

1.01 Low birthweight infants

The incidence of low birthweight among live-born babies of Aboriginal and Torres Strait Islander mothers

Data sources

National Perinatal Data Collection

Data for this measure come from the Australian Institute of Health and Welfare (AIHW) National Perinatal Statistics Unit National Perinatal Data Collection.

Data on birthweight are collected as part of the Perinatal National Minimum Data Set. Each state and territory has a perinatal collection based on birth notification forms completed by midwives and other staff, using information obtained from mothers and from hospital and other records. These data are provided in electronic format annually to the AIHW National Perinatal Statistics Unit. Perinatal notification forms are completed in Australia for all births of 20 weeks or more gestation, or a birthweight of 400 grams or more.

All jurisdictions collect the Indigenous status of the mother of the baby. However, this data element does not provide the Indigenous status of the baby. Therefore, Indigenous births will be underestimated as babies born to Indigenous fathers and non-Indigenous mothers are not included in the data collection. Over the period 2003–2005 there were approximately 10,100 ABS registered births to Indigenous fathers only, which represented 28% of registered Indigenous births (ABS 2006, 2005, 2004).

Data are presented for all states and territories with the exception of Tasmania for which the 'not stated' category for Indigenous status was unable to be distinguished from the category for non-Indigenous until 2005.

Data on mothers for whom Indigenous status was 'not stated' have been excluded from analysis. In 2005, there were 128 births with a 'not stated' Indigenous status (0.05%).

The World Health Organization (WHO) defines low birthweight as less than 2,500 grams.

Analyses

Births

Between 2003 and 2005 there were 769,587 births recorded in the Perinatal National Minimum Data Set (excluding Tasmania) of which 27,722 (3.6%) were to Aboriginal and Torres Strait Islander mothers.

Low birthweight

Table 1.01.1 presents the number and proportion of live-born low birthweight babies by Indigenous status of the mother and state/territory for the period 2003–2005.

- Over the period 1998–2000, there were 3,087 live-born babies weighing less than 2,500 grams birthweight born to Indigenous mothers in Australia (not including Tasmania). Babies of Indigenous mothers were twice as likely to be of low birthweight as babies born to non-Indigenous mothers (12% compared with 6%).

- Over the period 2003–2005, there were 3,601 live-born babies of low birthweight born to Indigenous mothers in Australia (not including Tasmania). Approximately 13% of babies born to Indigenous mothers were of low birthweight, compared with 6% of babies born to non-Indigenous mothers.
- When multiple births are excluded, approximately 12% of babies born to Indigenous mothers are of low birthweight compared with 5% of babies born to non-Indigenous mothers.
- Queensland and New South Wales had the lowest proportion of live-born low birthweight babies born to Indigenous mothers in 2003–2005 (12%). The Australian Capital Territory and South Australia had the highest proportion of low birthweight babies (18%); however, ACT data should be interpreted with caution because of the small number of Indigenous babies born in the Australian Capital Territory each year and the likelihood that some women from surrounding areas of New South Wales (especially those with pregnancy complications) are referred to hospitals in the Australian Capital Territory.

**Table 1.01.1: Low birthweight babies, by Indigenous status of mother and state/territory, 1998–2000
2001–2003 and 2003–2005^{(a)(b)(c)(d)(e)}**

	1998–2000		2001–2003		2003–2005	
	No.	Per cent	No.	Per cent	No.	Per cent
NSW						
Indigenous	681	11.0	784	12.2	835	12.0
Non-Indigenous	14,429	5.7	14,451	5.8	14,516	5.7
Vic						
Indigenous	171	13.4	152	12.7	190	14.3
Non-Indigenous	11,542	6.2	11,814	6.3	12,066	6.3
Qld						
Indigenous	907	10.8	956	11.5	1,014	11.7
Non-Indigenous	8,319	6.1	8,671	6.2	9,225	6.3
WA						
Indigenous	606	13.3	675	14.5	683	14.7
Non-Indigenous	4,160	5.8	4,042	5.8	4,306	6.0
SA						
Indigenous	203	15.7	229	17.6	251	17.5
Non-Indigenous	3,349	6.3	3,193	6.2	3,315	6.4
ACT^(f)						
Indigenous	29	16.7	39	19.1	45	17.7
Non-Indigenous	950	6.8	901	6.5	1,020	7.1
NT						
Indigenous	490	12.7	568	13.3	583	14.3
Non-Indigenous	490	7.2	402	6.0	434	6.6
Total^(g)						
Indigenous	3,087	12.0	3,403	12.9	3,601	13.1
Non-Indigenous	43,239	6.0	43,474	6.1	44,882	6.1

- (a) Table includes live births of 20 weeks gestation or more or of 400 grams or more birthweight. Low birthweight is defined as less than 2,500 grams.
- (b) Data are presented in 3-year groupings because of small numbers each year. These groupings represent three calendar years.
- (c) Data relate to the Indigenous status of the mother only and therefore underestimate Indigenous births.
- (d) Indigenous and non-Indigenous data exclude births where the mother's Indigenous status is not stated.
- (e) State-level data are based on place where birth occurred, not place of usual residence. Cross-border issues need to be considered here, e.g. a high proportion of births in ACT hospitals are to mothers usually resident in New South Wales.
- (f) ACT percentages are influenced by both small numbers and high proportions of non-ACT residents who gave birth in the Australian Capital Territory and must be interpreted with caution. In 2003–2005, the ACT resident proportion was 14.0% for low birthweight Indigenous babies and 5.6% for non-Indigenous babies.
- (g) Excludes Tasmania, as the 'not stated' category for Indigenous status was unable to be distinguished from the 'non-Indigenous' category for 2003 and 2004.

Source: AIHW analysis of National Perinatal Statistics Unit (NPSU) National Perinatal Data Collection.

Time series analysis

Longer term perinatal trend data are limited to six states and territories—New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory. These six states and territories have been assessed by the AIHW as having adequate identification of Indigenous mothers in their perinatal data collections from 1991 onwards (AIHW: Leeds et al. 2007).

Owing to the late inclusion of a 'not stated' category of Indigenous status in 2000 in the National Perinatal Data Collection (before which 'not stated' responses were included in the number of births to non-Indigenous mothers), the rate of low birthweight babies born to Indigenous mothers has been compared with rates of 'other' Australians (which includes births to both non-Indigenous mothers and births to mothers for which Indigenous status was not stated).

Fluctuations in the number/proportion of low birthweight babies of Indigenous mothers over time partly reflect changing levels of coverage of babies of Indigenous mothers in the perinatal data. Caution should be exercised in assessing trends in low birthweight babies of Indigenous mothers over time and comparisons with the non-Indigenous population.

The rate (proportion) of low birthweight babies per 100 live births, rate ratios and rate differences between Indigenous and non-Indigenous low birthweight babies over the period 1991–2005 are presented in Table 1.01.2 and Figure 1.01.1. Data are presented for all live births and for live singleton births only. Analyses of live singleton births are presented because low birthweight is associated with multiple births and there has been an increasing trend in multiple births over time. Inclusion of multiple births may therefore confound the results of trends analyses on low birthweight.

- Over the period 1991–2005, there was a significant increase in the proportion of low birthweight babies born to Indigenous mothers. The fitted trend implies an average yearly increase in low birthweight babies born to Indigenous mothers of around 0.1 per 100 live births, which is equivalent to an increase of 16% over the period (Figure 1.01.1). A similar increase was evident for singleton babies born to Indigenous mothers.
- Over the same period there was a significant increase in the proportion of low birthweight babies born to other mothers. There was an average yearly increase in low-birthweight babies of around 0.04 per 100 live births which is equivalent to a 9% increase over the period. Again, a similar increase was evident for singleton babies born to other mothers.
- Between 1991 and 2005 there was a significant increase in both the rate ratio and rate difference between low birthweight babies born to Indigenous and non-Indigenous mothers. The fitted trend implies an average yearly increase in the rate ratio of around 0.01 (increase of 7% over the period) and an average yearly increase in the rate difference of around 0.1 per 100 live births (increase of 23% over the period) (Figure 1.01.1). There were also significant increases in the rate ratio and rate differences for low birthweight singleton live-born babies.

Table 1.01.2: Rate (proportion), rate ratio and rate difference between low birthweight babies of Indigenous and other mothers, 1991–2005

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Annual change ^(a)	Per cent change ^(b)
Low birthweight live-born babies																	
Indigenous rate	11.9	11.8	10.8	11.9	10.9	11.6	12.1	11.0	12.2	12.7	12.8	12.9	12.9	13.1	13.3	0.1*	16.4
Other rate ^(c)	5.7	5.7	5.7	5.7	5.8	5.8	5.9	5.9	6.0	6.1	6.0	6.1	6.0	6.1	6.1	0.04*	8.9
Rate ratio	2.1	2.1	1.9	2.1	1.9	2.0	2.1	1.9	2.0	2.1	2.1	2.1	2.1	2.2	2.2	0.01*	7.3
Rate difference	6.2	6.1	5.1	6.3	5.2	5.9	6.3	5.1	6.2	6.6	6.8	6.8	6.9	7.0	7.2	0.1*	23.3
Low birthweight singleton live-born babies																	
Indigenous rate	11.1	10.8	9.7	11.0	10.2	10.7	11.3	10.0	10.9	11.7	11.5	11.8	11.9	12.1	12.1	0.1*	15.5
Other rate ^(c)	4.5	4.4	4.5	4.4	4.5	4.5	4.5	4.6	4.6	4.5	4.5	4.6	4.5	4.6	4.5	0.01*	2.6
Rate ratio	2.5	2.4	2.2	2.5	2.3	2.4	2.5	2.2	2.4	2.6	2.6	2.6	2.6	2.6	2.7	0.02*	12.8
Rate difference	6.6	6.3	5.3	6.7	5.7	6.2	6.8	5.4	6.3	7.2	7.0	7.3	7.4	7.5	7.5	0.1*	24.2

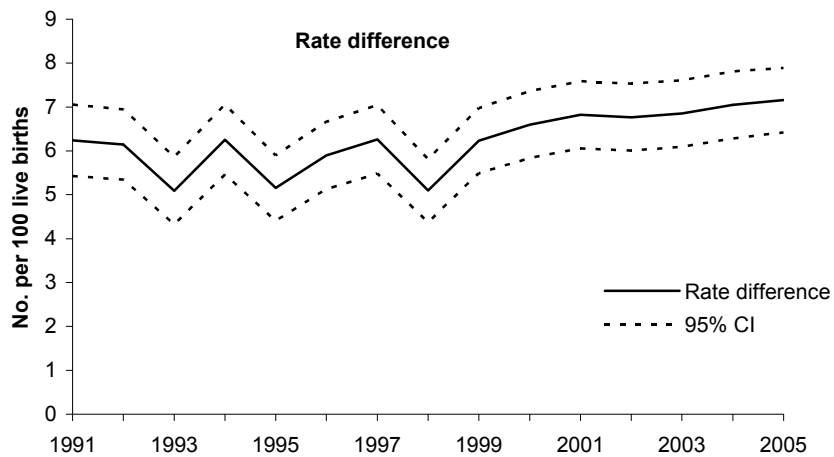
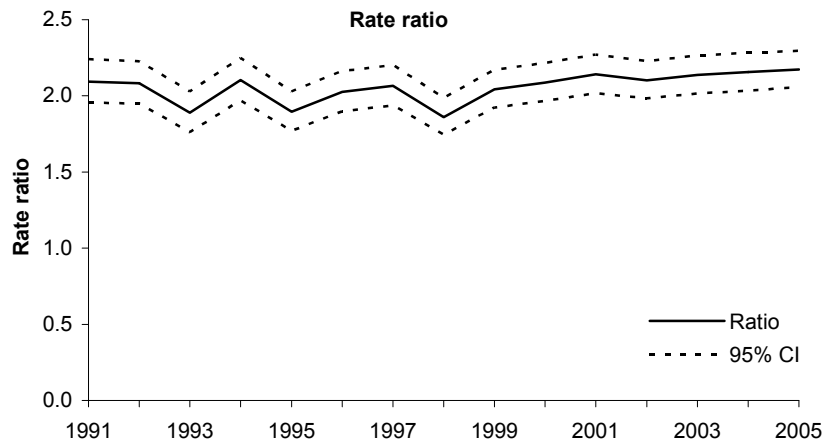
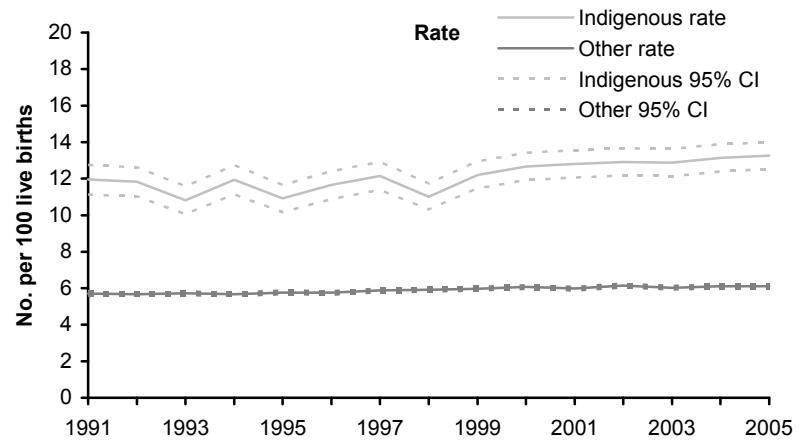
(a) Average annual change in number and proportion of low birthweight babies determined using linear regression analysis.

(b) Per cent change between 1991 and 2005 based on the average annual change over the period.

(c) Includes non-Indigenous mothers and mothers for whom Indigenous status was not stated.

Note: Excludes Tasmania and the Australian Capital Territory.

Source: AIHW analysis of NPSU National Perinatal Data Collection.



Note: Excludes Tasmania and the Australian Capital Territory.

Source: AIHW analysis of NPSU National Perinatal Data Collection.

Figure 1.01.1: Rates, rate ratios and rate differences between low birthweight babies (all live births) of Indigenous and other mothers, 1991-2005

Low birthweight babies by birth characteristics

Table 1.01.3 presents the number and proportion of low birthweight babies born to Indigenous and non-Indigenous mothers in 2003–2005 by selected birth characteristics.

- Approximately 68% of pre-term babies born to Indigenous mothers were of low birthweight compared with only 5% of full-term babies born to Indigenous mothers.
- Approximately 63% of multiple births of Indigenous mothers resulted in babies born with low birthweight compared with 13% of singleton births.
- Almost half (47%) of live-born babies born to Indigenous mothers with an Apgar score of less than 7 were of low birthweight.
- Although the proportion of pre-term and multiple births resulting in low birthweight babies was similar for babies born to Indigenous and non-Indigenous mothers, low birthweight among full-term births and singleton births was almost 3 times as high among babies born to Indigenous mothers as among babies born to non-Indigenous mothers.
- The perinatal death rate among low birthweight babies born to Indigenous mothers was 625 per 1,000 births. This compared with 588 per 1,000 births among low birthweight babies born to non-Indigenous mothers.

Table 1.01.3: Live-born low birthweight babies by birth characteristics and Indigenous status, 2003–2005

	Indigenous		Non-Indigenous		Ratio
	Number	%	Number	%	
Pre-term	2,671	68.1	35,098	60.6	1.1
Full-term	1,181	5.0	13,788	2.0	2.5
Multiple birth	390	63.2	12,936	51.5	1.2
Singleton birth	3,463	12.8	35,968	5.0	2.5
APGAR score^(a)					
0–6	282	46.6	2,972	31.6	1.5
7–10	3,269	12.3	41,753	5.8	2.1
Perinatal deaths per 1,000 births^(b)	306	624.5	4,389	587.9	1.1
Total	3,853	13.1	48,904	6.1	..

(a) Live births only.

(b) Excludes the Northern Territory for 2003.

Notes

1. Excludes Tasmania, as the 'not stated' category for Indigenous status was unable to be distinguished from the 'non-Indigenous' category for 2003 and 2004.
2. Excludes mothers for whom Indigenous status was not stated.

Source: AIHW analysis of NPSU National Perinatal Data Collection.

Low birthweight babies by maternal characteristics

Table 1.01.4 presents the number and proportion of live-born low birthweight babies born to Indigenous and non-Indigenous mothers in 2003–2005 by selected characteristics of the mother.

- In 2003–2005, the highest rate of low birthweight babies born to Indigenous mothers was among mothers aged 35 years and over (16%) followed by mothers aged less than 20 years (14%). Indigenous mothers in all age groups were around twice as likely to have low birthweight babies as non-Indigenous mothers.
- Indigenous mothers in the most disadvantaged quintile and 4th quintile of socioeconomic status (SES) were most likely to have low birthweight babies (14%). Rates of low birthweight babies among Indigenous mothers were around twice those among non-Indigenous mothers across all quintiles of socioeconomic status.
- Low birthweight babies were most common among Indigenous mothers who had a parity of three or more or who were having their first baby (around 14%).
- The proportion of low birthweight babies born to Indigenous mothers was highest among mothers living in Remote and Very Remote areas (15% and 14% respectively). In remote areas, babies born to Indigenous mothers were almost three times as likely as babies born to non-Indigenous mothers to be of low birthweight.

Table 1.01.4: Live-born low birthweight babies by maternal characteristics and Indigenous status, 2003–2005

	Indigenous		Non-Indigenous		Ratio
	Number	%	number	%	
Age of mother					
Less than 20	817	13.5	2,134	7.8	1.7
20–24	1,095	12.8	6,685	6.6	2.0
25–29	805	12.6	11,481	5.7	2.2
30–34	551	12.9	14,419	5.6	2.3
35+	333	15.5	10,160	6.8	2.3
Quintile of socioeconomic status					
1st quintile (most disadvantaged)	1,456	13.9	9,487	6.7	2.1
2nd quintile	932	12.7	9,128	6.3	2.0
3rd quintile	620	11.8	9,189	6.3	1.9
4th quintile	401	13.8	8,711	5.9	2.4
5th quintile (least disadvantaged)	119	12.6	8,184	5.4	2.3
Parity					
None	1,141	13.6	22,803	7.3	1.9
One	778	11.8	12,013	4.8	2.5
Two	588	12.3	5,553	5.0	2.5
Three	457	14.4	2,542	6.6	2.2
Four or more	627	13.9	1,952	8.3	1.7
Remoteness					
Major Cities	857	12.8	31,431	6.1	2.1
Inner Regional	573	12.1	8,463	6.2	1.9
Outer Regional	988	13.0	4,075	6.1	2.1
Remote	452	14.7	659	5.7	2.6
Very Remote	723	13.6	233	5.7	2.4
Total	3,601	13.1	44,882	6.1	..

Notes

1. Excludes Tasmania, as the 'not stated' category for Indigenous status was unable to be distinguished from the 'non-Indigenous' category for 2003 and 2004.
2. Excludes mothers for whom Indigenous status was not stated.

Source: AIHW analysis of NPSU National Perinatal Data Collection.

Mean birthweight

- In 2005, the average birthweight of live-born babies of Indigenous mothers was 3,155 grams. This was 221 grams lighter than the average of 3,376 grams for live-born babies of non-Indigenous mothers in 2005.
- Note that male babies were proportionally less likely to be of low birthweight than were female babies (the average birthweight of male babies was 119 grams higher than that of female babies in 2005).

Time series analysis

- Over the period 1997–2005, although there was a significant decline in the mean birthweight of babies born to Indigenous mothers (the fitted trend implies an average yearly decline of around 2.9 grams), this decline is not necessarily clinically significant. The change could be accounted for by measurement error, such as instrument calibration or error in the observer making the measurement, which is more likely to occur in births in remote areas or home births for which Indigenous births are over-represented (Table 1.01.3).
- There was no significant change in the mean birthweight of babies of other mothers over the same period.
- There was a significant increase in the difference between the mean birthweight of babies born to Indigenous and other mothers over the period 1997–2005.

Table 1.01.3: Mean birthweight, ratio and difference between mean birthweight of live-born babies of Indigenous and other mothers, 1997–2005

	1997	1998	1999	2000	2001	2002	2003	2004	2005	Annual change ^(a)	% change
Mean birthweight (grams)											
Indigenous	3,170	3,186	3,170	3,175	3,166	3,165	3,160	3,158	3,155	-2.9*	-0.7
Other ^(b)	3,375	3,382	3,380	3,384	3,382	3,378	3,380	3,382	3,376	0.0	0.0
Ratio	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.0	-0.7
Difference (grams)											
	-205	-196	-211	-209	-216	-214	-220	-223	-221	2.9*	11.1

* Represents results with statistically significant increases or decreases at the $p < 0.05$ level over the period 1997–2005.

(a) Average annual change in number and proportion of low birthweight babies determined using linear regression analysis.

(b) Includes non-Indigenous mothers and mothers for whom Indigenous status was not stated.

Note: Excludes Tasmania and the Australian Capital Territory.

Source: AIHW analysis of NPSU National Perinatal Data Collection.

High birthweight

High birthweight is defined here as babies born weighing 4,000 grams or more.

- In 2003–2005 the proportion of high birthweight babies born to Indigenous mothers in Australia (excluding Tasmania) was 8%. This compared with 12% of babies born of high birthweight to non-Indigenous mothers (AIHW: NPSU unpublished data).

International comparisons

International indigenous data are available for Indigenous persons from New Zealand, the United States and Canada using the WHO definition of low birthweight.

International statistics on low birthweight show that Indigenous mothers in Canada and the United States have lower rates of low birthweight babies than the general population, and Indigenous mothers in New Zealand have slightly higher rates of low birthweight babies than the general population, but the gap is not as great as for Aboriginal and Torres Strait Islander Australians. In Australia, babies of Aboriginal or Torres Strait Islander mothers are more than twice as likely to be of low birthweight as babies born to other Australian mothers (13% compared with 6% – Laws et al. 2007).

The latest available data from the United States, Canada and New Zealand are outlined below. Note that the Canadian data exclude births less than 500 grams because of changes over time in the quality of reporting babies' birthweight less than 500 grams. This definition is slightly different from Australia's criteria – excluding babies less than 400 grams or less than 20 weeks gestation.

- For the period 2004–2006, 7.4% of babies born to American Indian or Alaskan native mothers on reserves were of low birthweight compared with 8.2% of babies born to non-Indigenous mothers in the United States (National Center for Health Statistics, unpublished data).
- For the period 2001–2002, 5.5% of Canadian First Nation babies were of low birthweight which was the same as the 2001 total Canadian rate of 5.5% (Health Canada unpublished data; Health Canada 2005).
- For the period 2004–2006, 6.8% of babies born to Maori mothers were of low birthweight compared with 5.6% of babies born to non-Indigenous mothers in New Zealand (Statistics New Zealand unpublished data).

Additional information

Risk factors for low birthweight

There are a range of factors that can affect a baby's birthweight. Low birthweight babies may also be the result of pre-term birth, fetal growth restriction, or a combination of the two, or other factors such as socioeconomic status, the size and age of the mother, the number of babies previously born to the mother, the mother's nutritional status, smoking and other risk factors such as the use of alcohol, illness during pregnancy, multiple births and the duration of pregnancy (Horta et al. 1997; Kramer 1998). Data on some of these risk factors for low birthweight are presented below for Indigenous and non-Indigenous mothers.

- Aboriginal and Torres Strait Islander mothers smoke during pregnancy at around three times the rate of non-Indigenous mothers (see 2.19 for more information on smoking during pregnancy).
- Indigenous females are more likely to have babies at younger ages than non-Indigenous mothers. Between 2001 and 2004, around 20% of Aboriginal and Torres Strait Islander mothers were aged less than 20 years compared with 4% of non-Indigenous mothers (AIHW: Leeds et al. 2007). Teenage pregnancies are associated with a number of adverse reproductive outcomes including low birthweight (Fraser et al. 1995).
- Indigenous mothers have twice the rate of pre-term birth (gestational age of less than 37 weeks) as non-Indigenous mothers (14% compared with 8% in 2003–2005).
- Indigenous mothers are more likely to have had a higher number of previous pregnancies. Between 2001 and 2004, 28% of Aboriginal and Torres Strait Islander

mothers had given birth three or more times previously. This compared with 8% of non-Indigenous mothers (AIHW: Leeds et al. 2007).

Data quality issues

Perinatal data

Births

Birth notification forms are completed for all births of 20 weeks or more gestation, or a birthweight of 400 grams or more. The Perinatal National Minimum Data Set includes all births in Australia in hospitals, birth centres and the community.

The state/territory of birth is provided for all births. State-level data is based on place where birth occurred, not place of usual residence. Complicated pregnancies from surrounding New South Wales may be referred to the Australian Capital Territory and hence there may be poorer outcomes attributed to Australian Capital Territory births. Because of this and the small numbers involved, care should be taken in interpreting data from the Australian Capital Territory (Laws et al. 2007).

Indigenous status question

A standard data item for Indigenous status is specified in the Perinatal National Minimum Data Set. However, not all states and territories use this standard wording for the Indigenous status question on their forms. This affects the quality and comparability of the data collected (ABS & AIHW 2003).

Under-identification

All jurisdictions collect Indigenous status of the mother for each baby. However, this does not necessarily indicate the Indigenous status of the baby.

Studies linking perinatal data with birth registration data and hospital admissions in Canada show that Indigenous data are under-reported (Human Resources Development Canada & Health Canada 2003). In 2007 the AIHW completed an assessment of the quality of Indigenous status information in perinatal data in each state and territory. This involved a survey which was sent to the midwifery managers across Australia to determine how many hospitals in each jurisdiction obtain Indigenous status information of mothers giving birth from admission records and how many collect this information independently. The assessment also involved analysis of the variability in the number and proportion of mothers recorded as Indigenous in the perinatal data collection over time and across jurisdictions for the period 1991–2004. The outcomes of this assessment showed that Indigenous status data from New South Wales, Victoria, Queensland, Western Australia, South Australia and the Northern Territory are suitable for trends analysis. Perinatal data from Tasmania, although improving, were deemed to be of insufficient quality. Although the most recent data in the Australian Capital Territory were of publishable quality, the data were not yet of sufficient stability to support trends analysis (AIHW: Leeds et al. 2007).

All jurisdictions are working towards improving the quality of the Indigenous status data. Data on Indigenous status are not reported for Tasmania before 2005 because the 'not stated' category for Indigenous status was included with the non-Indigenous category. The 'not stated' category for birthweight was found to be small nationally in the evaluation of the Perinatal National Minimum Data Set (Laws & Sullivan 2004). Therefore, the exclusion of 'not stated for birthweight will not have a significant impact on these data.

(continued)

Data quality issues (continued)

International comparisons

International indigenous data are available for New Zealand, the United States and Canada using the WHO definition of low birthweight. These data are subject to similar data quality issues experienced in Australia around the accuracy of identification. The Canadian data exclude births less than 500 grams because of changes over time in the quality of reporting babies' birthweight less than 500 grams. This definition is slightly different from Australia's criteria – excluding babies less than 400 grams or less than 20 weeks gestation.

The scope of data collections in Canada and the United States is often limited to the registered or reserve Indigenous populations and therefore does not cover the whole Indigenous population. International comparisons need to take into account that the definition of Indigenous status is specific to each country.

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