

Remote Areas Statistical Geography in Australia

Notes on the
Accessibility/Remoteness Index for Australia (ARIA+ version)

John Glover and Sarah Tennant

Working Paper Series No. 9

Public Health Information Development Unit

Copyright

© Commonwealth of Australia 2003

This work may be reproduced and used subject to acknowledgement of the source of any material so reproduced.

National Library of Australia Cataloguing in Publication entry

Glover, John, 1945- .
Remote areas statistical geography in Australia : notes on
the Accessibility/remoteness index (ARIA + version).

Bibliography.
ISBN 0 7308 9230 1.

1. Measuring Remoteness: Accessibility/Remoteness Index of
Australia (ARIA) . 2. Rural health services - Australia.
3. Health services accessibility - Australia. I. Tennant,
Sarah. II. Public Health Information Development Unit
(Australia). III. Australia. Dept. of Health and Ageing.
IV. Title. (Series : Working paper series (Public Health
Information Development Unit (Australia)) ; no. 9).

362.1042570994

Public Health Information Development Unit, The University of Adelaide

This research was produced by the Public Health Information Development Unit (PHIDU), The University of Adelaide, South Australia in September 2002. The research was funded under a grant from the Australian Government Department of Health and Ageing. The views expressed in this paper are solely those of the authors and should not be attributed to the Department of Health and Ageing or the Minister for Health and Ageing.

Suggested citation:

Glover J and Tennant S. (2003) *Remote Areas Statistical Geography in Australia: Notes on the Accessibility/Remoteness Index for Australia (ARIA + version)*. Working Paper Series No. 9. Public Health Information Development Unit, Adelaide.

Enquiries about or comments on this publication should be addressed to:

PHIDU, The University of Adelaide, South Australia 5005
Phone: 08-8303 6239 or e-mail: PHIDU@publichealth.gov.au

This and other publications are available from the PHIDU website (www.publichealth.gov.au).

ISSN 1447-879X Working Paper Series

Published online by Public Health Information Development Unit, The University of Adelaide

Contents	Page
List of Tables	iv
List of Figures	iv
List of Maps	iv
Acknowledgements	v
Glossary	v
1. Introduction	1
2. Background	3
Development of a remoteness classification for Australia (ARIA and ARIA+)	3
3. Comparison of ARIA and ARIA+	7
4. Characteristics of the population under ARIA+	9
Distribution	9
Age and sex	11
<i>Total population</i>	<i>11</i>
<i>Indigenous population</i>	<i>13</i>
Selected characteristics	14
<i>Total population</i>	<i>14</i>
<i>Indigenous population</i>	<i>15</i>
Appendix 1: Calculation of the Accessibility/Remoteness Index of Australia (ARIA+)	17
Appendix 2: Additional Tables	19
References	25

List of Tables

Table 1: ARIA+ population (compared with ARIA) and area, Australia, 1996	7
Table 2: Population by ARIA+ , State and Territory, 1996	10
Table 3: Population by ARIA+ and Section of State, Australia, 1996	10
Table 4: Indigenous population by ARIA+ and Section of State, Australia, 1996	11
Table A1: Population by ARIA+ category, age and sex, 1996	21
Table A2: Indigenous population by ARIA+ category, age and sex, 1996	23
Table A3: Selected characteristics of the population by ARIA+ , 1996	25
Table A4: Selected characteristics of the Indigenous population by ARIA+ , 1996	25

List of Figures

Box 1: Some issues around the development and use of ARIA+	4
Figure 1: Population by ARIA+ , Australia, 1999	9
Figure 2: Total and Indigenous population in each ARIA+ class, by age and sex, 1996	12
Figure 3: Selected characteristics of the population by ARIA+ , 1996	15
Figure 4: Selected characteristics of the Indigenous population by ARIA+ , 1996	16
Figure 5: Unemployment beneficiaries by ARIA+ , 1996	16

List of Maps

Map 1: Accessibility/ Remoteness Index of Australia (ARIA+)	5
---	---

Acknowledgements

Frank Blanchfield, Director of Geography, Australian Bureau of Statistics for additional information and advice on ARIA+ .

Danielle Taylor and Chris Wright of the National Centre for Social Applications in GIS (GISCA) for the map in this paper.

The people who read the final draft of the report and provided comments which improved the readability and accuracy of the final document.

Glossary

Census Collection District

The Collection District (CD) is the smallest area level in the Australian Bureau of Statistics' statistical geography. CDs are designed for collection and dissemination of Population Census data.

Statistical Local Area (SLA)

The Statistical Local Area (SLA) is the area based measure used in much of the Australian Bureau of Statistics' statistical geography. The SLA is generally equivalent to a local government area, with additional codes allocated to areas outside local government areas (eg. unincorporated areas) and to local government areas split for statistical purposes. The exceptions to this general situation are in Queensland – Brisbane, Gold Coast and Townsville; Northern Territory – Darwin; and the Australian Capital Territory – Canberra, where SLAs are based on suburbs. SLAs cover the whole of Australia.

.. not applicable

– nil

1. Introduction

There have been increasing concerns over a number of years about the difficulties faced by Australians living in rural and remote areas of Australia in accessing services that most Australians take for granted. A parallel concern has been the extent to which the health of people living in these areas is poorer than that of those living in areas with greater accessibility to health, welfare and other services. Government in particular has been interested in finding out more about the circumstances and needs of these populations, and in targeting assistance accordingly (DHAC 1999).

This led the (then) Department of Health and Aged Care (DHAC) to sponsor a project to obtain a standard classification and index of remoteness which would allow the comparison of information about populations based on their access, by road, to service centres (towns) of various sizes. Note that although by specifying towns of various sizes the index implicitly takes account of the education, health, welfare, etc. services likely to be located in towns of those sizes, there is no explicit use in the development of the index of what services should exist. That is, distance is the sole measure of access. The outcome of that project was the Accessibility/ Remoteness Index of Australia (ARIA) (DHAC 1999, superseded by DHAC 2001), based on a methodology developed by the National Centre for Social Applications in GIS (GISCA) ¹.

More recently, the Australian Bureau of Statistics (ABS) addressed the concept of remoteness, with a view to including it in its classification of areas. The ABS work, also undertaken with GISCA, used ARIA as the underlying methodology for the determination of remoteness. The new classification, described by the ABS as a 'Remoteness Structure', is referred to as ARIA+ (ie., ARIA plus, ABS 2001a), and is an update and refinement of the original ARIA.

¹ ARIA supersedes the Rural, Remote and Metropolitan Areas classification (RRMA) (DHS 1994)

2. Background

Development of a remoteness classification for Australia (ARIA and ARIA+)

In their report, the developers of ARIA note that, whereas the concept of remoteness itself has lacked precision, it is clear that distance is central to most people's understanding of the concept. For example,

"Remote: ...Far away, far off, distant from some place, thing or person; removed, set apart..."² (DHAC 1999)

They therefore focussed on disadvantage in terms of accessibility to services, especially those available to people in metropolitan areas. It should be noted that ARIA was designed to be an unambiguously geographical approach to defining remoteness, and did not take into account socioeconomic characteristics or urban/ rural concepts.

A separate, but related, issue has been confusion around the terminology to describe the areas outside of the capital cities and the small number of other large cities in Australia. These areas are variously referred to as 'rural', 'regional' or 'non-metropolitan' areas, 'the country' and 'the bush'. In particular, it has been difficult to determine the cut off point between, for example, what is meant by rural and remote, or regional and remote, when these terms are used in the same context. The ARIA and ARIA+ geographical classifications of remoteness address this issue.

ARIA+ is a continuous variable with remoteness values ranging from 0 to 15. It is possible to classify ARIA+ into groups. The ABS has identified five classes of remoteness within ARIA+ (as was the case with ARIA): however the cut off points between the classes and the names of the first three classes are different (see Box 1). The ARIA+ classes (Map 1) are: Major Cities of Australia; Inner Regional Australia; Outer Regional Australia; Remote Australia; and Very Remote Australia. More detail of the development of ARIA+ is provided in Appendix 1.

Under ARIA+, no areas in Victoria are classified to the Very Remote class; no areas in Tasmania are classified to the Major Cities class (Hobart is classified as Inner Regional); and no areas in the Northern Territory are classified to the Major Cities or Inner Regional classes (Darwin is classified as Outer Regional). Almost all of the Australian Capital Territory is classified to the Major Cities class.

² Shorter Oxford Dictionary

Box 1: Some issues around the development and use of ARIA+

In moving to adopt the ARIA classification from 1 July 2001, the Australian Bureau of Statistics worked with the staff at GISCA, the original developers of ARIA.

GISCA introduced a number of enhancements. The most notable of these were the inclusion in the calculation of the influence of towns in the 1,000 to 4,999 population range (under ARIA, the smallest towns were those with populations of 5,000 and above) and some other methodological and weighting adjustments. The choice of cut off points between the classes and weighting adjustments resulted in, for example, Hobart being classified as Accessible (previously Highly Accessible) and Darwin as Moderately Accessible (previously Accessible); and a small increase in the total population in the combined Remote and Very Remote areas, with a reduction in population in the Very Remote areas and an increase in population in the Remote areas (Table 1).

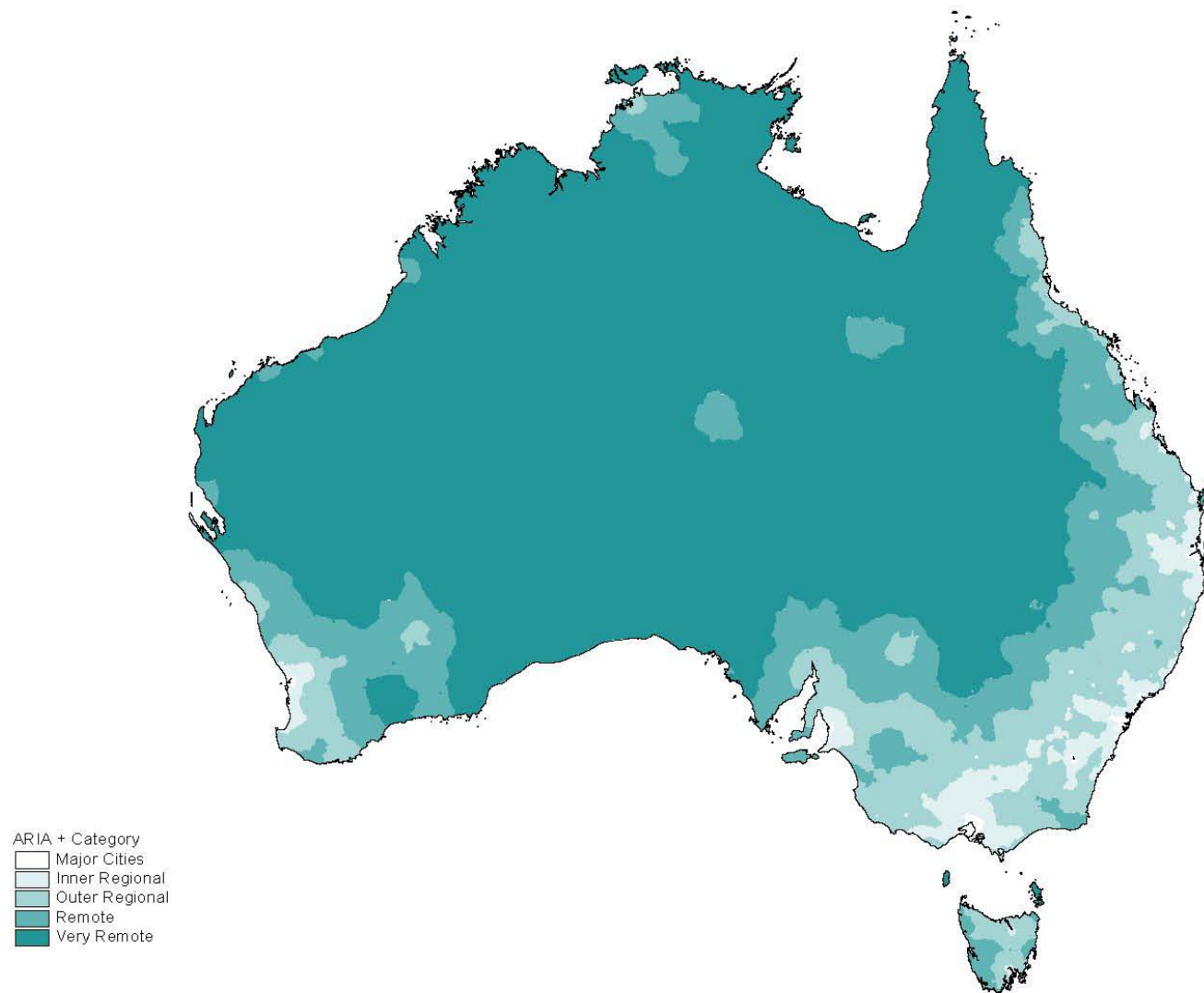
Another effect of these adjustments has been a change in the proportions of the population in the second and third 'accessible' categories (Table 1). Overall, the population in Highly Accessible was reduced by around one fifth, that in Accessible was increased by more than two thirds and that in Moderately Accessible was increased by more than two and a half times.

The other major change is in the names of the classes. This came about as a result of a consultation undertaken by the ABS following the development of ARIA+ (ABS 2001b). The ABS note that one criticism made of ARIA is the use of the word 'Accessible' in the common English sense, i.e., the opposite to remote. They add that 'Accessibility' has been used in a much more specific sense in the Griffith Service Access Frame. To avoid any possible confusion over the use of the word, the ABS removed it from their terminology. The names they use are:

Name under ARIA	Name under ARIA+
Highly Accessible	Major Cities of Australia
Accessible	Inner Regional Australia
Moderately Accessible	Outer Regional Australia
Remote	Remote Australia
Very Remote	Very Remote Australia

The words 'cities' and 'regional' appear to be less useful in describing the other end of a scale of a remoteness classification than does the word 'accessible', in particular when the measure is one of distance (see the notes above in the Background section). Nor do the descriptions of Hobart as Inner Regional and Darwin as Outer Regional fit easily with a concept of remoteness. The descriptions of their ARIA+ class under the old (ARIA) terminology, of Accessible (Hobart) and Moderately Accessible (Darwin), appear far more logical.

Map 1: Accessibility/ Remoteness Index of Australia (ARIA+)¹



¹A brief description of ARIA+ is in Appendix 1.

Source: Produced by GISCA

3. Comparison of ARIA and ARIA+

Table 1 shows the population by remoteness class under ARIA+, both when produced by aggregation of SLAs and when produced by aggregation of CDs: there is little difference in the population when calculated under either of these approaches (the way in which the population is calculated for each remoteness class is discussed in the following section). The table also shows the notable differences in population by remoteness class between ARIA+ and the earlier ARIA measure. As a result of the selection of class breaks made in the development of ARIA+, there have been reductions in the population in the Major Cities (19.0%) and Very Remote (27.1%) classes, and increases in the other three classes, the largest of which is in the Outer Regional class (163.0%).

Table 1 also shows details of the area, in square kilometers, of the ARIA+ classes. The most striking feature is the dominance of the Very Remote areas, comprising 72.8% of Australia, with only 1.1% of the population. However, as noted below (see Table 5), these areas comprise 18.9% of Australia's Indigenous population.

Table 1: ARIA+ population (compared with ARIA) and area, Australia, 1996

By aggregation of 1996 SLAs							
ARIA+			ARIA			Difference ARIA+ / ARIA	
	Number	%		Number	%	Number	%
Major Cities	11,697,757	65.4	Highly Accessible	14,439,830	80.8	-2,742,073	-19.0
Inner Regional	3,671,401	20.5	Accessible	2,175,733	12.2	1,495,668	68.7
Outer Regional	1,971,630	11.0	Moderately Accessible	749,740	4.2	1,221,890	163.0
Remote	343,144	1.9	Remote	245,934	1.4	97,210	39.5
Very Remote	194,265	1.1	Very Remote	266,126	1.5	-72,167	-27.1
Total	17,878,197	100.0	Total	17,877,363	100.0	528	0.0

By aggregation of 1996 CDs				
ARIA+	Number	Number %	Area (sq kms)	Area %
Major Cities	11,697,757	65.4	14,587.3	0.2
Inner Regional	3,671,401	20.5	222,359.7	2.9
Outer Regional	1,971,630	11.0	808,525.8	10.5
Remote	343,144	1.9	1,045,730.0	13.6
Very Remote	193,959	1.1	5,604,044.2	72.8
Total	17,877,891	100.0	7,695,247.1	100.0

Source: Calculated on population data supplied by ABS

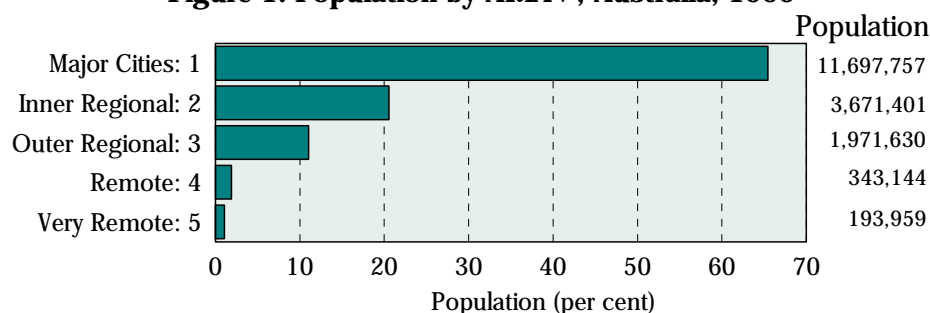
4. Characteristics of the population under ARIA+

Distribution

Figure 1 and Table 2 show the distribution of the population across Australia by ARIA+ . Almost two thirds (65.4%) of Australia's population live in areas classed as Major Cities, 20.6% live in areas in the Inner Regional class, 11.0% in Outer Regional, 1.9% in Remote and 1.1% in Very Remote.

The population used here is the Estimated Resident Population by Statistical Local Area (SLA) at 30 June 1999. The population of an SLA is allocated to an ARIA+ class if the whole area of the SLA is within that class. Where part of the SLA lies in more than one ARIA+ class, the population of the SLA is allocated to those classes on the basis of the proportion of the SLA population in each class at the CD level at the 1996 Census. Each CD has been assigned an ARIA+ class: the sum of the population at the CD level is then used to calculate the proportion of the SLAs population in each ARIA+ class. Note that this method only provides an approximation of the distribution of the population by ARIA+ class: for example, it does not take account of where in the CD the population lives, nor does it take account of the distribution of the age, sex or other characteristics of the population in the SLA.

Figure 1: Population by ARIA+, Australia, 1999



Source: Calculated on Estimated Resident Population (by CD), June 1999, ABS Cat. No. 3235.0 (ABS 2000), using a concordance supplied by ABS

Variations in remoteness between the States and Territories are evident from the data in Table 2. As noted above, no areas in the Northern Territory are classified to the first two classes, with the population almost equally split between the Outer Regional (51.2%) (largely Darwin) and the two remote classes (48.8%: 24.1% in the Remote and 24.7% in the Very Remote). The Northern Territory has by far the highest proportions of its population in these remote areas. At the other extreme, almost all (99.8%) of the Australian Capital Territory is classified as Major Cities. Western Australia, South Australia, Victoria and New South Wales have similarly high proportions (all in the region of 70%) of their populations in the Major Cities class, while Western Australia also has the second highest proportion of population of the States/ Territories in the remote areas (9.2%: 5.5% in Remote and 3.7% in Very Remote areas).

Table 2: Population by ARIA+ and State and Territory, Australia, 1996

State/ Territory		Major Cities	Inner Regional	Outer Regional	Remote	Very Remote	Total
NSW	No.	4,265,285	1,245,349	476,637	40,001	8,787	6,036,059
	%	70.7	20.6	7.9	0.7	0.1	100.0
Vic	No.	3,192,169	922,944	251,508	6,092	-	4,372,713
	%	73.0	21.1	5.8	0.1	..	100.0
Qld	No.	1,711,584	858,853	637,365	101,971	56,078	3,365,851
	%	50.9	25.5	18.9	3.0	1.7	100.0
SA	No.	1,024,900	166,638	176,201	44,652	14,947	1,427,338
	%	71.8	11.7	12.3	3.1	1.0	100.0
WA	No.	1,205,202	186,724	173,076	94,763	63,612	1,723,377
	%	69.9	10.8	10.0	5.5	3.7	100.0
Tas	No.	-	290,267	157,242	8,797	2,721	459,027
	%	..	63.2	34.3	1.9	0.6	100.0
NT	No.	-	-	99,601	46,868	48,120	194,589
	%	..	..	51.2	24.1	24.7	100.0
ACT	No.	298,617	626	-	-	-	299,243
	%	99.8	0.2	..	..	..	100.0
Total	No.	11,697,757	3,671,401	1,971,630	343,144	194,265	17,878,197
	%	65.4	20.5	11.0	1.9	1.1	100.0

Source: Calculated on data (population by SLA) supplied by ABS

There are also some interesting variations in the characteristics of populations between the ARIA+ classes when examined by the ABS Section of State classification³ (Table 3). As would be expected, the majority (93.9%) of the population of the Major Cities class is classified as Major Urban, with 4.0% in Other Urban and 2.0% in Rural Balance. The largest concentration of population in the Inner Regional class is in Other Urban (65.6%), with a further 26.1% in Rural Balance. The Outer Regional population is also heavily weighted toward Other Urban (52.4%), with the bulk of the remainder in Rural Balance (33.2%).

Table 3: Population by ARIA+ and Section of State, Australia, 1996

ARIA+ classes		Section of State				Total	
		Major Urban	Other Urban	Bounded Locality	Rural Balance	Number	%
Major Cities	No.	10,985,361	469,463	12,715	230,218	11,697,757	..
	%	93.9	4.0	0.1	2.0	100.0	65.4
Inner Regional	No.	126,118	2,408,127	178,158	958,998	3,671,401	..
	%	3.4	65.6	4.9	26.1	100.0	20.5
Outer Regional	No.	109,914	1,033,732	172,810	655,174	1,971,630	..
	%	5.6	52.4	8.8	33.2	100.0	11.0
Remote	No.	-	177,529	45,613	120,002	343,144	..
	%	..	51.7	13.3	35.0	100.0	1.9
Very Remote	No.	-	70,741	39,124	84,094	193,959	..
	%	..	36.5	20.2	43.4	100.0	1.1
Total	No.	11,221,393	4,159,592	448,240	2,048,486	17,877,891	..
	%	62.8	23.3	2.5	11.5	100.0	100.0

Source: Calculated on data (ARIA+ class and Section of State by CD) supplied by ABS and CDATE96 (population by CD)

³ The Section of State is an urban/ rural classification, reflecting the concentration of the population. It is comprised of Major Urban (urban areas with a population of 100,000 & over); Other Urban (urban areas with a population of 1,000 to 99,999); Bounded Locality (rural localities with a population of 200 to 999); and Rural Balance (the remainder of the State/ Territory).

Neither of the remote classes has any population in Major Urban, with the bulk of the Remote class population in Other Urban (51.7%) and Rural Balance (35.0%). The population in the Very Remote class is more evenly distributed, with 43.4% in Rural Balance, 36.5% in Other Urban and 20.2% in Bounded Locality.

While almost two thirds (65.4%) of the total Australian population live in areas in the Major Cities class, only 30% of the Indigenous population live in these areas (Table 4). Conversely, although just 1.1% of the total population live in the Very Remote areas, 18.9% of the Indigenous population live in these areas.

Indigenous Australians in the Outer Regional and Remote areas are more likely than all Australians to live in the Other Urban Section of State areas, rather than in the Rural Balance areas where farming communities predominate. Indigenous people living in areas in the Very Remote class are more likely than all Australians to also be classified in the small communities in the Bounded Locality areas than in the larger towns in the Other Urban areas.

Table 4: Indigenous population by ARIA+ and Section of State, Australia, 1996

ARIA+ classes		Section of State				Total	
		Major Urban	Other Urban	Bounded Locality	Rural Balance	Number	%
Major Cities	No.	98,388	5,635	112	1,819	105,594	..
	%	92.9	5.3	0.1	1.7	100.0	30.0
Inner Regional	No.	2,849	51,858	2,285	9,019	66,011	..
	%	4.3	78.6	3.5	13.7	100.0	18.7
Outer Regional	No.	5,385	55,616	6,993	13,647	81,641	..
	%	6.6	68.1	8.6	16.7	100.0	23.2
Remote	No.	–	20,620	5,786	5,669	32,075	..
	%	..	64.3	18.0	17.7	100.0	9.1
Very Remote	No.	–	15,414	22,813	28,328	66,555	..
	%	..	23.2	34.3	42.6	100.0	18.9
Total	No.	106,622	149,143	37,989	58,482	352,236	..
	%	30.3	42.3	10.8	16.6	100.0	100.0

Source: Calculated on data (ARIA+ class and Section of State by CD) supplied by ABS and CDATE96 (population by CD)

Age and sex

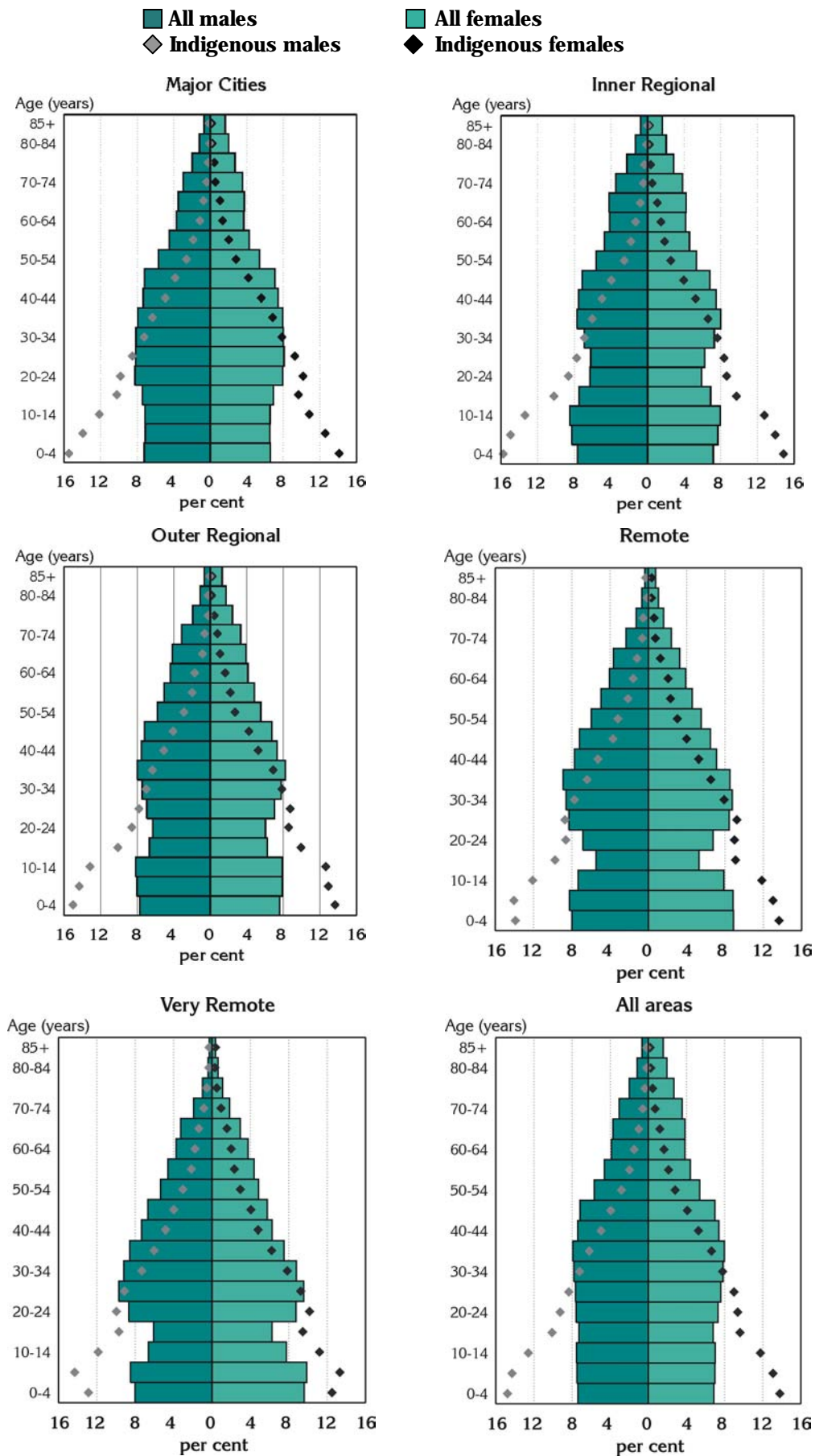
Total population

Although the largest variation in the profile of the total population by age is between the Major Cities (older, more stable population) and the Very Remote areas (younger population, with high death rates), there is a detectable pattern in each remoteness class (Figure 2 and data in Table A1).

The profile in the 'All areas' chart is typical of a slow growing (low fertility) and ageing population, with the pyramid 'undercut' at younger ages. There are similar proportions of the population in the age groups from 1 to 19 and from 20 to 39 years.

The undercut at ages from 0 to 19 years is most pronounced in the Major Cities areas. As for the 'All areas' chart, there are similar proportions of the population in the age groups from 1 to 19 and from 20 to 39 years, reflecting the long-term nature of the lack of growth in the population.

Figure 2: Total and Indigenous population in each ARIA+ class, by age and sex, 1996



Note: Proportions are shown of males and females separately, not of persons.
Source: Calculated on data (population by CD) supplied by ABS

Areas in the Inner Regional class exhibit a different profile below age 35 years than is evident in the Major Cities areas. The undercutting of the population pyramid evident in the Major Cities areas does not occur, with higher proportions in each of the 5 to 9 and 10 to 14 year age groups. This, together with the lower proportions in the 20 to 34 year age groups, suggests that family sizes in these areas are larger. The profile of the population in the Outer Regional areas is similar to that in the Inner Regional areas.

It is in the Remote areas that the pyramid develops a more differentiated profile, a profile that is accentuated in the Very Remote areas. In the Remote areas the low proportion of the population in the 15 to 19 and (to a lesser extent) 20 to 24 year age group is noticeable, although the 0 to 4 and 5 to 9 year age groups are at relatively high levels. Contributing factors are likely to include children leaving the area to attend school and the death rates at these ages.

In the Very Remote areas the proportions in the population drop sharply after the 25 to 29 year age group, and even more markedly after age 50 and age 70, as the out migration of older non-Indigenous people and high Indigenous death rates take effect. There are similarly high proportions of 0 to 4 and 5 to 9 year old children to those in the Remote areas, but with fewer at ages 10 to 14 years and more at ages 15 to 19 years.

Overall, there are higher proportions of females than males from age 65 in the Major Cities areas; from age 70 in the Inner Regional, Outer Regional and Remote areas; and from age 75 in the Very Remote areas. Females also predominate at younger ages in the Remote (0 to 4, 5 to 9 and 10 to 14 years) and Very Remote areas (0 to 4, 5 to 9 and 10 to 14, 15 to 19 and 20 to 24 years). The highest proportions of the male/ female distribution in each of the classes are:

- Major Cities: for males at ages 20 to 29 years (8.2%) and for females at ages 25 to 29 years (8.1%);
- Inner Regional: for males at ages 10 to 14 (8.5%) and for females at ages 35 to 39 (8.0%);
- Outer Regional: for males at ages 10 to 14 (8.2%) and for females at ages 35 to 39 (8.2%);
- Remote: for males at ages 35 to 39 (8.9%) and for females at ages 0 to 4 (8.9%); and
- Very Remote: for males at ages 25 to 29 (9.7%) and for females at ages 5 to 9 (9.9%).

Indigenous population

The population pyramids in Figure 2 (and data in Table A2) show the distribution of the Indigenous population in each of the ARIA+ categories. The charts highlight the very young age structure of the Indigenous population, with approximately 40% of the population aged between 0 and 14 years (41.6% for males and 38.7% for females). In the 'All areas' chart the proportion of the population decreases rapidly with increasing age, reflecting the high fertility and mortality rates among the Indigenous population. The decline is particularly noticeable for females at ages 15 to 19 years (down 18.1% on the previous age group), 50 to 54 years (down 31.1%) and 70 to 74 years (down 40.9%). For

males, the age groups with the steepest declines include 15 to 19 years (down 19.8% on the previous age group), 50 to 54 years (down 28.6%) and 80 to 84 years (down 52.2%).

Selected characteristics

Total population (Figure 3 and Table A3)

People living in the Major Cities areas had the lowest proportions of low income families in 1996, with 18.0% of people in this category. As remoteness increases, the proportion of low income families also increases, rising to 25.0% in the Very Remote class. The Remote areas had a lower proportion of low income families of 19.6%.

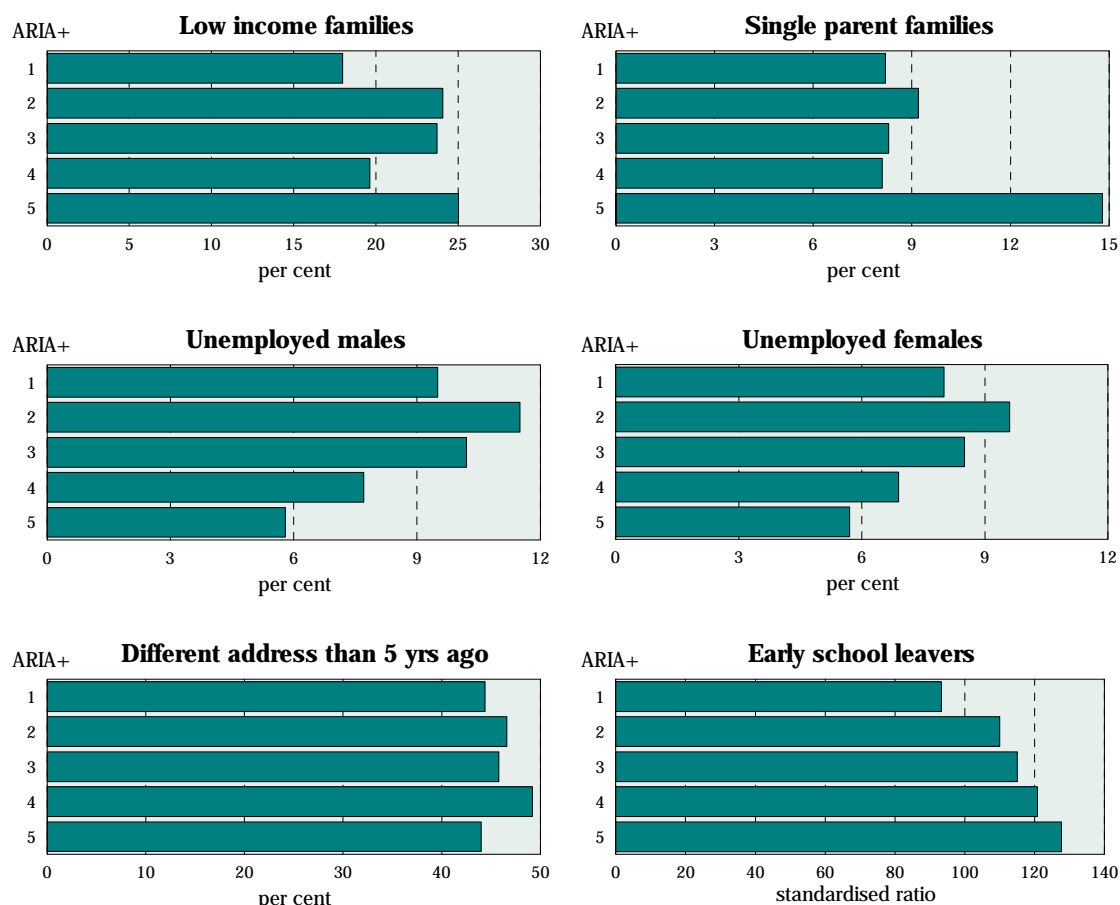
There are only minor variations across the first four ARIA categories in the proportion of single parent families with dependent children under 15 years of age, ranging from 8.2% in the Major Cities areas to 9.2% in the Inner Regional areas. A substantially higher 14.8% of families in the Very Remote areas were single parent families.

Although unemployment rates are higher among males than females, the distribution across the ARIA+ categories is similar. In 1996, 9.5% of males and 8.0% of females in the Major Cities areas were unemployed. The highest unemployment rates were recorded in the Inner Regional areas (a rate of 11.5% for males and 9.6% for females), before declining over the last three categories to a low of 5.8% for males and 5.7% for females.

People living in the areas classified within ARIA+ as Very Remote and Major Cities were the least likely to have moved address in the previous five years (with proportions of 44.0% and 44.4%, respectively). Those in the Remote areas were the most likely to have moved (49.2%).

The highest rates of educational participation (the lowest rates of people who left school at age 15 years or earlier, or did not go to school) were located in areas classified within ARIA+ as Major Cities (a Standardised Ratio of 93, or 7% fewer than expected from the Australian rates). The likelihood of people having left school before age 15 increases notably with increasing remoteness, with the Standardised Ratio rising to 128 in the Very Remote areas.

Figure 3: Selected characteristics of the population by ARIA+, 1996



1 – Major Cities; 2 – Inner Regional; 3 – Outer Regional; 4 – Remote; 5 – Very Remote.

Source: Calculated on data (population by CD) supplied by ABS

Indigenous population (Figure 4 and Table A4)

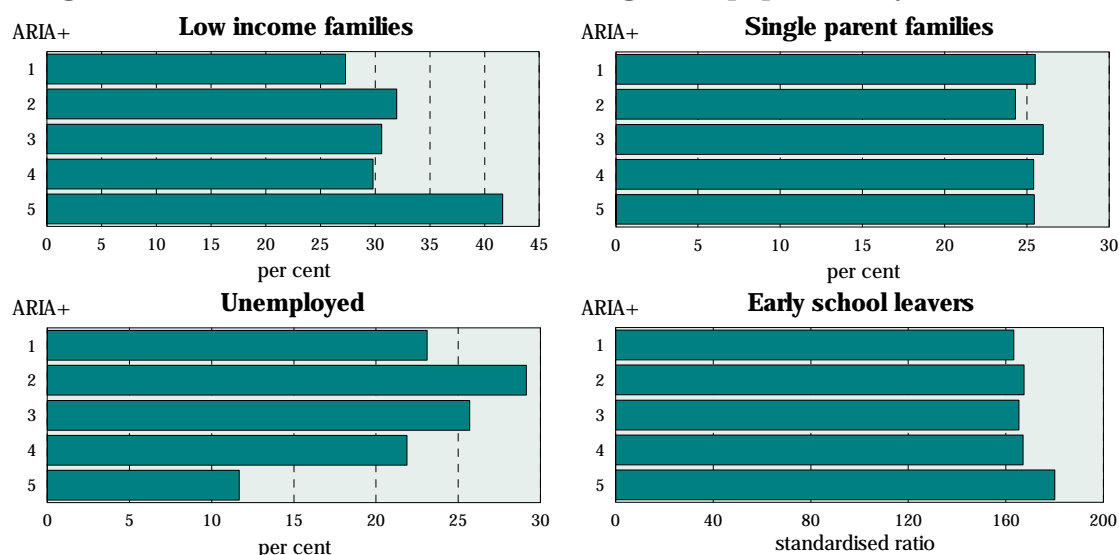
As is the case for the total population, Indigenous people living in areas included in the Major Cities class had the lowest proportion of low income families, with 27.3% of people in this category. Proportions in the next three categories declined from 32.0% in the Inner Regional areas to 29.8% in the Remote regions, before increasing to a high 41.7% in the Very Remote class. Note that the proportions here are substantially larger than for the total population, and that the lowest proportion for the Indigenous population is larger than the highest for the total population.

There is little differentiation across the ARIA categories in the proportion of Indigenous single parent families, with relatively high rates in all classes. Just over a quarter of Indigenous families in the Major Cities, Remote and Very Remote areas had one parent with dependent children under 15 years of age, with a lower rate of 24.3% in the Inner Regional areas and a higher rate of 26.0% in the Outer Regional areas.

Unemployment among the Indigenous population shows a similar pattern to that recorded for the total population, although once again the rates are considerably higher. The highest unemployment rate was recorded in the Inner Regional areas (29.1%), with proportions in the next three categories dropping steadily to 11.7% in the Very Remote areas. This is the reverse of what we might expect and is likely the result of the way in which Indigenous people record their responses to the labour force questions at the Census. Indigenous people involved in the

Community Development Employment Program – whereby their unemployment benefits are pooled and paid to the community – are likely to record themselves as employed at the Census. To the extent that this occurs the unemployment levels of Indigenous people are understated relative to the total population, where such a practice does not exist. Such understatement is likely to be greater the more remote the area. This view is supported by the data in Figure 5, which shows the proportion of the population in receipt of an unemployment benefit, to which has been added details of Indigenous people involved in the Community Development Employment Program.

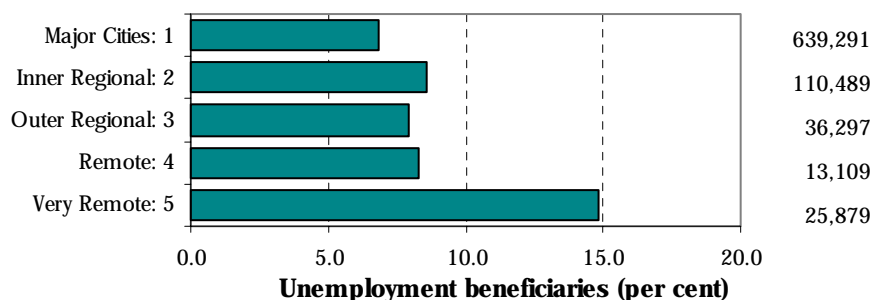
Figure 4: Selected characteristics of the Indigenous population by ARIA+, 1996



1 – Major Cities; 2 – Inner Regional; 3 – Outer Regional; 4 – Remote; 5 – Very Remote.

Source: Calculated on data (population by SLA) supplied by ABS

Figure 5: Unemployment beneficiaries¹ by ARIA+, 1996



¹Includes people involved in the Community Development Employment Program.

Source: Calculated on data (population by SLA) supplied by ABS

Educational participation rates among Indigenous people are substantially lower than for the total population in each of the ARIA+ classes. Rates for people who left school at age 15 years or earlier, or did not go to school are around half as high again as for the total population. The differential between the total population and Indigenous rates increased with increasing remoteness, rising from a Standardised Ratio of 163 in the Major Cities areas to 180 in the Very Remote class.

Details of the address of Indigenous people five years ago were not available.

Appendix 1

Calculation of the Accessibility/Remoteness Index of Australia (ARIA+)

ARIA+ measures access in terms of remoteness along a road network from 11,914 populated localities to five categories of service centres (service centres with more than 250,000 persons; with 48,000 to 249,999 persons; with 18,000 to 47,999 persons; with 5,000 to 17,999 persons; and with 1,000 to 4,999 persons). An adjustment is made for localities situated on islands (including Tasmania).

For each locality, the distance to each of the five categories of service centre is converted to a ratio to the mean. To remove the effect of extreme values, a threshold of 3 is applied to each component and then the five component index values are summed. This produces a continuous variable with values between 0 (high accessibility) and 15 (high remoteness). Index values for an expanded locality and point database of 42,648 localities are then interpolated to produce an index value for 1km grids and averages calculated for larger areas such as postcodes or SLAs.

A continuous index is ideally suited to some forms of research; however many other uses require discrete categories. To meet these other uses, the ARIA+ index values have been grouped into five categories: Major Cities, Inner Regional, Outer Regional, Remote, Very Remote. The categories were chosen on the basis of natural breaks in the data, balance across categories and broad comparability with the earlier RRMA classification.

Appendix 2: Additional Tables

Table A1: Population by ARIA+ category, age and sex, 1996

ARIA+ by age	Males		Females		Persons	
	Number	%	Number	%	Number	%
Major Cities						
0-4	410,676	7.2	388,911	6.6	799,587	6.9
5-9	404,458	7.1	386,516	6.5	790,974	6.8
10-14	406,427	7.1	388,311	6.6	794,738	6.8
15-19	421,465	7.4	409,280	6.9	830,745	7.2
20-24	467,853	8.2	470,134	7.9	937,987	8.1
25-29	463,856	8.2	477,475	8.1	941,331	8.1
30-34	461,687	8.1	473,059	8.0	934,746	8.1
35-39	451,360	7.9	469,015	7.9	920,375	7.9
40-44	417,055	7.3	438,890	7.4	855,945	7.4
45-49	408,539	7.2	420,455	7.1	828,994	7.1
50-54	323,144	5.7	318,879	5.4	642,023	5.5
55-59	255,576	4.5	253,398	4.3	508,974	4.4
60-64	210,267	3.7	217,697	3.7	427,964	3.7
65-69	198,474	3.5	221,119	3.7	419,593	3.6
70-74	168,620	3.0	210,150	3.6	378,770	3.3
75-79	112,359	2.0	161,080	2.7	273,439	2.4
80-84	67,178	1.2	118,239	2.0	185,417	1.6
85+	38,006	0.7	97,006	1.6	135,012	1.2
Inner Regional						
0-4	138,332	7.7	132,349	7.2	270,681	7.4
5-9	149,031	8.2	414,747	7.7	290,778	8.0
10-14	153,024	8.5	146,345	7.9	299,369	8.2
15-19	134,754	7.5	127,443	6.9	262,197	7.2
20-24	113,427	6.3	108,958	5.9	222,385	6.1
25-29	112,127	6.2	115,557	6.3	227,684	6.2
30-34	124,612	6.9	134,464	7.3	259,076	7.1
35-39	138,967	7.7	148,005	8.0	286,972	7.9
40-44	136,348	7.5	138,164	7.5	274,512	7.5
45-49	129,164	7.1	125,659	6.8	254,823	7.0
50-54	101,184	5.6	98,768	5.3	199,952	5.5
55-59	84,864	4.7	84,610	4.6	169,474	4.6
60-64	74,720	4.1	77,038	4.2	151,758	4.2
65-69	75,928	4.2	77,854	4.2	153,782	4.2
70-74	62,575	3.5	70,636	3.8	133,211	3.6
75-79	40,790	2.3	52,875	2.9	93,665	2.6
80-84	23,587	1.3	37,695	2.0	61,282	1.7
85+	13,542	0.7	29,471	1.6	43,013	1.2
Outer Regional						
0-4	76,532	7.7	72,670	7.6	149,202	7.6
5-9	79,598	8.0	75,193	7.9	154,791	7.9
10-14	81,113	8.2	75,458	7.9	156,571	8.0
15-19	66,203	6.7	59,842	6.3	126,045	6.5
20-24	62,465	6.3	57,903	6.1	120,368	6.2
25-29	68,915	6.9	67,400	7.0	136,315	7.0
30-34	74,000	7.4	74,390	7.8	148,390	7.6
35-39	79,412	8.0	78,574	8.2	157,986	8.1
40-44	74,820	7.5	70,140	7.3	144,960	7.4
45-49	71,353	7.2	64,575	6.7	135,928	7.0
50-54	57,477	5.8	52,980	5.5	110,457	5.7
55-59	50,185	5.0	46,340	4.8	96,525	4.9
60-64	43,485	4.4	39,528	4.1	83,013	4.3
65-69	41,146	4.1	37,529	3.9	78,675	4.0
70-74	31,005	3.1	31,936	3.3	62,941	3.2
75-79	19,038	1.9	23,289	2.4	42,327	2.2
80-84	10,825	1.1	16,554	1.7	27,379	1.4
85+	6,275	0.6	12,514	1.3	18,789	1.0

Table A1: Population by ARIA+ category, age and sex, 1996 ...cont

ARIA+ by age	Males		Females		Persons	
	Number	%	Number	%	Number	%
Remote						
0-4	14,418	8.0	13,975	8.9	28,393	8.4
5-9	14,893	8.3	13,900	8.8	28,793	8.5
10-14	13,241	7.3	12,408	7.9	25,649	7.6
15-19	9,872	5.5	8,313	5.3	18,185	5.4
20-24	12,348	6.8	10,625	6.8	22,973	6.8
25-29	14,982	8.3	13,270	8.4	28,252	8.4
30-34	15,523	8.6	13,771	8.8	29,294	8.7
35-39	16,076	8.9	13,393	8.5	29,469	8.7
40-44	13,933	7.7	11,182	7.1	25,115	7.4
45-49	12,994	7.2	10,189	6.5	23,183	6.9
50-54	10,776	6.0	8,665	5.5	19,441	5.8
55-59	8,945	5.0	7,204	4.6	16,149	4.8
60-64	7,347	4.1	6,121	3.9	13,468	4.0
65-69	6,587	3.7	5,143	3.3	11,730	3.5
70-74	4,220	2.3	3,765	2.4	7,985	2.4
75-79	2,312	1.3	2,506	1.6	4,818	1.4
80-84	1,243	0.7	1,659	1.1	2,902	0.9
85+	695	0.4	1,185	0.8	1,880	0.6
Very Remote						
0-4	8,470	8.0	8,167	9.6	16,637	8.7
5-9	8,963	8.5	8,392	9.9	17,355	9.1
10-14	7,001	6.6	6,590	7.8	13,591	7.1
15-19	6,430	6.1	5,316	6.3	11,746	6.2
20-24	9,162	8.7	7,445	8.8	16,607	8.7
25-29	10,262	9.7	8,126	9.6	18,388	9.6
30-34	9,702	9.2	7,476	8.8	17,178	9.0
35-39	9,056	8.6	6,374	7.5	15,430	8.1
40-44	7,747	7.3	5,326	6.3	13,073	6.9
45-49	7,061	6.7	4,900	5.8	11,961	6.3
50-54	5,656	5.4	4,127	4.9	9,783	5.1
55-59	4,850	4.6	3,728	4.4	8,578	4.5
60-64	3,951	3.7	3,192	3.8	7,143	3.7
65-69	3,450	3.3	2,503	2.9	5,953	3.1
70-74	2,027	1.9	1,561	1.8	3,588	1.9
75-79	1,050	1.0	938	1.1	1,988	1.0
80-84	435	0.4	534	0.6	969	0.5
85+	307	0.3	304	0.4	611	0.3
All areas						
0-4	648,428	7.4	616,072	6.9	1,264,500	7.1
5-9	656,943	7.5	625,748	7.0	1,282,691	7.2
10-14	660,806	7.5	629,112	7.0	1,289,918	7.3
15-19	638,724	7.3	610,194	6.8	1,248,918	7.0
20-24	665,255	7.6	655,065	7.3	1,320,320	7.4
25-29	670,142	7.6	681,828	7.6	1,351,970	7.6
30-34	685,524	7.8	703,160	7.8	1,388,684	7.8
35-39	694,871	7.9	715,361	8.0	1,410,232	7.9
40-44	649,903	7.4	663,702	7.4	1,313,605	7.4
45-49	629,111	7.2	625,778	7.0	1,254,889	7.1
50-54	498,237	5.7	483,419	5.4	981,656	5.5
55-59	404,420	4.6	395,280	4.4	799,700	4.5
60-64	339,770	3.9	343,576	3.8	683,346	3.9
65-69	325,585	3.7	344,148	3.8	669,733	3.8
70-74	268,447	3.1	318,048	3.5	586,495	3.3
75-79	175,549	2.0	240,688	2.7	416,237	2.3
80-84	103,268	1.2	174,681	1.9	277,949	1.6
85+	58,825	0.7	140,480	1.6	199,305	1.1

Source: Calculated on data (population by CD) supplied by ABS

Table A2: Indigenous population by ARIA+ category, age and sex, 1996

ARIA+ by age	Males		Females		Persons	
	Number	%	Number	%	Number	%
Major Cities						
0-4	7,934	15.5	7,640	14.1	15,575	14.8
5-9	7,135	13.9	6,806	12.6	13,941	13.2
10-14	6,225	12.1	5,856	10.8	12,080	11.5
15-19	5,235	10.2	5,221	9.6	10,456	9.9
20-24	5,027	9.8	5,485	10.1	10,511	10.0
25-29	4,400	8.6	5,053	9.3	9,453	9.0
30-34	3,709	7.2	4,254	7.9	7,962	7.6
35-39	3,205	6.3	3,660	6.8	6,864	6.5
40-44	2,533	4.9	3,030	5.6	5,563	5.3
45-49	1,976	3.9	2,266	4.2	4,242	4.0
50-54	1,370	2.7	1,530	2.8	2,901	2.8
55-59	945	1.8	1,087	2.0	2,032	1.9
60-64	620	1.2	774	1.4	1,394	1.3
65-69	414	0.8	619	1.1	1,034	1.0
70-74	241	0.5	346	0.6	587	0.6
75-79	153	0.3	241	0.4	394	0.4
80-84	65	0.1	160	0.3	225	0.2
85+	47	0.1	95	0.2	143	0.1
Inner Regional						
0-4	5,132	15.8	4,934	14.8	10,066	15.3
5-9	4,872	15.0	4,637	13.9	9,509	14.4
10-14	4,364	13.4	4,242	12.8	8,606	13.1
15-19	3,327	10.2	3,227	9.7	6,554	10.0
20-24	2,835	8.7	2,864	8.6	5,699	8.7
25-29	2,493	7.7	2,786	8.4	5,279	8.0
30-34	2,251	6.9	2,509	7.5	4,761	7.2
35-39	1,941	6.0	2,199	6.6	4,140	6.3
40-44	1,590	4.9	1,743	5.2	3,333	5.1
45-49	1,287	4.0	1,315	4.0	2,601	4.0
50-54	829	2.5	872	2.6	1,701	2.6
55-59	591	1.8	646	1.9	1,237	1.9
60-64	452	1.4	485	1.5	938	1.4
65-69	283	0.9	354	1.1	637	1.0
70-74	141	0.4	191	0.6	332	0.5
75-79	106	0.3	141	0.4	247	0.4
80-84	32	0.1	74	0.2	106	0.2
85+	24	0.1	48	0.1	72	0.1
Outer Regional						
0-4	6,147	14.9	5,811	13.7	11,958	14.3
5-9	5,900	14.3	5,496	12.9	11,396	13.6
10-14	5,425	13.2	5,370	12.6	10,795	12.9
15-19	4,192	10.2	4,221	9.9	8,413	10.0
20-24	3,527	8.6	3,626	8.5	7,153	8.5
25-29	3,176	7.7	3,713	8.7	6,890	8.2
30-34	2,894	7.0	3,343	7.9	6,237	7.5
35-39	2,573	6.3	2,927	6.9	5,499	6.6
40-44	2,057	5.0	2,243	5.3	4,300	5.1
45-49	1,672	4.1	1,791	4.2	3,463	4.1
50-54	1,183	2.9	1,188	2.8	2,370	2.8
55-59	820	2.0	927	2.2	1,747	2.1
60-64	693	1.7	730	1.7	1,423	1.7
65-69	375	0.9	493	1.2	868	1.0
70-74	249	0.6	327	0.8	575	0.7
75-79	128	0.3	184	0.4	313	0.4
80-84	86	0.2	103	0.2	189	0.2
85+	57	0.1	64	0.1	121	0.1

Table A2: Indigenous population by ARIA+ category, age and sex, 1996 ...cont

ARIA+ by age	Males		Females		Persons	
	Number	%	Number	%	Number	%
Remote						
0-4	2,285	13.9	2,256	13.6	4,541	13.8
5-9	2,312	14.1	2,152	13.0	4,464	13.5
10-14	1,991	12.1	1,959	11.8	3,950	12.0
15-19	1,603	9.7	1,503	9.1	3,106	9.4
20-24	1,421	8.6	1,485	9.0	2,907	8.8
25-29	1,436	8.7	1,528	9.2	2,964	9.0
30-34	1,270	7.7	1,308	7.9	2,578	7.8
35-39	1,052	6.4	1,079	6.5	2,131	6.5
40-44	869	5.3	869	5.2	1,737	5.3
45-49	609	3.7	662	4.0	1,271	3.9
50-54	523	3.2	499	3.0	1,022	3.1
55-59	350	2.1	382	2.3	731	2.2
60-64	262	1.6	341	2.1	603	1.8
65-69	195	1.2	204	1.2	399	1.2
70-74	108	0.7	120	0.7	228	0.7
75-79	91	0.6	98	0.6	188	0.6
80-84	26	0.2	55	0.3	81	0.2
85+	46	0.3	58	0.4	105	0.3
Very Remote						
0-4	4,122	12.8	4,056	12.5	8,178	12.7
5-9	4,581	14.3	4,314	13.3	8,895	13.8
10-14	3,798	11.8	3,631	11.2	7,429	11.5
15-19	3,105	9.7	3,067	9.5	6,173	9.6
20-24	3,191	9.9	3,301	10.2	6,491	10.1
25-29	2,922	9.1	2,998	9.3	5,920	9.2
30-34	2,341	7.3	2,547	7.9	4,888	7.6
35-39	1,933	6.0	2,015	6.2	3,948	6.1
40-44	1,545	4.8	1,563	4.8	3,108	4.8
45-49	1,274	4.0	1,316	4.1	2,590	4.0
50-54	969	3.0	963	3.0	1,933	3.0
55-59	687	2.1	762	2.4	1,449	2.2
60-64	561	1.7	654	2.0	1,215	1.9
65-69	437	1.4	511	1.6	948	1.5
70-74	266	0.8	307	0.9	573	0.9
75-79	164	0.5	165	0.5	329	0.5
80-84	97	0.3	100	0.3	198	0.3
85+	91	0.3	123	0.4	214	0.3
All areas						
0-4	25,633	14.8	24,710	13.8	50,343	14.3
5-9	24,815	14.3	23,418	13.1	48,233	13.7
10-14	21,823	12.6	21,071	11.8	42,894	12.2
15-19	17,494	10.1	17,251	9.6	34,745	9.9
20-24	16,033	9.2	16,782	9.4	32,815	9.3
25-29	14,457	8.3	16,093	9.0	30,550	8.7
30-34	12,487	7.2	13,969	7.8	26,456	7.5
35-39	10,722	6.2	11,888	6.6	22,610	6.4
40-44	8,606	5.0	9,453	5.3	18,059	5.1
45-49	6,829	3.9	7,359	4.1	14,188	4.0
50-54	4,879	2.8	5,068	2.8	9,947	2.8
55-59	3,400	2.0	3,803	2.1	7,203	2.0
60-64	2,598	1.5	2,984	1.7	5,582	1.6
65-69	1,704	1.0	2,185	1.2	3,889	1.1
70-74	1,004	0.6	1,291	0.7	2,295	0.7
75-79	646	0.4	829	0.5	1,475	0.4
80-84	309	0.2	492	0.3	801	0.2
85+	268	0.2	388	0.2	656	0.2

Source: Calculated on data (population by CD) supplied by ABS

Table A3: Selected characteristics of the population by ARIA+, 1996

Characteristic		Major Cities	Inner Regional	Outer Regional	Remote	Very Remote
Low income families	No.	550,618	234,548	119,385	15,587	9,031
	%	18.0	24.1	23.7	19.6	25.0
Single parent families	No.	246,693	88,494	41,611	6,312	4,611
	%	8.2	9.2	8.3	8.1	14.8
Unemployed males	No.	297,670	105,094	53,435	7,746	3,250
	%	9.5	11.5	10.2	7.7	5.8
Unemployed females	No.	200,940	66,110	31,265	4,342	1,729
	%	8.0	9.6	8.5	6.9	5.7
Different address than 5 years ago	No.	4,608,163	1,519,848	791,584	143,468	70,391
	%	44.4	46.6	45.8	49.2	44.0
Early school leavers	No.	2,911,612	1,090,966	602,693	103,631	57,604
	SR¹	93	110	115	121	128

¹Standardised Ratio

Source: Calculated on data (population by CD) supplied by ABS

Table A4: Selected characteristics of the Indigenous population by ARIA+, 1996

Characteristic		Major Cities	Inner Regional	Outer Regional	Remote	Very Remote
Low income families	No.	7,736	5,722	6,486	2,240	5,571
	%	27.3	32.0	30.6	29.8	41.7
Single parent families	No.	7,220	4,353	5,491	1,911	3,401
	%	25.5	24.3	26.0	25.4	25.4
Unemployed	No.	8,110	5,643	6,206	2,069	2,127
	%	23.1	29.1	25.7	21.9	11.7
Early school leavers	No.	25,891	15,786	21,056	8,778	18,817
	SR¹	163	168	165	167	180

¹Standardised Ratio

Source: Calculated on data (population by CD) supplied by ABS

References

- Australian Bureau of Statistics (2000) *Population by Age and Sex, Australia, 30 June 1999*, Canberra: ABS. (ABS Cat. No. 3235.0)
- Australian Bureau of Statistics (2001a) *ABS views on Remoteness, Australia*, Canberra: ABS. (ABS Cat. No. 1244.0)
- Australian Bureau of Statistics (2001b) *Outcomes of ABS views on Remoteness Consultation, Australia*, Information paper, Canberra: ABS. (ABS Cat. No. 1244.0.00.001)
- Department of Human Services and Health (1994) *Rural, Remote and Metropolitan Areas classification*, Canberra: Departments of Primary Industry and Energy and Department of Human Services and Health.
- Commonwealth Department of Health and Aged Care (1999) *Accessibility/Remoteness Index of Australia (ARIA)*, Canberra: DHAC. (DHAC Occasional paper Series No. 6) (superseded by Occasional Paper New Series No. 14 below)
- Commonwealth Department of Health and Aged Care (2001) *Measuring Remoteness: Accessibility Index of Australia (ARIA)*, Revised Edition, Canberra: DHAC. (DHAC Occasional Paper New Series No. 14)
See <http://www.health.gov.au/pubs/hfsocc/ocpanew14a.htm>; accessed 17 September 2002.
- Griffith DA (1997) 'The Griffith Service Access Frame: A Practical Model for both Quantifying Access to Services and Developing Education Profiles in Australia's Rural and Remote Areas', August.
See <http://www.nexus.edu.au/teachstud/ARERA/research/DG1.HTM>; accessed 17 September 2002.
- Lindorff K, (2002) 'Tobacco - time for action: National Aboriginal and Torres Strait Islander Tobacco Control Project', Canberra: National Aboriginal Community Controlled Health Organisation (NACCHO).
See <http://www.naccho.org.au/TobaccoReport.html>; accessed 17 September 2002.