

**Statistical Series/70
ISSN 0816-2999**

**PERINATAL, INFANT AND MATERNAL MORTALITY
IN WESTERN AUSTRALIA
A TRIENNIAL COHORT OF 1999-2001 BIRTHS.**

December 2005

**Maternal and Child Health Unit
Health Data Collections
Information Collection and Management**

**Department of Health
Western Australia**

ACKNOWLEDGMENTS

The authors acknowledge the contribution of many people for input essential to this document.

- ♦ The midwives of Western Australia for their cooperation in providing the data related to all birth incidences;
- ♦ The Registry of Births, Deaths and Marriages for providing information on deaths of liveborn infants;
- ♦ The Australian Bureau of Statistics for population estimates;
- ♦ The clerical officers Ms Daelene Johnson and Ms Thelma Curran of the Maternal and Child Health, Health Data Collections, for coding and processing the 'Notification of Case Attended' forms.

FURTHER INFORMATION

Enquiries or comments on this publication and/or requests for additional information should be addressed to –

Manager, Maternal and Child Health
Health Data Collections
Information Collection and Management
Department of Health Western Australia
189 Royal Street
EAST PERTH WA 6004

Telephone: (08) 9222 4262
Facsimile: (08) 9222 4236
Email: vivien.gee@health.wa.gov.au

CITATION

The citation below should be used in reference to this publication.

Gee V and Green TJ. (2005). Perinatal, Infant and Maternal Mortality in Western Australia, 1999-2001. Department of Health, Perth, Western Australia.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	iv
1. INTRODUCTION.....	1
2. BIRTHS IN WESTERN AUSTRALIA IN 1999-2001	2
2.1 Births incidence	2
2.2 Crude birth rate.....	2
2.3 Condition at birth.....	2
2.4 Aboriginality of mother	2
2.5 Place of birth.....	2
2.6 Maternal place of residence.....	2
2.7 Maternal age	2
3. PERINATAL MORTALITY IN WESTERN AUSTRALIA IN THE 1999-2001 BIRTH COHORT	4
3.1 Perinatal deaths.....	4
3.1.1 Maternal age and parity	5
3.1.2 Birthweight and gender	5
3.1.3 Cause of death and plurality	5
3.2 Fetal deaths	5
3.2.1 Birthweight and gestational age	6
3.2.2 Gestational age and plurality	6
3.2.3 Cause and time of death for fetal deaths	6
3.2.4 Cause of death and Aboriginality of mother	6
3.3 Neonatal deaths	6
3.3.1 Birthweight and gestational age	6
3.3.2 Gestational age and plurality	7
3.3.3 Cause of death and age at death	7
3.3.4 Cause of death and Aboriginality of mother	7
4. INFANT MORTALITY IN WESTERN AUSTRALIA IN THE 1999-2001 BIRTH COHORT	8
4.1 Infant deaths	8
4.1.1 Maternal age and parity	9
4.1.2 Birthweight and gender	9
4.1.3 Gestational age and plurality	9
4.2 Post-neonatal deaths	9
4.2.1 Cause of death and age at death	9
4.2.2 Cause of death and Aboriginality of mother	9
5. MATERNAL MORTALITY IN WESTERN AUSTRALIA 1999-2001	10
5.1 Introduction	10
5.2 Classification of maternal deaths.....	10
5.3 Maternal deaths in 1981-2001	11
5.4 Trend of maternal mortality.....	11
5.5 Long term trend of maternal mortality	12
5.6 National and international comparisons	12

TABLES.....	13
REFERENCES.....	25
DEFINITIONS.....	26
APPENDICES	27
A. Notification of Case Attended Form 2 (MR15)	27
B. Medical Certificate of Cause of Stillbirth of Neonatal Death (BDM201)	28
C. Medical Certificate of Cause of Death (BDM202)	29

FIGURES

1. Crude birth rate, perinatal and infant mortality by health region of maternal residence for births in Western Australia, 1999-2001.....	3
2. Perinatal, fetal and neonatal mortality in Western Australia, 1999-2001	4
3. Perinatal mortality and Aboriginality of mother in Western Australia, 1999-2001.....	4
4. Infant, neonatal and post-neonatal mortality in Western Australia, 1999-2001	8
5. Infant mortality and Aboriginality of mother in Western Australia, 1999-2001.....	8
6. Trends in maternal mortality in Western Australia, 1931-2001	12

TABLES

Births

1. Live and total births by health region of maternal residence in Western Australia, 1999-2001	1
2. Crude birth rates and Aboriginality of mother in Western Australia, 1987-2001.....	13
3. Fetal, neonatal and post-neonatal deaths and fetal, perinatal and infant death rates by health region of maternal residence in Western Australia, 1999-2001.....	14
4. Fetal, neonatal and perinatal deaths and Aboriginality of mother in Western Australia, 1999-2001	14
5. Fetal, neonatal and perinatal death rates and Aboriginality of mother in Western Australia, 1987-2001	14

Perinatal Mortality

6. Condition at birth and gender of births in Western Australia, 1999-2001	15
7. Condition at birth and Aboriginality of mother for births in Western Australia, 1999-2001	15
8. Condition at birth and place of birth for births in Western Australia, 1999-2001	15
9. Maternal age and parity of perinatal deaths in Western Australia, 1999-2001	16

Perinatal Mortality (continued)

10.	Maternal age and Aboriginality of Mother for all births in Western Australia, 1999-2001.....	16
11.	Birthweight and gender of perinatal deaths in Western Australia, 1999-2001.....	16
12.	Cause of death and plurality of perinatal deaths in Western Australia, 1999-2001, PSANZ-PDC classification of perinatal deaths..	17
13.	Cause of death and plurality of neonatal deaths in Western Australia, 1999-2001, PSANZ-NDC classification of perinatal deaths..	17
14.	Fetal, neonatal and perinatal deaths and autopsy in Western Australia, 1999-2001..	17
15.	Birthweight and gestational age of fetal deaths in Western Australia, 1999-2001.....	18
16.	Birthweight and gestational age of all births in Western Australia, 1999-2001	18
17.	Gestational age and plurality of fetal deaths in Western Australia, 1999-2001	18
18.	Cause of death and time of death of fetal deaths in Western Australia, 1999-2001	19
19.	Cause of death and Aboriginality of mother of fetal deaths in Western Australia, 1999-2001.....	19
20.	Birthweight and gestational age of neonatal deaths in Western Australia, 1999-2001	20
21.	Gestational age and plurality of neonatal deaths in Western Australia, 1999-2001	20
22.	Cause of death and age at death of neonatal deaths in Western Australia, 1999-2001	21
23.	Cause of death and Aboriginality of mother of neonatal deaths in Western Australia, 1999-2001	21

Infant Mortality

24.	Neonatal, post-neonatal and infant deaths and Aboriginality of mother in Western Australia, 1999-2001.....	22
25.	Neonatal, post-neonatal and infant death rates and Aboriginality of mother in Western Australia, 1987-2001.....	22
26.	Maternal age and parity of infant deaths in Western Australia, 1999-2001	23
27.	Birthweight and gender of infant deaths in Western Australia, 1999-2001	23
28.	Gestational age and plurality of infant deaths in Western Australia, 1999-2001	23
29.	Cause of death and age at death of post-neonatal deaths in Western Australia, 1999-2001	24
30.	Cause of death and Aboriginality of mother of post-neonatal deaths in Western Australia, 1999-2001	24

EXECUTIVE SUMMARY

The Maternal and Child Health data collections record perinatal, infant and maternal deaths on an ongoing basis in Western Australia. This Report presents an overview of mortality data for the triennium 1999-2001 categorised by mortality grouping. It also describes trends over the fifteen year period from 1987 to 2001.

Births in Western Australia

- During the triennium 75,938 babies were born to 74,689 women with 99.3% of births being liveborn.
- Births occurred in hospital for 99.2% of women and 72.7% of women were resident in the Perth Metropolitan area.
- The crude birth rate of 13.3 per 1000 total population for the triennium has decreased from 16.1 per 1000 in 1987.
- Mothers in their teenage years accounted for 5.9% of births and women aged 40 years or more represented 2.4%.
- Aboriginal mothers represented 6.5% of all birthing women and the crude birth rate for these women was twice that of the overall rate.

Perinatal Mortality

- Perinatal deaths during the triennium were comprised of 551 fetal deaths (7.3 per 1000 total births) and 215 neonatal deaths (2.9 per 1000 livebirths). This provided a perinatal mortality rate of 10.1 per 1000 total births.
- The majority of fetal deaths occurred during the antenatal period (51.1%). The principal causes for all perinatal deaths were related to prematurity and/or congenital anomalies.
- Birthweight, gestational age and plurality influence birth outcomes and a corresponding decrease in the fetal wellbeing is demonstrated as birthweight and gestational age decrease.

Infant Mortality

- There were 339 infant deaths identified during the triennium providing an infant mortality rate of 4.5 per 1000 livebirths. This rate has reduced from 8.2 per 1000 in 1987. Among babies of Aboriginal mothers the infant mortality rate of 16.4 per 1000 was more than four times that of the rate for babies of non-Aboriginal women (3.7 per 1000). This may be attributed to the high proportion of deaths among babies of Aboriginal mothers in the post-neonatal period (7.5 per 1000 livebirths) being six times the rate recorded for babies of non-Aboriginal women.
- Causes of infant death are principally Sudden Infant Death Syndrome (SIDS), lethal congenital anomaly, low birthweight and infection. Among babies of Aboriginal women a third were of an unknown cause, while infections (22.2%) and Sudden Infant Death Syndrome (SIDS) (22.2%) were the principal causes of death during the post-neonatal period.

Maternal Mortality

- The maternal mortality rate for the triennium (1999-2001) was 5.3 per 100,000 livebirths in Western Australia.
- During the thirteen year period, 1989-2001, twenty two maternal deaths were reported in Western Australia. This represents a maternal mortality rate of 6.7 per 100,000 livebirths. In accordance with prescribed definitions these deaths have been classified as thirteen direct, five indirect and four incidental maternal deaths.
- Trend data for Western Australia shows a dramatic improvement in maternal mortality rates which halved every ten years from 1931 to 1980. Since that time an average of 1.4 maternal deaths per year were recorded providing a maternal mortality rate of 5.8 per 100,000 livebirths for that 21 year period. This rate compares favourably with a national maternal mortality rate of 8.2 per 100,000 livebirths for the 3 year period 1997-1999.

1. INTRODUCTION

Aims

This report is the second triennial report in a continuing series examining perinatal and infant mortality in Western Australia since 1984. The aim of compiling the data in this report is to measure relationships of mortality among infants with consideration of variables such as maternal race, maternal age, parity, conjugal state and infant plurality, gestation and birthweight. The Report also includes information about maternal mortality in Western Australia.

This report relates to a cohort of childbearing women and their babies, born in the period 1999-2001 and includes information on birth outcomes to the age of twelve months. Prior to 1984, mortality data was calculated according to year of death rather than year of birth.

Epidemiological studies in the area of infant mortality are naturally long term and this report compiles basic factual data which will assist research aimed at limiting human loss in future years.

Data Sources

The Western Australian Midwives' Notification System formed the basis of this triennial report of perinatal, infant and maternal mortality¹.

Information relating to deaths was obtained from the Registry of Births, Deaths and Marriages, the Hospital Morbidity Data System, and the Australian Bureau of Statistics (Western Australian Branch). As far as can be determined from the above-mentioned sources, the data relating to the number of deaths in this report is complete.

Information on deaths of Western Australians who die outside the State was not received by this Department and therefore could not be included in this Report.

A computer file of deaths was created and linked to the Midwives' Notification System. This provided a comprehensive database from which this report was written. After all follow up procedures were complete, linkage was 100% successful. Intercensal estimates of total population of Western Australia and Statistical Divisions, and female populations by age were supplied by the Australian Bureau of Statistics (Western Australian Branch).

2. BIRTHS IN WESTERN AUSTRALIA IN 1999-2001

2.1 Births incidence

Notifications by midwives received by this department indicate that 75,939 babies were born (Table 1) to 74,689 women during the 1999-2001 triennium. This report includes statistics on all births of 20 weeks or more gestation, or a birthweight of 400 grams or more¹.

2.2 Crude birth rate

An overall crude birth rate of 13.3 per 1000 total population was identified for Western Australia during 1999-2001, less than half that recorded for Aboriginal women (29.2 per 1000). The crude birth rate has decreased from 16.1 per 1000 in 1987 to 13.0 per 1000 in 2001 (Table 2). The crude birth rates are highest in health regions with the highest proportions of Indigenous people (Figure 1).

2.3 Condition at birth

Analysis of the condition at birth showed 75,387 (99.3%) babies were liveborn and 551 (0.7%) babies were stillborn. There were 4821 (98.6%) livebirths to Aboriginal women and 67 (1.4%) fetal deaths. For non-Aboriginal women there were 70,566 (99.3%) livebirths and 484 (0.7%) fetal deaths (Table 7).

2.4 Aboriginality of mother

Examination of births showed that 4888 (6.4%) babies were born to Aboriginal women, and 71,050 (93.6%) to non-Aboriginal women (Table 7).

2.5 Place of birth

The majority of total births, 75,316 (99.2%), occurred in hospital. Of these, births in metropolitan hospitals numbered 58,586 (77.1%) and non-metropolitan hospital births were 16,730 (22.0%). There were 621 (0.8%) non hospital births including 229 (0.3%) born before arrival at hospital and 392 (0.5%) planned supervised homebirths (Table 8).

2.6 Maternal place of residence

Assessment of usual place of residence of birth mothers throughout the State shows that the majority of births 55,108 (72.6%) were to women who lived within one of the Perth Metropolitan Health Regions (Table 1).

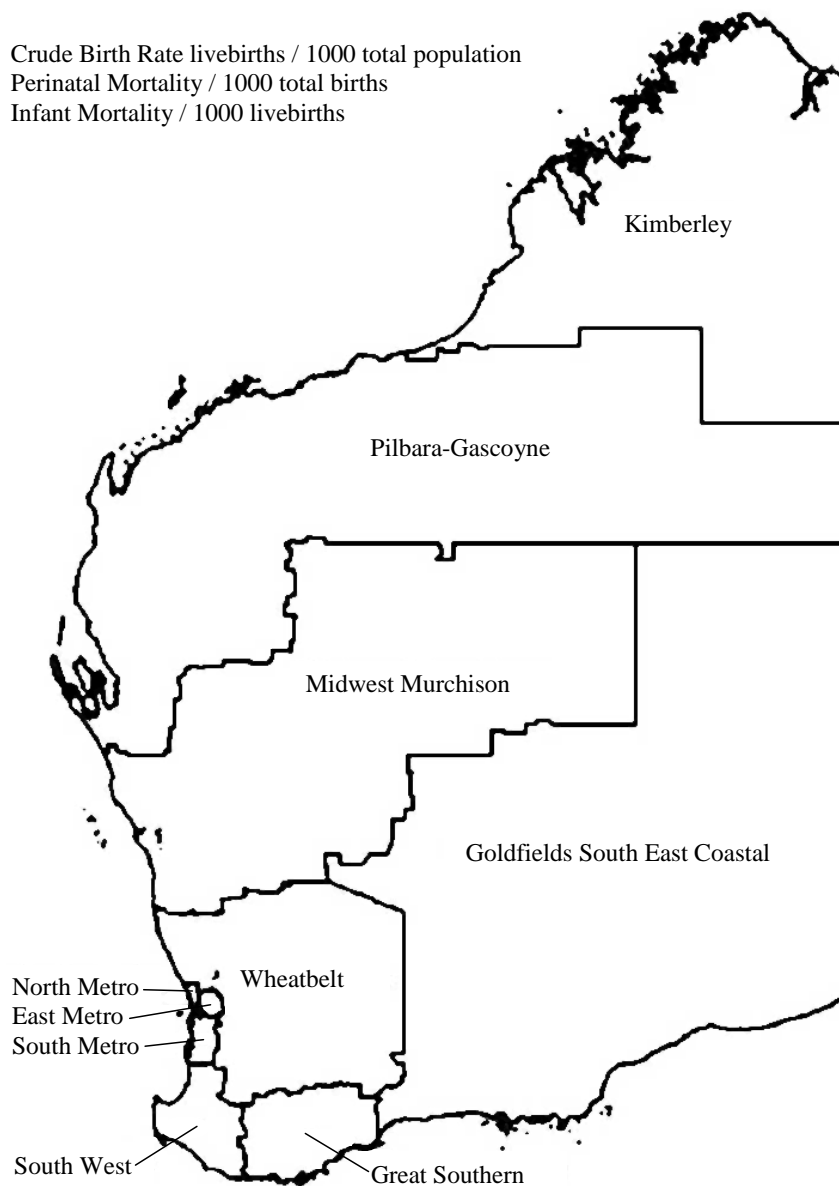
2.7 Maternal age

Consideration of maternal age in five year age groups shows that the highest percentages of women confined were in the 25 to 29 year age category (30.8%) and the 30 to 34 year age category (30.5%). Women in their teenage years accounted for 5.9% of total confinements. Almost a quarter (23.6%) of Aboriginal women confined were teenagers in contrast with non-Aboriginal women of whom 4.7% were teenagers. Women aged 40 years or more represented 2.4% of all women confined (Table 10).

Figure 1:

Crude Birth Rate, Perinatal and Infant Mortality and Health Region of maternal residence for births in Western Australia, 1999-2001

Crude Birth Rate livebirths / 1000 total population
 Perinatal Mortality / 1000 total births
 Infant Mortality / 1000 livebirths



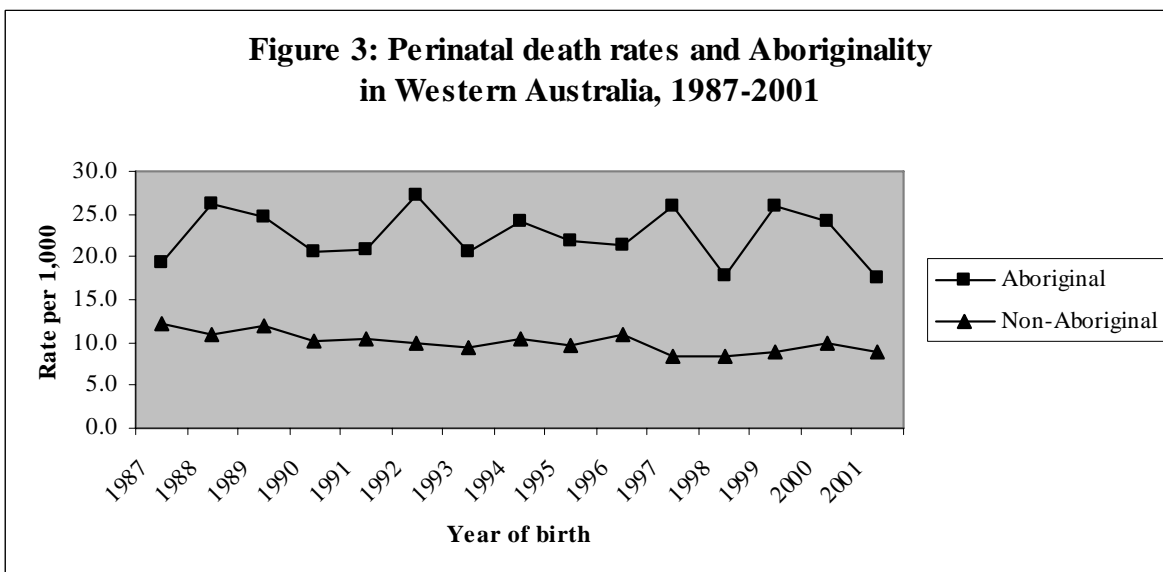
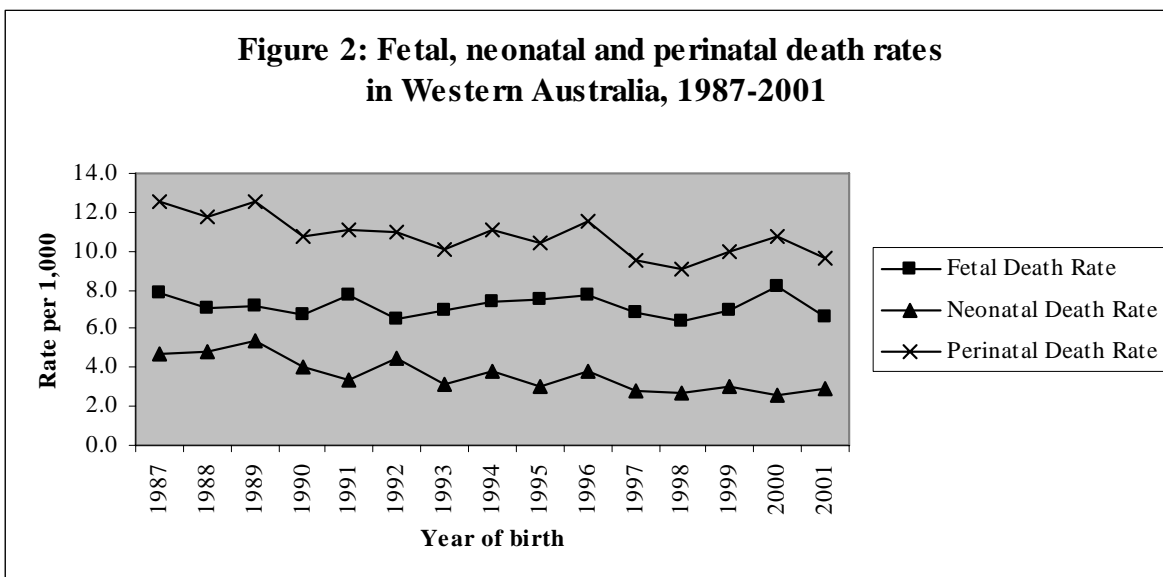
Health Region	Crude Birth Rate	Perinatal Mortality	Infant Mortality
Kimberley	21.8	21.4	12.8
Pilbara Gascoyne	17.8	14.5	8.3
Midwest Murchison	16.0	12.5	7.1
Wheatbelt	13.9	10.4	4.9
Goldfields SE Coastal	18.7	14.0	6.1
South West	13.6	11.2	3.7
Great Southern	14.0	5.9	4.5
North Metro	12.6	8.6	3.5
East Metro	13.3	9.1	3.7
South Metro	14.2	9.8	4.3
Total WA	13.3	10.1	4.5

3. PERINATAL MORTALITY IN WESTERN AUSTRALIA IN THE 1999-2001 BIRTH COHORT

3.1 Perinatal deaths

There were 766 perinatal deaths identified in the 1999-2001 birth cohort providing a perinatal mortality rate of 10.1 per 1000 total births (Table 4 and Figure 2).

Trend data on individual years shows that there has been a gradual reduction, over the fifteen year period, in the overall rate from 12.5 per 1000 in 1987 to 9.6 per 1000 in 2001. However, although the rate for babies of Aboriginal mothers was 17.6 per 1000 in 2001, the rates for 1999 and 2000 were both among the highest six rates recorded during the 15 year period (Table 5 and Figure 3).



3.1.1 Maternal age and parity

Perinatal deaths of babies born to first time mothers numbered 334 with a rate of 10.8 per 1000 total births. Of these, 59 were born to teenage mothers with a rate of 16.2 per 1000. This rate is slightly higher than the overall rate of perinatal deaths to babies of teenage mothers (15.1 per 1000, Table 9).

3.1.2 Birthweight and gender

More than three quarters of the perinatal deaths were of low birthweight providing a rate of 113.4 per 1000 total births. The ratio of male to female perinatal deaths was 1.14:1 (Table 11).

3.1.3 Cause of death and plurality

Perinatal deaths in Western Australia have been classified, retrospectively, in accord with the Perinatal Society of Australia and New Zealand's Perinatal Death Cause (PSANZ-PDC)². This classification system indicated that congenital abnormality was the cause of 26.3% of deaths with a further 21.7% being spontaneous preterm (<37 weeks). A further 13.2% were unexplained antepartum fetal deaths. Among multiple birth perinatal deaths 46.7% were attributed to spontaneous preterm (<37 weeks) and 21.1% to specific perinatal conditions. A further 14.4% of multiple birth perinatal deaths were due to congenital abnormalities incompatible with life. (Table 12).

Information relating to cause of death was gained from autopsy for 57.0% of perinatal deaths while 39.8% of perinatal deaths were not examined. It is not known whether or not an autopsy was performed for the remaining 3.1% of deaths (Table 14).

3.2 Fetal deaths

There were 551 fetal deaths in Western Australia during 1999-2001 providing a fetal death rate for the triennium in Western Australia of 7.3 per 1000 total births (Table 3).

Fetal death proportions relating to the Health Region of maternal residence are shown in Table 2 and Figure 1. Among babies of Aboriginal mothers the fetal death rate was high (13.7 per 1000) compared with that for babies of non-Aboriginal women (6.8 per 1000) (Table 4).

3.2.1 Birthweight and gestational age

There was a corresponding decrease in the fetal death rate as birthweight increased, except among babies with birthweight in excess of 4000 grams. For low birthweight babies the rate of fetal death was 83.4 per 1000. As gestation increased the fetal death rate fell as shown by a rate of 518.0 per 1000 for fetal deaths at 20-27 weeks in contrast with the rate of 1.6 per 1000 for births at 37-42 weeks (Table 15).

3.2.2 Gestational age and plurality

The fetal death proportion for all multiple births (20.0 per 1000 total births) compares unfavourably with fetal death rate for all singleton births (6.8 per 1000). The rate of fetal death among babies of 28-32 weeks gestation for singleton births (75.1 per 1000) was almost twice that for multiple births (44.2 per 1000). Among babies born 20-27 weeks gestation singleton births had a higher fetal mortality rate (542.6 per 1000) than did multiple births (370.0 per 1000, Table 17).

3.2.3 Cause and time of death for fetal deaths

Of the 551 fetal deaths during the triennium there were 282 (51.2%) antepartum deaths and 197 (35.8%) intrapartum deaths. It was not known when the remaining 73 (13.2%) fetal deaths occurred. The principal causes were those related to conditions of extremely low birth weight (215, 39.0%) and lethal congenital anomaly (138, 25.0%). An additional 116 (21.1%) fetal deaths were not able to be classified for cause (Table 18).

3.2.4 Cause of death and Aboriginality of mother

Among fetal deaths to women recorded as Aboriginal the proportion of deaths due to lethal congenital anomaly (10.4%) was lower than for fetal deaths of babies born to non-Aboriginal women (27.1%). Low birthweight contributed to more fetal deaths of babies born to Aboriginal women (52.2%) than for those born to non-Aboriginal women (37.2%) (Table 19).

3.3 Neonatal deaths

There were 215 neonatal deaths in Western Australia during the 1999-2001 triennium cohort indicating a neonatal mortality rate of 2.9 per 1000 livebirths. For babies of Aboriginal women neonatal mortality was 8.9 per 1000 which is far greater than that recorded for babies of non-Aboriginal women (2.4 per 1000) (Table 20 and Table 24).

3.3.1 Birthweight and gestational age

In general the neonatal death rate decreases as birthweight increases, with the exception of those babies with birthweight greater than 4500 grams. All but one neonatal death of 32 or less weeks gestation are classified as low birthweight. Overall more than half (157, 73.0%) of all neonatal deaths were low birthweight (Table 20).

3.3.2 Gestational age and plurality

Consideration of neonatal death rates by plurality for all gestational ages shows a marked difference, the singleton rate (2.5 per 1000 livebirths) being considerably lower than the rate for multiple births (15.0 per 1000). In contrast, the rates for the 20-27 weeks gestational age grouping are very similar (351.7 per 1000 singleton livebirths and 333.3 per 1000 multiple births, Table 21).

3.3.3 Cause of death and age at death

The principal causes of neonatal deaths of livebirths aged less than a day were attributed to low birthweight (57.0%) and lethal congenital anomaly (29.0%). Early neonatal deaths, those who died at less than 8 days, numbered 170 (79.8%). Causes of neonatal death among these were complications related to low birthweight (51.8%) and with anomalies incompatible with life (28.8%, Table 22).

3.3.4 Cause of death and Aboriginality of mother

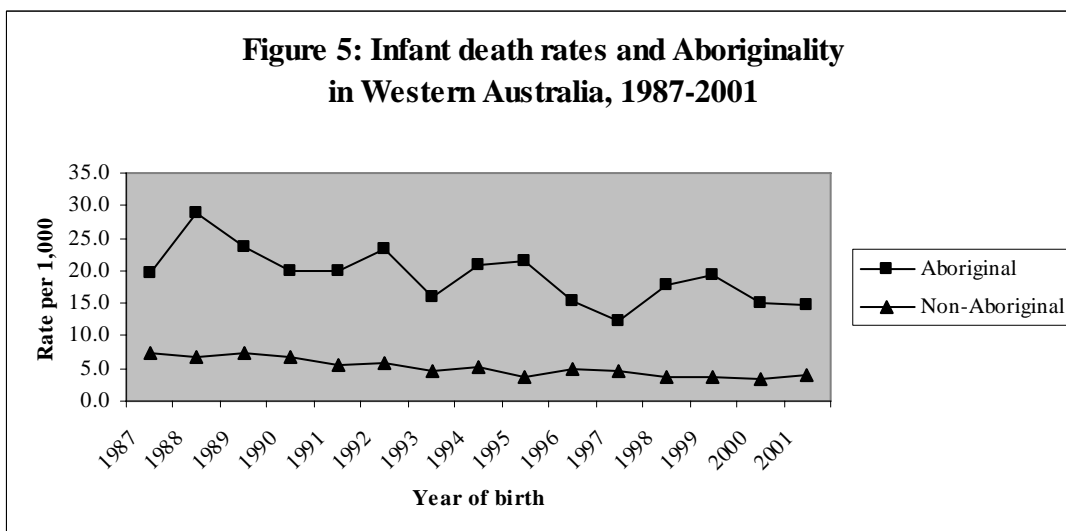
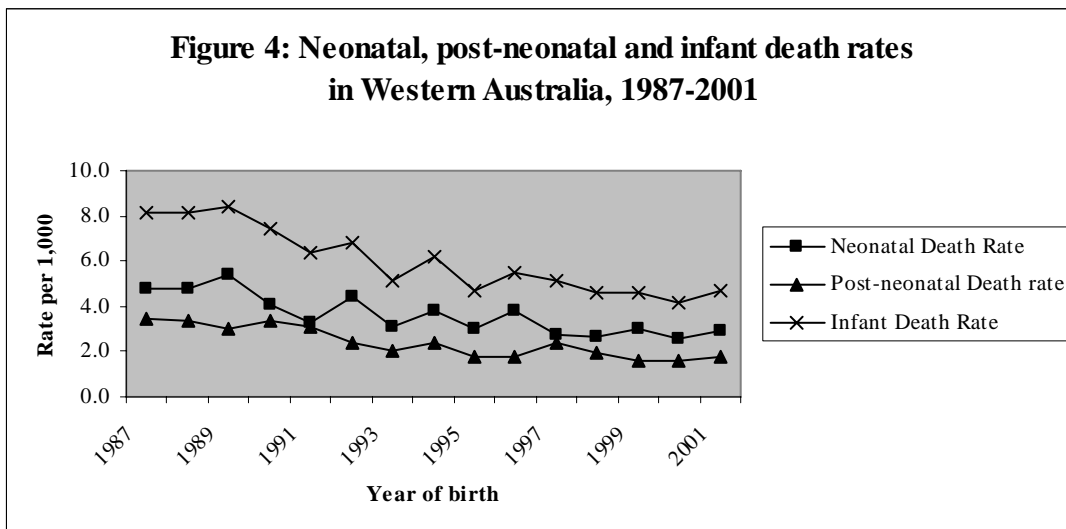
Among neonatal deaths where the mother was recorded as Aboriginal the proportion of deaths due to factors associated with low birthweight (48.8%) was similar to that for babies of non-Aboriginal women (50.0%). Likewise the proportion of neonatal deaths among babies of Aboriginal mothers attributed to lethal congenital anomaly was relatively similar to the proportion for those identified as non-Aboriginal. (Table 23).

4. INFANT MORTALITY IN WESTERN AUSTRALIA IN THE 1999-2001 BIRTH COHORT

4.1 Infant deaths

There were 339 infant deaths identified amongst the 75,387 livebirths in the 1999-2001 triennium. Of these, 215 were neonatal deaths and 124 were post-neonatal deaths. The infant mortality rate for Western Australia in 1999-2001 was 4.5 per 1000 livebirths (Table 24). Over the 15 year period from 1987-2001 there has been a gradual decrease in the infant mortality rate from 8.2/1000 in 1987 to 4.7/1000 in 2001 (Table 25 and Figure 4).

Infant mortality among babies born to Aboriginal women (16.4 per 1000) in the triennium was more than four times that for babies born to non-Aboriginal women (3.7 per 1000) (Table 24). Although infant mortality rates among both groups have reduced overall, the rate for babies of Aboriginal mothers in 2001 per 1000 remains more than three times the rate for babies of non-Aboriginal mothers being 14.7 per 1000 and 4.0 per 1000 respectively in 2001 (Table 25 and Figure 5).



4.1.1 Maternal age and parity

There were 41 (12.1%) infant deaths among babies of teenage mothers during the 1999-2001 triennium. Of these, 34 (82.9%) were the first born and 7 (17.1%) were born to mothers having a parity of one or two (Table 26).

4.1.2 Birthweight and gender

Low birthweight was recorded for 201 (41.9%) infant deaths during the 1999-2001 triennium. Male babies suffered higher rates of infant death in both the low birthweight (50.9 per 1000 versus 34.2 per 1000) and the overall category (5.2 per 1000 versus 3.7 per 1000). The mortality rates for both male and female decreased as birthweight increased with the exception of births greater than 4500 grams (Table 27).

4.1.3 Gestational age and plurality

The rate of infant mortality among multiple births (17.9 per 1000 livebirths) was more than four times the rate of singleton births (4.1 per 1000, Table 28).

4.2 Post-neonatal deaths

There were 124 post-neonatal deaths among the 75,387 livebirths during the 1999-2001 triennium, providing a rate of 1.6 per 1000 livebirths (Table 24).

The post-neonatal mortality rate for babies of Aboriginal women was 7.5 per 1000 livebirths, more than six times the rate of 1.2 per 1000 for babies of non-Aboriginal women (Table 24).

Post-neonatal deaths in relation to Health Region of maternal residence are shown in Table 3. It should be noted however, that due to small numbers of births in some Regions the rates vary from year to year and may be considered unrepresentative even on a triennial basis.

4.2.1 Cause of death and age at death

Among post neonatal deaths where cause is known, the principal causes of death were Sudden Infant Death Syndrome (SIDS) (25.0%), lethal congenital anomaly (21.0%) and infection (12.1%). There were a further 32 babies (25.8%) for whom cause of post neonatal death was not known. Among post neonatal deaths during the 9-12 week period, 45.5% of deaths were attributed to SIDS (Table 29).

4.2.2 Cause of death and Aboriginality of mother

Among post-neonatal deaths of babies born to Aboriginal women a third (33.3%) were of unknown cause and (22.2%) were attributed to SIDS. Infection (22.2%) was also a major cause. The proportion of resulting from lethal congenital anomalies was lower among babies of Aboriginal mothers 13.9% than that for babies of non-Aboriginal women (23.9%)(Table 30).

5. MATERNAL MORTALITY IN WESTERN AUSTRALIA 1999-2001

5.1 Introduction

Maternal mortality as defined by the World Health Organization is the death of a woman during pregnancy, childbirth or in the 42 days of the puerperium. Classification of deaths in Western Australia is defined in accordance with the NHMRC Triennial Reports on Maternal Mortality for Australia³. Thus, maternal mortality is the death of woman during pregnancy, childbirth or the puerperium. The puerperium normally refers to the 42 days after pregnancy, but deaths occurring after 42 days are also included if their origin and illness relates to the pregnancy and/or birthing process.

This definition includes deaths from abortion and ectopic pregnancy, but excludes deaths from assisted reproduction technology where pregnancy has not yet occurred.

5.2 Classification of maternal deaths

Maternal mortality as defined by the World Health Organisation provides for deaths to be classified into three groups:

Direct maternal deaths – resulting from obstetric complications of the pregnant state (pregnancy, labour and puerperium), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above – they are complications of the pregnancy itself (for example, eclampsia, rupture of the uterus, postpartum haemorrhage).

Indirect obstetric deaths – resulting from pre-existing disease or disease that developed during pregnancy and was not due to direct obstetric causes, but which may have been aggravated by the physiological effects of pregnancy (for example, heart disease, diabetes, renal disease).

Incidental deaths – due to conditions occurring during pregnancy, where the pregnancy is unlikely to have contributed significantly to the death, although it is sometimes possible to postulate a distant association (for example, road accidents, malignancies and suicide). It is often difficult to decide whether a death is an indirect or an incidental death. For example, death from a self-administered overdose could be an accident or a suicide, and may or may not have been due to some effect on the woman of the pregnant state.

Maternal mortality rates are calculated per 100,000 live births.

5.3 Maternal deaths in 1981-2001

During the period 1981–2001 there were 30 maternal deaths. However, a paucity of information available in the data collection means that the WHO Classification can only be applied to the 23 maternal deaths reported over the period from 1989 to 2001. These 23 deaths, based on information from death certificates and classified in accord with prescribed definitions, would appear to be, thirteen direct maternal deaths, six indirect maternal deaths and four incidental maternal deaths.

Of the thirteen direct maternal deaths, three occurred at the time of delivery with the principal cause being haemorrhage. A further nine deaths occurred post delivery as a result of pulmonary embolus, haemorrhage and septicaemia. The remaining direct maternal death was due to a ruptured ectopic pregnancy.

Among the six indirect deaths, two were as a result of maternal suicide, two resulted from cerebral haemorrhage during pregnancy, one resulting from cardiomyopathy and one from an amniotic fluid embolus during pregnancy.

The cause of the four deaths classified as incidental maternal deaths included motor vehicle accidents and manslaughter during pregnancy.

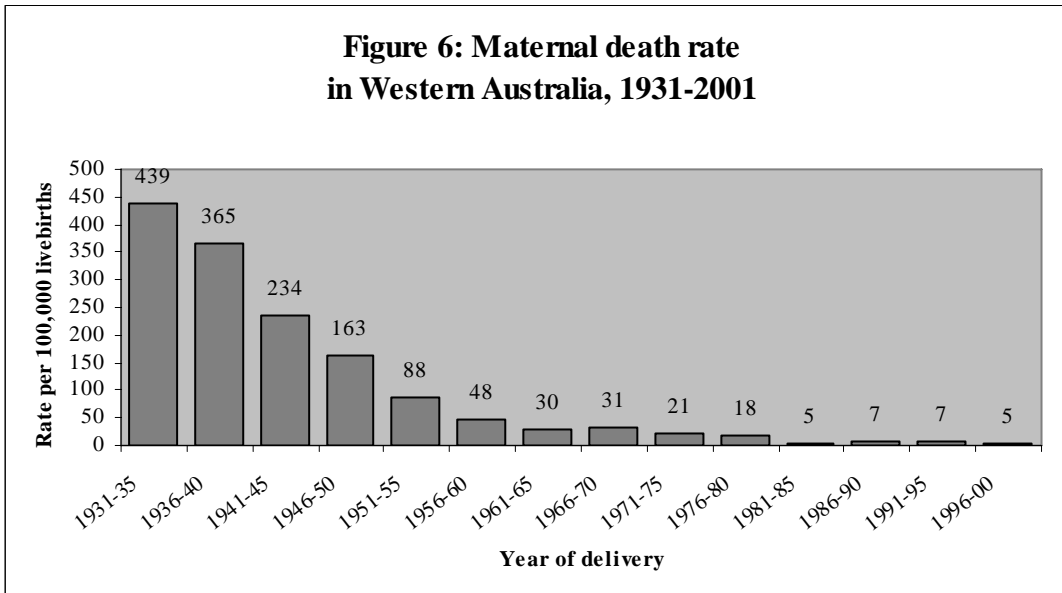
5.4 Trend of maternal mortality

Examination of maternal deaths in Western Australia showed that during the 21 year period from 1981 to 2001 there were 30 reported maternal deaths resulting in an average of 1.4 maternal deaths per year or a maternal mortality death rate of 5.8 per 100,000 livebirths for that period⁴.

Year	Maternal Deaths	Livebirths in WA	Rate per 100,000
1981-85	5	111,982	4.5
1986-90	7	123,828	5.7
1991-95	9	125,624	7.1
1996-98	5	75,997	6.5
1999-01	4	75,387	5.3
1981-01	30	513,637	5.8

5.5 Long term trend of maternal mortality

The accompanying figure shows the dramatic improvement in the maternal mortality rate for Western Australia which more than halved every ten years between 1931 and 1970. From that time the rate of decline of maternal mortality rates eased to a rate of 4.7 per 100,000 livebirths for the years 1996 to 2000.



5.6 National and international comparisons

The World Health Organisation estimates that approximately 500,000 women die each year due to complications of pregnancy and childbirth. Of these women 99 per cent are from African, Asian and Latin American countries⁵.

Considering international differences in methods of ascertainment and reporting, the most recent Australian national report⁵ focused on comparable countries for which the ICD-10 definition of maternal death was used for classification, uniformity in reporting and calculations of cases with an inclusion criteria of 42 days after delivery.

This evaluation showed the Western Australian rate of 5.3 per 100,000 livebirths for the 1999 to 2001 period was lower than the reported Australian national statistic of 8.2 per 100,000 livebirths during the years 1997 to 1999.

Among other developed countries maternal mortality rates reported for the 1997 to 1999 period were for Canada 5.1 per 100,000, France 9.6 per 100,000, United Kingdom 11.4 per 100,000, United States of America 11.8 per 100,000 and South Korea 15.2 per 100,000⁵.

It is therefore appropriate to record that the decline in the Western Australian maternal mortality rate to 5.3 per 100,000 livebirths for the 1999 to 2001 period compares favourably with Australian national and international maternal mortality rates.

Table 1: Live and total births by health region of maternal residence in Western Australia, 1999-2001

Health Region of Residence	1999				2000				2001			
	Live Births		Total Births		Live Births		Total Births		Live Births		Total Births	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Metropolitan												
North	6083	23.8	6124	23.8	5922	23.7	5955	23.6	6073	24.5	6113	24.5
East	6149	24.0	6186	24.0	6161	24.6	6212	24.6	5897	23.8	5934	23.8
South	6262	24.5	6294	24.4	6084	24.3	6139	24.3	6108	24.7	6151	24.7
Total Metropolitan	18494	72.3	18604	72.2	18167	72.6	18306	72.6	18078	73.0	18198	73.0
Country												
Kimberley	643	2.5	650	2.5	713	2.8	722	2.9	671	2.7	680	2.7
Pilbara Gascoyne	928	3.6	936	3.6	861	3.4	871	3.5	870	3.5	877	3.5
Midwest Murchison	821	3.2	829	3.2	816	3.3	823	3.3	741	3.0	747	3.0
Wheatbelt	1057	4.1	1069	4.1	1008	4.0	1014	4.0	1002	4.0	1005	4.0
Goldfields SE Coastal	1098	4.3	1107	4.3	1000	4.0	1013	4.0	1009	4.1	1021	4.1
South West	1742	6.8	1762	6.8	1700	6.8	1720	6.8	1666	6.7	1674	6.7
Great Southern	787	3.1	791	3.1	718	2.9	720	2.9	703	2.8	705	2.8
Total Country	7076	27.6	7144	27.7	6816	27.2	6883	27.3	6662	26.9	6709	26.9
Outside WA	22	0.1	23	0.1	39	0.2	39	0.2	33	0.1	33	0.1
TOTAL	25592	100.0	25771	100.0	25022	100.0	25228	100.0	24773	100.0	24940	100.0

Table 2: Crude birth rates and Aboriginality of mother in Western Australia, 1987-2001

Year of Birth	Aboriginal			Non-Aboriginal			Total		
	Live Births	Population	Crude Birth Rate	Live Births	Population	Crude Birth Rate	Live Births	Population	Crude Birth Rate
1987	1329	40397	32.9	22686	1455851	15.6	24015	1496248	16.1
1988	1428	41575	34.3	23553	1536859	15.3	24981	1578434	15.8
1989	1431	42722	33.5	23928	1535712	15.6	25359	1578434	16.1
1990	1542	43979	35.1	24302	1569070	15.5	25844	1613049	16.0
1991	1464	45213	32.4	23351	1590854	14.7	24815	1636067	15.2
1992	1412	46304	30.5	23747	1611046	14.7	25159	1657350	15.2
1993	1436	47436	30.3	23724	1628987	14.6	25160	1676423	15.0
1994	1431	48488	29.5	23806	1652576	14.4	25237	1701064	14.8
1995	1444	49442	29.2	23811	1681720	14.2	25255	1731162	14.6
1996	1425	50353	28.3	23960	1715385	14.0	25385	1765738	14.4
1997	1549	51369	30.2	23547	1746760	13.5	25096	1798129	14.0
1998	1506	52517	28.7	24011	1778882	13.5	25517	1831399	13.9
1999	1603	53778	29.8	23989	1807238	13.3	25592	1861016	13.8
2000	1587	55021	28.8	23435	1827207	12.8	25022	1882228	13.3
2001	1631	56274	29.0	23142	1849840	12.5	24773	1906114	13.0

Table 3: Fetal, neonatal and postneonatal deaths and fetal, perinatal and infant death rates by health region of maternal residence in Western Australia, 1999-2001

Health Region of Residence	Fetal Deaths		Neonatal Deaths		Postneonatal Deaths		Fetal deaths		Perinatal deaths		Infant deaths	
	No.	%	No.	%	No.	%	No.	Rate	No.	Rate	No.	Rate
Metropolitan												
North	114	20.7	42	19.5	22	17.7	114	6.3	156	8.6	64	3.5
East	124	22.5	43	20.0	24	19.4	124	6.8	167	9.1	67	3.7
South	130	23.6	52	24.2	28	22.6	130	7.0	182	9.8	80	4.3
Total Metropolitan	368	66.8	137	63.7	74	59.7	368	6.7	505	9.2	211	3.9
Country												
Kimberley	25	4.5	19	8.8	7	5.6	25	12.2	44	21.4	26	12.8
Pilbara Gascoyne	25	4.5	14	6.5	8	6.5	25	9.3	39	14.5	22	8.3
Midwest Murchison	21	3.8	9	4.2	8	6.5	21	8.8	30	12.5	17	7.1
Wheatbelt	21	3.8	11	5.1	4	3.2	21	6.8	32	10.4	15	4.9
Goldfields SE Coastal	34	6.2	10	4.7	9	7.3	34	10.8	44	14.0	19	6.1
South West	48	8.7	10	4.7	9	7.3	48	9.3	58	11.2	19	3.7
Great Southern	8	1.5	5	2.3	5	4.0	8	3.6	13	5.9	10	4.5
Total Country	182	33.0	78	36.3	50	40.3	182	8.8	260	12.5	128	6.2
Outside WA	1	0.2	0	0.0	0	0.0	1	10.5	1	10.5	0	0.0
TOTAL	551	100.0	215	100.0	124	100.0	551	7.3	766	10.1	339	4.5

Table 4: Fetal, neonatal and perinatal deaths and Aboriginality of mother in Western Australia, 1999-2001

Aboriginality of Mother	Fetal deaths		Neonatal deaths		Perinatal deaths	
	No.	Rate	No.	Rate	No.	Rate
Aboriginal	67	13.7	43	8.9	110	22.5
Non-Aboriginal	484	6.8	172	2.4	656	9.2
TOTAL	551	7.3	215	2.9	766	10.1

Table 5: Fetal, neonatal and perinatal death rates and Aboriginality of mother in Western Australia, 1987-2001

Year of Birth	Fetal Death Rate			Neonatal Death Rate			Perinatal Death Rate		
	Non-Aboriginal			Non-Aboriginal			Non-Aboriginal		
	Aboriginal	Aboriginal	Total	Aboriginal	Aboriginal	Total	Aboriginal	Aboriginal	Total
1987	13.4	7.5	7.8	6.0	4.7	4.7	19.3	12.1	12.5
1988	14.5	6.6	7.0	11.9	4.4	4.8	26.2	10.9	11.8
1989	15.8	6.7	7.2	9.1	5.2	5.4	24.8	11.8	12.6
1990	10.9	6.5	6.7	9.7	3.7	4.1	20.5	10.1	10.8
1991	14.8	7.3	7.8	6.1	3.1	3.3	20.9	10.4	11.0
1992	15.3	6.0	6.5	12.0	4.0	4.5	27.2	10.0	10.9
1993	13.7	6.5	6.9	7.0	2.9	3.1	20.6	9.4	10.0
1994	16.5	6.8	7.4	7.7	3.5	3.8	24.1	10.3	11.1
1995	13.0	7.1	7.5	9.0	2.6	3.0	21.9	9.7	10.4
1996	14.5	7.4	7.8	7.0	3.6	3.8	21.5	10.9	11.5
1997	20.9	5.9	6.8	5.2	2.6	2.7	25.9	8.4	9.5
1998	9.9	6.2	6.4	8.0	2.3	2.7	17.8	8.5	9.0
1999	13.5	6.5	6.9	12.5	2.4	3.0	25.8	8.9	9.9
2000	16.7	7.6	8.2	7.6	2.3	2.6	24.2	9.8	10.7
2001	10.9	6.4	6.7	6.7	2.7	2.9	17.6	9.0	9.6

Table 6: Condition at birth and gender of births in Western Australia, 1999-2001

Gender	Condition at Birth				TOTAL	
	Livebirth		Fetal death		No.	%
	No.	%	No.	%		
Male	38468	51.0	280	50.8	38748	51.0
Female	36919	49.0	271	49.2	37190	49.0
TOTAL	75387	100.0	551	100.0	75938	100.0

Table 7: Condition at birth and Aboriginality of mother for births in Western Australia, 1999-2001

Aboriginality of Mother	Condition at Birth				TOTAL		Fetal death rate
	Livebirth		Fetal death		No.	%	
	No.	%	No.	%			
Aboriginal	4821	6.4	67	12.2	4888	6.4	13.7
Non-Aboriginal	70566	93.6	484	87.8	71050	93.6	6.8
TOTAL	75387	100.0	551	100.0	75938	100.0	7.3

Table 8: Condition at birth and place of birth for births in Western Australia, 1999-2001

Place of Birth	Condition at Birth				TOTAL		Fetal death rate
	Livebirth		Fetal death		No.	%	
	No.	%	No.	%			
Metropolitan							
Teaching	14244	18.9	328	59.5	14572	19.2	22.5
Department	18639	24.7	45	8.2	18684	24.6	2.4
Private	25256	33.5	75	13.6	25331	33.4	3.0
Country							
Regional	10142	13.5	68	12.3	10210	13.4	6.7
Private	1435	1.9	5	0.9	1440	1.9	3.5
Other	5059	6.7	21	3.8	5080	6.7	4.1
Non-Hospital							
Homebirths	392	0.5	-	-	392	0.5	-
BBA	220	0.3	9	1.6	229	0.3	39.3
TOTAL	75387	100.0	551	100.0	75938	100.0	7.3

Table 9: Maternal age and parity of perinatal deaths in Western Australia, 1999-2001

Maternal Age	Parity								TOTAL	
	0		1-2		3-4		≥ 5		No.	Rate
≤ 15	9	42.3	-	-	-	-	-	-	9	41.1
16	7	17.2	3	100.0	-	-	-	-	10	23.0
17	14	19.5	-	-	-	-	-	-	14	17.3
18	13	12.3	2	9.8	-	-	-	-	15	11.8
19	16	13.0	3	6.4	-	-	-	-	19	11.1
≤ 19	59	16.2	8	10.0	-	-	-	-	67	15.1
20-24	57	8.7	60	10.8	8	15.4	1	37.0	126	9.9
25-29	97	9.6	98	8.7	31	18.1	2	7.5	228	9.8
30-34	85	11.0	98	7.6	18	8.3	12	24.5	213	9.2
35-39	31	12.5	52	8.8	11	7.2	10	24.4	104	10.0
40-44	3	7.8	18	20.5	3	7.9	2	14.8	26	14.7
≥ 45	2	87.0	-	-	-	-	-	-	2	29.9
TOTAL	334	10.8	334	9.0	71	11.2	27	20.2	766	10.1

Table 10: Maternal age and Aboriginality of Mother for all births in Western Australia, 1999-2001

Maternal Age	Aboriginal		Non-Aboriginal		TOTAL	
	No.	%	No.	%	No.	%
≤ 15	129	2.7	89	0.1	218	0.3
16	164	3.4	270	0.4	434	0.6
17	257	5.3	543	0.8	800	1.1
18	289	6.0	970	1.4	1259	1.7
19	301	6.2	1398	2.0	1699	2.3
≤ 19	1140	23.6	3270	4.7	4410	5.9
20-24	1525	31.6	11019	15.8	12544	16.8
25-29	1211	25.1	21784	31.2	22995	30.8
30-34	662	13.7	22152	31.7	22814	30.5
35-39	244	5.1	9896	14.2	10140	13.6
40-44	40	0.8	1683	2.4	1723	2.3
≥ 45	1	0.0	62	0.1	63	0.1
TOTAL	4823	100.0	69866	100.0	74689	100.0

Table 11: Birthweight and gender of perinatal deaths in Western Australia, 1999-2001

Birth weight	Gender				TOTAL	
	Male		Female		No.	Rate
	No.	Rate	No.	Rate		
< 500	119	983.5	140	985.9	259	984.8
500-999	103	517.6	78	400.0	181	459.4
1000-1499	29	123.4	25	94.3	54	108.0
1500-1999	23	49.1	20	40.3	43	44.6
2000-2499	28	19.8	28	16.5	56	18.0
< 2500	302	124.0	291	104.2	593	113.4
2500-2999	39	7.4	23	3.4	62	5.2
3000-3499	31	2.4	24	1.7	55	2.0
3500-3999	21	1.7	16	1.6	37	1.6
4000-4499	13	2.9	2	0.8	15	2.1
≥ 4500	2	2.4	2	5.4	4	3.4
TOTAL	408	10.5	358	9.6	766	10.1

Table 12: Cause of death and plurality of perinatal deaths in Western Australia, 1999-2001
PSANZ-PDC classification of perinatal deaths

Cause of Death	Plurality				TOTAL	
	Singleton		Multiple		No.	%
	No.	%	No.	%		
Congenital abnormality	188	27.9	13	14.4	201	26.3
Perinatal infection	42	6.2	1	1.1	43	5.6
Hypertension	17	2.5	1	1.1	18	2.4
Antepartum haemorrhage	67	9.9	1	1.1	68	8.9
Maternal conditions	25	3.7	1	1.1	26	3.4
Specific perinatal conditions	36	5.3	19	21.1	55	7.2
Hypoxic peripartum death	39	5.8	4	4.4	43	5.6
Foetal growth restriction	24	3.6	4	4.4	28	3.7
Spontaneous preterm (< 37 weeks)	124	18.4	42	46.7	166	21.7
Unexplained antepartum death	98	14.5	3	3.3	101	13.2
No obstetric antecedent	15	2.2	1	1.1	16	2.1
TOTAL	675	100.0	90	100.0	765	100.0

* Excludes 1 singleton deaths not classified

Table 13: Cause of death and plurality of neonatal deaths in Western Australia, 1999-2001
PSANZ-NDC classification of neonatal deaths

Cause of Death	Plurality				TOTAL	
	Singleton		Multiple		No.	%
	No.	%	No.	%		
Congenital abnormality	52	29.2	6	16.7	58	27.1
Extreme prematurity	49	27.5	14	38.9	63	29.4
Cardio-respiratory disorders	13	7.3	6	16.7	19	8.9
Infection	17	9.6	2	5.6	19	8.9
Neurological	26	14.6	6	16.7	32	15.0
Gastrointestinal	4	2.2	-	-	4	1.9
Other (inc. SIDS)	17	9.6	2	5.6	19	8.9
TOTAL	178	100.0	36	100.0	214	100.0

Excludes 1 singleton death not classified

Table 14: Fetal, neonatal and perinatal deaths and autopsy in Western Australia, 1999-2001

Autopsy	Fetal deaths		Neonatal deaths		Perinatal deaths	
	No.	%	No.	%	No.	%
Yes	338	61.3	99	46.0	437	57.0
No	200	36.3	105	48.8	305	39.8
Unknown	13	2.4	11	5.1	24	3.1
TOTAL	551	100.0	215	100.0	766	100.0

Table 15: Birthweight and gestational age of fetal deaths in Western Australia, 1999-2001

Birth weight	Gestational Age								TOTAL	
	20-27		28-32		33-36		37-43		No.	Rate
	No.	Rate	No.	Rate	No.	Rate	No.	Rate		
< 500	210	826.8	6	857.1	-	-	1	1000.0	217	828.2
500-999	98	324.5	19	218.4	1	200.0	-	-	118	299.5
1000-1499	8	145.5	24	62.8	8	129.0	-	-	40	80.0
1500-1999	-	-	11	29.3	10	19.0	3	47.6	24	24.9
2000-2499	-	-	2	22.2	22	13.8	13	9.2	37	11.9
< 2500	316	517.2	62	65.8	41	18.7	17	11.5	436	83.4
2500-2999	1	1000.0	1	111.1	14	8.4	27	2.6	43	3.6
3000-3499	-	-	-	-	6	10.5	31	1.2	37	1.3
3500-3999	-	-	-	-	-	-	22	1.0	22	1.0
4000-4499	-	-	-	-	1	76.9	10	1.4	11	1.6
≥ 4500	-	-	-	-	-	-	2	1.7	2	1.7
TOTAL	317	518.0	63	65.6	62	13.6	109	1.6	551	7.3

Rate is number of deaths per 1000 total births in each birthweight category.

Table 16: Birthweight and gestational age of all births in Western Australia, 1999-2001

Birth weight	Gestational Age								TOTAL	
	20-27		28-32		33-36		37-43		No.	%
	No.	%	No.	%	No.	%	No.	%		
< 500	254	41.5	7	0.7	-	-	1	0.0	262	0.3
500-999	302	49.3	87	9.1	5	0.1	-	-	394	0.5
1000-1499	55	9.0	382	39.8	62	1.4	1	0.0	500	0.7
1500-1999	-	-	376	39.2	525	11.5	63	0.1	964	1.3
2000-2499	-	-	90	9.4	1599	35.0	1418	2.0	3107	4.1
< 2500	611	99.8	942	98.1	2191	47.9	1483	2.1	5227	6.9
2500-2999	1	0.2	9	0.9	1674	36.6	10323	14.8	12007	15.8
3000-3499	-	-	7	0.7	571	12.5	26922	38.6	27500	36.2
3500-3999	-	-	2	0.2	114	2.5	22794	32.7	22910	30.2
4000-4499	-	-	-	-	13	0.3	7058	10.1	7071	9.3
≥ 4500	-	-	-	-	8	0.2	1183	1.7	1191	1.6
TOTAL	612	100.0	960	100.0	4571	100.0	69763	100.0	75906	100.0

Excludes 12 Babies for whom birthweight was not recorded

Table 17: Gestational age and plurality of fetal deaths in Western Australia, 1999-2001

Gestation	Plurality				TOTAL	
	Singleton		Multiple		No.	Rate
	No.	Rate	No.	Rate		
20-27	280	#REF!	37	370.0	317	514.6
28-32	50	76.2	13	42.6	63	65.6
33-36	60	16.8	2	2.0	62	13.6
37-43	107	1.6	2	1.9	109	1.6
TOTAL	497	6.8	54	22.0	551	7.3

Table 18: Cause of death and time of death of fetal deaths in Western Australia, 1999-2001

Cause of Death	Time of Death						TOTAL	
	Antepartum		Intrapartum		Unknown		No.	%
	No.	%	No.	%	No.	%		
Lethal congenital anomaly	27	9.6	82	41.6	29	40.3	138	25.0
Extremely low birthweight	106	37.6	82	41.6	27	37.5	215	39.0
Unknown	88	31.2	18	9.1	10	13.9	116	21.1
Maternal Obstetric	7	2.5	2	1.0	1	1.4	10	1.8
Maternal Medical	8	2.8	-	-	-	-	8	1.5
Maternal Hypertension	1	0.4	-	-	-	-	1	0.2
Placenta and Cord	38	13.5	13	6.6	5	6.9	56	10.2
Other	7	2.5	-	-	-	-	7	1.3
TOTAL	282	100.0	197	100.0	72	100.0	551	100.0

Table 19: Cause of death and Aboriginality of mother of fetal deaths in Western Australia, 1999-2001

Cause of Death	Aboriginality of Mother				TOTAL	
	Aboriginal		Non-Aboriginal		No.	%
	No.	%	No.	%		
Lethal congenital anomaly	7	10.4	131	27.1	138	25.0
Extremely low birthweight	35	52.2	180	37.2	215	39.0
Unknown	12	17.9	104	21.5	116	21.1
Maternal obstetric	2	3.0	8	1.7	10	1.8
Maternal medical	3	4.5	5	1.0	8	1.5
Maternal hypertension	1	1.5	-	-	1	0.2
Placenta and cord	7	10.4	49	10.1	56	10.2
Other	-	-	7	1.4	7	1.3
TOTAL	67	100.0	484	100.0	551	100.0

Table 20: Birthweight and gestational age of neonatal deaths in Western Australia, 1999-2001

Birth weight	Gestational Age								TOTAL	
	20-27		28-32		33-36		37-42		No.	Rate
	No.	Rate	No.	Rate	No.	Rate	No.	Rate		
< 500	41	911.1	1	1000.0	-	-	-	-	42	913.0
500-999	59	287.8	3	44.1	1	250.0	-	-	63	227.4
1000-1499	4	85.1	8	22.3	2	37.0	-	-	14	30.4
1500-1999	-	-	9	24.7	10	19.4	-	-	19	20.2
2000-2499	-	-	1	11.4	12	7.6	6	4.3	19	6.2
< 2500	104	350.2	22	25.0	25	11.6	6	4.1	157	32.8
2500-2999	-	-	1	125.0	3	1.8	15	1.5	19	1.6
3000-3499	-	-	-	-	2	3.5	16	0.6	18	0.7
3500-3999	-	-	-	-	1	8.8	14	0.6	15	0.7
4000-4499	-	-	-	-	-	-	4	0.6	4	0.6
≥ 4500	-	-	-	-	-	-	2	1.7	2	1.7
TOTAL	104	350.2	23	25.6	31	6.9	57	0.8	215	2.9

Table 21: Gestational age and plurality of neonatal deaths in Western Australia, 1999-2001

Gestation	Plurality				TOTAL	
	Singleton		Multiple		No.	Rate
	No.	Rate	No.	Rate		
20-27	83	351.7	21	333.3	104	347.8
28-32	17	28.1	6	20.5	23	25.6
33-36	22	6.2	9	9.1	31	6.9
37-42	57	0.8	-	-	57	0.8
≥ 43	-	-	-	-	-	-
TOTAL	179	2.5	36	15.0	215	2.9

Table 22: Cause of death and age at death of neonatal deaths in Western Australia, 1999-2001

Cause of Death	Age at Death (days)											TOTAL No.
	0 No.	1 No.	2 No.	3 No.	4 No.	5 No.	6 No.	7 No.	8-14 No.	15-21 No.	22-28 No.	
Lethal Congenital Anomaly	27	8	4	1	1	2	3	3	6	2	1	58
Low birthweight	53	19	7	6	1	1	1	-	11	4	2	105
Asphyxia	4	3	2	1	1	3	-	-	1	2	1	18
Pregnancy conditions	2	-	1	-	-	-	-	-	-	-	-	3
Infection	2	1	1	-	-	-	-	1	1	1	1	8
Hydrops fetalis	2	-	-	-	-	-	-	-	-	-	-	2
Other	1	-	-	-	-	1	-	-	1	-	-	3
SIDS	-	-	-	1	-	-	-	-	2	-	1	4
Unknown	2	3	1	-	-	-	-	-	4	2	-	12
TOTAL	93	34	16	9	3	7	4	4	26	11	6	213
	%	%	%	%	%	%	%	%	%	%	%	%
Lethal Congenital Anomaly	29.0	23.5	25.0	11.1	33.3	28.6	75.0	75.0	23.1	18.2	16.7	27.2
Low birthweight	57.0	55.9	43.8	66.7	33.3	14.3	25.0	-	42.3	36.4	33.3	49.3
Asphyxia	4.3	8.8	12.5	11.1	33.3	42.9	-	-	3.8	18.2	16.7	8.5
Pregnancy conditions	2.2	-	6.3	-	-	-	-	-	-	-	-	1.4
Infection	2.2	2.9	6.3	-	-	-	-	25.0	3.8	9.1	16.7	3.8
Hydrops fetalis	2.2	-	-	-	-	-	-	-	-	-	-	0.9
Other	1.1	-	-	-	-	14.3	-	-	3.8	-	-	1.4
SIDS	-	-	-	11.1	-	-	-	-	7.7	-	16.7	1.9
Unknown	2.2	8.8	6.3	-	-	-	-	-	15.4	18.2	-	5.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Excludes 2 neonates for whom age at death was unknown.

Table 23: Cause of death and Aboriginality of mother of neonatal deaths in Western Australia, 1999-2001

Cause of Death	Aboriginality of Mother				TOTAL	
	Aboriginal		Non-Aboriginal		No.	%
	No.	%	No.	%		
Lethal Congenital Anomaly	10	23.3	48	27.9	58	27.0
Low birthweight	21	48.8	86	50.0	107	49.8
Asphyxia	4	9.3	14	8.1	18	8.4
Pregnancy conditions	2	4.7	1	0.6	3	1.4
Infection	1	2.3	7	4.1	8	3.7
Hydrops fetalis	-	-	2	1.2	2	0.9
Other	-	-	3	1.7	3	1.4
SIDS	3	7.0	1	0.6	4	1.9
Unknown	2	4.7	10	5.8	12	5.6
TOTAL	43	100.0	172	100.0	215	100.0

Table 24: Neonatal, postneonatal and infant deaths and Aboriginality of mother in Western Australia, 1999-2001

Aboriginality of Mother	Neonatal deaths		Postneonatal deaths		Infant deaths	
	No.	Rate	No.	Rate	No.	Rate
Aboriginal	43	8.9	36	7.5	79	16.4
Non-Aboriginal	172	2.4	88	1.2	260	3.7
TOTAL	215	2.9	124	1.6	339	4.5

Table 25: Neonatal, postneonatal and infant death rates and Aboriginality of mother in Western Australia, 1987-2001

Year of Birth	Neonatal Death Rate			Postneonatal Death Rate			Infant Death Rate		
	Aboriginal	Non-Aboriginal	Total	Aboriginal	Non-Aboriginal	Total	Aboriginal	Non-Aboriginal	Total
1987	6.0	4.7	4.7	13.5	2.8	3.4	19.6	7.5	8.2
1988	11.9	4.4	4.8	16.8	2.5	3.3	28.7	6.9	8.1
1989	9.1	5.2	5.4	14.7	2.3	3.0	23.8	7.5	8.4
1990	9.7	3.7	4.1	10.4	2.9	3.4	20.1	6.6	7.4
1991	6.1	3.1	3.3	13.7	2.4	3.1	19.8	5.5	6.4
1992	12.0	4.0	4.5	11.3	1.9	2.4	23.4	5.9	6.8
1993	7.0	2.9	3.1	9.1	1.6	2.1	16.0	4.5	5.2
1994	7.7	3.5	3.8	13.3	1.8	2.4	21.0	5.3	6.2
1995	9.0	2.6	3.0	12.5	1.1	1.7	21.5	3.7	4.7
1996	7.0	3.6	3.8	8.4	1.3	1.7	15.4	4.9	5.5
1997	5.2	2.6	2.7	7.1	2.0	2.4	12.3	4.6	5.1
1998	8.0	2.3	2.7	10.0	1.5	2.0	17.9	3.8	4.6
1999	12.5	2.4	3.0	6.9	1.2	1.6	19.3	3.6	4.6
2000	7.6	2.3	2.6	7.6	1.2	1.6	15.1	3.5	4.2
2001	6.7	2.7	2.9	8.0	1.3	1.8	14.7	4.0	4.7

Table 26: Maternal age and parity of infant deaths in Western Australia, 1999-2001

Maternal Age	Parity								TOTAL	
	0		1-2		3-4		≥ 5		No.	Rate
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
≤ 15	7	33.8			-	-	-	-	7	32.9
16	3	7.4	1	37.0	-	-	-	-	4	9.3
17	8	11.3	2	22.2	-	-	-	-	10	12.5
18	11	10.5	2	9.8	-	-	-	-	13	10.4
19	5	4.1	2	4.3	-	-	-	-	7	4.1
≤ 19	34	9.5	7	8.8	-	-	-	-	41	9.3
20-24	29	4.4	42	7.6	9	17.4	1	37.0	81	6.4
25-29	32	3.2	35	3.1	24	14.2	4	15.1	95	4.1
30-34	29	3.8	32	2.5	6	2.8	7	14.5	74	3.2
35-39	10	4.1	21	3.6	3	2.0	6	14.9	40	3.9
40-44	-	-	5	5.8	2	5.3	-	-	7	4.0
≥ 45	1	45.5	-	-	-	-	-	-	1	15.2
TOTAL	135	4.4	142	3.8	44	7.0	18	13.6	339	4.5

Table 27: Birthweight and gender of infant deaths in Western Australia, 1999-2001

Birth weight	Gender				TOTAL	
	Male		Female		No.	Rate
	No.	Rate	No.	Rate	No.	Rate
< 500	22	956.5	21	913.0	43	934.8
500-999	42	313.4	31	216.8	73	263.5
1000-1499	11	51.9	11	44.4	22	48
1500-1999	15	32.7	10	20.8	25	27
2000-2499	23	16.5	15	8.9	38	12
< 2500	113	50.9	88	34.2	201	41.9
2500-2999	32	6.1	14	2.1	46	3.8
3000-3499	28	2.1	20	1.4	48	1.7
3500-3999	19	1.5	13	1.3	32	1.4
4000-4499	7	1.6	2	0.8	9	1.3
≥ 4500	2	2.4	1	2.7	3	2.5
TOTAL	201	5.2	138	3.7	339	4.5

Table 28: Gestational age and plurality of infant deaths in Western Australia, 1999-2001

Gestation	Plurality				TOTAL	
	Singleton		Multiple		No.	Rate
	No.	Rate	No.	Rate	No.	Rate
20-27	91	385.6	25	396.8	116	388.0
28-32	29	47.9	7	24.0	36	40.1
33-36	38	10.8	10	10.1	48	10.6
37-42	138	2.0	1	0.9	139	2.0
≥ 43	-	-	-	-	-	-
TOTAL	296	4.1	43	17.9	339	4.5

Table 29: Cause of death and age at death of postneonatal deaths in Western Australia, 1999-2001

Cause of Death	Age at Death (weeks)						TOTAL No.
	5-8 No.	9-12 No.	13-16 No.	17-20 No.	21-24 No.	25-52 No.	
SIDS	5	10	5	2	5	4	31
Lethal Congenital Anomaly	5	5	3	4	2	7	26
Infection	3	4	1	1	2	4	15
Other	5	-	4	-	2	4	15
Unknown	13	3	6	1	-	9	32
Prematurity	2	-	1	1	1	-	5
TOTAL	33	22	20	9	12	28	124
	%	%	%	%	%	%	%
SIDS	15.2	45.5	25.0	22.2	41.7	14.3	25.0
Lethal Congenital Anomaly	15.2	22.7	15.0	44.4	16.7	25.0	21.0
Infection	9.1	18.2	5.0	11.1	16.7	14.3	12.1
Other	15.2	-	20.0	-	16.7	14.3	12.1
Unknown	39.4	13.6	30.0	11.1	-	32.1	25.8
Prematurity	6.1	-	5.0	11.1	8.3	-	4.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 30: Cause of death and Aboriginality of mother of postneonatal deaths in Western Australia, 1999-2001

Cause of Death	Aboriginality of Mother				TOTAL	
	Aboriginal		Non-Aboriginal		No.	%
	No.	%	No.	%	No.	%
SIDS	8	22.2	23	26.1	31	25.0
Lethal Congenital Anomaly	5	13.9	21	23.9	26	21.0
Infection	8	22.2	7	8.0	15	12.1
Other	3	8.3	12	13.6	15	12.1
Unknown	12	33.3	20	22.7	32	25.8
Prematurity	-	-	5	5.7	5	4.0
TOTAL	36	100.0	88	100.0	124	100.0

REFERENCES :

1. Gee V and O'Neill MT. (2002). *Perinatal Statistics in Western Australia, 2001. Nineteenth Annual report of the Western Australian Midwives' Notification System.* Department of Health. Perth, Western Australia.
2. Perinatal Society of Australia and New Zealand (PSANZ) online: www.psanz.org
3. National Health Medical Research Council and Australian Institute of Health and Welfare (2001). *Report on Maternal Deaths in Australia, 1994-96.* Canberra. Commonwealth of Australia.
4. Giles PFH. (1992). *The Report of the Maternal Mortality Committee 1989-1991.* Department of Health. Perth, Western Australia.
5. Slaytor EK, Sullivan EA & King JF 2004. *Maternal deaths in Australia 1997-1999.* AIHW Cat.No.PER 24. Sydney: AIHW National Perinatal Statistics Unit. (Maternal Deaths Series No.1) www.npsu.unsw.edu.au/md1high.htm

DEFINITIONS :

ABORIGINALITY :

Identification as of Aboriginal and/or Torres Straight Islander origin.

Refers to mother's identification, not that of the baby or of the father of the baby.

BIRTHWEIGHT :

The first weight, measured to the nearest five grams, of the newborn. It is usually obtained within the first hour of birth.

Low Birthweight A birthweight of less than 2500 grams

Very Low Birthweight A birthweight of less than 1500 grams

Extremely Low Birthweight A birthweight of less than 1000 grams

CONGENITAL ANOMALY :

Any defect present at birth, probably of developmental origin.

CRUDE BIRTH RATE :

The number of livebirths per 1000 person-years of total population.

FETAL DEATH :

The complete expulsion or extraction from its mother, of a product of conception of at least 20 weeks gestation and/or 400 grams birthweight, which after separation did not show any sign of life.

INFANT DEATH :

The death of a liveborn infant within the first year of life.

LIVEBIRTH :

The complete expulsion or extraction from its mother of a product of conception, irrespective of duration of pregnancy, which after separation shows signs of life.

MORTALITY PROPORTIONS :

Fetal Mortality The number of fetal deaths per 1000 total births in a year.

Neonatal Mortality The number of neonatal deaths per 1000 livebirths in a year.

Perinatal Mortality The number of fetal and neonatal deaths per 1000 total births in a year.

Post-neonatal Mortality The number of post-neonatal deaths per 1000 livebirths in a year.

Infant Mortality The number of infant deaths per 1000 livebirths in a year.

Maternal Mortality The number of maternal deaths per 100,000 livebirths in a year.

NEONATAL DEATH :

The death of a liveborn infant within 28 days of birth.

PARITY :

The total number of livebirths and fetal deaths of the mother prior to the parturition under consideration.

PERINATAL DEATH :

A fetal death or neonatal death.

POST-NEONATAL DEATH :

The death of a liveborn infant occurring after the first month and within the first year of life.

PLURALITY :

The number of fetuses or babies resulting from the pregnancy. On this basis, pregnancy may be classified as singleton or multiple.

APPENDIX B

BDM201

**Western Australia
Births, Deaths and Marriages Registration Act 1998**



MEDICAL CERTIFICATE OF CAUSE OF STILLBIRTH OR NEONATAL DEATH

To be completed in respect of –

- i). A child not born alive, of at least 20 weeks gestation or if the period of gestation cannot be reliably established, a weight of 400 grams
- ii). A live born child who dies within twenty-eight days after birth

Note: Where appropriate please tick relevant boxes If details are unknown, write "Unknown".

MOTHER'S DETAILS

Given names			
Surname			
DOB	Day	Month	Year
			Parity
Usual Residence			

CHILD'S DETAILS

Name (if given)
Place of death (Hospital name or other address)
Place of birth (if different to place of death)

Sex: Male Female
 Plurality: Single Twin Triplet Other

Date of birth or delivery _____ / _____ / _____

- 1. Time of birth or delivery _____ (24 hour clock)
- 2. Weight at birth _____ grams
- 3. Period of gestation _____ completed weeks from first day of last menstrual period to date of delivery

4. When did heartbeat cease?
- (a) Before labour commenced.....
 - (b) During labour but before delivery.....
 - (c) Before delivery but not known whether before or during labour.....
 - (d) After delivery.....
 - (e) Not known whether before or after delivery.....

5. If heartbeat ceased **prior** to delivery, estimate how long before _____ hours _____ days

6. If heartbeat ceased **after** delivery, enter the time _____ (24 hour clock)

7. If heartbeat ceased **after** delivery, enter the date _____

8. Did the child breathe after complete expulsion or extraction from the mother? Yes No

CAUSE OF DEATH (Print clearly. Do not abbreviate)

➤ **Post mortem:**
 Carried out To be carried out: Yes No

➤ **Is cause of death shown below based on post mortem?** Yes No

➤ **Causes in child or foetus**

Disease or condition directly leading to death	Approx. interval between onset & death
Due to †	

Maternal or other conditions or causes giving rise to the underlying cause above

Maternal or other conditions or causes giving rise to the underlying cause above	Approx. interval between onset & death
Due to †	

† Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last.

Other significant conditions in child, foetus or mother contributing to the death, but not related to the disease or condition causing it

Other significant conditions in child, foetus or mother contributing to the death, but not related to the disease or condition causing it	Approx. interval between onset & death

I hereby certify that the particulars shown above are true to the best of my knowledge.

Signature _____

Name _____

Address _____

Date _____

APPENDIX C

BDM 202

Registry of Births, Deaths & Marriages Western Australia

MEDICAL CERTIFICATE OF CAUSE OF DEATH

Details of Deceased

(PLEASE PRINT CLEARLY IN BLOCK LETTERS)

Surname			
Given names (in full)			
Sex	Male <input type="checkbox"/>	Female <input type="checkbox"/>	Date of death / /
Place of death (in full)			
Age at death	(show age in completed units - Y= years or M = months)		
Aboriginal or Torres Strait Islander origin?	(If of both Aboriginal and Torres Strait Islander origin, cross both "Yes" boxes)		
	No <input type="checkbox"/>	Yes, Aboriginal origin <input type="checkbox"/>	Yes, Torres Strait Islander origin <input type="checkbox"/>
Date last seen alive by me	/ /		
Coroner	Is this death being, or has it been, reported to the Coroner? No <input type="checkbox"/> Yes <input type="checkbox"/>		
Post mortem status	Not to be conducted <input type="checkbox"/> Has been conducted <input type="checkbox"/> Yet to be conducted <input type="checkbox"/>		

Cause of Death Details

Cause

Approximate interval
between onset & death

Part I	(a)	<input style="width: 95%;" type="text"/>	
Disease or condition directly leading to death*		due to	<input style="width: 95%;" type="text"/>
*This means the disease, injury or complication which caused death – not only the mode of dying, such as heart failure, respiratory failure etc.			
Antecedent causes (b) - (e)	(b)	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
		due to	<input style="width: 95%;" type="text"/>
Morbid conditions, if any, giving rise to the above cause (a), stating the underlying condition last	(c)	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
		due to	<input style="width: 95%;" type="text"/>
	(d)	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
		due to	<input style="width: 95%;" type="text"/>
	(e)	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
Part II			
Other significant conditions		<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
contributing to death but not related to the disease or condition causing it		<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>

Other Details

Operations	Was an operation performed on the deceased within 4 weeks of death?	No <input type="checkbox"/>	Yes <input type="checkbox"/> (if "Yes" specify below)
Type of operation <input style="width: 95%;" type="text"/>			
Disease/condition <input style="width: 95%;" type="text"/>			
Pregnancy	Was the deceased pregnant within 6 weeks of death?	No <input type="checkbox"/>	Yes <input type="checkbox"/>
	Was the deceased pregnant between 6 weeks and 12 months of death?	No <input type="checkbox"/>	Yes <input type="checkbox"/>
Injury	Was an injury/external cause involved in the death?	No <input type="checkbox"/>	Yes <input type="checkbox"/> (if "Yes" specify below)
<i>Only complete if death is not reportable to the Coroner</i>			

Certification

I hereby certify that I am a currently registered medical practitioner and that:

- I was responsible for the medical care of the abovenamed deceased immediately before death AND/OR
- I examined the body of the abovenamed deceased after death

and that the particulars and cause of death above written are true to the best of my knowledge and belief. This certificate is signed pursuant to Section 44 (1) of the Births, Deaths and Marriages Registration Act 1998.

Full name	Phone
Address	
Signature	Date / /