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**PERINATAL, INFANT AND MATERNAL MORTALITY
IN WESTERN AUSTRALIA
A TRIENNIAL COHORT OF 1996-1998 BIRTHS.**

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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 1996-1998 categorised by mortality grouping. It also describes trends over the fifteen year period from 1984 to 1998.

Births in Western Australia

- During the triennium 76,531 babies were born to 75,355 women with 99% of births being liveborn.
- Births occurred in hospital for 99% of women and 72% of women were resident in the Perth Metropolitan area.
- The crude birth rate of 14.1 per 1000 total population for the triennium has decreased from 16.4 per 1000 in 1984.
- Mothers in their teenage years accounted for 5.9% of births and women aged 40 years or more represented 2.0%.
- Aboriginal mothers represented 5.9% 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 535 fetal deaths (7.0/1000) and 233 neonatal deaths (3.1/1000). This provided a perinatal mortality rate of 10.0/1000.
- The majority of fetal deaths occurred during the antenatal period (63.7%). 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 386 infant deaths identified during the triennium providing an infant mortality rate of 5.1/1000 livebirths. This rate has reduced from 9.9 per 1000 in 1984.
- Among babies of Aboriginal mothers the infant mortality rate of 15.0 per 1000 was three times that of the rate for babies of non-Aboriginal women (4.4 per 1000). The high proportion of deaths among babies of Aboriginal mothers in the post-neonatal period (8.5 per 1000) is 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 SIDS was the finding for 52.6% of deaths during the post-neonatal period.

Maternal Mortality

- The maternal mortality rate for the triennium (1996-1998) was 6.6 per 100,000 livebirths in Western Australia.
- During the ten year period, 1989-1998, nineteen maternal deaths were reported in Western Australia. This represents a maternal mortality rate of 7.5 per 100,000 livebirths. In accord with prescribed definitions it would appear that classification of these deaths would be ten 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 on average 1.4 maternal deaths per year were recorded providing a maternal mortality rate of 5.9 per 100,000 livebirths for that 18 year period.

1. INTRODUCTION

Aims

This report is the first triennial report in a continuing series examining perinatal and infant mortality. 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 will also include information about maternal mortality in Western Australia.

This report relates to a cohort of childbearing women and their babies 1996-1998 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 data base 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 1996-1998

2.1 Births incidence

Notifications by midwives received by this department indicate that 76,531 babies were born to 75,355 women during the 1996-1998 triennium. This report includes statistics on all births of 20 weeks or more gestation, or a birthweight of 400 grams or more¹ (Table 1).

2.2 Place of birth

The majority of births, 75,954 (99.2%), occurred in hospital. Of these, births in metropolitan hospitals numbered 57,457 (75.1%) and non-metropolitan hospital births were 18,497 (24.2%). There were 577 (0.7%) non hospital births including 242 (0.3%) born before arrival at hospital and 335 (0.4%) planned supervised homebirths.

2.3 Maternal place of residence

Assessment of usual place of residence of birth mothers throughout the State shows that the majority of births 55,050 (71.9%) were to women who lived within one of the Perth Metropolitan health zones (Table 1).

2.4 Crude birth rate

An overall crude birth rate of 14.1 per 1000 total population was identified for Western Australia during 1996-1998 less than half that recorded for Aboriginal women of 29.1 per 1000. The crude birth rate has decreased from 16.4 per 1000 in 1984 to 13.9 per 1000 in 1998 (Table 3).

2.5 Condition at birth

Analysis of the condition at birth showed 75,997 (99.3%) babies were liveborn and 534 (0.7%) babies were stillborn. There were 4479 (98.5%) livebirths to Aboriginal women and 68 (1.5%) fetal deaths. For non-Aboriginal women there were 71,518 (99.3%) livebirths and 466 (0.7%) fetal deaths. (Table 5).

2.6 Maternal age

Consideration of maternal age in five year age groups shows that the highest percentage of women confined (32.7%), were in the 25 to 29 year age category. Women in their teenage years accounted for 5.9% of total confinements. Almost a quarter (24.7%) 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 2.0% of all women confined¹.

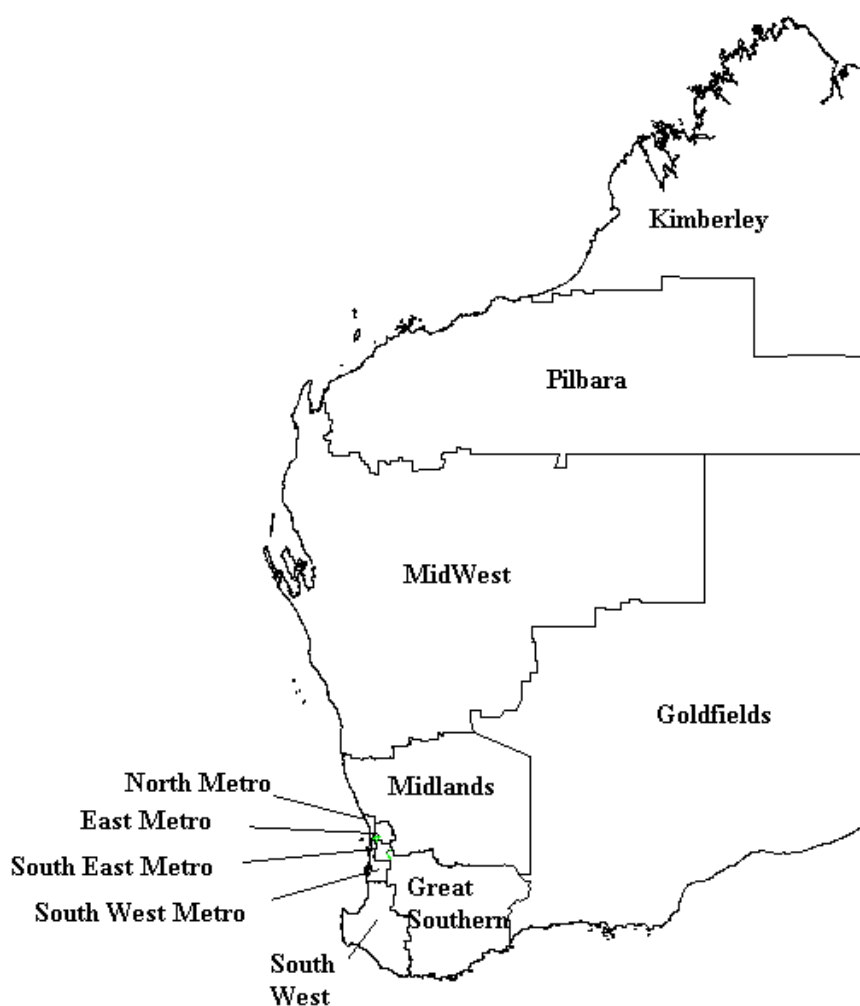
2.7 Aboriginality of mother

Examination of births showed that 4547 (5.9%) babies were born to Aboriginal women, and 71,984 (94.1%) to non-Aboriginal women (Table 3).

Figure 1:

Crude Birth Rate, Perinatal and Infant Mortality and Health Zone of maternal residence for births in Western Australia, 1996-1998

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



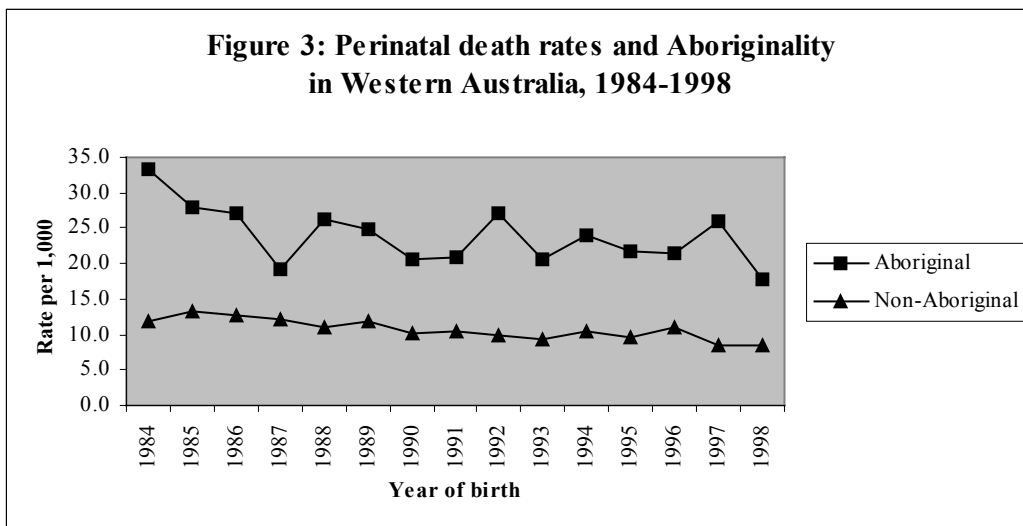
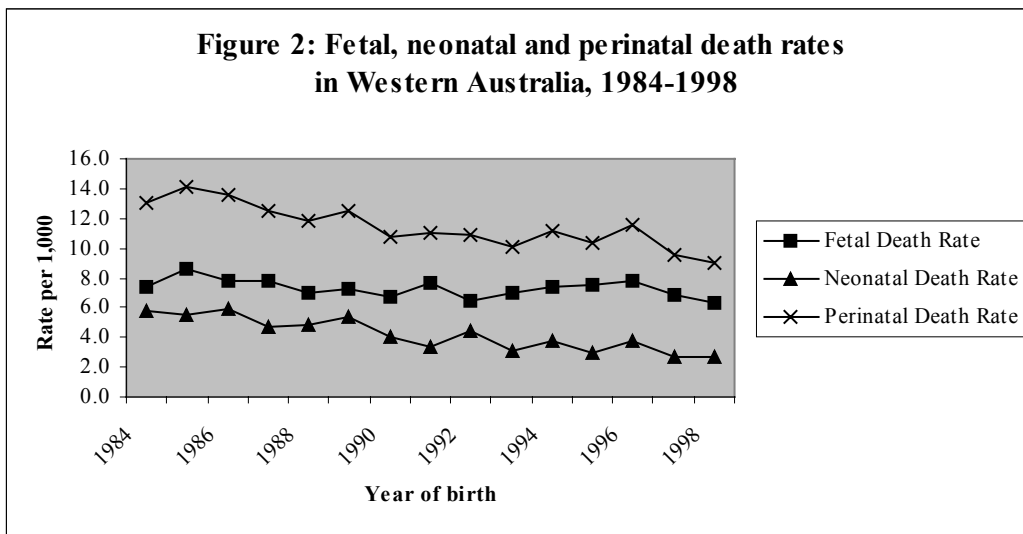
Health Zone	Crude Birth Rate	Perinatal Mortality	Infant Mortality
Kimberley	23.6	21.9	12.2
Pilbara	18.2	11.9	4.4
Midwest	18.2	8.9	8.0
Central	14.9	5.1	5.1
Goldfields	19.5	12.4	5.6
South West	14.1	6.5	4.3
Great Southern	15.0	10.9	5.9
North Metro	12.5	9.0	4.6
East Metro	14.0	9.8	4.2
South West Metro	12.9	11.7	5.5
South East Metro	14.3	9.5	4.4
Total WA	14.1	10.0	5.1

3. PERINATAL MORTALITY IN WESTERN AUSTRALIA IN THE 1996-1998 BIRTH COHORT

3.1 Perinatal deaths

There were 768 perinatal deaths identified in the 1996-1998 birth cohort providing a perinatal mortality rate of 10.0/1000 total births (Table 4).

Trend data on individual years shows that there has been a gradual reduction, over the fifteen year period, in the overall rate from 13.1 per 1000 in 1984 to 9.0 per 1000 in 1998. Among babies of Aboriginal mothers the rate has reduced from 33.3 per 1000 to 17.8 per 1000 over the same period (Table 5).



3.1.1 Maternal age and parity

Perinatal deaths of babies born to first time mothers numbered 349 with a rate of 11.4 per 1000. Of these, 60 were born to teenage mothers with a rate of 16.5 per 1000. This rate is similar to the overall rate of perinatal deaths to babies of teenage mothers 16.6 per 1000 (Table 6).

3.1.2 Birthweight and gender

More than half of the perinatal deaths were of low birthweight providing a rate of 110.4 per 1000. The ratio of male to female perinatal deaths was 1:1 (Table 7).

3.1.3 Cause of death and plurality

Perinatal deaths in Western Australia have been classified in accord with both the Queensland Council on Obstetric and Paediatric Morbidity and Mortality (QCOPMM), Classification of perinatal deaths (QCPMC)² and the South Australian Obstetric Cause-Specific Classification of Perinatal Deaths (Amended Whitfield)³ for comparative purposes.

Using the QCPMC, congenital abnormality was the cause of 22.9% of deaths with 19.3% unexplained antepartum deaths and 17.8% unexplained preterm deaths. Among multiple births 77.5% were attributed to factors relating to the multiple pregnancy. (Table 8a). The Amended Whitfield classification showed similar proportions with 23.0% fetal abnormality, 19.0% unexplained deaths and 18.4% resulting from spontaneous preterm births who died. However among multiple births the distribution of cause was more specific with 32.6% attributed to spontaneous preterm conditions (Table 8b).

It was known that information relating to death was gained from autopsy for 34.0% of perinatal deaths although for a further 31.4% it was not known whether or not an autopsy was performed (Table 9).

3.2 Fetal deaths

There were 535 fetal deaths in Western Australia during 1996-1998 providing a fetal death rate in the State for the triennium of 7.0 per 1000 total births (Table 4).

Fetal death proportions relating to the Health Zone of maternal residence are shown in Table 2 and Figure 1. Among babies of Aboriginal mothers the fetal death rate was high (15.2 per 1000) compared with that for babies of non-Aboriginal women (6.5 per 1000) (Table 4).

3.2.1 Birthweight and gestational age

There was a corresponding decrease in the fetal death rate as birthweight increased. The exception being among babies with birthweight in excess of 4500 grams. For low birthweight babies the rate of fetal death was 80.1 per 1000. Similarly, as gestation increases the fetal death rate falls as shown by a rate of 444.6 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 10).

3.2.2 Gestational age and plurality

The fetal death proportion for all multiple births (23.8 per 1000) compares unfavourably with fetal death rate for all singleton births (6.5 per 1000). The rate of fetal death among babies of 28-32 weeks gestation for singleton births (116.8 per 1000) was almost three times that for multiple births (37.0 per 1000). Among babies born 20-27 weeks gestation singleton births had a higher fetal mortality rate (487.3 per 1000) than did multiple births (265.5 per 1000) (Table 11).

3.2.3 Cause and time of death for fetal deaths

Of the 535 fetal deaths during the triennium there were 341 (63.7%) antepartum deaths and 132 (24.7%) intrapartum deaths. It was not known when the remaining 62 (11.6%) fetal deaths occurred. The principal causes were those related to conditions of extremely low birth weight (232, 43.4%) and lethal congenital anomaly (80, 15.0%). An additional 140 (26.2%) fetal deaths were not able to be classified for cause (Table 12)

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 (10.1%) was lower than for fetal deaths of babies born to non-Aboriginal women (15.7%). Low birthweight contributed to more fetal deaths of babies born to Aboriginal women (50.7%) than for those born to non-Aboriginal women (42.3%) (Table 13).

3.3 Neonatal deaths

There were 233 neonatal deaths in Western Australia during the 1996-1998 triennium cohort indicating a neonatal mortality rate of 3.1 per 1000 livebirths. For babies of Aboriginal women neonatal mortality was 6.6 per 1000 which is far greater than that recorded for babies of non-Aboriginal women (2.8 per 1000) (Table 18).

3.3.1 Birthweight and gestational age

In general the neonatal death rate decreases with birthweight, with the exception of those babies with birthweight greater than 4500 grams. All neonatal deaths of 32 or less weeks gestation are classified as low birthweight. Overall more than half (156, 67.0%) of all neonatal deaths were low birthweight (Table 14).

3.3.2 Gestational age and plurality

The neonatal death rate for multiple births (15.1 per 000) was far greater than that for singleton livebirths (2.7 per 1000). This was consistent with the neonatal deaths rates where gestational age was 20-27 weeks where the rate for multiple births was slightly higher (325.3 per 1000) than the rate for singleton births (303.3 per 1000) (Table 15).

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 (55.3%) and lethal congenital anomaly (29.1%). Early neonatal deaths, those that died at less than 8 days, numbered 181 (77.7%) being due to complications related to low birthweight (48.6%) and with anomalies incompatible with life (32.6%) (Table 16).

3.3.4 Cause of death and Aboriginality of mother

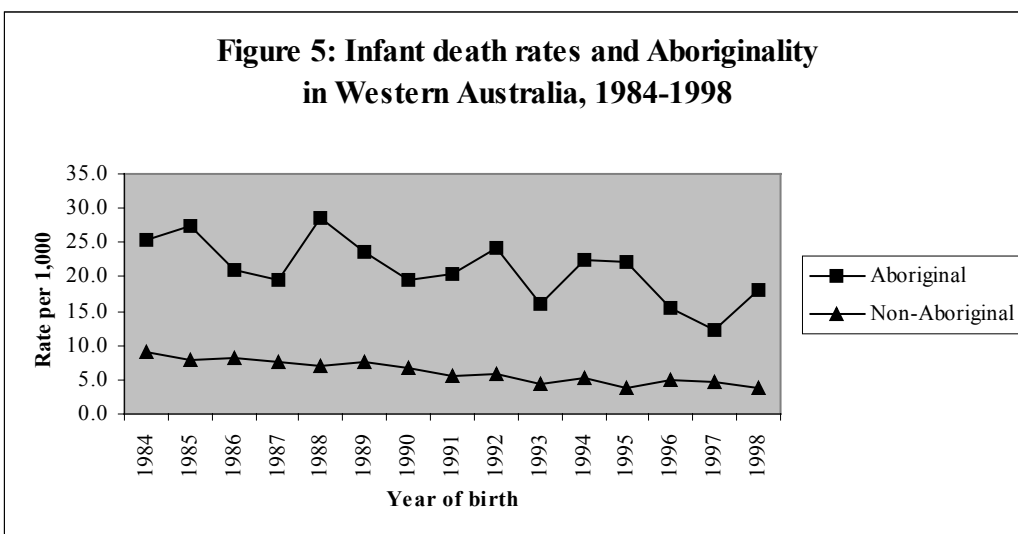
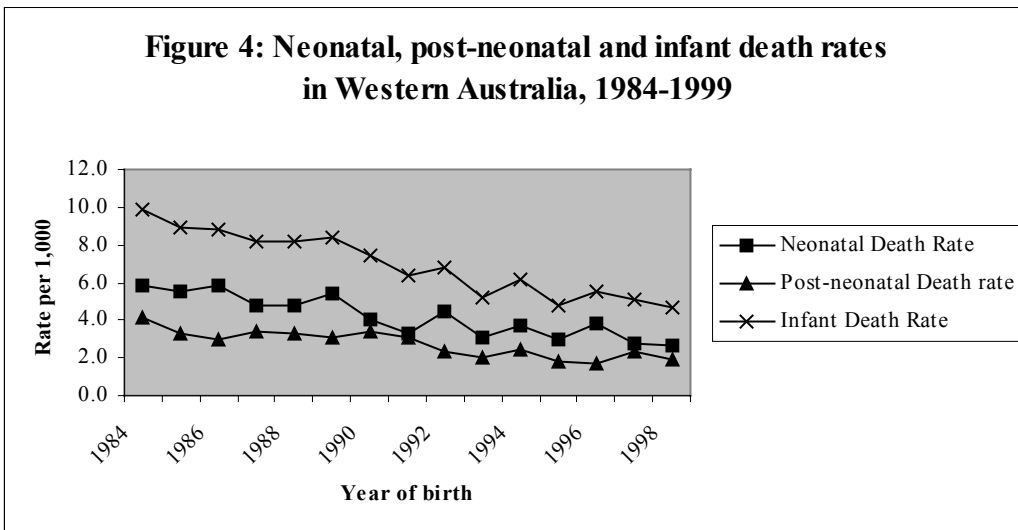
Among neonatal deaths where the mother was recorded as Aboriginal the proportion of deaths due to lethal congenital anomaly was similar to the proportion for those identified as non-Aboriginal. However the proportion of neonatal deaths attributed to factors associated with low birthweight for babies of Aboriginal women (33.3%) was less than that for babies of non-Aboriginal women (45.3%). There were four (13.3%) babies of Aboriginal mothers for whom the cause of death was not determined (Table 17).

4. INFANT MORTALITY IN WESTERN AUSTRALIA IN THE 1996-1998 BIRTH COHORT

4.1 Infant deaths

There were 386 infant deaths identified amongst the 75,997 livebirths in the 1996-1998 triennium. Of these, 233 were neonatal deaths and 153 were post-neonatal deaths. The infant mortality rate for Western Australia in 1996-1998 was 5.0/1000 livebirths (Table 18). Over the 15 year period from 1984-1998 there has been a gradual decrease in the infant mortality rate from 9.9/1000 in 1984 to 4.6/1000 in 1998 (Table 19).

Infant mortality among babies born to Aboriginal women (15.0/1000) was three times that for babies born to non-Aboriginal women (4.4/1000) (Table 18). The difference between these groups reduced from 19.7/1000 in 1985 and 12.8/1000 in 1990, then rose to 18.4/1000 in 1995 before falling to 14.1/1000 in 1998 (Table 19).



4.1.1 Maternal age and parity

There were 49 (11.0%) infant deaths among babies of teenage mothers during the 1996-1998 triennium. Of these, 36 (73.5%) were the first born and 13 (26.5%) of mothers had a parity of two or less (Table 20).

4.1.2 Birthweight and gender

Low birthweight was recorded for 43.2% of infant deaths during the 1996-1998 triennium. Male babies suffered higher rates of infant death in both the low birthweight and the overall category (60.6%). For births less than 4,500 grams, the mortality rate decreased as birthweight increased (Table 21).

4.1.3 Gestational age and plurality

The rate of infant mortality among multiple births (20.4 per 1000) was more than four times the rate of singleton births (4.6 per 1000) (Table 22).

4.2 Post-neonatal deaths

There were 153 post-neonatal deaths among the 75,997 livebirths during the 1996-1998 triennium, providing a rate of 2.0 per 1000 livebirths (Table 18 and Table 19).

Post-neonatal mortality rate for babies of Aboriginal women was 8.5 per 1000 livebirths, six times the rate of 1.6 per 1000 for babies of non-Aboriginal women (Table 18).

Post-neonatal deaths in relation to Health Zone of maternal residence are shown in Table 2. It should be noted however, that due to small numbers of births in some Zones the rates do 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

The principal causes of post-neonatal death were lethal congenital anomaly (17.6%), infection (17.6%) and Sudden Infant Death Syndrome (SIDS) (38.6%). During the 9-12 week period 64.5% of deaths were attributed to SIDS (Table 23).

4.2.2 Cause of death and Aboriginality of mother

Among post-neonatal deaths of babies born to Aboriginal women more than half (52.6%) were attributed to SIDS. Infection (23.7%) was also a major cause. The proportion of 5.3% resulting from lethal congenital anomalies was lower among babies of Aboriginal mothers than that of 21.7% for babies of non-Aboriginal women (Table 24).

5. MATERNAL MORTALITY IN WESTERN AUSTRALIA 1996-1998

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 accord with the NHMRC Triennial Reports on Maternal Mortality for Australia⁴. 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 related to the pregnancy.

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); and

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 1989-1998

From 1989 to 1998 there were 19 maternal deaths reported in Western Australia. These deaths, based on information from death certificates and classified in accord with prescribed definitions, would appear to be, ten direct maternal deaths, five indirect maternal deaths and four incidental maternal deaths.

Of the ten direct maternal deaths, three occurred at the time of delivery with the principal cause being haemorrhage. A further six 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 five incidental deaths, two were as a result of maternal suicide, two resulted from cerebral haemorrhage during pregnancy 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 18 year period from 1981 to 1998 there were 26 reported maternal deaths being on average 1.4 maternal deaths per year or a maternal mortality death rate of 5.9 per 100,000 livebirths for that period.

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	7	125,624	5.6
1996-98	7	75,997	9.2
1981-98	26	437,431	5.9

5.5 Long term trend of maternal mortality

The accompanying figure shows the dramatic improvement in the maternal mortality rate for Western Australia which has more than halved every ten years since 1931. This decline in the Western Australian maternal mortality rate reflects Australian national statistics.

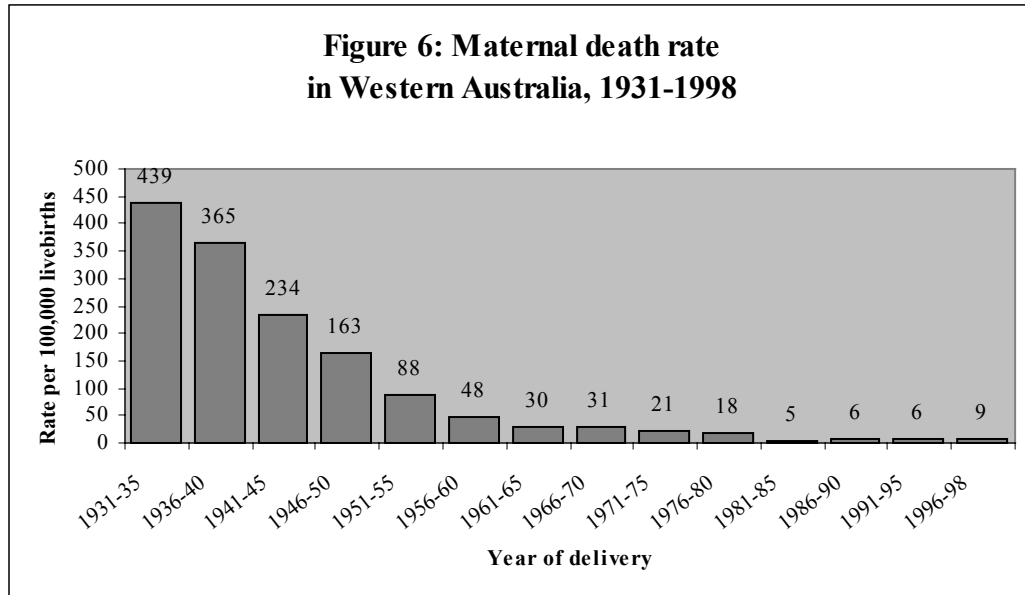


Table 1: Live and total births by health region of maternal residence in Western Australia, 1996-1998

Health Region of Residence	1996				1997				1998			
	Live Births		Total Births		Live Births		Total Births		Live Births		Total Births	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Metropolitan												
North	5787	22.8	5829	22.8	5612	22.4	5645	22.3	5958	23.4	5990	23.3
East	3899	15.4	3925	15.3	3910	15.6	3937	15.6	3730	14.6	3757	14.6
South West	4242	16.7	4284	16.7	4114	16.4	4140	16.4	4331	17.0	4360	17.0
South East	4362	17.2	4394	17.2	4320	17.2	4349	17.2	4409	17.3	4440	17.3
Country												
Kimberley	596	2.3	605	2.4	623	2.5	639	2.5	664	2.6	671	2.6
Pilbara	752	3.0	761	3.0	742	3.0	745	2.9	758	3.0	767	3.0
Midwest	1117	4.4	1123	4.4	1148	4.6	1154	4.6	977	3.8	983	3.8
Central	775	3.1	779	3.0	805	3.2	807	3.2	787	3.1	789	3.1
Goldfields	1112	4.4	1121	4.4	1127	4.5	1141	4.5	1124	4.4	1132	4.4
South West	1613	6.4	1622	6.3	1619	6.5	1624	6.4	1664	6.5	1670	6.5
Great Southern	1085	4.3	1094	4.3	1031	4.1	1040	4.1	1079	4.2	1086	4.2
Outside WA	45	0.2	47	0.2	45	0.2	46	0.2	35	0.1	35	0.1
TOTAL	25385	100.0	25584	100.0	25096	100.0	25267	100.0	25516	100.0	25680	100.0

Table 2: Fetal, neonatal and postneonatal deaths and fetal, perinatal and infant death rates by health region of maternal residence in Western Australia, 1996-1998

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	107	20.0	51	21.9	28	18.3	107	6.1	158	9.0	79	4.6
East	80	15.0	34	14.6	15	9.8	80	6.9	114	9.8	49	4.2
South West	98	18.3	51	21.9	19	12.4	98	7.7	149	11.7	70	5.5
South East	92	17.2	33	14.2	25	16.3	92	7.0	125	9.5	58	4.4
Country												
Kimberley	32	6.0	10	4.3	13	8.5	32	16.7	42	21.9	23	12.2
Pilbara	21	3.9	6	2.6	4	2.6	21	9.2	27	11.9	10	4.4
Midwest	19	3.6	10	4.3	16	10.5	19	5.8	29	8.9	26	8.0
Central	8	1.5	4	1.7	8	5.2	8	3.4	12	5.1	12	5.1
Goldfields	31	5.8	11	4.7	8	5.2	31	9.1	42	12.4	19	5.6
South West	20	3.7	12	5.2	9	5.9	20	4.1	32	6.5	21	4.3
Great Southern	24	4.5	11	4.7	8	5.2	24	7.5	35	10.9	19	5.9
Outside WA	3	0.6	0	0.0	0	0.0	3	23.4	3	23.4	0	0.0
TOTAL	535	100.0	233	100.0	153	100.0	535	7.0	768	10.0	386	5.1

Table 3: Crude birth rates and Aboriginality of mother in Western Australia, 1984-1998

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
1984	1177	35914	32.8	21616	1355330	15.9	22793	1391244	16.4
1985	1237	37447	33.0	21919	1381112	15.9	23156	1418559	16.3
1986	1231	39315	31.3	22472	1419704	15.8	23703	1459019	16.2
1987	1329	40397	32.9	22686	1455851	15.6	24015	1496248	16.1
1988	1428	41575	34.3	23552	1536859	15.3	24980	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	23723	1628987	14.6	25159	1676423	15.0
1994	1431	48488	29.5	23806	1652576	14.4	25237	1701064	14.8
1995	1445	49442	29.2	23809	1681720	14.2	25254	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	1505	52517	28.7	24011	1778882	13.5	25516	1831399	13.9

Table 4: Fetal, neonatal and perinatal deaths and Aboriginality of mother in Western Australia, 1996-1998

Aboriginality of Mother	Fetal deaths		Neonatal deaths		Perinatal deaths	
	No.	Rate	No.	Rate	No.	Rate
Aboriginal	69	15.2	30	6.7	99	21.8
Non-Aboriginal	466	6.5	203	2.8	669	9.3
TOTAL	535	7.0	233	3.1	768	10.0

Table 5: Fetal, neonatal and perinatal death rates and Aboriginality of mother in Western Australia, 1984-1998

Year of Birth	Fetal Death Rate			Neonatal Death Rate			Perinatal Death Rate		
	Aboriginal	Non-Aboriginal	Total	Aboriginal	Non-Aboriginal	Total	Aboriginal	Non-Aboriginal	Total
1984	20.0	6.7	7.4	13.6	5.4	5.8	33.3	12.0	13.1
1985	15.9	8.2	8.6	12.1	5.2	5.6	27.8	13.4	14.2
1986	16.0	7.3	7.7	11.4	5.6	5.9	27.2	12.8	13.6
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	11.5	6.5	6.8	9.1	3.7	4.1	20.5	10.2	10.8
1991	14.8	7.3	7.7	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	21.8	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

Table 6: Maternal age and parity of perinatal deaths in Western Australia, 1996-1998

Maternal Age	Parity								TOTAL	
	0		1-2		3-4		>= 5		No.	Rate
<= 15	5	24.6							5	23.4
16	11	29.4							11	27.0
17	17	22.8	3						20	23.4
18	18	17.2	4	13.8					22	17.0
19	9	7.1	8	15.2					17	9.7
<= 19	60	16.5	15	17.2					75	16.6
20-24	74	10.3	53	9.1	11	19.8			138	10.2
25-29	84	7.9	92	7.4	29	16.0	6	25.9	211	8.4
30-34	87	12.8	109	8.5	24	10.4	4	9.4	224	10.0
35-39	40	18.4	37	6.9	19	12.3	6	15.8	102	10.8
40-44	4	13.0	12	17.8	1	3.2			17	11.8
45+					1	83.3			1	15.6
TOTAL	349	11.4	318	8.4	85	12.9	16	12.9	768	10.0

Table 7: Birthweight and gender of perinatal deaths in Western Australia, 1996-1998

Birth weight	Gender						TOTAL	
	Male		Female		Indeterminate		No.	Rate
< 500	114	974.4	109	916.0	4	1000.0	227	945.8
500-999	94	454.1	73	386.2	2	1000.0	169	424.6
1000-1499	31	121.1	26	112.6			57	117.0
1500-1999	33	68.9	25	52.9			58	60.9
2000-2499	33	23.4	25	15.0			58	18.9
< 2500	305	123.6	258	96.3	6	1000.0	569	110.4
2500-2999	29	5.4	35	5.0			64	5.2
3000-3499	36	2.7	31	2.2			67	2.4
3500-3999	24	1.9	26	2.6			50	2.2
4000-4499	6	1.3	3	1.1			9	1.3
>= 4500	6	7.6	3	8.6			9	8.0
TOTAL	406	10.3	356	9.6	6	1000.0	768	10.0

Table 8a: Cause of death and plurality of perinatal deaths in Western Australia, 1996-1998
QCPMC classification of perinatal deaths

Cause of Death	Plurality				TOTAL	
	Singleton		Multiple		No.	%
	No.	%	No.	%		
Congenital abnormality	169	24.9	7	7.9	176	22.9
Infection	29	4.3	3	3.4	32	4.2
Multiple pregnancy	2	0.3	69	77.5	71	9.2
Maternal conditions	21	3.1			21	2.7
Hypertension	24	3.5	1		25	3.3
Antepartum haemorrhage	56	8.2	1	1.1	57	7.4
Intrauterine growth restriction	18	2.7		0.0	18	2.3
Other specific obstetric condition	43	6.3		0.0	43	5.6
Unexplained antepartum death	148	21.8		0.0	148	19.3
Hypoxic peripartum death	24	3.5			24	3.1
Unexplained preterm	131	19.3	6	6.7	137	17.8
No obstetric antecedent	14	2.1	2	2.2	16	2.1
TOTAL	679	100.0	89	100.0	768	100.0

Table 8b: Cause of death and plurality of neonatal deaths in Western Australia, 1996-1998
Amended Whitfield cause-specific classification of perinatal deaths

Cause of Death	Plurality				TOTAL	
	Singleton		Multiple		No.	%
	No.	%	No.	%		
Spontaneous preterm	112	16.5	29	32.6	141	18.4
Intrauterine growth restriction	23	3.4	1	1.1	24	3.1
Unexplained	137	20.2	9	10.1	146	19.0
Birth trauma	2	0.3			2	0.3
Intrapartum asphyxia	44	6.5	1	1.1	45	5.9
Hypertension	32	4.7	3	3.4	35	4.6
Maternal disease	54	8.0			54	7.0
Antepartum haemorrhage	17	2.5	5	5.6	22	2.9
Fetal abnormality	169	24.9	8	9.0	177	23.0
Haemolytic disease	1	0.1			1	0.1
Infection	55	8.1	7	7.9	62	8.1
Other	33	4.9	26	29.2	59	7.7
TOTAL	679	100.0	89	100.0	768	100.0

Table 9: Fetal, neonatal and perinatal deaths and autopsy in Western Australia, 1996-1998

Autopsy	Fetal deaths		Neonatal deaths		Perinatal deaths	
	No.	%	No.	%	No.	%
Yes	194	36.3	67	28.8	261	34.0
No	169	31.6	97	41.6	266	34.6
Unknown	172	32.1	69	29.6	241	31.4
TOTAL	535	100.0	233	100.0	768	100.0

Table 10: Birthweight and gestational age of fetal deaths in Western Australia, 1996-1998

Birth weight	Gestational Age								TOTAL	
	20-27		28-32		33-36		37-42		No.	Rate
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
< 500	171	750.0	8	800.0	1	1000.0	1	1000.0	181	754.2
500-999	86	277.4	22	268.3	1	333.3			109	273.9
1000-1499	2	43.5	32	84.9	7	119.0	1	200.0	42	86.2
1500-1999	2	666.7	18	56.1	22	42.0	2	19.4	44	46.2
2000-2499			5	64.1	22	14.0	10	7.0	37	12.0
< 2500	261	444.6	85	97.9	53	24.5	14	9.1	413	80.1
2500-2999			1	125.0	14	9.2	27	18.7	42	3.4
3000-3499					4	8.3	34	1.2	38	1.4
3500-3999							28	1.2	28	1.2
4000-4499					1	50.0	6	0.8	7	1.0
>= 4500							7	6.2	7	6.2
TOTAL	261	444.6	86	97.3	72	16.8	116	1.6	535	7.0

Table 11: Gestational age and plurality of fetal deaths in Western Australia, 1996-1998

Gestation	Plurality				TOTAL	
	Singleton		Multiple		No.	Rate
	No.	Rate	No.	Rate	No.	Rate
20-27	231	487.3	30	265.5	261	444.6
28-32	78	116.8	8	37.0	86	97.3
33-36	58	16.9	14	16.7	72	16.8
37-42	113	1.6	3	2.6	116	1.6
>= 43						
TOTAL	480	6.5	55	23.8	535	7.0

Table 12: Cause of death and time of death of fetal deaths in Western Australia, 1996-1998

Cause of Death	Time of Death						TOTAL	
	Antepartum		Intrapartum		Unknown		No.	%
	No.	%	No.	%	No.	%		
Lethal congenital anomaly	30	8.8	37	28.0	13	21.0	80	15.0
Extremely low birthweight	135	39.6	62	47.0	35	56.5	232	43.4
Unknown	117	34.3	15	11.4	8	12.9	140	26.2
Maternal Obstetric	5	1.5	4	3.0	1	1.6	10	1.9
Maternal Medical	10	2.9	1	0.8	1		12	2.2
Maternal Hypertension	2	0.6					2	0.4
Placenta and Cord	35	10.3	13	9.8	4	6.5	52	9.7
Other	7	2.1					7	1.3
TOTAL	341	100.0	132	100.0	62	100.0	535	100.0

Table 13: Cause of death and Aboriginality of mother of fetal deaths in Western Australia, 1996-1998

Cause of Death	Aboriginality of Mother				TOTAL	
	Aboriginal		Non-Aboriginal		No.	%
	No.	%	No.	%		
Lethal congenital anomaly	7	10.1	73	15.7	80	15.0
Extremely low birthweight	35	50.7	197	42.3	232	43.4
Unknown	14	20.3	126	27.0	140	26.2
Maternal obstetric	3	4.3	7	1.5	10	1.9
Maternal medical	4	5.8	8	1.7	12	2.2
Maternal hypertension			2	0.4	2	0.4
Placenta and cord	4	5.8	48	10.3	52	9.7
Other	2	2.9	5	1.1	7	1.3
TOTAL	69	100.0	466	100.0	535	100.0

Table 14: Birthweight and gestational age of neonatal deaths in Western Australia, 1996-1998

Birth weight	Gestational Age								TOTAL	
	20-27		28-32		33-36		37-42		No.	Rate
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
< 500	45	775.9	1	500.0					46	766.7
500-999	52	232.1	8	133.3					60	207.6
1000-1499	3	68.2	10	29.0	2	38.5			15	33.7
1500-1999	1	1000.0	3	9.9	4	8.0	6	59.4	14	15.4
2000-2499			2	27.4	7	4.5	12	8.5	21	6.9
< 2500	101	308.9	24	30.7	13	6.2	18	11.8	156	32.9
2500-2999					6	4.0	16	0.6	22	1.8
3000-3499					2	4.2	27	1.2	29	1.0
3500-3999							22	3.1	22	1.0
4000-4499							2	500.0	2	0.3
>= 4500							2	1.8	2	1.8
TOTAL	101	308.9	24	30.1	21	5.0	87	1.2	233	3.1

Table 15: Gestational age and plurality of neonatal deaths in Western Australia, 1996-1998

Gestation	Plurality				TOTAL	
	Singleton		Multiple		No.	Rate
	No.	Rate	No.	Rate	No.	Rate
20-27	74	303.3	27	325.3	101	308.9
28-32	21	35.6	3	14.4	24	30.1
33-36	19	5.6	2	2.4	21	5.0
37-42	85	1.2	2	2.4	87	1.2
>= 43						
TOTAL	199	2.7	34	15.1	233	3.1

Table 16: Cause of death and age at death of neonatal deaths in Western Australia, 1996-1998

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	30	9	6	5	4	2	2	1	6	7	4	76
Low birthweight	57	13	6	8	2		1	1	10	2	2	102
Asphyxia	7	4	3	3	1	1			2	1		22
Pregnancy conditions	2											2
Infection	3	1	1						1	2	1	9
Hydrops fetalis			1									1
Other	3								1	1		5
SIDS									2	4	2	8
Unknown	1			1		1	1		3		1	8
TOTAL	103	27	17	17	7	4	4	2	25	17	10	233
	%	%	%	%	%	%	%	%	%	%	%	%
Lethal Congenital Anomaly	29.1	33.3	35.3	29.4	57.1	50.0	50.0	50.0	24.0	41.2	40.0	32.6
Low birthweight	55.3	48.1	35.3	47.1	28.6		25.0	50.0	40.0	11.8	20.0	43.8
Asphyxia	6.8	14.8	17.6	17.6	14.3	25.0			8.0	5.9		9.4
Pregnancy conditions	1.9											0.9
Infection	2.9	3.7	5.9						4.0	11.8	10.0	3.9
Hydrops fetalis	0.0		5.9									0.4
Other	2.9								4.0	5.9		2.1
SIDS									8.0	23.5	20.0	3.4
Unknown	1.0			5.9		25.0	25.0		12.0		10.0	3.4
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

Table 17: Cause of death and Aboriginality of mother of neonatal deaths in Western Australia, 1996-1998

Cause of Death	Aboriginality of Mother				TOTAL	
	Aboriginal		Non-Aboriginal		No.	%
	No.	%	No.	%	No.	%
Lethal Congenital Anomaly	10	33.3	66	32.5	76	32.6
Low birthweight	10	33.3	92	45.3	102	43.8
Asphyxia			22	10.8	22	9.4
Pregnancy conditions			2	1.0	2	0.9
Infection	2	6.7	7	3.4	9	3.9
Hydrops fetalis			1	0.5	1	0.4
Other	1	3.3	4	2.0	5	2.1
SIDS	3	10.0	5	2.5	8	3.4
Unknown	4	13.3	4	2.0	8	3.4
TOTAL	30	100.0	203	100.0	233	100.0

Table 18: Neonatal, postneonatal and infant deaths and Aboriginality of mother in Western Australia, 1996-1998

Aboriginality of Mother	Neonatal deaths		Postneonatal deaths		Infant deaths	
	No.	Rate	No.	Rate	No.	Rate
Aboriginal	30	6.6	38	8.5	68	15.0
Non-Aboriginal	203	2.8	115	1.6	318	4.4
TOTAL	233	3.0	153	2.0	386	5.1

Table 19: Neonatal, postneonatal and infant death rates and Aboriginality of mother in Western Australia, 1984-1998

Year of Birth	Neonatal Death Rate			Postneonatal Death Rate			Infant Death Rate		
	Aboriginal	Non-Aboriginal	Total	Aboriginal	Non-Aboriginal	Total	Aboriginal	Non-Aboriginal	Total
1984	13.6	5.4	5.8	11.9	3.7	4.1	25.5	9.1	9.9
1985	12.1	5.2	5.6	15.4	2.6	3.3	27.5	7.8	8.9
1986	11.4	5.6	5.9	9.7	2.6	3.0	21.1	8.2	8.9
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	9.1	3.7	4.1	10.4	2.9	3.4	19.5	6.7	7.4
1991	6.1	3.1	3.3	14.3	2.4	3.1	20.5	5.5	6.4
1992	12.0	4.0	4.5	12.0	1.8	2.4	24.1	5.8	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	14.7	1.7	2.4	22.4	5.2	6.2
1995	9.0	2.6	3.0	13.1	1.1	1.8	22.1	3.7	4.8
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

Table 20: Maternal age and parity of infant deaths in Western Australia, 1996-1998

Maternal Age	Parity								TOTAL	
	0		1-2		3-4		≥ 5		No.	Rate
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
<= 15										
16	4	10.9							4	10.0
17	12	16.4	3	28.0					15	17.8
18	13	12.6	5	19.9					18	14.0
19	7	5.5	5	10.9					12	6.9
<= 19	36	10.0	13	15.1					49	11.0
20-24	39	5.5	38	6.6	12	21.8			89	6.6
25-29	28	2.7	44	3.6	29	16.1	6	26.2	107	4.3
30-34	30	4.5	53	4.1	12	5.2	7	16.5	102	4.6
35-39	8	3.7	9	1.7	11	7.2	3	8.0	31	3.3
40-44	3	9.8	2	3.0	2	6.4			7	4.9
45+					1	83.3			1	15.6
TOTAL	144	4.7	159	4.2	67	10.3	16	13.4	386	5.1

Table 21: Birthweight and gender of infant deaths in Western Australia, 1996-1998

Birth weight	Gender				TOTAL	
	Male		Female		No.	Rate
	No.	Rate	No.	Rate	No.	Rate
< 500	22	916.7	26	722.2	48	800.0
500-999	44	287.6	24	176.5	68	235.3
1000-1499	19	79.2	4	19.5	23	52
1500-1999	9	20.0	15	32.8	24	26
2000-2499	27	19.5	15	9.1	42	14
< 2500	121	53.7	84	33.8	205	43.2
2500-2999	32	6.0	21	3.0	53	4.3
3000-3499	45	3.4	25	1.7	70	2.5
3500-3999	25	2.0	20	2.0	45	2.0
4000-4499	9	2.0	2	0.7	11	1.5
≥ 4500	2	2.5			2	1.8
TOTAL	234	6.0	152	4.1	386	5.1

Table 22: Gestational age and plurality of infant deaths in Western Australia, 1996-1998

Gestation	Plurality				TOTAL	
	Singleton		Multiple		No.	Rate
	No.	Rate	No.	Rate	No.	Rate
20-27	81	332.0	29	349.4	110	336.4
28-32	29	49.2	6	28.8	35	43.9
33-36	39	11.5	6	7.3	45	10.7
37-42	191	2.7	5	4.4	196	2.8
≥ 43						
TOTAL	340	4.6	46	20.4	386	5.1

Table 23: Cause of death and age at death of postneonatal deaths in Western Australia, 1996-1998

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	12	20	4	10	7	6	59
Lethal Congenital Anomaly	9	2	3	3	4	6	27
Infection	4	5	2	2	1	13	27
Other	5	1	1	2	3	8	20
Unknown	1	2		1	2	5	11
Prematurity	4	1		2	2		9
TOTAL	35	31	10	20	19	38	153
	%	%	%	%	%	%	%
SIDS	34.3	64.5	40.0	50.0	36.8	15.8	38.6
Lethal Congenital Anomaly	25.7	6.5	30.0	15.0	21.1	15.8	17.6
Infection	11.4	16.1	20.0	10.0	5.3	34.2	17.6
Other	14.3	3.2	10.0	10.0	15.8	21.1	13.1
Unknown	2.9	6.5		5.0	10.5	13.2	7.2
Prematurity	11.4	3.2		10.0	10.5		5.9
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 24: Cause of death and Aboriginality of mother of postneonatal deaths in Western Australia, 1996-1998

Cause of Death	Aboriginality of Mother				TOTAL	
	Aboriginal		Non-Aboriginal		No.	%
	No.	%	No.	%	No.	%
SIDS	20	52.6	39	33.9	59	38.6
Lethal Congenital Anomaly	2	5.3	25	21.7	27	17.6
Infection	9	23.7	18	15.7	27	17.6
Other	2	5.3	18	15.7	20	13.1
Unknown	2	5.3	9	7.8	11	7.2
Prematurity	3	7.9	6	5.2	9	5.9
TOTAL	38	100.0	115	100.0	153	100.0

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DEFINITIONS :

ABORIGINALITY :

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.

