

Preventing Infant Deaths Among Aboriginal and Teenage Women In South Australia

2009



Part 1



Government of South Australia
SA Health



THE UNIVERSITY
OF ADELAIDE
AUSTRALIA



Artwork by Daisybelle Virgin

This report was commissioned by the Strategic Health Research Program (SHRP) of the South Australian Department of Health.

Suggested citation

Middleton PF, for the SHRP team. Preventing infants deaths among Aboriginal and teenage women in South Australia. Adelaide: The University of Adelaide, 2009.

Any enquiries

ARCH

Discipline of Obstetrics and Gynaecology
The University of Adelaide

Women's and Children's Hospital
King William Road
North Adelaide SA 5006
AUSTRALIA

<http://www.adelaide.edu.au/arch/>



ISBN: 978-0-86396-923-2



©The University of Adelaide





Final Report Part 1

Part one

| | |
|--|----|
| Executive Summary | 5 |
| Scope | 9 |
| Introduction..... | 11 |
| Methods | 16 |
| Results | 18 |
| Summary of Topics and Models | 18 |
| Alcohol Use Summary..... | 18 |
| Antenatal Care Summary..... | 19 |
| Birth Spacing Summary..... | 20 |
| Breastfeeding Summary | 21 |
| Diabetes Summary..... | 22 |
| Family Violence Summary | 23 |
| Home Visits Summary..... | 24 |
| Hypertension in Pregnancy Summary | 25 |
| Infection in Women, Mothers and Babies Summary | 26 |
| Nutrition summary | 27 |
| Obesity Summary | 28 |
| Poverty and SES Summary..... | 29 |
| Social and Emotional Wellbeing Summary..... | 30 |
| Sudden Infant Death Syndrome (SIDS) and Sudden Unexpected Deaths in Infancy (SUDI) Summary ... | 31 |
| Smoking in Pregnancy Summary | 32 |
| Social and Family Support Summary | 33 |
| Substance Use Summary | 34 |
| Potentially modifiable factors and their association with stillbirth, perinatal mortality, infant mortality, preterm birth, LBW, and SGA | 35 |
| Stillbirth | 35 |
| Perinatal Mortality..... | 36 |
| Infant Mortality | 37 |
| Preterm Birth..... | 38 |
| Low Birthweight..... | 39 |
| Small for Gestational Age (SGA) | 40 |
| Special Topic: Epigenetics and intergenerational effects Summary | 41 |
| Models | 42 |
| Maternal Education Summary..... | 44 |
| Community Resilience Summary..... | 47 |
| Unplanned Pregnancy Summary | 48 |





Suggestions..... 49

Appendices 53

 List of team members..... 53

 Abbreviations 54



Executive Summary

In 2007, the perinatal mortality rate for South Australia was three times higher for babies of Aboriginal and Torres Strait Islander mothers compared with other mothers; for infant mortality, the rate was over four times higher, a differential that has persisted for some years.

The Strategic Health Research Program of the South Australian Department of Health commissioned a synthesis of Australian and international research to identify possible reasons for the higher infant and perinatal mortality among Aboriginal and Torres Strait Islander women and teenage women in South Australia; and to identify strategies and models for preventing infant deaths. We were also asked to look at the influence of level of maternal education and community resilience on infant mortality. The sixth question looked at strategies for reducing unplanned pregnancies among teenage women.

The scope of this report did not extend to a detailed consideration of longer term outcomes such as early childhood development, although there is some coverage of these outcomes.

This research synthesis around six main questions was lead by researchers based at the University of Adelaide, who brought together a multidisciplinary team from several other organisations.

A mixed (qualitative and quantitative) methodology was adopted. Standard database searches were heavily supplemented by internet searches, pearling of references, scanning of journals, reports and newsletters and personal contacts, and covered sources up to the end of 2008.

Nearly 1000 studies and reports were used to build the evidence base for the six questions posed.

We identified 17 health-related and social factors relevant to Aboriginal and Torres Strait Islander women and teenage women, and with the potential to be modified in order to reduce infant mortality or to reduce or prevent other adverse birth and infant outcomes. These factors were: alcohol use, antenatal care, birth spacing, breastfeeding, diabetes, family violence, home visits, hypertension in pregnancy, infection, nutrition, obesity, poverty, social and emotional wellbeing (SEWB), SIDS/SUDI, smoking, social support and substance use.

Perinatal mortality was reported in seven models – six in Aboriginal and Torres Strait Islander communities and in one Canadian service for Inuit people. Five models monitored perinatal mortality over time; with three models finding a decrease in the most recent period. For one of the models, the Mums and Babies program from Townsville, this was a statistically significant decrease. The Inuit model reported that their perinatal mortality rate was similar to the rest of Canada.

Together with evidence from over 100 local and overseas programs, we explored which strategies and models might be considered in our South Australian context for preventing infant mortality for Aboriginal and Torres Strait Islander women and teenage women from urban, regional/rural and remote regions. Potentially effective strategies for improving perinatal and infant outcomes ranged from brief specific and targeted primary care interventions to entire antenatal and postnatal programs. These strategies are outlined in the summaries of factors in part 1 of this report, with more detail provided in part 2 of the report.

Across 39 studies with a total of over 20 million women, a gradient was evident for level of education and infant and perinatal mortality. Pooling of unadjusted outcomes demonstrated a clear benefit for increased levels of education, with around a 1.5 to 2 times increased risk for the lowest level of education compared to all other levels of education for infant and perinatal outcomes. Only one small study reported education level and perinatal outcomes in Aboriginal and Torres Strait Islander women.



Although there is very little direct evidence of links between community resilience and birth outcomes, it is plausible that ways to strengthen the resilience of families and communities may result in improved outcomes for babies and infants.

In South Australia, the teenage pregnancy rate is at its lowest level since 1970. Decline in teenage births is generally attributed to improved contraceptive use. The higher risk of poor birth outcomes for teenage women is more likely to be related to social circumstances than age alone. Comprehensive early childhood and youth development programs have shown reductions in teen pregnancies (particularly rapid repeat births) as well as having positive employment and education outcomes for young parents.

This research synthesis shows that many strategies and models may be used effectively to improve health and social outcomes for Aboriginal and teenage mothers and their children in South Australia. These, however, will require consultation with the relevant communities and groups, as well as careful, sensitive and appropriate implementation. Since many health outcomes have their origins in pregnancy or early childhood, an intergenerational perspective is necessary. Preconception and interpregnancy care is a priority, as is care of young women, during adolescence and beyond.

The fact that the causal pathways and reasons for links between poverty, deprivation, mental health and a range of health behaviours are not well understood should not be a barrier to sustainable resourcing of accessible programs - on small and large scales. A vital part of this will be workforce development which gives workers appropriate job stability, recognition, authority and career progression and provides structures and supports for health and other workers to be able to make a difference.



Potentially modifiable factors and associations with adverse birth outcome

| | Stillbirth | Perinatal Mortality | Infant Mortality | Preterm | Low Birth Weight |
|--------------------|------------|---------------------|------------------|---------|------------------|
| Alcohol Use | ✓ | | ✓ | ✓ | ✓ |
| Antenatal Care | | ✓ | | ✓ | ✓ |
| Birth Spacing | | | ✓ | ✓ | ✓ |
| Not Breastfeeding | | | ✓ | | |
| Diabetes | ✓ | ✓ | | ✓ | |
| Family Violence | | ✓ | | ✓ | ✓ |
| Home Visits | | | ✓ | ✓ | ✓ |
| Hypertension | ✓ | ✓ | | ✓ | |
| Infection | ✓ | ✓ | | ✓ | ✓ |
| Maternal Education | ✓ | ✓ | ✓ | | ✓ |
| Nutrition | | | | ✓ | |
| Obesity | ✓ | ✓ | | ✓ | |
| Poverty/SES | ✓ | ✓ | ✓ | ✓ | ✓ |
| SEWB | ✓ | ✓ | | | |
| Smoking | ✓ | | ✓ | ✓ | ✓ |
| Social Support | | | | | ✓ |
| Substance Use | ✓ | ✓ | | ✓ | ✓ |

Summary of models and main outcomes – Documented Improvements

| | Perinatal Mortality | Preterm Birth | Low Birthweight |
|---|---------------------|---------------|-----------------|
| Australia (Aboriginal and Torres Strait Islander people) | | | |
| Anangu Bibi (SA) 2004-6 | | | |
| Bibbulung Gnarneep (WA) | | ✓ | ✓ |
| Daruk (NSW) 1996 | | ✓ | ✓ |
| Djuli Galban (NSW) 2002 | | ✓ | |
| Mums and Babies (QLD) 2000-5 | ✓ | ✓ | ✓ |
| Nganampa (SA) 2006-7 | | | |
| Ngua Gundi (QLD) 1997-2000 | | | |
| NNK (SA) 2006-7 | | | |
| NSW AMIHS 2004 | ✓ | ✓ | |
| SWSBSC (NT) 1988-2001 | | | |
| SWSBSC (WA) 1991-1997 | | | |
| WBS, Mildura (VIC) 2001-2002 | | | |
| Yapatjarra (QLD) | | | |
| Canada (Inuit people) | | | |
| Inulitsivik 1986-2004 | ✓ | | |
| USA | | | |
| CenteringPregnancy RCT 2001-2004 | | ✓ | |



Scope

This research synthesis, on the topic of identifying strategies to reduce the infant mortality rate in high risk groups, was commissioned by the Strategic Health Research Program (SHRP) of the South Australian Department of Health.

The research was conducted by a multidisciplinary team led by The University of Adelaide (see Appendix 1 for a list of team members and their affiliations).

SHRP asked us to address the following five questions:

- Question 1:** Risk factors - What are the attributable risks for infant mortality, particularly in relation to prematurity and small for gestational age births?
- Question 2:** Models and strategies - What models and strategies, including prevention and early intervention service strategies (and non health-system based social strategies) have proved successful in improving the antecedents of infant mortality, and thus reducing the IMR (Infant mortality rate) in Australia and overseas (particularly developed countries with indigenous populations)?
- Question 3:** Context and transferability - Taking into account cultural differences and other contextual factors, which successful approaches could be transferred to our local context to reduce infant mortality in high risk groups? This research will examine universal, population and targeted approaches.
- Question 4:** Maternal education - What role does the education level of mothers play in infant mortality rates?
- Question 5:** Community resilience - Does community resilience have a significant bearing on Infant mortality rates?
- Question 6:** What are the factors that impact on unplanned pregnancies among teenage women? Do these factors have an impact or correlate with the infant mortality rate of this pregnant population? What strategies have been successful in reducing the number of unplanned pregnancies among the teenagers?

Questions 1, 2 and 3 (risk factors; models and strategies; context and transferability):

We researched links between infant mortality (and antecedents) and identified those factors which are potentially modifiable, and judged to be relevant to Aboriginal and Torres Strait Islander women and teenage women. We then collected and synthesised the evidence of how those factors could be modified to prevent or reduce infant mortality. We also analysed Australian and overseas models which have been established to improve quality of care for mothers, babies and their families at the population or community level; as well as models targeted at particular groups. Issues of context and transferability have been embedded throughout the presentation of both the topics and the models syntheses.

Question 4: Maternal education

The nature of this question allowed us to perform a systematic review and a meta-analysis of studies investigating links between levels of maternal education and perinatal and infant mortality.

Question 5: Community resilience

We took a narrative approach for this question, although we searched systematically for models of community resilience that reported infant mortality and perinatal outcomes.



Question 6: We took a similar approach to that used for Questions 1, 2 and 3.

Structure of the report

Part 1

This section provides the scope and methods of the project, together with summaries of the evidence derived from potentially modifiable factors and relevant models and programs. Summaries of the maternal education and community resilience topics are also included, as are general suggestions for further action and research. (More specific suggestions appear under relevant topics and models in part 2 of the report.)

Part 2

2.1 Topics and models

This section contains detailed coverage of 17 topics for which we were able to establish direct associations with infant mortality and/or other adverse perinatal outcomes; and which involved pathways that were potentially modifiable.

Nearly 40 models of maternity, perinatal or postnatal care are included in the Models section and over 50 more are also described and discussed within topics (see list at beginning of part 2 of the report).

Each is self-contained in that a particular topic or model can be accessed without necessarily needing to refer to the rest of the report.

Topics

(potential modifiable factors associated with infant mortality)

- | | |
|------------------------------|------------------------------------|
| 1. Alcohol use | 10. Nutrition |
| 2. Antenatal care | 11. Obesity |
| 3. Birth spacing | 12. Poverty |
| 4. Breastfeeding | 13. Social and emotional wellbeing |
| 5. Diabetes | 14. SIDS/SUDI |
| 6. Family violence | 15. Smoking |
| 7. Home visits | 16. Social support |
| 8. Hypertension in pregnancy | 17. Substance use |
| 9. Infection | |

Special topic

Epigenetics and intergenerational effects

Together these components address the first three questions about risk factors, models and strategies for preventing or reducing infant mortality and the context and transferability of the models and strategies.

2.2. Maternal education

A systematic review and meta-analysis of 39 studies of level of maternal education and infant and perinatal mortality is presented here.

2.3 Community resilience

A narrative review of community resilience and likely links with perinatal and infant outcomes is presented here.

2.4 Unplanned pregnancy

This topic is presented as a narrative review, including evidence for strategies to reduced unplanned pregnancy among teenage women.





Introduction

The gap in health and socioeconomic status between Aboriginal and Torres Strait Islander people and other Australians begins *in utero* and remains evident throughout life (Boyle 2008), and even across generations.

The reasons for these gaps are complex and the search for ways to address and close the gaps often seems overwhelming, spanning areas much wider than health.

South Australian perinatal and infant statistics

In 2007, the perinatal mortality rate for South Australia was three times higher for babies of Aboriginal and Torres Strait Islander mothers compared with other mothers; for infant mortality, the rate was over four times higher, both differentials have persisted for some time. However since 1991, this gap between Aboriginal and Torres Strait Islander and non-Indigenous infant mortality has halved in Australia (Pincock 2008).

There were 590 births of Aboriginal and Torres Strait Islander babies in SA during 2007, 3% of all births, a rate which is increasing over time. There were 900 babies born to teenage mothers in SA in 2007, with 109 (12%) of these births being to Aboriginal and Torres Strait Islander women.

About 55% of Aboriginal and Torres Strait Islander women giving birth in SA had their normal residence in the metropolitan area. In 2007, 60% (356/589) of Aboriginal and Torres Strait Islander babies were born in metropolitan hospitals (190 at Women's and Children's Hospital) (Chan 2008b).

Perinatal mortality

In 2007, the perinatal mortality rate (stillbirths and neonatal deaths before 28 days) was 27.1 per 1000 births for babies of Aboriginal and Torres Strait Islander mothers, compared with 8.9 per 1000 births for other babies.

The teenage perinatal mortality rate was 7.8 per 1000, lower than the rate of 9.5 per 1000 for all women. None of these seven perinatal deaths were babies of Aboriginal and Torres Strait teenage women.

The overall perinatal mortality rate was 9.5 per 1000 births – excluding 48 terminations of pregnancy (25.5% of the 188 perinatal deaths) would result in a perinatal mortality rate of 7.1 per 1000 births.

The contribution of fetal growth restriction as a cause of perinatal death has increased and in 2007 surpassed that of unexplained antepartum deaths for the first time (21 and 19 deaths respectively).

Infant mortality

In 2007, the infant mortality rate (deaths of liveborn babies before one year of age) was 13.8 per 1000 livebirths for babies of Aboriginal and Torres Strait Islander mothers, compared with 3.9 per 1000 livebirths for other babies.

The teenage infant mortality rate was 6.7 per 1000, higher than the rate of 4.2 per 1000 for all women. Two of the six infant deaths were babies of Aboriginal and Torres Islander teenagers; both were postneonatal deaths.

Low birthweight

In 2007, the proportion of low birthweight babies (< 2,500 g) was 17.6 for babies of Aboriginal and Torres Strait Islander women compared with 6.6% for other babies.



Preterm and small-for-gestational age births

In 2007, the proportions of preterm births and small-for-gestational age births for Aboriginal and Torres Strait Islander mothers were considerably higher than for other mothers (19.2% v 8.2% and 20.6% v 8.5% respectively).

Perinatal and infant mortality in South Australia 2007 (adapted from Chan 2008b)

| | Stillbirths (A) | Neonatal deaths (B) | Perinatal deaths (A+B) | Infant deaths (post-neonatal) (C) | Infant deaths (neonatal and postneonatal) (B+C) |
|--|--------------------|---------------------------|------------------------------|---|--|
| Overall | | | | | |
| Total (n) | 132/19,757 | 55/19,623 | 188/19,757 | 28/19,623 | 83/19,623 |
| Total rate | 6.7 per 1000 | 2.8 per 1000 | 9.5 per 1,000 | 1.4 per 1000 | 4.2 per 1000 |
| Children of Aboriginal and Torres Strait Islander mothers | | | | | |
| Total | 10/590 | 6/580 | 16/590 | 2/580 | 8/580 |
| Rate | 16.9 per 1000 | 10.3 per 1000 | 27.1 per 1000 | 3.5 per 1000 | 13.8 per 1000 |
| Children of teenage mothers | | | | | |
| Total | 6/900 | 1/894 | 7/900 | 5/894 | 6/894 |
| Rate | 6.7 per 1000 | 1.1 per 1000 | 7.8 per 1000 | 5.6 per 1000 | 6.7 per 1000 |

Causes of death in Aboriginal and Torres Strait Islander babies

Causes of the 16 perinatal deaths (10 stillbirths and six neonatal deaths) of Aboriginal and Torres Strait Islander babies in 2007 were:

- Congenital abnormalities – two stillbirths (Down syndrome and multiple abnormalities) and one neonatal death (cardiovascular abnormalities);
- Infection – two stillbirths (Group B Streptococcal and cytomegalovirus infection);
- Maternal conditions – two stillbirths (one to a diabetic mother with nephropathy, who smoked and had little antenatal care; the other mother had gastric stapling before she knew she was pregnant);
- Fetal growth restriction – two stillbirths and one neonatal death (one mother had a history of smoking, substance use and infections in pregnancy; the second mother had no antenatal care and had evidence uteroplacental insufficiency and thrombophilia; and the third mother was a smoker with evidence of chorioamnionitis and funisitis);
- Spontaneous preterm – four neonatal deaths (one mother was a smoker, had no antenatal care and had an urinary tract infection; mixed organisms were grown from the placenta of the second mother; the third mother was a smoker, who was anaemic and had many other medical conditions; and the fourth mother was also a smoker, had no antenatal care and developed chorioamnionitis);
- Unexplained antepartum death – two stillbirths (both mothers were anaemic).

The two postneonatal deaths of Aboriginal and Torres Strait Islander babies were of undetermined cause.

Australian statistics

In 2006, 10,183 women who identified as being Aboriginal or Torres Strait Islander gave birth, representing 3.7% of all women who gave birth in Australia (Laws 2008). Nearly three-quarters (73%) of Aboriginal and Torres Strait Islander people live in urban centres (in O’Dea 2008).





Age of mothers

More Aboriginal or Torres Strait Islander mothers have their babies at a younger age compared with non-Indigenous mothers. The average age of Aboriginal or Torres Strait Islander women who gave birth in 2006 was 25.0 years, compared with 30.0 years for non-Indigenous mothers.

Adverse birth outcomes

National adverse birth outcomes for Aboriginal and Torres Strait Islander women are generally similar to the SA figures (PMSEIC 2008; Australian Health Ministers Advisory Committee 2008):

- Aboriginal and Torres Strait Islander mothers are five times more likely to die around the time of birth;
- Aboriginal and Torres Strait Islander babies are:
 - Three times as likely to die before their first birthday
 - Twice as likely to be low birthweight
 - Almost 3 times as likely to suffer from fetal growth restriction
 - Almost twice as likely to be born preterm
 - Over four times as likely to die from SIDS (depending how SIDS is measured).

Teenage statistics

In 2005, teenagers who gave birth in Australia were five times more likely to be Aboriginal and Torres Strait Islander women than other women - 21.7% versus 3.7% of all women under 20 years (Australian Health Ministers Advisory Council 2008). The corresponding percentages for SA in 2007 were 18.8% and 4.1%; there were 107 births to Aboriginal and Torres Strait Islander teenage mothers and 790 births to non-Indigenous teenage mothers (Chan 2008b).

Aboriginal and Torres Strait Islander teenage mothers were most likely to come from remote areas (Australian Health Ministers Advisory Council 2008).

The age breakdown for Aboriginal and Torres Strait Islander teenage women in Australia who gave birth in 2005 is as follows (Australian Health Ministers Advisory Council 2008):

| | Aboriginal and Torres Strait Islander teens (n=2,138) | Non-Indigenous Teens (~9,000) |
|-------------|---|-------------------------------|
| 12/13 years | 0.5% | 0.2% |
| 14 years | 1.6% | 0.5% |
| 15 years | 6.7% | 2.0% |
| 16 years | 12.7% | 7.8% |
| 17 years | 19.3% | 17.6% |
| 18 years | 26.6% | 28.0% |
| 19 years | 32.6% | 43.9% |

Relevant national and SA initiatives

General targets

The COAG working group on Indigenous reform aims to halve the gap in mortality rates for Indigenous children under five within a decade (Close the gap 2008).

Role of evaluation and evidence-based approaches

In McEwan 2008, Ian Anderson notes that most Indigenous health research in Australia has been descriptive, and we have found here that the maternal and infant area is no exception to this. Anderson acknowledges that descriptive research is important, but that intervention research and evaluation is needed to guide change and lead to improved outcomes.

There is growing recognition of the need to evaluate programs and have an understanding of the body of evidence behind proposed interventions and programs.





Effects of dispossession and colonisation on health

For every Aboriginal and Torres Strait Islander child there is about one Aboriginal and Torres Strait Islander adult; in contrast to three non-Indigenous adults for each non-Indigenous child (AMA 2008). Compared with their non-Indigenous counterparts, Aboriginal and Torres Strait Islander children are cared for by significantly fewer adults, who are also at higher risk of premature death, serious illness, substance abuse, imprisonment, major social and emotional stress, lower household income, lower educational attainment, lower employment, and lower access to appropriate sanitary and household conditions, than other Australian adults (AMA 2008).

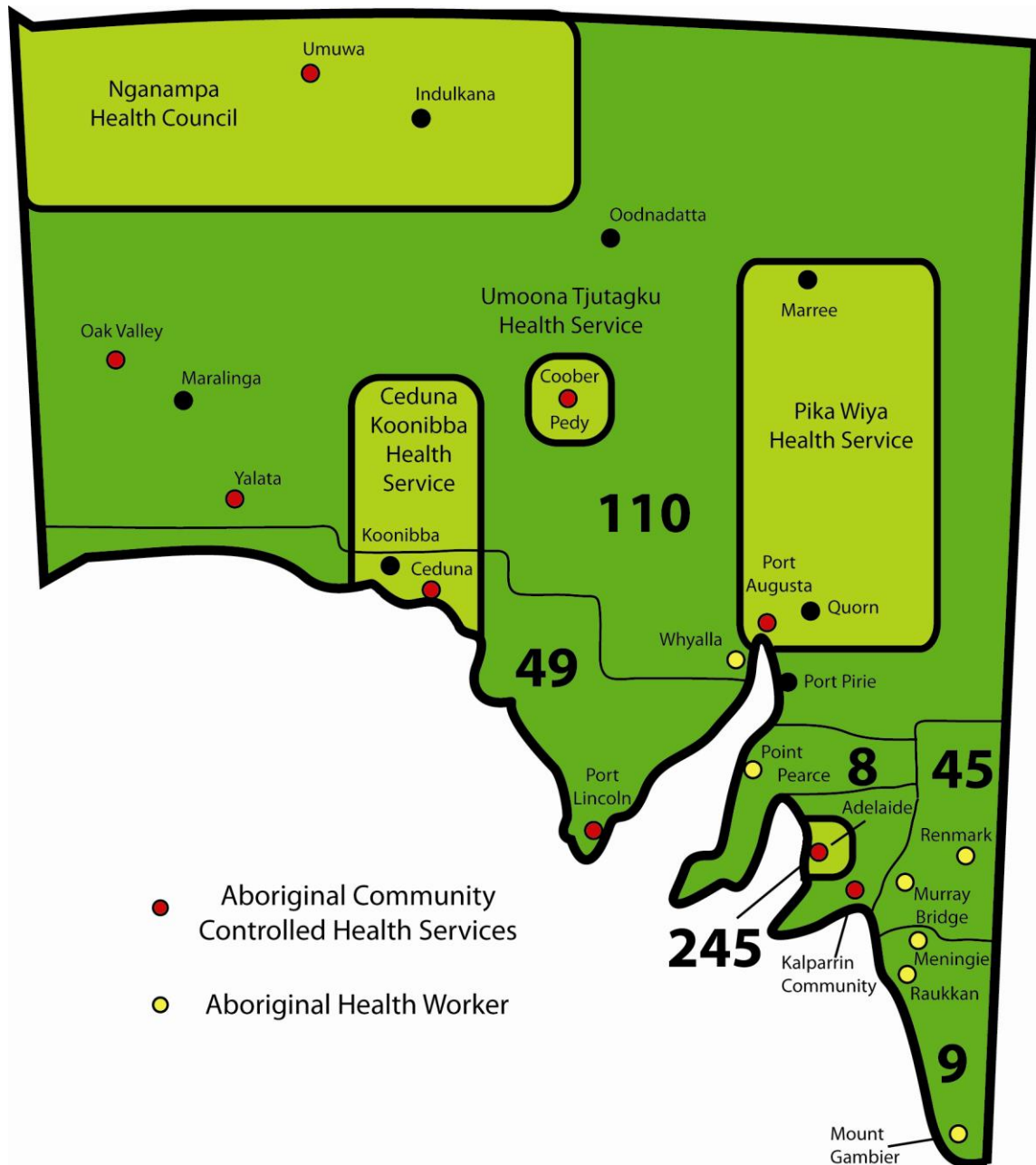
AMA Report Card 2008

The AMA believes that the health of Australia's Aboriginal and Torres Strait Islander children will be improved through the establishment of a national network of Aboriginal community controlled primary health care services specifically for Aboriginal and Torres Strait Islander mothers and children. Through this, universal access to a comprehensive range of services can be provided, including:

- Antenatal services;
- Childhood health monitoring, screening and access to specialists;
- Early childhood outreach and family support interventions, including home visiting, and nutritional risk identification;
- Health promotion and interventions targeting smoking and substance abuse in mothers and pregnant women;
- Dental and oral health services;
- Immunisation and affordable medicines; and
- Parenting education and life skills, including programs for teenage parents.



Map – distribution of normal residence of Aboriginal and Torres Strait Islander women giving birth in SA during 2005



- Aboriginal Community Controlled Health Services
- Aboriginal Health Worker



Methods

This mixed methods synthesis used quantitative, descriptive and qualitative methods.

Topics (potentially modifiable factors):

Templates were designed to address question 1, 2 and 3. These templates contained the following components:

- Prevalence of [topic] in pregnant women
- Links between [topic] and infant mortality
- Population attributable risks
- Links between [topic] and other outcomes
- Why might [topic] cause adverse birth outcomes
- Links between [topic] and other risk/protective factors
- Evidence for preventing/reducing [topic]
- Strategies for preventing/reducing [topic]
- Barriers/facilitators
- Ongoing project/programs
- Further research/action required

Dot points were omitted if no relevant material was identified for a particular topic (e.g. population attributable risks were often either not available or it was not appropriate to calculate them).

Model templates:

We particularly sought models which contained some evaluation of pregnancy outcomes, but also included models that addressed antenatal and postnatal care in the target populations. Templates were also designed to describe and present the models.

Question 4: Maternal education

As this was a relatively contained question, it was possible to use full systematic review methodology which is outlined in part 2 of the report.

Question 5: Community resilience

This question was addressed through narrative review of the concepts of community resilience and the evidence about the impact of particular programs.

Question 6: Unplanned pregnancy

A separate template was designed to describe and synthesise the evidence about unplanned pregnancy.

Searching

Searching for relevant studies and other information was comprehensive but not exhaustive.

Initial search methods used index terms in the standard bibliographic databases, but it quickly became apparent through 'pearling' of references from papers retrieved from these sources and from extensive internet searching that standard searching methods would not be sufficient.

Inclusion of studies

As the scope of the questions was very wide, we adopted broad inclusion criteria for most components. However for evidence of interventions we looked first for systematic reviews of RCTs, then RCTs and then other comparative studies. For evaluation of strategies and models we also adopted a broad approach.

**Ethics**

Ethics approval for this project was obtained from both the Aboriginal Health Council of South Australia and the South Australian Department of Health.

Sources

We scanned over 2000 papers and reports and ultimately included results or material from nearly 1000 reports and studies.





Results

Summary of Topics and Models

Alcohol Use Summary

The picture of alcohol use in pregnancy for Aboriginal and Torres Strait Islander women, teenage women and other women in Australia is not particularly clear and is likely to differ considerably between different groups of women. It seems that while Aboriginal and Torres Strait Islander women use alcohol during pregnancy at levels similar to or perhaps a little higher than other Australian women, their rates of high risk drinking may be several times higher than for other women. This is reflected in higher rates of fetal alcohol syndrome in babies born to Aboriginal and Torres Strait Islander mothers.

In the absence of consistent statistics, working estimates of 50% of Australian women drinking before pregnancy and between pregnancies; 25% drinking during pregnancy; and 10% drinking at high levels in early pregnancy are proposed.

Moderate to high levels of alcohol use in pregnancy are linked with low birthweight, intrauterine growth restriction and preterm birth. These associations have been seen for babies of Aboriginal and Torres Strait Islander women, Australian women in general and women internationally, with one Danish study finding a link with stillbirth.

Avoiding alcohol use in pregnancy has the potential to reduce low birthweight, intrauterine growth restriction, numbers of small for gestational age babies, preterm birth and perhaps stillbirths. It will also reduce numbers of infants with fetal alcohol syndrome which has been described as “the beginning of a lifelong and intergenerational pathway to physical, social and mental ill-health” (Elliott 2004).

Brief motivational interventions appear to be effective in reducing alcohol-exposed pregnancies and in reducing the number of women continuing to drink during pregnancy, although postnatal home visits specifically to support women with alcohol problems have not been shown to reduce alcohol use. As alcohol use in pregnancy is often linked with use of other drugs and with smoking, jointly targeting these behaviours may help.

Assessing alcohol use by pregnant women and women planning pregnancy will require substantial resources to implement since less than half of Australian health professionals screen for alcohol use in these women. Even more resources will be required to assess the significant number of women using alcohol at risky levels and who have an unplanned pregnancy.

Promising brief motivational interventions need to be tailored for Aboriginal and Torres Strait Islander women and teenage women populations and settings; and they then need to be piloted in specific groups of these women.



Antenatal Care Summary

Other material relevant to antenatal care is also covered elsewhere in the report - the following concentrates on the more general aspects of antenatal care.

Aboriginal and Torres Strait Islander women attend antenatal care later and less frequently than other women (just over half attend seven or more visits in SA); and teenage women are more likely to have no, or inadequate, antenatal care than other women. However the rate of SA Aboriginal and Torres Strait Islander women's attendance at antenatal care is growing steadily.

Failure to access any antenatal care is associated with significantly higher rates of perinatal mortality, preterm birth, and low birthweight and inadequate antenatal care is associated with higher rates of postneonatal mortality and babies who are small for gestational age. Lack of access to care and late access are both implicated in some pregnancies which have ended in perinatal death. Inadequate antenatal care is likely to be a proxy for a range of social factors.

Initial results from the ABCD program indicate some important variation and gaps in antenatal care provisions for Aboriginal and Torres Strait Islander women, such as low rates of ultrasound, and screening for gestational diabetes and infections. However when problems were detected, appropriate referral levels were high.

Some features of antenatal care for Aboriginal and Torres Strait Islander women that are likely to lead to improved health outcomes include: community-based or community controlled services which are welcoming, safe and flexible; respecting Aboriginal and Torres Strait Islander people and their culture; continuity of care and a broad and integrated spectrum of services; and provision of transport and child care.

Some of this need may be addressed through the establishment of Children and Family Centres as part of the COAG National Partnership for closing the gap on Indigenous disadvantage and the national Maternity Services Review which is currently underway.

There need to be more reliable ways to measure the quality of antenatal care, antenatal care models need to have evaluation mechanisms built in from the beginning and women need to have a greater role in decision-making for their community's antenatal services.

An increased focus on quality of antenatal care, through implementation of evidence-based guidelines (currently being developed nationally) for example, will enhance the role of antenatal care as a key preventative health strategy.





Birth Spacing Summary

More than a quarter of Aboriginal and Torres Strait Islander women have given birth three or more times, increasing their chances of having short intervals between pregnancies.

Compared with interpregnancy intervals of about two years, intervals shorter than six months are associated with increased risks of preterm birth, low birthweight and small for gestational age. The association with fetal and neonatal death is less clear, although one study has shown significantly more fetal deaths with birth spacings less than two years compared with more than two years.

The reason for poorer birth outcomes when pregnancies are close together may be because women do not have sufficient time to replenish their nutritional reserves, especially of folate.

Less spacing between pregnancies may be linked to low income, while exclusive breastfeeding is likely to lengthen the interval between births. Interpregnancy primary care and social support may reduce the number of women with short intervals between pregnancies.





Breastfeeding Summary

Aboriginal and Torres Strait Islander women and other women have breastfeeding initiation rates of about 90%, but within six months both Aboriginal and Torres Strait Islander and younger women are breastfeeding at levels below the national average of 50%. Only 3% of Australian women are achieving the WHO target of exclusive breastfeeding for six months.

There is a socioeconomic differential in breastfeeding rates and it appears to be widening over time in Australia. In 2004-05, the initiation rate was 81% for the lowest socioeconomic quintile and 91% for the highest (88% over all quintiles). The corresponding figures for breastfeeding at six months were 37% and 66% (50% overall).

Early initiation of breastfeeding and exclusive breastfeeding are both associated with a reduced risk of neonatal and postneonatal mortality. In a systematic review of seven case control studies, any breastfeeding was associated with a reduced risk of SIDS compared with exclusive formula feeding (odds ratio 0.64 95% CI 0.51 to 0.81).

The evidence for fewer infections, less necrotising enterocolitis and improved neurodevelopment in breastfed infants is strong and consistent. There is emerging strong evidence that maternal obesity can interfere with both initiation and duration of breastfeeding.

The evidence for antenatal breastfeeding education is also strong. Out of every three to five women participating, one additional woman will breastfeed who otherwise would have not. Many forms of support, such as the WHO/UNICEF programs, are also effective. Support from partners and other family members such as grandmothers of the new baby is also important. However that support may not be available for some women, including Aboriginal and Torres Islander women who were removed from their families when they were children.

The Parliamentary Best Start program (Best Start 2007) has recommended that breastfeeding should be promoted within Aboriginal and Torres Strait Islander communities as a major preventative health measure; and that the Department of Health and Ageing should provide leadership in monitoring, surveillance and evaluation of breastfeeding rates and practices in Aboriginal and Torres Strait Islander populations. They also recommended that the Australian College of Midwives be funded to run the Baby Friendly Hospital Initiative in Australia. The Federal Government has recently funded an expansion of the Australian Breastfeeding Association's helpline to a national toll-free 24-hour service.

The SA Breastfeeding Program; Strategic and Action Plan aims to increase the hospital discharge rate of fully breastfed babies from the current (2007) rate of 83% to greater than 90% by 2012; and to increase the number of babies being fully breastfed at six months by ten percentage points from 18% to 28% by 2012.

Research priorities around breastfeeding include gaining a better understanding of women's intentions regarding breastfeeding, and of 'insufficient milk' syndrome (the most common reason given for stopping breastfeeding). Other priorities are finding ways to help obese women breastfeed successfully, investigating why staff do not always follow best practice, and ways to use mass media and social marketing to promote breastfeeding.



Diabetes Summary

Diabetes (both pre-existing type 1 and 2 diabetes and gestational diabetes) is about 1.5 times more prevalent (age adjusted) among Aboriginal and Torres Strait Islander women and likely to be increasing in line with other metabolic conditions such as obesity and hypertension. In addition Aboriginal and Torres Strait Islander women are likely to experience diabetes earlier in life; and are likely to have their diabetes treated later and less intensively than other Australian women.

Higher perinatal mortality is particularly associated with pre-existing type 2 diabetes that is not recognised until pregnancy, and/or when women have poor glycaemic control. Women with gestational diabetes are at higher risk of high blood pressure and pre-eclampsia, preterm labour and caesarean birth; obese women are four times more likely to develop gestational diabetes than normal weight women.

Preconception care for women with type 1 diabetes has been shown to improve pregnancy planning and lifestyle interventions can delay or prevent diabetes in women showing impaired glucose tolerance. Lifestyle modifications (and insulin if required) can improve birth outcomes for women with 'mild' gestational diabetes; and a recent trial indicates that oral drugs may be a suitable alternative to injecting insulin. However these findings have not always been translated with the same effects in Indigenous populations, with some suggestion that insufficient clinical emphasis is devoted to women with, or at risk for, diabetes in pregnancy. Increasing access to good food and to glucose monitors both have the potential to help prevent diabetes or to reduce its impact for Aboriginal and Torres Strait Islander women.

The continuous quality improvement approach that has been developed to prevent and manage chronic disease among Aboriginal and Torres Strait Islander may also be appropriate for trying to prevent and reduce the impact of diabetes in Aboriginal and Torres Strait Islander women of reproductive age.

A number of Australian trials testing interventions such as diet, exercise and organisation of care for women with impaired glucose control or diabetes have recently been completed. Their findings will inform the future management of women of reproductive age who have diabetes or are at risk for developing diabetes, including Aboriginal and Torres Strait Islander women and teenage women. This will require adapting program design and delivery so that it is feasible and culturally acceptable for these groups of women.





Family Violence Summary

In Australia, intimate partner violence is the leading contributor to death, disability and illness for women aged 15 to 44 years. Over 10% of pregnant women (Aboriginal and Torres Islander women and other Australian women) report some form of recent partner violence. However violence towards Aboriginal and Torres Strait Islander women is much more likely to lead to hospitalisation.

Associations between family violence and perinatal death, preterm birth and low birthweight have been seen, with a more pronounced effect with increasing levels of violence. However not all studies show these associations. In some studies, different forms of violence have been associated with different outcomes – for example physical abuse with neonatal death and verbal abuse with low birthweight. Women who decline to be interviewed about family violence show the worst outcomes.

There are connections between family violence and alcohol and substance use, and family violence is a strong predictor of antenatal depression and of child abuse.

Internationally a very strong link between low income and family violence is evident. This is also apparent among Aboriginal and Torres Strait Islander people, with colonisation and dispossession, family dislocations, marginalisation other factors connected with family violence.

Recent international consensus guidelines recommend that GPS should routinely ask all pregnant and adolescent women about partner violence, although health professionals may be reluctant to ask about violence and women may be reluctant to disclose abuse.

Many of the mainstream responses to violence in Aboriginal and Torres Strait Islander families have been regarded as culturally inappropriate and ineffective. Programs such as the Canadian healing circles and lodges programs may be effective in reducing repeat violence. The Australian Early Intervention and Prevention Program provides funding for rural and remote Aboriginal and Torres Strait Islander communities to address family violence and sexual abuse. The Victorian Indigenous Family Violence Strategy has set up ten regional action projects and provides funding for community projects.

The Australian Government is currently finalising a national plan to reduce violence against women and their children.

A cluster RCT called MOSAIC (Mothers' Advocates in the Community) is underway in Victoria; and in another Victorian cluster RCT, a multifaceted general practice intervention will be tested to see if it can increase the safety, mental health and quality of life of abused women. As part of the Northern Territory Intervention, twenty safe houses for women and men's cooling places have been established in NT Aboriginal and Torres Strait Islander communities.



Home Visits Summary

Most home visiting programs for pregnant women, mothers and families are primarily intended to address issues such as preventing child abuse and improving children's social and educational development, and perinatal and infant outcomes have not been their main focus.

However in one small US RCT, where half the antenatal care in the intervention group was provided in women's homes by nurse specialists, preterm births were significantly lower and infant mortality showed a nonsignificant trend towards reduction (Brooten 2001). In another US RCT, fortnightly home visits from nurses resulted in significantly fewer low birthweight babies in the social support group (Norbreck 1996). One trial of the Olds Nurse Family Partnership model (the Memphis study) showed a trend towards fewer infant deaths from birth through age 9, with 10/498 deaths in the control group and 1/222 deaths in the nurse-visited group. Six of the deaths in the control group (due to extreme prematurity, SIDS (3), intestinal infection, multiple congenital abnormalities) and the single death in the nurse-visiting group (due to chromosomal abnormalities) occurred in the first year of life. In a large US registry study, mothers in the Children First program showed lower rates of infant mortality, preterm birth and low birthweight.

Many other studies of home visiting have either not measured infant mortality and perinatal outcomes, or have found no differences between intervention and control groups.

These inconsistent findings may be due to differences in program design and program implementation - as Olds 2007 maintains "The success of parenting programs will depend upon the degree to which parents' concerns and motivations are integrated into the program design and effective clinical methods for behavioural change are employed by the staff".

Parental engagement with programs and the ability to train, attract and retain staff also affect the performance of antenatal and postnatal home visiting models. The Olds Nurse Family Partnership model is being implemented in Australia with 2000 Aboriginal and Torres Strait Islander families.





Hypertension in Pregnancy Summary

Around 5% of pregnant Aboriginal and Torres Strait Islander women are likely to have high blood pressure. Rates of pre-existing (chronic) hypertension are likely to be much higher than the rate in other pregnant Australian women, with rates of hypertension appearing during pregnancy probably similar between groups (although information is incomplete). The likelihood of poor birth outcomes is more likely with pre-eclampsia, or chronic hypertension, than with high blood pressure that occurs for the first time during pregnancy.

In South Australia the perinatal mortality rate for hypertensive women is now similar for women with normal blood pressure, although it was nearly double just over a decade ago. International studies show links between hypertension in pregnancy and stillbirth; and with neonatal death. Risks were increased for older women, women who were obese, and women with diabetes. Rates of preterm birth and SGA in hypertensive Aboriginal and Torres Strait Islander women are likely to be double the rates of other Australian women.

Cochrane reviews show calcium and magnesium to be effective treatments for pre-eclampsia. An international multicentre trial (with centres in Australia) of ways to control raised blood pressure in pregnant women is currently underway.

Further research is needed to try to elucidate the links between hypertension and other elements of the metabolic syndrome (such as diabetes and obesity); and to use this knowledge to test methods of reducing hypertension and allied problems in pregnancy.



Infection in Women, Mothers and Babies Summary

STI rates in pregnant Aboriginal and Torres Strait Islander women are up to 20% (36% in women under 20); and in SA gonorrhoea and syphilis occur predominantly in Aboriginal women from remote and rural areas. Infection is still one of the commonest causes of infant mortality for Aboriginal and Torres Strait Islander babies, in contrast to other Australian babies. Perinatal mortality, low birthweight and preterm birth are significantly higher in Aboriginal and Torres Strait Islander women with STI and infectious syphilis. In SA, the contribution of genitourinary infection is estimated to be 48% for preterm birth and 34% for low birthweight, a similar magnitude to smoking.

Associations between STIs and young age (< 20 years), risky alcohol use, domestic violence, stress and poor nutrition have been seen in pregnant Aboriginal and Torres Strait Islander and other women.

The rate for infant deaths caused by infections is over eight times higher for Aboriginal and Torres Strait Islander infants, compared with other infants, and the risk of death from infection was significantly higher among Aboriginal and Torres Strait Islander infants living in remote areas. The main causes of deaths from infection were respiratory infection followed by chorioamnionitis (infection in the placental membranes).

In remote Aboriginal communities, sexual health programs with dedicated and gender specific sexual health staff, community involvement in the programs, along with intensive screening and testing have resulted in sustained reductions in STIs. There is a large body of international evidence about the effectiveness of treatments such as antibiotics for women with preterm prelabour rupture of membranes and in pregnant women with asymptomatic urinary tract infections, but the evidence for antibiotic treatment of bacterial vaginosis in pregnancy and prophylactic antibiotics for women at risk of preterm birth is less clear.

Early and improved access to antenatal care is likely to make an impact on reducing infections in pregnant women, particularly if STI screening is routinely incorporated into care protocols and by ensuring that sexual health is a core part of training for all Aboriginal and Torres Strait Islander health workers. STI management programs which consider the wider social network and peer norms may be a useful approach, particularly for teenagers.

Examples of ongoing programs include the national SNAKE condoms project which uses social marketing to promote condom use and safe sexual behaviour, the 'Telling Like It Is' sexual health peer education initiative, and the Mooditj program which integrates issues of sexual health with physical, mental and emotional wellbeing. Improved housing and environmental living conditions are also likely to prevent the spread of some infectious diseases.

Future priorities include developing interventions to reduce STIs that incorporate a broader context than individual risk factors; ways to improve perinatal outcomes once infection is detected; understanding why the incidence of vaccine preventable diseases are still higher in Aboriginal and Torres Strait Islander children; and investigating why transmission of blood borne viruses through intravenous drug use is increasing amongst Aboriginal and Torres Strait Islander people.





Nutrition summary

Fifteen per cent of Aboriginal and Torres Strait women in the Darwin region were undernourished after giving birth; and 10% of prepubertal Aboriginal and Torres Strait Islander children in the Darwin region were underweight, particularly those children from remote areas. Rates of anaemia and neural tube defects (due to folate deficiency) are also high among Aboriginal and Torres Strait Islander women. Diets of urban Aboriginal women are likely to be high in protein and cholesterol and low in vitamins and minerals. Mandatory fortification of bread flour will be introduced into Australia in September 2009.

Many teenage women are likely to have diets lacking in at least some nutrients, particularly if they have low incomes.

The proportion of Aboriginal and Torres Strait Islander infants from central Australia who fail to thrive has been estimated to be 2-3% of infants aged 0-6 months and 20% of infants aged 6-12 months.

Being low weight at the beginning of pregnancy as well as gaining low levels of weight during pregnancy are linked to having low birthweight babies and intrauterine growth restriction.

In general, increasing fruit and vegetable intake is likely to save lives, but we could not locate information on this specific to Aboriginal and Torres Strait Islander women and teenage women and their babies.

Energy and protein supplements during pregnancy can reduce the risk of stillbirth or of having an SGA baby. A range of vitamins and minerals such as folate, vitamin A and micronutrient supplementation during pregnancy are associated with improved birth and baby outcomes. Nutrition education may also play a role.

In low income countries, vitamin A supplementation of newborns and infants increases survival, but it is uncertain if this finding would apply to other settings.

Some community nutrition programs have demonstrated improvements in diet, but cost of food and access to quality fresh food are barriers, particularly for remote communities.

Recent COAG recommendations relating to nutrition (Close the gap 2008) include developing a national 'nutritional risk' scheme for at-risk Aboriginal and Torres Strait Islander mothers, infants and children.

In order to design effective programs for improving the nutrition of Aboriginal and Torres Strait Islander women and teenage women, including women living in urban areas, more information is needed about dietary patterns and drivers of choice of foods.



Obesity Summary

Just under 20% of South Australian Aboriginal and Torres Strait Islander women are likely to be overweight (body mass index (BMI) 25 to 29.9) at the start of their pregnancy; and just over 20% are likely to be obese (BMI 30 and above).

Being overweight or obese pre-pregnancy is a risk factor for stillbirth, perinatal mortality and preterm birth. Obese women are more likely to have a caesarean section and there are also links between morbid obesity in mothers and birth defects. In addition obese mothers are not as likely to breastfeed as long as non-obese mothers.

In line with theories about the metabolic syndrome, obese women are more likely to have hypertension and to develop diabetes, with the concomitant risks for poor birth outcomes that are associated with these conditions.

Excessive weight gain during pregnancy is also associated with poorer birth outcomes as well as being linked to a higher chance of retaining weight after pregnancy.

The existing evidence about how to reduce weight before pregnancy and how to reduce excessive weight gain during pregnancy is limited, due to only a handful of rigorous studies being published to date. The studies indicate some promise for dietary interventions and exercise, and a large number of studies are currently underway. One of these is a large international study 'LIMIT', with its main centre in Adelaide, which is evaluating a range of methods to limit women's weight gain during pregnancy.

The results of these studies will also help us to better understand the motivators for pregnant women, new mothers and yet-to-be mothers to achieve healthy weights.





Poverty and SES Summary

Nearly half of Aboriginal and Torres Strait Islander children are born into poverty – at least three times the rate for non-Indigenous children.

There is a clear link between poverty and infant mortality and other adverse birth outcomes; in SA the most disadvantaged 20% of the population have an infant mortality rate 63% higher than the most well-off group.

Low socio-economic status is associated with smoking, stressful life events, depression, physical abuse and low levels of social support. The evidence is increasing for poorer health outcomes and social position being a result of accumulated hazardous exposures throughout life.

There is some evidence for a link between lower infant mortality and more generous family policies such as parental leave. A systematic review of cash transfer conditional on fulfilling one or more health requirements shows improved use of preventive health services and health outcomes such as improved nutrition in mothers and babies. The Australian Baby Bonus scheme may be a vehicle for a similar cash transfer scheme.

Outcomes from programs addressing disadvantaged mothers and children as Sure Start in the UK and Healthy Start in the USA have not yet been able to demonstrate improved health outcomes.

Financial problems, combined with transportation problems and stress, can be barriers to accessing services such as antenatal care.

Education and employment (as health workers for example) are seen as powerful ways for Aboriginal and Torres Strait Islander people to escape from poverty.

The UK has a specific target to reduce the infant mortality gap between the lowest SES groups and the population as a whole by at least 10% by 2010. Reducing obesity, reducing smoking in pregnancy and reducing SIDS have been identified as the most promising strategies to achieve this.





Social and Emotional Wellbeing Summary

About one in seven Australian mothers suffer some form of postnatal depression. We do not know if this rate applies to Aboriginal and Torres Strait Islander women or teenage women.

While antenatal psychosocial factors are common (almost all women from a disadvantaged area of Adelaide had at least one) these factors do not accurately predict if a woman will develop postnatal depression.

The links between depression and other forms of psychological distress and infant mortality and other adverse birth outcomes are not clear, although one large Danish study has shown a link between stress during pregnancy and stillbirth.

Psychological distress is associated with experiencing violence, drug and alcohol problems, smoking and low SES. Maternal psychiatric illness is one of the leading causes of maternal death.

Psychosocial interventions (such as peer support and non-directive counselling) and psychological interventions (such as cognitive behaviour therapy and interpersonal psychotherapy) are effective in reducing the symptoms of postpartum depression. The picture is not quite as clear for ways to prevent postnatal depression, although home visits and telephone support from specially trained counsellors are showing some promise.


Some mainstream services and internet resources such as 'moodgym' may not be as accessible to Aboriginal and Torres Strait Islander people, and the usefulness and appropriateness of many programs have not been evaluated for Aboriginal and Torres Strait Islander women.

Although Aboriginal Mental Health Workers have been employed in parts of the Northern Territory (including at the Royal Darwin Hospital) there is serious shortage of these workers across Australia. Beyondblue has identified lack of mental health services and workers for Aboriginal and Torres Strait Islander communities as one of the large gaps in perinatal mental health services in Australia.

Beyond blue has been funded to develop an Aboriginal and Torres Strait Islander Perinatal Mental Health Plan, which is part of an \$85 million initiative by the Australian Government to develop a national plan, including the development of Australian perinatal mental health guidelines.

COAG is supporting the development of maternal/infant mental health services alongside antenatal services for Aboriginal and Torres Strait Islander people, and has recommended that all Aboriginal and Torres Strait Islander women have access to perinatal mental health screening within five years.





Sudden Infant Death Syndrome (SIDS) and Sudden Unexpected Deaths in Infancy (SUDI) Summary

SIDS remains the leading cause of death among infants between one month and one year of age in the developed world even after the striking decrease after the risk-reduction campaigns of the 1990s. In 2005, the Australian SIDS rate was 0.32 per 1000 live births, representing an 82% drop from 1990.

Recently a stricter definition for SIDS has been used, which restricts SIDS to deaths that remain unexplained. The broader term of SUDI (Sudden Unexpected Deaths in Infancy) now encompasses SIDS, accidental asphyxiation and undetermined cause.

Due to the different classification methods it is difficult to determine if the rate of SIDS/SUDI remains higher among infants of Aboriginal and Torres Strait Islander women compared with infants of non-Indigenous women. From 1993 to 1996, the rate of SIDS for Aboriginal infants born in SA was seven times the rate of non-Indigenous infants and the rate for infants of teenage mothers was about three times greater than for infants of older mothers.

In SA during 2007, there were 11 sudden unexpected deaths in infancy – none of these were attributed to the stricter definition of SIDS. There were two accidental asphyxiations and nine deaths with an undetermined cause.

Nearly three-quarters of Aboriginal and Torres Strait Islander children (71%) under one year of age who were provided with health checks in the Northern Territory in 2007-8 were judged to be at risk of SIDS.

While prone sleeping remains one of these risk factors, unsafe bedding, smoking and alcohol use are among other risk factors. Being born preterm or low birthweight also increases the chances of a baby dying from SIDS. Infection may also play a role.

Two Aboriginal and Torres Strait Islander SIDS prevention programs have been developed – one in WA and one in the NT.



Smoking in Pregnancy Summary

In South Australia, nearly 60% of Aboriginal and Torres Strait Islander women smoke during pregnancy – four times more than other pregnant women. Teen rates are also high, representing one in nine of all women who smoke during pregnancy in Australia.

Smoking in pregnancy has a pronounced negative effect on fetal growth, with over a three-fold risk of growth restriction. Perinatal and infant mortality rates are also higher in women who smoked during pregnancy, particularly for stillbirth, and in the postneonatal period.

Women who smoke during pregnancy are significantly more likely to have a low birthweight baby; or a small-for-gestational age baby; or a preterm birth. The risks of a poor birth outcome increase with increased amounts of smoking. The risks of having a low birthweight baby are also significantly higher if a pregnant woman lives in a household with other smokers, even if she herself does not smoke during pregnancy.

Smoking in pregnancy is related to lower income, and for teenagers, with having less formal education and being unemployed. Women who are more aware of the risks of smoking are less likely to smoke during pregnancy.

For every 100 women undergoing a smoking cessation program, six will stop smoking in pregnancy – sufficient to show a positive impact on low birthweight and preterm birth.

Postpartum prevention of smoking relapse and school based prevention programs have not been shown to be effective.

In some instances, nicotine replacement therapy may be a suitable option. Although some concerns have been expressed about its use in pregnancy, recent studies in pregnant women have not shown adverse effects and some health professionals maintain that the risk of smoking in pregnancy is far higher than any risk of nicotine replacement therapy in pregnancy.

A considerable amount of attention is now being given to various quit smoking in pregnancy programs in SA and the rest of Australia and evaluation of their impact on smoking rates is awaited.

For Aboriginal and Torres Strait Islander women, stopping smoking in pregnancy is often difficult in the face of other pressures they face in their lives, and may not be seen as a high priority.





Social and Family Support Summary

This summary should be read in conjunction with the 'Home Visits' summary (although clearly not all social and family support is home-based).

The majority of Aboriginal and Torres Strait Islander women living in remote communities travel to regional centres and birth alone without their family. These women have considerable needs for social support which have been described in some detail. The social support needs of urban Aboriginal and Torres Strait Islander pregnant women are also likely to be considerable.

Pregnant women and new mothers may need particular kinds of social support – having a small-for-gestational-age baby has been particularly related to lack of emotional support and low social participation more than practical 'instrumental' support.

There is much less evidence from randomised trials about the role of lay people in providing social support than there is for the role of nurses.





Substance Use Summary

The best available estimate of substance use by pregnant Aboriginal and Torres Strait Islander women is about 5%. Amphetamine and cannabis use among these women is more likely than opiate use. There is some evidence that cannabis use is increasing in Aboriginal and Torres Strait Islander communities where access to alcohol has been restricted.

Substance use during pregnancy is associated with elevated risks of stillbirth, neonatal deaths, preterm birth and small-for-gestational-age babies. The magnitude of these associations is likely to differ according to which substances are being used, but this detail is often not reported.

Between half and three-quarters of drug dependent women also have some form of psychiatric disorder. In a South Australian survey, substance use during pregnancy was also linked with smoking, being of lower socio-economic status, and being an Aboriginal and Torres Strait Islander woman. Pregnant Australian teenagers who were using substances had significantly more genitourinary infections, particularly if they were using multiple types of drugs.

Some anti-addiction medications such as methadone for opiate dependency are available. Breastfeeding has not been recommended while women are using these medications, although some clinicians are now suggesting that the benefits of breastfeeding generally outweigh the risks in these situations.

Contingency management using positive supportive reinforcement has been shown to be more effective than motivational interviewing for keeping pregnant women in drug treatment programs although neither strategy was shown to have an influence on birth outcomes. Home visits for pregnant women and new mothers using substances have not been shown to decrease postpartum drug use or increase breastfeeding duration.

The National Drugs Strategy Aboriginal and Torres Strait Islander Peoples Complementary Action Plan outlines a number of strategies, including giving priority to providing cultural awareness training to all maternal and child health care providers and drug and alcohol service providers.

The US Early Start program shows benefits for women who are both assessed and treated for their substance use in pregnancy compared with those women who are not assessed, or who are assessed but do not receive treatment.

There are many barriers to accessing drug services for Aboriginal and Torres Strait Islander people – services may be perceived as slow and inflexible, ongoing treatment can be expensive, and there are few Aboriginal and Torres Strait Islander staff in these services.

Some of the COAG funding has been directed to substance and alcohol rehabilitation and treatment services, with complementary funding from States and Territories. In Victoria, Koori Community Drug and Alcohol Services have been established.



Potentially modifiable factors and their association with stillbirth, perinatal mortality, infant mortality, preterm birth, LBW, and SGA

Any potentially modifiable factor (such as smoking) appearing in the following tables shows a significant association (compared with individuals not exposed to the factor) with one or more adverse perinatal outcomes. While these associations are not necessarily directly causal, each factor listed here should be considered very important to address in strategies to prevent infant mortality and other outcomes such as low birthweight.

Due to lack of information, the magnitude of some associations is based on international data and not data from Australian Aboriginal and Torres Strait Islander women and teenage women. However sufficient information was available to estimate the prevalence of factors among Aboriginal and Torres Strait Islander women, Aboriginal and Torres Strait Islander teenage and Australian teenage women (designated in the tables as A, AT and T respectively).

Stillbirth

- The risk of stillbirth is increased (by up to double) in the presence of smoking, being overweight or obese, being poor, stress, low levels of education, hypertension and pre-eclampsia (most common modifiable factor first).
- The risk of stillbirth is increased (by up to three times) with high use of alcohol, diabetes and in the presence of substance use (most common modifiable factor first).
- Less than 1% of Aboriginal and Torres Strait Islander women are likely to have syphilis, but for those women the risk of stillbirth is more than quadrupled.

| | | Increase in stillbirth (fold) | | | | |
|------------|--------|---|-------------------------------|----------|--------------|-----|
| | | 1 to 1.9 | 2 to 2.9 | 3 to 3.9 | 4 to 4.9 | ≥ 5 |
| Prevalence | < 1% | Pre-eclampsia (A) | | | Syphilis (A) | |
| | 1-4% | | Substance use (A, AT, T) | | | |
| | 5-9% | Hypertension (A) | Diabetes (A, T) | | | |
| | 10-19% | Education < 10 years (A, AT) Stress (A, AT) Poverty (T) | Alcohol - high use (A, AT, T) | | | |
| | 20-29% | | | | | |
| | 30-39% | Poverty (A, AT) | | | | |
| | 40-49% | Overweight/ Obesity (A, AT) | | | | |
| | ≥ 50% | Smoking (A, AT, T) | | | | |

(A) – ATSI Women, (AT) – ATSI Teen Women, (T) – Teen Women



Perinatal Mortality

- The risk of perinatal mortality is increased (by up to double) by being overweight or obese, by being poor, having low education levels, and having hypertension (most common modifiable factor first).
- The risk of perinatal mortality is increased (by up to three times) in the presence of family violence, substance use, and psychiatric illness (most common modifiable factor first).
- The risk of perinatal mortality is increased (by up to four times) for STI and diabetes (most common modifiable factor first).
- Less than 1% of Aboriginal and Torres Strait Islander women are likely to have syphilis; or to have no antenatal care, but for those women the risk of perinatal mortality is more than quadrupled.

| | | Increase in Perinatal Mortality (fold) | | | | |
|------------|--------|---|----------------------------|------------------|----------|---------------------------------------|
| | | 1 to 1.9 | 2 to 2.9 | 3 to 3.9 | 4 to 4.9 | ≥ 5 |
| Prevalence | < 1% | | Psychiatric illness (A) | | | No antenatal care (A) Syphilis (A) |
| | 1-4% | | Substance use (A, AT, T) | | | |
| | 5-9% | Hypertension (A) | | Diabetes (A, AT) | | |
| | 10-19% | Education < 10 years (A, AT) Poverty (T) | Family violence (A, AT, T) | | | |
| | 20-29% | | | STI (A, AT, T) | | |
| | 30-39% | Poverty (A, AT) | | | | |
| | 40-49% | Overweight/obesity (A, AT) | | | | |
| | ≥ 50% | | | | | |

(A) – ATSI Women, (AT) – ATSI Teen Women, (T) – Teen Women



Infant Mortality

- The risk of infant mortality is increased (by up to double) for being poor, having low education levels, and never breastfeeding (most common modifiable factor first).
- The risk of infant mortality is increased (by up to three times) for smoking, no home visits, and births not spaced (most common modifiable factor first).
- The risk of infant mortality is increased by more than five times for serious infant infection and for the risk of a SIDS death where high alcohol use is involved.

| | | Increase in Infant Mortality (fold) | | | | |
|------------|--------|-------------------------------------|----------------------------|----------|----------|--------------------------------------|
| | | 1 to 1.9 | 2 to 2.9 | 3 to 3.9 | 4 to 4.9 | > 5 |
| Prevalence | < 1% | | | | | Infant infection** |
| | 1-4% | Never breastfed – SIDS (A, AT, T) | Births not spaced (A) | | | |
| | 5-9% | Poverty (T) | No home visits* (A, AT, T) | | | |
| | 10-19% | Education < 10 years (A, AT) | | | | Alcohol (high use) – SIDS (A, AT, T) |
| | 20-29% | Poverty (A, AT) | | | | |
| | 30-39% | | Smoking – SIDS (A, AT, T) | | | |
| | 40-49% | | | | | |
| | ≥ 50% | | | | | |

* Sustained program of home visits for women with low support;

**based on data from fatal infections only

(A) – ATSI Women, (AT) – ATSI Teen Women, (T) – Teen Women

Preterm Birth

- The risk of preterm birth is increased (by up to double) for smoking, being poor, being overweight or obese, having STI, periodontitis, hypertension, no home visits and births not spaced (most common modifiable factor first);
- The risk of preterm birth is increased (by up to three times) for poor nutrition, family violence, obesity, substance use and syphilis (most common modifiable factor first).
- The risk of preterm birth is increased by up to five times with high use of alcohol, diabetes and for mothers who were removed from their family.
- The risk of preterm birth is increased by more than five times with no antenatal care.

| | | Increase in Preterm (fold) | | | | |
|------------|--------|---|---|----------|-------------------------------|------------------------------|
| | | 1 to 1.9 | 2 to 2.9 | 3 to 3.9 | 4 to 4.9 | ≥ 5 |
| Prevalence | < 1% | | Syphilis (A) | | | No antenatal care (A, AT, T) |
| | 1-4% | Births not spaced (A) | Substance use (A, AT, T) | | Family removal*** (A) | |
| | 5-9% | No home visits**** (A, AT, T) Hypertension (A) Periodontitis (A, AT, T) | Obesity* (A, AT) | | Diabetes (A, AT) | |
| | 10-19% | | Family violence (A, AT, T) Nutrition** (T) | | Alcohol - high use (A, AT, T) | |
| | 20-29% | STI (A, AT, T); | | | | |
| | 30-39% | | | | | |
| | 40-49% | O'weight/obesity (A, AT) | | | | |
| | ≥ 50% | Smoking (A, AT, T) Poverty (A) | | | | |

* Preterm < 34 weeks;

**Nutrition = nutrient deficient;

***Mother raised in mission: PTB and LBW (Eades 2008);

**** Sustained program of home visits for women with low support

(A) – ATSI Women, (AT) – ATSI Teen Women, (T) – Teen Women

Low Birthweight

- The risk of low birthweight is increased (by up to double) for STI, low levels of education, no home visits, and births not spaced (most common modifiable factor first).
- The risk of low birthweight is increased (by up to three times) for smoking, being poor, having poor nutrition, family violence, and low maternal BMI (most common modifiable factor first).
- The risk of low birthweight is increased (by up to four times) in the presence of syphilis and substance use.
- The risk of low birthweight is increased by up to five times with no antenatal care and by over five times with high use of alcohol.

| | | Increase in Low Birthweight (fold) | | | | |
|------------|--------|------------------------------------|---|--------------------------|------------------------------|-------------------------------|
| | | 1 to 1.9 | 2 to 2.9 | 3 to 3.9 | 4 to 4.9 | ≥ 5 |
| Prevalence | < 1% | | | Syphilis (A) | No antenatal care (A, AT, T) | |
| | 1-4% | Births not spaced (A) | | Substance use (A, AT, T) | | |
| | 5-9% | No home visits* (A, AT, T) | Nutrition (1)** | | | |
| | 10-19% | Education < 10 years (A, AT) | Family violence (A, AT, T) Nutrition (2)** | | | Alcohol - high use (A, AT, T) |
| | 20-29% | STI (A, AT, T) | Poverty (A, AT) | | | |
| | 30-39% | | | | | |
| | 40-49% | | | | | |
| | ≥ 50% | | Smoking (A, AT, T) | | | |

* Sustained program of home visits for women with low support;

**Nutrition (1) = low BMI; nutrition (2) = nutrient deficient;

(A) – ATSI Women, (AT) – ATSI Teen Women, (T) – Teen Women



Small for Gestational Age (SGA)

- The risk of SGA is increased (by up to double) for low levels of education, substance use and births not spaced (most common modifiable factor first).
- The risk of SGA is increased (by up to three times) for low maternal BMI.
- The risk of SGA (by up to four times) for smoking.
- The risk of SGA is increased by over five times with high use of alcohol.

| | | Increase in Small for Gestational Age (fold) | | | | |
|-------------------|--------|---|----------------|--------------------|----------|-------------------------------|
| | | 1 to 1.9 | 2 to 2.9 | 3 to 3.9 | 4 to 4.9 | ≥ 5 |
| Prevalence | < 1% | | | | | |
| | 1-4% | Births not spaced (A) Substance use (A, AT, T) | | | | |
| | 5-9% | | | | | |
| | 10-19% | Education < 10 years (A, AT) | Nutrition (1)* | | | Alcohol - high use (A, AT, T) |
| | 20-29% | | | | | |
| | 30-39% | | | | | |
| | 40-49% | | | | | |
| | ≥ 50% | | | Smoking (A, AT, T) | | |

**Nutrition (1) = low BMI; nutrition (2) = nutrient deficient;
(A) – ATSI Women, (AT) – ATSI Teen Women, (T) – Teen Women





Special Topic: Epigenetics and intergenerational effects Summary

There are now well-established links between low birthweight and increased risk of diseases in later life. This process is thought to begin in utero with the fetus making physiological responses to an adverse environment in the womb. Evidence is also emerging that high birthweight as well as low birthweight may be associated with later development of chronic disease.

Nutritional and hormonal status during pregnancy and early life may interfere irreversibly with development of organs involved in control of food intake and metabolism, paving the way for diabetes, heart disease, hypertension and stroke in later life.

In the predictive adaptive response hypothesis, the developing fetus is able to assess its current nutritional environment and reprogram accordingly. If the mother is under-nourished, the fetus can adapt by directing more glucose to the brain and heart (and away from other organs) by reducing insulin secretion. When abundant nutrition is available postnatally and beyond, the 'reason' for the in utero programming has disappeared. Since the effects of these epigenetic changes are permanent and cannot adjust to the unpredicted nutritional excess, glucose intolerance and diabetes may eventuate.

In a remote northern Australian Aboriginal community, low birthweight was significantly correlated with higher blood pressure in adult life. Low birthweight is linked to a higher risk of developing type 2 diabetes in later life in most populations. In two studies in native North American populations with high prevalences of maternal diabetes and one other population of young adults, the association was between high birthweight and risk of later type 2 diabetes.

The effect of undernutrition spans at least three generations, as suggested by the small but significant association between grandmother's height and birthweight of children born to their daughters. Thus preventing maternal and child undernutrition is a long term investment that will benefit present and future generations.

The concept of social epigenetics has recently been coined to refer to the intergenerational effects of adversity, which are considered to operate through social, rather than (or as well as) biological, mechanisms. For Aboriginal and Torres Strait Islander people, forced family separations are great sources of adversity and distress, and manifest in the causal pathways to health and social problems in subsequent generations.



Models

Nearly 40 models (mostly of antenatal or postnatal care, or both; and mostly from Australia) have been described and analysed; and a further 50 models have been described as part of topics (potentially modifiable factors).

Fourteen of the models reported one or more of the primary outcomes of interest in the populations of interest (Aboriginal and Torres Strait Islander infants and babies of teenage mothers) – see Table:

Perinatal mortality

Perinatal mortality was reported in seven models – six serving Aboriginal and Torres Strait Islander people and one Canadian service for Inuit people. Five models monitored perinatal mortality over time; with three models finding a decrease in the most recent period. For one of the models, the Mums and Babies program from Townsville, this was a statistically significant decrease. The Inuit model reported that their perinatal mortality rate was similar to the rest of Canada.

Preterm birth

Ten models (all serving Aboriginal and Torres Strait Islander people) reported preterm birth rates. Five reported a decrease for the most recent period; and one (Bibbulung Gnarneep) reported a lower rate than Aboriginal mothers in Perth overall.

Low birthweight

In the USA Centering Pregnancy RCT, there were significantly fewer babies born preterm, with no significant differences seen between the intervention and control for stillbirth, low birthweight or SGA.



Table: Summary of models and main outcomes

| | Infant/Perinatal Mortality | | | | PTB | LBW | PTB /LBW | SGA |
|---|----------------------------|--|-----|----|---|---|--------------|-------------|
| | Stillbirth | PM | PNM | IM | | | | |
| Australia (Aboriginal and Torres Strait Islander people) | | | | | | | | |
| Anangu Bibi (SA) 2004-6 | 1/46 | - | - | - | | 9/46 (20%) | | |
| Bibbulung Gnarneep (WA) | | | | | 9% (lower than Perth Aboriginal mothers, 13%) | 9% (lower than Perth Aboriginal mothers, 14%) | 33/273 (12%) | |
| Daruk (NSW) 1996 | | | | | Possible reduction? | Possible reduction? | | |
| Djuli Galban (NSW) 2002? | | | | | Possible reduction? | No reduction | | |
| Mums and Babies (QLD) 2000-5 | | 11/781 (1.4%) decrease over time (p=0.014) | | | 14/84 (16.7%) decrease over time (p=0.055) | 13/84 (15.5%) decrease over time (p=0.289) | | |
| Nganampa (SA) 2006-7 | [1] | 3/51 (6%) [1 stillbirth] | | | 12/51 (24%) | 11/51 (22%) | | |
| Ngua Gundi (QLD) 1997-2000 | | 4/123 (3%) v 13/583 (3%) [1993-6] | | | 14/108 (13%) v 13/100 (13%) | 10/108 (9%) v 10/100 (10%) | | |
| NNK (SA) 2006-7 | | | | | 0/10 | 0/10 | | |
| NSW AMIHS 2004 | | 2 (0.5%); improved over time | | | 11%; improved over time | 12% | | |
| SWSBSC (NT) 1988-2001 | | | | | No sustained reduction | No reduction | | |
| SWSBSC (WA) 1991-1997 | | | | | 6/43 (14%) in 1996/7 v 43/204 (21%) in 1991/6 | 16.3% in 1996/7 v 15.2% in 1991/6 | | |
| WBS, Mildura (VIC) 2001-2002 | | | | | | 5/25 (20%) | | |
| Yapatjarra (QLD) | | 2 (was 8 in prev. 6 months) | | | | | | |
| Canada (Inuit people) | | | | | | | | |
| Inuulitsivik 1986-2004 | | 0.9% (sim. to Canada overall) | | | | | | |
| USA | | | | | | | | |
| CenteringPregnancy RCT 2001-2004 | No sig diff | | | | 9.8% v 13.8% OR 0.67 95% CI 0.44 to 0.98 | No sig diff | No sig diff | No sig diff |





Maternal Education Summary

What role does the education level of mothers play in infant mortality rates?

Aboriginal and Torres Strait Islander people continue to be educationally disadvantaged compared with the rest of the Australian population. School retention rates are significantly lower for Aboriginal and Torres Strait Islander students, fewer Aboriginal and Torres Strait Islander students complete year 12 and Aboriginal and Torres Strait Islander students are less likely to meet national literacy and numeracy benchmarks.

If level of maternal education is shown to be an important contributor to infant mortality and other associated outcomes, clearly this would have additional and substantial policy impacts on the need to improve educational attainment for Aboriginal and Torres Strait Islander women (over and above the many other policy considerations). However, at present there is no direct evidence about the influence of levels of maternal education on infant mortality for Aboriginal and Torres Strait Islander people and teenagers in Australia. Evidence from other populations did show a clear *educational gradient*, with increasing levels of education being associated with decreased levels of infant mortality and other associated outcomes. This needs to be interpreted taking into account that a very large number of confounding factors may be influencing these results including maternal age, parity, smoking and socioeconomic status, infant birthweight, sex, gestational age, birth order, and breastfeeding. The included studies adjusted outcomes for a variety of these factors but none adjusted for all factors and not all adjusted for those we considered to be most important (maternal age, parity, smoking and SES). Therefore, it was not possible to pool adjusted rates of infant mortality and other outcomes.

Including the single study of Aboriginal women from WA, 39 studies with a total of over 20 million women contributed data to this systematic review. Pooling of unadjusted outcomes demonstrated a clear benefit for increased levels of education, with around a 1.5 to 2 times increased risk for the lowest level of education compared to all other levels of education for each of the outcomes (see Table 1). These results must be interpreted with caution. In adjusted analyses, examined on a study by study basis, it was difficult to demonstrate a clear advantage of increasing education level depending on which confounding factors were taken into account in the analysis.

Table 2 (see part 2 of the report) summarises the results of each study indicating whether a statistically significant educational benefit was shown when the analysis was adjusted, and showing which confounding factors were adjusted. While the educational benefit was clear for the four international ecological studies, the pattern of results differed depending on the populations being studied as discussed below.

Table 1: Pooled odds ratios of infant mortality outcomes: lowest education vs. all other educational levels

| OR (95%CI) | Overall | ATSI | Developed country minority | Developing country | Developed country |
|------------|--|--|--|--|--|
| IM | 1.64 (1.19,2.28) (9 studies, 6683482 live births) | NA | 1.53 (0.75,3.10) (1 study, 2684 live births) | 1.95 (0.94,4.01) (4 studies, 141516 live births) | 1.39 (1.30,1.49) (4 studies, 6539282 live births) |
| NM | 1.31 (1.21,1.41) (8 studies, 10337083 live births) | NA | NA | NA | 1.31 (1.21,1.41) (8 studies, 10337083 live births) |
| PNM | 1.89 (1.62,2.20) (6 studies, 5830524 live births) | NA | NA | NA | 1.89(1.62,2.20) (6 studies, 5830524 live births) |
| LBW | 1.72(1.37,2.15) (9 studies, 6275769 live births) | 1.79 (0.82,3.92) (1 study, 267 live births) | 1.49 (1.16,1.92) (1 studies, 3232 live births) | 2.13 (1.42,3.20) (2 studies, 1084 live births) | 1.67 (1.29,2.15) (6 studies, 6271186 live births) |
| SGA | 1.53 (1.23,1.91) (7 studies, 409586 live births) | NA | 1.25 (1.01,1.55) (2 studies, 113140 live births) | NA | 1.59 (1.25,2.03) (5 studies, 296355 live births) |

KEY: IM – infant mortality; NM – neonatal mortality; PNM – postneonatal mortality; LBW – low birth weight; SGA – small for gestational age; ATSI – Aboriginal and Torres Strait Islander people; **statistically significant results in bold**

Australian aboriginal and Torres Strait Islander populations

No studies of Aboriginal and Torres Strait Islander infant mortality were identified which considered the effect of maternal education level. One study reported rates of low birth weight and preterm birth among a cohort of urban Australian Aboriginal women (Eades 2008). While not statistically significant in this small study, maternal education (less than year 10) was associated with nearly twice the risk of low birth weight and preterm (OR 1.8). Three studies of maternal education level on child survival, parental health seeking behaviours and child health markers (such as ear and diseases) showed no clear effect of maternal education level on these outcomes (Ewald 2002; Gray 1988; Gray 2001).

Non-Australian Indigenous populations

Only one study reported infant mortality rates for an Indigenous population (Kieffer 1994) and found no effect of maternal education level on infant mortality for either white or Hawaiian women. However, Hawaiian women with low educational attainment had an increased risk of low birth weight and preterm compared to white women with average educational attainment. Three of the four studies in Indigenous populations looked at risk of SIDS. One study of New Zealand Maoris found no effect of educational attainment on risk of SIDS (Mitchell 1993). Two studies of American Indians found an educational gradient existed for white Americans but not for American Indians (Pezzino 1996; Oyen 1990).



Minority populations in developed countries

Six studies in minority populations within developed countries also showed some inconsistent results. While the educational gradient was identified in most studies, Din-Dzietham 1998 found that for African American women the risk of infant mortality increased with increasing educational attainment. Further, the disparity between African American and white women increased so that white women gained a relative benefit from increasing education compared to African American women. Singh 1995 also demonstrated an increasing disparity between African American and white infant mortality with increasing educational attainment. Parker 1994 found that increasing maternal education reduced the risk of low birthweight and preterm for African American mothers but SGA for white mothers. Collins 1998 did not find a significant relationship between education level and risk of SGA for US-born Mexican American mothers. Stoltenberg 1998 found an educational gradient for risk of infant mortality and stillbirth among Norwegian mothers but not Pakistani mothers in Norway.

Developing countries

In studies of populations in developing countries the picture was generally clearer and the educational gradient was demonstrated in all but two studies. Adetunji 1995 found there was no significant effect of increasing education on reducing infant mortality rates when the analysis controlled for breastfeeding, maternal age and birth order. Sandiford 1997 did not find a significant effect of education level on infant death in Nicaragua, however, this study was primarily interested in the impact of maternal intelligence on infant death rates. While overall Pena 1999 showed an educational gradient, when the results were stratified by socioeconomic status, only women in the poorest households realised a benefit from increasing maternal education.

Developed countries

Similarly, the results from studies in developed countries generally conformed to the expected educational gradient. However in three studies, birthweight appeared to modify the impact of educational attainment on infant deaths (Bobak 1997; Chen 1998; Olsen 1999).

Teenage women

Hoyert 1990 found that overall there did not appear to be a clear relationship between educational attainment in teenagers and fetal mortality. However for African American teenage women in this study, increasing levels of education were associated with an increased risk of fetal mortality. Millar 1998 found a relationship between SGA and educational attainment for teenage women but did not adjust the analysis for any of the important confounding factors.





Community Resilience Summary

Resilience refers to the ability to react and adapt positively when faced with hardship and challenges. It can apply to individuals, families and communities, although the literature on individual resilience is considerably more developed than that on community resilience. Other concepts such as cohesion, social capital, social engagement, community strength and wellbeing share some similarities with community resilience. Communities are regarded as being inherently resilient, and this resilience can be tapped with appropriate support and encouragement.

Important features of community resilience are thought to include creation of opportunities and choices, strong relationships, education, level of social cohesion in a geographic area, service provisions and concentrating on community assets rather than deficits.

Initiatives in Aboriginal and Torres Strait Islander communities include family empowerment programs designed to address past hurt and also the challenges of being marginalised in an affluent society; and the concept of community functioning outlined and measured in the 2008 Aboriginal and Torres Strait Islander Health Performance Framework.

We located only one study that described a direct link between community resilience and infant mortality and allied outcomes. Birth outcomes for Latina mothers in the US are better than might be expected for women with this level of socioeconomic disadvantage – for example low birthweight and infant mortality rates are lower than the national averages for the US. This ‘Latina paradox’ is attributed to social and cultural factors maintained by community networks. However the protective effect was most pronounced for women born in Mexico and eroded in subsequent generations of mothers who were born in the US.

Although not directly reporting on infant mortality or other infant and baby outcomes, a number of authors have described the impact of community resilience on factors likely to be linked to infant mortality in some way. Improvements in the safety and health of communities have been linked with traditional culture and ways of life, with community renewal, absence of alcohol problems, importance of religion/spirituality, social connections and empowerment.

Even though there is very little direct evidence of links between community resilience and birth outcomes, it is plausible that ways to strengthen the resilience of families and communities may result in improved outcomes for babies and infants.

Some recent developments in Aboriginal and Torres Strait Islander communities are likely to bolster community resilience and this may in turn be reflected in better general health outcomes and better birth and infant outcomes, as well as addressing some of the intergenerational issues. Initiatives include integrating antenatal care provision with early childhood services and making these integrated or standalone services flexible and welcoming as well as encouraging women and families to drop in informally or for social interaction. An emphasis on educational attainment and achievement is important given the link between maternal education and infant mortality and other birth outcomes.

While community resilience may indeed make a positive contribution to maternal, infant and family health, the components and packages of various models of community resilience and functioning need to be evaluated and changes and refinements made accordingly. In addition, more understanding of which components of community resilience make the greatest contribution to improving short and long-term health outcomes, the pathways involved, and under which circumstances, will inform the design of targeted programs and ways to prevent or manage particular conditions.



Unplanned Pregnancy Summary

In 2007, the SA teenage pregnancy rate of 35.0 per 1000 was the lowest recorded since 1970.

Australia's overall teenage birth rate is about midrange for western countries, at 15 per 1000 women. The adolescent conception rate in Australia is about 45 per 1000, with the difference between this and the birth (fertility) rate being accounted for by terminations.

Both teenage pregnancy rates and birth rates are higher among Aboriginal and Torres Strait Islander women than non-Indigenous teenage women. In 2005, teenagers who gave birth in Australia were five times more likely to be Aboriginal and Torres Strait Islander women than other women – 22% versus 4% (19% versus 4% in SA).

In Victoria, numbers of births to Aboriginal and Torres Strait Islander teenagers are increasing. It is unclear whether this is due to better identification of teenagers as Aboriginal and Torres Strait Islander women, differing cultural practices, the desire to have babies at an earlier age, or whether this relates to poverty or a lack of access to family planning services.

In Australia, median age of first sexual intercourse is 16, and decreasing.

A considerable number of unplanned teenage pregnancies are 'semi-planned', where women say that while they were not intending to become pregnant, they did not mind being pregnant. This is sometimes reflected in patterns of inconsistent contraceptive use and is an important consideration regarding strategies for promoting contraception to teenagers.

While a higher risk of poor birth outcomes such as low birthweight is seen for births to teenage women, this is likely to be related more to the social circumstances of these young women rather than their age. The exception may be for the infants of mothers 15 years or younger, where postnatal death is higher than for adult mothers. Some of these additional postnatal deaths have been attributed to neglect.

Availability of social capital appears to be protective against unplanned teen pregnancy.

A second or subsequent teenage birth is more likely than a first teenage birth to lead into a life of poverty and deprivation, so some programs have focussed on trying to prevent rapid repeat births, with both comprehensive and targeted programs demonstrating that a number of subsequent births can be prevented.

Most of the decline in teenage births is attributed to improved contraceptive use.

Sex education in schools has been demonstrated to have positive effects on students' sexual health knowledge and on their sexual behaviours.

Comprehensive early childhood and youth development programs have shown reductions in teen pregnancies, as well as positive employment and education outcomes for young parents.



Suggestions

The following suggestions address general considerations of knowledge, care and systems. More specific suggestions for further action and research are given under individual topic and model sections in part 2 of the report.

Access to knowledge

Build on the resource created in this report to establish or extend an evidence and knowledge surveillance system for maternal, perinatal and infant health in Australia (the Victorian Department of Education and Early Childhood Development's catalogue of evidence-based interventions would be a good model to consider).

Establish a system to monitor the outcomes of programs and models relevant for Aboriginal and Torres Strait Islander women, and teenage women, and their infants; and disseminate findings to women, their families and carers.

Explore ways to ensure a maternal and perinatal section is maintained and updated on the national Australian Indigenous Health *Infonet* system.

Support the development and maintenance of relevant national evidence-based practice and care guidelines – national antenatal care guidelines (including consideration of the needs of Aboriginal and Torres Strait Islander women) and perinatal mental health guidelines are currently being prepared; national guidelines are also needed for preconception care, preterm birth and postnatal, for example.

Support and extend the current SA perinatal guidelines work; and ideally link into national systems.

Access to respectful and appropriate care, and choice

Ensure that services are welcoming, responsive and respectful, that they avoid conveying message of distrust, and are seen to value their clients.

Ensure services and structures enable and encourage Aboriginal and Torres Strait Islander women and teenage women to make choices and participate in decisions that directly affect their lives.

Access to high quality care, to continuity of care and to sustained care

Provide the option of antenatal services dedicated to Aboriginal and Torres Strait Islander women and their families, with such services ideally offering preconception and interpregnancy programs.

Community control and community involvement and partnerships

Establish a national network of Aboriginal and Torres Strait Islander maternal and perinatal services (analogous to the national neonatal network).

Preventative care

Use opportunities provided by the new National Preventative Health Taskforce to highlight the importance of primary, secondary and tertiary strategies for Aboriginal and Torres Strait Islander women and teenage women.



Evaluation, quality improvement and research

Encourage collaborative research capacity and provide opportunities for Aboriginal and Torres Strait Islander researchers, ideally as lead researchers.

Help disseminate gaps in the evidence and seek views of research priorities for maternal, perinatal and infant health at community, state and national levels.

Workforce and capacity building

Advocate for minimum percentages of Aboriginal and Torres Strait Islander people in health and health-related employment areas.

Ensure that all staff in health agencies who deal with Aboriginal and Torres Strait Islander women understand the concepts of cultural safety.

Longterm planning and outlook

Advocate for long term funding for models which are based both on evidence of what works and what is decided by Aboriginal and Torres Strait Islander communities as relevant and appropriate; and discourage short 'pilot' funding cycles.

Support and enable programs to take a long term view of initiatives to improve the health of Aboriginal and Torres Strait Islander women, teenage women, and their infants.





References

- Adetunji J. (1995) Infant mortality and mother's education in Ondo State, Nigeria. *Social Science and Medicine* 40(2): 253-63.
- Australian Health Ministers' Advisory Council. (2008) *Aboriginal and Torres Strait Islander Health Performance Framework Report 2008 Summary*. Canberra, ACT: AHMAC.
- AMA (Capolingua R). (2008). Ending the cycle of vulnerability: the health of Indigenous children. Indigenous Health Report Card 2008. Australian Medical Association: 1-8.
- Best Start (2007). Report on the Inquiry into the Health Benefits of Breastfeeding: the Best Start. Canberra, ACT: House of Representatives, The Parliament of the Commonwealth of Australia.
- Bobak M, Pikhart H, Koupilova I. (1997) Neonatal mortality of low birthweight babies is increased in mothers with higher education. *BMJ* 315(7112): 886.
- Boyle J, Rumbold AR, Clarke M, Hughes C, Kane S. (2008) Aboriginal and Torres Strait Islander women's health: acting now for a healthy future. *Aust N Z J Obstet Gynaecol* 48(6):526-8.
- Brooten D, Youngblut JM, Brown L, Finkler SA, Neff DF, Madigan E. (2001) A randomized trial of nurse specialist home care for women with high-risk pregnancies: outcomes and costs. *Am J Manag Care* 7(8):793-803.
- Chan A, Scott J, Nguyen A-M, Tucker G. (2008b) Pregnancy and Neonatal Care Bulletin 2007. Adelaide, Pregnancy Outcome Unit, SA Health, Government of South Australia.
- Chen J, Fair M, Wilkins R, Cyr M. (1998) Maternal education and fetal and infant mortality in Quebec. Fetal and Infant Mortality Study Group of the Canadian Perinatal Surveillance System. *Health Rep* 10(2): 53-64 (Eng)
- Close The Gap. (2008) National Indigenous Health Equality Targets: Outcomes from the National Health Equality Summit March 18-20. Canberra, Aboriginal and Torres Strait Islander Social Justice Commissioner, Steering Committee for Indigenous Health Equality.
- Collins JW, Jr., Martin CR. (1998) Relation of traditional risk factors to intrauterine growth retardation among United States-born and foreign-born Mexican Americans in Chicago. *Ethn Dis* 8(1): 21-5.
- Din-Dzietham R, Hertz-Picciotto I. (1998) Infant mortality differences between whites and African Americans: the effect of maternal education. *Am J Public Health* 88(4): 651-6.
- Eades S, Read A, Stanley F, Eades F, McCaullay D, Williamson A. (2008) Bibbulung Gnarneep ('solid kid'): Causal pathways to poor birth outcomes in an urban Aboriginal birth cohort. *Journal of Paediatrics and Child Health* 44:342-346.
- Elliott EJ, Bower C. (2004) FAS in Australia: fact or fiction? *J Paediatr Child Health* 40(1-2):8-10.
- Ewald D, Boughton B. (2002) Maternal education and child health: an exploratory investigation in a Central Australian aboriginal community. Occasional Papers Series. Darwin, NT: Cooperative Research Centre for Aboriginal and Tropical Health.
- Gray A. (1988) Aboriginal child survival. An analysis of results from the 1986 Census of Population and Housing. Canberra, ACT: Australian Bureau of Statistics.
- Gray A, Boughton B. (2001) Education and health behaviour of Indigenous Australians: evidence from the 1994 National Aboriginal and Torres Strait Islander Survey (NATSIS). Occasional Paper Series. Darwin, NT: Cooperative Research Centre for Aboriginal and Tropical Health.
- Hoyert DL. (1996) Fetal mortality by maternal education and prenatal care, 1990. *Vital Health Stat* 20 (30): 1-29.
- Kieffer EC, Mor JM, Alexander GR. (1994) The perinatal and infant health status of Native Hawaiians. *Am J Public Health* 84(9): 1501-4.
- Laws P, Hilder L. (2008) Australia's Mothers and babies 2006. Perinatal Statistics series no. 22. Cat. no. PER 46. Sydney, AIHW National Perinatal Statistics Unit.
- McEwan A, Tsey K, the Empowerment Research Team (2008) *The Role of Spirituality in Social and Emotional Wellbeing Initiatives: The Family Wellbeing Program at Yarrabah. Discussion Paper Series No. 7*. Darwin, NT: Cooperative Research Centre for Aboriginal Health.
- Millar WJ, Chen J. (1998) Maternal education and risk factors for small-for-gestational-age births. *Health Rep* 10(2): 43-51 (Eng); 47-56.
- Mitchell EA, Stewart AW et al. (1993). "Ethnic differences in mortality from sudden infant death syndrome in New Zealand.[see comment]." BMJ 306(6869): 13-16.
- Norbeck JS, DeJoseph JF, Smith RT. (1996) A randomized trial of an empirically-derived social support intervention to prevent low birthweight among African American women. *Soc Sci Med* 43(6):947-54.
- O'Dea K, Cunningham J, Maple-Brown L, Weeramanthri T, Shaw J, Dunbar T, Zimmet P. (2008) Diabetes and cardiovascular risk factors in urban Indigenous adults: Results from the DRUID study. *Diabetes Res Clin Pract* 80(3):483-9.
- Olds DL, Sadler L, Kitzman H. (2007) Programs for parents of infants and toddlers: recent evidence from randomized trials. *J Child Psychol Psychiatry* 48(3-4):355-91.
- Olsen O, Madsen M (1999). Effects of maternal education on infant mortality and stillbirths in Denmark. *Scandinavian Journal of Public Health* 27(2): 128-136.



Oyen N, Bulterys M, Welty TK, Kraus JF. (1990) Sudden unexplained infant deaths among American Indians and whites in North and South Dakota. *Paediatr Perinat Epidemiol* **4**(2): 175-83.

Parker JD, Schoendorf KC, Kiely JL. (1994) Associations between measures of socioeconomic status and low birth weight, small for gestational age, and premature delivery in the United States. *Ann Epidemiol* **4**(4): 271-8.

Pena R, Liljestrand J, Zelaya E, Persson LA. (1999) Fertility and infant mortality trends in Nicaragua 1964-1993. The role of women's education. *J Epidemiol Community Health* **53**(3): 132-7.

Pezzino G, Iyasu S. (1996) Sudden infant death syndrome among American Indians: United States 1983-1987. *J SIDS Infant Mortal* **1**(1): 3-11.

Pincock S. (2008) Indigenous health in Australia still lagging. *Lancet* **372**(9632):18.

PMSEIC. (2008) PMSEIC Working Group on Aboriginal and Torres Strait Islander health focusing on maternal, fetal and post-natal health. Prime Minister's Science, Engineering and Innovation Council (PMSEIC).

Sandiford P, Cassel J, Sanchez G, Coldham C. (1997) Does intelligence account for the link between maternal literacy and child survival? *Soc Sci Med* **45**(8): 1231-9.

SABPSAP. (2007) SA Breastfeeding Program Strategic and Action Plan 2007-2012. Adelaide, Children's Youth and Women's Health Service, Government of South Australia.

Singh GK, Yu SM. (1995) Infant mortality in the United States: trends, differentials, and projections, 1950 through 2010. *Am J Public Health* **85**(7): 957-64.

Stoltenberg C, Magnus P, Lie RT, Daltveit AK, Irgens LM. (1998) Influence of consanguinity and maternal education on risk of stillbirth and infant death in Norway, 1967-1993. *Am J Epidemiol* **148**(5): 452-9.





Appendices

List of team members

Appendix 1

Team members and their affiliations (named investigators, staff, and co-opted members)

| Middleton, Philippa | The University of Adelaide |
|----------------------------|---|
| Baghurst, Peter | Child, Youth and Women's Health Service |
| Bonner, Alex | The University of Adelaide |
| Chan, Annabelle | Child, Youth and Women's Health Service |
| Chong, Alwin | Aboriginal Health Council of South Australia |
| Coleman, Sheena | The University of Adelaide |
| Crowther, Caroline | The University of Adelaide |
| Dare, Marianna | CYWHS |
| Glover, Karen | Child, Youth and Women's Health Service |
| Gregory, Daisy | The University of Adelaide |
| Healy, Virginia | Nunkuwarrin Yunti |
| Koolmatrie, Jessica | The University of Adelaide |
| Kowanko, Inge | Flinders University of SA |
| Maier, Belinda | The University of Adelaide |
| Martis, Ruth | The University of Adelaide |
| Mitchell, Jill | Aboriginal Health Division, SA Department of Health |
| Nixon, Anne | SHine |
| Paleologos, Mary | The University of Adelaide |
| Reid, Jessica | The University of Adelaide |
| Robinson, Jeffrey | The University of Adelaide |
| Rumbold, Alice | The University of Adelaide |
| Smith, Jacki | The University of Adelaide |
| Staugas, Rima | Women's and Children's Hospital |
| Tooher, Rebecca | The University of Adelaide |
| Weetra, Donna | Southern Primary Health |

Abbreviations

| Abbreviation | Meaning |
|--------------|--|
| ABS | Australian Bureau of Statistics |
| ACCHS | Aboriginal Controlled Health Services |
| ADAC | Aboriginal Drug and Alcohol Council (SA) |
| AHAC | Aboriginal Health Advisory Committee |
| AHCSA | Aboriginal Health Council of South Australia |
| AHMAC | Australian Health Ministers' Advisory Council |
| AIHW | Australian Institute of Health and Welfare |
| AMA | Australian Medical Association |
| COAG | Council of Australian Governments |
| CRCAH | Corporative Research Centre for Aboriginal Health |
| DAA | Dieticians Association of Australia |
| NACCHO | National Aboriginal Community Controlled Health Organisation |
| NPDC | National Perinatal Data Set |
| NPSU | National Perinatal Statistics Unit |
| OATSIH | Office for Aboriginal and Torres Strait Islander Health |
| PHAA | Public Health Association of Australia |
| PHOs | Primary Health Care Organisations |
| PMSEIC | Prime Minister's Science, Engineering and Innovation Council |
| WHO | World Health Organization |
| | |
| AMIC worker | Aboriginal Maternal and Infant Care Worker |
| ATSI | Aboriginal and Torres Strait Islander |
| | |
| BMI | Body Mass Index |
| IPV | Intimate Partner Violence |
| IUGR | Intrauterine Growth Retardation |
| LBW | Low Body Weight |
| NTD | Neural Tube Defects |
| PPROM | Preterm Premature Rupture of Membrane |
| SGA | Small-for-Gestational-Age |
| SEWB | Social and Emotional wellbeing |
| SIDS/SUDI | Sudden Infant Death Syndrome/Sudden Unexpected Deaths in Infancy |
| VBAC | Vaginal Birth after Caesarean |