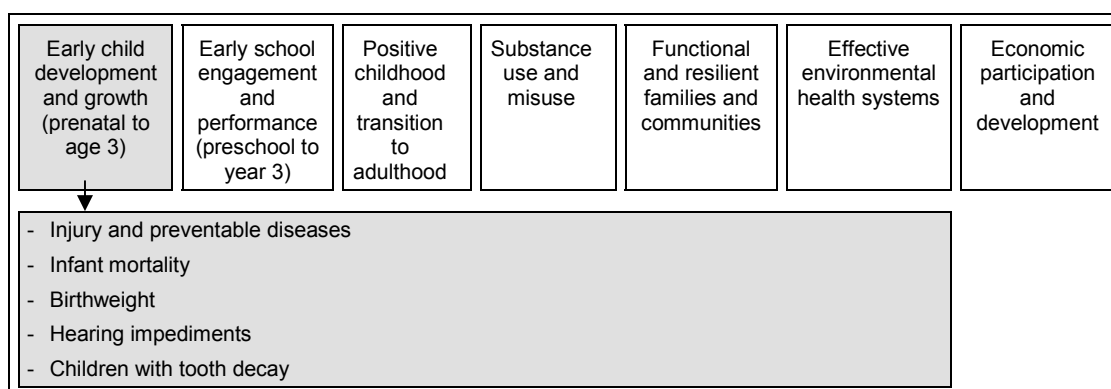

5 Early child development and growth

Strategic areas for action



Providing children with a good start in life can have a profound effect on their passage through the life cycle. While options and opportunities in the future can be determined at this early stage, so too can barriers.

Early childhood experiences have a significant influence on health and educational outcomes in later life. Research has shown that health, growth and development in the first three years of life play a crucial role in later outcomes. Brain development is at its greatest to the age of three. Deprivation, stress and neglect in these early years can have significant impacts on later childhood and adult health and educational outcomes (see, for example, McCain and Mustard (1999), and Keating and Hertzman (1999)).

Headline indicators influence, or reflect, the environment in which young children are born and grow up:

- household and individual income
- suicide and self-harm
- substantiated child abuse and neglect
- family and community violence
- imprisonment and juvenile detention rates.

Early child development and growth can be affected by outcomes in other strategic areas for action including:

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- substance use and misuse (alcohol, tobacco, drug and other substance misuse and harm) — chapter 8
 - functional and resilient families and communities (access to primary health care, mental health, engagement with service delivery) — chapter 9
 - effective environmental health systems (rates of diseases associated with poor environmental health, access to clean water and functional sewerage, overcrowding in housing) — chapter 10
 - positive childhood and transition to adulthood (the education of the parents of young children and whether parents have made a good transition from school to work and established themselves well before becoming parents) — chapter 7
 - economic participation and development (employment, governance capacity and skills, governance arrangements) — chapter 11

Injury and preventable diseases in early childhood can prove fatal for young children. Even when they are not fatal, they can affect nutrition, growth and mental stimulation at a crucial time when children are developing rapidly. Research has shown that negative stresses in early childhood can adversely affect child development (see McCain and Mustard 1999 for examples). Repeated infections can lead to kidney stones and high blood pressure (DHAC 1999).

Hospitalisation and deaths from injury and preventable diseases are reported in section 5.1.

Infant mortality reflects the most serious outcome of disadvantage and illness during pregnancy and infancy (the first year of life). Infants are growing rapidly and still developing immunity to diseases and are more vulnerable to many illnesses and environmental hazards than older children and adults. Section 5.2 reports on the survival of Indigenous children in their first year of life.

Low birthweight has been shown in several studies to be correlated with coronary heart disease and non-insulin dependent diabetes later in life. Small size and disproportion at birth can indicate lack of nutrients or oxygen during particular stages of pregnancy (see Mackerras 1998; Fall et al. 1995; Barker 1995; Barker et al. 2001). Birthweight is also a key factor affecting neonatal mortality (Sayers and Powers 1997). Section 5.3 examines data relating to babies born to Indigenous mothers.

Hearing impediments in Indigenous children are often the result of recurring ear infections. Chronic ear infections and subsequent hearing loss are generally agreed to impair language development and educational achievement (Bowd (2002); Couzos, Metcalf and Murray (1999); and Smith Mackenzie and Hatcher (1995)

cited in Couzos, Metcalf and Murray (2001)). A recent study found that school attendance rates were much lower for Indigenous children with chronic ear infections when compared with other children (NACCHO 2003).

Hearing impediments in early childhood may not be diagnosed until children begin school and are unable to hear properly in the classroom. Deafness makes learning much more difficult for children throughout their schooling and later life and is a particular problem for children for whom English is not their first language (NTDE 1999). From the results of a large scale survey conducted in 2001 and 2002, Zubrick et al. (2004) found that:

Recurrent and discharging ear infections, which affected one in eight Aboriginal children in WA, had a very significant impact on rates of hearing loss and on speech, language and learning problems.

Data on hearing impediments are contained in section 5.4.

The indicator of children with tooth decay has been moved from the strategic area ‘Early school engagement and performance (preschool to year 3)’ in recognition of the importance of good oral health as part of early child development and growth. The level of tooth decay, missing or filled teeth in primary school aged children (where most data are available) reflects diet, dental hygiene and access to treatment in the early years of life. Aboriginal and Torres Strait Islander children suffer from much higher rates of decayed or missing teeth than non-Indigenous children, which can also indicate poor access to, and unmet need for, dental care (AHMAC 2006).

Healthy teeth are an important part of overall good health, as tooth decay causes illness and pain. Other effects can include difficulties chewing and discomfort while eating, as well as impaired speech and language development. Tooth decay can also exacerbate chronic disease, and generate negative psycho-social effects such as embarrassment and social isolation (AHMAC 2006).

Data on tooth decay from school dental services, as well as data on hospitalisations for dental problems are contained in section 5.5.

Attachment tables

Attachment tables for this chapter are identified in references throughout this chapter by an ‘A’ suffix (for example, table 5A.1.1). A list of attachment tables is in section 5.7. These tables can be found on the Review web page (www.pc.gov.au/gsp). Users can also contact the Secretariat to obtain the attachment tables.

5.1 Injury and preventable diseases

Box 5.1.1 Key messages

- In 2004-05, Indigenous children under four were twice as likely to be hospitalised for potentially preventable diseases and injuries than non-Indigenous children (251.0 per 1000 compared to 122.6 per 1000) (table 5.1.1).
- For the period 2001 to 2005, the death rate from external causes and preventable diseases was around five times as high for Indigenous children (from 5.7 to 10.8 per 10 000 population) as for non-Indigenous children (from 1.4 and 2.5 per 10 000 population) in Queensland, WA, SA and the NT (figure 5.1.2).

Since the 2005 Report, this indicator has been changed from ‘rates of hospital admission for infectious diseases’ to ‘injury and preventable diseases’. This reflects comments received during consultations on the 2003 and 2005 Reports that the health of Indigenous children involved more than just infectious diseases. This report covers a wide range of preventable conditions, including infectious diseases, non-infectious diseases and injury (includes injuries caused by transport accidents, other accidents, assault and complications of medical and surgical care).

Until the second half of the 20th century, infectious diseases were a prominent cause of death in Australia. Between 1921 and 1995, age standardised death rates from infectious diseases fell from 185 per 100 000 population to 6 per 100 000 (ABS 1997). In 2005, the death rate from certain infectious and parasitic diseases in Australia (total persons, both Indigenous and non-Indigenous) was 7.8 per 100 000 population (ABS 2007).

Infectious diseases range in severity from minor conditions such as the common cold, to serious illnesses such as meningococcal infection and tuberculosis, which can result in death. Disease is caused by organisms such as bacteria, viruses or parasitic worms, and can be transmitted directly (for example, through droplet infection) between people, or from insects and animals to people. Disease can also be indirectly transmitted (for example, through contaminated food or water) and through the environment. Infection can also result from the pathological growth of organisms already present in a person’s body (ABS 1997).

Some infections that may appear minor can have serious longer term health effects. Recurring skin and throat infections (caused by group A streptococcal bacteria) in

some Aboriginal communities are associated with the highest worldwide rates of acute rheumatic fever (Currie and Carapetis 2000).¹

the major pathogen of skin infection, group A streptococcus, is also associated with chronic renal failure — a prevalent and highly burdensome condition of Aboriginal adults. (Zubrick *et al.* 2004, p.150)

In Australia, many childhood diseases are generally prevented or successfully treated without requiring hospitalisation. The main focus of this indicator is to examine the range of diseases and injuries experienced by children that result in a hospital admission.

A wide range of social, cultural, physical and economic factors influence the health of children. Health initiatives of communities and governments can assist in the prevention of disease and promote the health of children. These initiatives include education on the benefits of breastfeeding, good nutrition and sanitation, and the provision of adequate housing (see chapter 10 for more information on diseases associated with poor environmental health). Access to effective and appropriate health care services (including dental and immunisation services) can also influence the health of children in both the short and long term. More information on immunisation rates in children and the prevalence of vaccine preventable diseases as well as access to primary health care in general, is included in section 9.3. Section 5.4 includes information on ear infections in children and section 5.5 covers tooth decay in children.

¹ The role of group A streptococcal bacteria (in skin and throat infections) leading to acute rheumatic fever is contentious but it appears likely in Australia that it plays a role. Interventions which aim to reduce group A streptococcal throat and skin infection are likely to reduce the rate of acute rheumatic fever. Acute rheumatic fever is an auto-immune disease initiated by infection with group A streptococcal bacteria. The important of acute rheumatic fever is its major complication, rheumatic heart disease. After an initial episode of acute rheumatic fever, a person is at risk of recurrent episodes, each of which can increase the risk of rheumatic heart disease. Rheumatic heart disease is caused by the damage done to the heart valves during an episode of acute rheumatic fever (ABS and AIHW 2003; Online Medical Dictionary 2005). Acute rheumatic fever and rheumatic heart disease are now rare in populations with good living conditions — optimal hygiene and minimal household overcrowding — and easy access to quality medical care (things that Indigenous people often lack).

Box 5.1.2 'Things that work' — injury and preventable diseases

Jabba Jabba Indigenous Immunisation Program — Sunshine Coast, Queensland

Indigenous vaccination programs in the past have sometimes had limited success, and those most in need and at risk of disease have been most difficult to reach. The Jabba Jabba Indigenous Immunisation program operated initially as a pilot between March 2002 and June 2004 to enable culturally appropriate access for 'hard to reach' sections of the Indigenous community and to provide an entry point to mainstream health services. The program now operates on a permanent basis in recognition of its success in providing Indigenous clients with an entry point to mainstream health services.

The program operates within an Indigenous child and family health model and provides first time vaccinations for children who would otherwise have missed their vaccination schedules. It also provides follow up to children who were long overdue for vaccinations. The program was designed to have a high degree of cultural sensitivity. For example Indigenous health workers assist the nurse immuniser during home visiting. This not only breaks down cultural barriers but also enhances the skills and knowledge of Indigenous health workers. Importantly the community has become aware of other Indigenous services and has shown increased use of those services (Queensland Government and Central Public Health Unit Network Sunshine Coast 2005).

Keeping Kids Healthy Makes a Better World, NT

This program operated in four communities in the Northern Territory: Mt Liebig, Titjikala, Nyirripi and Willowra. Funded by UNICEF, Waltja and the Telstra Foundation, its initial aim was to improve the nutrition of 0–5 year olds, but over time it was used to achieve other outcomes such as engagement in the community, cultural awareness and strength and greater family cohesion, including an emphasis on the role of men.

Program strategies included education, providing better access to healthy foods at the community store, healthy breakfast programs, bush tucker and bush medicine activities with elders, and gardening. The whole community was involved in these activities. Local workers were trained as nutrition workers. Community engagement was an essential element of program design — in the selection of foods to grow and stock, in the development of priorities and in developing activities that achieved program aims. The program itself was developed in response to concerns from the local communities about diet.

Outcomes included decreased numbers of children failing to thrive, increased awareness of the importance of nutrition, better access to healthy foods, decreased incidence of anaemia in children and coordination between community-based agencies such as the clinic, school, store and council. The communities involved continued to focus on better nutrition even after the project came to an end.

(Continued next page)

Box 5.1.2 (continued)

Growth Assessment and Action and Healthy School-Age Kids Programs are now being implemented across all remote communities, supported by the Maternal, Child and Youth Health Team (MCYH), in collaboration with Remote Health and Workforce Support. Comprehensive under-five child health promotion, action planning for children who are not thriving and early identification and treatment of ear infection programs are being developed. Interdivisional collaboration is integrating health and wellbeing assessments and interventions in a 'one-stop shop' approach (NT Government, unpublished).

Team approach to children's nutrition (0 to 5 years) on Tiwi Islands, NT

A new approach to child nutrition on Tiwi Islands started in 2006 built on knowledge that a team approach was the best form of management for child nutrition issues in remote communities. A nutritionist worked with a multidisciplinary team, the crèche and local women to support the nutrition of children aged less than five years. The Tiwi child health strategy became part of routine practice at the health centre to be continued after the nutritionist left. In the first six months of implementation began only one child (who had other complex health issues) had to be sent away for failure to thrive. The outcomes are shared with the Strong Women group (see section 5.3), who are happy with and support the strategy, which has highlighted the importance of child health and growth in the community (NT Government, unpublished).

Box 5.1.2 describes programs to reduce rates of preventable diseases in Indigenous children.

Despite overall improvements in the health of most Australian children, significant inequalities still exist. Hospitalisation data indicate that Indigenous children under age four are hospitalised for injury and preventable diseases at twice the rate of non-Indigenous children of the same age.

Time series data on hospitalisations for injury and preventable diseases are not included in this Report. Definitions of potentially preventable diseases and injury (and the conditions that should be included) are currently being reviewed by national health data committees. The conditions included in table 5.1.1 are based on advice from the AIHW and include conditions that could have potentially been prevented by the provision of appropriate non-hospital health services as well as injuries that could potentially have been prevented (usually outside the health system in broader society). Some of the disease codes included in table 5.1.1 may also include some non-preventable conditions. Once definitions have been agreed it should be possible to provide more precise, as well as time series, data for future Reports.

Table 5.1.1 Potentially preventable hospitalisations for children aged less than 4 years, Qld, WA, SA, and public hospitals in the NT, 2004-05^{a, b, c}

ICD-10-AM code and description	Hospitalisations (number)			Age specific rate (per 1000 population)	
	Indigenous	Non-Indigenous ^d	Total	Indigenous	Non-Indigenous ^d
Certain infectious and parasitic diseases (A00–B99)	1 731	7 792	9 523	59.8	22.0
Nutritional anaemias (D50–D53) and malnutrition (E40–E46)	104	43	147	3.6	0.1
Diseases of the ear and mastoid process (H60–H95)	303	5 813	6 116	10.5	16.4
Diseases of the respiratory system (J00–J99)	3 416	19 285	22 701	118.1	54.5
Diseases of oral cavity salivary glands and jaws (K00–K14)	297	2 146	2 443	10.3	6.1
Diseases of the skin and subcutaneous tissue (L00–L99)	594	1 273	1 867	20.5	3.6
Injury, poisoning and certain other consequences of external causes (S00–T98) ^e	815	7 003	7 818	28.2	19.8
Transport accidents (V01–V99) ^e	62	286	348	2.1	0.8
Other external causes of accidental injury (W00–X59) ^e	602	6 067	6669	20.8	17.2
Assault (X85–Y09)	73	79	152	2.5	0.2
Complications of medical and surgical care (Y40–Y84) ^e	66	551	617	2.3	1.6
Other ^e	12	20	32	0.4	0.1
Total potentially preventable hospitalisations	7 260	43 355	13 063	251.0	122.6

^a Data are based on principal diagnosis as classified by the ICD-10-AM code and description. ^b Data are based on state of usual residence. ^c Age specific rates are as per 1000 people in that age group (based on ABS estimated resident population (ERP)). ^d Hospitalisations where Indigenous status was not stated are included in the non-Indigenous numbers and rates. ^e External causes sub-categories classified by first external cause.

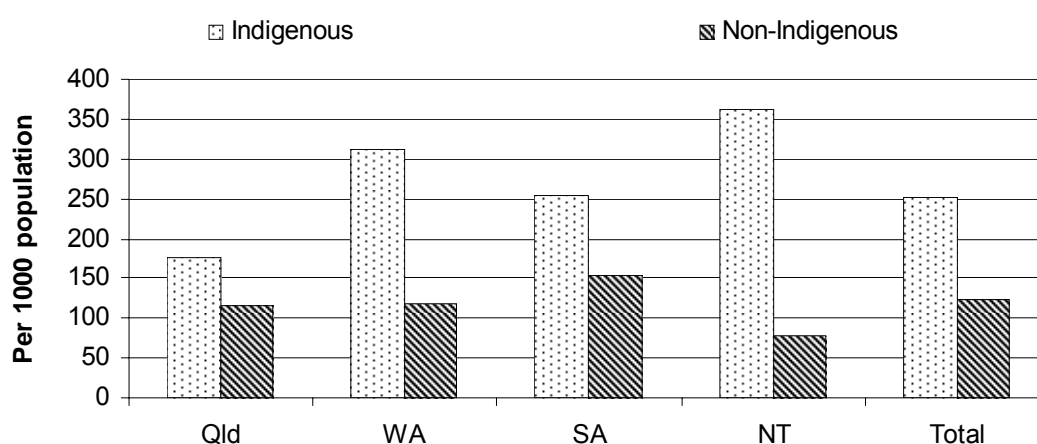
Source: AIHW National Hospital Morbidity Database (unpublished); table 5A.1.1.

- In 2004-05, Indigenous children aged less than four years were twice as likely to be hospitalised for potentially preventable diseases and injuries than non-Indigenous children (251.0 per 1000 compared to 122.6 per 1000) (table 5.1.1).
- Diseases of the respiratory system were the most common cause of potentially preventable hospitalisations for both Indigenous and non-Indigenous children aged less than four years, however the rate for Indigenous children (118.1 per 1000) was twice as high as for non-Indigenous children (54.5 per 1000).
- Indigenous children aged less than four years suffered from nutritional anaemias and malnutrition at 29.6 times the rate for non-Indigenous children (3.6 per 1000 compared to 0.1 per 1000). However, it was the least common potentially

preventable condition for which Indigenous children aged less than four years were hospitalised (104 Indigenous hospitalisations).

- Data on hospitalisations of children aged less than four years for potentially preventable diseases and injuries by state and territory are included in table 5A.1.1.

Figure 5.1.1 Potentially preventable hospitalisations for children aged less than 4 years, Qld, WA, SA, and public hospitals in the NT, 2004-05^{a, b, c, d}



^a Data are based on principal diagnosis as classified by the ICD-10-AM code and description. ^b Data are based on state of usual residence. ^c Age specific rates are as per 1000 people in that age group (based on ABS estimated resident population(ERP)). ^d Hospitalisations where Indigenous status was not stated are included in the non-Indigenous numbers and rates.

Source: AIHW National Hospital Morbidity Database (unpublished); table 5A.1.1.

- Hospitalisations for potentially preventable diseases and injuries were higher for Indigenous than non-Indigenous children aged less than four years in 2004-05 for each of the four states and territories for which data are available (figure 5.1.1).

Results from the Western Australian Aboriginal Child Health Survey (Zubrick et al. 2004) undertaken in 2001 and 2002 are outlined below.

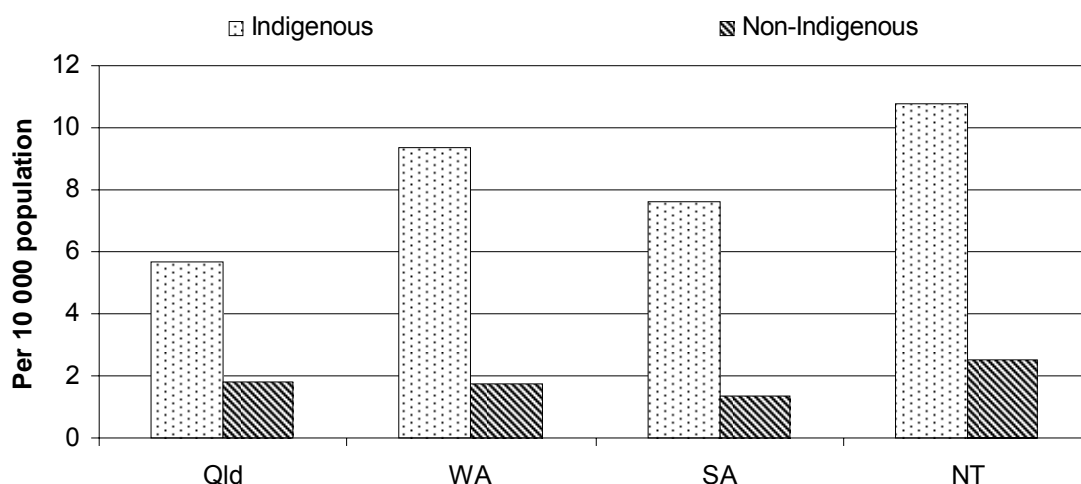
- Recurring chest infections affected 12.3 per cent of Indigenous children aged 0–17 years, with infection rates highest in children aged 0–3 years and lowest in children aged 12–17 years. There was no association between infection rates and levels of relative isolation.²

² Zubrick et al. (2004) used a different series of geographic region (remoteness) categories than the standard ABS categories used elsewhere in this Report and discussed in chapter 2. Both sets of categories are based on the Accessibility Remoteness Index of Australia (ARIA). The ABS

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- An estimated 8.5 per cent of Indigenous children had recurring skin infections such as school sores or scabies. Children aged 4–11 years were the most likely to have recurring skin infections. The prevalence was 17.6 per cent in extremely isolated areas, more than twice the rate in all other areas.
 - An estimated 5.6 per cent of Indigenous children suffered from recurring gastrointestinal infections, with infection rates twice as high in extremely isolated areas as in other areas. Prevalence decreased significantly after 12 years of age.
 - Some 18.1 per cent of Indigenous children had recurring ear infections. Older children aged 12–17 years were significantly less likely to have recurring ear infections (13.6 per cent) than children aged 0–3 years (20.4 per cent) and children aged 4–11 years (19.9 per cent).
 - An estimated 9.7 per cent of Indigenous children reported more than one of recurring chest, skin, gastrointestinal and/or ear infections, with 6.9 per cent suffering from two types, 2.3 per cent suffering from three types and 0.5 per cent suffering from all four types. Significantly more children in areas of extreme isolation (17.9 per cent) had more than one type of recurring infection than children in less isolated areas.
 - An estimated 16.3 per cent of children in households where their primary carer reported financial strain suffered from more than one type of recurring infection, which was significantly higher than the prevalence in households where the primary carer could ‘save a bit now and again’ (8.4 per cent) or could ‘save a lot’ (7.2 per cent). There was no association between the primary carer’s educational attainment and either recurring infections or ear infections.

categories are a widely used version known as ARIA+, whereas the version used by Zubrick et al. (2004) is known as ARIA++, which has been designed to allow greater distinction between locations that are all classified as very remote in the ABS ARIA+ version. The five ARIA++ categories used by Zubrick et al. (2004) are called levels of relative isolation and comprise the categories: none (Perth metropolitan area), low, moderate, high and extreme.

Figure 5.1.2 **Deaths from external causes and preventable diseases as a proportion of total population for children aged less than five years, 2001–2005^{a, b}**



^a Data are subject to a degree of uncertainty and apparent differences in life expectancy estimates between jurisdictions may not be statistically significant. ^b Calculations of rates for the Indigenous population are based on ABS Experimental Projections, Aboriginal and Torres Strait Islander Australians (low series, 2001 base). There are no comparable population data for the non-Indigenous population. Calculations of rates for the non-Indigenous population are based on data derived by subtracting Indigenous population projections from total population estimates and should be used with care.

Source: ABS Causes of Deaths 2005, Cat. no. 3303.0 (unpublished); table 5A.1.4.

- Between 2001–2005, the death rate from external causes and preventable diseases was five times as high for Indigenous children (between 5.7 and 10.8 per 10 000 population) as the rate for non-Indigenous children (between 1.4 and 2.5 per 10 000 population) in Queensland, WA, SA and the NT (the four jurisdictions for which data were available) (figure 5.1.2).

5.2 Infant mortality

Box 5.2.1 Key message

Indigenous infant mortality rates in most of the states and territories for which data are available have improved in recent years. Nevertheless, mortality rates for Indigenous infants in these jurisdictions remain two to three times as high as those for the total population of infants (figures 5.2.1 and 5.2.2).

The rate of infant mortality (the number deaths of children under one year of age per 1000 live births)³ is commonly viewed as an indicator of the general health and wellbeing of a population. A low infant mortality rate is a major contributor to increased life expectancy for a population.

There was a dramatic decline in infant mortality rates in Australia over the 20th century (the rate of infant deaths decreased from 103 deaths per 1000 live births in 1900 to 4.8 deaths per 1000 live births in 2003). During the first half of the 20th century, a significant share of the decline in infant mortality was associated with improvements in public sanitation and health education. By the 1940s, the development of vaccines and mass vaccination programs resulted in further gains. Improved medical technology (including improvements in neonatal intensive care) and education campaigns about the importance of immunisation, and more recently, in the case of sudden infant death syndrome, infant sleeping position, have led to further modest declines in infant deaths in the last half of the century (ABS 1996 and 2004).

The main causes of Indigenous infant deaths are congenital disorders, sudden infant death syndrome, respiratory and cardiovascular disorders, and accidents (ABS 1996).

Box 5.2.2 'Things that work'— infant mortality

NSW Aboriginal Maternal and Infant Health Strategy

The NSW Aboriginal Maternal and Infant Health Strategy commenced in 2001. It aims to improve access to culturally appropriate maternity services for Aboriginal mothers, including antenatal visits for pregnant women. The purpose of antenatal visits is to monitor the health of both the mother and baby, provide information, identify antenatal complications and provide appropriate intervention at the earliest time.

In those areas of NSW where the strategy has been implemented, 78 per cent of Aboriginal women had their first antenatal visit before 20 weeks gestation in 2003-04, compared with 64 per cent for these areas in the period 1996–2000 (prior to the strategy).

(Continued next page)

³ Infant deaths are usually divided into 'neonatal' (occurring in the first 28 days after birth (0–27 days)) and 'postneonatal' periods (those occurring in the remainder of the first year (28 days to 364 days)).

Box 5.2.2 (continued)

Between 1993–95 and 2002–04, the perinatal mortality⁴ rate among babies born to Aboriginal mothers in NSW decreased from 19.7 to 12.5 per 1000 live births. The NSW Aboriginal Maternal and Infant Health Strategy may have been one of several factors and programs contributing to the decrease in mortality over this period (NSW Government, unpublished).

Townsville Aboriginal and Islander Health Service, Queensland — Mums and Babies program

In February 2000, the Mums and Babies project commenced at Townsville Aboriginal and Islander Health Service (TAIHS). Under a partnership arrangement between the Queensland Health Child Health Unit and the Aboriginal and Islander Health Team, the Kirwan Women's Hospital, and TAIHS, a collaborative model of antenatal and postnatal care for women was developed. The program encompasses regular antenatal and postnatal medical examinations, pregnancy nutrition advice, birthing information and support, supervised childcare, and a transport service. The program has seen a decrease in perinatal deaths by 62 per cent, pre-term births by 44 per cent and the incidence of low birthweight by 26 per cent since 2000. The Mums and Babies clinic also sees large numbers of infants and children who are regularly monitored for growth, development, and hearing. The program has been extended to include primary health care for children up to eight years of age (TAIHS 2005; Atkinson 2001; Panaretto et al. 2005; Queensland Government (unpublished)).

As well as those mentioned in box 5.2.2, a variety of programs have been developed to improve the health of Indigenous babies and young children, some of which are included as case studies in sections 5.1 and 5.3. Efforts to improve the health of mothers and babies through better antenatal care, immunization and greater use of maternal and child health services are likely to help reduce infant mortality.

At present, estimates of the infant mortality rate among Australia's Indigenous population are imprecise:

The exact scale of difference between the Indigenous and total population mortality is difficult to establish conclusively, due to data quality issues with Indigenous deaths data and the uncertainties inherent with estimating and projecting the Indigenous population over time. Caution should be exercised when undertaking precise analysis of Indigenous mortality and trends in Indigenous data. (ABS 2006)

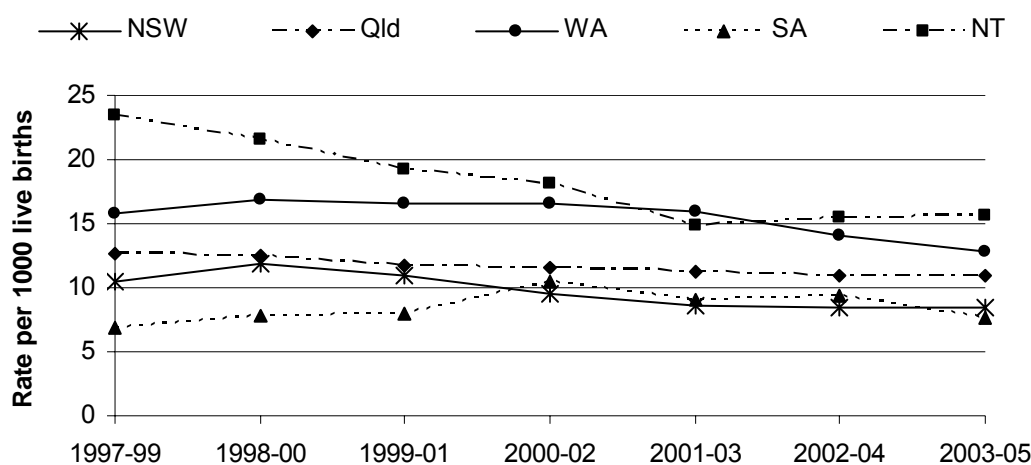
The ABS suggests that under-coverage of Indigenous infant mortality is mainly due to under reporting. Although each jurisdiction now asks a standard question about the Indigenous status of the deceased, it is sometimes left unanswered or recorded

⁴ Perinatal mortality is the death of an infant within 28 days of birth (neonatal death) or of a fetus (unborn child) that weighs at least 400 grams or that is of a gestational age of at least 20 weeks.

incorrectly. There is some evidence that under-identification of Indigenous deaths is primarily caused by Indigenous people being incorrectly recorded as not Indigenous, rather than from their Indigenous status not being recorded at all. The ABS suggests accuracy of Indigenous status data varies with how the information is collected (for example, by surveys or through administrative data) and who provides the information (for example, the person of interest, a relative, a health professional or an official) and other factors that influence data collected for death certificates (ABS 2006).

Although the total proportion of deaths for which Indigenous status is not stated is quite small (1.2 per cent), comparison with population projections based on Census data suggests that many Indigenous deaths are incorrectly recorded as non-Indigenous. The implied coverage of Indigenous deaths, for the period 2001 to 2005, ranged from 92 per cent in the NT, to 45 per cent and 31 per cent in NSW and Victoria respectively (ABS 2006).⁵ Consequently, in this Report, Indigenous infant mortality data are only presented for NSW, Queensland, WA, SA, and the NT.

Figure 5.2.1 Indigenous infant mortality

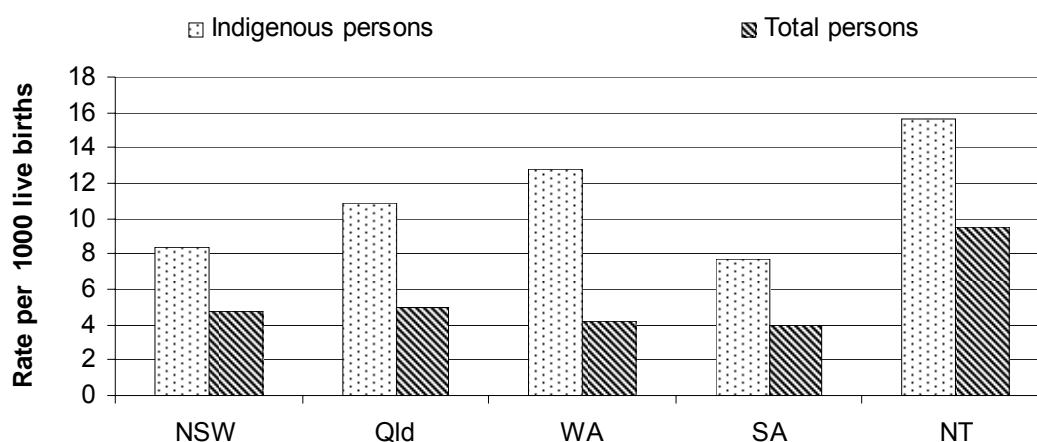


Source: ABS (2006), *Deaths Australia, 2005* (and previous issues); table 5A.2.1.

- Between 1997–1999 and 2003–2005, Indigenous infant mortality fell in NSW, Queensland, WA and the NT. Because of the incomplete identification of Indigenous deaths and as the rates are based on small numbers of deaths, which fluctuate from year to year, and because changes in some states are small, trends should be interpreted with caution (figure 5.2.1).
- Infant mortality rates for all persons (Indigenous plus non-Indigenous) also fell over the same time periods (table 5A.2.1 and ABS (2006)).

⁵ Coverage ratios for Tasmania and the ACT are not calculated due to small numbers.

Figure 5.2.2 Infant mortality, by Indigenous status, 2003–2005^a

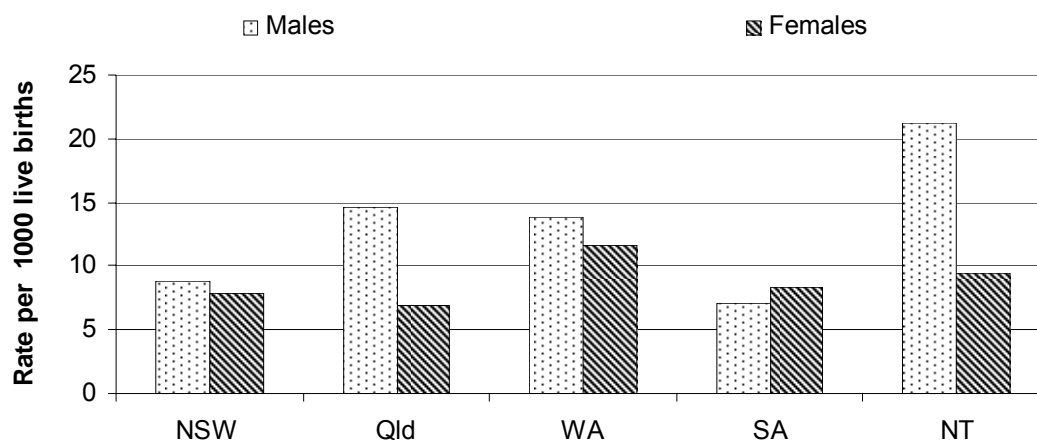


^a Total includes Indigenous status not stated.

Source: ABS (2006), *Deaths Australia, 2005*; table 5A.2.1.

- Infant mortality rates among Indigenous people were about two to three times those for total persons for the period 2003–2005, in states and territories for which data are available (figure 5.2.2).
- In the NT, the significant proportion (28.8 per cent in 2001) of Indigenous people in the total population skews the comparison between Indigenous and total persons. The Indigenous infant mortality rate for the NT is best compared with the total Australian infant mortality rate (5.0 per 1000 live births) (ABS 2006). For other states and territories Indigenous people comprised approximately 2.4 per cent of the total population in 2001, therefore, infant mortality for total persons represents mostly non-Indigenous births (for population data see table A.6 of appendix 3).
- Data in figure 5.2.2 compare Indigenous with total population infant mortality, which allows the inclusion of data for NSW. Data comparing Indigenous and non-Indigenous infant mortality for Queensland, WA, SA and the NT (but excluding NSW) have been published by AHMAC (2006, p.65).
- Indigenous infants in the US, Canada and New Zealand have higher mortality rates than infants in the general populations of those countries, but the gap is not as large as for Aboriginal and Torres Strait Islander infants in Australia (AHMAC 2006, p.64).

Figure 5.2.3 Indigenous infant mortality by sex, 2003–2005



Source: ABS (2006), *Deaths Australia, 2005*; table 5A.2.1.

- In the period 2003–2005, infant mortality was higher for Indigenous males than females in NSW, Queensland, WA and the NT (figure 5.2.3).
- The male infant mortality rate for the total population has been consistently higher than the female infant mortality rate over the past 20 years (ABS 2006).

5.3 Birthweight

Box 5.3.1 Key messages

- From 2002 to 2004, babies born to Indigenous mothers were more than twice as likely to have low birthweight (13.0 per 1000 live births) than babies born to non-Indigenous mothers (6.1 per 1000 live births) (table 5.3.2).
- Average birthweights and proportions of low birthweight babies to Indigenous mothers did not change between 1998–2000 and 2002–2004 (tables 5A.3.1 to 5A.3.5).
- From 2002 to 2004, the average birthweight of live births to Indigenous mothers was 3161 g, compared with 3380 g for babies born to non-Indigenous mothers — a difference of 219 g (table 5.3.2).

The birthweight of a baby is a key indicator of health status. Children with low birthweights are more likely to have problems early in life, or even die in infancy. Low birthweight can also have long-term influences on the development of chronic diseases in adulthood, including diabetes and heart disease (Mackerras 1998; Fall et al. 1995). For many Indigenous children, health risks associated with low

birth weight are compounded by high rates of infectious disease and poor infant nutrition (Singh and Hoy 2003).

Low birthweight is defined as less than 2500 g. Within this category, babies weighing less than 1500 g are considered as very low birthweight and those less than 1000 g as extremely low birthweight (AIHW 2003). Generally, a higher proportion of female infants are born with a low birthweight compared to male infants. However, female infants tend to do better than male infants of the same weight.

Low birthweight might be a result of being born early (pre-term), although the infant may be within the expected size range for its gestational age. Alternatively, the infant may be small for its gestational age (fetal growth retardation). Low birthweight can also result from a combination of these two factors (ABS/AIHW 2003). Mackerras (1998) and Sayers and Powers (1997) identify fetal growth retardation as the main cause of low birthweight among Indigenous babies born in non-remote areas. Conversely, Rousham and Gracey (2002), in a study of Indigenous infants in the Kimberley region of WA, identified pre-term birth as the more likely cause of low birthweight in this rural population.

Predictors for fetal growth retardation and pre-term birth are listed in table 5.3.1. Some predictors cannot be altered (for example, infant sex or race), others may take at least a generation to change (for example, maternal birthweight), while others might be influenced in the short-term (for example, maternal weight or cigarette smoking). Fetal-alcohol syndrome, which is more prevalent in Indigenous than non-Indigenous populations (see section 8.1), can also lead to low birthweight. Presence of multiple births can also influence an infant's birthweight (ABS/AIHW 2003).

Table 5.3.1 Predictors of fetal growth retardation and pre-term birth^a

	<i>Fetal growth retardation</i>	<i>Pre-term birth</i>
Direct	infant sex, race/ethnic origin, maternal height, maternal pre-pregnancy weight, paternal height and weight, maternal birthweight, parity, prior low birthweight infant, gestational weight gain, energy intake, general morbidity, malaria, maternal cigarette smoking, alcohol consumption, and tobacco chewing.	maternal pre-pregnancy weight, prior preterm birth, prior spontaneous abortion, maternal cigarette smoking, in utero diethylstilboestrol exposure, maternal diabetes, urogenital infections, bacterial vaginosis, and placental, cervical or uterine abnormalities.
Indirect	Very young maternal age, socio-economic status (including maternal education)	

^a Excludes deliveries in women with an underlying chronic illness. ^b Diethylstilboestrol is a drug prescribed widely from the 1940s to 1970s that has been associated with increased risks of vaginal and cervical cancers and other disorders in people who were exposed to the drug in the uterus when their mothers were given it while pregnant.

Source: Mackerras 1998.

Factors that may reduce low birthweight in the long term include:

- increasing attendance for antenatal care in the first trimester, which would allow for the identification and possible modification of factors (such as smoking) that might compromise the mother's and child's health. Plunkett et al. (1996) found that Indigenous women are less likely than non-Indigenous women to attend early antenatal care. Some Indigenous women face difficulties in accessing antenatal care, such as a lack of local facilities or suitable transport, cost, and a lack of culturally accessible programs.
- introducing nutritional assessment and monitoring into prenatal care, with evaluation of their use and effectiveness
- evaluating strategies to improve maternal nutrition by increased weight gain during pregnancy (Mackerras 1998).

A study undertaken by the Nganampa Health Council on people residing in the Anangu Pitjantjatjara Lands in the far north-west of SA found that better antenatal care for expectant mothers led to positive outcomes in perinatal mortality and improved birthweights (ABS/AIHW 2003).

Box 5.3.2 provides examples of successful programs providing antenatal care to Indigenous women.

Box 5.3.2 'Things that work' — birthweight

Congress Alukura Women's Health Program

Based in Alice Springs, NT, Congress Alukura is a women's health and birthing centre developed in the 1980s to address the needs of Aboriginal women in Central Australia.

The services include the provision of culturally appropriate antenatal, intrapartum, postnatal and women's health care through a midwifery led maternity service and women's health clinic. The service includes home visiting, transport, specialist/hospital liaison, limited mobile bush service and adult and youth health education. The program employs a full-time medical officer, midwives, women's health nurse, liaison officer, educators, traditional grandmothers and administrative/support staff.

A large proportion of Aboriginal mothers use Alukura for antenatal care (in 1994, 98 per cent of urban women and 18 per cent of rural women). Mean birthweight of Aboriginal infants in the Alice Springs urban area increased from 3168 g in 1986–90 to 3271 g in 1991–95 (an increase of 103 g or 3.3 per cent) and was maintained at 3268 g in 1996–99 (Ah Chee, Alley and Milera 2001; Carter et al. 2004).

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Box 5.3.2 (continued)

Strong Women, Strong Babies, Strong Culture

The Strong Women, Strong Babies, Strong Culture (SWSBSC) Program is a bi-cultural program that supports Indigenous women to look after and teach young pregnant women and new mothers to care for themselves and their children in ways that reflect traditional cultural values and practices.

The aims of SWSBSC are:

- to address the modifiable health risks during pregnancy for low birthweight
- support involvement in cultural ceremonies and traditions for women
- encourage early presentation for antenatal care
- support families to care for their women during pregnancy and after the birth of the baby
- support and encourage women to care for their babies and young children.

The program is delivered 'by Aboriginal women, for Aboriginal women'. The local community-based Strong Women Workers are supported to provide information and health promotion by regional SWSBSC Coordinators, who are employed by the NT Department of Health and Community Services. The program is built on the respect and understanding of Aboriginal women's cultural ways for the health of women and children by keeping 'grandmother's law' strong.

The SWSBSC program was set up in 1993-94 and evaluation has shown a reduction in low birthweight in participating communities compared to those without the program. The program is currently funded in 15 communities (NT Government, unpublished).

Djuli Galban, NSW

Djuli Galban operates in Kempsey, NSW, with a focus on antenatal and early postnatal care and education.

The format is an accessible, community based, culturally sensitive outreach program. Participating women are provided with individualised, flexible and supportive care and education that is appropriate to their individual needs. 'At risk' pregnancies (including teenage pregnancies) are monitored and referred to specialist services. Culturally appropriate resources have been developed to facilitate the delivery of education and care. In addition, the delivery of education has been adapted to suit the needs of the local community (one-on-one sessions are used, as group sessions were found to be less effective). The program aims to create close relationships and trust between staff and clients. Transport assistance is provided.

(Continued next page)

Box 5.3.2 (continued)

The service uses an electronic registration and recall system to keep track of appointments and vaccinations. Women using the program are invited to participate in the early postnatal care and education program. Home visits are provided if desired.

- 88 per cent of Aboriginal women in the Macleay area presented for antenatal care before 20 weeks gestation.
- 93 per cent of women use the postnatal service.
- Child immunisation coverage has increased to 95.2 per cent.
- The rate of premature birth is lower than for the total NSW Aboriginal population, but there is significant variation over time. In 2004-05 the rate was 10.5 per cent.

(Aspery, Jarrett and Donovan 1998).

Koori Maternity Strategy, Victoria

The main aim of the service is to provide culturally appropriate maternity care to Koori women and align their birthing experiences and outcomes with those experienced by all Australian women. The strategy operates across Victoria.

The program provides both ante and postnatal care, antenatal education, birthing support and a health service for children in early childhood. Transport is provided for mothers to facilitate access to the clinic. Aboriginal women still have their babies in the local hospital, but it is not uncommon for them to be discharged after only two days. The birthing program is able to provide support for mothers in this situation, particularly in relation to continuation of breastfeeding after discharge from hospital.

A self assessment of the strengths of the program pointed to the cultural appropriateness of the service provided, its flexibility and reliability, with confidentiality assured, and to the fact that it is community based, owned and controlled.

There has been an increase in Koori women accessing antenatal care and earlier in pregnancy. Social networks have improved and better working relationships with mainstream organisations have been established (Dwyer 2005).

Marrang Aboriginal Child and Family Health Model, NSW

The Marrang Aboriginal Child and Family Health Model was developed to improve access and health outcomes for Aboriginal families in Orange, NSW. It is based on a two person team consisting of an Aboriginal Health Worker and a child and family health nurse dedicated to servicing Aboriginal families. The model engages Aboriginal families in a culturally appropriate manner.

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Box 5.3.2 (continued)

The model was developed following consultation with Aboriginal families to gain a better understanding of why they were not accessing child and family health services. The model advocates community development and building strong partnerships with local communities. Flexibility of service provision and a strong antenatal focus assists in engaging the Aboriginal community. The NSW Health Family Partnership Model and training was utilised to sustain quality relationships with families in this project.

The main change in the service delivery model was the formation of a two person team dedicated to Aboriginal families. Aboriginal clients who had been referred through the antenatal clinic or maternity service were allocated to the new team. Each client was followed up personally, either at the hospital or through a home visit to determine if they wanted to access the service and, more importantly, how they wanted to access the service. The 'how' component needed to consider other health and social issues within the family unit.

The form of the contact is the key to the success of the new service delivery model. The contact recognised socio-economic factors affecting the Aboriginal community which have often been overlooked. These may be low literacy levels, no telephone or not having transport. Improved health access was achieved by being an interpreter, providing transport, encouraging clients to seek additional health services, ensuring health appointments are attended and providing health education.

Referrals from within the Aboriginal community or through the more traditional health services and health professionals and attendances at antenatal clinics increased. The sustained contact by the dedicated team increased trust within the community (Bootle and Toomey 2006).

Nganampa Health Council Child and Maternal Health Program, SA

Nganampa Health Council Child and Maternal Health Program is an intensive antenatal and early postnatal care program operating in the Anangu Pitjantjatjara lands of SA since the mid 1980s.

The program introduced standard protocols for antenatal and child health care. An electronic registration and recall system helps to achieve these protocols. Dedicated positions were created to collect and review data with a focus on improving outcomes. The development of culturally appropriate resources appears to have been a key factor in the program's success.

The program is founded upon close relationships between midwives and pregnant women. Individual Growth Action Plans are developed with parents and carers, supported by culturally appropriate resource materials. The program is integrated within the Health Council, enabling continuity of care for pregnant women, infants and even school age children.

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Box 5.3.2 (continued)

Rates of low birth weight in the region have fallen to the level of the national Australian figure and are substantially better than those in many other Aboriginal communities. 84 per cent of pregnant women have at least five antenatal visits during pregnancy and two thirds of all pregnant women have a first antenatal assessment in the first trimester. Eighty-three per cent of five year olds, 80 per cent of 10 year olds and 66 per cent of 15 year olds participated in child health screening (school based). Immunisation coverage is high with rates well over 90 per cent in most communities.

However, although wasting has ceased, rates of anaemia and stunted growth in children remain high in the region (Sloman et al. 1999, OATSIH 2001).

Ngua Gundi — the Mother/Child Project, Queensland

Ngua Gundi — the Mother/Child Project — was funded by the Commonwealth Birthing Services Project to address the serious under utilisation of antenatal services by young Aboriginal mothers in Woorabinda, Queensland.

An initial needs analysis indicated that, although there was a lack of local hospital facilities, Aboriginal women were reluctant to attend the Rockhampton Hospital for antenatal classes and/or to have their babies. The promotion and support of breastfeeding and provision of education and support in relation to infant nutrition are integrated into the maternal and child health care services. The program has expanded its range of services to include adolescent and older mothers, birthing support and the health needs of children 0–5 years. Transport is provided for mothers wanting to attend the clinic and the midwife will visit mothers in their own homes.

There is a high level of acceptance of, and involvement with the program. Trust has built up between the community and the Aboriginal Health Workers (Dorman 1997; Perkins 1998, Pholeros, Rainow and Torzillo 1993).

The analyses in this section are based on data provided by the AIHW National Perinatal Statistics Unit. Each jurisdiction has a perinatal data collection in which midwives and other staff, using information obtained from mothers and from hospital or other records, complete notification forms for each birth. Information on Indigenous people based on hospital records is limited by the accuracy with which Indigenous people are identified in these records (see appendix 3). Not all Indigenous mothers are identified as Indigenous, therefore, not all births to Indigenous mothers are recorded as Indigenous.

There are also problems with the reliability of data from jurisdictions with small numbers of babies born to Indigenous mothers. Caution needs to be exercised when examining data from these jurisdictions. The perinatal statistics do not record any information about the father. Therefore, births in the Indigenous population reported here only include those from Indigenous mothers, and do not include births to Indigenous fathers and non-Indigenous mothers. In 2003, 27 per cent of Indigenous

babies had non-Indigenous mothers and Indigenous fathers (ABS and AIHW 2005, p. 78). Hence, these figures underestimate the total number of Indigenous babies born in a given period.

Table 5.3.2 Birthweight, by live births and fetal deaths, 2002–2004^{a, b}

<i>Births to Indigenous mothers^c</i>	<i>Live births</i>		<i>Fetal deaths^d</i>		<i>Total births</i>	
Mean birthweight (grams)	3 161		1 300		3 140	
	no.	%	no.	%	no.	%
Low birthweight (<2500g)	3 459	13.0	241	78.2	3 700	13.8
Very low birthweight (<1500g)	630	2.4	206	66.9	836	3.1
Extremely low birthweight (<1000g)	296	1.1	184	59.7	480	1.8
All births	26 583	100.0	308	100.0	26 891	100.0
<i>Births to non-Indigenous mothers</i>	<i>Live births</i>		<i>Fetal deaths</i>		<i>Total births</i>	
Mean birthweight (grams)	3 380		1 297		3 366	
	no.	%	no.	%	no.	%
Low birthweight (<2500g)	43 974	6.1	3 822	76.7	47 796	6.6
Very low birthweight (<1500g)	7 275	1.0	3 219	64.6	10 494	1.4
Extremely low birthweight (<1000g)	3 182	0.4	2 858	57.4	6 040	0.8
All births	720 309	100.0	4 981	100.0	725 290	100.0
<i>All births^e</i>	<i>Live births</i>		<i>Fetal deaths</i>		<i>Total births</i>	
Mean birthweight (grams)	3 372		1 293		3 358	
	no.	%	no.	%	no.	%
Low birthweight (<2500g)	48 652	6.4	4 197	77.0	52 849	6.9
Very low birthweight (<1500g)	8 108	1.1	3 538	64.9	11 646	1.5
Extremely low birthweight (<1000g)	3 549	0.5	3 141	57.6	6 690	0.9
All births	763 773	100.0	5 452	100.0	769 225	100.0

^a Birthweight is collected at birth and includes stillbirths of at least 20 weeks gestation or 400g birthweight.

^b Data are presented in a three year grouping due to small numbers from year to year. ^c Indigenous data relate to babies born to Indigenous mothers only, and exclude babies born to non-Indigenous mothers and Indigenous fathers. Thus, the information is not based on the total count of Indigenous babies. ^d The denominator for the fetal death percentages is fetal deaths rather than births. ^e Includes babies to mothers of unknown Indigenous status. The number of all births is greater than the sum of births to Indigenous plus non-Indigenous mothers because births for Tasmania are included in the total births but were not available by Indigenous status for Tasmania and so are not included in the Indigenous and non-Indigenous totals for Australia.

Source: AIHW National Perinatal Data Collection, National Perinatal Statistics Unit (unpublished); table 5A.3.1.

The following analyses are based on table 5.3.2. The data on Indigenous babies relate to babies born to Indigenous mothers only, as the data collection excludes babies born to non-Indigenous mothers and Indigenous fathers:

- During 2002–2004, there was a total of 763 773 live births in Australia, of which 94.3 per cent were babies born to non-Indigenous mothers and 3.5 per cent were babies born to Indigenous mothers⁶.
- The mean birthweight of live births to Indigenous mothers was 3161 g, compared with 3380 g for babies born to non-Indigenous mothers — a difference of 219 g (non-Indigenous births were 6.9 per cent heavier).
- The proportion of live births to Indigenous mothers with low birthweight was more than twice that of non-Indigenous mothers (13.0 per cent compared with 6.1 per cent). Further, the proportion of live births to Indigenous mothers with very low and extremely low birthweights (2.4 and 1.1 per cent respectively) was higher than for babies born to non-Indigenous mothers (1.0 and 0.4 per cent).
- Of all live births, 6.4 per cent had low birthweight compared with 77.0 per cent of all fetal deaths.
- 1.1 per cent of babies born to Indigenous mothers, compared with 0.7 per cent of babies born to non-Indigenous mothers, were fetal deaths.
- Of those fetuses that died, over half — for both Indigenous and non-Indigenous mothers — had extremely low birthweights.

Across states and territories, there was little variation in the proportion of live births with low birthweight for babies born to non-Indigenous mothers (table 5A.3.1). Mean birthweights and proportions of low birthweight babies in 2002–2004 have not changed in the period since 1998–2000 (except for some minor fluctuations) (tables 5A.3.1 to 5A.3.5). In general, comparisons of birthweights of babies to Indigenous mothers between states and territories and over time should be interpreted with care.

⁶ Proportions do not add to 100 per cent because births for Tasmania are included in the total live births but were not available by Indigenous status for Tasmania and so are not included in the Indigenous and non-Indigenous totals for Australia.

5.4 Hearing impediments

Box 5.4.1 Key messages

- In 2004-05, the prevalence of hearing conditions for Indigenous children was three times as high as for non-Indigenous children (table 5A.4.1).
- Between 2001 and 2004-05, there was no change in the overall prevalence of hearing problems among Indigenous children (figure 5.4.1).
- From 2001-02 to 2004-05, hospitalisations for middle ear and mastoid diseases decreased for Indigenous children aged 0–3 years (from 12.9 per 1000 to 9.5 per 1000) (tables 5A.4.6 to 5A.4.9).

This indicator presents data on the prevalence of hearing problems for Indigenous and non-Indigenous children, and information on ear or hearing problems that resulted in admission to a hospital for Queensland, WA, SA and the NT.

In 2004-05, rates of hearing loss were higher among Indigenous people than non-Indigenous people in all age groups up to 55 years of age (ABS 2006). The greatest disparity was between Indigenous and non-Indigenous children aged 0–14 years (ABS 2006). Between July 2002 and June 2004, Indigenous children aged 0–14 years were hospitalised for tympanoplasty⁷ procedures due to middle ear infection at a rate five times as high as other children (AHMAC 2006). The excessive burden of ear disease, particularly otitis media, in Indigenous populations has long been recognised (Burrow and Thomson 2006; Coates et al. 2002; Howard and Hampton 2006; Lowell 1991 cited in Nienhuys 1992; Morris et al. 2005; Thorne 2004; WHO 2006; Zubrick et al. 2004).

The Australian Health Ministers' Advisory Council (2006) identified children's hearing loss as a health issue that needs improvement. Children's hearing loss is a performance measure in the Aboriginal and Torres Strait Islander Health Performance Framework (AHMAC 2006).

The most common causes of hearing loss among Indigenous people are disorders of the middle ear. Otitis media, which is an inflammation of the middle ear, often occurs as a result of another illness (such as a cold), caused by bacterial and viral infections (Burrow and Thomson 2006; Morris et al. 2005; Couzos, Metcalf and Murray 2001).

⁷ Tympanoplasty is a surgical procedure to repair the tympany, or eardrum, perforated as a result of chronic otitis media (infections of the middle ear). The procedure restores the hearing of children affected by a perforated eardrum.

The rates of otitis media remain extremely high for Indigenous children (Burrow and Thomson 2006; Morris et al. 2005; Morris et al. 2006). A recent study based on the assessment of 709 Aboriginal children aged 6–30 months living in 29 remote Aboriginal communities across Northern Australia found:

- 25 per cent of the children had acute otitis media without perforation
- 6 per cent had acute otitis media with perforation.

The authors of the study noted that no other published surveys in other populations have documented such high prevalence rates of acute otitis media (Morris et al. 2006).

The Western Australian Aboriginal Child Health Survey (WAACHS) revealed that Indigenous children aged four to 17 with recurring ear infections not only had an increased risk of abnormal hearing but also a significantly greater risk of language problems and learning difficulties (Zubrick et al. 2004).

There are various forms of otitis media. Generally accepted definitions are provided in box 5.4.2. The types of otitis media observed among Indigenous people are different from those common among non-Indigenous Australians. Indigenous people are more likely to suffer from acute and chronic suppurative forms of otitis media while otitis media with effusion is a major problem among non-Indigenous people (Burrow and Thomson 2003; Couzos, Metcalf and Murray 2001).

Box 5.4.2 Types of otitis media

- Otitis media with effusion (OME) is inflammation of the middle ear characterised by fluid behind the eardrum without signs or symptoms of acute otitis media. Sometimes referred to as 'glue ear'.
- Acute otitis media without perforation (AOM without perforation) is acute inflammation of the middle ear and eardrum (tympanic membrane) with signs or symptoms of infection. AOM is characterised by fluid behind the eardrum combined with one or more of the following: bulging eardrum, red eardrum, recent discharge of pus, fever, ear pain or irritability. Bulging of the eardrum is the most reliable indicator of AOM in Aboriginal children.
- Recurrent acute otitis media (rAOM) is where there are three or more attacks of AOM within six months.
- Acute otitis media with perforation (AOM with perforation) is where there is discharge of pus through a perforation (hole) in the eardrum within the last six weeks.

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Box 5.4.2 (continued)

- Chronic otitis media is a persistent inflammation of the middle ear. It can occur with or without perforation, either as chronic suppurative otitis media or as otitis media with effusion.
- Chronic suppurative otitis media (CSOM) is recurrent or persistent bacterial infection of the middle ear, with discharge of pus through a perforation in the eardrum for at least six weeks. Sometimes referred to as 'runny ears'.
- Dry perforation is the presence of a perforation in the eardrum without any signs of discharge or fluid behind the eardrum.

Sources: Close, Murphy and Goodwin 1996; Coates et al. 2002; Couzos, Metcalf and Murray 1999 and Menzies School of Health Research 2001 cited in Burrow and Thomson 2006.

Otitis media in Indigenous children is characterised by very early onset, persistence and high rates of severe disease — resulting in a chronic disease which Indigenous people carry from childhood into adolescence (Morris et al. 2005; Morris et al. 2006; Leach et al. 1994). In contrast, otitis media in non-Indigenous children typically resolves with age and is rarely seen amongst non-Indigenous children over the age of eight (Burrow and Thomson 2003).

Persistent bacterial colonisation, which is said to come from poor environmental factors such as overcrowded living conditions and poor hygiene, contribute to the chronic nature and severity of otitis media in Indigenous people (Coates et al. 2002; Jones and Smith 2006; WHO 2006; Zubrick et al. 2004). The condition is often exacerbated by inadequate health infrastructure, ineffective treatment and poor nutrition and exposure to passive smoking (Burrow and Thomson 2003; WHO 2006; Zubrick et al. 2004).

The impact of conductive hearing loss, due to otitis media, on the quality of life of Indigenous children and their caregivers is well documented (Brouwer et al. 2005; Howard and Hampton 2006; Nienhuys 1992; Thorne 2004). Indigenous children suffer significantly from conductive hearing loss in early infancy and their hearing level may not recover fully before adulthood. The fluctuation of hearing level during childhood has implications for children's auditory, linguistic, cognitive and psychosocial development (Brouwer et al. 2005; Nienhuys 1992).

To a large extent, otitis media is preventable and treatable. A surgical procedure (myringotomy) can be performed to assist in restoring hearing. This is achieved by releasing the fluid that builds up in the middle ear (NSW DoH 2002).

Identifying risk factors for otitis media might increase the chances for early prevention and intervention. Some of the possible risk factors are outlined below.

-
- There is relatively higher bacterial colonisation in Indigenous infants, which is strongly correlated with the onset of middle ear effusion (this tended to occur within the first 12 weeks of life in 66 per cent of Indigenous infants). No correlation is found between colonisation and the onset of otitis media in non-Indigenous infants. Further, once established, it is significantly less likely for an Indigenous infant compared with a non-Indigenous infant to clear the bacterial pathogens (Morris et al. 2006). The early bacterial colonisation in Indigenous infants might be linked to the fact that Indigenous communities are more exposed to factors such as a greater number of siblings in an overcrowded household, which increases the risk factors for bacterial colonisation and acute otitis media.
 - Some studies have found a link between the early first onset of otitis media and the increased risk of recurrent infections (that is, ‘early and often appears to be the rule’). Indigenous infants tend to have persistent acute otitis media and other ear infections that are rarely resolved (Boswell and Nienhuys 1996; Morris et al. 2006).
 - The incidence of acute otitis media in other family members may significantly increase the risk of ear infection, especially in children.
 - Although few studies have evaluated this relationship, malnutrition in Indigenous children might be associated with the development of chronic otitis media (Jones and Smith 2006).
 - High rates of smoking within the Indigenous population might contribute to the prevalence of otitis media among Indigenous children (see section 8.2 for more information on tobacco use).

Box 5.4.3 provides examples of programs that have improved health outcomes for Indigenous children.

Box 5.4.3 'Things that work' — improving health outcomes

Swimming pools in remote communities

Indigenous children in remote areas suffer from high rates of skin diseases, including pyoderma, which is associated with chronic renal failure, and otitis media. Many Indigenous children also suffer from perforated tympanic membranes and some degree of hearing loss, which can create learning difficulties.

The 2005 Report presented the outcomes of a preliminary study into the health benefits of swimming pools in remote communities (Lehmann et al. 2003). A final report (TICHR 2006) from the Telethon Institute for Child Health Research compared the health status of children from the Burringurrah Aboriginal community before and after the swimming pool was opened. The installation of the swimming pool was part of a 'no school, no pool' initiative. In Burringurrah the pool is open continuously each summer season.

The first health examinations were conducted in 2000, before the pool was built. The final health examinations were conducted in early 2005. Some of the findings include:

- before the pool opened, 62 per cent of children had skin infections (which included 30 per cent who had severe skin infections requiring antibiotics). In April 2005, these figures were 10 per cent and 2 per cent, respectively.
- 33 per cent of children had an ear perforation before installation of the pool. In April 2005, this had decreased to 15 per cent of children.

The Telethon Institute noted that the outcomes from the study provided evidence to support the importance of providing infrastructure in remote communities (TICHR 2006).

Improved hearing assessment for primary school children in Townsville

A 2005 study by the Townsville Learning and Engagement Centre (LEC), Education Queensland and Queensland Health assessed the hearing of children in a local Townsville primary school. The study found that 44.8 per cent of year 2 students were identified as having possible conductive hearing loss (this confirmed an earlier study that found at least 40 per cent of Indigenous children have an unidentified conductive hearing loss).

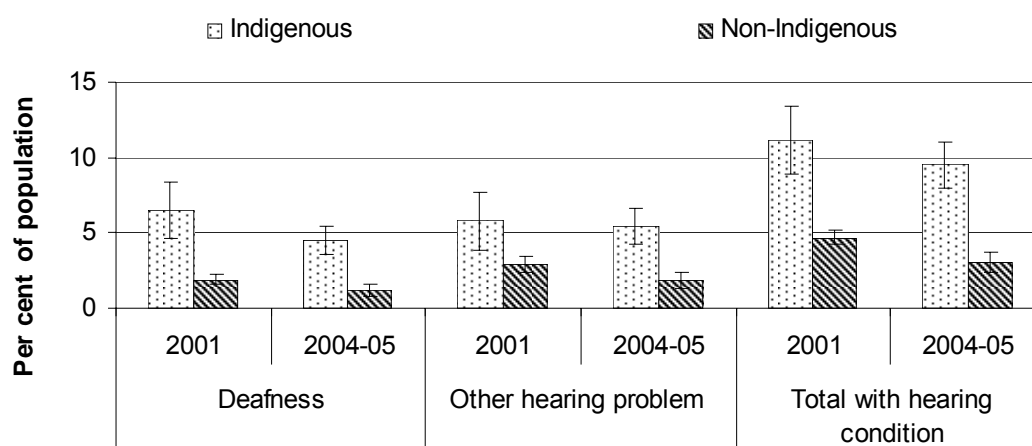
A high proportion of the students assessed at the local Townsville primary school were Indigenous and many were not achieving high results in literacy and numeracy and were also identified as demonstrating behavioural concerns. This led the LEC to:

- develop in-class hearing assessment tools for teaching staff
- develop hearing assessment games for parents and
- provide professional development for both teachers and parents to identify any hearing loss that may reduce the opportunity for academic and schooling success.

Prevalence of hearing conditions

Survey data provide information on the prevalence of hearing conditions for Indigenous and non-Indigenous children.

Figure 5.4.1 **Prevalence of hearing conditions in children aged 0–14 years^{a, b, c}**

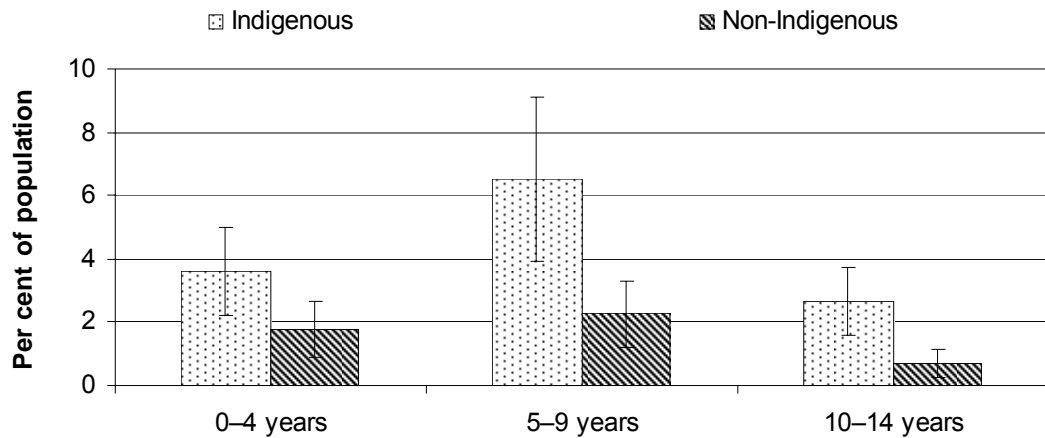


^a Error bars represent 95 per cent confidence intervals around each estimate (see chapter 2 for more information). ^b Other hearing problem includes otitis media, tinnitus and Meniere's disease/vertiginous syndrome. ^c Total with hearing condition includes 'Type of ear/hearing problem' not known.

Source: ABS 2004-05 NATSIHS (unpublished); ABS 2004-05 NHS (unpublished); ABS 2001 NHS (unpublished); tables 5A.4.1 and 5A.4.2.

- In 2001 and 2004-05, Indigenous children aged 0–14 years old were more likely to suffer from hearing problems than non-Indigenous children (figure 5.4.1).
- There was no statistically significant difference in the prevalence of hearing problems among Indigenous children between 2001 and 2004-05, while there was a statistically significant reduction in prevalence for non-Indigenous children (tables 5A.4.1 and 5A.4.2).
- In 2004-05 the prevalence of hearing conditions, including total/partial hearing loss and otitis media, was higher for Indigenous children aged 0–14 (9.5 per cent) than non-Indigenous children (3.0 per cent) (table 5A.4.1).
- The prevalence of hearing conditions in the Indigenous population (all ages) did not vary with remoteness in 2001 or 2004-05 (tables 5A.4.3 and 5A.4.4).

Figure 5.4.2 Prevalence of otitis media, 2004-05^a



^a Error bars represent 95 per cent confidence intervals around each estimate (see chapter 2 for more information).

Source: ABS 2004-05 NATSIHS (unpublished); ABS 2004-05 NHS (unpublished); table 5A.4.5.

- In 2004-05, the prevalence of otitis media among Indigenous children aged five to nine years was 6.5 per cent (compared with 2.3 per cent for non-Indigenous children) (figure 5.4.2).
- Across all age groups Indigenous children were two to four times as likely as non-Indigenous children to suffer from hearing problems (table 5A.4.5).

Hospitalisations for ear and hearing problems

The availability of hospitalisations data for Indigenous people is significantly reduced in the 2007 Report compared to previous Reports. AIHW analyses into the quality of Indigenous identification of hospital admitted patient statistics has shown that while the quality is good in some jurisdictions, in other jurisdictions it is poor (AIHW 2005). Consequently, Indigenous hospitalisations data are only available for Queensland, WA, SA and the NT. Data from NSW, Victoria, Tasmania and the ACT were considered to be of insufficient quality. Data issues, including hospitalisations are discussed in chapter 2.

Table 5.4.1 Age specific hospitalisations where the principal diagnosis was diseases of the ear and mastoid process, Qld, WA, SA, and public hospitals in the NT, 2004-05^{a, b, c}

<i>Principal diagnosis</i>	<i>Indig.</i>	<i>Non-Indig.</i>	<i>Not stated</i>	<i>Total</i>	<i>Indig.</i>	<i>Non-Indig.^d</i>
	no.	no.	no.	no.	per 1000	
People aged 0–3 years						
Diseases of external ear	18	94	np	np	0.6	0.3
Diseases of middle ear and mastoid	275	4 956	466	5 697	9.5	15.3
Suppurative and unspecified otitis media	164	1 596	110	1 870	5.7	4.8
Diseases of inner ear	–	7	–	7	–	–
Other disorders of ear	10	277	9	296	0.3	0.8
People aged 4–14 years						
Diseases of external ear	27	316	12	355	0.3	0.3
Diseases of middle ear and mastoid	558	5 419	485	6 462	7.0	5.5
Suppurative and unspecified otitis media	148	1 140	74	1 362	1.9	1.1
Diseases of inner ear	–	13	np	np	–	–
Other disorders of ear	19	261	7	287	0.2	0.2

^a Hospitalisation is the discharge, transfer, death or change of episode of care of an admitted patient (see glossary for a detailed definition). ^b Data are based on state of usual residence. ^c Identification of Indigenous patients is incomplete and completeness varies across jurisdictions. The AIHW has advised that only data for Queensland, WA, SA and the NT are considered to be acceptable for analytical purposes. Data for NSW, Vic, Tasmania and the ACT were withheld by AIHW due to high rates of Indigenous under-identification (see chapter 2 and appendix 4 for more information). ^d Includes separations where Indigenous status was not reported. – Nil or rounded to zero. np Not published.

Source: AIHW National hospital morbidity database (unpublished); table 5A.4.6.

Hospitalisations data only include those who access medical services, and have been diagnosed and admitted to hospital for the specified conditions. Therefore, when examining hospital statistics on ear and hearing problems it should be noted that only ear or hearing related illness resulting in admission to a hospital are collected. Cases that result in a visit to a general practitioner or to an emergency department, but do not lead to hospitalisation, are excluded. This is likely to include a large share of 0–3 year olds where parents may not be aware that their children have an ear or hearing problem or where access to hospitals may be limited.

Based on data available from Queensland, WA, SA and the NT, in 2004-05:

- The most common hospitalisation rate (for both populations and age groups) was for diseases of the middle ear and mastoid.
- Indigenous children three years and under had a higher hospitalisation rate for suppurative and unspecified otitis media than non-Indigenous children (5.7 per 1000 compared with 4.8 per 1000) but a lower rate of hospitalisation than non-Indigenous children for all diseases of the middle ear and mastoid (table 5.4.1).

- Although the hospitalisation rate for suppurative and unspecified otitis media for children aged four to 14 years is lower than the hospitalisation rate for children aged under three years, Indigenous children aged between four and 14 years still had a higher hospitalisation rate than non-Indigenous children aged between four and 14 years (1.9 per 1000 compared with 1.1 per 1000).
- Indigenous children aged between four and 14 years had a higher hospitalisation rate for diseases of the middle ear and mastoid than non-Indigenous children (7.0 per 1000 compared with 5.5 per 1000).

Data for Queensland, WA, SA and the NT show that from 2001-02 to 2004-05:

- Hospitalisation rates for middle ear and mastoid diseases decreased for Indigenous children aged 0–3 years (from 12.9 per 1000 to 9.5 per 1000) and non-Indigenous children aged 0–3 years (16.2 per 1000 to 15.3 per 1000) (tables 5A.4.6 to 5A.4.9).
- The hospitalisation rate for suppurative and unspecified otitis media decreased for Indigenous children under the age of three years from 7.0 per 1000 in 2001-02 to 5.7 per 1000 in 2004-05 (tables 5A.4.6 to 5A.4.9).

5.5 Children with tooth decay

Box 5.5.1 Key messages

- Data on tooth decay were available only for NSW, SA and the NT. For these jurisdictions:
 - Indigenous children had higher numbers of both infant and adult teeth with decay than non-Indigenous children, in both metropolitan and rural areas (table 5.5.1)
 - fewer Indigenous children than non-Indigenous children had decay-free infant and adult teeth across all age groups and in both metropolitan and rural areas (table 5.5.2).
- National data on dental hospitalisation rates and procedure rates showed:
 - Indigenous children aged less than five years had the highest dental hospitalisation rate of any age group, almost one and a half times the rate for non-Indigenous children of that age group (table 5A.5.8)
 - extraction rates were greater for Indigenous children than for non-Indigenous children. The rate of extraction procedures for Indigenous boys was 1.3 times as high as the rate for non-Indigenous boys (figure 5.5.4).

In the 2005 Report, data on tooth decay among Indigenous children were presented under the indicator ‘Primary school children with dental caries’, which was part of

the 'Early school engagement and performance (preschool to year 3)' strategic area for action. For the 2007 Report, data on the dental health of Indigenous children have been expanded and moved to the 'Early child development and growth' strategic area for action. Dental health status was considered more an indicator of growth and development rather than school engagement.

Tooth decay is caused by acid-producing bacteria living in the mouth and is often caused by a diet of sugary or sticky foods and inadequate dental hygiene. Unless treated in its early stage, tooth decay may result in pain, infection, and destruction of soft tissues in the mouth (AIHW 2000). It has a significant impact on self-esteem, psychological and social wellbeing, employment, interpersonal relations and quality of life (National Advisory Committee on Oral Health 2004). While tooth decay is fully reversible if treated early, when left untreated, it requires complex and costly procedures to prevent tooth loss (Harford, Spencer and Roberts-Thomson 2003).

Historically, Indigenous people had less tooth decay due to their traditional diet. As their diet changed to include food rich in fermentable carbohydrates, they have become as exposed to tooth decay risk factors as non-Indigenous people (Davies et al. 1997). This risk is worsened by limited access to dental health services and lack of preventive measures and education in some parts of Australia (Harford, Spencer and Roberts-Thomson 2003).

While the dental health of non-Indigenous children has generally improved since the introduction of the School Dental Scheme in 1977 and the addition of fluoride to public drinking water supplies, the dental health of Indigenous children appears to have deteriorated in the last couple of decades (AIHW 1996 and 1998, cited in Al-Yaman, Bryant and Sargeant 2002).

A paper by Endean, Roberts-Thomson and Wooley (2004) found that the dental health of Indigenous children living in an Indigenous community in the north west of South Australia deteriorated between 1987-88 and 2000. This paper compared the dental health of Indigenous children aged 4 to 10 years in 2000 with information obtained from the Nganampa Health Council (NHC) Dental Program in 1987. AHMAC (2006) reported that Indigenous children had more decayed than filled teeth in SA, NSW and the NT, reflecting a large unmet need for dental care.

In far north Queensland, a privately-funded dental health program was successfully implemented in 2005, with the aim of improving the dental health of Indigenous people in and around Cairns (see box 5.5.2). Box 5.5.3 describes a program successfully established by the SA Dental Service to increase the use of dental services and improve the oral health of the Indigenous community around Adelaide.

Box 5.5.2 'Things that work' — 'Filling the Gap': Indigenous Dental Program

Wuchopperen Indigenous Health Service provides care to approximately 20 000 Aboriginal and Torres Strait Islander people in and around Cairns (far north Queensland). Oral health is an important component of Wuchopperen's services, with two fully equipped dental rooms at the clinic in Cairns plus a mobile dental van ready to travel to outlying communities. However, up until recently, there was a severe shortage of dentists, limiting Wuchopperen's dental services (for example, there was a waiting list of one year for basic care). This lack of access to dental care worsened the continuing poor standard of dental health amongst Aboriginal and Torres Strait Islander people in this region.

The 'Filling the Gap Indigenous Dental Program' has partly alleviated this problem by making full use of the existing facilities by supplying volunteer dentists from around Australia to assist the Wuchopperen clinic. This privately funded volunteer program provides air fares to Cairns, accommodation and the cost of registration with the Queensland Dental Board in return for one to two weeks of a dentist's time. With a generous \$10 000 donation from an anonymous donor and word-of-mouth promotion, Filling the Gap got off the ground in late 2005 and the first dentists flew to Cairns in January 2006 (University of NSW 2006).

Box 5.5.3 'Things that work' — SA Dental Service Aboriginal Liaison Program

In February 2005, a dental therapist from the northern area of Adelaide commenced work as an Aboriginal Liaison Officer for the SA Dental Service. The aim of her role was to develop a partnership with the local Aboriginal and Torres Strait Islander community through involvement with the Muna Paiendi Health Service and Kurna Plains Primary School. She regularly attended community based events, including a diabetes luncheon and young mothers' group, and provided clinical services for the school children at the local school dental clinic.

The Aboriginal Liaison Officer's continued enthusiasm and genuine interest has since gained her respect within the local Aboriginal and Torres Strait Islander community and increased the community's confidence and trust in mainstream dental services. Children are now transported via school bus to the dental clinic for examinations and treatment twice a week. The dental clinic staff frequently attend Kurna Plains School to provide classroom education and oral health information resources. Increased attendance at the school dental clinic has been the direct result of this more interactive and flexible approach.

(Continued next page)

Box 5.5.3 (continued)

A broader Aboriginal Liaison Program was then established in late 2005 to build on the achievements in the north of Adelaide. The aim of the program is to improve oral health outcomes for Aboriginal and Torres Strait Islander people by increasing the number who access dental care. Five Aboriginal Liaison Officers are currently working with local Aboriginal Health Services and Aboriginal communities to develop sustainable pathways for referring clients to dental services and to increase knowledge about oral health care (SA government unpublished).

Tooth decay is measured as the sum of the number of untreated decayed teeth (D), missing teeth (M) extracted due to caries⁸, and filled teeth (F) restored following caries (that is $DMFT = D+M+F$). While DMFT is used for permanent (adult) teeth, dmft (in lower case) refers to infant teeth and is derived in the same way as DMFT. The indicator $DMFT=0$ ($dmft=0$ for infant teeth) refers to caries-free teeth and is used to refer to the number/proportion of teeth that are free of decay (Armfield and Roberts-Thomson 2004).

The data for this indicator are sourced from four published articles prepared by the Australian Research Centre for Population Oral Health (Ellershaw, Spencer and Slade 2005; Jamieson, Armfield and Roberts-Thomson 2006a, 2006b; Jamieson and Roberts-Thomson 2006). The first part of this section reports on the extent of tooth decay among Indigenous and non-Indigenous children enrolled in school dental services in NSW, SA and the NT (Jamieson, Armfield and Roberts-Thomson 2006a). The second and third parts focus on the dental health of Indigenous and non-Indigenous children in the NT (Jamieson, Armfield and Roberts-Thomson 2006b) and SA (Ellershaw, Spencer and Slade 2005), respectively. The fourth part presents hospital dental admission and procedure rates based on separations data from 1297 public and private hospitals located across Australia (Jamieson and Roberts-Thomson 2006).

Indigenous children's dental health in NSW, SA and the NT combined

Measures of tooth decay for Indigenous and non-Indigenous children enrolled in school dental services in metropolitan and rural NSW, SA and the NT presented in tables 5.5.1 and 5.5.2 are based on data collected over three 12-month periods; 2000 for NSW, 2002 for the NT, and 2003 for SA. Of the 326 099 children examined, 10 743 (3.2 per cent) were Indigenous (Jamieson, Armfield and Roberts-Thomson 2006a).

⁸ Dental caries is a technical term for tooth decay.

Table 5.5.1 Children's mean number of teeth with decay, by remoteness and age group, NSW, SA and the NT, selected years between 2000 and 2003^a

Age	Metropolitan				Rural			
	Indigenous		Non-Indigenous		Indigenous		Non-Indigenous	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
<i>Mean dmft score (for infant teeth)</i>								
4 years	2.89	0.33	1.31	0.03	3.56	0.19	1.39	0.05
5 years	2.63	0.20	1.20	0.01	4.13	0.15	1.68	0.03
6 years	2.74	0.18	1.42	0.02	4.09	0.15	1.82	0.03
7 years	2.09	0.13	1.44	0.01	3.43	0.12	1.86	0.02
8 years	2.20	0.15	1.48	0.02	3.16	0.11	1.87	0.03
9 years	1.98	0.12	1.26	0.01	2.28	0.09	1.60	0.02
10 years	1.39	0.13	1.00	0.01	1.66	0.08	1.27	0.02
<i>Mean DMFT score (for permanent (adult) teeth)</i>								
6 years	0.13	0.04	0.08	0.00	0.18	0.03	0.05	0.00
7 years	0.22	0.03	0.22	0.00	0.36	0.03	0.22	0.01
8 years	0.44	0.06	0.30	0.01	0.53	0.04	0.28	0.01
9 years	0.56	0.05	0.39	0.01	0.68	0.04	0.36	0.01
10 years	0.77	0.08	0.47	0.01	1.00	0.06	0.44	0.01
11 years	0.80	0.07	0.59	0.01	1.05	0.06	0.59	0.01
12 years	1.08	0.11	0.77	0.01	1.33	0.09	0.70	0.02
13 years	1.44	0.16	0.88	0.01	1.77	0.17	0.90	0.01
14 years	1.83	0.31	1.18	0.03	2.27	0.24	1.19	0.04

SE = Standard error.

^a D=number of untreated decayed teeth; M=number of missing teeth; F=number of filled teeth; DMFT=D+M+F (for permanent adult teeth); dmft refers to infant teeth and is derived in the same way as DMFT. The indicator DMFT=0 (dmft=0 for infant teeth) refers to decay-free teeth.

Source: Jamieson, Armfield and Roberts-Thomson (2006a); table 5A.5.1 and 5A.5.2.

- The mean (average) number of infant teeth with decay was higher for Indigenous children than non-Indigenous children across all ages (from four to 10 years) and for both metropolitan and rural areas (table 5.5.1).
- The highest number of infant teeth with decay for Indigenous children was 2.89 for children four years of age in metropolitan areas and 4.13 for five-year-old Indigenous children living in rural areas (table 5.5.1).
- The mean number of permanent (adult) teeth with decay was higher for Indigenous children than non-Indigenous children across all ages except for seven-year-olds in metropolitan areas (both had the same DMFT score of 0.22) (table 5.5.1).
- The mean number of permanent teeth with decay for Indigenous children living in metropolitan areas ranged from 0.13 for six-year-olds to 1.83 for 14-year-olds, compared with 0.08 for non-Indigenous six-year-olds and 1.18 for non-Indigenous 14-year-olds (table 5.5.1).

- The level of decay on infant teeth was higher for both Indigenous and non-Indigenous children living in rural areas than those living in metropolitan areas (table 5.5.1).
- For both Indigenous and non-Indigenous children living in metropolitan and rural areas, the mean number of permanent teeth with decay increased with age (table 5.5.1).

Table 5.5.2 Proportion of children with decay-free teeth, by remoteness and age group, NSW, SA and the NT, selected years between 2000 and 2003^a

Age	Metropolitan				Rural			
	Indigenous		Non-Indigenous		Indigenous		Non-Indigenous	
	%	SE	%	SE	%	SE	%	SE
<i>Per cent dmft=0 (decay-free infant teeth)</i>								
4 years	41.6	4.4	69.7	0.6	31.0	2.3	64.3	0.5
5 years	47.7	2.5	70.9	0.2	31.8	1.6	62.2	0.5
6 years	36.6	2.8	64.5	0.4	24.2	1.7	56.8	0.3
7 years	51.8	2.2	62.9	0.3	28.8	1.5	54.2	0.5
8 years	43.6	2.9	58.9	0.4	28.6	1.6	51.6	0.6
9 years	48.9	2.3	62.2	0.3	38.1	1.6	54.2	0.5
10 years	57.0	2.9	66.1	0.4	44.9	1.8	59.7	0.6
<i>Per cent DMFT=0 (decay-free permanent (adult) teeth)</i>								
6 years	93.8	1.4	96.7	0.1	90.4	1.2	97.1	0.1
7 years	89.5	1.3	90.4	0.2	83.5	1.3	90.1	0.3
8 years	78.7	2.4	86.0	0.3	74.6	1.5	86.7	0.4
9 years	74.7	2.0	83.1	0.2	68.9	1.6	83.3	0.4
10 years	66.6	2.8	78.9	0.3	60.6	1.8	79.1	0.5
11 years	67.8	2.2	75.4	0.3	60.5	1.7	75.3	0.4
12 years	59.3	3.2	70.6	0.4	53.5	2.2	70.9	0.6
13 years	57.4	3.2	70.0	0.3	52.3	3.1	65.6	0.6
14 years	41.3	5.1	62.1	0.6	40.0	4.1	59.1	0.9

SE = Standard error.

^a D=number of untreated decayed teeth; M=number of missing teeth; F=number of filled teeth; DMFT=D+M+F (for permanent adult teeth); dmft refers to infant teeth and is derived in the same way as DMFT. The indicator DMFT=0 (dmft=0 for infant teeth) refers to decay-free teeth.

Source: Jamieson, Armfield and Roberts-Thomson (2006a); table 5A.5.1 and 5A.5.2.

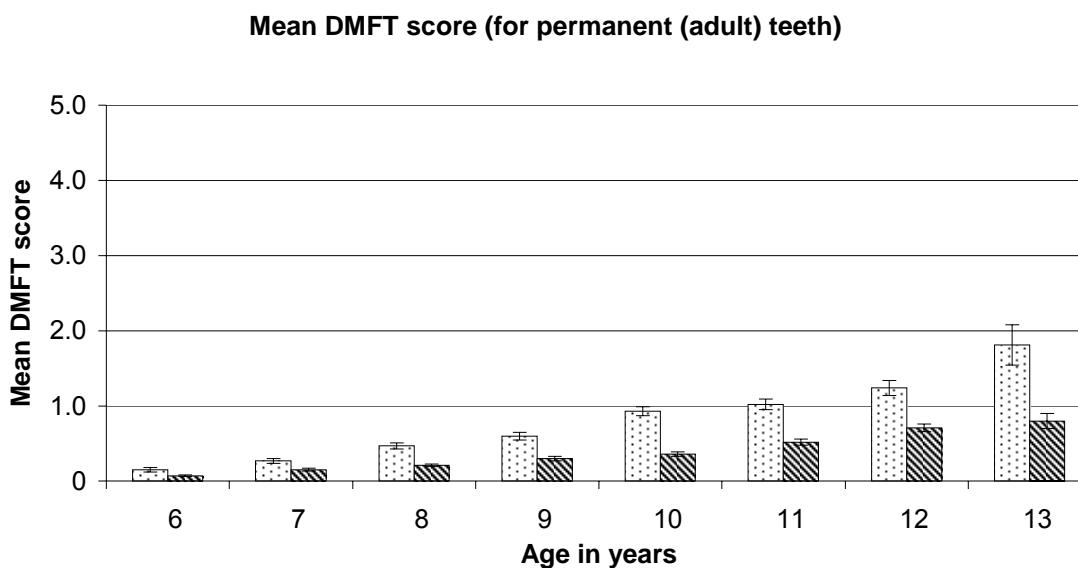
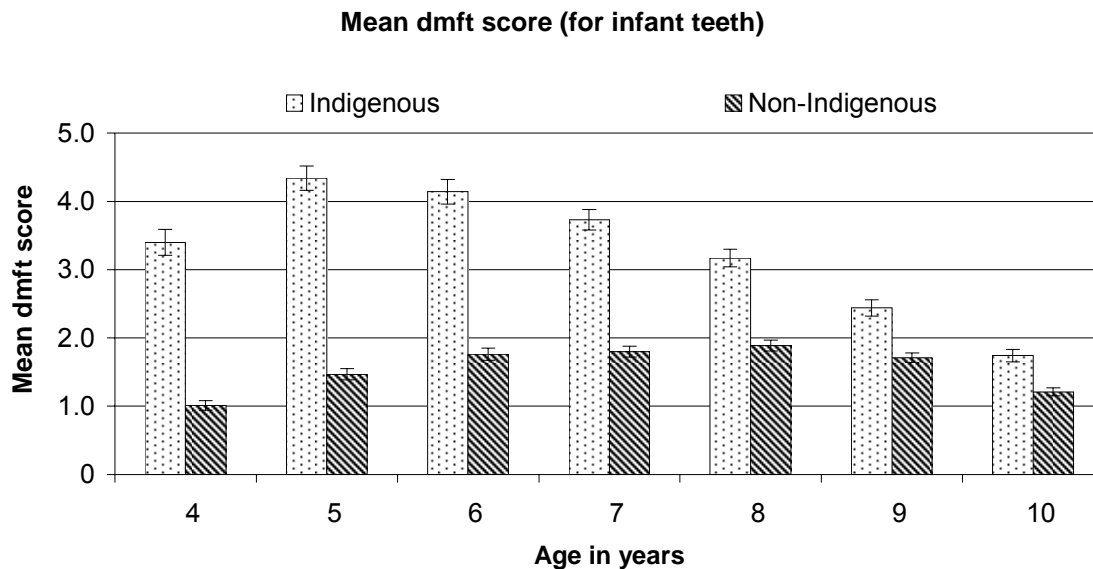
- In both metropolitan and rural areas and across all age groups (from four to 10 years), the proportion of Indigenous children with decay-free infant teeth was lower than the proportion of non-Indigenous children without decay (table 5.5.2).
- The proportion of Indigenous children with decay-free permanent teeth was lower than the proportion of non-Indigenous children without decay, across all age groups (from six to 14 years) in rural areas and for eight to 14-year-olds in metropolitan areas (table 5.5.2).

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- The percentage of Indigenous children with decay-free infant teeth was greater in metropolitan areas than rural areas (table 5.5.2).
 - For both Indigenous and non-Indigenous children living in metropolitan and rural areas, the proportion of children with decay-free permanent teeth decreased with age (table 5.5.2).

Tooth decay among Indigenous and non-Indigenous children in the NT

Tooth decay measures for Indigenous and non-Indigenous children enrolled in school dental services in the NT presented in figure 5.5.1 and table 5.5.3 were calculated using data collected in 2002-03. Of the 12 584 children examined, 4 417 (35.1 per cent) were Indigenous (Jamieson, Armfield and Roberts-Thomson 2006b).

Figure 5.5.1 Mean number of teeth with decay for 4–13 year old Indigenous and non-Indigenous children, by age group, NT School Dental Service, 2002-03^{a, b}



^a D=number of untreated decayed teeth; M=number of missing teeth; F=number of filled teeth; DMFT=D+M+F (for permanent adult teeth); dmft refers to infant teeth and is derived in the same way as DMFT. The indicator DMFT=0 (dmft=0 for infant teeth) refers to decay-free teeth. ^b Error bars represent 95 per cent confidence intervals around each mean.

Source: Jamieson, Armfield and Roberts-Thomson (2006b); table 5A.5.3.

- Average numbers of infant teeth with decay were higher for Indigenous children than non-Indigenous children across all ages (from four to 10 years) in the NT school dental service in 2002-03 (figure 5.5.1).
- The highest scores for infant teeth decay for Indigenous children were 4.34 and 4.14 for five and six-year-olds, respectively (figure 5.5.1). The greatest

difference in scores between Indigenous and non-Indigenous children was for 5-year-olds (4.34 for Indigenous children compared to 1.47 for non-Indigenous children) (figure 5.5.1).

- Average numbers of adult teeth with decay for Indigenous children ranged from 0.15 for six-year-olds to 1.81 for 13-year-olds, compared to 0.07 for non-Indigenous six-year-olds and 0.80 for non-Indigenous 13-year-olds (figure 5.5.1).
- The greatest difference in permanent tooth decay scores between Indigenous and non-Indigenous children was for 13-year-olds; the score for Indigenous children was 2.3 times as high as the score for non-Indigenous children (figure 5.5.1).
- For both Indigenous and non-Indigenous children, permanent tooth decay scores increased with age (figure 5.5.1).

Attachment tables 5A.5.4 and 5A.5.5 presents average infant and adult tooth decay scores for Indigenous and non-Indigenous children aged four to 13 years enrolled in the NT school dental service classified by the Socio-Economic Indices for Areas (SEIFA). The SEIFA was developed by the ABS using data derived from the 2001 Census of Population and Housing, using a range of measures to rank areas based on their relative social and economic wellbeing. A SEIFA category of '1' denotes the most disadvantaged areas and '4' denotes the least disadvantaged areas (Jamieson, Armfield and Roberts-Thomson 2006b). None of the NT tooth decay data for Indigenous children fell into category '4' of the SEIFA (the least disadvantaged areas).

Average infant tooth decay scores were higher for Indigenous children than non-Indigenous children across all ages (from four to 10 years) and SEIFA categories '1', '2' and '3' (table 5A.5.4). The highest scores for Indigenous children were consistently associated with SEIFA category '1' and the lowest scores with SEIFA category '3' (table 5A.5.4). This provides evidence that Indigenous children from the most disadvantaged areas tend to have a greater number of decayed infant teeth.

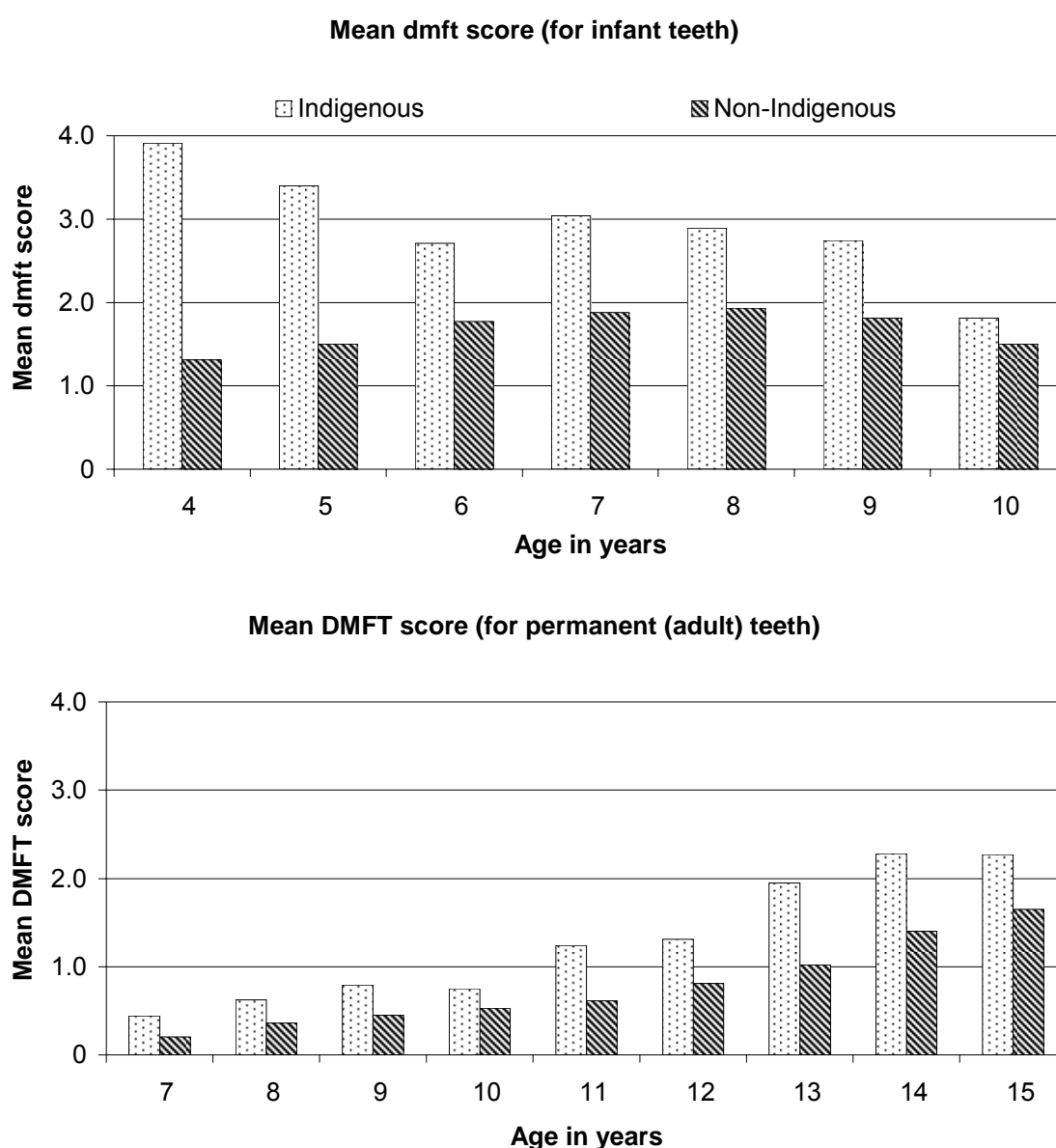
A similar trend was found for permanent tooth decay scores for Indigenous children, with the average number of decayed teeth decreasing as the level of disadvantage decreased from SEIFA category '1' to '3' (table 5A.5.5). Average scores were higher for Indigenous children than non-Indigenous children across all ages (from six to 13 years) in SEIFA category '1' (table 5A.5.5).

For non-Indigenous children, there was no consistent pattern between the average number of decayed teeth (infant and permanent) and the level of disadvantage as measured by SEIFA (tables 5A.5.4 and 5A.5.5).

Tooth decay among Indigenous and non-Indigenous children in SA

Average tooth decay scores for Indigenous and non-Indigenous children attending school dental services in SA, presented in figure 5.5.2, were calculated using data from the 2002 Child Dental Health Survey (Ellershaw, Spencer and Slade 2005).

Figure 5.5.2 SA, mean number of teeth with decay for 4–15 year old Indigenous and non-Indigenous children, by age group, 2002 Child Dental Health Survey^a

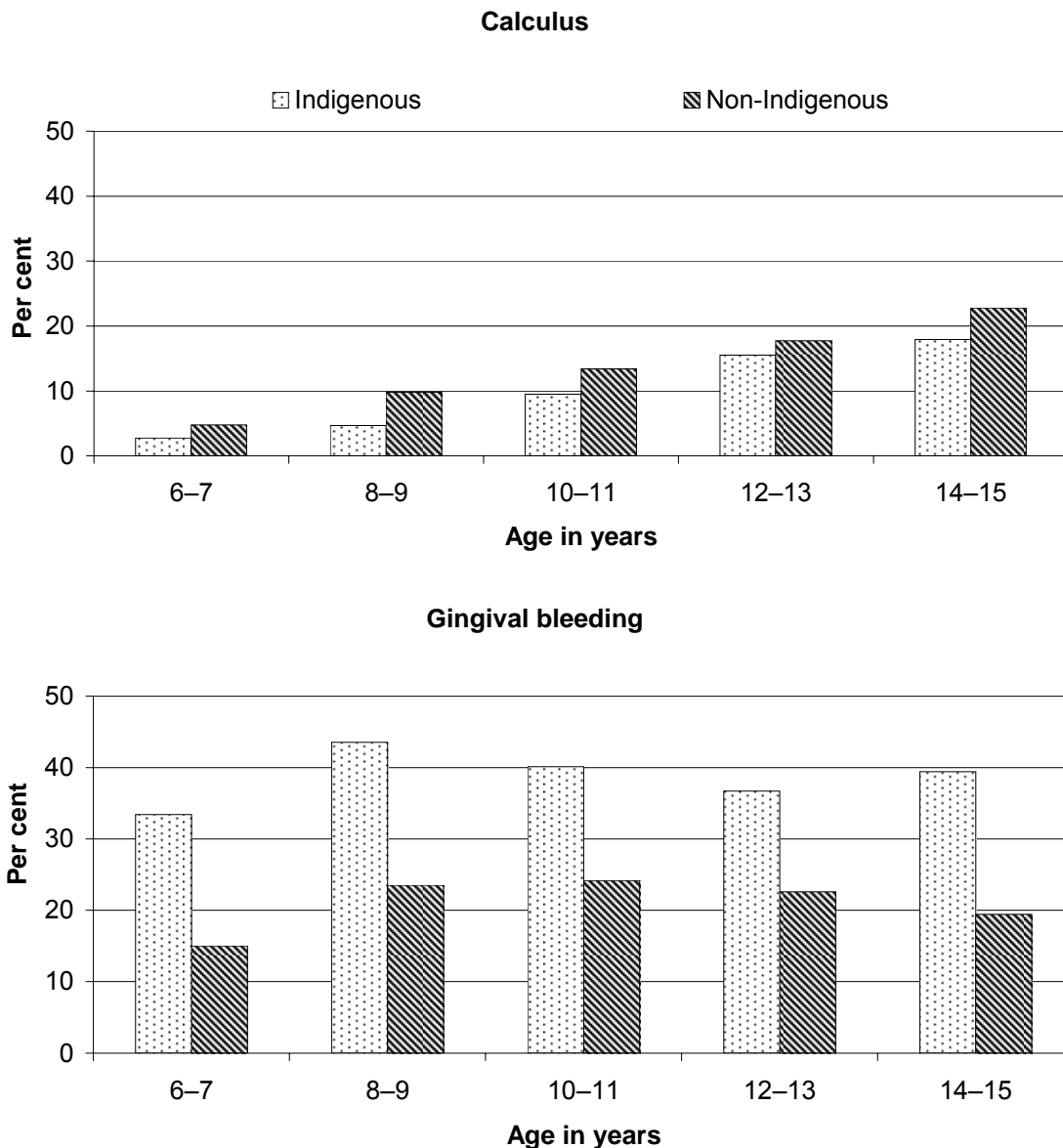


^a D=number of untreated decayed teeth; M=number of missing teeth; F=number of filled teeth; DMFT=D+M+F (for permanent adult teeth); dmft refers to infant teeth and is derived in the same way as DMFT. The indicator DMFT=0 (dmft=0 for infant teeth) refers to decay-free teeth.

Source: Ellershaw, Spencer and Slade (2005); table 5A.5.6.

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- According to the 2002 Child Dental Health Survey, average numbers of infant teeth with decay were higher for Indigenous children than non-Indigenous children across all ages (from four to 10 years) in SA. The highest scores for Indigenous children were 3.91 and 3.40 for four and five-year olds, respectively (figure 5.5.2). The greatest difference in scores between Indigenous and non-Indigenous children was for four-year-olds (3.91 for Indigenous children compared to 1.31 for non-Indigenous children) (figure 5.5.2).
 - For both Indigenous and non-Indigenous children, permanent tooth decay scores increased with age (figure 5.5.2). Average scores for Indigenous children ranged from 0.44 for seven-year-olds to 2.27 for 15-year-olds, compared with 0.20 for non-Indigenous seven-year-olds and 1.65 for non-Indigenous 15-year-olds (figure 5.5.2). The greatest relative difference in scores between Indigenous and non-Indigenous children was for seven-year-olds; the score was 2.2 times greater for Indigenous children than non-Indigenous children (figure 5.5.2).

Figure 5.5.3 SA, proportion of Indigenous and non-Indigenous children with calculus and gingival bleeding, by age group, 2002 Child Dental Health Survey^{a, b}



^a Gingival bleeding is bleeding of the gums associated with gingivitis, which is an inflammation of the gums surrounding the teeth caused by a buildup of plaque or food particles. ^b Calculus is a hard deposit of mineralized plaque which is attached to crowns and/or roots of teeth.

Source: Ellershaw, Spencer and Slade (2005); table 5A.5.7.

- For each age group presented in figure 5.5.3, a smaller proportion of Indigenous children had calculus than non-Indigenous children. For both Indigenous and non-Indigenous children, the proportion with calculus increased with age. Eighteen per cent and 22.8 per cent, respectively, of 14–15-year old Indigenous and non-Indigenous children had calculus.

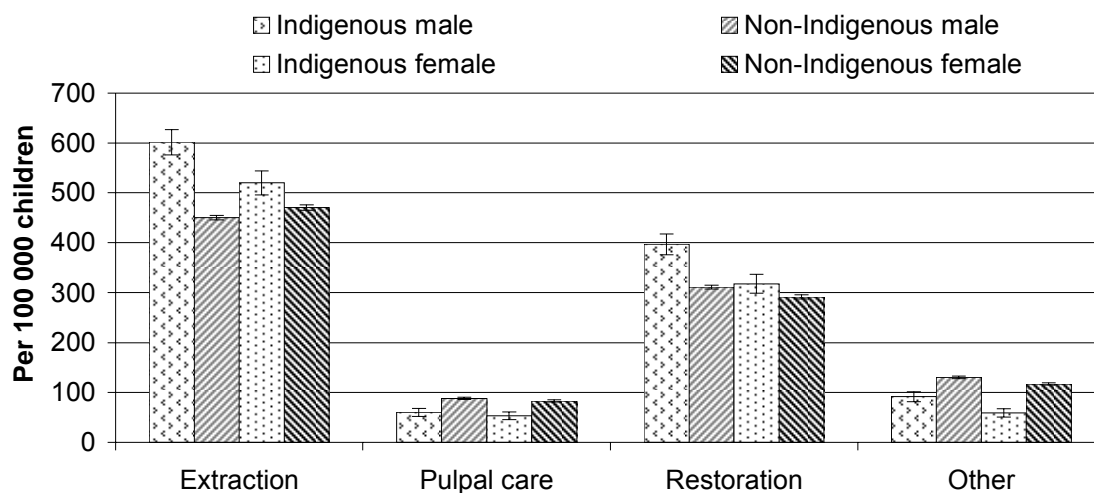
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- A greater proportion of Indigenous children had gingival bleeding than non-Indigenous children across all age groups (figure 5.5.3). Forty-four per cent of Indigenous children aged 8–9 years suffered from gingival bleeding, greater than any other age group.

Hospital dental admission and procedure rates for Indigenous children living in all Australian states and territories

In 2002-03, dental hospitalisation rates for male and female Indigenous children (aged two to 14 years) were higher than the rates for male and female non-Indigenous children, based on dental hospitalisations data from 1297 public and private hospitals (AIHW National Hospital Morbidity Database) (table 5A.5.8). Dental hospitalisation rates for Indigenous children aged under five years and those living in remote areas were particularly high compared with rates for non-Indigenous children and Indigenous children of other age groups or remoteness areas (table 5A.5.8).

Figures 5.5.4, 5.5.5 and 5.5.6 compare the hospital dental procedure rates for Indigenous and non-Indigenous children aged two to 14 years by sex, age group and remoteness. Over 80 dental procedure codes (International Classification of Diseases Australian Modification) were grouped into ‘extraction’, ‘pulpal care’, ‘restorative care’, or ‘other’ (including the provision of splints, crowns or bridges) (Jamieson and Roberts-Thomson 2006).

Figure 5.5.4 Hospital dental procedure rates for children aged 2–14 years, by type of procedure and sex, 2002-03^{a, b, c, d, e}

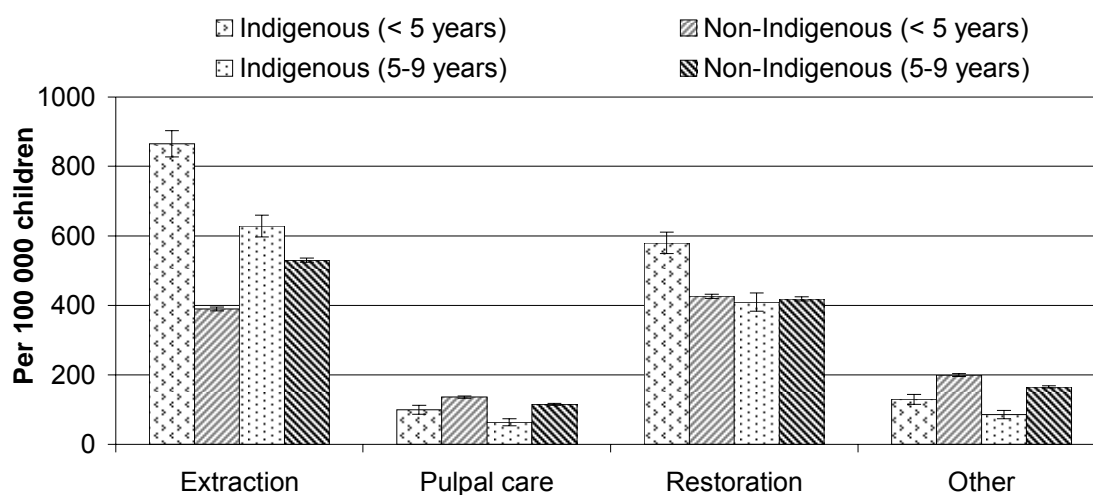


^a Error bars represent 95 per cent confidence intervals around each estimate. ^b Extraction procedures are performed to remove decayed, damaged, malformed, or malpositioned teeth. ^c Pulpal care refers to procedures carried out on the soft inner structure of a tooth, consisting of nerve and blood vessels. ^d Restoration procedures involve placing a material in a tooth to restore function and morphology when tooth structure has been lost due to decay or fracture (generally, because of extensive caries), or to improve the aesthetics of the tooth. ^e Other includes the provision of splints, crowns or bridges.

Source: Jamieson and Roberts-Thomson (2006); table 5A.5.9.

- Extraction is an invasive procedure used on patients with excessive decay (that is, when multiple teeth are affected or when time constraints preclude more comprehensive care) (Jamieson and Roberts-Thomson 2006). For Indigenous and non-Indigenous children, the rate of extraction procedures was greater than any other procedure rate presented in figure 5.5.4.
- For ‘extraction’ and ‘restoration’ procedures, rates for Indigenous males and females were greater than the rates for these procedures for non-Indigenous males and females (figure 5.5.4). The rate of ‘extraction’ procedures for Indigenous males was 1.3 times the rate for non-Indigenous males.
- For ‘pulpal’ and ‘other’ procedures, the rates for Indigenous males and females were less than the rates for these procedures for non-Indigenous males and females (figure 5.5.4).

Figure 5.5.5 Hospital dental procedure rates for children aged 2–9 years, by type of procedure and age, 2002-03^{a, b, c, d, e}

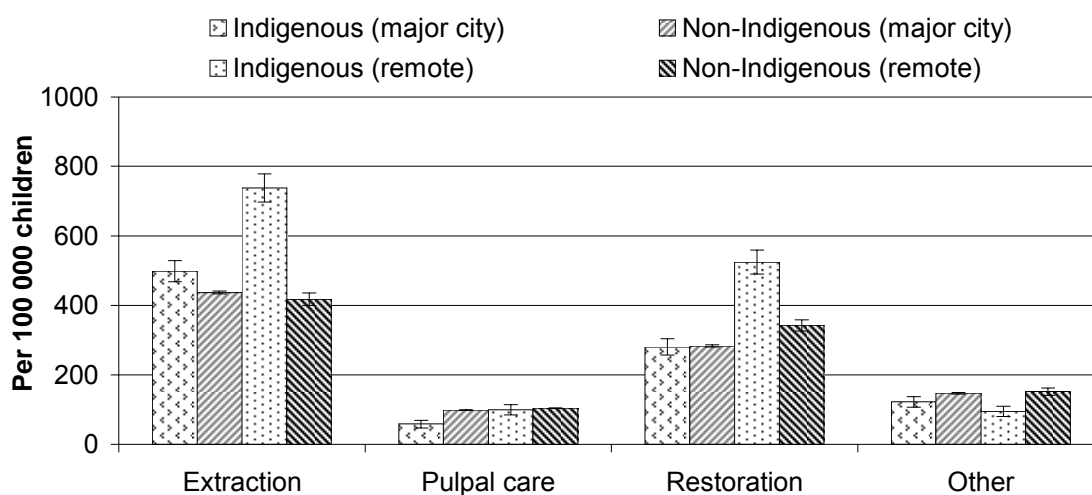


^a Error bars represent 95 per cent confidence intervals around each estimate. ^b Extraction procedures are performed to remove decayed, damaged, malformed, or malpositioned teeth. ^c Pulpal care refers to procedures carried out on the soft inner structure of a tooth, consisting of nerve and blood vessels. ^d Restoration procedures involve placing a material in a tooth to restore function and morphology when tooth structure has been lost due to decay or fracture (generally, because of extensive caries), or to improve the aesthetics of the tooth. ^e Other includes the provision of splints, crowns or bridges.

Source: Jamieson and Roberts-Thomson (2006); table 5A.5.10.

- Indigenous children aged less than 5 years and 5–9 years of age experienced higher rates of ‘extraction’ procedures than non-Indigenous children in the same age groups (figure 5.5.5). The rate of ‘extraction’ procedures for Indigenous children aged less than five years was 2.2 times the rate for non-Indigenous children.
- The rate for ‘restoration’ procedures was also greater for Indigenous children aged less than 5 years; 1.4 times greater than the ‘restoration’ procedure rate for non-Indigenous children (figure 5.5.5).
- Similar to the pattern shown in figure 5.5.4, rates for ‘pulpal’ and ‘other’ procedures were lower among Indigenous children than non-Indigenous children in both age groups (figure 5.5.5).
- Indigenous children aged 10 to 14 years were hospitalised for extractions at around one third the rate for non-Indigenous children of the same age (table 5A.5.10).

Figure 5.5.6 Hospital dental procedure rates for children aged 2–14 years, by type of procedure and remoteness area, 2002-03^{a, b, c, d, e}



^a Error bars represent 95 per cent confidence intervals around each estimate. ^b Extraction procedures are performed to remove decayed, damaged, malformed, or malpositioned teeth. ^c Pulpal care refers to procedures carried out on the soft inner structure of a tooth, consisting of nerve and blood vessels. ^d Restoration procedures involve placing a material in a tooth to restore function and morphology when tooth structure has been lost due to decay or fracture (generally, because of extensive caries), or to improve the aesthetics of the tooth. ^e Other includes the provision of splints, crowns or bridges.

Source: Jamieson and Roberts-Thomson (2006); table 5A.5.11.

- Indigenous children in major cities and remote areas experienced greater rates of ‘extraction’ procedures than non-Indigenous children in the same locations. The rate of ‘extraction’ procedures for Indigenous children living in remote areas was nearly twice the rate for non-Indigenous children (figure 5.5.6). The rate for ‘restoration’ procedures for Indigenous children living in remote areas was 1.5 times greater than the rate for non-Indigenous children (figure 5.5.6).
- For ‘pulpal care’ and ‘other’ procedures, the rates for Indigenous children living in major cities were lower than the rates for non-Indigenous children (figure 5.5.6).

5.6 Future directions in data

Hearing impediments

There are only limited data available on the burden of hearing loss in Indigenous children. Comprehensive, up-to-date data need to be collected to enable the assessment of the type and severity of ear infections in the Indigenous population.

The proposed Longitudinal Study of Indigenous Children (LSIC) may collect data on hearing impediments.

Children with tooth decay

Reliable data on the dental health status of Indigenous children are currently limited to three jurisdictions (NSW, SA and NT). There is considerable scope to expand the availability of comparable data on Indigenous children's dental health so that a national picture can be seen as well as variations over time and by remoteness area.

5.7 Attachment tables

Attachment tables are identified in references throughout this chapter by an 'A' suffix (for example, table 5A.2.1 is table 1 in the attachment tables for section 5.2). The files containing the attachment tables can also be found on the Review web page (www.pc.gov.au/gsp). Users without access to the Internet can contact the Secretariat to obtain the attachment tables (see contact details on the inside front cover of the Report).

5.1 Injury and preventable diseases

Table 5A.1.1 Number and rate of hospitalisations for injury and potentially preventable diseases for children aged less than 4 years, Qld, WA, SA, and public hospitals in the NT, 2004–05

Table 5A.1.2 Deaths from external causes and preventable diseases for children aged less than 5 years, 2001–2005

5.2 Infant mortality

Table 5A.2.1 Infant mortality rates (per 1000 live births)

5.3 Birthweight

Table 5A.3.1 Baby's birthweight, by live births and fetal deaths, 2002–2004

Table 5A.3.2 Baby's birthweight, by live births and fetal deaths, 2001–2003

Table 5A.3.3 Baby's birthweight, by live births and fetal deaths, 2000–2002

Table 5A.3.4 Baby's birthweight, by live births and fetal deaths, 1999–2001

Table 5A.3.5 Baby's birthweight, by live births and fetal deaths, 1998–2000

5.4 Hearing impediments

- Table 5A.4.1** Persons with a long-term hearing problem: type of ear/hearing problem, by age and Indigenous status, 2004-05 (per cent of population)
- Table 5A.4.2** Persons with a long-term hearing problem: type of ear/hearing problem, by age and Indigenous status, 2001 (per cent of population)
- Table 5A.4.3** Persons with a long-term hearing problem: type of ear/hearing problem, by remoteness areas and Indigenous status, 2004-05 (per cent of population)
- Table 5A.4.4** Persons with a long-term hearing problem: type of ear/hearing problem, by remoteness areas and Indigenous status, 2001 (per cent of population)
- Table 5A.4.5** Persons with otitis media, by age and Indigenous status, 2004-05 (per cent of population)
- Table 5A.4.6** Age specific separations where the principal diagnosis was diseases of the ear and mastoid process, Qld, WA, SA, and public hospitals in NT, 2004-05
- Table 5A.4.7** Age specific separations where the principal diagnosis was diseases of the ear and mastoid process, Qld, WA, SA, and public hospitals in NT, 2003-04
- Table 5A.4.8** Age specific separations where the principal diagnosis was diseases of the ear and mastoid process, Qld, WA, SA and public hospitals in NT, 2002-03
- Table 5A.4.9** Age specific separations where the principal diagnosis was diseases of the ear and mastoid process, Qld, WA, SA and public hospitals in NT, 2001-02

5.5 Children with tooth decay

- Table 5A.5.1** Decayed and decay-free infant teeth in 4- to 10-year-old children enrolled in school dental services in NSW, SA and the NT, by Indigenous status and location
- Table 5A.5.2** Decayed and decay-free permanent teeth in 6- to 14-year-old children enrolled in school dental services in NSW, SA and the NT, by Indigenous status and location
- Table 5A.5.3** Mean number of teeth with decay for children enrolled in the NT School Dental Service, by age and Indigenous status, 2002-03
- Table 5A.5.4** Mean tooth decay (dmft) for 4- to 10-year-old children enrolled in the NT School Dental Service, by SEIFA index of relative socio-economic disadvantage, age and Indigenous status, 2002-03
- Table 5A.5.5** Mean tooth decay (DMFT) for 6- to 13-year-old children enrolled in the NT School Dental Service, by SEIFA index of relative socio-economic disadvantage, age and Indigenous status, 2002-03
- Table 5A.5.6** SA, infant and permanent tooth decay, mean dmft and DMFT by Indigenous status and age, 2002 Child Dental Health Survey
- Table 5A.5.7** SA, proportion of children with calculus and gingival bleeding by Indigenous status and age, children attending school dental service, 2002 Child Dental Health Survey
- Table 5A.5.8** Dental hospitalisations for children aged 2 to 14 years, per 100 000 children, by sociodemographic characteristics and Indigenous status, 2002-03
- Table 5A.5.9** Hospital dental procedure rates for children aged 2 to 14 years, per 100 000 children, by sex and Indigenous status, 2002-03
- Table 5A.5.10** Hospital dental procedure rates for children aged 2 to 14 years, per 100 000 children, by age group and Indigenous status, 2002-03
- Table 5A.5.11** Hospital dental procedure rates for children aged 2 to 14 years, per 100 000 children, by remoteness area and Indigenous status, 2002-03

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