



### Trends in perinatal mortality, birthweight and gestational age among Aboriginal, Torres Strait Islander, and non-Indigenous babies in Queensland

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#### Summary

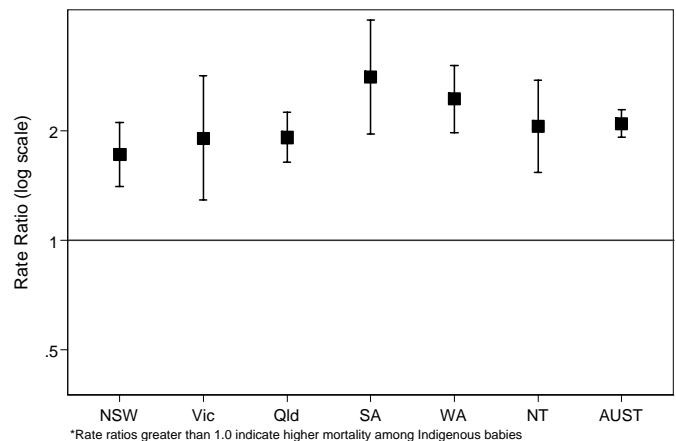
- ▶ Perinatal mortality has declined in Aboriginal, Torres Strait Islander and non-Indigenous populations by 2-3 percent per year over the last 16 years.
- ▶ However, perinatal mortality in babies born to Aboriginal and Torres Strait Island (TSI) mothers is approximately twice that in babies born to non-Indigenous mothers, and the gap between these populations has not narrowed in 16 years.
- ▶ A major determinant of perinatal mortality is low birthweight (due to preterm birth, intrauterine growth retardation or a combination of the two).
- ▶ There has been no reduction in the proportion of low birthweight babies born to Aboriginal or TSI mothers since 1988.
- ▶ Risk factors for preterm births and low birthweight include cigarette smoking, genito-urinary tract infections, poor nutrition and psychosocial stress related to economic disadvantage. These risk factors are present in excess in Aboriginal and TSI mothers and could be addressed through interventions that focus on health during the antenatal period, on women's health in general and on social determinants to reduce social inequalities that impact upon health. Such initiatives would result in sustainable improvements in health and would be likely to bring about a net reduction in health care expenditure.

The perinatal mortality rate for Aboriginal and Torres Strait Islander (TSI) populations in Queensland is approximately twice as high as the rate in the non-Indigenous population. In 2000-2002 the rate was 9.7 per 1000 births to non-Indigenous mothers compared with 21.5 per 1000 births to Aboriginal mothers (Relative Risk (RR)=2.21, 95% CI:1.86-2.61) and 17.2 per 1000 births to TSI mothers (RR=1.77, 1.05-2.59).

This result is similar to the difference found at a national level [1] with the perinatal mortality rate in babies born to Aboriginal mothers in Australia in 1998-2000 equal to 20.1 per 1000 births compared to 9.6 per 1000 births to non-Indigenous mothers. As shown in Figure 1 and Table 1 (Appendix 1), a similar pattern was present in all states. There is some variation in both Aboriginal and non-Indigenous mortality rates across states and territories, with perinatal mortality in births to Aboriginal mothers ranging from 15.5 per 1000 births to 24.9, with the Queensland rate approximately in the middle of the

range. The overall number of Aboriginal births and perinatal deaths is much higher in Queensland than in any other state so this issue is an especially high priority in Queensland. Variation in death rates may reflect variation in identification of Indigenous status across different states and territories so interstate comparisons should be interpreted cautiously.

**Figure 1. Perinatal mortality rate ratio\* by state – Aboriginal versus non-Indigenous**



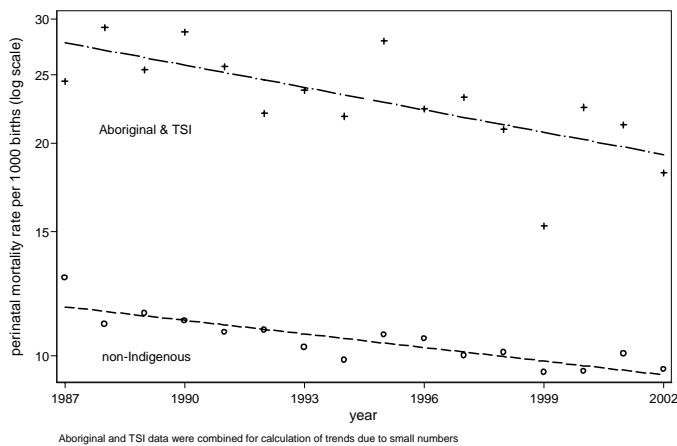
Source: AIHW National Perinatal Statistics Unit perinatal collection

Perinatal mortality in Queensland has been steadily declining over the last 16 years. Reductions in perinatal mortality are similar in Aboriginal, TSI and non-Indigenous populations. Over the 16-year interval from 1987-1989 to 2000-2002, perinatal mortality rates have decreased by a total of 18% in births to non-Indigenous mothers and by 16% in births to Aboriginal mothers. The perinatal mortality rate in births to TSI mothers has decreased by 40%, however this decline is more reflective of the substantial year to year variation in rates due to the small numbers of births and deaths occurring among this group than of a meaningful trend. Overall, perinatal mortality has declined in all populations by approximately 2-3 percent per year and the gap between these populations has not narrowed. Annual percentage change for perinatal, fetal and neonatal mortality by Indigenous status is shown in Table 2 (Appendix 1).

Despite reductions in perinatal mortality in births to Aboriginal and TSI mothers, the relative difference between Aboriginal and Torres Strait Islander perinatal mortality rates and rates in the non-Indigenous population remains as large in 2002 as it was in 1987.

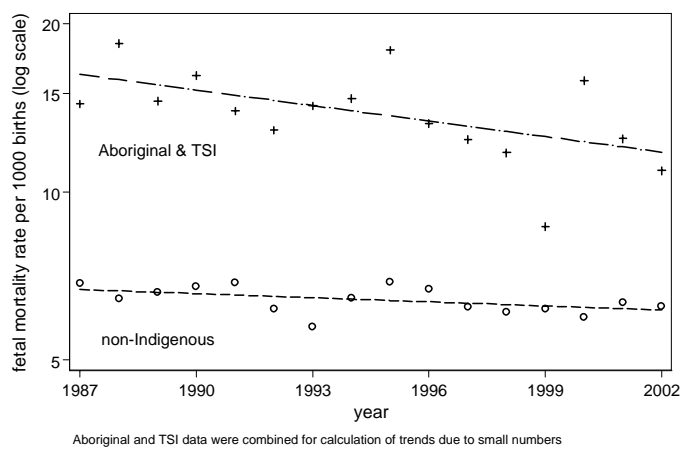
This is the case with both fetal and neonatal mortality. Figure 2 shows the actual and smoothed perinatal mortality rates over time for Aboriginal/TSI and non-Indigenous populations. Figures 3 and 4 show trends for fetal and neonatal mortality, respectively. Figures 5, 6 and 7 show the relative risk of perinatal, fetal and neonatal mortality for babies born to Aboriginal mothers compared to babies born to non-Indigenous mothers over time. Figures 8, 9 and 10 show relative mortality risk for perinatal, fetal and neonatal mortality for babies born to TSI mothers compared with babies born to non-Indigenous mothers. These figures provide further evidence of the persistence of the difference between groups.

**Figure 2. Trend in perinatal mortality rate by Indigenous status**



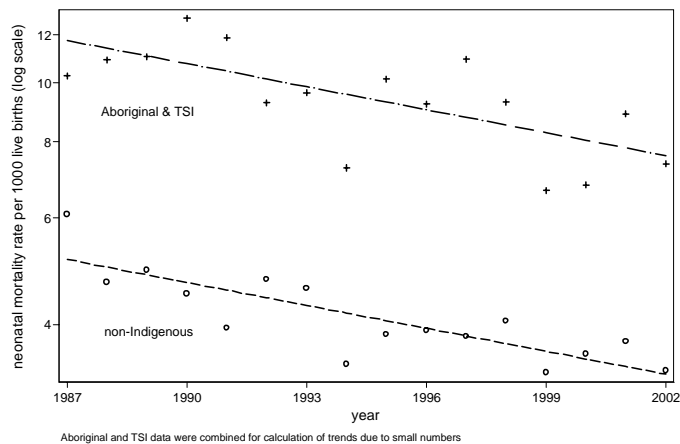
Source: Queensland Health Perinatal Data Collection

**Figure 3. Trend in fetal mortality rate by Indigenous status**



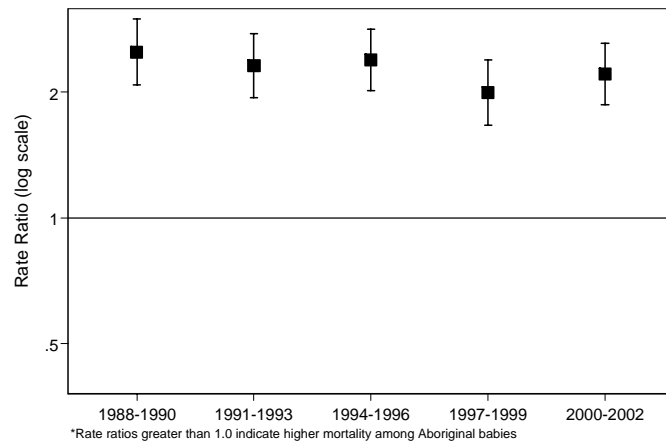
Source: Queensland Health Perinatal Data Collection

**Figure 4. Trend in neonatal mortality rate by Indigenous status**



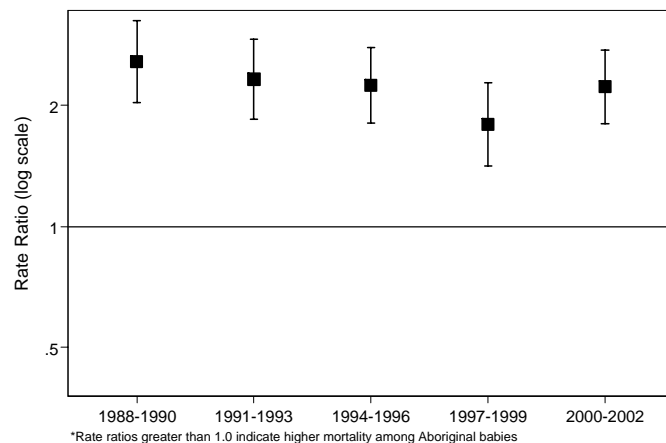
Source: Queensland Health Perinatal Data Collection

**Figure 5. Trend in perinatal mortality rate ratio\* – Aboriginal versus non-Indigenous**



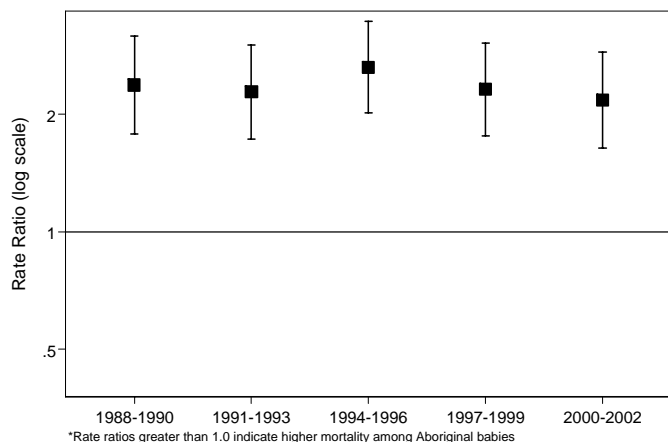
Source: Queensland Health Perinatal Data Collection

**Figure 6. Trend in fetal mortality rate ratio\* – Aboriginal versus non-Indigenous**



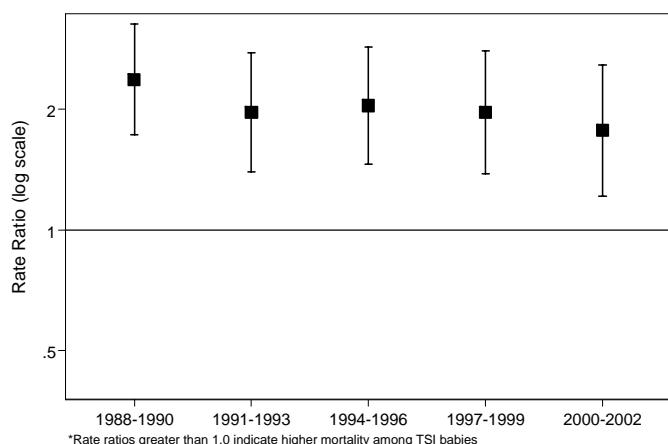
Source: Queensland Health Perinatal Data Collection

**Figure 7. Trend in neonatal mortality rate ratio\* – Aboriginal versus non-Indigenous**



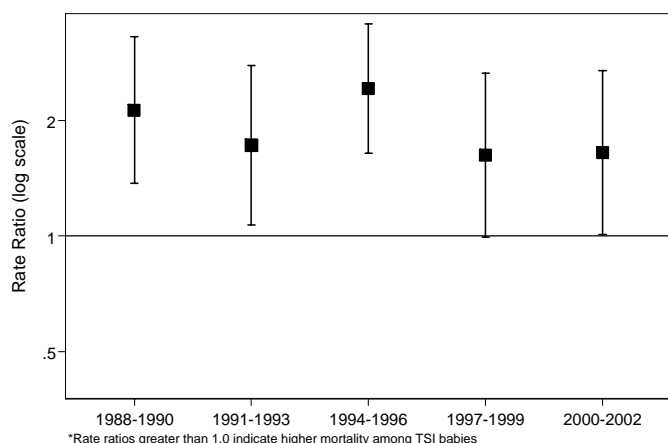
Source: Queensland Health Perinatal Data Collection

**Figure 8. Trend in perinatal mortality rate ratio\* – TSI versus non-Indigenous**



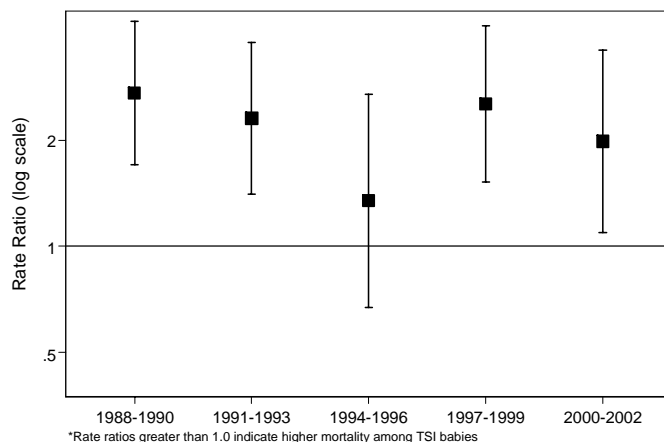
Source: Queensland Health Perinatal Data Collection

**Figure 9. Trend in fetal mortality rate ratio\* – TSI versus non-Indigenous**



Source: Queensland Health Perinatal Data Collection

**Figure 10. Trend in neonatal mortality rate ratio\* – TSI versus non-Indigenous**



Source: Queensland Health Perinatal Data Collection

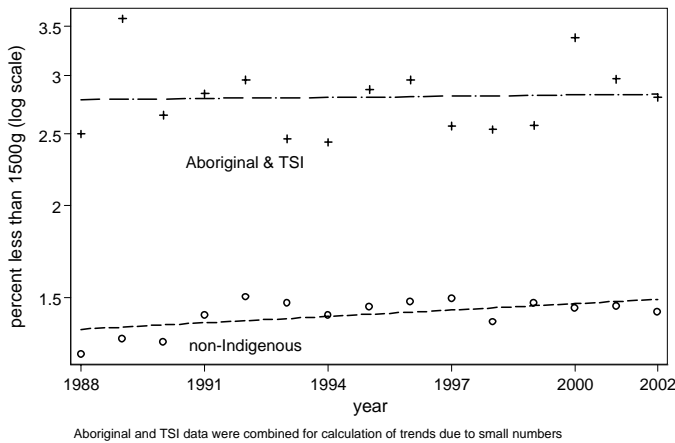
Factors that increase the risk of perinatal mortality can be divided into three main categories. These are antenatal factors (nutrition, maternal infections, smoking and other factors resulting in low birthweight), intrapartum factors (skill of birth attendant, recognition of danger signs, resuscitation) and postpartum factors (feeding, hygiene, warmth, infection surveillance and control). The majority of perinatal deaths in Australia are due to problems occurring in the antenatal period (discussed below) that result in low birthweight.

The two main causes of low birthweight are intrauterine growth retardation (IUGR) and preterm birth. While IUGR is a major problem in developing countries, in developed countries the majority of babies with low birthweight are born prematurely [2].

In Queensland in 2000-2002, 6.58% of non-Indigenous babies weighed less than 2500 grams compared with 13.04% of Aboriginal babies (RR=1.96, 1.83-2.09) and 9.97% of TSI babies (RR=1.50, 1.30-1.74). Among babies born at term, 1.82% of non-Indigenous babies weighed less than 2500 grams compared with 4.73% of Aboriginal babies (RR=2.60, 2.30-2.94) and 2.30% of TSI babies (RR=1.26, 0.90-1.78). It has been suggested that the smaller proportion of low birthweight found in TSI babies compared with that observed in Aboriginal babies reflects the increased rate of type 2 diabetes and obesity found in Torres Strait Islanders rather than a decreased level of risk for adverse outcomes [3].

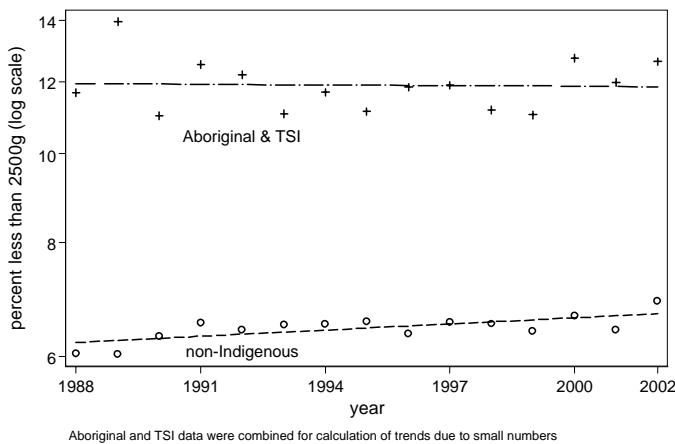
For non-Indigenous babies, there has been a decrease in the proportion of low birthweight babies among those born at full term, but a small but steady increase in the proportion of low birthweight non-Indigenous babies overall. This is due to a small increase in preterm births (discussed below). *There has been no change in the proportion of low birthweight babies (overall or at term) born to Aboriginal or TSI mothers from 1988-2002.* Trends in low birthweight in births to Aboriginal, TSI and non-Indigenous mothers overall and at term are shown in Figures 11-13. Annual percentage change in the proportion of babies with birthweight less than 2500 grams, overall and at term, by Indigenous status is shown in Table 2 (Appendix 1).

**Figure 11. Trend in percent of babies less than 1500g overall by Indigenous status**



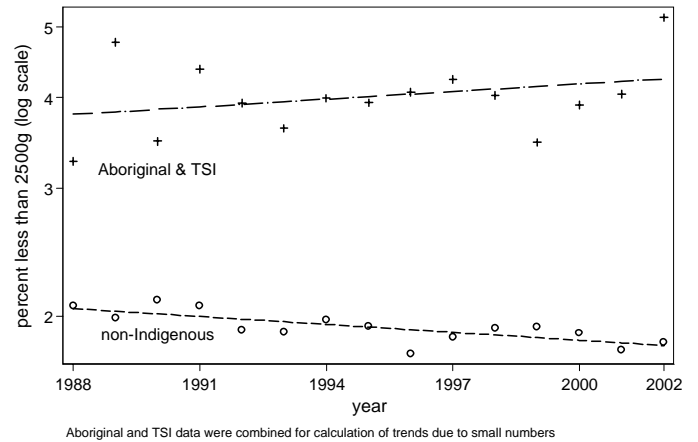
Source: Queensland Health Perinatal Data Collection

**Figure 12. Trend in percent of babies less than 2500g overall by Indigenous status**



Source: Queensland Health Perinatal Data Collection

**Figure 13. Trend in percent of babies less than 2500g at term by Indigenous status**



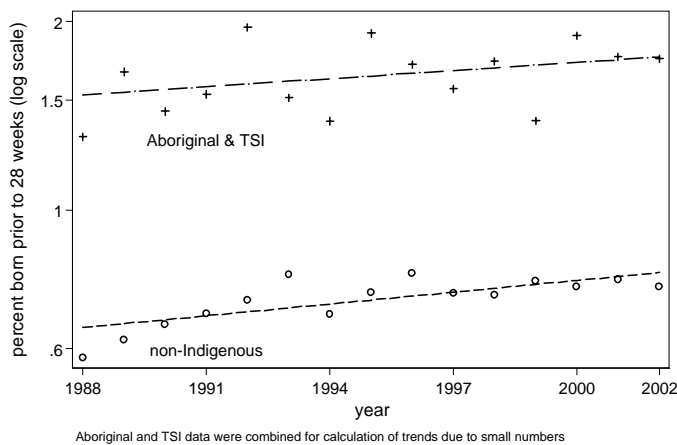
Source: Queensland Health Perinatal Data Collection

A similar pattern of low birthweight has been observed for the whole of Australia [1]. In 1998-2000, babies of Aboriginal mothers were approximately twice as likely to be low birthweight (<2500g) (12.8%) as those born to non-Indigenous mothers (6.5%). A similar differential has been reported in all states [4-8]. *Since 1991, no change in the proportion of low birthweight babies born to Aboriginal mothers or in the mean birthweight of babies born to Aboriginal mothers has been observed at a national level [1].* This result was also reported in Western Australia for Aboriginal and non-Indigenous mothers over the last 15 years [7].

In Queensland in 2000-2002, 8.09% of non-Indigenous babies were born preterm compared with 13.20% of Aboriginal babies (RR=1.63, 1.53-1.74) and 10.98% of TSI babies (RR=1.36, 1.18-1.57). There has been a slight decrease in the proportion of Aboriginal babies born prior to 37 weeks gestation since 1988. There has been no change in the proportion of preterm births to TSI mothers since 1988. There has been an increase in the proportion of non-Indigenous babies born prior to 28, 32, and 37 weeks gestation since 1988. This increase has also been observed in other developed countries [9-11]. It is believed that the rise is due to an increase in multiple births related to use of technologies to combat infertility (partly related to an increase in maternal age) [9-12]; an increase in the use of inductions to prevent fetal deaths, maternal mortality and severe morbidity related to fetal growth retardation and other complications [9, 10, 13]; improved accuracy in the estimation of gestational age [9, 10]; other risk factors associated with the increasing maternal age distribution [9, 10]; and a decrease in the proportion of births among those with a higher socioeconomic status [9, 10].

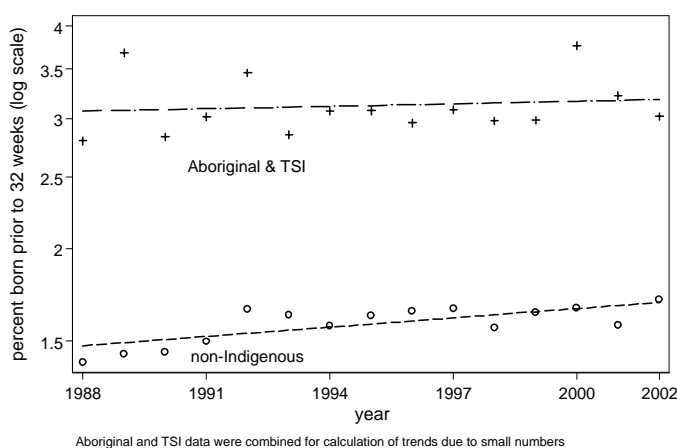
Similar differences between Aboriginal and non-Indigenous preterm delivery rates have been reported in other states [6, 8]. Trends in preterm births to Aboriginal, TSI and non-Indigenous mothers are shown for babies born prior to 28, 32, and 37 weeks in Figures 14-16, respectively. Annual percentage change in the proportion of babies born prior to 37 weeks by Indigenous status is shown in Table 2 (Appendix 1).

**Figure 14. Trend in percent of babies born prior to 28 weeks by Indigenous status**



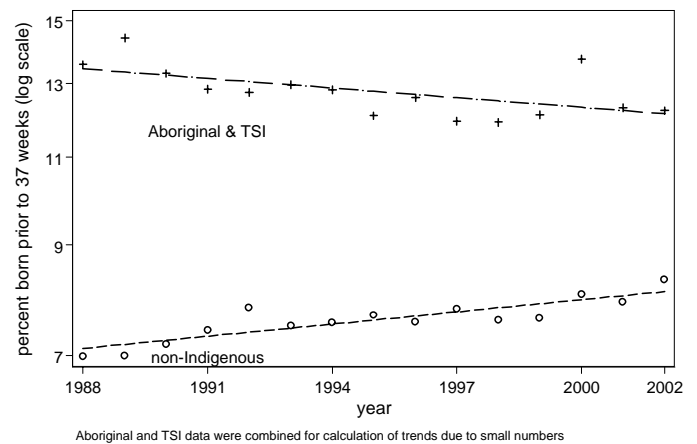
Source: Queensland Health Perinatal Data Collection

**Figure 15. Trend in percent of babies born prior to 32 weeks by Indigenous status**



Source: Queensland Health Perinatal Data Collection

**Figure 16. Trend in percent of babies born prior to 37 weeks by Indigenous status**



Source: Queensland Health Perinatal Data Collection

Table 3 (Appendix 1) shows the relative risk of perinatal death by Indigenous status in preterm babies, low birthweight full-term babies, and full-term babies of normal weight in 1998-2002. When perinatal mortality rates for births to Aboriginal, TSI and non-Indigenous mothers are compared within each birthweight and gestational age strata, babies born to Aboriginal and TSI mothers are no more likely to die than babies of non-Indigenous mothers. *This result suggests that the mortality excess is largely due to the increased rate of preterm and low birthweight babies born to Aboriginal and TSI mothers as opposed to an inadequacy in the level of hospital care available to Aboriginal and TSI babies who are at an increased risk.*

Numerous studies have investigated the factors that increase the risk of IUGR and preterm birth. Risk factors for IUGR include poor diet and low gestational weight gain, low pre-pregnancy BMI, primiparity, pregnancy-induced hypertension, and smoking [14, 15]. Risk factors for preterm delivery include lower genital tract and urinary tract infections, pregnancy-induced hypertension, low pre-pregnancy BMI, and smoking [14, 16, 17].

A number of studies in Australia have investigated the prevalence of these risk factors in Aboriginal and non-Indigenous populations. Smoking during pregnancy is a key risk factor for both IUGR and preterm birth [14, 18]. A higher rate of smoking during pregnancy has been found in Aboriginal women than in non-Indigenous women. In NSW in 2000, 59.9% of Aboriginal women smoked during pregnancy compared with 17.4% of non-Indigenous women [6]. Similar results were found in South Australia in 1998-1999 where 57.8% of Aboriginal women smoked during pregnancy compared with 24.0% of non-Indigenous women [19]. Other important risk factors have also



been found to be more common in Aboriginal women than in non-Indigenous women. A study conducted in central Sydney found Aboriginal women had more pregnancy-induced hypertension, more urinary tract infection, and more need for methadone stabilisation than non-Indigenous women [20].

Antenatal visits provide an opportunity for counselling about risk factors and an introduction of primary prevention initiatives. In addition, antenatal examinations allow identification of fetuses at risk of death or disability due to preeclampsia and fetal growth restriction. Identification of at risk fetuses and subsequent early delivery is believed to be responsible for the reduction in fetal deaths achieved over the past two decades [17]. Given the observed preterm and low birthweight rates among Aboriginal and TSI women, it is clear that early (within the first 12 weeks of gestation) and regular antenatal care would be of benefit for these women. However, there is evidence that Aboriginal and TSI women are not accessing antenatal services. In NSW in 2000, 25.9% of Aboriginal women presented late in their pregnancy (after 20 weeks) for their first antenatal visit compared with 13% of non-Indigenous women [6]. *An earlier study in NSW found that non-Indigenous women in central Sydney were 5.5 times more likely to have received antenatal care by 28 weeks gestation than Aboriginal women [20].*

Studies have also compared social determinants of health related to perinatal outcomes. Several studies have found that teenage pregnancy is more common in Aboriginal women than in non-Indigenous women [1, 4, 6, 21]. Teenage pregnancy is associated with an increased likelihood of complications and an increased risk due to behaviours associated with younger age and low socioeconomic status such as smoking, binge drinking, drug use and poor nutrition [22]. In Australia in 1998–2000 21.7% of Indigenous mothers were under 20 years of age whereas only 4.5% of non-Indigenous mothers were under 20 [1]. Single motherhood is another factor commonly associated with entrenched poverty. In NSW between 1986–91 single mothers accounted for 56% of Aboriginal births [6]. These risk factors are largely associated with poverty and social disruption, which are widely recognised characteristics of the Australian Indigenous population.

Efforts are, therefore, required to reduce the rate of risk factors within the Australian Indigenous population. In order to improve perinatal outcomes in Aboriginal and TSI populations, long term interventions that focus on the mix of social, behavioural and medical factors that result in the increased risk of adverse outcomes are needed. Interventions targeting risk factors in Aboriginal communities and in high-risk groups in other countries have included education campaigns

about antenatal services including efforts to develop a culture of antenatal care among Aboriginal women; efforts to improve the appropriateness of antenatal services, including the use of midwives and Aboriginal health workers and tailoring antenatal care to meet the needs of pregnant adolescents; efforts to improve physical access to antenatal services for example, via home/community visits or provision of transport for Aboriginal women and families; education campaigns aimed at reduction of adolescent pregnancy rates; efforts to reduce the impact of teenage pregnancy on completion of education; STD education programs; education campaigns addressing smoking during pregnancy; and empowerment promotion programs aimed at increasing health knowledge, leadership and decision making skills utilising peer education strategies [6, 23, 24].

Where programs have been evaluated, it has been found that they have resulted in increased proportions of Aboriginal women attending antenatal care and reduced rates of sexually transmitted diseases during pregnancy [6, 23, 24]. There is also some evidence that programs have resulted in a reduction in perinatal mortality and low birthweight babies, although the adequacy of control groups used in these studies has been questioned [6, 24, 25]. In addition, there is evidence that increasing antenatal access for high risk populations results in a net reduction in health care expenditure [26, 27]. Careful design of evaluation plans, using outcomes such as birthweight and preterm rate, will be a crucial component of future initiatives to allow determination of the best way to bring about improvements.

## Conclusion

Although perinatal mortality rates in Queensland have decreased over the last 16 years, the rates in Aboriginal and TSI populations remain approximately double those in the non-Indigenous population.

The analysis stratified by birthweight and gestational age shows that Aboriginal babies who are born preterm or with low birthweight do about as well as their non-Indigenous counterparts. This suggests that, broadly speaking, access to high quality care during confinement is adequate for these babies. In other words, Aboriginal babies have a higher risk of death than their non-Indigenous counterparts mainly because a larger proportion of them are born too small and too early. Initiatives to reduce the number of low birthweight and preterm Aboriginal babies would facilitate significant reductions in their death rates.

Risk factors for preterm births and low birthweight include cigarette smoking during pregnancy, genitourinary tract infections, poor nutrition and

psychosocial stress related to economic disadvantage. These risk factors are present in excess in Indigenous mothers and could be addressed through interventions that focus on health during the antenatal period, on women's health in general and on social determinants to reduce social inequalities that impact upon health. Such initiatives are likely to result in sustainable improvements in health and a net reduction in health care expenditure.

Antenatal visits provide an opportunity for introduction of primary prevention initiatives and examinations to allow identification of fetuses at risk of death or disability to facilitate early intervention. Among high risk pregnancies, which are present in excess among Aboriginal and TSI women, early and regular access to antenatal services is vital [6]. In order to improve antenatal care for Indigenous mothers it will be necessary to both increase the cultural appropriateness of antenatal services and to improve access to these services throughout Queensland [6, 24, 28]. Models of culturally appropriate services for rural and urban Indigenous women have been developed and, with support from key women in each site and modifications to increase appropriateness for local needs, they could provide the basis for a state- or nationwide initiative [6, 24].

Provision of antenatal services can also be an important component of an overall shift towards empowerment of Indigenous women and increased awareness and ownership of health. The peer-education based 'Strong Women Strong Babies Strong Culture' program in the Northern Territory demonstrates that provision of appropriate and accessible education regarding nutrition and women's health issues and antenatal services for Indigenous women can increase early attendance for antenatal care, reduce the number of STDs, and reduce the proportion of low birthweight babies [25]. In addition this program resulted in improved health knowledge and provided Aboriginal women with skills in running workshops and developing educational resources that will enable ongoing improvements in these communities. Such initiatives, if they are tailored adequately to the needs of rural and urban Indigenous women, have the potential to play an important role in reducing the social inequality that has resulted in outcomes such as those found for perinatal mortality [6, 24].

A public health focus, with emphasis on women's health, constitutes a wider acknowledgment of the factors that contribute to adverse antenatal outcomes. Implementation of policy and programs targeting

women's health issues will have a wider impact than is possible with improvements in antenatal care alone. A public health focus would include initiatives such as targeting school age children to provide information and skills relevant to prevention of STDs, the importance of nutrition, and the health risks involved with smoking and alcohol in general and during pregnancy in particular. A wider focus on prevention of domestic violence is also a part of this approach [24, 28].

Finally, a social determinants focus allows recognition that the issue is wider than just the immediate precursors of an adverse birth outcome. Socioeconomic factors such as education, housing, employment, income, transport, justice and the environment play a crucial role in health outcomes and wellbeing. Thus, attention to factors such as access to employment and an adequate income, family support programs, alcohol management legislation, free parenting programs, improved housing, and secure food supply distribution are essential for a cost effective, sustainable improvement in Indigenous perinatal health to be achieved [24].

## Definitions

The Queensland Health Perinatal Data Collection includes births to infants of at least 20 weeks gestation or 400g birthweight. Analyses for this report include all births occurring in Queensland, excluding mid trimester terminations.

**Fetal death** The birth of an infant of at least 20 weeks gestation or 400g birthweight which shows no signs of life after birth

**Live born infant** An infant whose heart has beaten after it has been completely expelled or extracted from its mother

**Perinatal mortality rate** The number of fetal and neonatal deaths per 1000 total births

**Fetal mortality rate** The number of fetal deaths per 1000 total births

**Neonatal mortality rate** The number of deaths of live born infants under 28 days of age per 1000 live births

Indigenous status is based on the Indigenous status of the mother.

Gestational age is defined in the Queensland Health Data Dictionary and National Health Data Dictionary as number of completed weeks as determined by clinical assessment after birth. In practice, determination is based on the best clinical estimate of the gestational age of the baby whether based on the date of the last menstrual period, ultrasound in early pregnancy or maturity scoring of the neonate at birth. The method (or methods) used is (are) not recorded. Term is defined as 37-41 completed weeks.

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## Appendix 1

**Table 1. Perinatal mortality by mother's Indigenous status by state - 1998-2000**

	Fetal deaths		Neonatal deaths		Perinatal deaths		
	Number	Rate <sup>a</sup>	Number	Rate <sup>b</sup>	Number	Rate <sup>a</sup>	Rate ratio
<b>New South Wales</b>							
Aboriginal mothers	66	10.5	31	5.0	97	15.5	1.7 (1.4-2.1)
Non-Indigenous mothers	1657	6.5	645	2.5	2302	9.0	
<b>Victoria</b>							
Aboriginal mothers	14	10.9	11	8.6	25	19.5	1.9 (1.3-2.8)
Non-Indigenous mothers	1278	6.9	618	3.3	1896	10.2	
<b>Queensland</b>							
Aboriginal mothers	107	12.6	63	7.5	170	20.0	1.9 (1.6-2.3)
Non-Indigenous mothers	935	6.8	500	3.7	1435	10.4	
<b>South Australia</b>							
Aboriginal mothers	22	16.7	9	7.0	31	23.6	2.8 (2.0-4.0)
Non-Indigenous mothers	320	5.9	132	2.5	452	8.4	
<b>Western Australia</b>							
Aboriginal mothers	59	12.8	39	8.6	98	21.3	2.5 (2.0-3.0)
Non-Indigenous mothers	490	6.8	138	1.9	628	8.7	
<b>Northern Territory</b>							
Aboriginal mothers	61	15.5	37	9.7	98	24.9	2.1 (1.5-2.8)
Non-Indigenous mothers	48	7.0	35	5.1	83	12.1	
<b>Australia</b>							
Aboriginal mothers	337	12.8	193	7.4	530	20.1	2.1 (1.9-2.3)
Non-Indigenous mothers	5004	6.7	2171	2.9	7175	9.6	

Data for Tasmania and Australian Capital Territory are not presented separately due to small numbers, but are included in overall figures for Australia  
<sup>a</sup> rate per 1000 total births; <sup>b</sup> rate per 1000 live births

Source: AIHW National Perinatal Statistics Unit, perinatal collection [1]

**Table 2. Annual percentage change by Indigenous status from 1987 to 2002**

	Aboriginal/ TSI APC <sup>a</sup> (95%CI)	Non-Indigenous APC <sup>a</sup> (95%CI)
Perinatal mortality	-2.40 (-3.81, -0.97)	-1.47 (-1.96, -0.97)
Fetal death	-2.11 (-3.93, -0.25)	-0.56 (-1.20, +.07)
Neonatal death	-2.87 (-5.07, -0.61)	-2.86 (-3.64, -2.08)
Birthweight > 2500g	-0.05 (-0.71, +0.61)	+0.52 (0.31, 0.73)
Preterm (< 37 weeks)	-0.72 (-1.35, -0.09)	+0.93 (0.73, 1.13)
Term + birthweight < 2500g	+0.81 (-0.49, +2.12)	-0.83 (-1.25, -0.41)

<sup>a</sup>Annual percentage change

Source: Queensland Health Perinatal Data Collection

**Table 3. Perinatal mortality rate by Indigenous status within preterm and low birthweight babies - 1998-2002**

	Perinatal mortality rate ratio	
	Aboriginal vs non-Indigenous	TSI vs non-Indigenous
Born prior to 28 weeks	1.01 (0.83-1.21)	1.09 (0.75-1.53)
Born 28-31 weeks	1.24 (0.78-1.90)	0.51 (0.06-1.87)
Born 32-36 weeks	1.23 (0.82-1.78)	1.36 (0.50-3.00)
Born 37+ weeks, weight <2500g	0.95 (0.40-1.97)	0.87 (0.02-4.98)
Born 37-41 weeks, weight >2500g	1.69 (1.15-2.39)	0.84 (0.23-2.17)
Born 42+ weeks, weight >2500g	1.32 (0.03-8.66)	2.74 (0.06-18.02)
Crude overall RR	2.04 (1.77-2.34)	1.89 (1.39-2.51)
Mantel-Haenszel combined RR	<b>1.13 (0.99-1.30)</b>	<b>1.05 (0.79-1.40)</b>

Source: Queensland Health Perinatal Data Collection