

**PERINATAL, INFANT AND MATERNAL MORTALITY
IN WESTERN AUSTRALIA
5-YEAR COHORT OF 2006-2010 BIRTHS**

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**Data Collection and Analysis - Statutory and Non-admitted Branch
Data Integrity Directorate
Performance Activity & Quality Division**

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FURTHER INFORMATION

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

Principal Consultant, Statutory Mortality Committees
Data Collection and Analysis - Statutory & Non-Admitted Branch
Data Integrity Directorate
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

Internet address:

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EXECUTIVE SUMMARY

As part of its role supporting the Perinatal and Infant and Maternal Mortality Committees, the Data Collection and Analysis Statutory and Non-admitted Branch compiles statistics on perinatal, infant and maternal deaths on an ongoing basis in Western Australia. This Report presents an overview of these mortality data for the 5 year period 2006-2010, categorised by mortality grouping. It also describes trends over the fifteen year period from 1996 to 2010.

Perinatal Mortality

- Perinatal deaths during 2006-2010 consisted of 1076 fetal deaths (7.1 per 1000 total births) and 324 neonatal deaths (2.1 per 1000 livebirths), giving a perinatal mortality rate of 9.2 per 1000 total births.
- The majority of fetal deaths occurred during the antenatal period before onset of labour (54.7%) with the remainder being either intrapartum deaths (32.7%) or where time of death was unknown (12.5%). Most perinatal deaths were related to prematurity and/or congenital anomalies.
- Perinatal mortality generally increases with decreased birthweight, decreased gestational age and among multiple births.
- The fetal death rate among babies of Aboriginal mothers over the 2006-2010 period (13.1 per 1000) was nearly double that of babies of non-Aboriginal mothers (6.7 per 1000).
- The neonatal death rate among babies of Aboriginal mothers over the 2006-2010 period (6.8 per 1000) was more than 3 times that of babies of non-Aboriginal mothers (1.9 per 1000).
- The perinatal death rate among babies of Aboriginal mothers over the 2006-2010 period (19.8 per 1000), was more than twice that of babies of non-Aboriginal mothers (8.6 per 1000).

Infant Mortality

- There were 510 infant deaths identified during the 2006-2010 period, providing an infant mortality rate of 3.4 per 1000 livebirths. This rate has reduced from 5.5 per 1000 in 1996. For babies of Aboriginal women the rate reduced from 15.4 per 1000 in 1996 to 11.3 per 1000 in 2010.
- Among babies of Aboriginal mothers, the infant mortality rate of 12.5 per 1000 was more than four times that of the rate for babies of non-Aboriginal women (2.8 per 1000) during the 5 year period. Impacting this figure is the high proportion of deaths among babies of Aboriginal mothers in the post-neonatal period (5.7 per 1000 livebirths), which was more than five times the rate recorded for babies of non-Aboriginal women (1.0 per 1000).
- Causes of infant death are principally Sudden Infant Death Syndrome (SIDS), lethal congenital anomaly, low birthweight and infection. Among babies of Aboriginal women, Sudden Infant Death Syndrome (SIDS) (18.0%) and lethal congenital anomaly (20.0%) were the principal known causes of death during the post-neonatal period.

Births in Western Australia - Cohort for Perinatal Deaths and Infant Mortality

- During the 2006-2010 period 151,898 babies were born to 149,724 women with 99.3% of births being liveborn.
- Most births occurred in hospital for 99.1% and 76.0% were to women resident in the Perth Metropolitan Area.
- The crude birth rate of 13.9 per 1000 total population for the period has decreased from 14.4 per 1000 in 1996. For Aboriginal women the crude birth rate reduced from 24.1 per 1000 in 1996 to 22.3 per 1000 in 2010.
- Mothers in their teenage years accounted for 4.9% of births and women aged 40 years or more represented 3.4%
- Aboriginal women represented 5.8% of all mothers and the crude birth rate for these women (23.8 per 1000) was almost twice that of the overall rate (13.9 per 1000) for the 5 year period from 2006-2010.

Maternal Mortality

- Australian national reporting measures maternal mortality based on reported direct and indirect maternal deaths. There were 15 maternal deaths for the period 2002-2010 giving a maternal mortality rate of 6.0 per 100,000 livebirths in Western Australia. This rate excludes incidental maternal deaths.
- For the period 1992-2010, where classification of cause of death is known in Western Australia, the maternal mortality rate was 5.3 calculated per 100,000 livebirths and the maternal mortality ratio was 5.4 calculated per 100,000 women who gave birth.
- During the period 1992-2010, 37 maternal deaths were reported in Western Australia. In accordance with prescribed definitions (page 11) these deaths have been classified as 18 direct, 12 indirect and 7 incidental maternal deaths.
- Long term trend data for Western Australia shows a dramatic improvement in maternal mortality rates which halved every ten years from 1931 to 1980. Maternal mortality since that time averaged 1.7 maternal deaths per year.
- The Western Australian maternal mortality rate of 6.5 per 100,000 livebirths for the 30 year period (1981-2010) was calculated including all maternal deaths. Even so, this rate compares favourably with a national maternal mortality rate of 11.0 per 100,000 livebirths for 2000-2002 and a national maternal mortality ratio of 8.4 per 100,000 women who gave birth for the three year period 2003-2005⁷.

1. INTRODUCTION

Aims

This report provides an additional a five year cohort to the continuing series of Department of Health reports examining perinatal and infant mortality in Western Australia since 1984. Information on maternal mortality has been included from 1996. The aim of compiling these data is to measure relationships between mortality among infants and variables such as maternal ethnic status, age, parity, conjugal state and infant plurality, gestation and birthweight. The Report also includes information about maternal mortality in Western Australia. Early reports in this series were published annually (1984 to 1995), while later reports have been published triennially since 1996.

The perinatal and infant mortality data in this report relates to the cohort of childbearing women and their babies, born in the period 2006-2010 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

It is a requirement of the Health Act 19111 that stillbirths, infant and maternal deaths are notified directly to the Executive Director, Public Health and Clinical Services Division by attending medical practitioners. Information is also made available to the Executive Director from midwifery notification forms and the Registrar General's Office (death certificates).

The following were the data sources for deaths included in this five year report:

- The Western Australian Midwives' Notification System for fetal deaths.
- The Registry of Births, Deaths and Marriages , the Hospital Morbidity Data System, and the Australian Bureau of Statistics for neonatal and infant deaths.
- Notifications of maternal deaths to the Executive Director, Public Health and Clinical Services Division and death information from the Registry of Births, Deaths and Marriages, the Hospital Morbidity Data System, and the Australian Bureau of Statistics (Western Australian Office) and Coroner's reports for maternal deaths.

As far as can be determined from the above-mentioned sources, the data relating to the number of deaths in this report is complete. However data for 2010 should be considered preliminary. Information on deaths of Western Australians who died outside the State was not received by this Department and therefore could not be included in this Report.

Perinatal and infant death records were compiled from these sources and were linked to data held in the Midwives' Notification System by the Western Australian Data Linkage Branch. This provided a comprehensive dataset from which analysis of these deaths was undertaken. After all checking and follow-up procedures were complete, linkage was 100% successful.

Estimates of the population of Western Australia and it's Statistical Divisions, were supplied by the Australian Bureau of Statistics (Western Australian Office) and these were used for compiling populations for WA Health Regions. The female population by age group was also supplied by ABS.

2. BIRTHS IN WESTERN AUSTRALIA IN 2006-2010 - COHORT FOR PERINATAL AND INFANT DEATHS

2.1 Births incidence

Notifications by midwives received by the Department of Health indicate that 151,898 babies (Table 1) were born to 149,724 women during the 2006-2010 period. These data are for births at 20 weeks or more gestation, or a birthweight of 400 grams or more.

2.2 Crude birth rate

An overall crude birth rate of 13.9 per 1000 total population was identified for all Western Australian women during 2006-2010, compared with that recorded for Aboriginal women (23.8 per 1000). The crude birth rate has decreased overall from 14.4 per 1000 in 1996 to 13.5 per 1000 in 2010. The rate was highest overall in 2007 at 14.2 per 1000 (Table 2). The crude birth rates are highest in those health regions with a higher proportion of Aboriginal people (Figure 1).

2.3 Condition at birth

150,822 (99.3%) babies were liveborn and 1,076 (0.7%) babies were stillborn. There were 8,724 livebirths (98.7% of all births) and 116 (1.3%) stillbirths to Aboriginal women with a fetal death rate being 13.1 per 1000 total births. For non-Aboriginal women there were 142,098 (99.3%) livebirths and 960 (0.7%) stillbirths with a fetal death rate of 6.8 per 1000 total births (Table 7).

2.4 Aboriginality of mother

8,840 (5.8%) babies were born to Aboriginal women, and 143,058 (94.2%) to non-Aboriginal women (Table 3).

2.5 Place of birth

The majority of births, 150,729 (99.2%), occurred either in hospital or en route to a hospital. Of these, births in metropolitan hospitals numbered 122,689 (80.8%) and non-metropolitan hospital births totalled 28,040 (18.5%). There were 1169 (0.8%) planned supervised homebirths (Table 11).

2.6 Maternal place of residence

The majority of births 115,473 (76.0%) 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 who gave birth were in the 30 to 34 year age category (30.9%) followed by the 25 to 29 year age category (27.2%). Women in their teenage years accounted for 4.9% of total women who gave birth. Almost a quarter (22.3%) of Aboriginal women who gave birth were teenage women (less than 20 years of age) in contrast with non-Aboriginal women of whom 3.8% were teenagers. Women aged 40 years or more represented 3.4% of all women who gave birth during the 5 year period 2006-2010 (Table 3).

3. Crude birth rate, perinatal and infant mortality by health region of maternal residence for births in Western Australia, 2006-2010

Figure 1: Crude Birth Rate, Perinatal and Infant Mortality by Health Region of maternal residence for births in Western Australia, 2006-2010



Health Region	Crude Birth Rate	Perinatal Mortality Rate	Infant Mortality Rate
Kimberley	20.2	17.0	8.8
Pilbara	17.8	9.9	4.6
Midwest	15.0	9.4	5.5
Wheatbelt	12.7	9.7	5.6
Goldfields	17.8	15.5	5.5
South West	13.3	9.2	2.3
Great Southern	12.1	10.5	3.9
North Metro	13.4	8.4	2.4
South Metro	13.9	8.8	3.6
Total WA	13.9	9.2	3.4

Crude Birth Rate is the number of livebirths per 1000 total population
 Perinatal Mortality is calculated per 1000 total births
 Infant Mortality is calculated per 1000 livebirths

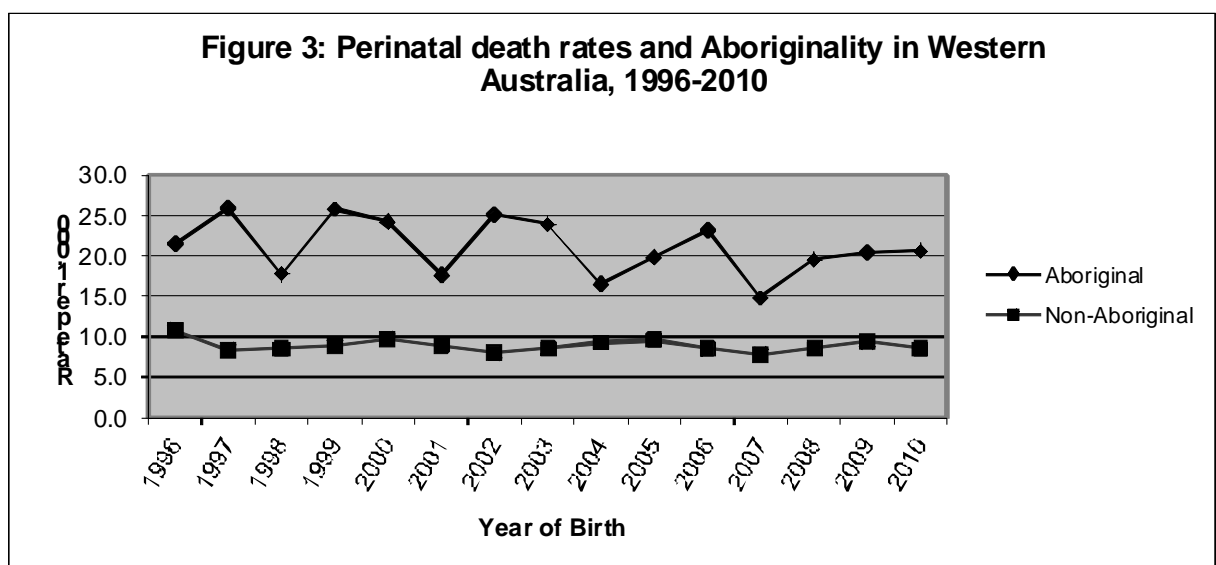
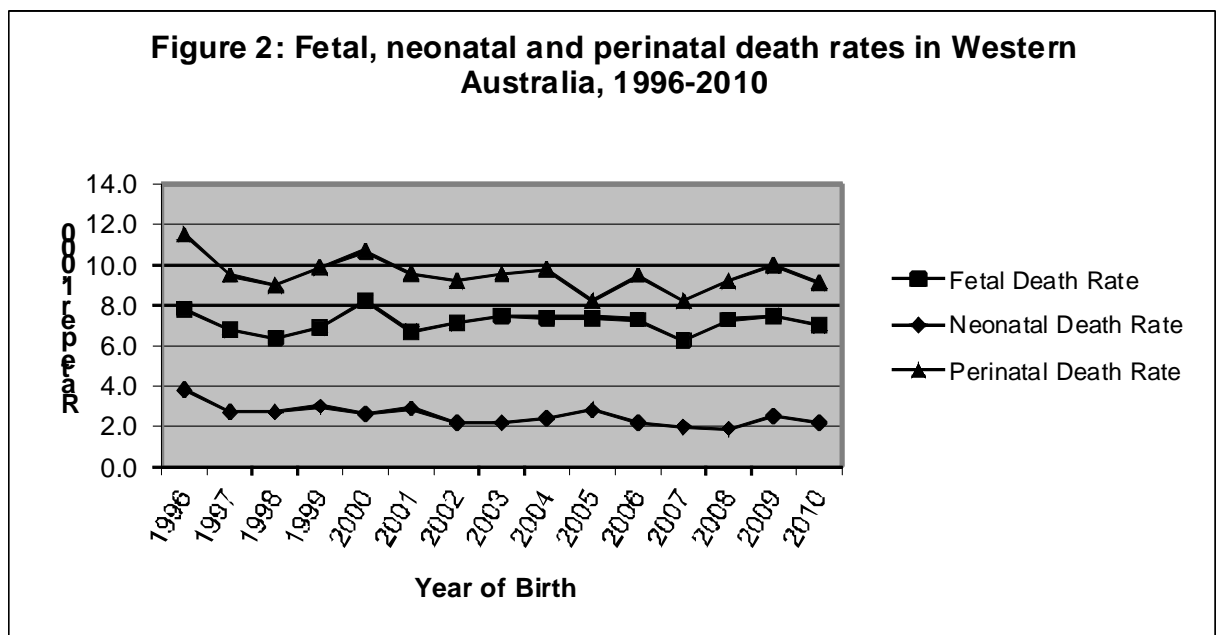
4. PERINATAL MORTALITY IN WESTERN AUSTRALIA 2006-2010 BIRTH COHORT

4.1 Perinatal deaths

There were 1,400 perinatal deaths identified in the 2006-2010 birth cohort providing a perinatal mortality rate of 9.2 per 1000 total births (Table 6 and Figure 2).

Perinatal mortality rates are calculated from fetal mortality plus neonatal mortality rates.

Trend data on individual years shows that there has been only slight variation, over a 15-year period, in the overall rate from 11.5 per 1000 in 1996 to 9.1 per 1000 in 2010. The rate for babies of Aboriginal mothers was 20.6 per 1000 in 2010. These rates have varied over the period being as high as 25.9 per 1000 in 1997 and as low as 14.8 per 1000 in 2007 (Table 8 and Figure 3).



4.1.1 Maternal age and parity

Perinatal deaths of babies born to first time mothers numbered 609 with a rate of 9.6 per 1000 total births. Of these, 79 were born to teenage mothers with a rate of 12.7 per 1000. As a large proportion of births to teenage mothers are their first birth this rate is similar to the overall rate of perinatal deaths to babies of teenage mothers (12.9 per 1000) (Table 12).

4.1.2 Birthweight and gender

More than three quarters of the perinatal deaths were of low birthweight providing a rate of 107.2 per 1000 total births with low birthweight. The ratio of male to female perinatal deaths was 1.12:1 (Table 13).

4.1.3 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 29.2% of deaths with a further 24.8% being spontaneous preterm (<37 weeks). A further 9.3% were unexplained antepartum fetal deaths. Among multiple birth perinatal deaths, 40.1% were attributed to spontaneous preterm birth (<37 weeks) and 32.0% to specific perinatal conditions. A further 17.7% of multiple birth perinatal deaths were due to congenital abnormalities incompatible with life. (Table 14).

Information relating to cause of death was gained from an autopsy for 61.5% of perinatal deaths while 34.8% of perinatal deaths were not examined. It is not known whether or not an autopsy was performed for the remaining 3.7% of deaths (Table 16).

4.2 Fetal deaths

There were 1076 fetal deaths in Western Australia during 2006-2010 providing a fetal death rate for the period in Western Australia of 7.1 per 1000 total births (Table 7).

Fetal death proportions relating to the Health Region of maternal residence are shown in Table 3. Among babies of Aboriginal mothers the fetal death rate (13.1 per 1000) was almost twice that for babies of non-Aboriginal women (6.7 per 1000) (Table 7).

4.2.1 Birthweight and gestational age

There was a decrease in the fetal death rate as birthweight increased, except among babies with birthweight in excess of 4000 grams. For low birthweight babies (weighing less than 2500 grams) the rate of fetal death was 85.3 per 1000. As gestation increased the fetal death rate fell. The rate of 497.7 per 1000 for fetal deaths at 20-27 weeks was naturally in sharp contrast to the rate of 1.5 per 1000 for births at 37-43 weeks (Table 17).

4.2.2 Gestational age and plurality

The fetal death rate for all multiple births (21.8 per 1000 total births) remains higher than the fetal death rate for all singleton births (6.7 per 1000). Conversely, the rate of fetal death among babies of 28-32 weeks gestation for singleton births (73.7 per 1000) was more than four times that for multiple births (17.3 per 1000). Among babies born of 20-27 weeks gestation singleton births had a higher fetal mortality rate (535.1 per 1000) than did multiple births (300.0 per 1000)(Table 18).

4.2.3 Cause and time of death for fetal deaths

Of the 1076 fetal deaths during the 5 year period there were 589 (54.7%) antepartum deaths and 352 (32.7%) intrapartum deaths. It was not known when the remaining 135 (12.5%) fetal deaths occurred. The principal causes were those related to conditions of lethal congenital anomaly (310, 28.8%), spontaneous preterm birth (230, 21.4%) and an additional 131 (12.2%) fetal deaths were recorded as unexplained Antepartum deaths (Table 19).

4.2.4 Cause of fetal death and Aboriginality of mother

Among fetal deaths to women recorded as Aboriginal the proportion of deaths due to lethal congenital anomaly (17.2%) was lower than for fetal deaths of babies born to non-Aboriginal women (30.2%). Maternal conditions contributed to a higher proportion of fetal deaths among babies born to Aboriginal women (12.9%) than for those born to non-Aboriginal women (4.7%) (Table 20).

4.3 Neonatal deaths

There were 324 neonatal deaths in Western Australia in the 2006-2010, 5 year cohort leading to a neonatal mortality rate of 2.1 per 1000 livebirths (Table 21). For babies of Aboriginal women the neonatal mortality rate was 6.8 per 1000 which was more than three times the rate recorded for babies of non-Aboriginal women (1.9 per 1000) (Table 25).

4.3.1 Birthweight and gestational age

In general, the neonatal death rate decreased as birthweight increased until birthweight reached 4500 grams. All neonatal deaths with gestational age of 27 or less weeks had a birthweight of less than 2000 grams. Overall nearly three quarters (225, 69.4%) of all neonatal deaths were of low birthweight (Table 21).

4.3.2 Gestational age and plurality

Consideration of neonatal death rates by plurality for all gestational ages shows a marked difference, the singleton rate (1.8 per 1000 livebirths) being only one seventh the rate for multiple births (12.6 per 1000) (Table 22).

4.3.3 Cause of death and age at death

The principal causes of neonatal death of livebirths aged less than a day were attributed to extreme prematurity (50.4%) and lethal congenital anomaly (29.1%). Early neonatal deaths, those who died at less than 8 days, numbered 256 (79.0%) of all neonatal deaths (Table 23).

4.3.4 Cause of death and Aboriginality of mother

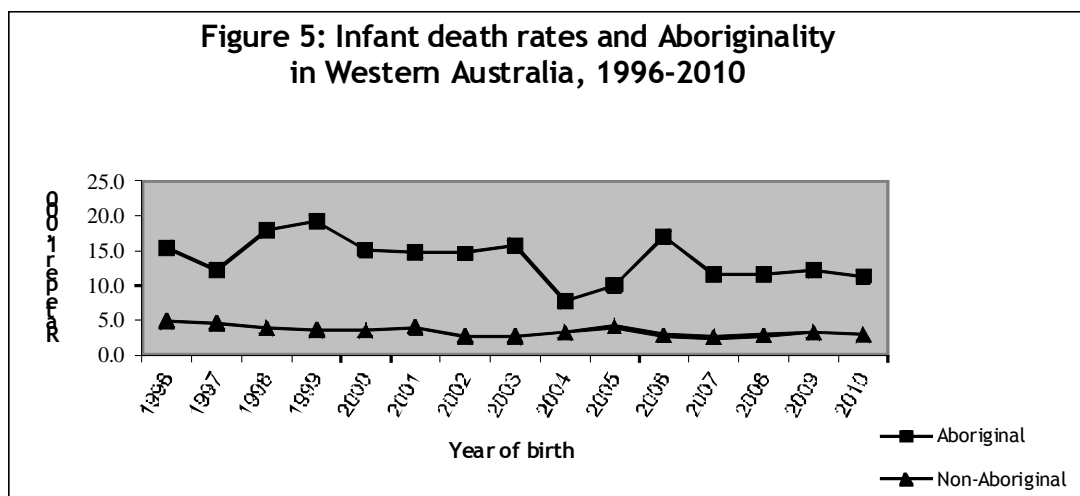
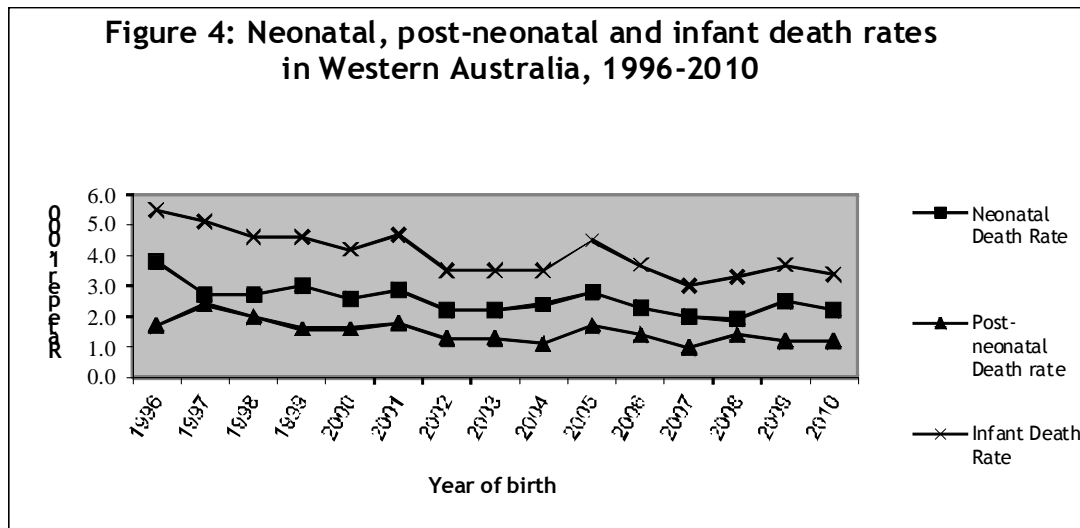
Among neonatal deaths where the mother was recorded as Aboriginal, the proportion of deaths due to factors associated with extreme prematurity (45.8%) was higher than that for babies of non-Aboriginal women (28.7%). The proportion of neonatal deaths among babies of Aboriginal mothers attributed to lethal congenital anomaly (23.7%) was lower than the proportion for those identified as non-Aboriginal (31.7%) (Table 24).

5. INFANT MORTALITY IN WESTERN AUSTRALIA, 2006-2010 BIRTH COHORT

5.1 Infant deaths

There were 510 infant deaths of the 150,822 livebirths in the 2006-2010 period. Of these, 324 (63.5%) were neonatal deaths and 186 (36.5%) were post-neonatal deaths. The infant mortality rate for Western Australia in 2006-2010 was 3.4 per 1000 livebirths (Table 25). Over the 15 year period from 1996-2010 the infant mortality rate has almost halved from 5.5 per 1000 in 1996 to 3.4 per 1000 in 2010 (Table 26 and Figure 4).

Infant mortality among babies born to Aboriginal women (12.5 per 1000) during the period was more than four times that for babies born to non-Aboriginal women (2.8 per 1000) (Table 25). Through time infant mortality rates among both groups have reduced overall, the rate for babies of Aboriginal mothers in 2010 remains four times the rate for babies of non-Aboriginal mothers being 11.3 per 1000 and 2.9 per 1000 respectively in 2010 (Table 26 and Figure 5).



5.1.1 Maternal age and parity

Of the 510 infant deaths in the 2006-2010 period 61 (8.3 per 1000 live births or 12.0%) were among babies of teenage mothers. Of these, 49 (80.3%) were the first born child and 11 (18.0%) were born to mothers having a parity of one or two. Infant death rates among babies of teenage mothers is more than double that of older mothers (Table 27).

5.1.2 Birthweight and gender

Low birthweight (<2500 grams) was present in 285 (30.3 per 1000) infant deaths during the 5 year period 2006-2010. Male babies suffered higher rates of infant death than female babies, in the low birthweight category (34.7 per 1000 versus 26.4 per 1000) while overall the rates were similar (3.5 per 1000 for male and 3.1 per 1000 for female infant deaths). The mortality rates for both male and female infants decreased as birthweight increased with the exception of births greater than 4500 grams (Table 28).

5.1.2 Gestational age and plurality

The rate of infant mortality among multiple births (15.8 per 1000 livebirths) was five times the rate of singleton births (3.0 per 1000 livebirths) but this is entirely accounted for by the high mortality in multiple birth babies with gestational age of 20-27 weeks (Table 29).

5.2 Post-neonatal deaths

There were 186 post-neonatal deaths among the 150,822 livebirths during the 2006-2010 time period, providing a rate of 1.2 per 1000 livebirths (Table 25).

The post-neonatal mortality rate for babies of Aboriginal women was 5.7 per 1000 livebirths, being five times the rate of 1.0 per 1000 for babies of non-Aboriginal women (Table 25).

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 may vary significantly from year to year and should be interpreted with caution, even for the 5 year period.

5.2.1 Cause of death and age at death

Among post neonatal deaths where cause is known, the principal causes of death were lethal congenital anomaly (24.7%), Sudden Infant Death Syndrome (SIDS) (11.8%), and infection (7.0%). There were a further 15 babies (8.1%) for whom cause of post neonatal death was classified as other (Table 30).

5.2.2 Cause of death and Aboriginality of mother

Among post-neonatal deaths of babies born to Aboriginal women 9 (18.0%) were attributed to SIDS, with infection being also a major cause for 6 (12.0%) deaths. The proportion of deaths resulting from lethal congenital anomalies (20.0%) was lower among babies of Aboriginal mothers than the proportion for babies of non-Aboriginal women (26.5%) (Table 31).

6 MATERNAL MORTALITY IN WESTERN AUSTRALIA 2006-2010

6.1 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 Australia⁵. Thus, maternal mortality is the death of a 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.

6.2 Classification of maternal deaths

Maternal mortality as defined by the World Health Organisation, provides for deaths to be classified into three groups⁶:

Direct maternal deaths - those 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, amniotic fluid embolism, 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 was aggravated by the physiological effects of pregnancy (for example, heart disease, pulmonary embolism, diabetes, renal disease).

Incidental deaths - resulting from 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, some malignancies).

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

6.3 Maternal deaths in 1981-2010

During the period 1981-2010, there were 50 maternal deaths. These include direct, indirect and incidental. However, a paucity of information available in the data collection means that the WHO Classification can only be applied to the 37 maternal deaths reported over the period from 1992 to 2010. These 37 deaths, based on information from death certificates and classified in accord with prescribed definitions, would appear to be 18 direct maternal deaths, 12 indirect maternal deaths and 7 incidental maternal deaths.

Of the 18 direct maternal deaths, six occurred at the time of delivery with the principal cause being haemorrhage. The remaining 12 deaths occurred either during pregnancy with complications arising from ruptured ectopic pregnancy or in the post delivery period with causes including hypertensive disorders, pulmonary embolus, obstetric haemorrhage and septicaemia.

Causes of the 12 indirect deaths included cerebral haemorrhage, amniotic fluid embolus during pregnancy, psychiatric causes, septicaemia and cardiac disorders.

The causes of the 7 deaths classified as incidental maternal deaths included maternal conditions, motor vehicle accidents and manslaughter during pregnancy.

6.4 Trend of maternal mortality

In accordance with Australian national reporting, measurement of maternal mortality may more effectively be determined by calculation of maternal mortality rates based on reported direct and indirect maternal deaths.

Years	Direct & Indirect Maternal Deaths	Number of live births in WA	Maternal Mortality Rate per 100,000
1992-1996	7	126,192	5.5
1997-2001	8	125,999	6.3
2002-2006	10	129,684	7.7
2007-2010	5	122,367	4.1
1992-2010	30	564,577	5.3

Alternatively a similar outcome may be achieved by calculation of a maternal mortality ratio based on the numbers of women reported to have given birth.

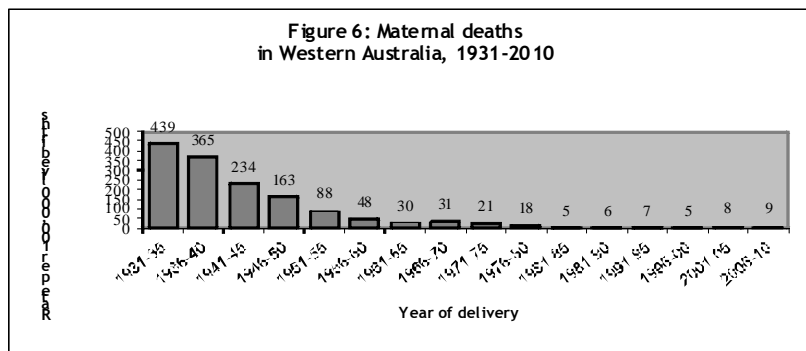
Years	Direct & Indirect Maternal Deaths	Number of women who gave birth in WA	Maternal Mortality Ratio per 100,000
1992-1996	7	125,296	5.6
1997-2001	8	124,851	6.4
2002-2006	10	128,578	7.8
2007-2010	5	120,595	4.1
1992-2010	30	559,188	5.4

6.5 Long term trend of maternal mortality

Examination of all maternal deaths in Western Australia showed that during the 29 years from 1981 to 2010 there were 50 reported maternal deaths resulting in an overall maternal mortality rate of 6.5 per 100,000 livebirths for that period.

Year	Maternal Deaths	Livebirths in WA	Rate per 100,000
1981-1985	5	113,058	4.4
1986-1990	7	123,902	5.6
1991-1995	9	125,624	7.2
1996-2000	6	126,612	4.7
2001-2005	10	126002	7.9
2006-2010	13	150824	8.6
1981-2010	50	766019	6.5

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 6.5 per 100,000 livebirths for the years 1981 to 2010⁶.



6.6 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 countries⁷.

Considering international differences in methods of ascertainment and reporting, the most recent Australian national report⁶ 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.

The World Health Organization defines the maternal mortality rate as the number of direct and indirect maternal deaths during a given time period per 100,000 livebirths. The maternal mortality rate of the developed regions (including Australia, New Zealand, USA, Europe, Japan and Canada) in 2000 was an estimated 20 deaths per 100,000 livebirths compared with an estimated 440 deaths per 100,000 livebirths in the developing regions⁷.

This evaluation shows the Western Australian maternal mortality ratios of 5.4 per 100,000 women who gave birth for the 1992-2010 period and 7.8 per 100,000 women who gave birth for the 2002-2006 period were both lower than the reported Australian national statistic of 8.4 per 100,000 women who gave birth during the years 2003-2005⁷.

It is therefore appropriate to state that the decline in the Western Australian maternal mortality rate to 7.7 per 100,000 livebirths for the 2002 to 2006 period compares favourably with Australian and international maternal mortality rates.

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8. TABLES 2006-10 DATA- BIRTHS COHORT, FETAL, PERINATAL AND INFANT MORTALITY

Table 1: Live and total births by health region of maternal residence in Western Australia, 2006-2010
(Health Regions as currently defined)

Health Region of Residence	2006				2007				2008				2009				2010				
	Live Births		Total Births		Live Births		Total Births		Live Births		Total Births		Live Births		Total Births		Live Births		Total Births		
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Metropolitan																					
North	11246	39.5	11322	39.5	11898	39.8	11983	39.9	12229	40.2	12311	40.1	12423	40.1	12499	40.0	12330	39.7	12421	39.7	
South	10138	35.6	10203	35.6	10688	35.8	10740	35.7	11066	36.3	11146	36.3	11276	36.4	11359	36.4	11520	37.1	11598	37.1	
Total Metropolitan	21384	75.1	21525	75.1	22586	75.6	22723	75.6	23295	76.5	23457	76.5	23699	76.5	23858	76.3	23850	76.8	24019	76.8	
Country																					
Kimberley	669	2.4	680	2.4	728	2.4	734	2.4	672	2.2	681	2.2	678	2.2	687	2.2	681	2.2	689	2.2	
Pilbara	840	3.0	849	3.0	791	2.6	799	2.7	790	2.6	792	2.6	858	2.8	860	2.8	848	2.7	857	2.8	
Midwest	928	3.3	935	3.3	967	3.2	969	3.2	954	3.1	961	3.1	962	3.1	976	3.1	958	3.1	961	3.1	
Wheatbelt	933	3.3	936	3.3	975	3.3	981	3.3	977	3.2	990	3.2	973	3.1	982	3.2	933	3.0	935	3.0	
Goldfields	938	3.4	950	3.3	1008	3.4	1021	3.4	936	3.1	942	3.1	982	3.2	996	3.2	919	3.0	932	3.0	
South West	1938	6.8	1953	6.8	2038	6.8	2053	6.8	2047	6.7	2068	6.7	2056	6.6	2076	6.7	2085	6.7	2093	6.7	
Great Southern	794	2.8	804	2.8	754	2.5	755	2.5	745	2.4	750	2.5	740	2.4	747	2.4	744	2.4	750	2.4	
Total Country	7040	24.7	7107	24.8	7261	24.3	7312	24.3	7121	23.4	7184	23.4	7249	23.4	7324	23.4	7168	23.1	7217	23.1	
Outside WA	32	0.1	33	0.1	39	0.1	40	0.1	32	0.1	33	0.1	37	0.1	37	0.1	29	0.1	29	0.1	
TOTAL	28456	100.0	28665	100.0	29886	100.0	30075	100.0	30448	100.0	30674	100.0	30985	100.0	31219	100.0	31047	100.0	31265	100.0	

Table 2: Live birth count and crude birth rate by Aboriginality of mother in Western Australia, 1996-2010

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
1996	1425	59055	24.1	23960	1706201	14.0	25385	1765256	14.4
1997	1549	60405	25.6	23547	1736233	13.6	25096	1796638	14.0
1998	1506	61780	24.4	24011	1765047	13.6	25517	1826827	14.0
1999	1603	63229	25.4	23989	1791184	13.4	25592	1854413	13.8
2000	1587	64597	24.6	23435	1815297	12.9	25022	1879894	13.3
2001	1631	66069	24.7	23142	1835090	12.6	24773	1901159	13.0
2002	1646	67272	24.5	22963	1860050	12.3	24609	1927322	12.8
2003	1524	68724	22.2	22973	1883514	12.2	24497	1952238	12.5
2004	1557	70125	22.2	23785	1912079	12.4	25342	1982204	12.8
2005	1697	71454	23.7	25084	1938659	12.9	26781	2010113	13.3
2006	1781	72639	24.5	26676	1986406	13.4	28457	2059045	13.8
2007	1810	71936	25.2	28076	2034183	13.8	29886	2106119	14.2
2008	1716	73035	23.5	28733	2098162	13.7	30449	2171197	14.0
2009	1742	73820	23.6	29243	2171237	13.5	30985	2245057	13.8
2010	1677	75037	22.3	29370	2218473	13.2	31047	2293510	13.5

Table 3: Maternal age by Aboriginality of mother for all births in Western Australia, 2006-2010

Maternal Age	Aboriginal		Non-Aboriginal		TOTAL	
	No.	%	No.	%	No.	%
≤ 15	150	1.7	141	0.1	291	0.2
16	265	3.0	408	0.3	673	0.4
17	406	4.6	898	0.6	1304	0.9
18	509	5.8	1570	1.1	2079	1.4
19	638	7.2	2456	1.7	3094	2.0
≤ 19	1968	22.3	5473	3.8	1441	4.9
20-24	2907	32.9	21240	14.9	24147	16.0
25-29	2072	23.4	39280	27.5	41352	27.2
30-34	1183	13.4	45753	32.0	46936	30.9
35-39	595	6.7	26226	18.3	26821	17.7
40-44	112	1.3	4893	3.4	5005	3.3
≥ 45	3	0.0	193	0.1	196	0.1
TOTAL	8840	100.0	143058	100.0	151898	100.0

Table 4: Birthweight by gestational age of livebirths in Western Australia, 2006-2010

Birth weight	Gestational Age								TOTAL	
	20-27		28-32		33-36		37-44		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%
< 500	82	12.4	1	n/a	-	-	-	-	83	0.1
500-999	472	71.2	105	6.2	2	n/a	1	n/a	580	0.4
1000-1499	106	16.0	643	37.8	113	1.1	3	n/a	865	0.6
1500-1999	3	n/a	738	43.4	1065	10.8	127	0.1	1933	1.3
2000-2499	-	-	170	10.0	3275	33.1	2495	1.8	5940	3.9
< 2500	663	100.0	1657	97.5	4455	45.1	2626	1.9	9401	6.2
2500-2999	-	-	28	1.6	3643	36.9	19985	14.4	23656	15.7
3000-3499	-	-	13	0.8	1411	14.3	53924	38.9	55348	36.7
3500-3999	-	-	1	n/a	307	3.1	45768	33.0	46076	30.5
4000-4499	-	-	-	-	59	0.6	14049	10.1	14108	9.4
≥ 4500	-	-	-	-	11	0.1	2220	1.6	2231	1.5
unknown	-	-	-	-	--	-	2	n/a	2	n/a
TOTAL	663	100.0	1699	100.0	9886	100.0	138574	100.0	150822	100.0

Table 5: Birthweight by gestational age of all births in Western Australia, 2006-2010

Birth weight	Gestational Age								TOTAL	
	20-27		28-32		33-36		37-44		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%
< 500	532	40.3	14	0.8	5	0.1	11	0.0	562	0.4
500-999	657	49.8	131	7.3	3	0.0	2	0.0	793	0.5
1000-1499	126	9.5	679	37.6	124	1.2	7	0.0	936	0.6
1500-1999	5	0.4	765	42.4	1008	10.1	132	0.1	1990	1.3
2000-2499	-	-	173	9.6	3304	33.1	2520	1.8	5997	4.0
< 2500	1320	100.0	1762	97.8	4444	44.5	2472	1.9	10278	6.8
2500-2999	-	-	30	1.7	3667	36.7	20033	14.5	23730	15.7
3000-3499	-	-	13	0.7	1424	14.2	53988	39.0	55425	36.7
3500-3999	-	-	1	0.1	309	3.1	45793	33.0	46103	30.6
4000-4499	-	-	-	-	59	0.6	14063	10.1	14122	9.4
≥ 4500	-	-	-	-	12	0.1	2226	1.6	2238	1.5
unknown	-	-	-	-	-	-	2	0.0	2	0.0
TOTAL	1320	100.0	1806	100.0	9995	100.0	138577	100.0	150898	100.0

Table 6: Percentages of fetal, neonatal and post-neonatal deaths and fetal, perinatal and infant death rates by health region of maternal residence in Western Australia, 2006-2010

Health Region of Residence	Fetal		Neonatal		Postneonatal		Fetal		Perinatal		Infant	
	No.	%	No.	%	No.	%	No.	Rate	No.	Rate	No.	Rate
Metropolitan												
North	410	38.1	98	30.2	46	24.7	410	6.8	508	8.4	144	2.4
South	358	33.3	127	39.2	68	36.6	358	6.5	485	8.8	195	3.6
Total Metropolitan	768	71.4	225	69.4	114	61.3	768	6.7	993	8.6	339	3.0
Country												
Kimberley	43	4.0	16	4.9	14	7.5	43	12.4	59	17.0	30	8.8
Pilbara	30	2.8	11	3.4	8	4.3	30	7.2	41	9.9	19	4.6
Midwest	33	3.1	12	3.7	14	7.5	33	6.9	45	9.4	26	5.5
Wheatbelt	33	3.1	14	4.3	13	7.0	33	6.8	47	9.7	27	5.6
Goldfields	58	5.4	17	5.2	10	5.4	58	12.0	75	15.5	27	5.5
South West	79	7.3	15	4.6	8	4.3	79	7.7	94	9.2	23	2.3
Great Southern	29	2.7	11	3.4	3	1.6	29	7.6	40	10.5	14	3.9
Total Country	305	28.3	96	29.6	70	37.6	305	8.4	401	11.1	166	4.6
Outside WA	3	0.3	3	0.9	2	0.5	3	10.2	6	20.5	5	17.2
TOTAL	1076	100.0	324	100.0	186	100.0	1076	7.1	1400	9.2	510	3.4

Rate is number of deaths per 1000 total births or livebirths in each health region.

Table 7: Number and rates of fetal, neonatal and perinatal deaths by Aboriginality of mother in Western Australia, 2006-2010

Aboriginality of Mother	Fetal deaths		Neonatal deaths		Perinatal deaths	
	No.	Rate	No.	Rate	No.	Rate
Aboriginal	116	13.1	59	6.8	175	19.8
Non-Aboriginal	960	6.7	265	1.9	1225	8.6
TOTAL	1076	7.1	324	2.1	1400	9.2

Rate is number of deaths per 1000 total births or livebirths by Aboriginality of mother.

Table 8: Fetal, neonatal and perinatal death rates by Aboriginality of mother in Western Australia, 1996-2010

Year of Birth	Fetal Death Rate			Neonatal Death Rate			Perinatal Death Rate		
	Aboriginal	Non-Aboriginal	Total	Aboriginal	Non-Aboriginal	Total	Aboriginal	Non-Aboriginal	Total
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	11.5
1999	13.5	6.5	6.9	12.5	2.4	3.0	25.8	8.9	9.5
2000	16.7	7.6	8.2	7.6	2.3	2.6	24.2	9.8	9.0
2001	10.9	6.4	6.7	6.7	2.7	2.9	17.6	9.0	9.9
2002	16.1	6.4	7.1	9.1	1.7	2.2	25.1	8.0	10.7
2003	16.1	6.9	7.5	7.9	1.8	2.2	23.9	8.6	9.6
2004	10.8	7.1	7.4	5.8	2.2	2.4	16.5	9.3	9.2
2005	13.9	7.0	7.4	5.9	2.6	2.8	19.8	9.6	9.6
2006	14.9	6.8	7.3	8.4	1.8	2.2	23.2	8.5	9.8
2007	10.4	6.0	6.3	4.4	1.8	2.0	14.8	7.8	8.2
2008	13.8	6.9	7.3	5.8	1.7	1.9	19.5	8.6	9.5
2009	13.0	7.2	7.5	7.5	2.2	2.5	20.4	9.4	10.0
2010	13.5	6.6	7.0	7.2	1.9	2.2	20.6	8.5	9.1

Rate is number of deaths per 1000 total births for fetal and perinatal deaths and livebirths for neonatal deaths.

Table 9: Condition at birth by gender of births in Western Australia, 2006-2010

Gender	Condition at Birth				TOTAL	
	Livebirth		Fetal death		No.	%
	No.	%	No.	%	No.	%
Male	77024	50.7	565	52.5	77589	51.1
Female	73795	48.6	502	46.7	74297	48.9
Indeterminate	3	0.0	9	0.8	12	0.0
TOTAL	150822	100.0	1076	100.0	151898	100.0

Table 10: Condition at birth by Aboriginality of mother for births in Western Australia, 2006-2010

Aboriginality of Mother	Condition at Birth				TOTAL		Fetal death rate
	Livebirth		Fetal death		No.	%	
	No.	%	No.	%	No.	%	
Aboriginal	8724	5.7	116	10.8	8840	5.8	13.1
Non-Aboriginal	142098	93.6	960	89.2	143058	94.2	6.7
TOTAL	150822	100.0	1076	100.0	151898	100.0	7.1

Table 11: Condition at birth by place of birth for births in Western Australia, 2006-2010

Place of Birth	Condition at Birth				TOTAL		Fetal death rate
	Livebirth		Fetal death		No.	%	
	No.	%	No.	%	No.	%	
Metropolitan							
Teaching	29786	19.8	715	66.5	30501	20.1	23.4
Public	34771	23.1	86	8.0	34857	23.0	2.5
Private	57202	37.9	129	12.0	57331	37.7	2.3
Country							
Public	24255	16.1	127	11.8	24382	16.1	5.2
Private	3641	2.4	17	1.6	3658	2.4	4.6
Non-Hospital							
	1167	0.8	2	0.2	1169	0.8	1.7
TOTAL	150822	100.0	1076	100.0	151898	100.0	7.1

Table 12: Maternal age by parity of perinatal deaths in Western Australia, 2006-2010

Maternal Age	Parity								TOTAL	
	0		1-2		3-4		≥ 5		No.	Rate
≤ 15	7	24.6	-	-	-	-	-	-	7	24.1
16	8	12.4	3	100.0	-	-	-	-	11	16.3
17	16	13.5	3	24.7	-	-	-	-	19	14.6
18	17	9.7	6	18.7	-	-	-	-	23	11.1
19	31	13.3	5	6.7	-	-	-	-	36	11.6
≤ 19	79	12.7	17	13.9	-	-	-	-	96	12.9
20-24	150	11.5	97	9.5	12	14.6	2	66.7	261	10.8
25-29	136	7.1	140	7.4	45	15.0	11	23.8	332	8.0
30-34	150	8.9	182	7.2	37	9.4	15	15.1	384	8.2
35-39	81	11.4	124	7.9	41	13.1	17	17.7	263	1.0
40-44	13	10.6	32	12.0	8	10.6	8	23.1	61	12.2
≥ 45	-	-	21	291.7	2	48.8	-	-	3	15.3
TOTAL	609	9.6	593	8.0	145	12.4	53	18.8	1400	9.2

Rate is number of deaths per 1000 total births.

Table 13: Birthweight by gender of perinatal deaths in Western Australia, 2006-2010

Birth weight	Gender				Indeterminate		TOTAL	
	Male		Female				No.	Rate
< 500	271	961.0	264	967.0	7	1000.0	542	964.4
500-999	186	425.6	118	333.3	2	1000.0	306	385.9
1000-1499	52	108.3	47	103.3	-	-	99	105.8
1500-1999	38	40.3	39	37.3	-	-	77	38.7
2000-2499	33	12.1	45	13.7	-	-	78	13.0
< 2500	580	119.2	513	94.9	9	818.2	1102	107.2
2500-2999	52	5.0	61	4.6	-	-	113	4.8
3000-3499	61	2.3	46	1.6	-	-	107	1.9
3500-3999	26	1.0	23	1.1	-	-	49	1.1
4000-4499	11	1.2	7	1.4	-	-	18	1.3
≥ 4500	8	5.3	2	2.8	-	-	10	4.5
unknown	1	n/a	-	-	-	-	1	n/a
TOTAL	739	9.5	652	8.8	9	750.0	1400	9.2

Rate is number of deaths per 1000 total births.

Table 14: Cause of death by plurality of perinatal deaths in Western Australia, 2006-2010

PSANZ-PDC classification of perinatal deaths

Cause of Death	Plurality				TOTAL	
	Singleton		Multiple		No.	%
	No.	%	No.	%		
Congenital abnormality	383	30.6	26	17.7	409	29.2
Perinatal infection	62	4.9	1	0.7	63	4.5
Hypertension	49	3.9	2	1.4	51	3.6
Antepartum haemorrhage	63	5.0	-	-	63	4.5
Maternal conditions	62	4.9	2	1.4	64	4.6
Specific perinatal conditions	60	4.8	47	32.0	107	7.6
Hypoxic peripartum death	43	3.4	1	0.7	44	3.1
Fetal growth restriction	96	7.7	5	3.4	101	7.2
Spontaneous preterm (< 37 weeks)	288	23.0	59	40.1	347	24.8
Unexplained antepartum death	126	10.1	4	2.7	130	9.3
No obstetric antecedent	21	1.7	-	-	21	1.5
TOTAL	1253	100.0	147	100.0	1400	100.0

Table 15: Cause of death by plurality of neonatal deaths in Western Australia, 2006-2010

PSANZ-NDC classification of neonatal deaths

Cause of Death	Plurality				TOTAL	
	Singleton		Multiple		No.	%
	No.	%	No.	%		
Congenital abnormality	89	32.8	9	17.0	98	30.2
Extreme prematurity	74	27.3	29	54.7	103	31.8
Cardio-respiratory disorders	12	4.4	4	7.5	16	4.9
Infection	21	7.7	-	-	21	6.5
Neurological	48	17.7	8	15.1	56	17.3
Gastrointestinal	6	2.2	3	5.7	9	2.8
Other (inc. SIDS)	21	7.7	-	-	21	6.5
TOTAL	271	100.0	53	100.0	324	100.0

Table 16: Fetal, neonatal and perinatal deaths by performance of autopsy in

Western Australia, 2004-2008

Autopsy	Fetal deaths		Neonatal deaths		Perinatal deaths	
	No.	%	No.	%	No.	%
Yes	726	67.5	135	41.7	861	61.5
No	319	29.7	168	51.9	487	34.8
Unknown	31	2.9	21	6.5	52	3.7
TOTAL	1076	100.0	324	100.0	1400	100.0

Table 17: Birthweight by gestational age of fetal deaths in Western Australia, 2006-2010

Birth weight	Gestational Age								TOTAL	
	20-27		28-32		33-36		37-43		No.	Rate
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
< 500	450	845.9	13	928.6	5	1000.0	11	1000.0	479	852.3
500-999	185	281.6	26	198.5	1	333.3	1	500.0	213	268.6
1000-1499	20	158.7	36	53.0	11	88.7	4	571.4	71	75.9
1500-1999	2	400.0	27	35.3	23	21.1	5	37.9	57	28.6
2000-2499	-	-	3	17.3	29	8.8	25	9.9	57	9.5
< 2500	657	497.7	105	59.6	69	15.3	46	17.2	877	85.3
2500-2999	-	-	2	66.7	24	6.5	48	2.4	74	3.1
3000-3499	-	-	-	-	13	9.1	64	1.2	77	1.4
3500-3999	-	-	-	-	2	6.5	25	0.5	27	0.6
4000-4499	-	-	-	-	-	-	14	1.0	14	1.0
≥ 4500	-	-	-	-	1	8.3	6	2.7	7	3.1
TOTAL	657	497.7	107	59.2	109	10.9	203	1.5	1076	7.1

Rate is number of deaths per 1000 total births.

Table 18: Gestational age by plurality of fetal deaths in Western Australia, 2006-2010

Gestation	Plurality				TOTAL	
	Singleton		Multiple		No.	Rate
	No.	Rate	No.	Rate		
20-27	594	535.1	63	300.0	657	497.7
28-32	99	73.7	8	17.3	107	59.2
33-36	99	12.4	10	5.0	109	10.9
37-44	190	1.4	13	7.9	203	1.5
TOTAL	982	6.7	94	21.8	1076	7.1

Rate is number of deaths per 1000 total births.

Table 19: Cause of death by time of death of fetal deaths in Western Australia, 2006-2010
PSANZ-PDC classification of perinatal deaths

Cause of Death	Time of Death						TOTAL	
	Antepartum		Intrapartum		Unknown		No.	%
	No.	%	No.	%	No.	%		
Congenital abnormality	89	15.1	175	49.7	46	34.1	310	28.8
Perinatal infection	22	3.7	15	4.3	4	3.0	41	3.8
Hypertension	32	5.4	4	1.1	6	4.4	42	3.9
Antepartum haemorrhage	26	4.4	16	4.5	6	4.4	48	4.5
Maternal conditions	48	8.1	6	1.7	6	4.4	60	5.6
Specific perinatal conditions	71	12.1	16	4.5	9	6.7	96	8.9
Hypoxic peripartum death	4	0.7	15	4.3	7	5.2	26	2.4
Fetal growth restriction	78	13.2	7	2.0	7	5.2	92	8.6
Spontaneous preterm	100	17.0	98	27.8	32	23.7	230	21.4
Unexplained antepartum death	119	20.2	-	-	12	8.9	131	12.2
TOTAL	589	100.0	352	100.0	135	100.0	1076	100.0

Table 20: Cause of death by Aboriginality of mother of fetal deaths in Western Australia, 2006-2010
PSANZ-PDC classification of perinatal deaths

Cause of Death	Aboriginality of Mother				TOTAL	
	Aboriginal		Non-Aboriginal			
	No.	%	No.	%	No.	%
Congenital abnormality	20	17.2	290	30.2	310	28.8
Perinatal infection	3	2.6	38	4.0	41	3.8
Hypertension	8	6.9	34	3.5	42	3.9
Antepartum haemorrhage	10	8.6	38	4.0	48	4.5
Maternal conditions	15	12.9	45	4.7	60	5.6
Specific perinatal conditions	2	1.7	94	9.8	96	8.9
Hypoxic peripartum death	-	-	26	2.7	26	2.4
Fetal growth restriction	10	8.6	82	8.5	92	8.6
Spontaneous preterm birth	34	29.3	196	20.4	230	21.4
Unexplained Antepartum death	14	12.1	117	12.2	131	12.2
TOTAL	116	100.0	960	100.0	1076	100.0

Table 21: Birthweight by gestational age of neonatal deaths in Western Australia, 2006-2010

Birth weight	Gestational Age								TOTAL	
	20-27		28-32		33-36		37-44			
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
< 500	63	768.3	-	-	-	-	-	-	63	759.0
500-999	90	190.7	3	n/a	-	-	-	-	93	160.0
1000-1499	8	75.5	17	26.4	3	26.5	-	-	28	32.4
1500-1999	1	n/a	7	9.5	9	8.5	3	23.6	20	10.3
2000-2499	-	n/a	3	n/a	4	1.2	14	5.6	21	3.5
< 2500	162	244.3	30	18.1	16	3.6	17	6.5	225	23.9
2500-2999	-	--	-	-	12	3.3	27	1.4	39	1.6
3000-3499	-	--	1	n/a	3	2.1	26	0.5	30	0.5
3500-3999	-	--	-	-	1	n/a	21	0.5	22	0.5
4000-4499	-	--	-	-	1	n/a	3	0.2	4	0.3
≥ 4500	-	--	-	-	-	-	3	1.4	3	1.3
unknown	-	-	-	-	-	-	1	n/a	1	n/a
TOTAL	162	244.3	31	18.2	33	3.3	98	1.4	324	2.1

Rate is number of deaths per 1000 livebirths.

Table 22: Gestational age by plurality of neonatal deaths in Western Australia, 2006-2010

Gestation	Plurality				TOTAL	
	Singleton		Multiple			
	No.	Rate	No.	Rate	No.	Rate
20-27	122	236.4	40	272.1	162	244.3
28-32	24	19.3	7	15.4	31	18.2
33-36	28	3.5	5	2.5	33	3.8
37-42	97	0.7	1	n/a	98	0.7
≥ 43	-	-	-	-	-	-
TOTAL	271	1.8	53	12.6	324	2.1

Rate is number of deaths per 1000 livebirths.
Perinatal, Infant and Maternal Mortality in Western Australia 2002-2006

Table 23: Cause of death by age at death of neonatal deaths in Western Australia, 2006-2010
PSANZ-NDC classification of neonatal deaths

Cause of Death	Age at Death (days)								TOTAL No.
	0 No.	1 No.	2 No.	3 No.	4-7 No.	8-14 No.	15-21 No.	22-28 No.	
Congenital abnormality	41	9	7	5	18	7	5	6	98
Extreme prematurity	71	8	7	4	4	5	2	2	103
Cardio-respiratory disorders	5	2	2	1	2	1	2	1	16
Infection	6	6	2	1	1	3	2	-	21
Neurological	13	4	12	5	9	7	5	1	56
Gastrointestinal	-	-	-	-	-	3	4	2	9
Other	5	2	1	-	3	2	5	3	21
TOTAL	141	31	31	16	37	28	25	15	324
	%	%	%	%	%	%	%	%	%
Congenital abnormality	29.1	29.0	22.6	31.3	48.6	25.0	20.0	40.0	30.2
Extreme prematurity	50.4	25.8	22.6	25.0	10.8	17.9	8.0	13.3	31.8
Cardio-respiratory disorders	3.5	6.5	6.5	6.3	5.4	3.6	8.0	6.7	4.9
Infection	4.3	19.4	6.5	6.3	2.7	10.7	8.0	-	6.5
Neurological	9.2	12.9	38.7	31.3	24.3	25.0	20.0	6.7	17.3
Gastrointestinal	-	-	-	-	-	10.7	16.0	13.3	2.8
Other	3.5	6.5	3.2	-	8.1	7.1	20.0	20.0	6.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 24: Cause of death by Aboriginality of mother of neonatal deaths in Western Australia, 2004-2008
PSANZ-NDC classification of neonatal deaths

Cause of Death	Aboriginality of Mother				TOTAL	
	Aboriginal		Non-Aboriginal		No.	%
	No.	%	No.	%	No.	%
Congenital abnormality	14	23.7	84	31.7	98	30.2
Extreme prematurity	27	45.8	76	28.7	103	31.8
Cardio-respiratory disorders	2	3.4	14	5.3	16	4.9
Infection	4	6.8	17	6.4	21	6.5
Neurological	5	8.5	51	19.2	56	17.3
Gastrointestinal	2	3.4	7	2.6	9	2.8
Other	5	8.5	16	6.0	21	6.5
TOTAL	59	100.0	265	100.0	324	100.0

Table 25: Neonatal, postneonatal and infant deaths by Aboriginality of mother in Western Australia, 2006-2010

Aboriginality of Mother	Neonatal deaths		Postneonatal deaths		Infant deaths	
	No.	Rate	No.	Rate	No.	Rate
Aboriginal	59	6.8	50	5.7	109	12.5
Non-Aboriginal	265	1.9	136	1.0	401	2.8
TOTAL	324	2.1	186	1.2	510	3.4

Table 26: Neonatal, postneonatal and infant death rates by Aboriginality of mother in Western Australia, 1996-2010

Year of Birth	Neonatal Death Rate			Postneonatal Death Rate			Infant Death Rate		
	Aboriginal	Non-Aboriginal	Total	Aboriginal	Non-Aboriginal	Total	Aboriginal	Non-Aboriginal	Total
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
2002	9.1	1.7	2.2	5.5	1.0	1.3	14.6	2.7	3.5
2003	7.9	1.8	2.2	7.9	0.9	1.3	15.7	2.7	3.5
2004	5.8	2.2	2.4	1.9	1.0	1.1	7.7	3.2	3.5
2005	5.9	2.6	2.8	4.1	1.6	1.7	10.0	4.1	4.5
2006	8.4	1.8	2.3	6.8	1.0	1.4	17.0	2.8	3.7
2007	4.4	1.8	2	7.2	0.6	1.0	11.6	2.5	3.0
2008	5.8	1.7	1.9	5.8	1.1	1.4	11.7	2.8	3.3
2009	7.5	2.2	2.5	4.6	1.0	1.2	12.1	3.2	3.7
2010	7.2	1.9	2.2	4.2	1.1	1.2	11.3	2.9	3.4

Table 27: Maternal age by parity of infant deaths in Western Australia, 2006-2010

Maternal Age	Parity								TOTAL	
	0		1-2		3-4		≥ 5		No.	Rate
≤ 15	8	28.7	-	-	-	-	-	-	8	28.1
16	4	6.8	1	n/a	-	-	-	-	5	7.5
17	4	3.4	2	16.8	-	-	-	-	6	4.7
18	10	5.7	4	12.5	--	-	-	-	14	6.8
19	23	9.9	4	5.4	1	n/a	-	-	28	9.1
≤ 19	49	8.0	11	14.8	1	n/a	-	--	61	8.3
20-24	44	3.4	60	5.9	10	12.2	1	n/a	115	4.8
25-29	48	2.5	59	3.1	18	6.1	13	28.3	138	3.4
30-34	40	2.4	45	1.8	17	4.4	8	8.1	110	2.4
35-39	19	2.7	27	1.7	12	3.9	11	11.6	69	2.6
40-44	4	3.3	8	3.0	4	5.3	-	-	16	3.2
≥ 45	-	-	1	n/a	-	-	-	-	1	n/a
TOTAL	204	3.2	211	2.9	62	5.4	33	11.9	510	3.4

Rate is number of deaths per 1000 total livebirths in each age group category.

Table 28: Birthweight by gender of infant deaths in Western Australia, 2006-2010

Birth weight	Gender				TOTAL	
	Male		Female		No.	Rate
< 500	25	735.3	41	836.7	66	795.2
500-999	64	209.8	46	167.3	110	189.7
1000-1499	24	53.7	14	33.6	38	43.9
1500-1999	20	21.7	10	9.9	30	15.5
2000-2499	20	7.4	21	6.5	41	6.9
< 2500	153	34.7	132	26.4	285	30.3
2500-2999	44	4.3	34	2.5	78	3.3
3000-3499	48	1.8	37	1.3	85	1.5
3500-3999	25	1.0	22	1.1	47	1.0
4000-4499	7	0.8	3	0.6	10	0.7
≥ 4500	4	2.7	-	-	4	1.8
unknown	1	n/a	-	-	1	n/a
TOTAL	282	3.7	228	3.1	510	3.4

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

Table 29: Gestational age by plurality of infant deaths in Western Australia, 2006-2010

Gestation	Plurality				TOTAL	
	Singleton		Multiple		No.	Rate
	No.	Rate	No.	Rate		
20-27	139	269.3	42	285.7	181	273.0
28-32	37	29.7	10	2.2	47	27.7
33-36	48	6.1	12	6.0	60	6.1
37-42	219	1.6	3	1.8	222	1.6
≥ 43	-	-	-	-	-	-
TOTAL	443	3.0	67	15.8	510	3.4

Rate is number of deaths per 1000 total livebirths in each gestational group category.

Table 30: Cause of death by age at death of postneonatal deaths in Western Australia, 2006-2010

Cause of Death	Age at Death (weeks)						TOTAL No.
	5-8	9-12	13-16	17-20	21-24	25-52	
	No.	No.	No.	No.	No.	No.	
SIDS	5	3	3	4	4	3	22
Lethal Congenital Anomaly	13	3	8	3	4	15	46
Infection	4	2	1	1	2	3	13
Other	1	1	1	3	1	8	15
Unknown	19	13	14	11	6	17	81
Prematurity	4	-	-	-	2	3	9
TOTAL	46	22	27	22	19	49	186
	%	%	%	%	%	%	%
SIDS	10.9	13.6	16.1	18.2	21.1	6.1	11.8
Lethal Congenital Anomaly	28.3	13.6	29.6	13.6	21.1	30.6	24.7
Infection	8.7	9.1	3.7	4.6	10.5	6.1	7.0
Other	2.2	4.6	3.7	13.6	5.3	16.3	8.1
Unknown	41.3	59.1	51.9	50.0	31.6	34.7	43.5
Prematurity	8.7	-	-	-	10.5	6.1	4.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 31: Cause of death by Aboriginality of mother of postneonatal deaths in Western Australia, 2006-2010

Cause of Death	Aboriginality of Mother				TOTAL	
	Aboriginal		Non-Aboriginal		No.	%
	No.	%	No.	%		
SIDS	9	18.0	13	9.6	22	11.8
Lethal Congenital Anomaly	10	20.0	36	26.5	46	24.7
Infection	6	12.0	8	5.9	14	7.5
Other	1	2.0	14	10.3	15	8.1
Unknown	22	44.0	58	42.7	80	43.0
Prematurity	2	4.0	7	5.2	9	4.8
TOTAL	50	100.0	136	100.0	186	100.0

9. 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 after birth.

<u>Low Birthweight</u>	A birthweight of less than 2500 grams
<u>Very Low Birthweight</u>	A birthweight of less than 1500 grams
<u>Extremely Low Birthweight</u>	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 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.

MATERNAL DEATH

See Part 5 of the report, on page 11.

MORTALITY PROPORTIONS

<u>Fetal Mortality Rate</u>	The number of fetal deaths per 1000 total births in a year.
<u>Neonatal Mortality Rate</u>	The number of neonatal deaths per 1000 livebirths in a year.
<u>Perinatal Mortality Rate</u>	The number of fetal and neonatal deaths per 1000 total births in a year.
<u>Post-neonatal Mortality Rate</u>	The number of post-neonatal deaths per 1000 livebirths in a year.
<u>Infant Mortality Rate</u>	The number of infant deaths per 1000 livebirths in a year.
<u>Maternal Mortality Rate</u>	The number of maternal deaths per 100,000 livebirths in a year.
<u>Maternal Mortality Ratio</u>	The number of maternal deaths per 100,000 women who gave birth 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 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			
Disease or condition directly leading to death*	(a)		
		due to	
<small>*This means the disease, injury or complication which caused death – not only the mode of dying, such as heart failure, respiratory failure etc.</small>			
Antecedent causes (b) - (e)	(b)		
		due to	
Morbid conditions, if any, giving rise to the above cause (a), stating the underlying condition last	(c)		
		due to	
	(d)		
		due to	
	(e)		
Part II			
Other significant conditions			
contributing to death but not related to the disease or condition causing it			

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			
Disease/condition			
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 / /