

# Overview of Indigenous health 2004

Neil Thomson  
Jane Burns  
Samantha Burrow  
Ellie Kirov

*December 2004*

**Australian Indigenous Health***InfoNet*  
Perth

**Contents**

|   |           |
|---|-----------|
| Preface.....  | iii       |
| Acknowledgments .....   | iv        |
| <b>Introduction .....</b>   | <b>1</b>  |
| Limitations of the sources of Indigenous health information ..... | 1         |
| <b>The context of Indigenous health .....</b>                     | <b>2</b>  |
| Indigenous population.....  | 2         |
| The socioeconomic context .....                                   | 6         |
| <b>Births and pregnancy outcome.....</b>                          | <b>8</b>  |
| Age of mothers .....  | 8         |
| Total fertility rates .....                                       | 8         |
| Birthweights .....  | 9         |
| <b>Mortality .....</b>  | <b>10</b> |
| Standardised death rates.....                                     | 10        |
| Expectation of life .....   | 11        |
| Age at death .....  | 12        |
| Infant mortality .....  | 12        |
| Causes of death .....   | 13        |
| Maternal mortality .....  | 13        |
| <b>Hospitalisation .....</b>                                      | <b>15</b> |
| Separation rates .....  | 15        |
| Age-specific separation rates.....                                | 15        |
| Causes of hospitalisation.....                                    | 16        |
| <b>Selected health conditions .....</b>                           | <b>17</b> |
| Cardiovascular disease .....                                      | 17        |
| Cancer.....   | 19        |
| Diabetes .....  | 20        |
| Mental health.....  | 21        |
| Renal disease.....  | 23        |
| Injury .....  | 25        |
| Respiratory disease .....   | 27        |
| Communicable diseases.....  | 28        |
| Hepatitis.....  | 28        |
| Haemophilus influenzae type b .....                               | 29        |
| Pneumococcal disease .....  | 30        |
| Meningococcal disease.....  | 30        |
| Sexually transmitted infections .....                             | 31        |
| HIV / AIDS.....   | 32        |
| Skin infections and infestations .....                            | 33        |
| Gastroenteritis among Indigenous children .....                   | 33        |

|                                  |           |
|----------------------------------|-----------|
| Eye health .....                 | 34        |
| Ear conditions.....              | 35        |
| Oral health.....                 | 36        |
| <b>Disability .....</b>          | <b>37</b> |
| <b>Health risk factors .....</b> | <b>38</b> |
| Nutrition .....                  | 38        |
| Physical activity .....          | 39        |
| Bodyweight.....                  | 39        |
| Immunisation .....               | 39        |
| Breastfeeding .....              | 39        |
| Tobacco smoking.....             | 40        |
| Alcohol use.....                 | 40        |
| Use of other drugs .....         | 40        |
| <b>Health expenditure.....</b>   | <b>41</b> |
| <b>Concluding comments.....</b>  | <b>42</b> |
| Glossary.....                    | 43        |
| References.....                  | 45        |
| Abbreviations .....              | 54        |
| Endnotes.....                    | 56        |

Suggested citation: Thomson N, Burns J, Burrow S, Kirov E (2004)  
Overview of Indigenous health: December 2004. Retrieved [access date]  
from  
[http://www.healthinfonet.ecu.edu.au/html/html\\_bulletin/bull\\_44/reviews/thomson/reviews\\_thomson.pdf](http://www.healthinfonet.ecu.edu.au/html/html_bulletin/bull_44/reviews/thomson/reviews_thomson.pdf)

## Preface

This overview has been prepared by the Australian Indigenous HealthInfoNet as a part of our efforts to contribute to improvements in Indigenous health by making relevant, high quality knowledge and information easily accessible to policy makers, health service providers, program managers, clinicians, researchers and the general community.

Research for the overview involved the collection, collation, and analysis of a wide range of relevant information, including both published and unpublished material. Sources included government reports, articles in journals and other periodicals, books and book chapters, reports from specific studies and projects, and dissertations and theses.

The overview draws on information from the main administrative data collections (such as the birth and death registration systems and the hospital inpatient collections) and national surveys. Information from these sources has been published mainly in government reports, particularly those produced by the Australian Bureau of Statistics (ABS) and the Australian Institute of Health and Welfare (AIHW).

Importantly, the overview draws also on a wide variety of other information sources, including registers for specific diseases and other conditions, regional and local surveys, and numerous epidemiological and other studies examining particular diseases, conditions, and health determinants. Information from these sources is disseminated mainly through journals and similar periodicals, or in special reports (such as the annual reports of the Australia and New Zealand Dialysis and Transplant Registry (ANZDATA)).

A number of sections include the results of our own analyses of data obtained from a variety of sources. For example, detailed information about mortality for a number of conditions was derived from information obtained from the AIHW Mortality Database. Similarly, estimates of the age-adjusted incidence of end-stage renal disease were made using notification data provided by ANZDATA.

The initial sections provide information about the Indigenous population, the context of Indigenous health, and various measures of population health status. Most sections about specific health conditions comprise an introduction about the condition and evidence of the current burden of the condition among Indigenous people. A final section summarises the current details about expenditure for Indigenous health. (To assist readers who may not be familiar with some of the technical aspects about the analysis of health data, a glossary is provided.)

Further information about the aspects summarised in this overview are included in the corresponding sections of the HealthInfoNet's website ([www.healthinfonet.ecu.edu.au](http://www.healthinfonet.ecu.edu.au)).

We welcome your comments and feedback about the overview.

Neil Thomson, Director, on behalf of the HealthInfoNet team

## Acknowledgments

Particular thanks are extended to:

- the Australian Institute of Health and Welfare, which provided some of the mortality data used in the special analyses included in this overview. Krys Sadkowsky and Paul Jelfs were particularly helpful in the provision of these data;
- the Australian and New Zealand Dialysis and Transplant Registry (ANZDATA), which provided data on new cases of end-stage renal disease. We are particularly grateful to Stephen McDonald for the provision of these data, and for his advice in its analysis;
- the Western Australian Cancer Registry for details of cancer incidence and mortality in that State. We are extremely grateful to Dr Tim Threlfall, the Registry's Senior Medical Officer, who provided expert guidance in the selection of cancers to be analysed, and, most importantly, extracted and analysed data from the Cancer Registry's database;
- other staff of the Australian Indigenous HealthInfoNet for their support and encouragement in the preparation of this overview; and
- the anonymous reviewers of this overview for their constructive comments.

Finally, special thanks are extended to the Office for Aboriginal and Torres Strait Islander Health within the Australian Department of Health and Ageing for the support that enabled expansion of the HealthInfoNet's previous *Overview of Indigenous health* to this form and the funds for production and distribution of a hard-copy version.

## Introduction

This overview of Australian Indigenous health draws largely on published information, some of which has been re-analysed to provide clearer comparisons between Indigenous and non-Indigenous people (for more details of statistics and methods, readers should refer to the original sources). Very little information is available separately for Australian Aboriginal people and Torres Strait Islanders, so no attempt has been made to provide separate summaries for these two sub-groups of the Indigenous population. In addition to information about health status, this overview includes a brief paragraph about health expenditure on Indigenous health.

### Limitations of the sources of Indigenous health information

Indigenous health information is limited by relatively low levels of identification of Indigenous people in the vital statistics and administrative data collections, except those relating to births (in most jurisdictions) and to deaths in the Northern Territory (NT) [1].<sup>1</sup> In other administrative collections, reasonably reliable information is available for Western Australia (WA), South Australia (SA) and the NT, but there is substantial room for improvement. Also, the need for information at community level was identified in consultations undertaken for the development of the National Aboriginal and Torres Strait Islander Information Plan [2]. Survey information, such as that collected nationally by the Australian Bureau of Statistics (ABS), for example, the 2001 National Health Survey (NHS), is valuable, but it is limited by the relatively small numbers of Indigenous people surveyed.<sup>2</sup> It is also difficult to compare survey findings because of differing sample sizes, methodologies and seasonal variations in some health conditions.

Statistics on hospitalisation provide some insights into ill-health in the population. They are, however, quite a poor reflection of the extent and patterns of treatable illness in the community, since they represent only illness that is serious enough to require hospitalisation. Even then, the comparability of hospitalisation statistics is limited by many factors, including State/Territory and regional variations in admission policies, and differential geographic accessibility of hospitals. Importantly, the incompleteness of Indigenous identification in most jurisdictions means that comparisons of Indigenous and non-Indigenous hospitalisation, including those presented in this overview, under-estimate the true difference.

## The context of Indigenous health

### Indigenous population

In the 2001 Census of Housing and Population, 410,003 Aboriginal and Torres Strait Islander people were counted [3]. Based on this figure, the ABS has estimated that there were 458,520 Indigenous people living in Australia at 30 June 2001 [4]. New South Wales (NSW) had the largest Indigenous population with 134,888, followed by Queensland (125,910), WA (65,931), and the NT (56,875) (Table 1). The NT had the highest proportion of Indigenous people among its population (28.8%) and Victoria the lowest (0.6%).

**Table 1 Estimated Indigenous population, Australia, by jurisdiction, 30 June 2001**

| Jurisdiction                 | Indigenous population | Proportion of Australian Indigenous population (%) | Proportion of jurisdiction population (%) |
|------------------------------|-----------------------|--|---|
| New South Wales              | 134,888               | 29.4   | 2.1                                       |
| Victoria                     | 27,846                | 6.1  | 0.6                                       |
| Queensland                   | 125,910               | 27.5   | 3.5                                       |
| Western Australia            | 65,931                | 14.4   | 3.5                                       |
| South Australia              | 25,544                | 5.6  | 1.7                                       |
| Tasmania                     | 17,384                | 3.8  | 3.7                                       |
| Australian Capital Territory | 3,909                 | 0.9  | 1.2                                       |
| Northern Territory           | 56,875                | 12.4   | 28.8                                      |
| Australia                    | 458,520               | 100.0  | 2.4                                       |

Source: Australian Bureau of Statistics, 2003 [4]

Notes: 1 The estimates of the resident Indigenous population, based on the 2001 Census counts, make allowances for unknown Indigenous status and for net under-enumeration and make a back adjustment for natural increases between 30 June 2001 and 7 August 2001 (the date of the census).

2 Australian population includes Jervis Bay Territory, the Cocos (Keeling) Islands, and Christmas Island.

The census counts for Indigenous people were 16% higher in 2001 than in 1996 (the counts for the total Australian population were 6% higher) [5]. The difference between births and deaths contributed to 12% of the overall increase among Indigenous people, with much of the remaining 4% being attributed by the ABS to 'an increasing propensity for persons to be identified as Indigenous on census forms'. The increase of 16% between 1996 and 2001 followed an increase of 33% between 1991 and 1996.

The majority of Indigenous people live in cities and towns, but the Indigenous population is much more widely dispersed across Australia than is the non-Indigenous population. Slightly more than one-half of the Indigenous population lives in areas classified as 'major cities' or 'inner regional' areas, compared with almost nine-tenths of the non-Indigenous population [6]. (As well as these two classifications of 'remoteness' in terms of access to goods and services and opportunities for social interaction, the Australian Standard Geographical Classification (ASGC) has four other categories: 'outer regional', 'remote', 'very remote' and 'migratory' [7].) Around one-quarter of Indigenous people live in areas classified as 'remote' or 'very remote' in relation to having 'very little or very restricted access to goods and services and opportunities for social interaction' [6, 8]. Only 2% of non-Indigenous people live in remote or very remote areas.

In terms of specific geographical areas, more than one-half of all Indigenous people live in nine of the 36 ATSI regions: Sydney; Brisbane; Coffs Harbour; Wagga Wagga; Perth; Cairns; Townsville; Hobart; and Adelaide [5].

Of the estimated Indigenous population of 458,520 people, around 409,800 identified as Aboriginal, around 29,120 as Torres Strait Islander, and around 19,600 as both Aboriginal

and Torres Strait Islander (the census question on Indigenous status enabled people to identify as Aboriginal, Torres Strait Islander or Aboriginal and Torres Strait Islander.) [4, 5]. A total of 429,392 people identified as Aboriginal (including those who were identified as Aboriginal and Torres Strait Islander) and 48,730 as Torres Strait Islander (including those who were identified as Aboriginal and Torres Strait Islander) (Table 2). As expected, most Torres Strait Islander people live in Queensland, with NSW the only other State with a substantial number of Torres Strait Islanders.



**Table 2 Estimated resident Indigenous population by Aboriginal/Torres Strait Islander status and jurisdiction, 30 June 2001**

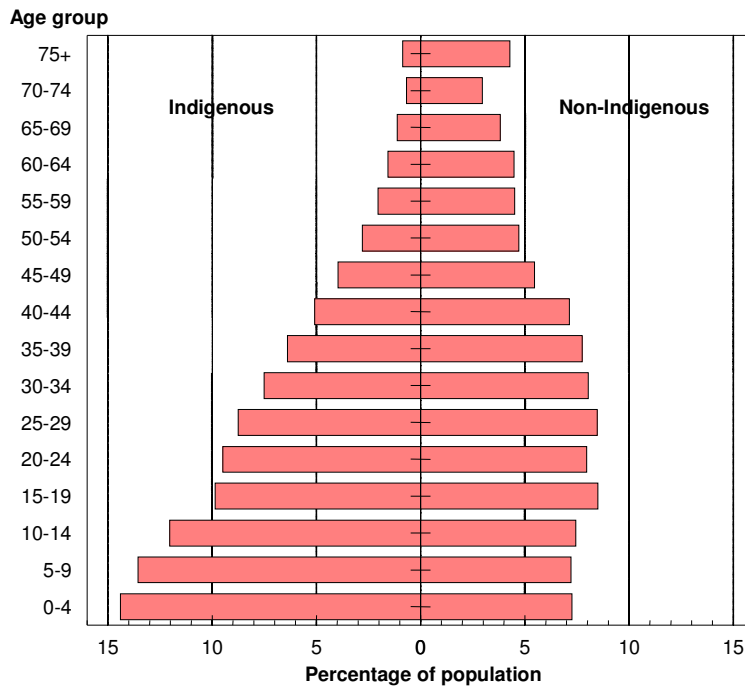
| Jurisdiction                 | Total Aboriginal population | Proportion of total Aboriginal population (%) | Total Torres Strait Islander population | Proportion of total Torres Strait Islander population (%) |
|------------------------------|-----------------------------|---|---|---|
| New South Wales              | 130,140                     | 30.3  | 8,628                                   | 17.7  |
| Victoria                     | 25,932                      | 6.0   | 3,089                                   | 6.3   |
| Queensland                   | 107,548                     | 25.0  | 28,453                                  | 58.4  |
| Western Australia            | 64,949                      | 15.1  | 2,481                                   | 5.1   |
| South Australia              | 24,683                      | 5.7   | 1,469                                   | 3.0   |
| Tasmania                     | 16,001                      | 3.7   | 2,389                                   | 4.9   |
| Australian Capital Territory | 3,734                       | 0.9   | 305                                     | 0.6   |
| Northern Territory           | 56,217                      | 13.1  | 1,858                                   | 3.8   |
| Australia                    | 429,392                     | 100.0   | 48,730                                  | 100.0   |

Source: Derived from ABS, 2002 [5] and ABS, 2003 [4]

- Notes:
- 1 The estimates of the resident Indigenous populations, based on the 2001 Census counts, make allowances for unknown Indigenous status and for net under-enumeration and make a back adjustment for natural increases between 30 June 2001 and 7 August 2001 (the date of the Census).
  - 2 People who identified as being both Aboriginal and Torres Strait Islander are included in the figures for each sub-population. As a result, the combined figure for this table is around 19,600 higher than the estimated resident population of 458,520.
  - 3 Australian populations include Jervis Bay Territory, the Cocos (Keeling) Islands, and Christmas Island.

The Indigenous population is markedly younger than the non-Indigenous population – in 2001, 40% of Indigenous people were aged less than 15 years, compared with 21% of non-Indigenous people. Only 2.6% of the Indigenous population was aged 65 years or over, compared with 12% of the non-Indigenous population (see Figure).

Figure: Population pyramid of Indigenous and non-Indigenous populations, 2001



## The socioeconomic context

The current health status of Indigenous people is only explicable in terms of their extreme social disadvantage [9]. This social disadvantage, directly related to dispossession and characterised by poverty and powerlessness, is reflected in measures of their education, employment, income and housing. Before summarising key indicators of Indigenous health status, the current sections provide information about the context within which these indicators should be considered.

Key indicators in these areas for Indigenous people nationally include:

### **Educational attainment**

According to the 2001 Census:

- 3.0% of Indigenous people aged 15 years or older had never attended school, compared with only 1.0% of non-Indigenous people;
- 17% of Indigenous people and 38% of non-Indigenous people reported having completed year 12 or equivalent (people aged 15 years or older);
- less than 2% of the Indigenous population reported attending a university or other tertiary institution, compared with almost 4% of the non-Indigenous population; and
- among those who had left school, 35% of the non-Indigenous population had some form of post-secondary school qualification (including degrees, diplomas, and trade or basic qualifications), compared with less than 15% of Indigenous people [derived from 10].

### **Employment status**

From information collected by the 2001 Census (which uses different procedures to those used in the compilation of the standard employment indicators):

- almost 22% of Indigenous males aged 15 years or over were unemployed, as were almost 18% of Indigenous females – the levels for non-Indigenous people were 7.7% for males and 6.5% for females;
- excluding people employed under the Community Development Employment Projects (CDEP) scheme, the overall Indigenous unemployment rate would have been around 34% – almost five times the rate of 7.2% for non-Indigenous people;<sup>3</sup>
- just under a quarter of employed Indigenous Australians worked as ‘labourers and related workers’ (Australian Standard Classification of Occupations (ASCO)), as did around 8% of employed non-Indigenous people;
- around 15% of employed Indigenous Australians were classified as managers or professionals (ASCO ‘managers and administrators’ and ‘professionals’), as were 28% of employed non-Indigenous people [derived from 10].

### **Income**

Key indicators include:

- the median family income for Indigenous people (\$630) in 2001 was slightly more than one-half of that for non-Indigenous people (\$1,188) [derived from 10]; and
- CDEP payments were the main source of income for 11% of Indigenous people (30% in remote areas and 4% in non-remote areas), and other government pensions and allowances for 52% [11]. The reliance on government payments is more than twice that of non-Indigenous people.

### **Housing and the physical environment**

The level and standard of current housing is a clear expression of Indigenous disadvantage, not only in remote areas, but also in long-settled parts of Australia. The sub-standard living conditions are generally characterised by overcrowding, inadequate water and washing facilities, poor sanitation and sewage disposal, limited food storage and sub-optimal food preparation facilities.<sup>4</sup>

Key indicators include:

- the average size of an Indigenous household was 3.5 persons compared with 2.6 persons per non-Indigenous household [12]. The average size of Indigenous households increased with remoteness of residence, ranging from 3.2 persons per household in the major cities to 5.3 in very remote areas. Across Australia, four-fifths of 2 or 3 bedroom households with 10 or more residents were Indigenous households [Derived from 13];
- 15% of Indigenous households required at least one additional bedroom, compared with around 4% of other households [12]. The proportions of Indigenous households requiring additional bedrooms ranged from 11% in major cities to 42% in very remote areas;
- 19% of Indigenous households in non-remote areas reported their accommodation to be in high need of repairs, compared with 7% of non-Indigenous households [14]. In remote and very remote areas, 19% needed major repairs and 10% needed replacement [15].

For Indigenous people living on discrete Indigenous communities:<sup>5</sup>

- bore water was the main source of drinking water for 62% of the total number of discrete Indigenous communities included in the 2001 CHINS [15];
- water restrictions were significant in 2001, with 35% of Indigenous communities (with a usual population of 50 or more) having experienced water restrictions within the previous year [15];
- 20% of 213 discrete Indigenous communities with 50 or more residents who were not connected to town water had not have their water tested within the previous year [15]; 26% of the communities had drinking water of poor quality that had failed testing at least once within the previous year;
- 7% of communities had no organised sewerage system [15];
- 48% of 327 discrete Indigenous communities with 50 or more residents reported a sewage overflow or leakage within the year previous to the 2001 CHINS [15];
- 94% of discrete Indigenous communities with a usual population of 50 had organised rubbish collections in place, but rubbish was disposed of in an unfenced tip in 53% of communities (this may allow rubbish to be spread by dogs and other vectors or blown from the tip) [15];
- 7% of discrete Indigenous communities with populations under 100 people had no organised electricity supply [15];
- generators were the main source of organised electricity for 66,451 people living in 647 discrete Indigenous communities;
- 82% of the 327 discrete Indigenous communities with 50 or more residents experienced electricity interruptions in the previous year;
- 31% of the discrete Indigenous communities with 50 or more residents had experienced some flooding in the previous year [15];
- 42% of discrete Indigenous communities with 50 or more residents had experienced ponding – the formation of ‘pools of still water that remain stagnant for a period of one week or more and cover an area of at least 10 square metres’ [16, p.22] – in the year prior to the 2001 CHINS [15].

## **Births and pregnancy outcome**

In 2003, there were 11,740 births registered in Australia with one or both parents identified as Indigenous (5% of all births registered), but this figure probably underestimates the true number considerably as it has been estimated that only 91% of Indigenous births in 1998-2003 were correctly identified [17]. Completeness of identification varies across the country, with only Queensland, WA, SA and the NT having levels above 90%. Both parents were identified as Indigenous in 31% of these births occurring in 2003, only the mother in 43% (including births where paternity was not acknowledged and those where the father's Indigenous status was unknown), and only the father in 27%.

### **Age of mothers**

In 2003, Indigenous women tended to have more babies and to have them at younger ages than did non-Indigenous women [17]. The median age of Indigenous mothers was 24.6 years compared with 30.5 years for all women. The highest birth rates (known technically as fertility rates) were for the 20-24 years age group for Indigenous women and in the 30-34 years age group for non-Indigenous women (Table 3). Fertility of teenage Indigenous women (73 babies per 1000 women) was more than four times the fertility rate for all teenage women (16 babies per 1000).

### **Total fertility rates**

In 2003, total fertility rates were 2,145 births per 1,000 Indigenous women and 1,755 per 1,000 for all mothers (Table 4) [17]. The highest Indigenous fertility occurred in the NT (2,771 babies per 1,000), followed by Queensland (2,332 babies per 1,000) and SA (2,172 babies per 1,000).

**Table 3 Age-specific fertility rates, by Indigenous status of mother, selected jurisdictions, Australia, 2003**

| Status of mother / age group | Jurisdiction |     |     |     |     |     |     |      |
|------------------------------|--------------|-----|-----|-----|-----|-----|-----|------|
|                              | NSW          | Vic | Qld | WA  | SA  | Tas | NT  | Aust |
| Indigenous                   |              |     |     |     |     |     |     |      |
| 15-19                        | 54           | 49  | 76  | 87  | 68  | 52  | 123 | 73   |
| 20-24                        | 124          | 98  | 133 | 144 | 114 | 93  | 174 | 133  |
| 25-29                        | 100          | 110 | 117 | 122 | 92  | 73  | 131 | 111  |
| 30-34                        | 65           | 71  | 71  | 69  | 65  | 49  | 84  | 70   |
| 35-39                        | 28           | 29  | 36  | 34  | 40  | 23  | 45  | 34   |
| 40-44                        | 7            | 7   | 9   | 8   | 10  | 3   | 9   | 8    |
| All mothers                  |              |     |     |     |     |     |     |      |
| 15-19                        | 15           | 10  | 22  | 19  | 15  | 26  | 65  | 16   |
| 20-24                        | 56           | 42  | 64  | 56  | 52  | 74  | 114 | 55   |
| 25-29                        | 106          | 94  | 107 | 104 | 103 | 118 | 117 | 103  |
| 30-34                        | 114          | 118 | 107 | 110 | 111 | 108 | 104 | 113  |
| 35-39                        | 57           | 58  | 48  | 51  | 52  | 44  | 63  | 54   |
| 40-44                        | 11           | 11  | 8   | 9   | 11  | 7   | 13  | 10   |

Source: Derived from ABS, 2004 [17]

- Notes:
- 1 Rates per 1,000 women in each age group
  - 2 Caution should be exercised in the interpretation of the figures. This is because the identification of Indigenous births is less than 90% for all jurisdictions except Queensland, WA, SA and the NT.
  - 3 Numbers of Indigenous births for the ACT were not available

**Table 4 Total fertility rates, by Indigenous status of mother, selected jurisdictions, Australia, 2003**

| Status of mother | Jurisdiction |       |       |       |       |       |       |       |
|------------------|--------------|-------|-------|-------|-------|-------|-------|-------|
|                  | NSW          | Vic   | Qld   | WA    | SA    | Tas   | NT    | Aust  |
| Indigenous       | 1,892        | 1,826 | 2,208 | 2,323 | 1,951 | 1,467 | 2,830 | 2,145 |
| All mothers      | 1,798        | 1,669 | 1,776 | 1,739 | 1,720 | 1,892 | 2,377 | 1,755 |

Source: Derived from ABS 2004 [17]

- Notes:
- 1 Total fertility rate is the number of children born to 1,000 women at the current level and age pattern of fertility
  - 2 Caution should be exercised in the interpretation of the figures. This is because the identification of Indigenous births is less than 90% for all jurisdictions except Queensland, WA, SA and the NT.

## Birthweights

The average birthweight of babies born to Indigenous mothers in 2001 was 3,166 grams, which is around 200 grams less than the average for babies born to non-Indigenous mothers, 3,382 grams (Table 5) [18]. Babies born to Indigenous women in 2001 were more than twice as likely to be of low birthweight (LBW) (12.9%) than were those born to non-Indigenous women (6.0%). (LBW, which is defined as a birthweight of less than 2,500 grams, increases the risk of death in infancy and other health problems.) The low-birthweight proportions for babies born to Indigenous women were highest for SA (16.5%), WA (15.7%) and the NT (12.7%).

**Table 5 Mean birthweights and percentage of low birthweight for babies born to Indigenous and non-Indigenous mothers, selected jurisdictions, Australia, 2001**

|                               | NSW   | Vic   | Qld   | WA    | SA    | NT    | Aust  |
|-------------------------------|-------|-------|-------|-------|-------|-------|-------|
| <b>Indigenous mothers</b>     |       |       |       |       |       |       |       |
| Mean birthweight              | 3,186 | 3,205 | 3,213 | 3,100 | 3,095 | 3,138 | 3,166 |
| % low birthweight             | 12.5  | 11.7  | 11.2  | 15.6  | 16.5  | 12.7  | 12.9  |
| <b>Non-Indigenous mothers</b> |       |       |       |       |       |       |       |
| Mean birthweight              | 3,387 | 3,368 | 3,401 | 3,364 | 3,375 | 3,354 | 3,382 |
| % low birthweight             | 5.8   | 6.2   | 6.0   | 5.9   | 6.1   | 6.0   | 6.0   |

Source: Derived from Laws and Sullivan, 2004 [18]

- Notes: 1 Low birthweight is defined as less than 2,500 grams  
 2 Mean birthweights for babies born to non-Indigenous mothers have been estimated from published figures for Indigenous and all mothers

Risk factors for LBW include socioeconomic disadvantage, the size and age of the mother, the number of babies previously born, the mother's nutritional status, illness during pregnancy and the duration of the pregnancy [19]. A mother's alcohol consumption and use of tobacco and other drugs during pregnancy can also impact on the size of her baby. According to the Western Australian Aboriginal Child Health Survey (WAACHS), infants born to mothers who used tobacco during pregnancy had a significantly lower average birth weight (3,110 grams) than did infants born to mothers who had not used tobacco during pregnancy (3,310 grams) [20]. Lowest average birthweights were for infants whose mothers used marijuana with tobacco (3,000 grams) or with both tobacco and alcohol (2,940 grams).

## Mortality

Major impediments to producing a complete picture of Indigenous mortality in Australia are the incomplete identification of Indigenous status in death records, and the experimental nature of the population estimates [12]. As a result, the 2,140 deaths registered in 2002 where the deceased person was identified as Indigenous is certainly an underestimate of the actual number of Indigenous deaths [21].

Assessment by the ABS of the completeness of recording of Indigenous deaths is based on a comparison of registered Indigenous deaths with an estimate of the expected number of Indigenous deaths for the particular jurisdiction. The estimated completeness of identification of Indigenous people in death registrations has improved generally in recent years, but was still only 55% overall in 2001 [22]. WA, SA and the NT have been the jurisdictions with the most complete identification, but, except for the NT, identification in 2001 was generally quite poor (see footnote in 'Limitations of the sources of Indigenous health information' for proportions of Indigenous deaths identified correctly). Reflecting this, the ABS provided in 2001 detailed breakdown of Indigenous deaths only for NSW, Victoria, Queensland, WA, SA and the NT [22]. The poor coverage, coupled with the need to update the procedures for estimating coverage based on population figures derived from the 2001 census, meant that the ABS publication for 2002 did not include detailed tables of Indigenous deaths, nor information about overall death rates. As a result, there is no consistency about the extent of information available for recent years. Reflecting this, readers should be aware that the following sections vary in terms of the years to which they relate.

### Standardised death rates

After adjusting for the differences in the age structures of the Indigenous and non-Indigenous populations, death rates for Indigenous people were between two and four times those of non-

Indigenous people in Australia in 2001 (rates and ratios for the projected numbers of deaths should be interpreted with caution for two reasons: (1) the numbers are based on the estimated completeness of Indigenous identification in death registration systems for each jurisdiction; and (2) the population figures may under-estimate the actual numbers of Indigenous people. It is likely, however, that the true rates will be closer to those based on the projected numbers than to those based solely on death registrations.) (Table 6) [22].

**Table 6 Indigenous and non-Indigenous indirectly standardised death rates (ISDRs) and ISDR ratios, by jurisdiction, 2001**

| Jurisdiction       | Indigenous rate |             | Non-Indigenous rate | Rate ratio |            |
|--------------------|-----------------|-------------|---------------------|------------|------------|
|                    | Registered      | Projected   |                     | Registered | Projected  |
| New South Wales    | 9.9             | 21.8        | 5.4                 | 1.8        | 4.0        |
| Victoria           | 8.6             | 21.1        | 5.0                 | 1.7        | 4.2        |
| Queensland         | 12.6            | 22.5        | 5.6                 | 2.3        | 4.0        |
| Western Australia  | 13.4            | 21.5        | 5.2                 | 2.6        | 4.1        |
| South Australia    | 13.7            | 23.2        | 5.6                 | 2.4        | 4.1        |
| Northern Territory | 20.2            | 23.6        | 6.0                 | 3.4        | 3.9        |
| <b>Australia</b>   | <b>12.4</b>     | <b>22.3</b> | <b>5.3</b>          | <b>2.3</b> | <b>4.2</b> |

Source: Derived from ABS, 2002 [22]

- Notes: 1 The projected numbers of deaths are based on the estimated completeness of Indigenous identification in death registration systems for each jurisdiction  
2 Rates are per 1,000 population; rate ratio is the Indigenous rate divided by the non-Indigenous rate

### Expectation of life

After adjustment for the underestimate of the number of deaths identified as Indigenous (using the 1996 Census-based estimates and projections), Indigenous males born in 1999-2001 could be expected to live to 56.3 years, almost 21 years less than the 77.0 years expected for all males (Table 7) [22]. The expectation of life at birth of 62.8 years for Indigenous females was almost 20 years less than the expectation of 82.4 years for all Australian females.

**Table 7 Expectation of life at birth for Indigenous people and the total population, Australia and selected States, 1999-2001**

| Population              | Males | Females |
|-------------------------|-------|---------|
| <b>Indigenous</b>       |       |         |
| Australia               | 56.3  | 62.8    |
| New South Wales         | 56.8  | 63.6    |
| Victoria                | 56.8  | 63.8    |
| Queensland              | 56.6  | 62.5    |
| Western Australia       | 55.5  | 63.0    |
| South Australia         | 55.1  | 61.0    |
| Northern Territory      | 55.7  | 62.1    |
| <b>Total population</b> |       |         |
| Australia               | 77.0  | 82.4    |

Source: ABS, 2002 [22]

- Note: The Australian Indigenous estimates are based on the adjusted numbers of deaths for NSW, Victoria, Queensland, WA, SA and the NT, and do not include deaths for the ACT and Tasmania.



### Age at death

For those jurisdictions with reasonable information about Indigenous deaths, the median age at death for Indigenous males in 2002 ranged from 47.1 years for the NT to 56.3 years for NSW [21]. (The median age at death is the age below which 50% of people die. Because the measure partly reflects the age structures of the respective populations, it is a less precise measure than age-specific death rates, which are summarised below.) These levels are around 20 years less than those for non-Indigenous males, which were generally around 76-77 years. The median age at death for Indigenous females in 2002 ranged from 50.0 years for the NT to 61.9 years for NSW. These levels are more than 20 years less than those for non-Indigenous females, which were generally between 82 and 83 years.

Age-specific death rates are higher for Indigenous people than for the total population across all age groups, but the rate ratios are particularly high in the young and middle adult years (Table 8) [21]. (These ratios, being based on the numbers of deaths registered, are likely to underestimate the true differences between death rates for Indigenous people and the total population by up to 30%.)

**Table 8 Indigenous and total population age-specific death rates (registered deaths) and Indigenous:total population rate ratios, by sex, New South Wales, Queensland, Western Australia, South Australia, and the Northern Territory, 2002**

| Age group (years) | Indigenous |         | Total population |         | Rate ratio |         |
|-------------------|------------|---------|------------------|---------|------------|---------|
|                   | Males      | Females | Males            | Females | Males      | Females |
| 0-4               | 3.0        | 3.0     | 1.3              | 1.1     | 2.3        | 2.7     |
| 5-9               | 0.2        | 0.2     | 0.1              | 0.1     | 2.0        | 2.0     |
| 10-14             | 0.3        | 0.3     | 0.2              | 0.1     | 1.5        | 3.0     |
| 15-19             | 1.1        | 0.9     | 0.6              | 0.3     | 1.8        | 3.0     |
| 20-24             | 1.9        | 1.5     | 1.0              | 0.3     | 1.9        | 5.0     |
| 25-29             | 3.5        | 1.5     | 1.1              | 0.4     | 3.2        | 3.8     |
| 30-34             | 5.4        | 3.5     | 1.2              | 0.5     | 4.5        | 7.0     |
| 35-39             | 5.9        | 3.3     | 1.3              | 0.7     | 4.5        | 4.7     |
| 40-44             | 8.3        | 4.4     | 1.7              | 1.0     | 4.9        | 4.4     |
| 45-49             | 12.9       | 6.9     | 2.7              | 1.5     | 4.8        | 4.6     |
| 50-54             | 17.0       | 10.4    | 3.8              | 2.5     | 4.5        | 4.2     |
| 55-59             | 20.0       | 15.2    | 5.9              | 3.8     | 3.4        | 4.0     |
| 60-64             | 35.6       | 25.5    | 10.2             | 6.1     | 3.5        | 4.2     |
| 65-69             | 56.7       | 34.9    | 16.6             | 9.7     | 3.4        | 3.6     |
| 70-74             | 55.9       | 52.1    | 28.4             | 16.3    | 2.0        | 3.2     |
| 75+               | 116.8      | 93.1    | 80.3             | 65.2    | 1.5        | 1.4     |

Source: Derived from ABS, 2003 [21]

- Notes
- 1 Indigenous and total population rates are for NSW, Qld, WA, SA and the NT combined
  - 2 Rates are per 1,000 population
  - 3 Rate ratio is the Indigenous rate divided by the total population rate

### Infant mortality

The infant mortality rate is the number of deaths of children under one year of age in a calendar year per 1,000 live births in the same calendar year. For those jurisdictions with reasonable information about Indigenous deaths in 2000-2002, the highest Indigenous infant mortality rate was in the NT (18.1) and the lowest in NSW (9.5) (Table 9) [21]. These rates

are considerably higher than those for the total population in these jurisdictions, which range from the NT (11.2) to WA (4.6).

**Table 9: Infant mortality rates, Indigenous and total populations and rate ratios, selected jurisdictions, 2000-2002**

| Jurisdiction       | Indigenous | Total population | Rate ratio |
|--------------------|------------|------------------|------------|
| New South Wales    | 9.5        | 5.0              | 1.9        |
| Queensland         | 11.5       | 6.0              | 1.9        |
| Western Australia  | 16.5       | 4.6              | 3.6        |
| South Australia    | 10.4       | 4.8              | 2.2        |
| Northern Territory | 18.1       | 11.2             | 1.6        |

Source: Derived from ABS, 2003 [21]

- Notes: 1 Infant mortality rate is the number of infant deaths per 1,000 live births  
 2 The Indigenous rates are likely to be under-estimated, due to the incomplete identification of Indigenous status on death records

## Causes of death

For deaths identified as Indigenous in 2000-2002, cardiovascular disease (also known as 'diseases of the circulatory system', which includes heart disease and stroke) was the leading cause of death for Indigenous males and females living in Queensland, WA, SA and the NT, with rates 3.2 and 2.8 times those of males and females of the total population (note: the estimates quoted here have not been adjusted for the likely under-identification of Indigenous people in death registration systems, so the numbers and SMRs could be up to 30% higher) (Table 10) [19].

For Indigenous males, the next most frequent causes of death were injuries (including transport accidents, intentional self-harm and assault) (rate 3.0 times that of the total male population), malignant neoplasms (cancers) (1.3), diseases of the respiratory system (3.9), and endocrine, nutritional and metabolic disorders (mainly diabetes) (7.3). For Indigenous females, the most frequent causes of death after cardiovascular disease were malignant neoplasms (rate 1.6 times that of the total female population), endocrine, nutritional and metabolic disorders (11.7), injuries (2.9), and disease of the respiratory system (3.6).

## Maternal mortality

In 1997-1999 (the most recent period for which detailed data are available) seven (9.3%) of the 90 maternal deaths where Indigenous status was known were of Indigenous women (Indigenous status was not reported in 17% of the deaths) [23].

Reflecting the higher rate of confinements among Indigenous women, the maternal mortality ratio for Indigenous women in 1995-1997 was 23.5 per 100,000 confinements, more than three times higher than the ratio of 7.6 per 100,000 for non-Indigenous women (Table 11).<sup>6</sup> For direct maternal deaths, the ratio for Indigenous women was 13.0 compared with 5.1 for non-Indigenous women.

**Table 10 Numbers of Indigenous deaths, by cause and sex, and Indigenous standardised mortality ratios, Queensland, Western Australia, South Australia and the Northern Territory, 2000-2002**

| Cause of death                       | Males  |     | Females |      |
|--------------------------------------|--------|-----|---------|------|
|                                      | Number | SMR | Number  | SMR  |
| Circulatory                          | 664    | 3.0 | 510     | 2.2  |
| Injuries                             | 524    | 3.0 | 230     | 2.9  |
| Cancer                               | 356    | 1.3 | 314     | 1.6  |
| Respiratory                          | 228    | 3.9 | 170     | 3.6  |
| Endocrine, nutritional and metabolic | 193    | 7.3 | 250     | 10.1 |
| Digestive                            | 118    | 4.6 | 90      | 3.4  |
| Mental and behavioural disorders     | 79     | 3.6 | 37      | 1.0  |
| Nervous system                       | 67     | 2.7 | 44      | 1.6  |
| Infectious and parasitic             | 64     | 5.3 | 53      | 5.4  |
| Genitourinary                        | 48     | 4.6 | 90      | 7.5  |
| Other                                | 216    | -   | 190     | -    |
| All causes                           | 2,557  | 2.9 | 1,978   | 2.6  |

Source: AIHW, 2004 [19]

- Notes:
- 1 The standardised mortality ratio (SMR) is the ratio of the number of Indigenous deaths occurring to the number expected if the age, sex and cause-specific rates of the Australian total population applied to the Indigenous population.
  - 2 Due to under-identification of Indigenous deaths, these numbers and SMRs are likely to underestimate the true differences between the Indigenous and total populations by around 30%

**Table 11 Numbers of confinements, maternal deaths and maternal mortality ratios, by Indigenous status, Australia, 1997-1999**

| Indigenous status                   | Confinements | Maternal deaths | Maternal mortality ratio |
|-------------------------------------|--------------|-----------------|--------------------------|
| <b>Indigenous</b>                   | 25,530       |                 |                          |
| All maternal deaths                 |              | 7               |                          |
| Direct and indirect maternal deaths |              | 6               | 23.5                     |
| <b>Non-Indigenous</b>               | 758,030      |                 |                          |
| All maternal deaths                 |              | 83              |                          |
| Direct and indirect maternal deaths |              | 62              | 7.6                      |

Source: Slaytor, Sullivan and King, 2004 [23]

- Note:
- 1 Maternal mortality ratio is the number of maternal deaths divided by the number of confinements (in 100,000s). Due to some uncertainty about the numbers of Indigenous deaths and confinements, some caution must be exercised in the interpretation of the ratios.
  - 2 The non-Indigenous numbers and ratios include deaths for which Indigenous status was not known. This probably results in a slight, unknown over-estimate, and a resultant under-estimate of the differences between Indigenous and non-Indigenous women.

## Hospitalisation

### Separation rates

Of the 6.65 million hospital separations recorded in Australia during 2002-03, almost 203,000 (3%) were identified as Indigenous [24]. The age-standardised separation rate of 620 separations per 1,000 for the Indigenous population was almost twice that of the non-Indigenous population (329 per 1,000). The proportions of separations involving just overnight stays in hospital were very similar for Indigenous and non-Indigenous people – 47% and 46% respectively.

The identification of Indigenous people in hospital data is considered acceptable for only WA, SA and the NT, so these Australia-wide rates under-estimate the true difference between Indigenous and non-Indigenous hospitalisation. For jurisdictions with acceptable levels of Indigenous identification, the ratios of Indigenous and non-Indigenous separation rates are higher: 2.6 for WA, 2.0 for SA and 4.3 for the NT [24]. (Overall, it is likely that the Australia-wide numbers and rates for Indigenous hospitalisation could be up to 25% higher.)

### Age-specific separation rates

Separation rates were higher for Indigenous people than for non-Indigenous people for virtually all age groups, with the highest differences in the middle adult years (Table 12) [24].

**Table 12** Age-specific hospital separation rates, by Indigenous status and sex, and Indigenous:non-Indigenous rate ratios, 2002-03

| Age group | Males           |                     |            | Females         |                     |            |
|-----------|-----------------|---------------------|------------|-----------------|---------------------|------------|
|           | Indigenous rate | Non-Indigenous rate | Rate ratio | Indigenous rate | Non-Indigenous rate | Rate ratio |
| 0-4       | 333             | 273                 | 1.2        | 270             | 207                 | 1.3        |
| 5-14      | 88              | 92                  | 1.0        | 75              | 71                  | 1.1        |
| 15-24     | 142             | 126                 | 1.1        | 369             | 212                 | 1.7        |
| 25-34     | 304             | 154                 | 2.0        | 492             | 356                 | 1.4        |
| 35-44     | 574             | 194                 | 3.0        | 593             | 282                 | 2.1        |
| 45-54     | 963             | 283                 | 3.4        | 1053            | 309                 | 3.4        |
| 55-64     | 1241            | 476                 | 2.6        | 1660            | 430                 | 3.9        |
| 65-74     | 1142            | 825                 | 1.4        | 1777            | 659                 | 2.7        |
| 75+       | 1074            | 1219                | 0.9        | 1060            | 890                 | 1.2        |

Source: Derived from AIHW, 2004 [24].

- Notes:
- 1 Numbers do not include 231,044 separations for which Indigenous status was not stated
  - 2 Rates are expressed as separations per 1,000 population
  - 3 Rate ratio is the Indigenous rate divided by the non-Indigenous rate
  - 4 The rates have not been adjusted for likely under-identification of Indigenous separations, so it is likely that the Indigenous rates, and hence the rate ratios, could be 25-30% higher

### Causes of hospitalisation

In 2002-03 the most common reason of hospitalisation for Indigenous people was 'care involving dialysis' accounting for 36% of Indigenous separations (73,028 separations) [24]. Many of these separations involved repeat admissions for the same people, some on an almost daily basis. The ICD group 'Injury and other consequences of external causes' (including motor vehicle accidents, assaults, self-inflicted harm and falls) was the next most common cause of hospitalisation for Indigenous people, being responsible for 8.4% of separations (17,058 separations) (Table 13). (Unfortunately, the published data do not provide separate figures for males and females.)

**Table 13 Leading causes of Indigenous separations (excluding dialysis): numbers, proportions of separations, age-standardised separation rates and Indigenous:non-Indigenous rate ratios, 2002-03**

| Principal diagnosis                        | Number of separations | Proportion of Indigenous separations | Rate  | Rate ratio |
|--|-----------------------|--------------------------------------|-------|------------|
| Injury/poisoning                           | 17,058                | 8.4                                  | 41.1  | 1.9        |
| Pregnancy related                          | 16,932                | 8.3                                  | 28.0  | 1.2        |
| Respiratory diseases                       | 14,980                | 7.4                                  | 59.9  | 3.7        |
| Digestive diseases                         | 11,195                | 5.5                                  | 31.5  | 0.8        |
| Mental & behavioural disorders             | 9,184                 | 4.5                                  | 19.7  | 1.4        |
| Symptoms, signs not elsewhere classified   | 8,722                 | 4.3                                  | 27.6  | 1.4        |
| Circulatory diseases                       | 6,920                 | 3.4                                  | 24.6  | 1.1        |
| Genitourinary conditions                   | 5,862                 | 2.9                                  | 16.8  | 0.9        |
| Infectious/parasitic diseases              | 4,987                 | 2.5                                  | 20.9  | 4.6        |
| Diseases of the skin & subcutaneous tissue | 4,981                 | 2.4                                  | 13.8  | 2.4        |
| Other                                      | 29,074                | 14.3                                 | n/a   | n/a        |
| All causes, excluding dialysis             | 129,783               | 64.0                                 | 383.3 | 1.3        |

Source: AIHW, 2004 [24]

- Notes:
- 1 The published data do not provide separate figures for males and females
  - 2 Rates, directly standardised using the June 1991 Australian population as the reference population, are expressed as separations per 1,000 population
  - 3 Excludes hospitalisation for dialysis
  - 4 The numbers have not been adjusted for likely under-identification of Indigenous separations, so it is likely that the Indigenous numbers, and hence rates and ratios, could be up to 25% higher

## Selected health conditions

### Cardiovascular disease

Cardiovascular disease (CVD) presents a significant burden for Indigenous people in terms of prevalence, hospitalisation, and mortality [25]. Factors contributing to the development of cardiovascular disease include age, socio-economic circumstances, family history, physical inactivity, tobacco smoking, poor nutrition, and related physiological factors (high blood pressure, high blood cholesterol, overweight and obesity, and diabetes). A combination of risk factors and rural and remote dwelling contribute to higher levels of heart, stroke, and vascular disease among Indigenous people [25]. Immediate treatment and care of cardiovascular conditions for many Indigenous people are limited because of distance to health services, the availability of transport to access services, and language and cultural differences.

#### *Extent of cardiovascular disease among Indigenous people*

According to the 2001 NHS, the age-standardised prevalence for 'circulatory problems/diseases' was 19% among Indigenous respondents, and 17% among non-Indigenous respondents [26].<sup>7</sup> Indigenous people living in remote areas were more likely to report having 'circulatory problems' than those living in non-remote areas (24% compared with 18%). Of Indigenous people aged 35-44 years, 16% reported a cardiovascular condition, the rate increasing to 31% for those aged 45 to 54 years, and to 47% for those aged 55 years or over.

The most commonly reported circulatory system disorder in Indigenous people over 25 years of age was hypertension. The prevalence of hypertension increases with age and among Indigenous people prevalence increased from the age of 35 years, with onset approximately 10 years younger than for non-Indigenous people.

There were 6,920 hospital separations identified as Indigenous for 'diseases of the circulatory system' in 2002-03, representing 3.4% of separations identified as Indigenous [24]. Hospitalisation rates were 1.1 times higher than for non-Indigenous people.

Details are not available for 2002-03, but hospitalisation rates for heart failure and coronary heart disease were between 1.5 and three times higher for Indigenous people than for non-Indigenous people in 2001-02 [25]. Indigenous males were more likely to be hospitalised for heart, stroke or vascular diseases than Indigenous females. Indigenous males were three times more likely to be hospitalised for these conditions than other Australian males, and Indigenous females were 1.7 times more likely than other Australian females. For acute rheumatic fever and chronic rheumatic heart disease, hospitalisation rates for Indigenous males and females were six and eight times higher than for other Australians.

Collectively, cardiovascular disease is the leading cause of death in the Indigenous population (Table 10) [27]. Ischaemic heart diseases was responsible for 16% of all Indigenous deaths in 2002, compared with 20% of non-Indigenous deaths [28]. In Queensland, WA, SA, and the NT in 2000-2002, 'heart, stroke and vascular diseases' were the leading causes of death, accounting for 26% of Indigenous deaths at a rate 2.6 times higher than for non-Indigenous people [25].

Rheumatic heart disease was responsible for relatively few deaths, but the death rate for Indigenous people was 19 times higher than the rate for other Australians [25].

Deaths of Indigenous people from cardiovascular disease occur at younger age groups than those of non-Indigenous people – 62% of Indigenous deaths occurred prior to the age of 65 years compared with 10% for other Australians [25].

## Cancer

There is uncertainty about the incidence of cancer among Indigenous people, largely due to the under-identification of Indigenous people in cancer registrations, the exact extent of which has not been quantified [12]. The NT has the most complete information about the incidence of cancer among Indigenous people, and WA is the only other jurisdiction for which reasonable incidence data are available. Information about deaths from cancer is more readily available, but, as noted in the section on mortality, the overall levels of Indigenous identification are not very high.

Many of the cancers affecting Indigenous people are preventable – for example, cancers related to tobacco use, to which Indigenous people are particularly prone due to high levels of smoking [29-31]. (See ‘Tobacco smoking’ in the section on health risk factors.)

### *Extent of cancer among Indigenous people*

The evidence available suggests that the incidence rates of cancer for Indigenous people are slightly lower than those for non-Indigenous people, but that death rates are generally higher (Table 14) [12, 29-32].

**Table 14 Cancer: Indigenous to non-Indigenous incidence and death rate ratios, Queensland, WA, SA and the NT**

| Jurisdiction       | Incidence rate ratio |        | Death rate ratio |        |
|--------------------|----------------------|--------|------------------|--------|
|                    | Male                 | Female | Male             | Female |
| Queensland         | 0.9                  | 0.9    | 1.7              | 1.6    |
| Western Australia  | 0.7                  | 0.7    | 1.3              | 1.2    |
| South Australia    | n.a.                 | n.a.   | 0.9              | 1.3    |
| Northern Territory | 0.8                  | 0.8    | 1.1              | 1.3    |

Source: ABS & AIHW, 2003 [12]; Kirov and Thomson, 2003 [31]; Zhao, Condon and Garling, 2004 [32]

- Notes:
- 1 Queensland incidence data are for 1996-2000 and mortality data for 1999-2001; WA incidence and mortality are for 1997-2001; and the NT incidence and mortality data are for 1991-2001
  - 2 Rate ratio is the Indigenous age-standardised rate divided by the non-Indigenous age-standardised rate
  - 3 The age-standardised rates from which these ratios were derived have not been included in this table or in other parts of this section because they were calculated using different standard populations – the Queensland, WA and SA rates used the World Standard Population and the NT rates used the 2001 Australian Estimated Resident Population

The patterns of cancer differed somewhat between jurisdictions, but lung cancer was among the leading specific cancers for Indigenous males and females in all jurisdictions – rates for Indigenous people were higher than those for non-Indigenous people except for Indigenous males living in WA [12, 31, 32]. The incidence of breast cancer was generally substantially lower among Indigenous women than among non-Indigenous women, but that of cervical cancer was considerably higher among Indigenous women than among non-Indigenous women. Liver cancer is another specific cancer for which incidence is generally higher for Indigenous people than for non-Indigenous people. Incidence rates for pancreas cancer were higher for Indigenous people than for non-Indigenous people in WA and the NT.<sup>8</sup> On the other hand, colorectal cancer, which has a high incidence among non-Indigenous people, is not among the leading cancers for Indigenous people. The proportions of cancers for which the primary site was unknown were much higher for Indigenous people than for non-Indigenous people in all jurisdictions.

The ICD group ‘neoplasms’ (including cancers) was the third most common cause of death among Indigenous people living in Queensland, WA, SA and the NT combined in 2000-2002 [19]. The number of deaths from neoplasms among Indigenous males was 1.3 times higher than the number expected from rates for the non-Indigenous male population, and the number for Indigenous females 1.6 times higher. Overall, neoplasms were responsible for around 8% of the excess deaths experienced by Indigenous people [12].



The leading specific cause of death from cancer for Indigenous males and females living in WA and the NT was lung cancer, with other smoking-related cancers (particularly cancers of the oropharynx, oesophagus, stomach and pancreas) also being common causes of death [29-32].<sup>9</sup> The death rates for these cancers were generally higher for Indigenous people than for non-Indigenous people (the exception was the death rate from lung cancer for Indigenous males living in WA, which was slightly lower than for their non-Indigenous counterparts). Breast cancer was also a common cause of death for Indigenous females living in WA and the NT, with rates slightly lower than those for their non-Indigenous counterparts.

Cervical cancer is an important cause of death for Indigenous women, with the death rate for those living in Queensland, WA, SA and the NT in 1999-2002 being more than seven times that of their non-Indigenous counterparts [33]. Except for women aged less than 30 years, rates were higher for Indigenous women than for non-Indigenous women in every age group. Cervical cancer was the second most common cause of death for Indigenous women living in the NT in 1991-2001, with a rate four times that of their non-Indigenous counterparts [32]. A separate analysis of trends in cancer death rates in the NT found that the rate for cervical cancer among Indigenous women decreased by more than 50% in 1997-2000 [30]. Similar trend data are not available for WA, but the death rate for Indigenous women in WA in 1997-2001 was much lower than the rate for Indigenous women in the NT in 1991-2001,<sup>10</sup> and only 1.5 times that of non-Indigenous women in WA [31].

The quite low cervical death rate for Indigenous women in WA in 1997-2001 and the marked reduction in the rate for Indigenous women in the NT in 1997-2000 raises the possibility that these rates may be reflecting the impact of preventive Pap test programs, leading to earlier diagnosis and treatment [30].

The analysis of trends in cancer death rates in the NT also found that death rates for smoking-related cancers, including lung cancer, more than doubled between 1977-1982 and 1997-2000 [30]. For these cancers, the higher rate ratios for younger than older Indigenous people was seen as probably related to the comparatively recent uptake of smoking by Indigenous people in the NT.

Importantly, this analysis and a recent review of cancer services for Indigenous people have highlighted the fact that the absolute differences in survival after diagnosis with cancer are greatest for cancers with the highest survival in non-Indigenous people [29, 30]. That is, for cancers that are 'amenable to early diagnosis, effective treatment and a high probability of cure' [29, p.8]. As well, some of the most common cancers among Indigenous people are preventable, such as 'through reduced tobacco consumption, increased Pap test coverage and follow-up treatment, hepatitis B immunisation, and reduced alcohol misuse' [29, p.9].<sup>11</sup>

The review concluded that 'the experience of Indigenous people and cancer provides evidence that the Australian health system is not operating as effectively for Indigenous people as for other Australians' and that there was a need for 'strengthening primary health care services, reducing barriers for access to specialist services and improving collaboration between the two' [29, pp. 16-17].

## Diabetes

Diabetes is a major health problem for many Indigenous people, not only because the prevalence and hospitalisation rates are higher than those of the non-Indigenous population, but also because morbidity and mortality associated with various diabetic complications are likely to increase [34]. Diabetes also poses long-term effects on the quality of life experienced by Indigenous people [35]. Type 2 diabetes is the most common form of diabetes worldwide, and has been recognised as one of the most significant health problems facing Indigenous people in Australia [12].

Risk factors for the development and onset of type 2 diabetes are categorised as non-modifiable and modifiable [36]. Non-modifiable risk factors include family history, race/ethnicity, degree of westernisation, and increasing age. Modifiable risk factors include

obesity, poor diet, inactivity, and high blood pressure [37]. Possessing any number of risk factors increases the likelihood of developing type 2 diabetes. Type 2 diabetes development in Indigenous people has consistently been linked to high levels of centrally located obesity, the 'thrifty genotype', and/or other genetic factors. Furthermore, the 'westernisation' of Indigenous communities has led to current levels of physical inactivity and poor nutrition. Social, economic, and environmental disadvantage have also contributed to higher levels of type 2 diabetes, complications, and other chronic conditions in Indigenous people [38].

#### ***Extent of diabetes among Indigenous people***

In the 2001 NHS, the age-standardised prevalence for diabetes among Indigenous people was 11%, almost four times the prevalence for non-Indigenous people (3%) [26]. The age-standardised prevalence for Indigenous people was higher for people living in remote areas (16%), and lower for people living in non-remote areas (9%), but it has been estimated that the prevalence could be as high as 20% and 25%, and possibly higher than 30% in remote areas [39].

For 2001-2002, hospital separation rates for diabetes were much higher for Indigenous people (12.3 per 1,000) than for non-Indigenous people (4.9 per 1,000) (Australian Institute of Health and Welfare, 2003). Separation rates for diabetes were higher across all age groups, but they were highest for Indigenous females aged 55-64 years (40 separations per 1,000), and Indigenous males over 65 years of age (38 separations per 1,000) (Australian Bureau of Statistics, 2003).

Deaths due to diabetes accounted for 8% of all Indigenous deaths in 2002, compared with 2% of all non-Indigenous deaths (Australian Bureau of Statistics, 2003). In Queensland, WA, SA and the NT in 1998-2000, the rate for diabetes as the main cause of death among Indigenous males was seven times the rate for non-Indigenous males, and the rate for Indigenous females was 14 times higher than that for non-Indigenous females (National Centre for Monitoring Diabetes, 2002).

#### **Mental health**

Despite the importance of mental health to the total wellbeing of whole Indigenous community [40], 'there are glaring deficiencies in our knowledge' about mental health disorders [41, p. 150]. The deficiencies in knowledge are complicated by the complexity of the general area of mental health, in which 'diverse views exist and where terms are used in different ways' [42, p.5].

In trying to clarify the terms used, *The National Mental Health Plan, 2003-2008* defines mental health as 'a state of emotional and social wellbeing in which the individual can cope with the normal stresses of life and achieve his or her potential' [42, p.5]. (The Plan notes that the term 'social and emotional wellbeing' is preferred by some people, including Indigenous people, because of its more positive and holistic connotations.)

The Plan recognises a continuum between mental health (or social and emotional wellbeing) and mental illness – 'a clinically diagnosable disorder that significantly interferes with an individual's cognitive, emotional and social abilities' [42, p.5]. Using this terminology, mental illness includes potentially life-threatening conditions like chronic depression and schizophrenia, for which a person needs professional help, often from a psychiatrist. The Plan uses the term 'mental health problems' for those issues that interfere with a person's cognitive, emotional and social abilities to a lesser extent than a clinical mental illness. Trauma and grief – related to 'the history of invasion, the ongoing impact of colonisation, loss of land and culture, high rates of premature mortality, high levels of incarceration, high levels of family separations ... and also Aboriginal deaths in custody' – have been identified as underlying the great burden among Indigenous people of 'mental health problems', which may lead to 'mental illness' [40, 42].

The distinction between 'mental illness' and 'mental health problems' is not well defined [42], but it is an important distinction in ensuring that all aspects of the lack of mental health

(or social and emotional wellbeing) are addressed adequately in Indigenous, and other, populations.

***Extent of mental illness and mental health problems among Indigenous people***

The extent of mental illness and mental health problems has been recognised as ‘a major difficulty for most [Indigenous] communities’ [40], but, as noted above, the precise details are poorly documented.

Data on the incidence or prevalence of mental illness and mental health problems among Indigenous people are not available [19], and the Indigenous supplement of the 2001 NHS did not include specific questions related to mental health [26].<sup>12</sup>

The 2002 NATSISS didn’t include questions relating specifically to mental health, but did direct attention to stressors experienced in the previous 12 months. Overall, Indigenous people aged 18 years or older were almost one-and-a-half times more likely to report experiencing at least one stressor (82%) than non-Indigenous people did (57%, as reported in the 2002 ABS General Social Survey) [11]. The stressors reported most frequently by Indigenous people were: death of a family member or close friend (46%); serious illness or disability (31%); and inability to get a job (27%) (Table 15). Indigenous people living in remote areas were slightly more likely than those living in non-remote areas to report experiencing a stressor (86% compared with 81%). There were also differences between remote and non-remote areas in the proportions of people reporting the various types of stressors.

**Table 15 Proportions (%) of Indigenous people reporting stressors in the previous 12 months, by region of residence and stressor type, Australia, 2002**

| Type of stressor                      | Residence |        |            |
|---------------------------------------|-----------|--------|------------|
|                                       | Australia | Remote | Non-remote |
| Death of a family member or friend    | 46        | 55     | 42         |
| Serious illness or disability         | 31        | 34     | 30         |
| Not able to get a job                 | 27        | 25     | 28         |
| Alcohol or drug related problem       | 25        | 37     | 21         |
| Overcrowding at home                  | 21        | 42     | 13         |
| Member of family sent to jail/in jail | 20        | 25     | 17         |
| Trouble with police                   | 18        | 22     | 17         |
| Discrimination/racism                 | 18        | 16     | 18         |
| Any stressor                          | 82        | 86     | 81         |

Source: ABS, 2004 [11]

There were 9,184 hospital separations with a principal diagnosis of ‘mental and behavioural disorders’ identified as Indigenous in Australia in 2002-03 (4.5% of separations identified as Indigenous, excluding those for renal dialysis) [24].<sup>13</sup> The rate for Indigenous people was 1.4 times that for non-Indigenous people.

Information about hospitalisation for the specific sub-categories within this ICD chapter is not available for 2002-03, but the separation rates of Indigenous people for ‘mental and behavioural disorders due to psychoactive substance use’ in 2000-01 were 4.8 times higher for males and 3.6 times higher for females than those for their non-Indigenous counterparts [12]. Rates for Indigenous males and females for ‘schizophrenia, schizotypal and delusional disorders’ were more than double those for non-Indigenous males and females, and those for ‘mood and neurotic disorders’ slightly higher.

In 1999-2001, 103 Indigenous people living in Queensland, WA, SA, and the NT died as a result of 'mental and behavioural disorders': 4.1 times as many deaths as expected for Indigenous males and 2.1 times as many deaths as expected for Indigenous females (based on total Australian rates) [12]. A further 198 deaths of Indigenous people were attributed to 'intentional self-harm' (suicide). The numbers of suicides were 2.8 times more than expected for Indigenous males and 1.9 times more than expected for Indigenous females (based on the sex-specific rates for the total Australian population).

The overall numbers of suicide conceal, however, the very high rates of suicide among young Indigenous people. From the more detailed data available for WA, SA, and the NT in 1997-2001, the Indigenous:non-Indigenous rate ratios were 3.4 for males and 6.1 for females in the 15-24 age groups (see Table 16). The exceptionally high rate for Indigenous females aged less than 24 years - higher even than for non-Indigenous males in that age group - reflects the fact that 20 of the 32 Indigenous female suicides involved females in that age group (four were of females less than 15 years old).

**Table 16 Age-specific suicide rates, by Indigenous status and sex, and rate ratios, for WA, SA, and NT (1997-2001)**

| Age group | Indigenous |         | Indigenous |         | Rate ratio |         |
|-----------|------------|---------|------------|---------|------------|---------|
|           | Males      | Females | Males      | Females | Males      | Females |
| <24       | 87.3       | 29.5    | 25.5       | 4.8     | 3.4        | 6.1     |
| 25-34     | 104.8      | 5.0     | 40.9       | 7.4     | 2.6        | 0.7     |
| 35-44     | 45.9       | 18.7    | 33.8       | 8.6     | 1.4        | 2.2     |
| 45-54     | 4.4        | 4.0     | 24.0       | 7.4     | 0.2        | 0.5     |
| 55-64     | 17.0       | 0       | 16.9       | 5.5     | 1.0        | 0       |
| 65-74     | 0          | 0       | 19.7       | 5.2     | 0          | 0       |
| 75+       | 41.4       | 10.3    | 22.8       | 5.3     | 1.8        | 2.0     |

Source: Derived from data provided by the AIHW National Mortality Database and ABS low-series population projections (based on 1996 Census)

- Notes:
- 1 Rates are per 100,000 population; rate ratio is the Indigenous rate divided by the non-Indigenous rate
  - 2 Caution should be exercised in the interpretation of these figures, as some rates for Indigenous people were based on very small numbers of deaths
  - 3 Rates for the <24 years age group include deaths of people aged 14 years or under, but the rates have been calculated using the population figures for the 15-24 years age groups as the denominators

Recent research in Queensland, NSW and the ACT has highlighted the increasing impact of suicide among young Indigenous people [43, 44]. It may be, as Tatz argues, that suicide and attempted suicide among Indigenous youth (at least in NSW and the ACT) is not the result of mental illness 'in the strict pathological sense' [44, p.80], but it is certainly a manifestation of mental health problems.

Unfortunately, there is little recent information available about the extent of mental illness among Indigenous people, apart from that about some aspects of hospitalisation. There is, on the other hand, a considerable number of detailed studies - the most recent from the 1980s - which support the conclusion that 'serious psychiatric disorders occur in Indigenous populations, and are at least as common as in the mainstream population' [41, p.140].

## Renal disease<sup>14</sup>

Renal disease, particularly kidney disease, is more prevalent among Indigenous people than among non-Indigenous people [19], but the high rates of end-stage renal disease (ESRD) among Indigenous people have only been fully recognised in recent years. Currently dialysis is the most common treatment in hospital for Indigenous people. In Indigenous communities, successful management and control of renal disorders depends not only on effective,

acceptable medical and surgical treatment but also on action to ameliorate the poor socioeconomic conditions [45].

Risk factors for renal disease include infections, diabetes, high blood pressure, heredity, injury, excess weight, tobacco, smoking and use of certain analgesic compounds and related agents [46]. The major cause of kidney failure in Australia is glomerulonephritis, a term for a group of kidney diseases in which there is inflammation of the glomeruli.

#### ***Extent of renal disease among Indigenous people***

Notifications of ESRD are much higher for Indigenous people than they are for non-Indigenous people across most of the country, but rates are particularly high in remote areas – up to 30 times higher than the total national incidence [47].

In 2001, 6.2% of the persons registered with the ANZDATA identified as Indigenous (761 Indigenous people out of 12,278 registrations) [12].<sup>15</sup> Of 1,883 new cases starting treatment for renal disease, 9% were Indigenous. Indigenous patients were younger than non-Indigenous patients, with 66% aged less than 55 years.

Between 1997 and 2001, a total of 719 new Indigenous patients were identified with ESRD (Table 17) – the age-standardised notification rate of 645 new cases per 1,000,000 population for Indigenous people was almost nine times the rate of 75 per 1,000,000 for non-Indigenous people. The highest rates were for Indigenous people in the NT (1,471 per 1,000,000) and WA (906), but Queensland (691) and SA (562) also had very high rates.

The death rate from chronic kidney disease for Indigenous people in 2000-2002 was seven times as high as the rate for non-Indigenous people [19]. Between 1999 and 2001, chronic kidney disease was reported as the underlying cause of 108 deaths among Indigenous people living in Queensland, WA, SA and the NT [12].

**Table 17 End-stage renal disease: age-standardised notification rates, by Indigenous status, and rate ratios, selected jurisdictions, Australia, 1997-2001**

| Jurisdiction       | Indigenous |       | Non-Indigenous |      | Rate ratio |
|--------------------|------------|-------|----------------|------|------------|
|                    | Number     | Rate  | Number         | Rate |            |
| New South Wales    | 90         | 289   | 2,726          | 76   | 3.8        |
| Victoria           | 20         | 276   | 2,042          | 81   | 3.4        |
| Queensland         | 190        | 691   | 1,244          | 70   | 9.7        |
| Western Australia  | 154        | 906   | 646            | 71   | 12.7       |
| South Australia    | 45         | 562   | 570            | 68   | 10.2       |
| Northern Territory | 219        | 1,471 | 50             | 108  | 17.1       |
| Australia          | 719        | 645   | 7,430          | 75   | 8.6        |

Source: Derived from data provided by ANZDATA and ABS low series population projections (based on 1996 Census)

- Notes
- 1 Rates per 1,000,000 population have been standardised using the Australian 1991 population as the reference
  - 2 Rate ratio is the Indigenous rate divided by the non-Indigenous rate
  - 3 Figures for Australia include Tasmania and the ACT

Dialysis, specifically haemodialysis conducted in urban or regional clinics and hospitals, is the most common form of treatment for Indigenous people with ESRD [48], but evidence suggest that rates of withdrawal from treatment are also frequently high [49]. High Indigenous withdrawal rates in the NT have been attributed to: difficulties with chronic disability; the complex treatment regimen; and the loss of social support and connection with the land that accompanies relocation [49]. It should be noted, however, that the high rate of

withdrawal observed in the NT is not necessarily representative of the wider Indigenous population and is not apparent among Indigenous people in NSW [50].

About 84% of all Indigenous dialysis patients on the ANZDATA registry in 2001 were receiving haemodialysis treatment in either a hospital or a hospital satellite unit [12]. The ICD-10 group 'care involving dialysis' accounted for 33% of all hospital separations among Indigenous people in 2001-02 [51]. Indigenous men were around six times as likely to be hospitalised for 'care involving dialysis' as were non-Indigenous men; Indigenous women were approximately 14 times as likely to be hospitalised for this reason than their non-Indigenous counterparts.

Despite high treatment rates, an analysis of Indigenous ESRD patients commencing treatment between 1993 and 1998 revealed inequitable access to treatment services for a significant proportion of these patients [47]. Almost one-half of all Indigenous ESRD patients came from regions without dialysis or transplant facilities, and around one-sixth from regions with only satellite dialysis facilities. At the beginning of 2001, only five of the 16 ATSIC regions with the highest Indigenous ESRD incidence rates had satellite dialysis units.

Self-care dialysis in remote communities provides an effective alternative to metropolitan-based treatment. However, when this option is not available or not practicable, remote-area patients are relocated to dialysis units in major cities, with significant psychosocial and economic implications for individuals and the health care system [52]. Research has documented the enormous social, cultural and geographical difficulties experienced by many Indigenous renal patients who have to relocate from remote communities [53].

In terms of prevention, evaluation of a systematic treatment program implemented in the Tiwi Islands (off the coast of the Northern Territory) suggests that progression to ESRD has been reduced by half and that there has been a reduction in deaths from natural causes [54, 55]. This has led to a reversal in the pattern of ESRD in the community, with previously increasing rates of ESRD and natural death reduced. The program focuses on vigorous blood-pressure control and better metabolic management for people with diabetes and renal disease, or with diabetes and high blood pressure. It is centred on the use of the long-acting angiotensin-converting enzyme inhibitor (ACEi) perindopril, an anti-hypertensive with cardiovascular and renal protective effects. The program demonstrates that renal disease can be easily diagnosed and its progression dramatically altered by available interventions (Hoy et al. 2001).

## **Injury**

Injury from a variety of sources presents a significant burden of ill-health among Indigenous people. Assessing the total impact of injury is difficult, however. The vast majority of injuries do not result in hospitalisation or death and there are few systematic data on them other than those collected as part of population surveys, such as the ABS National Health Surveys. As a result, they may not be brought to the attention of health policy-makers and program managers [56-58].

Even for injuries that are serious enough to be recorded in the routine data collections or are identified by specific studies, there are some issues with their classification. The classification of injury has generally followed the World Health Organization's International Classification of Diseases (ICD), which includes particular attention to the external cause and intention of the injury. This system is followed in this section, but it has its limitations (for more details, see [59]).

Understanding of the proximal factors contributing to most types of injury among Indigenous people is limited, but the levels and types of injury need to be seen within a broad context including: disruption to cultural, environmental, and lifestyle variables; socioeconomic disadvantage; geographical isolation; increased road usage; exposure to hazardous environment(s); substance abuse; violence; social and familial dysfunction; risky behaviour;

risky home environments; and limited access to health and social support services [56, 57, 60-62].

### ***Extent of injury among Indigenous people***

Data from the 2001 NHS indicate that self-reported health conditions ‘as a result of an injury or accident’ were reported more frequently by Indigenous people than by non-Indigenous people across all age groups [26]. Reporting of injury increased significantly in Indigenous adults over the age of 25 years, and peaked among Indigenous adults between the ages of 45-55 years. Within this age group, 22% of Indigenous and 18% of non-Indigenous people reported a health condition as a result of an injury or accident.

One-quarter of Indigenous people reported in the 2002 NATSISS that they had been a victim of physical or threatened violence in the previous 12 months, a level nearly double that reported in the 1994 NATSIS (13%) [11].<sup>16</sup> After taking account of the different age structures of the two populations, the level of victimisation among Indigenous people was more than twice the level among non-Indigenous people [63]. Victimization was mainly among younger Indigenous people, with males aged 15-24 years having the highest reported level (36%).

In 2002-03, injuries were responsible for more than 17,000 hospital separations for Indigenous people across Australia – more than 13% of all Indigenous separations (excluding those of renal dialysis) [24]. The separation rate of 41 per 1,000 for Indigenous people was around 1.9 times that of 22 per 1,000 for non-Indigenous people. Information about the specific types of injury responsible for the hospital separations is not available for 2002-03, but in 2000-01 assault was the most common cause of external injury resulting in Indigenous hospitalisation (responsible for 23% of injury separations for Indigenous males, and 31% for Indigenous females), followed by accidental falls (17% males, 15% females), medical and surgical complications (10% males, 14% females), and transport-related injuries (11% males, 7% females) [Derived from 12].

Injury was the underlying cause of death for 15.6% of all Indigenous deaths registered in Australia in 2002, compared with 5.6% of non-Indigenous deaths [21]. From the more detailed data available for 1997-2001, the numbers of deaths from injury among Indigenous people living in WA, SA, and the NT were around three times the number expected for males and more than six times the number expected for females (Table 18) [58]. (Based on the estimated completeness of Indigenous identification for WA, SA, and NT the actual numbers and ratios could be up to 30% higher – see ‘Limitations of the sources of Indigenous health information’.)

**Table 18 Injury: numbers of Indigenous deaths and SMRs, WA, SA and the NT, 1997-2001**

| Injury type                     | Males      |            | Females    |            |
|---------------------------------|------------|------------|------------|------------|
|                                 | Number     | SMR        | Number     | SMR        |
| Land transport (V01-V89)        | 172        | 3.3        | 78         | 6.7        |
| Motor vehicle crashes (V10-V79) | 90         | 2.3        | 35         | 3.8        |
| Pedestrians (V01-V09)           | 62         | 8.0        | 33         | 32.5       |
| Other land transport (V80-V89)  | 20         | 4.4        | 10         | 0.1        |
| Intentional self-harm (X60-X84) | 140        | 2.2        | 32         | 2.5        |
| Assault (X85-Y09)               | 48         | 8.5        | 48         | 22.3       |
| Other external causes           | 171        | 3.5        | 85         | 7.5        |
| <b>All types</b>                | <b>531</b> | <b>3.2</b> | <b>243</b> | <b>6.4</b> |

Source: Thomson and Brooks, 2003 [58], derived from data from the AIHW mortality database

Notes: 1 SMRs (standardised mortality ratios) have been calculated by dividing the numbers of Indigenous deaths for each sex by the numbers expected from the rates for non-Indigenous people of the same sex.

Intentional self-harm was the leading specific cause of injury death among Indigenous males living in WA, SA and the NT in 1997-2001 (responsible for 26% of injury deaths), followed by motor-vehicle crashes (17%) and deaths of pedestrians (12%) [58]. Among Indigenous females, one-fifth of injury deaths were the result of assault, with the other major causes being motor-vehicle crashes and deaths of pedestrians (each 14%), and intentional self-harm (13%).

The numbers of Indigenous deaths were much higher than expected from non-Indigenous rates – for all injury categories and for both sexes (see SMRs in Table 16). The Indigenous numbers were particularly high for pedestrian deaths (eight times higher than expected for males and 33 times higher for females) and for assault (nine times higher for males and 22 times higher for females). The numbers of Indigenous deaths from intentional self-harm were higher than the numbers expected, by similar ratios for males (2.2) and females (2.5) (see also ‘The extent of mental illness and mental health problems among Indigenous people’).

Death rates from injury for Indigenous males and females were higher than those for their non-Indigenous counterparts in every age group. An indication of the enormous impact of injury on Indigenous females is the fact that their age-specific rates were higher generally than those for non-Indigenous males.

### **Respiratory disease**

Respiratory diseases represent a significant burden of ill-health and hospitalisation among Indigenous people, particularly among very young and older people [64]. The development of respiratory diseases is dependent on a number of contributing factors, including poor environmental conditions, socioeconomic disadvantage, risky behaviour (particularly cigarette smoking), and previous medical conditions [65-68]. Infants and children under 5 years of age are more susceptible to developing respiratory conditions due to factors like hand and face washing, childhood immunisation, parental smoking, poor nutrition (including aspects related to infant-feeding and weaning practices), and poor environmental conditions [65]. Among Indigenous adults, common risk factors for respiratory diseases include tobacco smoking, use of alcohol and other substances, diabetes mellitus and chronic renal disease [67]. Factors that may affect the risk of acquiring asthma include environmental and other related factors (for example diet and lifestyle), which may also change the course of the disease, or trigger attacks of airway narrowing and symptoms [19]. Factors that can trigger airway narrowing and symptoms in people with asthma include exercise, viral infections, irritants (for example, smoking and air pollutants), specific allergens and some food preservatives.

#### ***Extent of respiratory disease among Indigenous people***

In the 2001 NHS, 33% of Indigenous respondents reported having a respiratory condition, compared with 30% of non-Indigenous respondents [26]. Asthma was the second most commonly reported health condition among Indigenous people with a prevalence of 17% compared with 12% among non-Indigenous people.

There were 14,980 hospital separations identified as Indigenous for respiratory disease in 2002-03, representing 7.4% of separations identified as Indigenous (excluding those for renal dialysis) [24]. Hospitalisation rates for Indigenous people were 3.7 times higher than those for non-Indigenous people (based on the under-identification of Indigenous people in the hospital inpatient collections, these ratios could be up to 25% higher). The more detailed information available for 1999-2000 revealed that separation rates were particularly high in infancy and early childhood [69].

Disease of the respiratory system is among the leading causes of death for Indigenous people, being responsible for almost 9% of all deaths of Indigenous people living in Queensland, WA, SA and the NT in 2000-2002 (Table 10) [19]. The numbers of deaths from respiratory disease among Indigenous people is around four times higher than the numbers expected from rates for the non-Indigenous population (bearing in mind the under-identification of Indigenous people in death registration systems, this difference could be up to 30% higher).



Overall, respiratory disease is responsible for more than 9% of the excess deaths experienced by Indigenous people [12].

The more detailed information available for Indigenous people living in WA, SA and the NT combined in 1999-2001 reveals that the leading specific respiratory cause of death for both Indigenous males and females was chronic lower respiratory disease, for which there were around five times more deaths than expected [67]. Pneumonia and influenza were responsible for only small numbers of deaths, but the numbers were 12–15 times more than expected from the rates for the non-Indigenous population.

The differences between Indigenous and non-Indigenous people in death rates from respiratory disease are particularly high among young adults, with rates in the 35-44 years age group being around 20 times higher for males and 10 times higher for females [12].

### **Communicable diseases**

Communicable diseases of particular importance to Indigenous people include: tuberculosis; hepatitis (A, B, and C); sexually transmitted infections; HIV/AIDS; Haemophilus influenzae type b (Hib); pneumococcal disease, and meningococcal disease [70, 71]. For 2000-01, the Indigenous hospitalisation rate for communicable diseases including infectious and parasitic diseases was more than twice that of non-Indigenous people [12]. The highest rates of hospital separations for 'infectious and parasitic diseases' occurred in Indigenous children less than one year of age followed by those aged 1-4 years.

Risk factors for communicable diseases vary according to type of disease. Communicable diseases can be caused by: bacteria (for example, pertussis (whooping cough) and tuberculosis); bacterial toxins (for example, some forms of food poisoning); viruses (for example, measles, influenza and HIV); fungi (for example, tinea); protozoan parasites (for example, malaria) [19]. Communicable diseases also include infestation with larger parasites, such as head lice, as well as diseases which are spread through infectious particles, such as transmissible spongiform encephalopathies.

Information regarding specific communicable diseases comes from a variety of sources, including individual studies and State and Territory based notifiable disease collections. Data from State collections are collected and published by the National Notifiable Disease Surveillance System (NNDSS), but Indigenous status is often not reported for large proportions of notifications.

#### **Hepatitis**

Hepatitis, an inflammation of the liver, can be caused by viral infections, alcohol or drug abuse, or an attack by the body's immune system on itself (OATSIS 1997). The viruses identified most frequently have been designated hepatitis A, B, and C (hepatitis types D through G have been identified also).

##### **Hepatitis A**

Of the 1,012 notifications of hepatitis A for people living in NSW, WA, SA, and the NT in 2000-2002, 113 (11%) were identified as being Indigenous (in 22% of notifications, Indigenous status was not stated) [72]. The standardised notification rate of 9.1 per 100,000 for Indigenous people was almost three times the rate of 3.1 per 100,000 for other people. Differences between Indigenous and other people in notification rates were particularly high among children, with rate ratios of 22 for the 0-4 years age group and 7.7 for the 5-14 years age group.

The real incidence of hepatitis A among Indigenous people is probably much higher than these figures suggest, however, as the disease is endemic in many rural and remote communities [73, 74].

##### **Hepatitis B**

Of the 526 notifications of hepatitis B for people living in NSW, WA, SA, and the NT in 2000-2002, 57 (11%) were identified as being Indigenous (in 27% of notifications,

Indigenous status was not stated) [72]. The standardised notification rate of 7.2 per 100,000 for Indigenous people was more than four times the rate of 1.6 per 100,000 for other people. Notification rates were highest in the 15-24 years and 25-49 years age groups for both Indigenous and other people, but the difference in rates was greatest for people aged 50 years or older.

The relatively few notifications among people aged less than 15 years (3 Indigenous and 13 others) probably reflect the impact of childhood hepatitis B vaccination programs, which were first introduced for Indigenous people in the NT in the 1980s [72, 75]. These programs appear to have changed the incidence pattern of hepatitis B among Indigenous people, as early research suggests that the virus had been present at high levels in some Indigenous populations for some time: the virus was originally known as the 'Australia antigen' after its discovery in an Australian Aboriginal person in 1965 [76].<sup>17</sup> With a high prevalence in some Indigenous populations, transmission may have occurred more from mother to baby and horizontally through infected wounds on the surface of the skin, rather than its current modes: via blood (particularly from contaminated injecting equipment) and sexually.

### **Hepatitis C**

Of the 11,855 notifications of hepatitis C for people living in WA, SA, and the NT in 1999-2003, 793 (7%) were identified as being Indigenous (in 34% of notifications, Indigenous status was not stated) [Derived from 77]. The crude notification rate of 107 per 100,000 for Indigenous people was almost three times the rate of 39 per 100,000 for other people.

Because of the large proportions of notifications in which Indigenous status was not stated, these rates are likely to under-estimate the true difference between Indigenous and non-Indigenous people in notifications of hepatitis C. SA is the only jurisdiction with very low levels of 'not stated' notifications (3.2% for 1999-2003). The extent to which the situation in SA applies to other jurisdictions is not known, but 328 (8%) of the 4,011 notifications of hepatitis C in that State in 1999-2003 were identified as Indigenous. The crude notification rate of 257 per 100,000 for Indigenous people was almost seven times the rate of 38 per 100,000 for non-Indigenous people.

Infection with hepatitis C virus (HCV) occurs via contact with contaminated blood – typically through sharing of a needle during IV drug use (suspected in 75% of new cases), tattooing, or a blood transfusion [78]. HCV can also be passed from mother to foetus during pregnancy. Conflicting reports exist, but sexual contact may be another potential route of transmission. No vaccine exists for HCV. Preventive measures include avoiding IV drug use.

### **Haemophilus influenzae type b**

*Haemophilus influenzae* type b (Hib) is a bacterium that can cause meningitis, epiglottitis, pneumonia, septicaemia, cellulitis, osteomyelitis, pericarditis and septic arthritis [79]. Babies and children are particularly susceptible to Hib, which is spread by respiratory secretions. The main risk factors for Hib include contact with other children, particularly in large families or day care centres [80].

Hib notifications in Australia declined steeply following implementation of the national vaccination strategy in 1993, but the disease persists at much lower levels [19]. Hib notifications in Australia declined from 533 cases reported in 1991 to 29 cases in 2002, with only two deaths recorded in 2002. However, of 47 notifications of invasive Hib in 2000-2002 in jurisdictions with adequate data, 24 were for children 0-4 years and, of these, 11 (46%) were Aboriginal and/or Torres Strait Islander children [72]. Among children aged 0-4 years, the annual notification rate for Aboriginal and Torres Strait islander children was 10 per 100,000 compared with 0.7 per 100,000 for other children. (These rates represent a reduction of almost 98% since vaccination was introduced.)

## **Pneumococcal disease**

Pneumococcal disease, which is caused by the bacterium *Streptococcus pneumoniae* (pneumococcus), includes upper respiratory tract infection and lower respiratory tract infection (primarily pneumonia) [71, 72]. Invasive pneumococcal disease (IPD) occurs when the bacterium infects normally sterile sites, such as blood and cerebrospinal fluid, causing life-threatening septicaemia and meningitis. Recognised risk factors for pneumococcal disease include chronic illness (including chronic respiratory, cardiac and renal diseases) and immuno-compromised conditions. Children aged less than five years are particularly susceptible to pneumococcal disease.

### ***Extent of pneumococcal disease among Indigenous people***

Indigenous children and adults have a significantly higher incidence of pneumococcal disease than non-Indigenous people, but detailed data are available only for IPD, which has been notifiable Australia-wide since 2001 (since 1997 in Queensland and the NT) [71, 72].

Based on notifications for people living in NSW, NT, WA and SA in 2001-2002, the incidence of IPD among Indigenous people (45 per 100,000) was 4.5 times that among other people (10 per 100,000) [72].<sup>18</sup> For both Indigenous and other people, notification rates were highest in the 0-4 years age group (87 per 100,000 for Indigenous people and 49 per 100,000 for other people) and in the 50 years and over age group (59 per 100,000 compared with 14 per 100,000). Importantly, the incidence among Indigenous people aged 25-49 years was also very high, with a rate (48 per 100,000) 12 times higher than that among other people (4 per 100,000). These aggregated data conceal important regional differences, with notification rates being much higher for the NT (120 per 100,000 in 2001 and 86 per 100,000 in 2002) [81, 82]. The rate among NT Indigenous children aged less than 5 years was 483 per 100,000 in 2001.

The high rates of IPD notifications among Indigenous people are reflected in hospitalisation rates for pneumococcal septicaemia and meningitis [72]. Of the 21 deaths from IPD for people living in Queensland, WA, SA and the NT in 2000-2002, five (24%) were identified as Indigenous. Two of the five deaths identified as Indigenous were of children aged less than 5 years.

Vaccination for IPD is targeted for Indigenous children 0-2 years (except in central Australia and adjacent areas where the conjugate pneumococcal vaccine program extends to five years of age) [72]. Vaccination with the polysaccharide vaccine is recommended for Indigenous adults with risk factors for IPD (all Indigenous adults aged 15 years or over are eligible in the NT), and for all Indigenous people aged 50 years or older.

## **Meningococcal disease**

Meningococcal disease is caused by the bacterium *Neisseria meningitidis* (also known as meningococcus). Manifestations of meningococcal disease include meningitis, meningococcaemia without meningitis, and septic arthritis [72]. The risk of infection can be increased in crowded housing conditions [83].

### ***Extent of meningococcal disease among Indigenous people***

The incidence of meningococcal disease is higher among Indigenous people than other Australians, and children aged less than five years are particularly susceptible [72].

Almost 9% (92 cases) of the 1,067 cases of meningococcal disease notified in NSW, WA, SA and the NT in 2000-2002 were identified as Indigenous. More than 31% of all cases and almost 61% of cases identified as Indigenous occurred among children aged 4 years or younger. The rate of 51 per 100,000 for Indigenous children aged 0-4 years was 3.5 times the rate of 15 per 100,000 for their non-Indigenous counterparts. Overall, the standardised rate of 7.2 per 100,000 for Indigenous people was more than twice the rate of 3.4 per 100,000 for other Australians [72]. These combined rates for NSW, WA, SA and the NT conceal important regional differences in notification rates: in 2001, the crude notification rates were

19.7 per 100,000 for Indigenous people living in WA, and 15.8 per 100,000 for those living in the NT [83].

There were 38 deaths from meningococcal disease for people living in Queensland, WA, SA and the NT in 2000-2002 [72]. Five of these deaths were of people identified as Indigenous, four of whom were aged 0-4 years.

The most common groups of meningococcus found in Australia are B (60%) and C (34%), with vaccination available only for serogroup C [84]. Previously recorded outbreaks among Indigenous children in central Australia and north-west Queensland were due to types A and C [85], but recent data suggests that the disease in young children is now mainly due to serogroup B.

### **Sexually transmitted infections**

Sexually transmitted infections (STIs) are spread by heterosexual or homosexual contact with an infected person and most cases are found among sexually active teenagers and young adults [70]. Unprotected sex is a main risk factor for STIs. Infections that can be transmitted through sexual contact include gonorrhoea, syphilis, HIV/AIDS, hepatitis B, chlamydia, human papilloma virus (HPV), genital herpes and donovanosis. HPV and genital herpes are believed to be the most common STIs in Australia, but they are not notifiable diseases so it is difficult to monitor incidence [46].

Most STIs are asymptomatic or produce mild symptoms, and people affected often find out they have an infection through screening and contact tracing [86]. STIs can usually be effectively treated if diagnosed early, but, if left untreated, they may lead to complications.

Variations in notification rates over time may reflect real changes in incidence, but could be due also to the introduction of easier and more sensitive testing procedures, improved education encouraging notification reports from health authorities, and improved contact tracing [87].

#### **Gonorrhoea**

Gonorrhoea, which is caused by the bacterium *Neisseria gonorrhoea* and mainly affects the mucosal and glandular structures of the genital tract (cervix in women, urethra in men), is highly contagious [88]. It can cause pelvic inflammatory disease in women, which can result in ectopic pregnancy or sterility.

The notification rate of gonorrhoea for Indigenous people living in WA, SA and the NT in 2003 was 1,403 cases per 100,000 population (based on 2,151 cases notified), compared with a rate of 29 per 100,000 (999 cases notified) for non-Indigenous people [77].

The disease can be successfully treated with oral antibiotics, but some strains of *N. gonorrhoeae* in urban Australia are penicillin-resistant [86]. Ceftriaxone is used as treatment in communities in Queensland, for example, where penicillin resistant strains have been found [89]. People with gonorrhoea often also have chlamydia, so the infections are often treated at the same time.

#### **Syphilis**

Syphilis, which is caused by the organism *Treponema pallidum*, is an STI that has primary, secondary, latent, and tertiary stages [90]. The infection is especially contagious during the primary phase, when sores are present and is generally not contagious during the latent phases. Untreated syphilis can lead to serious damage of the nervous system and other body organs, or to death. Penicillin is the usual treatment [86].

The notification rate of syphilis for Indigenous people living in WA, SA and the NT in 2003 was 303 cases per 100,000 population (based on 381 cases notified), compared with a rate of 3 per 100,000 (100 cases notified) for non-Indigenous people [77].

#### **Chlamydia**

Chlamydia, which is caused by the bacterium *Chlamydia trachomatis*, is one of the most common STIs in Australia [86]. The infection in women can cause cervicitis, endometritis,

and pelvic inflammatory disease, leading to tubal factor infertility and ectopic pregnancy. In men, it can cause urethritis, epididymo-orchitis, and prostatitis. Azithromycin treatment for chlamydial infection has been a major advance. Due to lack of obvious symptoms of the disease, incidence is underestimated by notification data.

Notification rates for chlamydia were much higher for Indigenous people living in WA, SA and the NT in 2003 than for their non-Indigenous counterparts: 1,323 cases per 100,000 population (based on 2,049 cases notified) compared with 161 per 100,000 (5,306 cases notified) [77].

## **HIV / AIDS**

Australia has so far successfully prevented an uncontrolled spread of HIV (human immunodeficiency virus) and the overall rates of HIV and AIDS (acquired immune deficiency syndrome) are low in comparison with other countries [91]. However, great concerns have been expressed about the possible impact of HIV/AIDS among Indigenous people, for whom AIDS has been seen as having the potential 'to further erode the social and economic fabric of Indigenous communities' [92]. Indigenous people were seen as being at particular risk of HIV infection due to high rates of STIs and their lack of access to effective services [87].

HIV is transmitted from person to person through the exchange of blood and bodily fluids. In Australia, transmission occurs primarily through sexual contact between men. The virus can also be transmitted through: sexual contact between men and women; sharing of needles and/or syringes (primarily for drug injection) with someone who is infected; and, very rarely in countries like Australia where blood is screened for HIV antibodies, through transfusions of infected blood or blood clotting factors. Babies born to HIV-infected women may become infected before or during birth or through breast-feeding after birth.

### ***HIV/AIDS among Indigenous people***

Overall, notification rates for HIV infection and AIDS are similar for the Indigenous population and the non-Indigenous population, and appear to have declined at similar rates over the past decade. For the five-year period 1999-2003, the notification rate for HIV infection was 3.8 cases per 100,000 for both the Indigenous and non-Indigenous populations [77]. These rates are lower than those reported for 1992-1998: 5.2 per 100,000 for Indigenous people and 5.5 per 100,000 for non-Indigenous people [93]. For 1999-2003, the rates of AIDS diagnoses were 1.2 per 100,000 for both the Indigenous and non-Indigenous populations [Derived from 77].

There have been some important differences between Indigenous people and the total population in the characteristics of newly diagnosed HIV infection over the ten-year period 1994-2003 – in terms of age at diagnosis and exposure categories<sup>19</sup> [77]. The median age of diagnosis of HIV among Indigenous people was 30 years compared with almost 33 years for the total population. In contrast to the total population, for which less than 8% of diagnoses of HIV occurred in females, more than 31% of cases reported among Indigenous people occurred in females. Infection was acquired by heterosexual contact in 39% of cases among Indigenous people and in only 11% of cases among the total population. Male homosexual contact was responsible for 77% of cases in the total population and for 36% in the Indigenous population, and male homosexual contact with injecting drug use for 4% and almost 11% respectively. Injecting drug use without male homosexual contact was responsible for 4% of cases in the total population and for more than 12% in the Indigenous population.

Overall in Australia, the cumulative number of HIV diagnoses by the end of 2003 after adjustment for reporting delay was estimated to be 20,580 [77]. For the same period, after adjustment for reporting delay, there were 9,380 AIDS cases and 6,372 deaths following

AIDS. In comparison, there were 203 HIV notifications among the Indigenous population in the period 1992-2003 and 78 AIDS diagnoses.

### **Skin infections and infestations**

Susceptibility to skin infections increases with poor living conditions and overcrowding [95]. Skin infections and infestations in Indigenous communities reflect serious health inequalities, but have attracted much less professional attention than they deserve. Scabies, a disease caused by the mite *Sarcoptes scabiei* resulting in inflammation and itching [96], is endemic in many remote Indigenous communities, with prevalence in children up to 50% [95, 97]. The cycles of scabies transmission can result in pyoderma (also referred to as impetigo), a bacterial infection of the skin that can lead to kidney disease and possibly heart disease. Up to 70% of children living in some Indigenous communities have skin sores, with group A streptococcus (GAS) the major pathogen [97]. GAS is responsible for continuing outbreaks of post-streptococcal glomerulonephritis and acute rheumatic fever. Indigenous people, particularly those living in the high-rainfall, humid areas of northern Australia, are also vulnerable to a variety of fungal and related organisms [96].

Skin diseases cause very few deaths directly, but they can be linked with serious complications. They did, however, account for around 2.5% of hospital separations in 2002-03 for patients identified as Indigenous, at a rate around two-and-a-half times that of non-Indigenous people [24].

### **Gastroenteritis among Indigenous children**

Gastrointestinal infections and infestations, particularly those causing diarrhoea, are still significant causes of morbidity among Indigenous children [98].

Diarrhoea, usually referred to as gastroenteritis, is not a major problem among non-Indigenous children in Australia, but it remains a common cause of morbidity for Indigenous children. The greater impact of gastroenteritis among Indigenous than among non-Indigenous children is reflected in hospitalisation data. Unfortunately, detailed data are available only for WA: these data reveal that separation rates for gastroenteritis in the first two years of life are around 10 times higher for Indigenous children than for non-Indigenous children [99]. Separation rates in WA 2000 were 147 per 1,000 for Indigenous infants (less than 12 months of age) and 114 per 1,000 for Indigenous children in their second year of life. Rates for children aged between 2 and 10 years are considerably lower, but the Indigenous:non-Indigenous rate ratios are around 3-4. Separation rates in WA in 2000 were considerably higher for Indigenous infants living outside the Perth metropolitan area (184 per 1,000) than for metropolitan residents (69 per 1,000) [99].

Hospital separation rates for gastroenteritis in WA declined by around 22% between 1994 and 2000 for both Indigenous and non-Indigenous infants [99]. The declines in rates were slightly higher for children in their second year of life: 31% for Indigenous children and 25% for non-Indigenous children. The declines in rates were slightly higher for children living outside the Perth metropolitan area than for metropolitan residents.

Around one-third of 1,001 infants born in WA in 1995 and 1996 who had an index admission for gastroenteritis during their first year of life were Indigenous [100]. Follow-up of this group of infants until 31 May 2002 revealed that 58% of children admitted more than once were Indigenous. Overall, Indigenous children made up more than 38% of all admissions for gastroenteritis. Compared with non-Indigenous children admitted for gastroenteritis, Indigenous children were more likely to: be seriously dehydrated on admission (36% compared with 24%); be undernourished (13% compared with 4%);<sup>20</sup> have iron deficiency anaemia (8% compared with 1%); and have gastrointestinal carbohydrate intolerance (10% compared with 5%).

Similar measures of serious illness were documented among children admitted to Royal Darwin Hospital in 1997–98: half of the 44 Indigenous children hospitalised for diarrhoea were acidotic, 32 had moderate to severe hypokalaemia, and 37 had dehydration equivalent to a loss of more than 5% of body weight [101]. Many of the children had an underlying intestinal enteropathy characterised by partial atrophy of the small intestinal villi, which also contributed to gastrointestinal carbohydrate intolerance.

Another expression of the decline in gastroenteritis among Indigenous children, at least in terms of severity, is the marked reductions in mortality. In the period 1970-1979, there were 69 deaths of Indigenous children in hospital in WA from gastroenteritis (53 were infants) [99]. In the period 1980-1989, there were nine Indigenous deaths (six infants), but none in the period 1990-2000.

## Eye health

There has been progress in improving the eye health of Indigenous people, but many Indigenous people are still more likely than non-Indigenous people to suffer from preventable conditions, such as trachoma (a bacterial infection) [102, 103]. The eye health of many Indigenous people is also limited by difficulty in accessing optometrist or specialist services [104]. For those with refractive error, for example, the main issues are access to and utilisation of testing, cost of spectacles, the administrative difficulty of dispensing, and the repair of spectacles. Eye health can be affected by genetic factors, ageing, premature birth, diseases (such as diabetes) smoking, injuries, UV exposure and nutrition.

### *Extent of eye health problems among Indigenous people*

Eye problems were among the conditions reported most commonly in the 2001 NHS [26]. For people living in non-remote areas, similar proportions of Indigenous (49%) and non-Indigenous people (51%) reported having some eye disorder as a long-term health condition. The proportion was slightly less (38%) for Indigenous people in remote areas. Differences between Indigenous and non-Indigenous people were highest in the middle adult years, with total or partial loss of vision being twice as commonly reported by Indigenous than by non-Indigenous people. Levels of hyperopia (long-sighted vision) were similar for Indigenous people (23%) and non-Indigenous people (22%) and the level of myopia (short-sighted vision) reported by Indigenous people was slightly less (17%) than that reported by non-Indigenous people (21%).

According to the WAACHS, 8% of Indigenous children aged 4-17 years did not have normal vision in both eyes (a level significantly lower than the 14% of children in the general population found in the 1993 WA Child Health Survey not to have normal vision in both eyes) [20]. Of the 4-17 year-old Aboriginal children without normal vision in both eyes, 58% used prescribed glasses or contact lenses.

In Australia, trachoma is found almost exclusively within the Indigenous population [103, 104]. It is difficult to develop an accurate map of where trachoma remains endemic because of the lack of systematic screening, but surveys have found high prevalences in communities in northern and central Australia, particularly the latter. A survey in a large central Australian community in late 1998 found that 40% of children aged less than 13 years had infectious trachoma [105]. In other places, such as Broome, Derby and Kununurra in the Kimberley region of WA, the prevalence of trachoma has declined [106].

Diabetic retinopathy is a complication of diabetes, which is a major health problem among Indigenous people (see above) [34]. Diabetic retinopathy, which involves damage to the small blood vessels in the retina, can impair vision and may cause blindness [102]. There are very limited data available on the prevalence of diabetic retinopathy in the Indigenous population [104], but a cross-sectional study in the Katherine region in 1993 and 1996 found that the crude prevalences of diabetic retinopathy (21%) and vision-threatening retinopathy (7-8%) among Indigenous people with diabetes were similar to those reported for non-Indigenous

people with diabetes [107]. An evaluation of a non-mydratic fundus camera among 164 Indigenous people with diabetes living in the Pilbara region of WA, diagnosed retinopathy in 74 out of 328 eyes (23%), with 35 eyes in need of laser treatment [108].

The risk of cataract increases as people age, particularly over the age of forty years. Surgery for cataract tends to be performed at a later stage for Indigenous people than for non-Indigenous people – when the condition is at a more advanced stage and causing greater visual impairment [109]. The proportion of Indigenous people who reported having cataracts in the 2001 NHS was 3% (age-adjusted), compared with 2% of non-Indigenous people [26]. Cataract was reported more frequently by Indigenous males (5%) than by Indigenous females (2%).

## Ear conditions

Ear infections are the most common type of illness in babies and young children, and three out of four children experience some form of otitis media (OM) by the time they are 3 years of age (National Institute on Deafness and Other Communication Disorders 2003). OM, which often occurs as a result of another illness (involving viruses or bacteria or both), is a common disorder in both developed and developing countries [110], but its form, onset, and natural history vary from population to population [111]. In developed countries, OM with effusion is prevalent and considered a major problem. In contrast, in developing countries acute and chronic suppurative forms of OM are much more common [112]. The pattern of OM observed among many Indigenous communities differs from that typically observed in the developed world, being more similar to that seen among disadvantaged populations in developing countries [113]. The high prevalence of OM among Aboriginal people is well established, and suppurative OM is of greatest concern.<sup>21</sup>

OM, particularly suppurative forms, is associated with some impairment of hearing, with major implications for language development and learning difficulties [112, 114]. The risk of permanent hearing loss increases if OM is not adequately treated and followed up. The hearing impairment associated with OM is generally conductive in nature<sup>22</sup> and mild to moderate in degree, and may be intermittent or persistent depending on the middle-ear condition present at the time [112, 115].

### *Extent of ear disease among Indigenous people*

The level of ear disease and hearing loss among Indigenous people remains higher than that of the general Australian population, particularly among children and young adults [112, 116].

In the 2001 NHS, Indigenous people reported more ear and hearing problems (18%) than did non-Indigenous people (14%) with an increasing prevalence with age [26]. Importantly, the proportions of young people with ear and hearing problems were much higher for Indigenous than non-Indigenous people: 11% compared with 5% for people aged 0-14 years and 13% compared with 5% for those aged 15-24 years.

The more detailed information collected by the WAACHS reveals that 18% of Indigenous children aged 0-17 years had recurring ear infections [20]. Children 0-11 years were more likely (20%) to have recurring ear infections than children aged 12-17 years (14%). Abnormal hearing was reported by carers for 7% of the children aged 4-17 years. Of children with recurring ear infections with discharge, 28% had abnormal hearing compared with 1% of those without ear infections.

These differences are not fully reflected in overall hospitalisation rates for ear and hearing problems, which were similar for Indigenous and non-Indigenous people in 2000-01 [12].<sup>23</sup> There were, however, more separations for Indigenous people (67%) due to otitis media than for non-Indigenous people (60%). For Indigenous hospitalisations, a further 14% were for ear problems due to perforation of the tympanic membrane (compared with 7% for non-Indigenous people).



As is the case with knowledge about most specific health conditions, the most valuable information about ear disease comes from specific studies, which have found particularly high levels of OM among Indigenous people living in rural and remote communities and lower levels for those living in urban areas (see Burrow and Thomson (2003) for a detailed review of the various studies). OM can affect Indigenous babies within weeks of birth and a high proportion of children will continue to suffer from CSOM throughout their developmental years [117].

Studies have found particularly high levels of otitis media (OM) among Indigenous people living in rural and remote communities and lower rates for those living in urban areas [116]. OM can affect Indigenous babies within weeks of birth and a high proportion of children will continue to suffer from CSOM throughout their developmental years [117]. Individual studies have documented very high levels of CSOM in some Indigenous communities. The WHO has identified a prevalence of CSOM of greater than 4% as being 'a massive public health problem' requiring 'urgent attention' [118, p.29]: some Indigenous communities had a prevalence up to 10 times higher than this [114, 119].

The higher levels of OM that Indigenous people experience in their childhood years are reflected in a higher frequency of hearing loss, which have been documented in numerous studies (see Burrow and Thomson (2003) for a detailed review of the studies).

As with many other areas of Indigenous health, this massive public health problem will be solved 'only with urgent attention to improving housing and access to running water, nutrition and quality of care, and giving communities greater control over these improvements' [114, p.178]

## Oral health

Oral health is defined as 'a standard of health of the oral and related tissues that enables an individual to eat, speak, and socialise without active disease, discomfort, or embarrassment and that contributes to general wellbeing' (UK Department of Health 1994). Thus, it is more than simply the absence of disease in the oral cavity: it is a standard of oral functioning that enables comfortable participation in everyday activities.

Two major threats to oral health are dental caries and periodontal diseases. Dental caries is caused by acid-producing bacteria living in the mouth, which proliferate on sweet and sticky food [120]. Caries is reversible in its early stages, but, if untreated, can cause irreversible damage. Periodontal diseases (affecting the gums) are caused by bacterial infection associated with poor oral hygiene, infrequent dental visits, age, smoking, low education and income levels, and certain medical conditions [120], especially diabetes mellitus [121] and osteoporosis [122].

### ***Extent of oral health problems among Indigenous people***

Most information available about oral health in the Indigenous population relates to dental caries among children, and there is limited information about the oral health of adults. Generally the extent of caries in deciduous teeth among young Indigenous children has been increasing, whereas it has been declining for their non-Indigenous counterparts [123].

According to the WAACHS, an estimated 19% of Aboriginal and Torres Strait Islander children were reported by their carers to have holes in their teeth [20]. Prevalence of cavities was lowest for children 0-3 years (8%) and highest for children aged 4-7 years (31%). Carers reported 28% of children had ever had a tooth filled and almost one-in-ten had had a tooth removed because it was not amenable to restorative dental care.

In the *Child Dental Health Survey, Northern Territory 2000*, considerably fewer Indigenous children than non-Indigenous children were found to have had no history of caries [124]. Indigenous children up to the age of 9 years old had approximately 3 to 4 times more decayed teeth than non-Indigenous children and dmft scores (for deciduous teeth) one-and-a-half to

two-and-a-half times higher (two indices are used to measure caries: 'dmft' is the number of deciduous (baby) teeth (t) that are decayed (d), missing due to caries (m), or filled due to caries (f); and 'DMFT' is the corresponding index for permanent (adult) teeth.). For permanent teeth, Indigenous children had a higher mean number of decayed teeth and a higher mean DMFT score.

Dental decay in deciduous and permanent teeth of Indigenous children living in SA in 2001 was about twice the level for non-Indigenous children, and the proportion of dental decay that was untreated was also greater [12]. An earlier study in South Australia found that the lowest levels of dental decay in Indigenous children were in remote communities (mean dmfs = 1.0), with higher levels in other non-metropolitan areas (mean dmfs = 7.9) and in Adelaide (mean dmfs = 5.2) [125].

The mean number of teeth affected in Indigenous children aged 5-6 years living in the Anangu lands in the cross-border region of WA, SA and the NT (3.2) was more than twice that of children in the total Australian population (1.44) [126]. Compared with the decline in deciduous caries for children in the total population since 1987, Anangu children aged 5-9 years had experienced a 42% increase in the mean number of teeth affected. Anangu adults experienced low levels of dental caries, but tooth loss was found more frequently among adults with diabetes (mean 5.51) than non-diabetics (mean 1.53), and severe periodontal disease was more prevalent among diabetics (79%) than among non-diabetics (13.8%).

The extent of tooth loss and periodontal disease is higher among older Indigenous people than among their non-Indigenous counterparts [123]: around 16% of older Indigenous people had no natural teeth, compared with 10% of non-Indigenous people [127]. The extent of tooth loss results partly from the relatively poor periodontal health of Indigenous people aged 35 years or older [128]. The most common periodontal condition in Indigenous people aged less than 45 years accessing public dental services and Indigenous dental clinics was the presence of calculus (tartar) [12]. For people aged 45 years or older, 23% had periodontal pockets (space between the root of the tooth and the gums) of 6mm or more, and 25% had periodontal pockets of 4-5mm.

## Disability

According to the WHO's International Classification of Functioning, Disability and Health (ICF), disability is an umbrella term for impairments, activity limitations and participation restrictions [129]. Impairments are 'problems in body function or structure such as significant deviation or loss'; activity limitations are 'difficulties an individual may have in executing activities'; and participation restrictions are 'problems an individual may experience in involvement in life situations' [129, pp.7-10]. The ICF recognises that how these aspects impact on an individual are influenced by the 'physical, social and attitudinal environment in which people live and conduct their lives' [129, pp.16-17]. Thus, ICF emphasises functioning rather than disability, and views it as an outcome of interactions between health conditions (diseases, disorders and injuries) and contextual factors [130]. It also brings together the classifications of health and disability.

The AIHW is working on the application of the ICF to the classification of disability in Australia (see, for example, National Community Services Data Committee, 2004 [131]). However, much of the information available in Australia about functioning (disability) is based on the previous classifications that focused on disability and handicap. Much of this information is derived from the periodic surveys conducted by the ABS, but these surveys have never included sufficient numbers of Indigenous people to enable any definitive conclusions about disability.

### ***The extent of disability among Indigenous people***

There have been few studies of disability in the Indigenous population, but evidence suggests that the level of disability and handicap among Indigenous people is likely to be much higher – 'perhaps at least twice as high as' – that of the total population [132, p.223].

This estimate is consistent with a study undertaken in 1991 in the Taree area of New South Wales [133, 134]. The study, which followed the methodology used by the ABS in its national surveys of disability, found that 227 (25%) of the 907 Indigenous people living in households in the Taree area had one or more disabilities [133].<sup>24</sup> After adjustment for differences in the age structures of the Indigenous and non-Indigenous populations, the levels of reported disabilities among the Indigenous regular residents of the Taree area were 2.5 times higher for males and 2.9 times higher for females than for males and females in the total Australian population. Almost one-fifth (19%) of regular Indigenous residents reported having a disability of the sense organs, such as hearing loss (8.4%) or loss of sight (1.4%). The next most frequently reported disabilities were 'disorders of the musculo-skeletal system and connective tissues' (16%), 'circulatory system disorders' (15%), and 'respiratory system disorders' (13%). Bearing in mind that the study excluded people living in health establishments and institutions – whose residents would be expected to have higher levels of disability – the levels of disability reported were much higher than those for the total Australian population.

Virtually nothing is known about the overall level and types of disability among Indigenous people in other parts of Australia, but, given the overall levels of ill-health among Indigenous people and the fact that many of the known risk factors for disability are present at high levels in the Indigenous population, the levels documented for the Taree area provide a useful conservative 'working basis' until similar studies are undertaken in other parts of the country [135].<sup>25</sup>

## Health risk factors

The factors contributing to the poor health status of Indigenous people should be seen within the broad context of the 'social determinants of health'[136, 137]. These 'determinants', which are complex and interrelated, include income, education, employment, stress, social networks and support, social exclusion, working and living conditions, gender and behavioural aspects. Related to these are cultural factors, such as traditions, attitudes, beliefs, and customs. Together, these social and cultural factors also have a major influence on a person's behaviour.

Information about some of these determinants is available (see 'The context of Indigenous health'). As well, the 2002 NATSISS collected information about stressors experienced by Indigenous people in the previous 12 months [11].

The levels of these stressors and the indicators of the social disadvantage experienced by Indigenous people should be borne in mind in the interpretation of the following information about a number of specific health risk factors.

### Nutrition

The nutritional status of Indigenous people is influenced by socio-economic disadvantage, geographical factors, environmental and social factors [138]. Poor nutrition is a common risk factor for overweight and obesity, malnutrition, cardiovascular disease, type 2 diabetes, certain cancers, osteoporosis, and tooth decay [46, 139]. The National Health and Medical Research Council (NHMRC) has endorsed a number of dietary guidelines for infants, adolescents, adults, older Australians, women of childbearing age, and pregnant women [138].

Data from the 2001 NHS indicate that 57% of Indigenous respondents in non-remote areas had a low daily fruit intake (47% non-Indigenous) [26]. However, most Indigenous respondents reported a high to medium daily vegetable intake (83%) compared with a slightly lower proportion of non-Indigenous respondents (77%). Indigenous respondents were more likely to consume whole milk (instead of low fat alternatives) than non-Indigenous respondents, and were more likely to add salt after cooking [12].

## Physical activity

The *National Physical Activity Guidelines for Australians* currently recommend at least 30 minutes of moderate activity on at least five days of the week to reduce the risk of cardiovascular disease and other chronic conditions [25]. Insufficient levels of physical activity have shown to be a risk factor for cardiovascular disease, type 2 diabetes, certain cancers, depression, and overweight and obesity [140].

Data on the levels of physical activity of Indigenous people are limited [25], but 49% of respondents in the 2002 NATSISS reported participating in some sport or physical recreation activity in the previous 12 months [11]. This level of physical activity is higher than that documented in the 2001 NHS, in which 71% of Indigenous people and 68% of non-Indigenous people aged 15 years or older reported being sedentary or practising low levels of exercise [26].

## Bodyweight

Body mass index (BMI – weight in kilograms divided by the square of height in metres) is the usual measure for classifying a person's weight for height [19]. Being overweight (BMI between 25 to 29.9) or obese (BMI  $\geq$  30) increases a person's risk for cardiovascular disease, type 2 diabetes, respiratory diseases, renal disease, certain cancers, osteoarthritis, pregnancy complications, and psychosocial problems [25]. A high BMI can be a result of poor nutrition, physical inactivity, socioeconomic disadvantage, genetic predisposition, increased age, and alcohol and tobacco use [25, 141].

According to the 2001 NHS, the age-adjusted prevalence of overweight among Indigenous respondents aged 18 years and over living in non-remote areas was 64% compared with 50% for non-Indigenous people [26]. Indigenous people were nearly twice as likely to be obese than other Australians: 31% compared with 16%.

## Immunisation

In response to the greater burden of communicable diseases among Indigenous people, the NHMRC has endorsed a series of special guidelines and schedules for immunisation of vaccine-preventable diseases, which include some extra vaccinations [142].

According to the 2001 NHS, full immunisation coverage for Indigenous children under 7 years of age was generally lower than that for non-Indigenous children in non-remote areas [26]. Approximately 66% of Indigenous children were fully immunised for diphtheria and tetanus (78% non-Indigenous), 60% for whooping cough (73% non-Indigenous), 12% for hepatitis B (12% non-Indigenous), 71% for polio (84% non-Indigenous), 46% for Hib (73% non-Indigenous), and 78% for measles, mumps, and rubella (87% non-Indigenous) [12, 26]. The influenza vaccination level for Indigenous adults aged 50 years or older (51%) was similar to that for their non-Indigenous counterparts (47%). For pneumonia, 67% of Indigenous adults aged 50 years or older had never received vaccination, compared with 84% of non-Indigenous adults in that age group [26].

## Breastfeeding

Breast milk, which is the natural and optimum food for babies, contains proteins, fats and carbohydrates at levels that are appropriate for an infant's metabolic capacities and growth requirements [138]. It also has anti-infective properties and contains immunoglobulins which provide some immunity against early childhood diseases [143].

Surveys indicate that a majority of Indigenous women breastfeed their babies. According to the 2001 NHS, 77% of Indigenous children aged under 4 years living in non-remote areas were reported to have been breastfed for at least some period [26]. This level is slightly lower than the 87% of non-Indigenous children aged less than 4 years who had been breastfed. On the other hand, mothers of Indigenous children reported in the WAACHS that they were more likely to initiate breastfeeding and breastfeed for longer than mothers in the general population, particularly those living in more isolated areas [20].

## Tobacco smoking

Smoking tobacco increases the risk of cardiovascular disease, some cancers, lung diseases, and a variety of other health conditions [19]. Passive smoking is also of concern to health, with children particularly susceptible.

Population surveys consistently reveal that the prevalence of smoking is higher among Indigenous people than among non-Indigenous people. The 2001 National Drug Strategy Household Survey, for example, found that 45% of Indigenous people aged 14 years or older smoked daily – more than twice the proportion of their non-Indigenous counterparts (19%) [144].

According to the 2002 NATSISS, just over half (51%) of the Indigenous population aged 15 years or older reported being smokers, a similar proportion to that reported in the 1994 NATSIS (52%) [11]. Similar proportions of men and women were current daily or regular smokers (51% and 47%). For both men and women, the highest levels were reported for those aged 25-44 years. In the WAACHS, the proportion of mothers of Aboriginal infants who used tobacco during their pregnancy was twice the level of mothers in the general population [20].

## Alcohol use

Excessive alcohol use can contribute to liver disease, pancreatitis, diabetes, some cancers, epilepsy [12] and cardiovascular disease [19]. Alcohol use can also be a contributor to injury and violence [19]. Abstinence from drinking alcohol is advised for women when pregnant or breastfeeding [19]. Consumption in pregnancy can affect the unborn child leading to foetal alcohol syndrome (comprising abnormalities such as growth retardation, characteristic facial features, and central nervous system anomalies, including intellectual impairment) [145].

Surveys have shown consistently that Indigenous people are less likely to drink alcohol than non-Indigenous people, but those that do drink are more likely to consume it at hazardous levels [12]. According to the 2002 NATSISS, 15% of Indigenous people aged 15 years or older reported risky/high risk alcohol consumption in the previous 12 months (similar levels in non-remote and remote areas) [11]. The proportions were higher for Indigenous males than females (17% compared with 13%) and highest for males aged 45-54 years (22%) and for females aged 35-44 years (19%).

## Use of other drugs

Illicit drugs (such as marijuana, heroin, ecstasy and cocaine), volatile substances (such as glue, solvent and petrol) and the non-medical use of prescribed drugs are risk factors for ill-health and can cause death [19]. In addition to the risk of drug overdose, illicit drug use can contribute to a variety of health conditions (for example, HIV/AIDS, hepatitis C virus, low birthweight, malnutrition, infective endocarditis, poisoning, suicide, and self-inflicted injury).

According to the 2001 National Drug Strategy Household Survey, around 57% of Indigenous respondents in urban areas aged 14 years or older reported having tried at least one illicit drug compared with 37% of non-Indigenous respondents [144]. The percentage of current users of cannabis among Indigenous respondents (13%) was higher than that of non-Indigenous respondents (8%).

Studies among non-random samples of Indigenous people who inject drugs have raised concerns about the young age at which injecting commences, and about the safety of injecting practices [146]. High frequencies of poly-drug use have also been reported among Indigenous injecting drug users in WA and SA [146, 147]. It has been estimated that the prevalence of injecting drugs increased in WA in the period 1994-2001: the percentage of Indigenous people who had ever injected was probably between 4.5% and 6% in 2001, with the percentage of current injectors between 3% and 4% [148].

Estimating the prevalence of petrol sniffing is difficult, because sniffing patterns are often cyclical and populations fluctuate [146]. Petrol sniffing had been reported mainly from communities in Arnhem Land, central Australia and the Goldfields region of WA [149].

There appears to be a shift recently in the geographic distribution of petrol sniffing, however, with a reduction in the Eastern Goldfields region of WA but endemic occurrence in the south-east Kimberley region of WA, in northern Queensland and in parts of central Australia and Arnhem Land [150].

## Health expenditure

Estimated total expenditure by Australian governments and the private sector on health services to Indigenous people in the 1998-99 financial year was \$1,245 million [151]. This is equivalent to \$3,065 per person compared with \$2,518 per person for non-Indigenous people – a ratio of 1.22:1 (this compares with a ratio of 1.08 in 1995-96 [152]). When relative income position is taken into account, public expenditure on the health of Indigenous people appeared to be similar to that for non-Indigenous people in low-income groups, despite the much lower health status of Indigenous people [151].

The majority of Indigenous health expenditure was allocated through mainstream health programs which generally do not, or only incompletely, document use specifically by Indigenous people [151].

Indigenous people were, on average, much higher users than non-Indigenous people of publicly funded health services and State-funded health services, particularly admitted patient services in hospitals and community health services [151]. Compared with non-Indigenous people, Indigenous people used fewer private services such as doctors in private practice, private hospitals, dentists, and privately funded allied health professionals.

The Commonwealth and State governments contributed very similar amounts to health services for Indigenous people [151]. Over 50% of the Commonwealth's contribution was indirect through its contribution to public hospital funding. Expenditures were much lower for Indigenous people than for other Australians in the major Commonwealth-funded health programs, Medicare and the Pharmaceutical Benefits Scheme: per person expenditure for Indigenous people was 37% of that for non-Indigenous people.

The ratio of Indigenous to non-Indigenous service use would be lower than the expenditure ratio of 1.22:1 if the higher costs of providing services in remote areas could be factored in [151]. Access to Medicare-funded services and pharmaceutical benefits decreased as remoteness increased, but admitted patient expenditure increased with increasing remoteness.

After controlling for population and inflation, there were areas in which there had been increases in funding and service provision between 1995-96 and 1998-99 [151, 152]. However, the inadequacy of these levels of expenditure on Indigenous health was identified by a comprehensive review undertaken by the Commonwealth Grants Commission (CGC). The review concluded that 'the poorer health status of Indigenous people, and their greater reliance on the public health [care] system, would justify at least a doubling of the average per capita expenditure on non-Indigenous people' [153]. The CGC conclusion about the inadequacy of spending on Indigenous health services was matched by similar conclusions about expenditure on a number of health-related areas, such as education, training, employment, housing, and infrastructure [153]. In view of the importance to health of these 'up-stream' factors, the achievement of major gains in Indigenous health will require a much greater commitment by governments in many areas – not simply an increase in spending on health services.

Professor John Deeble has estimated that, on equity grounds (defined as access to equal health care resources based on equal health needs), the expenditure ratio for 1998-99 should have been 1.42 (that is, per capita expenditure for Indigenous people should have been 42% more than for non-Indigenous people) [154]. After taking account of changes in overall health expenditures up to 2001-02, additional funding for Indigenous health (improved access to Medicare and PBS benefits, and expansion of the Primary Health Care Access Program), Professor Deeble concluded that 'about \$250 million ... would therefore remain a minimum estimate in the current shortfall in Indigenous health spending overall' [154]. If this extra

money was provided, the network of Indigenous-specific primary care services could be further expanded. However, as Professor Deeble points out, there would be logistical difficulties in staffing the new and expanded services, so considerable funds would initially have to go into capacity development and training.

More recent research undertaken for the Australian Medical Association (AMA) by Access Economics, one of Australia's leading independent economic analysts, concluded that the increases in recent years in Indigenous health funding were 'too slow to make any early inroads into the severe health problems among Indigenous Australians' [155, p.18]. It was estimated that to redress the Indigenous health deficit funding for primary health care services alone required an additional \$400 million per annum. The AMA estimated that a further \$52.5 million was required annually for training-related costs to meet the need for more Indigenous and non-Indigenous health workers [156, 157].

## Concluding comments

Indigenous people remain the least healthy sub-population in Australia, and there is evidence that the disparity between Indigenous and non-Indigenous health, at least measured by mortality, has widened in recent years [158]. The lack of real improvement in Indigenous mortality in Australia contrasts markedly with the situation among Indigenous people in New Zealand, Canada and the United States. The success achieved in those countries 'generates considerable confidence that effective action in Australia will produce substantial changes in Indigenous health' [158]. Achievement of these changes will require progress in five areas: infrastructure (including physical environmental and socioeconomic aspects); Indigenous self-determination of health services; access to a network of community-controlled primary healthcare services; an adequate level of resources; and a skilled workforce.

Substantial progress has been made in the past decade in some aspects of Indigenous health, and there have been improvements in some indicators of Indigenous health status [159]. As well, all Australian governments have made a commitment through the Council of Australian Governments to address the enormous disadvantages experienced by Indigenous people [160].

Within the health sector, the substantial increase in resources provided by the Commonwealth since 1995–96 has enabled consolidation and expansion of the Australia-wide network of Aboriginal community-controlled health services and of Indigenous-controlled substance-misuse services, and development of the role of NACCHO (National Aboriginal Community Controlled Health Organisation) in national advocacy and in support of Indigenous-controlled services [159]. The growth and development of NACCHO, its affiliates, and community-controlled health and substance-misuse services are significant advances, but, as pointed out by the CGC, the poorer health status of Indigenous people justifies further substantial increases [153].

The actual amount of extra funds required to enable Indigenous people get access to high quality, integrated primary health care services and to ensure progress towards an adequate, appropriate workforce are probably at least \$450 million per year, the amount by which the AMA believes Indigenous health was under-funded in 2004 [157, p.2]. Funding increases of this order, complemented by the COAG developments and infrastructure progress, are essential to ensure that Australia doesn't just keep 'treading water on ... Aboriginal and Torres Strait Islander health' [157, p.2].

The Australian Indigenous HealthInfoNet attempts to contribute to improvements in Indigenous health by making relevant, high quality knowledge and information easily accessible to policy makers, health service providers, program managers, clinicians, researchers and the general community. We welcome your comments and feedback about this overview.

Australian Indigenous HealthInfoNet  
 Centre for Public Health  
 Edith Cowan University  
 100 Joondalup Drive  
 Joondalup, Western Australia 6027  
 Email: [healthinfonet@ecu.edu.au](mailto:healthinfonet@ecu.edu.au)  
 Telephone: (08) 6304 5104  
 Facsimile: (08) 6304 5449

## Glossary

age-specific death rate number of deaths of persons of a specific age group in one year per 1,000 persons of the same age group.

age-specific fertility rate the number of live births to women in a specified age group in one year per 1,000 women in the same age group.

age-standardisation a procedure for adjusting rates (such as death rates) to minimise the effects of differences in age composition and facilitate valid comparison of rates for populations with different age compositions. See direct standardisation and indirect standardisation.

body mass index (BMI) is calculated by dividing weight in kilograms by height in metres squared, and categorises a person as ranging from underweight to obese: underweight (BMI: <18.5); normal (BMI: 18.5–24.9); overweight (BMI: 25.0–29.9); obese (BMI: 30.0+)

direct standardisation the procedure for adjusting rates in which the specific rates for a study population are averaged using as weights the distribution of a standard population

excess deaths the difference between the actual number of deaths occurring and the number expected from rates for the comparable population (the population used for comparison may vary, but is most often the total Australian population or the total for the specific jurisdictions being considered)

expectation of life predicted number of years of life remaining to a person if the present pattern of mortality does not change. It is a statistical abstraction based on current age-specific death rates.

fertility rate See age-specific fertility rate and total fertility rate.

incidence the number of instances of illness commencing, or of persons falling ill, during a given period in a specified population (see incidence rate).

incidence rate the number of instances of illness commencing, or of persons falling ill, during a given period in a specified population divided by the population at risk

indirect standardisation the procedure for adjusting rates in which the specific rates in a standard population are averaged using as weights the distribution of the study population

infant mortality rate number of infant deaths per 1,000 live births

International Classification of Disease (ICD) World Health Organization's internationally accepted classification of death and disease

life expectancy See expectation of life.

maternal mortality ratio number of maternal deaths divided by the number of confinements (in 100,000s)

median age at death the age above and below which 50% of deaths occurred

mortality death

prevalence the number of instances of a given disease or other condition in a given population at a designated time.

risk factor an attribute or exposure that is associated with an increased probability of a specified outcome, such as the occurrence of a disease. Not necessarily a causal factor.



standardisation the process by which adjustments are made to take account of differences in the age structures of populations.

standardised mortality ratio (SMR) the ratio of the observed number of deaths in a study population to the number expected if the study population had the same age-specific rates as a standard population. (The SMR is expressed sometimes as the ratio multiplied by 100.); see age-standardisation and indirect standardisation.

total fertility rate the number of live births a woman would have if, throughout her reproductive years, she had children at the rates prevailing in the reference calendar year. It is the sum of the age-specific fertility rates for that calendar year.

### **References**

*Concise medical dictionary* (1980) Oxford University Press, Oxford

*Dorland's Illustrated Medical Dictionary* (1985) 26th edition, WB Saunders, Philadelphia

Last, J.M. (ed.) (2000) *A dictionary of epidemiology*. Fourth edition. Oxford University Press, New York

## References

- 1 Thomson N (2003) The need for Indigenous health information. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press: 1-24
- 2 Aboriginal and Torres Strait Islander Health and Welfare Information Unit (1997) *The Aboriginal and Torres Strait Islander health information plan: this time let's make it happen*. (AIHW Cat no. HWI 12) Canberra: AHMAC, AIHW & ABS
- 3 Australian Bureau of Statistics (2003) *Population characteristics: Aboriginal and Torres Strait Islander Australians 2001*. (4713.0) Canberra: Australian Bureau of Statistics
- 4 Australian Bureau of Statistics (2003) *Australian Demographic Statistics Quarterly: 2001. March quarter 2003*. (Cat no. 3101.0) Canberra: Australian Bureau of Statistics
- 5 Australian Bureau of Statistics (2002) *Population distribution, Aboriginal and Torres Strait Islander Australians, 2001*. (Cat No. 4705.0) Canberra: Australian Bureau of Statistics
- 6 Australian Bureau of Statistics (2004) *2004 Year Book Australia*. (ABS Cat. no. 1301.0) Canberra: Australian Bureau of Statistics
- 7 Australian Bureau of Statistics (2003) *Australian Standard Geographical Classification (ASGC), 2003*. (ABS Catalogue No. 1216.0) Canberra: Australian Bureau of Statistics
- 8 Australian Bureau of Statistics (2001) *Statistical geography, volume 1: Australian Standard Geographical Classification (ASGC), 2001*. (ABS Catalogue No. 1216.0) Canberra: Australian Bureau of Statistics
- 9 House of Representatives Standing Committee on Family and Community Affairs (2000) *Health is life: report on the inquiry into Indigenous health*. Canberra: The Parliament of the Commonwealth of Australia
- 10 Australian Bureau of Statistics (2002) *2001 Census Indigenous profiles, main areas: Australia*. Retrieved 19 March 2004 from [http://www.abs.gov.au/ausstats/abs@census.nsf/Census\\_IP\\_ASGC\\_ViewTemplate?ReadForm&Expand=1](http://www.abs.gov.au/ausstats/abs@census.nsf/Census_IP_ASGC_ViewTemplate?ReadForm&Expand=1)
- 11 Australian Bureau of Statistics (2004) *National Aboriginal and Torres Strait Islander Social Survey, 2002*. (ABS Cat. no. 4714.0) Canberra: Australian Bureau of Statistics
- 12 Australian Bureau of Statistics, Australian Institute of Health and Welfare (2003) *The health and welfare of Australia's Aboriginal and Torres Strait Islander peoples 2003*. (ABS Cat no.4704.0, AIHW Cat no. IHW11) Canberra: Australian Bureau of Statistics
- 13 Australian Bureau of Statistics (2002) *2001 Census Indigenous Profile*. Retrieved 16 August 2004 from <http://www.abs.gov.au/Ausstats/abs@census.nsf/Lookup2001Census/FDF84AC8757567EBCA256BB4000B9D88>
- 14 Australian Bureau of Statistics (2001) *Australian housing survey - Aboriginal and Torres Strait Islander results*. (ABS cat. no. 4712.0) Canberra: Australian Bureau of Statistics
- 15 Australian Bureau of Statistics (2002) *Housing and infrastructure in Aboriginal and Torres Strait Islander communities, Australia 2001*. (Catalogue no. 4710.0) Canberra: Australian Bureau of Statistics
- 16 Bailie R, Siciliano F, Dane G, Bevan L, Paradies Y, Carson B (2002) *Atlas of health-related infrastructure in discrete Indigenous communities*. Melbourne: Aboriginal and Torres Strait Islander Commission (ATSIC)
- 17 Australian Bureau of Statistics (2004) *Births, Australia 2003*. (3301.0) Canberra: Australian Bureau of Statistics
- 18 Laws PJ, Sullivan EA (2004) *Australia's mothers and babies 2001*. (AIHW cat. no. PER 25) Sydney: AIHW National Perinatal Statistics Unit

- 19 Australian Institute of Health and Welfare (2004) *Australia's health 2004: the ninth biennial report of the Australian Institute of Health and Welfare*. Canberra: Australian Institute of Health and Welfare
- 20 Zubrick SR, Lawrence DM, Silburn SR, et al. (2004) *The Western Australian Aboriginal Child Health Survey: the health of Aboriginal children and young people*. Perth: Telethon Institute for Child Health Research
- 21 Australian Bureau of Statistics (2003) *Deaths Australia 2002*. (Cat no. 3302.0) Canberra: Australian Bureau of Statistics
- 22 Australian Bureau of Statistics (2002) *Deaths Australia 2001*. (Cat no. 3302.0) Canberra: Australian Bureau of Statistics
- 23 Slaytor EK, Sullivan EA, King JF (2004) *Maternal deaths in Australia, 1997–1999*. (AIHW cat. no. PER 24) Canberra: Australian Institute of Health and Welfare
- 24 Australian Institute of Health and Welfare (2004) *Australian hospital statistics 2002–03*. (AIHW cat. no. HSE 32) Canberra: Australian Institute of Health and Welfare
- 25 National Centre for Monitoring Cardiovascular Disease (2004) *Heart, stroke and vascular diseases: Australia facts 2004*. Canberra: Australian Institute of Health and Welfare
- 26 Australian Bureau of Statistics (2002) *National Health Survey: Aboriginal and Torres Strait Islander results, Australia 2001*. (ABS Catalogue no. 4715.0) Canberra: Australian Bureau of Statistics
- 27 Australian Institute of Health and Welfare (2004) *Australia's health 2004: the ninth biennial health report of the Australian Institute of Health and Welfare*. (AIHW Cat. No. 8903.0) Canberra: Australian Institute of Health and Welfare
- 28 Australian Bureau of Statistics (2003) *Causes of Death 2002*. (Cat no. 3303.0) Canberra: Australian Bureau of Statistics
- 29 Condon J (2004) *Cancer, health services and Indigenous Australians*. (Consultant report no.5) Canberra: Office for Aboriginal and Torres Strait Islander Health
- 30 Condon JR, Barnes T, Cunningham J, Armstrong BK (2004) Long-term trends in cancer mortality for Indigenous Australians in the Northern Territory. *Medical Journal of Australia*;180(10):504-511
- 31 Kirov E, Francis J, Thomson N (2003) Cancer. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:207-223
- 32 Zhao Y, Condon JR, Garling LS (2004) *Cancer incidence and mortality, Northern Territory 1991-2001*. Darwin, NT: Department of Health and Community Services
- 33 Australian Institute of Health and Welfare (2004) *Cervical screening in Australia 2001-2002*. (AIHW cat. no. 22) Canberra: Australian Institute of Health and Welfare
- 34 Irvine J, Kirov E, Thomson N (2003) Diabetes. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:93-126
- 35 Kirov E, Thomson N (2004) Summary of Indigenous health: diabetes mellitus. *Aboriginal and Islander Health Worker Journal*;In Press
- 36 Leonard D, McDermott R, O'Dea K, et al. (2002) Obesity, diabetes and associated cardiovascular risk factors among Torres Strait Islander people. *Australian and New Zealand Journal of Public Health*;26(2):144-149
- 37 Wang Z, Hoy WE (2003) Hypertension, dyslipidemia, body mass index, diabetes and smoking status in Aboriginal Australians in a remote community. *Ethnic Disease*;13(3):324-330
- 38 Couzos S, O'Rourke S, Metcalf S, Murray R (2003) Diabetes. In: Couzos S, Murray R, eds. *Aboriginal primary health care: an evidence-based approach*. 2nd ed. South Melbourne: Oxford University Press:348-410
- 39 de Courten M, Hodge A, Dowse G, King I, Vickery J, Zimmet P (1998) *Review of the epidemiology, aetiology, pathogenesis and preventability of diabetes in Aboriginal and Torres Strait Islander populations*. Canberra: Commonwealth Department of Health and Family Services
- 40 Swan P, Raphael B (1995) 'Ways forward': *National Consultancy Report on Aboriginal and Torres Strait Islander Mental Health. Part 1*. Canberra: AGPS

- 41 Hunter E (2003) Mental health. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:127-157
- 42 Australian Health Ministers (2003) *National Mental Health Plan, 2003-2008*. Canberra, ACT: Australian Government
- 43 Hunter E, Reser J, Baird M, Reser P (2001) *An analysis of suicide in Indigenous communities of North Queensland: the historical, cultural and symbolic landscape*. Canberra, ACT: Commonwealth Department of Health and Aged Care
- 44 Tatz C (2001) *Aboriginal suicide is different: a portrait of life and self-destruction*. Canberra, ACT: Aboriginal Studies Press
- 45 Burrow S, Thomson N (2003) Disorders of the renal-urologic system. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:339-368
- 46 Australian Institute of Health and Welfare (2002) *Australia's health 2002: the eighth biennial report of the Australian Institute of Health and Welfare*. Canberra: Australian Institute of Health and Welfare
- 47 Cass A, Cunningham J, Wang Z, Hoy W (2001) Regional variation in the incidence of end-stage renal disease in Indigenous Australians. *Medical Journal of Australia*;175:24-27
- 48 Hoy W (1996) Renal disease in Australian Aboriginals: community health programs are critical to containing the renal disease epidemic. *Medical Journal of Australia*;165:126-127
- 49 Spencer JL, Silva DT, Snelling P, Hoy WE (1998) An epidemic of renal failure among Australian Aboriginals. *Medical Journal of Australia*;168(11):537-541
- 50 Cass A, Gillen AG, Horvath JS (1999) End-stage renal disease in Aboriginals in New South Wales: a very different picture to the Northern Territory. *Medical Journal of Australia*;171(8):407-410
- 51 Australian Institute of Health and Welfare (2003) *Australian hospital statistics 2001-02*. (AIHW cat. no. HSE 25) Canberra: Australian Institute of Health and Welfare
- 52 Thomas MAB (1998) Kidney disease in Australian Aboriginals: time for decisive action [editorial]. *Medical Journal of Australia*;168(11):532-533
- 53 Devitt J, McMasters A (1998) *Living on medicine. A cultural study of end-stage renal disease among Aboriginal people*. Alice Springs: IAD Press
- 54 Hoy W, Kelly A, Jacups S, et al. (1999) Stemming the tide: reducing cardiovascular disease and renal failure in Australian Aboriginals. *Australian and New Zealand Journal of Medicine*;29(3):480-483
- 55 Hoy WE, Baker PR, Kelly AM, Wang Z (2000) Reducing premature death and renal failure in Australian Aboriginals: a community-based cardiovascular and renal protective program. *Medical Journal of Australia*;172:473-478
- 56 Harrison J, Miller E, Weeramanthri T, Wakerman J, Barnes T (2001) *Information sources for injury prevention among Indigenous Australians: status and prospects for improvements*. Canberra: Australian Institute of Health and Welfare
- 57 Moller J, Thomson N, Brooks J (2004) *Injury prevention activity among Aboriginal and Torres Strait Islander peoples: Volume 1, Current status and future directions*. Canberra: Department of Health and Ageing
- 58 Thomson N, Brooks J (2003) Injury. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:442-466
- 59 Moller J (1996) Understanding national injury data regarding Aboriginal and Torres Strait Islander peoples. *Australian Injury Prevention Bulletin*;14(December):1-8
- 60 Brice GA (2000) *Australian Indigenous road safety: a critical review and research report, with special reference to South Australia, other Indigenous populations, and countermeasures to reduce road trauma [draft]*. Adelaide: A report to the Aboriginal Health Council of South Australia & Transport SA supported by the Safety Strategy, Transport SA Urban Planning & the Arts

- 61 Gordon S, Hallahan K, Henry D (2002) *Putting the picture together, inquiry into response by government agencies to complaints of family violence and child abuse in Aboriginal communities*. Perth: Department of Premier and Cabinet
- 62 Memmott P, Stacy R, Chambers C, Keys C (2001) *Violence in Indigenous communities: full report*. Canberra: Crime Prevention Branch, Attorney-General's Department
- 63 Australian Bureau of Statistics (2003) *General Social Survey: summary results, Australia, 2002*. (ABS Cat. no. 4159.0) Canberra: Australian Bureau of Statistics
- 64 Kirov E, Thomson N (2004) Summary of Indigenous health: respiratory disease. *Aboriginal and Islander Health Worker Journal*;28(2):15-18
- 65 Chang AB, Masel JP, Boyce NC, Torzillo PJ (2003) Respiratory morbidity in central Australian Aboriginal children with alveolar lobar abnormalities. *Medical Journal of Australia*;178(10):490-494
- 66 Currie B, Fisher D, Anstey N, et al. (2000) Melioidosis: the Top End prospective study continues into another wet season and an update on treatment guidelines. *Northern Territory Disease Control Bulletin*;7(4):4-5
- 67 Thomson N, Kirov E, Ali M (2003) Respiratory system disorders. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:224-246
- 68 Valery P, Purdie D, Chang A, Masters IB, Green AC (2003) Assessment of the diagnosis and prevalence of asthma in Australian Indigenous children. *Journal of Clinical Epidemiology*;56(7):629-635
- 69 Lehoczky S, Isaacs J, Grayson N, Hargreaves J (2002) *Hospital statistics. Aboriginal and Torres Strait Islander Australians. 1999-2000*. (ABS Cat. No. 4711.0 AIHW Cat. No. IHW-9; 4711.0) Canberra: Australian Bureau of Statistics and Australian Institute of Health and Welfare
- 70 Burns J, Burrow S, Genovese E, Pumphrey M, Sims E, Thomson N (2003) Other communicable diseases. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:397-441
- 71 McIntyre P (2003) Pneumococcal disease. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:384-396
- 72 Menzies R, McIntyre P, Beard F (2004) Vaccine preventable diseases and vaccination coverage in Aboriginal and Torres Strait Islander people, Australia, 1999 to 2002. *Communicable Diseases Intelligence*;28(2):127-159
- 73 Merritt A, Symons D, Griffiths M (1999) The epidemiology of acute hepatitis A in north Queensland, 1996-1997. *Communicable Diseases Intelligence*;23(5):120-124
- 74 Bowden F, Currie B, Miller N, Locarnini S, Krause V (1994) Should Aboriginals in the Top End of the Northern Territory be vaccinated against hepatitis A? *Medical Journal of Australia*;161:372-373
- 75 Kaldor J, Plant A, Thompson S, Longbottom H, Rowbottom J (1996) The incidence of hepatitis B infection in Australia: an epidemiological review. *Medical Journal of Australia*;165(6):322-326
- 76 Blumberg BS, Sutnick AI, London WT, Millman I (1971) The discovery of Australia antigen and its relation to viral hepatitis. *Perspectives in Virology*;7:223-240
- 77 National Centre in HIV Epidemiology and Clinical Research (2004) *2004 annual surveillance report: HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia*. Sydney: National Centre in HIV Epidemiology and Clinical Research
- 78 National Centre in HIV Epidemiology and Clinical Research (2000) *HIV/AIDS, hepatitis C and sexually transmissible infections in Australia annual surveillance report 2000*. (ISSN 1442-8784) Sydney: National Centre in HIV Epidemiology and Clinical Research, University of New South Wales
- 79 Horby P, Gilmour R, Wang H, McIntyre P (2003) Progress towards eliminating Hib in Australia: an evaluation of Haemophilus influenzae type b prevention in Australia, 1 July 1993 to 30 June 2000. *Communicable Diseases Intelligence*;27(3):324-341

- 80 Gilbert GL (1992) New vaccines against Haemophilus influenzae type b. *Modern Medicine*;35(6):70-71
- 81 Roche P, Krause V (2002) Invasive pneumococcal disease in Australia, 2001. *Communicable Diseases Intelligence*;26(4):505-519
- 82 Roche P, Krause V, Andrews R, et al. (2003) Invasive pneumococcal disease in Australia, 2002. *Communicable Diseases Intelligence*;27(4):466-477
- 83 Statistical Information Management Committee (2004) *National summary of the 2001 and 2002 jurisdictional reports against the Aboriginal and Torres Strait Islander health performance indicators*. (AIHW cat. no. IHW12) Canberra: Australian Institute of Health and Welfare
- 84 Australian Meningococcal Surveillance Programme (2004) Annual report of the Australian Meningococcal Surveillance Programme, 2003. *Communicable Diseases Intelligence*;28(2):194-206
- 85 Pearce M, Sheridan J, Jones D, et al. (1995) Control of group C meningococcal disease in Australian Aboriginal children by mass rifampicin chemoprophylaxis and vaccination. *Lancet*;346:20-23
- 86 Bowden FJ, Tabrizi SN, Garland SM, Fairley CK (2002) Sexually transmitted infections: new diagnostic approaches and treatments. *Medical Journal of Australia*;176(11):551-557
- 87 ANCARD Working Party on Indigenous Australians' Sexual Health (1997) *The National Indigenous Australians' sexual health strategy 1996-97 to 1998-99. A report of the ANCARD working party on Indigenous Australian's sexual health*. Canberra: Commonwealth Department of Health and family Services, Australian Government Publishing Services
- 88 McCall B (1994) *Surveillance of sexually transmissible disease in Queensland, 1988 to 1993*. Brisbane: Queensland Health
- 89 Bradford D (2000) Current testing methods and penicillin resistance in *Neisseria gonorrhoeae* in North Queensland. *Communicable Diseases Intelligence*;24(7):194
- 90 Holmes K, Sparling P, Mardh P-A, et al., eds. (1999) *Sexually transmitted diseases*. Third ed. New York: McGraw-Hill, Health Professions Division
- 91 National Centre in HIV Epidemiology and Clinical Research (2003) *HIV/AIDS, viral hepatitis and sexually transmissible infections in Australia annual surveillance report 2003*. Sydney: National Centre in HIV Epidemiology and Clinical Research
- 92 ANCAHRD (2000) *The management of HIV/AIDS. A resource guide for Indigenous primary health care organisations*. Canberra: ANCAHRD, Commonwealth Department of Health and Aged Care
- 93 Guthrie JA, Dore GJ, McDonald AM, Kaldor JM (2000) HIV and AIDS in Aboriginal and Torres Strait Islander Australians: 1992-1998. *Medical Journal of Australia*;172:266-269
- 94 Skov S, Bowden F, McCaul P, Thompson J, Scrimgeour D (1996) HIV and isolated Aboriginal communities. *Medical Journal of Australia*;165:41-42
- 95 Currie B, McGougan B (2003) Skin infections and infestations. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:369-383
- 96 Green AC (2001) *A handbook of skin conditions in Aboriginal populations of Australia*. Asia: Blackwell Science Asia Pty Ltd
- 97 Currie BJ, Carapetis JR (2000) Skin infections and infestations in Aboriginal communities in northern Australia. *Australasian Journal of Dermatology*;41(3):139-145
- 98 Ali M, Thomson N (2003) Gastrointestinal disorders. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:290-312
- 99 Gracey M, Cullinane J (2003) Gastroenteritis and environmental health among Aboriginal infants and children in Western Australia. *Journal of Paediatric Child Health*;39(6):427-431

- 100 Gracey M, Lee A, H., Yau KK (2004) Hospitalisation for gastroenteritis in Western Australia. *Archives of Disease in Childhood*;89:768-772
- 101 Kukuruzovic RH, Haase A, Dunn K, Bright A, Brewster DR (1999) Intestinal permeability and diarrhoeal disease in Aboriginal Australians. *Archives of Disease In Childhood*;81(4):304-308
- 102 Taylor HR (1997) *Eye health in Aboriginal and Torres Strait Islander communities: the report of a review commissioned by the Commonwealth Minister for Health and Family Services, the Hon. Michael Wooldridge, MP*. Canberra: Commonwealth Department of Health and Family Services
- 103 Burns J, Thomson N (2003) Eye health. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:273-289
- 104 Taylor V, Ewald D, Liddle H, Warchivker I (2004) *Review of the implementation of the National Aboriginal and Torres Strait Islander Eye Health Program*. Canberra: Centre for Remote Health
- 105 Ewald DP, Hall GV, Franks CC (2003) An evaluation of a SAFE-style trachoma control program in Central Australia. *Medical Journal of Australia*;178(2):65-68
- 106 Roden D (2000) Trachoma on the decline. *Rural Practice*;4(2):30-31
- 107 Jaross N, Ryan P, Newland H (2003) Prevalence of diabetic retinopathy in an Aboriginal Australian population: results from the Katherine Region Diabetic Retinopathy Study (KRDRS): report no. 1. *Clinical and Experimental Ophthalmology*;31(1):32-39
- 108 Diamond JP, McKinnon M, Barry C, et al. (1998) Non-mydratic fundus photography: a viable alternative to fundoscopy for identification of diabetic retinopathy in an Aboriginal population in rural Western Australia? *Australian and New Zealand Journal of Ophthalmology*;26(2):109-115
- 109 Office for Aboriginal and Torres Strait Islander Health (2001) *Specialist eye health guidelines for use in Aboriginal and Torres Strait Islander populations*. Canberra: Commonwealth Department of Health and Aged Care
- 110 Boswell J, Nienhuys T (1995) Onset of otitis media in the first eight weeks of life in Aboriginal and non-Aboriginal Australian infants. *Annals of otology, rhinology, and laryngology*;104:542-549
- 111 Boswell JB, Nienhuys TG, Rickards FW, Mathews JD (1993) Onset of otitis media in Australian Aboriginal infants in a longitudinal study from birth. *Australian Journal of Otolaryngology*;1:232-7
- 112 Couzos S, Metcalf S, Murray R (2003) Ear health. In: Couzos S, Murray R, eds. *Aboriginal primary health care: an evidence-based approach*. 2nd ed. South Melbourne: Oxford University Press:193-250
- 113 Leach AJ, Boswell JB, Asche V, Nienhuys TG, Mathews JD (1994) Bacterial colonization of the nasopharynx predicts very early onset and persistence of otitis media in Australian Aboriginal infants. *Pediatric Infectious Disease Journal*;13:983-9
- 114 Coates HL, Morris PS, Leach AJ, Couzos S (2002) Otitis media in Aboriginal children: tackling a major health problem [editorial]. *Medical Journal of Australia*;177(4):177-178
- 115 Morris P (1998) A systematic review of clinical research addressing the prevalence, aetiology, diagnosis, prognosis and therapy of otitis media in Australian Aboriginal children. [review]. *Journal of Paediatrics and Child Health*;34(6):487-497
- 116 Burrow S, Thomson N (2003) Ear disease and hearing loss. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:247-272
- 117 Couzos S, Metcalf S, Murray RB (2001) *Systematic review of existing evidence and primary care guidelines on the management of otitis media in Aboriginal and Torres Strait Islander populations*. Canberra: Commonwealth Department of Health and Aged Care
- 118 World Health Organization and Ciba Foundation (1998) *Prevention of hearing impairment from chronic otitis media. Report of WHO/CIBA Foundation Workshop*.

- London, 19-21 November 1996. Retrieved 11 July 2003 from [http://www.who.int/pbd/deafness/en/chronic\\_otitis\\_media.pdf](http://www.who.int/pbd/deafness/en/chronic_otitis_media.pdf)
- 119 World Health Organization (2004) *Chronic suppurative otitis media: burden of illness and management options*. Retrieved 5 November 2004 from [http://www.who.int/child-adolescent-health/New\\_Publications/CHILD\\_HEALTH/ISBN\\_92\\_4\\_159158\\_7.pdf](http://www.who.int/child-adolescent-health/New_Publications/CHILD_HEALTH/ISBN_92_4_159158_7.pdf)
- 120 Australian Institute of Health and Welfare (2002) *Chronic diseases and associated risk factors in Australia, 2001*. (ISBN 1 74024 153 3) Canberra: Australian Institute of Health and Welfare
- 121 Genco RJ (1996) Current view of risk factors for periodontal diseases. *Journal of Periodontology*;67(10):1041-1049
- 122 Jeffcoat MK, Chestnut C (1993) Systemic osteoporosis and oral bone loss: evidence shows increased risk factors. *Journal of the American Dental Association*;124(11):49-56
- 123 Harford J, Spencer J, Roberts-Thomson K (2003) Oral health. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:313-338
- 124 Armfield JM, Roberts-Thomson KF, Slade GD, Spencer AJ (2003) *Child dental health survey, Northern Territory 2000*. (AIHW Catalogue no. DEN 125) Adelaide: University of Adelaide
- 125 Bourke C, Baima D, Allister J, Spencer AJ (1999) Caries experience of Aboriginal children in South Australia 1991. *Journal of Dental Research*;78(5):951
- 126 Endean C, Roberts-Thomson K, Wooley S (2004) Anangu oral health: the status of the Indigenous population of the Anangu Pitjantjatjara lands. *Australian Journal of Rural Health*;12(3):99-103
- 127 AIHW Dental Statistics and Research Unit (2000) *Oral health and access to dental services among Indigenous Australians*. Adelaide: Australian Institute of Health and Welfare
- 128 Australian Health Ministers' Advisory Council (2001) Variations among population sub-groups: Indigenous Australians. In: Australian Health Ministers' Advisory Council, ed. *Oral health of Australians - national planning for oral health improvement. Final report*. Adelaide: South Australian Department of Human Services:36
- 129 World Health Organization (2001) *International classification of functioning, disability and health*. Geneva: World Health Organization
- 130 World Health Organization (2002) *ICF: towards a common language for functioning, disability and health*. Retrieved 5 November 2004 from <http://www3.who.int/icf/beginners/bg.pdf>
- 131 National Community Services Data Committee (2004) *National Community Services Data Dictionary. Version 3*. Canberra, ACT: Australian Institute of Health and Welfare.
- 132 Australian Institute of Health and Welfare (1999) *Australia's welfare 1999: the third biennial welfare report of the Australian Institute of Health and Welfare*. Canberra: Australian Institute of Health and Welfare
- 133 Thomson N, Snow C (1994) *Disability and handicap among Aborigines of the Taree area of New South Wales*. (No. 9) Canberra: Australian Institute of Health and Welfare
- 134 Thomson N (1998) *The Taree study: a model for Indigenous disability research*. Paper presented at the Indigenous disability data: current status and future prospects. Report on proceedings of the Canberra workshop, April 1998 Canberra
- 135 Burns J, Thomson N (2003) Disability. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:467-487
- 136 Marmot M, Wilkinson R, eds. (1999) *Social determinants of health*. Oxford: Oxford University Press



- 137 Wilkinson R, Marmot M, eds. (2003) *Social determinants of health: the solid facts*. Second ed. Copenhagen, Denmark: World Health Organization
- 138 National Health and Medical Research Council (2000) *Nutrition in Aboriginal and Torres Strait Islander peoples*. Canberra: National Health and Medical Research Council
- 139 National Public Health Partnership (2001) *National Aboriginal and Torres Strait Islander Nutrition Strategy and Action Plan 2000-2010 and first phase activities 2000-2003*. Canberra: National Public Health Partnership
- 140 Australian Institute of Health and Welfare (2004) *Physical inactivity, diet and body weight: results from the 2001 National Health Survey*. (No 1) Canberra: Australian Institute of Health and Welfare
- 141 Shannon C (2002) Acculturation: Aboriginal and Torres Strait Islander nutrition. *Asia Pacific Journal of Clinical Nutrition*;11(suppl):S576-S578
- 142 National Health and Medical Research Council (2003) *The Australian immunisation handbook*. 8th ed. Canberra: Commonwealth of Australia
- 143 Engeler T, McDonald M, Miller M, Groos A, Black M, Leonard D (1998) *Review of current interventions and identification of best practice currently used by community based Aboriginal and Torres Strait Island health service providers in promoting and supporting breastfeeding and appropriate infant nutrition*. Canberra: Commonwealth Department of Health and Family Services
- 144 Australian Institute of Health and Welfare (2002) *2001 National Drug Strategy Household Survey: detailed findings*. (AIHW cat. no. PHE-41) Canberra: Australian Institute of Health and Welfare
- 145 O'Leary C (2002) *Fetal alcohol syndrome, a literature review*. Canberra: Commonwealth of Australia
- 146 Gray D, Siggers S (2003) Substance misuse. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:158-185
- 147 Shoobridge J, Vincent N, Allsop S, Biven A (1998) *Using rapid assessment methodology to examine injecting drug use in an Aboriginal community: a collaborative project conducted by the Aboriginal Drug and Alcohol Council, the Lower Murray Nungas Club, and the National Centre for Education and Training on Addiction*. National Centre for Education and Training on Addiction and the Aboriginal Drug and Alcohol Council
- 148 Gray D, Siggers S, Atkinson D, Carter M, Loxley W, Hayward D (2001) *The harm reduction needs of Aboriginal people who inject drugs*. Perth: National Drug Research Institute, Curtin University of Technology
- 149 Brady M (1992) *Heavy metal: the social meaning of petrol sniffing in Australia*. Canberra: Aboriginal Studies Press
- 150 Aboriginal Drug & Alcohol Council (SA) Inc, Shaw G, Mosey A, Gray D, Stearne AE (2003) *'They sniffed and they sniffed and it just wasn't there': an evaluation of the COMGAS Scheme*. Adelaide: Aboriginal Drug and Alcohol Council (SA) Inc.
- 151 Australian Institute of Health and Welfare (2001) *Expenditures on health services for Aboriginal and Torres Strait Islander people 1998-99*. (AIHW Catalogue No. IHW 7) Canberra: Australian Institute of Health and Welfare and Commonwealth Department of Health and Aged Care
- 152 Deeble J, Mathers C, Smith L, Goss J, Webb R, Smith V (1998) *Expenditure on health services for Aboriginal and Torres Strait Islander people*. (AIHW Catalogue No. HWE-6) Canberra: National Centre for Epidemiology and Population Health, Australian Institute of Health and Welfare and Commonwealth Department of Health and Family Services
- 153 Commonwealth Grants Commission (2001) *Report on Indigenous funding*. Canberra: Commonwealth Grants Commission
- 154 Deeble J (2003) *Expenditures on Aboriginal and Torres Strait Islander health*. Kingston, ACT: Australian Medical Association

- 155 Access Economics (2004) *Indigenous health workforce needs: a report by Access Economics Pty Limited for the Australian Medical Association*. Canberra, ACT: Access Economics
- 156 Australian Medical Association (2004) *Media release: AMA Indigenous Health Report calls for more Indigenous health workers and an extra \$452.5 million a year in targeted funding*. Retrieved 15 November 2004 from <http://www.ama.com.au/web.nsf/doc/WEEN-63S2AD>
- 157 Australian Medical Association (2004) *AMA Discussion Paper, 2004: Healing hands - Aboriginal and Torres Strait Islander workforce requirements*. Canberra: Australian Medical Association
- 158 Ring IT, Firman D (1998) Reducing Indigenous mortality in Australia: lessons from overseas. *Medical Journal of Australia*;169:528-533
- 159 Thomson N (2003) Responding to our 'spectacular failure'. In: Thomson N, ed. *The health of Indigenous Australians*. South Melbourne: Oxford University Press:488-511
- 160 Council of Australian Governments (COAG) (2004) *Council of Australian Governments' Meeting 25 June 2004. Communique, Indigenous affairs*. Retrieved 15 November 2004 from <http://www.coag.gov.au/meetings/250604/index.htm#indigenous>

## Abbreviations

|         |   |
|---------|---|
| ABS     | Australian Bureau of Statistics   |
| ACCHS   | Aboriginal community-controlled Health Service; see also AMS  |
| ACEi    | Angiotensin-converting enzyme inhibitor   |
| ACT     | Australian Capital Territory  |
| AHS     | Australian Housing Survey   |
| AIDS    | Acquired immune deficiency syndrome   |
| AIHW    | Australian Institute of Health and Welfare  |
| AMA     | Australian Medical Association  |
| AMS     | Aboriginal Medical Service; see also ACCHS  |
| ANCARD  | Australian National Council on AIDS and Related Diseases  |
| ANZDATA | Australia and New Zealand Dialysis and Transplant Registry  |
| ASCO    | Australian Standard Classification of Occupations   |
| ASGC    | Australian Standard Geographical Classification   |
| ATSIC   | Aboriginal and Torres Strait Islander Commission  |
| BMI     | Body mass index   |
| CDEP    | Community Development Employment Projects scheme  |
| CGC     | Commonwealth Grants Commission  |
| CHINS   | Community Housing and Infrastructure Needs Survey   |
| COAG    | Council of Australian Governments   |
| CSOM    | Chronic suppurative otitis media  |
| CVD     | Cardiovascular disease  |
| dB      | Decibel   |
| DMFT    | A count of the sum of teeth (T) that are decayed (D), missing due to caries (M), and filled due to caries (F)                           |
| dmft    | A count of the sum of deciduous (baby) teeth (t) that are decayed (d), missing due to caries (m), and filled due to caries (f)          |
| ERP     | Estimated resident population   |
| ESRD    | End-stage renal disease   |
| GAS     | Group A streptococcus   |
| HAV     | Hepatitis A virus   |
| HBsAg   | Hepatitis B surface antigen (a serological marker for HBV)  |
| HBV     | Hepatitis B virus   |
| HCV     | Hepatitis C virus   |
| Hib     | <i>H. influenzae</i> type b   |
| HIV     | Human immunodeficiency virus  |
| HPV     | Human papilloma virus   |
| ICD     | International Classification of Diseases - the World Health Organization's internationally accepted classification of death and disease |
| ICDH    | International Classification of Disability and Handicaps  |

|         |  |
|---------|--|
| ICF     | International Classification of Functioning, Disability and Health                             |
| IDDM    | Insulin-dependent diabetes mellitus  |
| IHO     | Indigenous Housing Organisations   |
| IPD     | Invasive pneumococcal disease  |
| ISDR    | Indirectly standardised death rate   |
| IV      | Intravenous  |
| LBW     | Low birthweight  |
| mmol/L  | Millimoles per litre   |
| MMR     | Maternal mortality ratio   |
| NACCHO  | National Aboriginal Community Controlled Health Organisation                                   |
| NATSI   | (1994) National Aboriginal and Torres Strait Islander Survey                                   |
| NATSISS | (2002) National Aboriginal and Torres Strait Islander Social Survey                            |
| NHMRC   | National Health and Medical Research Council   |
| NHS     | National Health Survey   |
| NIDDM   | Non insulin-dependent diabetes mellitus  |
| NNDSS   | National Notifiable Diseases Surveillance System   |
| NSW     | New South Wales  |
| NT      | Northern Territory   |
| OATSIH  | Office for Aboriginal and Torres Strait Islander Health  |
| OATSIHS | Office for Aboriginal and Torres Strait Islander Health Services – the former name of OATSIH   |
| OM      | Otitis media   |
| Qld     | Queensland   |
| RR      | Rate ratio- usually in this publication the Indigenous rate divided by the non-Indigenous rate |
| SA      | South Australia  |
| SMR     | Standardised mortality ratio   |
| STD     | Sexually transmitted disease; see STI  |
| STI     | Sexually transmitted infection   |
| Tas     | Tasmania   |
| UK      | United Kingdom   |
| UNICEF  | United Nations International Children's Emergency Fund   |
| UV      | Ultraviolet  |
| Vic     | Victoria   |
| WA      | Western Australia  |
| WAACHS  | Western Australian Aboriginal Child Health Survey  |
| WHO     | World Health Organization  |

## Endnotes

- 1 In 2002, the most recent year for which estimates are available, the number of deaths identified as Indigenous was only 55% of the number expected (ABS, 2003). The only jurisdiction with a reasonable proportion identified correctly as the Northern Territory (85%). The proportions for the other jurisdictions were: Victoria (41%), Queensland (56%), WA (62%), SA (59%) and Tasmania (22%). An estimate wasn't available for the ACT.
- 2 A supplementary sample of 3,198 Indigenous people plus 483 included in the core NHS sample resulted in a total Indigenous sample of 3,681 (ABS, 2002).
- 3 The CDEP scheme offers unemployed Indigenous Australians the opportunity of working in community-managed projects and enterprises if they forego unemployment-related social security benefits.
- 4 The information summarised here has been extracted and/or derived from two main sources: the five-yearly Australian Census of Housing and Population (ABS, 2002); the 2001 Community Housing and Infrastructure Needs Surveys (CHINS), which collected information about housing in discrete Indigenous communities throughout Australia (ABS, 2002)
- 5 Information about discrete Indigenous communities – defined as geographic locations, bounded by physical or legal boundaries, and inhabited or intended to be inhabited predominantly (i.e. > 50% of usual residents) by Indigenous people, with housing or infrastructure that is managed on a community basis – was collected by the 2001 CHINS.
- 6 It should be noted that this maternal mortality ratio (MMR) is based on the direct and indirect deaths only, and excludes deaths to women where the cause was classified as 'incidental'. As such, the MMR is not directly comparable with those calculated for previous three-year periods, which were presented for all maternal deaths (including incidental deaths) and for direct deaths.
- 7 In the ICD, cardiovascular diseases are referred to as 'Diseases of the circulatory system'.
- 8 Information about rates of pancreas cancer were not available for Queensland
- 9 Specific information about the deaths from cancer is not available for Queensland and SA.
- 10 The age-standardised rate for Indigenous women in the NT in 1997-2000 was around 14 deaths per 100,000, but, being calculated using the 2001 Australian ERP, is not comparable with the other age-standardised rates that were calculated using the World Standard Population.
- 11 Hepatitis B is the main risk factor for primary liver cancer.
- 12 The module of mental health questions used in the general NHS, the Kessler Psychological Distress Scale 10 (K-10), was omitted from the Indigenous supplement as it was not considered culturally appropriate.
- 13 The ICD chapter 'Mental and behavioural disorders', used for the classification of both hospitalisation and mortality, is very broad. As well as mental illness and mental health problems, it includes mental retardation and a broad sub-category for disorders relating to the use of psychoactive substances (including alcohol, tobacco, other drugs and volatile substances). The chapter doesn't include, however, the results of intentional self-harm, which are classified within the ICD chapter 'External causes of morbidity and mortality'.
- 14 Renal (and urologic) disease includes conditions affecting the function of the body's urinary system, which involves the kidneys, ureters, bladder and urethra.
- 15 Details of new cases of ESRD are collected and collated by the Australian and New Zealand Dialysis and Transplant Registry (ANZDATA). The figures presented in Table 17 have been derived from data provided by ANZDATA.
- 16 It is possible that some of this increase may reflect under-reporting by respondents to the 1994 NATSIS.
- 17 See Burns et al., 2003 for details.
- 18 These jurisdictions are the only ones with reasonable levels of identification of Indigenous people in notifications. Indigenous rates have been compared with those for all other people, including those for whom Indigenous status was not known.
- 19 Note figures have not been adjusted for reporting delay. The figures quoted here are aggregated nationally, and may conceal differences across Australia, particularly between rural/remote and urban areas, for which the patterns may be quite different (see 94 Skov S, Bowden F, McCaul P, Thompson J, Scrimgeour D (1996) HIV and isolated Aboriginal communities. *Medical Journal of Australia*;165:41-42).
- 20 Defined as less than the third percentile of World Health Organization reference values.
- 21 As with all areas of Indigenous health, there is considerable diversity in the impact of ear disease among Indigenous people across Australia. In particular, ear disease has not been identified as a major problem among Torres Strait Islander people. The patterns described in this section do not apply to all Indigenous people, but they are characteristic for many Indigenous communities, particularly those in remote parts of the country.
- 22 Some literature suggests that chronic discharge may lead also to sensorineural hearing loss (Couzos et al., 2003). Sensorineural hearing loss is permanent and is commonly caused by nerve damage that impedes the transmission of sound from the inner ear to the brain. When conductive and sensorineural hearing loss coexist, the hearing loss is referred to as 'mixed'.
- 23 As noted in the section entitled 'Hospitalisation', it is likely that the Australia-wide numbers and rates underestimate Indigenous hospitalisation by as much as 25%.
- 24 The study did not include Indigenous people living in institutions.
- 25 Bearing in mind the generally higher levels of some risk factors documented for Indigenous people living in more remote parts of Australia, the levels of disability among Indigenous people in the Taree area may well be lower than in at least some other parts of the country.