tasmania to 62.2 per cent in Victoria (tables AA.22 and AA.24).
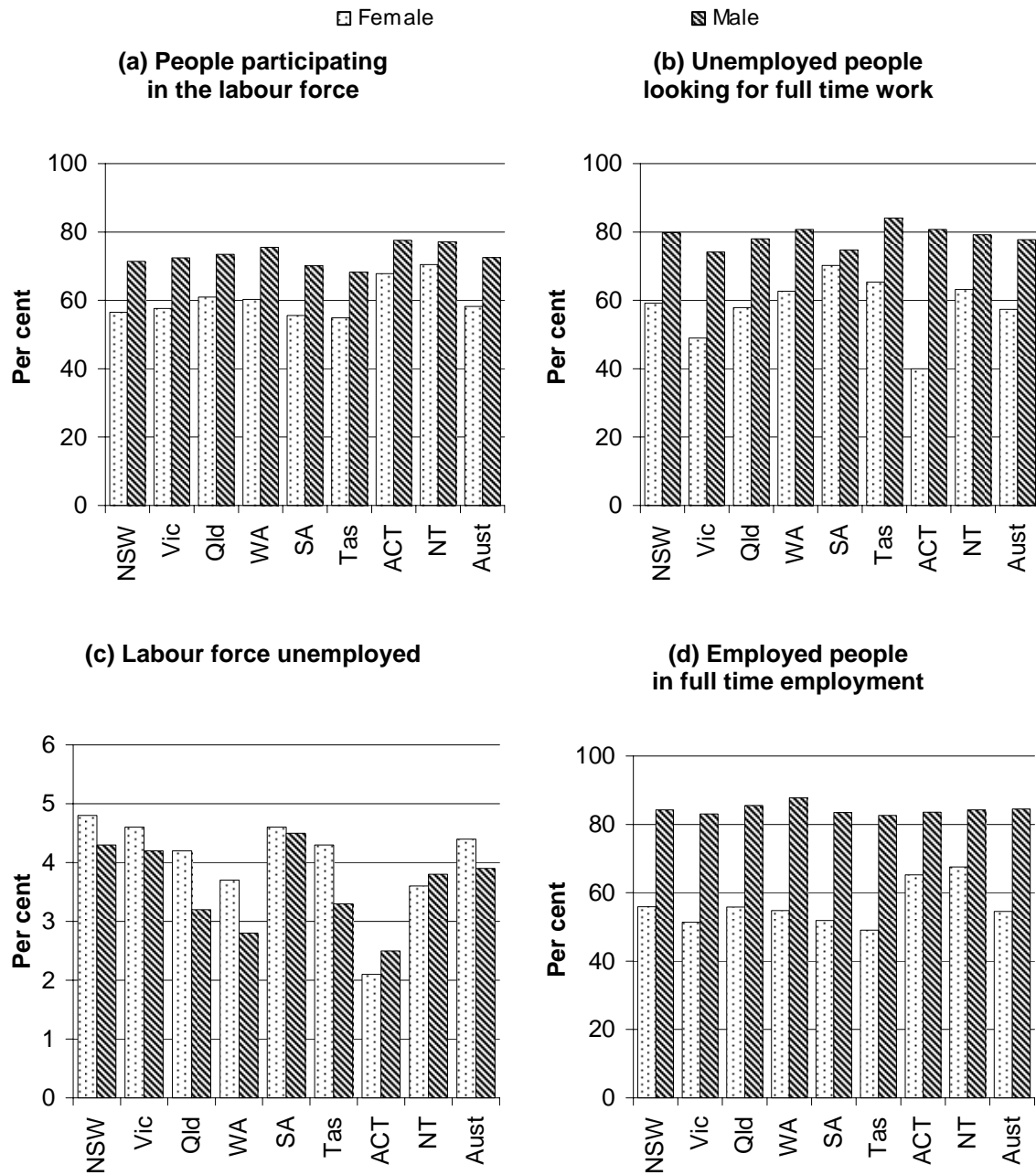
The unemployment rate needs to be interpreted within the context of labour force participation rates, which were higher for males than for females in all jurisdictions (figure A.14a). Nationally, fewer unemployed females were looking for full time work than males (57.4 per cent and 77.7 per cent respectively) (figure A.14b).

The unemployment rate for females was higher than that for males in all jurisdictions except for the ACT 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 33.6 percentage points in Tasmania to 16.7 percentage points in the NT (figure A.14d).

General economic indicators

Gross Domestic Product (GDP) is the total 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). In 2006-07, the GSP for NSW accounted for 32.0 per cent of national gross product, compared with 1.4 per cent for the NT. Growth from the previous year's GSP (in 2006-07 dollars) was highest for WA (12.4 per cent) and lowest for Victoria (0.1 per cent). Across Australia, the GSP per person was $50 264 in 2006-07 (table AA.25).

Figure A.14   **Labour force outcomes for people aged 15 years or over, by sex, June 2008**

☐ Female   ◩ Male

(a) People participating in the labour force

Per cent (vertical axis: 0, 20, 40, 60, 80, 100)

NSW, Vic, Qld, WA, SA, Tas, ACT, NT, Aust

(b) Unemployed people looking for full time work

Per cent (vertical axis: 0, 20, 40, 60, 80, 100)

NSW, Vic, Qld, WA, SA, Tas, ACT, NT, Aust

(c) Labour force unemployed

Per cent (vertical axis: 0, 1, 2, 3, 4, 5, 6)

NSW, Vic, Qld, WA, SA, Tas, ACT, NT, Aust

(d) Employed people in full time employment

Per cent (vertical axis: 0, 20, 40, 60, 80, 100)

NSW, Vic, Qld, WA, SA, Tas, ACT, NT, Aust

Source: ABS (2008), *Labour Force, Australia, Detailed – Electronic Delivery*, Cat. no. 6291.0; 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 databases. 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 may not accurately reflect the true value.

This Report indicates the reliability of estimates based on samples, by reporting either relative standard errors (RSE) or confidence intervals (CIs). RSE and CIs are calculated based on the standard error (SE). The larger the SE, RSE or CIs, the less reliable is the estimate as an indicator for the whole population (ABS 2008d, 2008c).

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 may 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:

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

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:

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

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:

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

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 25-50 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 (box A.2). 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 2008c). 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**

It can be said with 95 per cent confidence that the population value lies within the shaded area.
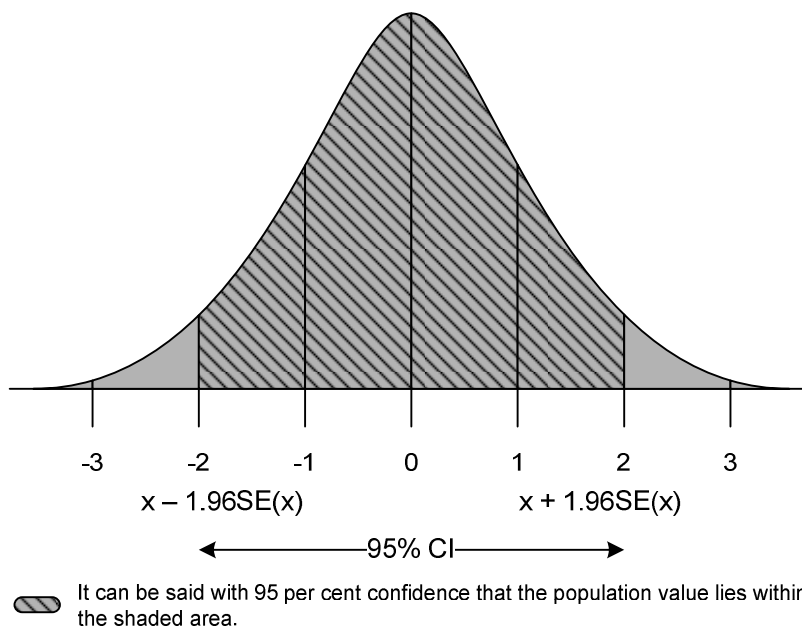
CIs are calculated from the population estimate and its associated SE. The most commonly used CI is calculated for 95 per cent levels of probability (where 95 per cent reflects the estimate plus and minus approximately two times the SE). For example, if the estimate from a survey was that 628 300 people 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) (ABS 2008c). For example, assume survey data estimated a result of 30 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 a result of 25 per cent 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 25 and 35 per cent, and the true result for jurisdiction B people lies between 15 and 35 per cent. As these two ranges overlap, it cannot be said with confidence that the results for jurisdiction A and jurisdiction B are statistically 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 overlap, then there can be little 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.

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

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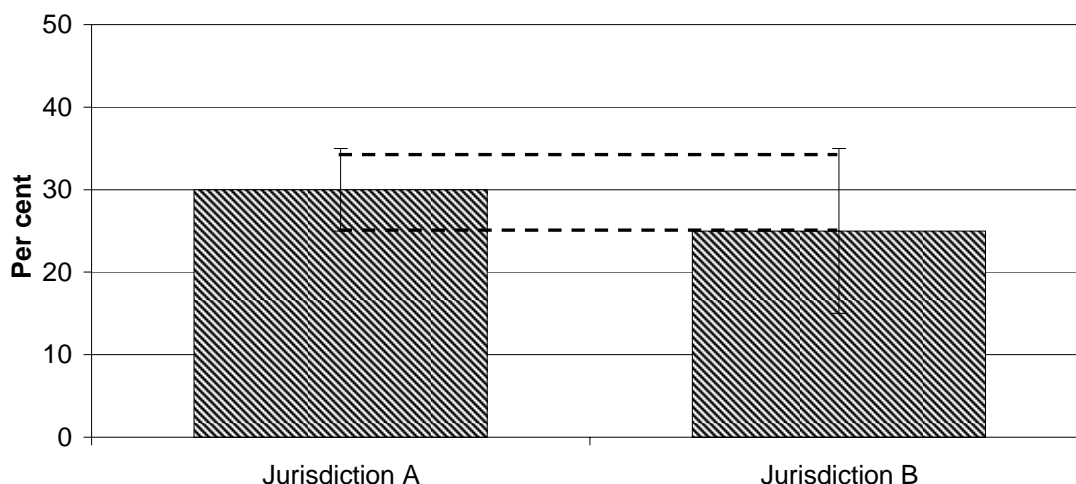
$$R_2 = \left(\frac{x_2}{y_2} - \frac{x_1}{y_1} \right) + 1.96 \sqrt{(RSE\left(\frac{x_2}{y_2}\right) \times \left(\frac{x_2}{y_2}\right))^2 + (RSE\left(\frac{x_1}{y_1}\right) \times \left(\frac{x_1}{y_1}\right))^2}$$ (equation A.6)

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 overlap so no statistically significant differences.

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 — that 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. These estimates 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, 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 good proxy for the average population level, and again, 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 (rather than estimates) for the fourth quarter population level. Population projections are not as accurate as 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 rates* (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 rates* (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 2004-05 to 2007-08, a composite of the growth rates between 2004-05 to 2005-06, 2005-06 to 2006-07 and 2006-07 to 2007-08 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:

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

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:

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

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 2004-05 to 2005-06
6 per cent in 2005-06 to 2006-07
8 per cent in 2006-07 to 2007-08

then the total growth over the period 2004-05 to 2007-08 can be calculated as:

$$TGR = [(1.06) \times (1.06) \times (1.08) - 1] \times 100$$
$$= (1.213488 - 1) \times 100$$
$$= 21.3 \text{ per cent.}$$

Gross domestic product deflators

The GDP deflator is used to convert raw financial data into constant (real) dollars (box A.5). '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 100 as this Report requires a current year deflator (2007-08 = 100). The ABS publishes the GDP IPD to the third most current year only (for example, if the current year is 2007-08, the available deflator is 2005-06 = 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 (2005-06 = 100)[a]	Calculation	Re-based GDP deflator (2007-08=100)
2003-04	92.1	92.1/109.0*100	84.5
2004-05	95.5	95.5/109.0*100	87.6
2005-06	100.0	100.0/109.0*100	91.7
2006-07	104.6	104.6/109.0*100	96.0
2007-08	109.0	109.0/109.0*100	100.0

a Index values from ABS (2008), *Australian National Accounts: National Income, Expenditure and Product, June Quarter 2008*, Cat. no. 5206.0, table 32, Expenditure on Gross Domestic Product (GDP), Chain volume measures and Current prices, Annual (Series ID. A2304682C).

Source: ABS (2008), *Australian National Accounts: National Income, Expenditure and Product, June Quarter 2008*, Cat. no. 5206.0; table AA.26.

Table AA.26 in the attachment contains GDP deflators for 1998-99 to 2007-08. Five GDP deflator series are published, from 2003-04 = 100 through to the latest year, where 2007-08 = 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 2006-07 then the data are deflated using the deflator series for

2006-07 = 100. If the most current year is 2007-08 then the data are deflated using the deflator series for 2007-08 = 100. Table A.2 shows how the GDP deflator for 2007-08 = 100 is applied.

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

Financial year	Nominal data	GDP deflator (2007-08 = 100)	Calculation	Real data
2003-04	6 200	84.5	(6 200/84.5)*100	7 337
2004-05	6 300	87.6	(6 300/87.6)*100	7 192
2005-06	6 350	91.7	(6 350/91.7)*100	6 925
2006-07	6 485	96.0	(6 485/96.0)*100	6 755
2007-08	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). Using 'crude' (or unadjusted) rates across populations with different age profiles can lead to drawing erroneous conclusions about variables that are correlated with age. 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 or 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:

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

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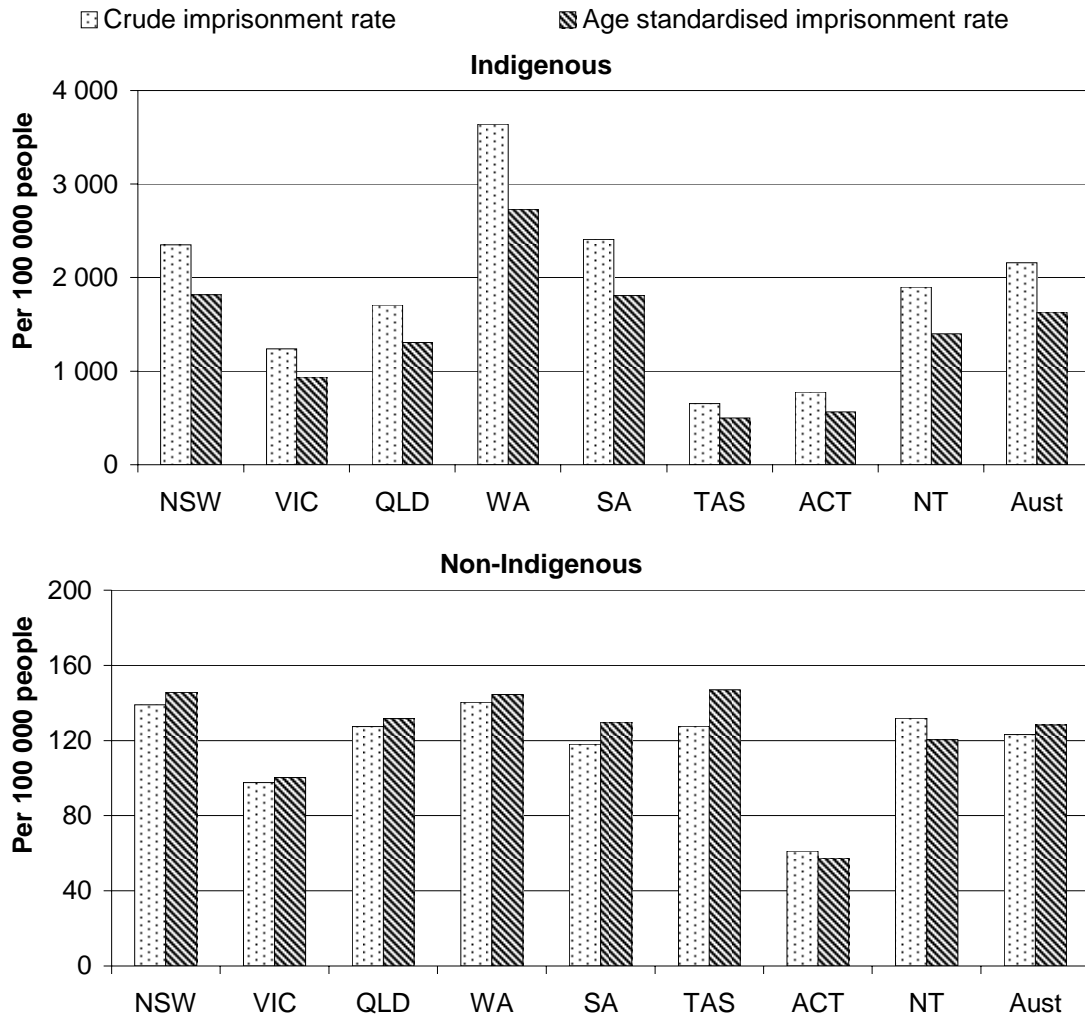
a For detailed notes relating to these figures, please see table 8A.4. **b** Rates are based on the indirect standardisation method, applying age-group imprisonment rates derived from Prison Census data.

Source: ABS (unpublished), derived from *Australian Demographic Statistics, December Quarter 2007*, Cat. no. 3101.0; ABS (unpublished), derived from *Experimental Projections Aboriginal and Torres Strait Islander Population*, Cat. no. 3231.0; ABS (unpublished), derived from *Prisoners in Australia*, Cat. no. 4517.0; State and Territory governments (unpublished); 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		
	Observed	*Expected*	*SMR*	*Observed*	*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 Qld, 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 persons.

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

A.6   Attachment tables

Attachment tables are identified in references throughout this appendix by an 'AA' suffix (for example, table AA.3). Attachment tables are provided on the CD-ROM enclosed with the Report and on the Review website (www.pc.gov.au/gsp). Users without access to the CD-ROM or 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 2007 ('000)
Table AA.2	Estimated resident population (ERP) by calendar and financial year
Table AA.3	Proficiency in spoken English of people born overseas, August 2006 ('000)
Table AA.4	Persons by country of birth, August 2006 ('000)
Table AA.5	Persons by language spoken at home, August 2006 ('000)
Table AA.6	Estimated resident population by remoteness area, 30 June 2007
Table AA.7	Experimental estimated resident Australian Indigenous population, 30 June 2006
Table AA.8	Experimental projection of the Indigenous population, 2000 to 2009 (number)
Table AA.9	Language spoken at home by Indigenous people and proficiency in spoken English, by sex, August 2006 (number)

Family and household

Table AA.10	Family structure, 2003–2007
Table AA.11	Family structure: lone parents, 2003–2007 (per cent)
Table AA.12	Families and work (per cent)
Table AA.13	Families and persons in families in occupied private dwellings by Indigenous status and family/household composition, August 2006
Table AA.14	Household structure, 2003–2007
Table AA.15	Occupied private dwellings by tenure type and landlord type, August 2006 ('000)

Income, education and employment

Table AA.16	Persons aged 15 years and over, by weekly individual income and sex, August 2006
Table AA.17	Persons aged 15 years and over by weekly individual income and Indigenous status, August 2006
Table AA.18	Persons aged 15 years and over, by weekly individual income and age, August 2006
Table AA.19	Income support, June, 2003–2007

A.7 References

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

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

——2008a, *Australian Demographic Statistics December Quarter 2007*, Cat. no. 3101.0, Canberra.

——2008b, *Australian Social Trends 2008*, Cat. no. 4102.0, Canberra.

——2008c, *Confidence intervals*, http://www.abs.gov.au/AUSSTATS/abs@.nsf/ProductsbyReleaseDate/8BDFEF 442F3901B0CA2572E500833358?OpenDocument#Confidence%20Intervals.

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