

# **Appendix 2: Methodology for the calculation of regional and non-regional population estimates**

## **Aboriginal and Torres Strait Islander population estimates**

Population estimates used in this report are the low-projection series from the Australian Bureau of Statistics (ABS) experimental projections of the Aboriginal and Torres Strait Islander population (ABS 1998). These projections (1996–2006) are an extension of the 1991–96 estimates, which assumed the same propensity of people to identify as Aboriginal and/or Torres Strait Islanders as applied in the 1996 Census. This propensity to identify was substantially higher than for the 1991 Census, and consequently the 1996 Census-based estimates are higher than the 1991 Census-based estimates.

The low-projection series assumes that the 1996 Census propensity to identify as an Aboriginal and/or Torres Strait Islander person does not change for the projection period. The high series assumes that the change in propensity to identify as an Aboriginal and/or Torres Strait Islander person increases in line with the change in the propensity between the 1991 Census and the 1996 Census. The low series is recommended because it is consistent with the 1991–96 experimental estimates. The high series is more an illustrative series to show what would happen to the Aboriginal and Torres Strait Islander population if the change in propensity to identify between the 1991 and 1996 Censuses continued through to 2006. If this high series was used, the population in 1998–99 would be higher, leading to a decline in estimating 1998–99 Aboriginal and Torres Strait Islander mortality and morbidity rates. For 1998–99, the difference between the low projections and high projections is 8%.

## **Population estimates for non-regional analyses**

A population estimate for Aboriginal and Torres Strait Islander people was obtained using an average of the population as at 30 June 1998 and 30 June 1999. For the total population, the mean resident population estimate was based on the ABS formula that uses estimates from five quarters of data. In this case, the four quarters of the 1998–99 financial year plus the March quarter of 1998 were used and each quarter weighted using the mathematical technique recommended by the ABS. The accuracy of estimates depends on the quality of source data. The major sources of potential error are considered to be the census date estimates of interstate migration based on Medicare transfer data (ABS 1995:29).

It is important to note that this total Australian population excludes Other Territories, which comprise approximately 2,000 persons that reside in Christmas Island, the Cocos Islands and the Jervis Bay Territory. These territories comprise a pseudo 'ninth State/Territory' of Australia.

**Table A2.1: Population estimates for Aboriginal and Torres Strait Islander people and the total Australian population, 1998–99**

State/Territory	Total population		Indigenous population		
	No.	% of total population	No.	% of Indigenous population	% of State population
NSW	6,367,287	33.8	115,532	28.43	1.81
Vic	4,682,951	24.	23,602	5.81	0.50
Qld	3,480,317	18.48	111,718	27.50	3.21
WA	1,844,559	9.79	58,852	14.48	3.19
SA	1,489,571	7.91	23,179	5.70	1.56
Tas	471,363	2.50	15,974	3.93	3.39
ACT	308,484	1.64	3,319	0.82	1.08
NT	191,354	1.02	54,137	13.32	28.29
<b>Total</b>	<b>18,835,884</b>	<b>100</b>	<b>406,311</b>	<b>100</b>	<b>2.16</b>
<b>Total<sup>(a)</sup></b>	<b>18,839,060</b>	<b>..</b>	<b>..</b>	<b>..</b>	<b>..</b>

(a) Includes Other Territories.

Source: Aboriginal and Torres Strait Islander data is adjusted ABS census data from ABS Cat. No. 3231.0. Population for the total population is Estimated Resident Population calculated by weighting quarterly data from ABS 3101.0 March Quarter 2000 according to the method described in ABS 3101.0 June Quarter 1995.

## Regional population estimates and classification scheme

The Accessibility/Remoteness Index of Australia (ARIA) classification has been used within this report as a framework for the analysis of regional information. Information on the development of the ARIA classification is presented below, followed by the regional population estimates used within this report.

### Accessibility and remoteness—the ARIA classification

The ARIA classification, developed by the National Key Centre for Social Applications of Geographic Information Systems (GISCA), has been used in this report as the framework for assessing regional differences in health expenditure. This represents a departure from the Rural, Remote and Metropolitan Areas classification (RRMA) that has conventionally been used for such analysis.

More information regarding the development, aims and assumptions of the ARIA classification is available in the joint publication of the Department of Health and Aged Care and GISCA, *Measuring Remoteness: Accessibility/Remoteness Index of Australia (ARIA)* (DHAC 1999b).

Since remoteness has largely come to be identified with lack of accessibility to services, ARIA focuses on disadvantage in terms of accessible services, especially those routinely available to those living in metropolitan areas.

ARIA is a geographic approach to defining remoteness that interprets it as a lack of accessibility to service centres and excludes socioeconomic, urban/rural and population size factors. It reflects the actual distance needed to travel by road from population localities to service centres of various sizes.

ARIA scores used in this report were calculated by measuring distances by road from 11,340 populated localities to one of four different size service centres. The distances are converted to ratios to the mean, a threshold of 3 is applied (removing the effect of extreme values) and then the four component index values are summed. This produces a continuous variable with values ranging from 0 to 12, where 0 indicates areas of high accessibility and 12 indicates areas of highest possible remoteness. Index values for each of the 11,340 populated localities are then interpolated to produce an index value for 1-km grids and averages calculated for larger areas, such as postcodes or Statistical Local Areas (SLAs) (DHAC 1999b). The ARIA score used here is defined in terms of distance from different size service centres, but it is possible to define an ARIA score in terms of distance from particular types of service, for example, a hospital ARIA could be defined in terms of distance from certain sizes and types of hospitals.

ARIA scores have also been grouped by GISCA into five categories—highly accessible, accessible, moderately accessible, remote and very remote. These groupings were devised with consideration to natural breaks in the data, balance across categories, and broad compatibility with RRMA categories. The scores comprising each category, together with a description of each category, are presented in Box A2.1 below.

**Box A2.1: Structure of the Accessibility/Remoteness Index of Australia (ARIA) classification**

<i>Category</i>	<i>ARIA score</i>	<i>Description</i>
<i>Highly accessible</i>	<i>0–1.840</i>	<i>Relatively unrestricted access to a wide range of goods and services and opportunities for social interaction.</i>
<i>Accessible</i>	<i>1.841–3.510</i>	<i>Some restrictions to accessibility of some goods, services and opportunities for social interaction.</i>
<i>Moderately accessible</i>	<i>3.511–5.800</i>	<i>Significantly restricted accessibility of goods, services and opportunities for social interaction.</i>
<i>Remote</i>	<i>5.801–9.080</i>	<i>Very restricted accessibility of goods, services and opportunities for social interaction.</i>
<i>Very remote</i>	<i>9.081–12</i>	<i>Locationally disadvantaged—very little accessibility of goods, services and opportunities for social interaction.</i>

Source: DHAC 1999b.

This report uses the ARIA categories in its analysis of regional variations in health expenditure. It is important to note that ARIA has not previously been used by AIHW to undertake regional analyses. Consequently there have been some issues regarding data concordance. An important issue is that for many datasets produced by the States and Territories, the only spatial detail available is the postcode. This necessitates that postcode data be converted to SLA if it is to be mapped on a common basis with data coded to SLA. Furthermore, ARIA concordance information was only available for 1996 SLAs and postcodes. Data provided using later Australian standard geographic classifications (ASGCs) was converted to the 1996 ASGC prior to concordance.

The conversion of postcode to SLA involves the allocation of a whole postcode (or more than one postcode) area to an SLA, together with part of another postcode (or parts of more than one postcode). The conversion is undertaken using approximate allocations of postcode populations to SLAs. In many instances this conversion represents a somewhat crude allocation of the population to SLAs.

In this analysis of ARIA, SLA population data was obtained from the 1996 census counts for each state including all Other Territories, and adjusted to reflect a projected average of the ABS 1998–99 populations. Demographics collected include age and gender for both the Aboriginal and Torres Strait Islander population and the total Australian population. These census data containing SLAs were concorded to ARIA categories. The small number of SLAs that did not have a valid SLA to ARIA concordance such as the off-shore and migratory areas for each State, and all of the Other Territories of Australia, were allocated into the ‘very remote’ ARIA category. A growth factor was applied to this ARIA-concorded data to ensure that the age and gender figures reflect that of the projected ABS 1998–99 population figures.

### **Population estimates for regional analysis**

Population estimates for Aboriginal and Torres Strait Islander people were not available by SLA for 1998–99. This is because they are a relatively small population who move a substantial amount, and projected data at the SLA level could be quite erroneous. For the regional analysis total population Census counts were obtained for each SLA then concorded to ARIA categories (description below). A growth factor was applied so that accurate projections could be made for the 1998–99 total Australian population. The ‘Other Territories’ were not able to be isolated at the regional level and so are included in the regional population estimates below.

**Table A2.2: Population distribution in Australia by ARIA, 1998–99**

ARIA category	Total population		Indigenous population	
	No.	%	No.	%
Highly accessible	15,349,960	81.50	173,746	42.74
Accessible	2,225,248	11.82	80,171	19.72
Moderately accessible	772,544	4.10	40,653	10.00
Remote	243,834	1.29	26,028	6.40
Very remote	242,176	1.29	85,912	21.13
<b>Total</b>	<b>18,833,763</b>	<b>100</b>	<b>406,510</b>	<b>100</b>

Note: The populations in this table include Other Territories.

Source: Adjusted ABS census data, 1996 calculated on ARIA classification, DHAC 1999b.

### Regional mortality estimates—population distribution of area analysed

The populations used to calculate mortality figures in Chapter 7 include deaths from South Australia, Western Australia and the Northern Territory. These three jurisdictions combined contain a different proportion of Aboriginal and Torres Strait Islander population per ARIA category to the Australia-wide population distributions of Aboriginal and Torres Strait Islander people. Australia-wide population proportions show that 21% of Aboriginal and Torres Strait Islander people reside in areas that are very remote (see Table 7.2) but in South Australia, Western Australia and the Northern Territory over 47% of the Aboriginal and Torres Strait Islander population reside in very remote areas (see Table A2.3).

**Table A2.3: Population distribution in South Australia, Western Australia and Northern Territory by gender and ARIA, 1996**

ARIA category	Total population (%)			Indigenous population (%)		
	Males	Females	Persons	Males	Females	Persons
Highly accessible	75.52	77.51	76.51	25.45	26.30	25.88
Accessible	10.27	9.82	10.04	12.28	12.77	12.53
Moderately accessible	5.47	5.06	5.27	5.39	5.28	5.33
Remote	3.18	2.89	3.04	8.68	8.74	8.71
Very remote	5.56	4.71	5.14	48.20	46.92	47.55
<b>Total (number)</b>	<b>1,712,394</b>	<b>1,708,958</b>	<b>3,421,352</b>	<b>57,733</b>	<b>59,633</b>	<b>117,366</b>

Note: Data present the usual residents of Western Australia, South Australia and the Northern Territory combined.

Source: Adjusted ABS census data 1996, calculated on ARIA classification, DHAC 1999b.

## Reason for differences in regional population and total population estimates

As a result of different calculation methods, the total Australian population (including Other Territories) in Table A2.1 derived using the ABS formula is 18,839,060. The estimated total population used in the regional analysis (includes Other Territories) was 18,833,763. This is a difference of 5,297 people.

## 1995–96 population methodology

The 1995–96 report used population estimates of Aboriginal and Torres Strait Islander people of 367,808 or 2.0% of the total population of Australia. The ABS has since revised these estimates to 381,402 or 2.1% of the total population. This represents an overall change of 3.7% in the estimate of the number of Aboriginal and Torres Strait Islander persons in 1995–96.

Table A2.4: Original and revised estimates of State populations, 1995–96 (%)

State	Proportion of population		Percentage change
	Original estimate	Revised estimate	
New South Wales	1.7	1.8	2.8
Victoria	0.5	0.5	-0.3
Queensland	3.0	3.1	3.1
Western Australia	3.1	3.2	3.0
South Australia	1.4	1.5	3.5
Tasmania	3.1	3.2	4.7
Australian Capital Territory	1.0	1.0	-3.0
Northern Territory	27.3	28.1	3.0
<b>Australia</b>	<b>2.0</b>	<b>2.1</b>	<b>3.7</b>

Source: Original estimate—Table 1.1 in *Expenditures on Health Services for Aboriginal and Torres Strait Islander People*, AIHW and NCEPH, May 1998; Revised estimate—*Experimental Estimates of the Indigenous Population 1991–1996* ABS Cat. No. 3230.0, March 1998; *Australian Demographic Statistics*, ABS Cat. No. 3101.0 September quarter 1999.