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**THE 1992 WESTERN AUSTRALIAN  
BIRTH COHORT**

**PERINATAL AND INFANT MORTALITY  
IDENTIFIED BY MATERNAL RACE**

VIVIEN GEE  
BAppSc.(Nursing Admin.),RN,RM,CHN  
Health Statistics  
State Health Purchasing Authority

and

**VALIDATION OF THE PERINATAL AND  
INFANT MORTALITY REGISTER  
IN WESTERN AUSTRALIA  
1991-1992**

MARISA GILLES  
MB ChB, BSc., MPH, FAFPHM

**September 1995**



Health Department of Western Australia

**Statistical Series /41  
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## SUMMARY

The Midwives' Notification System of Western Australia identified 25258 births of  $\geq 500$  grams birthweight to 24918 women during 1992. Of these babies, 115 were stillborn and a further 157 liveborn babies died within the first twelve months (Tables 23 and 29).

The overall stillborn proportion was 4.6/1000 total births. Among babies born to Caucasian women the proportion was 3.9/1000, for babies of Aboriginal women 11.9/1000 and for babies of women of other races the proportion was 6.7/1000 total births. The stillbirth proportion of 4.4/1000 among singleton births was one third that (11.8/1000) for multiple births (Table 6).

Of babies born to teenage women 13 (8.2/1000) were stillborn (Table 4). Consideration of maternal parity showed a higher stillbirth proportion for primiparous women (5.2/1000) than among babies of multiparous women (4.1/1000) (Table 5).

The causes of stillbirths were unexplained for 50 (43.5%) babies and the deaths of 17 (14.8%) babies were attributed to complications arising from extremely low birth weight ( $< 1000$  grams). Lethal congenital abnormalities were the cause of death for 23 (20.0%) stillbirths (Table 8).

There were 97 neonatal deaths, giving a neonatal mortality proportion of 3.9/1000 livebirths; for babies of Caucasian women the proportion was 3.5/1000, for babies of Aboriginal mothers 9.9/1000 and for babies of women of other races 3.1/1000 (Tables 3 and 10).

Post neonatal deaths numbered 60 (2.4/1000 livebirths) babies (Table 16). Twenty two (36.7%) of these were attributed to Sudden Infant Death Syndrome and 14 (23.3%) to lethal congenital malformations (Table 21).

The perinatal mortality proportion was 8.4/1000 total births. For babies of Caucasian women the proportion was 7.4/1000, for babies of Aboriginal women 21.7/1000 and babies of women of other races 9.7/1000. Perinatal deaths amongst babies born to Aboriginal teenage mothers (40.3/1000) was four times that for babies born to Caucasian women in the same age group (8.8/1000) (Table 24). The rate of perinatal mortality among babies of single women and of babies of separated, divorced or widowed women (13.9/1000) was noticeably higher than the rate (7.9/1000) for babies of women reported to be socially supported by a male partner (Table 28).

Infant deaths numbered 157 being 97 neonatal deaths and 60 post neonatal deaths. These numbers provide an overall proportion of 6.2/1000 livebirths (Table 37).

Among babies of Aboriginal women the infant mortality rate (22.0/1000) was more than three times the overall rate (6.2/1000). The fraction of infant deaths attributed to Sudden Infant Death Syndrome among babies of Aboriginal women (29.0%) was greater than the overall fraction of 15.9% (Table 36).

The major causes of infant death remain lethal congenital malformation (34.4%), Sudden Infant Death Syndrome (15.9%) and disorders related to low birthweight (21.0%) (Table 36).

In accord with perinatal deaths, overall the proportion of infant deaths was higher where mothers were socially unsupported by a male partner (Table 30).

Perinatal and infant mortality rates are higher among babies born to Aboriginal mothers than among babies of non-Aboriginal women. Although the infant mortality rate among babies of Aboriginal women has substantially decreased over the past twelve years from 31.1/1000 in 1980 to 22.0/1000 in 1992, it still remains more than three times that of the overall infant mortality rate (6.2/1000) of livebirths in 1992.

## **ACKNOWLEDGEMENTS**

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## **1. INTRODUCTION**

This report is the ninth 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.

This report relates to the cohort of babies that was born in Western Australia in 1992 and includes information on their outcomes up 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 to limit human loss in future years.

## **2. DATA COLLECTION**

The Western Australian Midwives' Notification System forms the basis of this ninth annual report of perinatal and infant mortality.

Although this System collects data for babies  $\geq 20$  weeks gestation or  $\geq 400$  grams birthweight, this report includes only those babies whose birthweight was  $\geq 500$  grams. Information related to deaths of liveborn babies was obtained from the Registrar General's Office, the Hospital Morbidity 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 number of deaths in this report are complete.

Information on infants born in Western Australia who die outside the State is not received by this Department and cannot 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 for babies  $\geq 500$  grams. 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).

### 3. DEFINITIONS

#### **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 MALFORMATION :**

Any defect present at birth, probably of developmental origin.

#### **CRUDE BIRTH RATE :**

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

#### **FERTILITY RATE :**

The total births per 1000 woman-years to women aged between 15-44 years.

#### **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 :**

Stillbirth                                Is the number of stillbirths per 1000 total births in a year.

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

Perinatal Mortality                    Is the number of stillbirths and neonatal deaths per 1000 total births in a year.

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

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

**NEONATAL DEATH :**

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

**PARITY :**

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

**PERINATAL DEATH :**

Is a stillbirth or neonatal death.

**POST-NEONATAL DEATH :**

Is 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.

**RACE :**

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

Caucasian Includes all people of caucasoid (European) heritage.

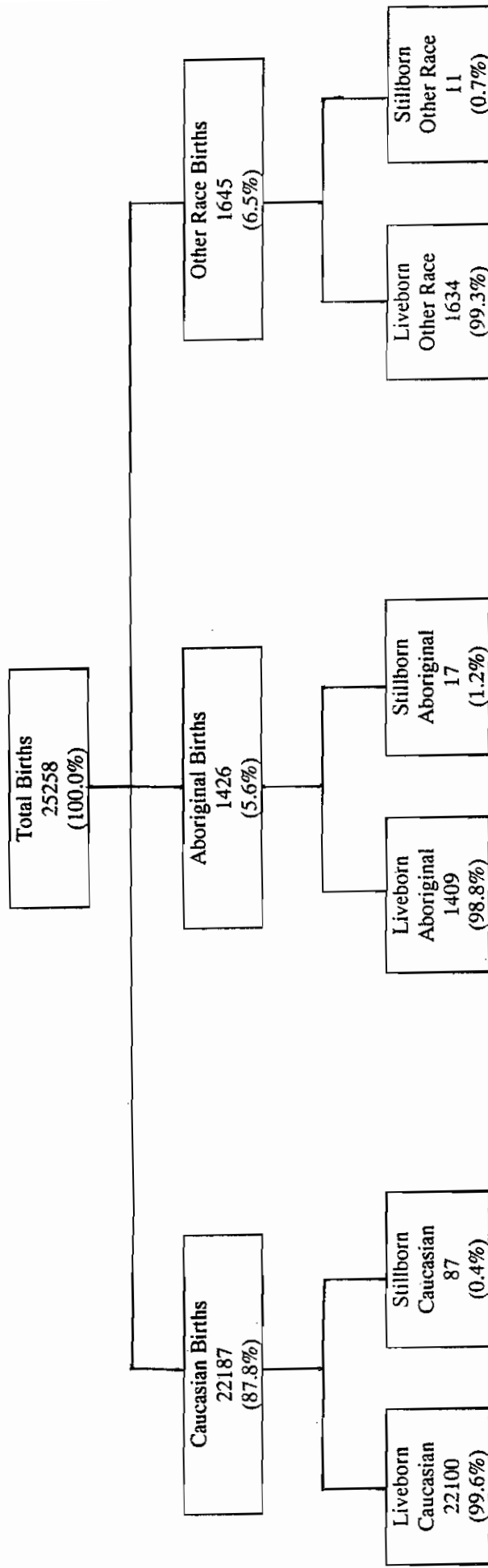
Aboriginal Includes persons of Australian-Aboriginal heritage (Australoid) or of mixed Aboriginal-caucasian heritage.

Other Includes Asian, Indian, Negroid, Polynesian, etc.

**STILLBIRTH :**

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

TABLE 1: MATERNAL RACE AND CONDITION OF BIRTHS IN WESTERN AUSTRALIA IN 1992



Excludes births less than 500 grams birthweight.

#### **4. BIRTHS IN WESTERN AUSTRALIA IN 1992**

##### **4.1 Births Incidence**

Midwives' forms received by this department indicate that 25258 babies were born to 24918 women during 1992. This report includes statistics only on those babies whose birthweight was equal to or greater than 500 grams.

Examination of births showed that 22187 (87.8%) were born to Caucasian women, 1426 (5.6%) to Aboriginal women and 1645 (6.5%) to women of other racial groups (Table 1).

##### **4.2 Place of Birth**

The majority of births, 24734 (99.3%), occurred in hospital. Of these, births in metropolitan hospitals numbered 18438 (74.5%) and non-metropolitan hospital births were 6295 (25.5%).

There were 184 (0.7%) non hospital births including 77 (0.3%) born before arrival at hospital and 107 (0.4%) planned supervised homebirths.

##### **4.3 Maternal Place of Residence**

Assessment of location of women bearing children throughout the State shows that the majority of births 17014 (68.3%) were to women whose usual place of residence was within one of the Perth Metropolitan Health Authorities (Table 2).

##### **4.4 Crude Birth Rate**

An overall crude birth rate of 15.2/1000 total population was identified for Western Australia during 1992. The area with the lowest crude birth rate (13.3/1000 total population) was the North Metropolitan Health Authority (Figure 1) (Table 39).

##### **4.5 Condition of Births**

Analysis of the condition at birth showed 25143 (99.5%) babies were liveborn and 115 (0.5%) babies were stillborn. Livebirths to Caucasian women numbered 22100 (99.6%) and stillbirths 87 (0.4%). Among Aboriginal women there were 1409 (98.8%) liveborn and 17 (1.2%) stillborn babies. For women of other races there were 1634 (99.3%) livebirths and 11 (0.7%) stillbirths (Table 1).

##### **4.6 Maternal Age**

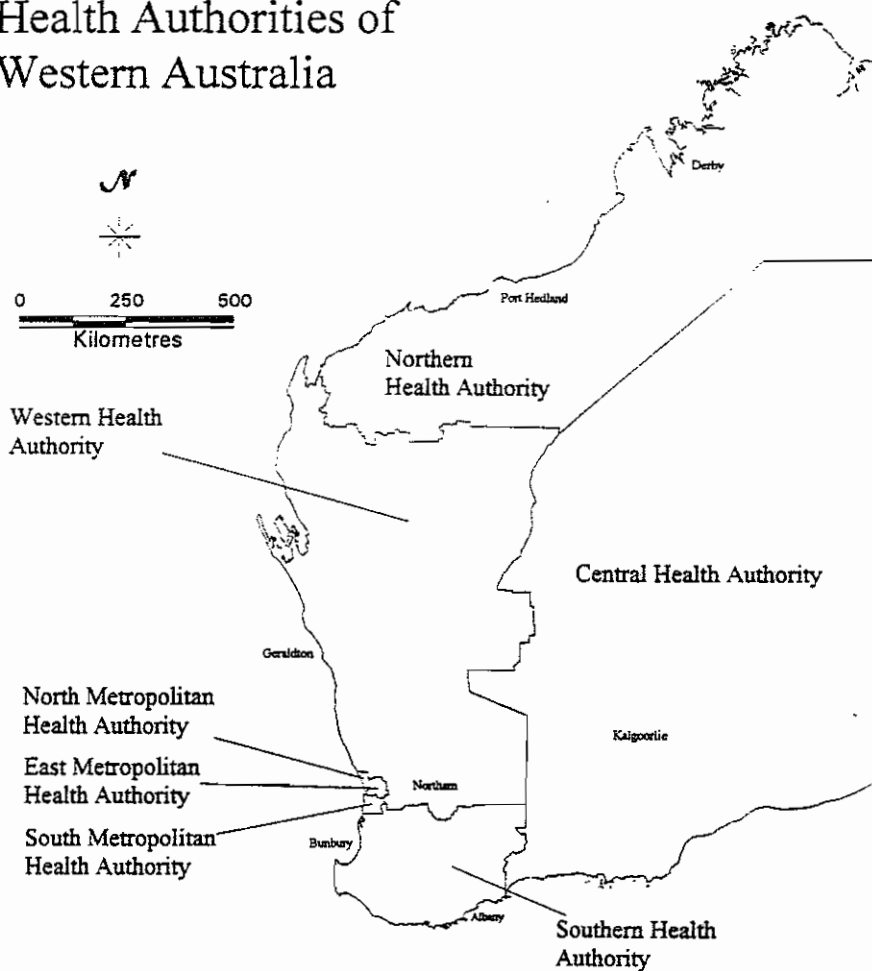
Consideration of maternal age shows that the highest percentage of women confined (34.5%), were in the 25 to 29 year age category. Women in their teenage years accounted for 6.3% of total confinements. Almost a third (27.9%) of Aboriginal women confined were teenagers. This contrasts with Caucasian women of whom 5.2% were teenagers and women of other races with 2.8% teenage confinements. Women aged 40 years or more represented 1.4% of all women confined.

**FIGURE I**

**CRUDE BIRTH RATE, PERINATAL AND INFANT MORTALITY  
BY HEALTH AUTHORITY OF MATERNAL RESIDENCE  
FOR BIRTHS IN WESTERN AUSTRALIA IN 1992**

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

Health Authorities of  
Western Australia



Authority	Crude Birth Rate	Perinatal Mortality	Infant Mortality
Northern	20.8	11.6	6.9
Western	17.2	5.8	5.8
Central	21.6	9.6	10.5
Southern	15.1	7.2	6.1
North Metropolitan	13.3	7.1	5.8
East metropolitan	14.6	8.5	5.9
South Metropolitan	15.2	9.7	6.3
Total WA	15.2	8.4	6.2



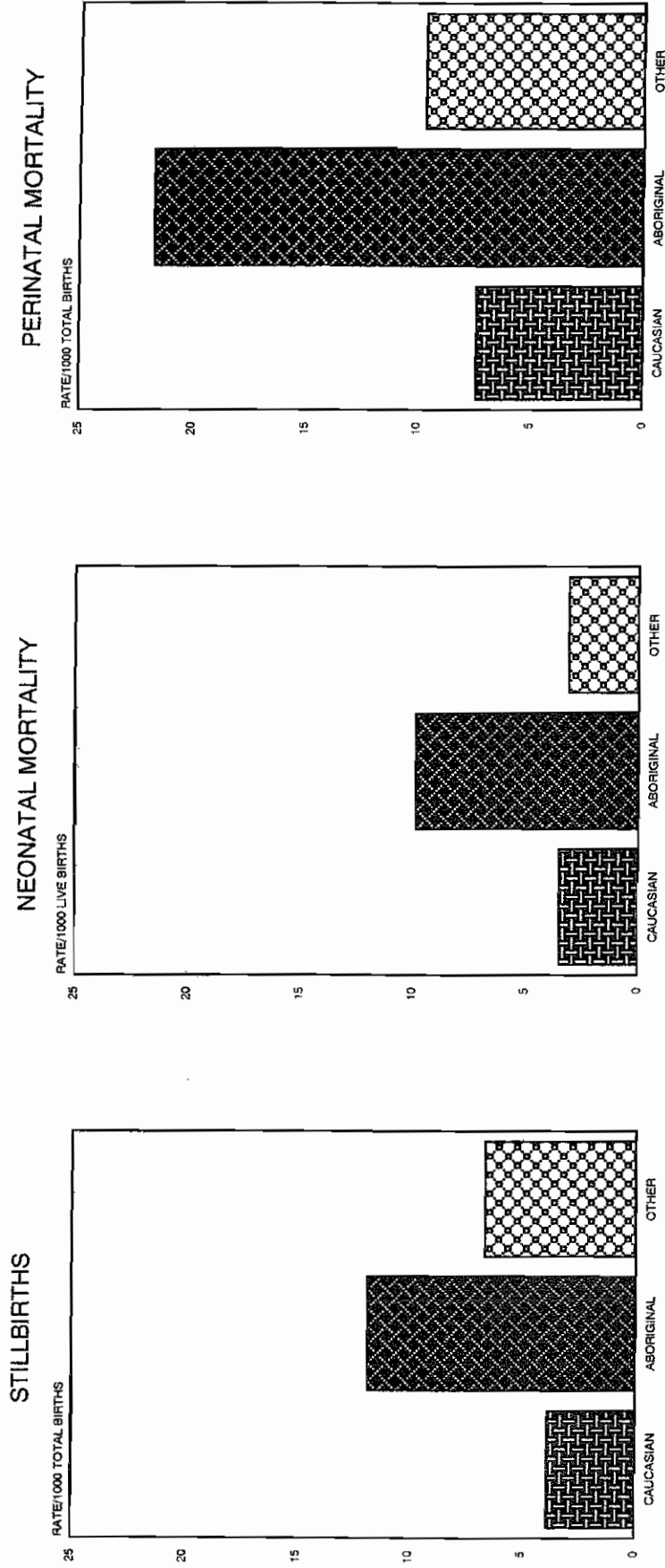
**TABLE 2: LIVEBIRTHS AND TOTAL BIRTHS BY HEALTH AUTHORITY OF MATERNAL RESIDENCE AND MATERNAL RACE IN WESTERN AUSTRALIA 1992**

Health Authority	Maternal Race															
	Caucasian				Aboriginal				Other				Total			
	Live Births No.	%	Total Births No.	%	Live Births No.	%	Total Births No.	%	Live Births No.	%	Total Births No.	%	Live Births No.	%	Total Births No.	%
<u>Metropolitan</u>																
North	4852	22.0	4869	22.0	114	8.1	114	8.0	390	23.9	392	23.8	5356	21.3	5375	21.3
East	4998	22.6	5017	22.6	181	12.9	181	12.7	553	33.8	558	33.9	5732	22.8	5756	22.8
South	5652	25.6	5681	25.6	148	10.5	152	10.7	432	26.4	435	26.4	6232	24.8	6268	24.8
<u>Non-Metropolitan</u>																
Northern	876	4.0	884	4.0	482	34.2	485	34.0	99	6.1	100	6.1	1457	5.8	1469	5.8
Western	1615	7.3	1617	7.3	223	15.8	228	16.0	54	3.3	54	3.3	1892	7.5	1899	7.5
Central	966	4.4	968	4.4	142	10.1	144	10.1	38	2.3	38	2.3	1146	4.6	1150	4.6
Southern	3128	14.2	3138	14.1	115	8.2	117	8.2	62	3.8	62	3.8	3305	13.1	3317	13.1
<u>Outside WA</u>	13	0.1	13	0.1	4	0.3	5	0.4	6	0.4	6	0.4	23	0.1	24	0.1
<b>TOTAL</b>	<b>22100</b>	<b>100.0</b>	<b>22187</b>	<b>100.0</b>	<b>1409</b>	<b>100.0</b>	<b>1426</b>	<b>100.0</b>	<b>1634</b>	<b>100.0</b>	<b>1645</b>	<b>100.0</b>	<b>25143</b>	<b>100.0</b>	<b>25258</b>	<b>100.0</b>

Excludes births <500 grams birthweight.

FIGURE II

# STILLBIRTHS, NEONATAL AND PERINATAL MORTALITY, ABORIGINAL AND NON-ABORIGINAL, WESTERN AUSTRALIA, 1992



Excludes births less than 500 grams birthweight

SOURCE: MIDWIVES' NOTIFICATION SYSTEM  
REGISTRAR GENERAL'S OFFICE  
COMMUNITY AND CHILD HEALTH SERVICES

TABLE 3: STILLBIRTHS, NEONATAL AND PERINATAL DEATHS BY HEALTH AUTHORITIES OF MATERNAL RESIDENCE AND MATERNAL RACE IN WESTERN AUSTRALIA IN 1992

Health Authorities of Maternal Residence	Maternal Race																							
	Caucasian						Aboriginal						Other						Total					
	Stillbirths		Neonatal		Perinatal		Stillbirths		Neonatal		Perinatal		Stillbirths		Neonatal		Perinatal		Stillbirths		Neonatal		Perinatal	
No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	
<u>Metropolitan</u>																								
North	17	3.5	17	3.5	34	7.0	-	-	-	-	-	2	(5.1)	2	(5.1)	4	(10.2)	19	3.5	19	3.5	38	7.1	
East	19	3.8	21	4.2	40	8.0	-	(11.0)	2	(11.0)	7	30.7	5	9.0	7	12.5	24	4.2	25	4.4	49	8.5		
South	29	5.1	21	3.7	50	8.8	4	(25.3)	3	(20.3)	7	46.1	3	(6.9)	4	(9.2)	36	5.7	25	4.0	61	9.7		
<u>Non Metropolitan</u>																								
Northern	8	9.0	1	(1.1)	9	10.2	3	(6.2)	4	(8.3)	7	14.4	1	(10.0)	-	-	12	8.2	5	3.4	17	11.6		
Western	2	(1.2)	2	(1.2)	4	(2.5)	5	21.9	2	(9.0)	7	30.7	-	-	-	-	-	7	3.7	4	2.1	11	5.8	
Central	2	(2.1)	5	5.2	7	7.2	2	(13.9)	2	(14.1)	4	(27.8)	-	-	-	-	-	4	(3.5)	7	6.1	11	9.6	
Southern	10	3.2	11	3.5	21	6.7	2	(17.1)	1	(8.7)	3	(25.6)	-	-	-	-	-	12	3.6	12	3.6	24	7.2	
Outside WA	-	-	-	-	-	-	1	(200.0)	-	-	1	(200.0)	-	-	-	-	-	1	(41.7)	-	-	1	41.7	
<b>TOTAL</b>	<b>87</b>	<b>3.9</b>	<b>78</b>	<b>3.5</b>	<b>165</b>	<b>7.4</b>	<b>17</b>	<b>11.9</b>	<b>14</b>	<b>9.9</b>	<b>31</b>	<b>21.7</b>	<b>11</b>	<b>6.7</b>	<b>5</b>	<b>3.1</b>	<b>16</b>	<b>9.7</b>	<b>115</b>	<b>4.5</b>	<b>97</b>	<b>3.9</b>	<b>212</b>	<b>8.4</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Stillbirth and Perinatal Death rate/1000 total births.

<sup>2</sup> Neonatal Death rate/1000 livebirths.

() Where n<5 rate has been bracketed.

SOURCE: MIDWIVES' NOTIFICATION SYSTEM  
REGISTRAR GENERAL'S OFFICE  
COMMUNITY AND CHILD HEALTH SERVICES

## 5. STILLBIRTHS, NEONATAL AND POST-NEONATAL MORTALITY IN WESTERN AUSTRALIA IN THE 1992 BIRTH COHORT

### 5.1 Stillbirths

There were 115 stillbirths in Western Australia during the 1992 year which were equal to or greater than 500 grams birthweight. The stillbirth proportion for the State was 4.6/1000 total births (Table 4).

The stillbirth proportion for babies of Aboriginal women (11.9/1000) was high compared to that for babies of Caucasian women (3.9/1000) and for babies of women of other racial groups (6.7/1000).

Stillbirth proportions relating to Health Authority of maternal residence are shown on Table 3. It should be noted, however, that due to small numbers of births in each country division the rates do vary from year to year and may be considered unrepresentative on an annual basis (Table 3, Figure I).

#### 5.1.1 Maternal Race and Maternal Age

Among babies of all teenage mothers, the rate was 8.2/1000 and for babies of Aboriginal teenage mothers the rate was 20.2/1000 total births. Among women aged 25-29 years, the group with the highest number of births overall, the stillbirth rate was 4.4/1000 total births. Among babies of women aged 35 years and over 8 (3.0/1000) stillbirths occurred. (Table 4).

TABLE 4: STILLBIRTHS BY MATERNAL RACE AND MATERNAL AGE IN WESTERN AUSTRALIA IN 1992

Maternal Age	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Total	Rate	No.	Total	Rate	No.	Total	Rate	No.	Total	Rate
≤15	-	24	-	-	40	-	1	2	500.	1	66	15.2
16	-	94	-	-	67	-	-	1	0	-	162	-
17	-	207	-	2	81	24.7	-	4	-	2	292	6.8
18	3	329	9.1	1	100	10.0	-	10	-	4	439	9.1
19	1	486	2.1	5	109	45.9	-	28	-	6	623	9.6
≤19	4	1140	3.5	8	397	20.2	1	45	22.2	13	1582	8.2
20-24	13	4461	2.9	2	523	3.8	-	239	-	15	5223	2.9
25-29	28	7902	3.5	4	323	12.4	6	503	11.9	38	8728	4.4
30-34	37	6381	5.8	1	139	7.2	3	538	5.6	41	7058	5.8
35-39	4	1984	2.0	2	39	51.3	1	273	3.7	7	2296	3.0
40-44	1	309	3.2	-	5	-	-	46	-	1	360	2.8
≥45	-	10	-	-	-	-	-	1	-	-	11	-
<b>TOTAL</b>	<b>87</b>	<b>22187</b>	<b>3.9</b>	<b>17</b>	<b>1426</b>	<b>11.9</b>	<b>11</b>	<b>1645</b>	<b>6.7</b>	<b>115</b>	<b>25258</b>	<b>4.6</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Rate/1000 total births.

### 5.1.2 Maternal Race and Parity

Fifty one (5.2/100) stillborn babies were to primiparous women compared with 51 (5.8/1000) in the 1991 birth cohort. For babies of women whose parity was three or more, the stillbirth rate was 14 (5.3/1000) in 1992. (Table 5).

**TABLE 5: STILLBIRTHS BY MATERNAL RACE AND PARITY IN WESTERN AUSTRALIA IN 1992**

Parity	Caucasian			Aboriginal			Other			Total		
	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate
0	36	8710	4.1	7	390	17.9	8	653	12.3	51	9753	5.2
1-2	43	11399	3.8	5	637	7.8	2	803	2.5	50	12839	3.9
3-4	8	1838	4.4	2	288	6.9	1	159	6.3	11	2285	4.8
≥5	-	240	-	3	111	27.0	-	30	-	3	381	7.9
<b>TOTAL</b>	<b>87</b>	<b>22187</b>	<b>3.9</b>	<b>17</b>	<b>1426</b>	<b>11.9</b>	<b>11</b>	<b>1645</b>	<b>6.7</b>	<b>115</b>	<b>25258</b>	<b>4.6</b>

Excludes births < 500 grams birthweight.

<sup>1</sup> Rate/1000 total births.

### 5.1.3 Maternal Race, Condition and Plurality

The stillbirth proportion for all multiple births (11.8/1000) compares to a 4.4/1000 stillbirth rate for all singleton births. For singleton births the rate of stillbirths among babies of Aboriginal women (11.4/1000) is higher than for total births (4.4/1000) (Table 6).

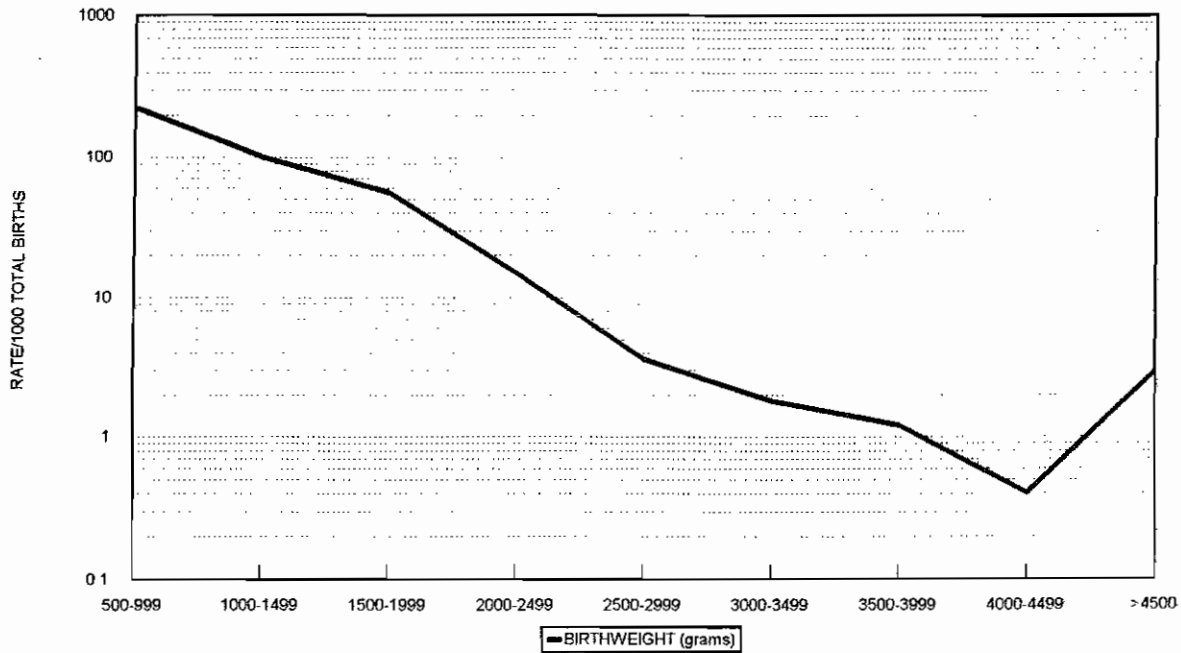
**TABLE 6: CONDITION, PLURALITY AND MATERNAL RACE OF BIRTHS IN WESTERN AUSTRALIA 1992**

		Plurality		
Maternal Race		Singleton	Multiple	Total
Caucasian	Total Births	21564	623	22187
	Live Births	21484	616	22100
	Stillbirths	80	7	87
	Rate	3.7	11.2	3.9
Aboriginal	Total Births	1403	23	1426
	Live Births	1387	22	1409
	Stillbirths	16	1	17
	Rate	11.4	43.5	11.9
Other	Total Births	1615	30	1645
	Live Births	1604	30	1634
	Stillbirths	11	-	11
	Rate	6.8	-	6.7
Total	Total Births	24582	676	25258
	Live Births	24475	668	25143
	Stillbirths	107	8	115
	Rate	4.4	11.8	4.6

Excludes births <500 grams birthweight.

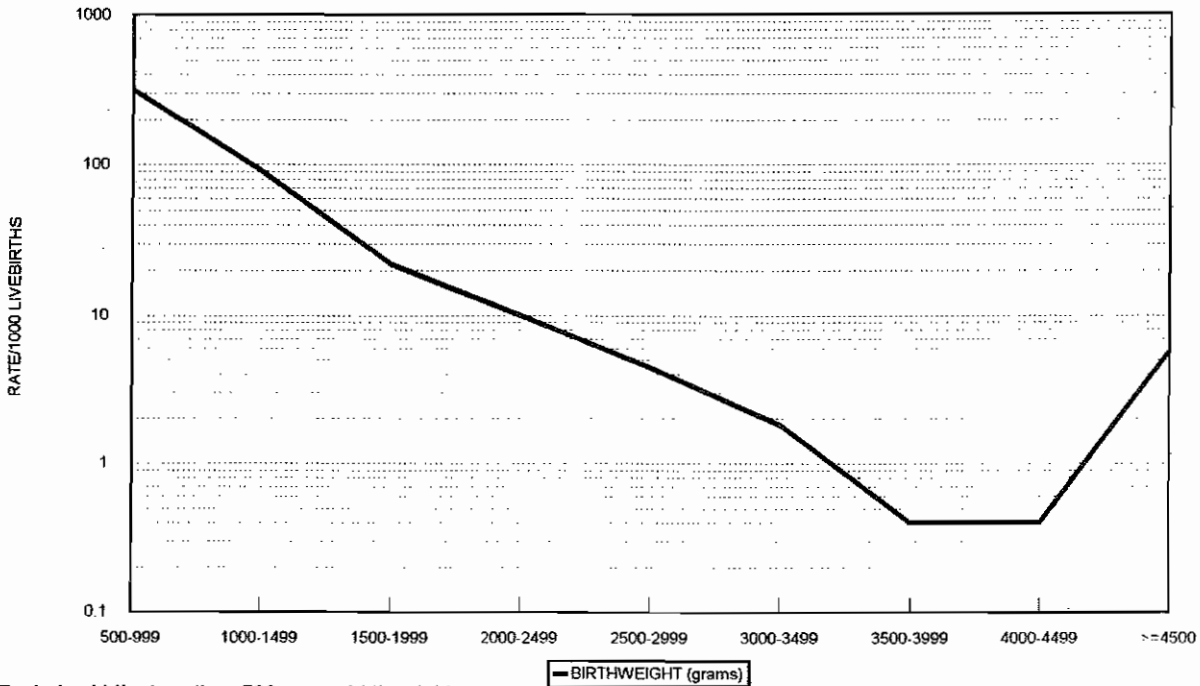
<sup>1</sup> Rate/1000 total births.

**FIGURE III  
BIRTHWEIGHT DISTRIBUTION OF STILLBIRTHS  
IN WESTERN AUSTRALIA IN 1992**



Excludes births less than 500 grams birthweight  
SOURCE: MIDWIVES' NOTIFICATION SYSTEM

**FIGURE IV  
BIRTHWEIGHT DISTRIBUTION OF NEONATAL DEATHS  
IN WESTERN AUSTRALIA IN 1992**



Excludes births less than 500 grams birthweight  
SOURCE: MIDWIVES' NOTIFICATION SYSTEM

#### 5.1.4 Maternal Race and Birthweight

The rate of stillbirths for low birthweight babies was 46.1/1000. The lowest stillbirth rate (0.4/1000) was for babies with birthweight 4000-4499 grams. (Table 7, Figure III).

**TABLE 7 : STILLBIRTH PROPORTION BY MATERNAL RACE AND BIRTHWEIGHT DISTRIBUTION IN WESTERN AUSTRALIA IN 1992**

Birthweight (grams)	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate
500-999	21	93	225.8	4	14	(285.7)	1	8	(125.0)	26	115	226.1
1000-1499	13	141	92.2	2	11	(181.8)	1	9	(111.1)	16	161	99.4
1500-1999	10	242	41.3	5	30	166.7	1	17	(58.8)	16	289	55.4
2000-2499	11	833	13.2	-	106	-	4	80	(50.0)	15	1019	14.7
<2500	55	1309	42.0	11	161	68.3	7	114	61.4	73	1584	46.1
2500-2999	11	3255	3.4	2	320	(6.3)	1	335	(3.0)	14	3910	3.6
3000-3499	14	8251	1.7	2	529	(3.8)	1	677	(1.5)	17	9457	1.8
3500-3999	6	6888	0.9	1	323	(3.1)	2	403	(5.0)	9	7614	1.2
4000-4499	1	2158	(0.5)	-	76	-	-	110	-	1	2344	(0.4)
≥4500	-	326	-	1	17	(58.8)	-	6	-	1	349	(2.9)
<b>TOTAL</b>	<b>87</b>	<b>22187</b>	<b>3.9</b>	<b>17</b>	<b>1426</b>	<b>11.9</b>	<b>11</b>	<b>1645</b>	<b>6.7</b>	<b>115</b>	<b>25258</b>	<b>4.6</b>

Excludes births <500 grams birthweight.

† Rate/1000 total births.

( ) Where n<5 rate has been bracketed.

#### 5.1.5 Causes of Stillbirth

There were 50 (43.5%) stillborn babies with cause unknown and 17 (14.8%) stillbirths with extremely low birthweight. Lethal congenital malformations resulted in 23 (20.0%) stillbirths and a further 17 (14.8%) stillbirths resulted from complications of placenta and/or cord (Table 8).

The high percentage of unexplained stillbirths may be reduced if autopsies were performed on more babies. Of the 115 stillborn babies, it is known that 74 (64.3%) had autopsies and 29 (25.2%) did not. It is not known whether the remaining 12 (10.4%) stillborn babies underwent autopsy.

Eighty two (71.3%) stillbirths were recorded as antepartum deaths, 22 (19.1%) were recorded as intrapartum deaths and for 11 (9.6%) the time of death was unknown.

**TABLE 8 : CAUSE OF STILLBIRTH BY MATERNAL RACE IN WESTERN AUSTRALIA IN 1992**

Cause of Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other		1992	
	No.	%	No.	%	No.	%	No.	%
Lethal Congenital Malformation	16	18.4	5	29.4	2	18.2	23	20.0
Extremely Low Birth Weight (<1000g)*	15	17.2	1	5.9	1	9.1	17	14.8
Unknown	36	41.4	8	47.1	6	54.6	50	43.5
Maternal: Obstetric	2	2.3	-	-	1	9.1	3	2.6
Maternal: Medical	2	2.3	1	5.9	-	-	3	2.6
Maternal: Hypertension	-	-	-	-	-	-	-	-
Placenta and Cord	15	17.2	1	5.9	1	9.1	17	14.8
Other	1	1.2	1	5.9	-	-	2	1.7
<b>TOTAL</b>	<b>87</b>	<b>100.0</b>	<b>17</b>	<b>100.0</b>	<b>11</b>	<b>100.0</b>	<b>115</b>	<b>100.0</b>

Excludes births < 500 grams birthweight.

\* Any non-malformed stillbirth of birthweight 500-999 grams was included in the extremely low birthweight category.

## 5.2 Neonatal Deaths

There were 97 neonatal deaths among the 25143 livebirths in 1992<sup>1</sup>. The overall neonatal mortality proportion was 3.9/1000 livebirths. For babies of Aboriginal women neonatal mortality was 9.9/1000 livebirths which is higher than for babies of Caucasian women (3.5/1000) and the rate for babies of women of other races (3.1/1000) (Table 3).

One additional death of a baby born outside the State was recorded in Western Australia and not included in this cohort Report.

The figures for neonatal mortality by Health Authority of maternal residence are provided in Table 3. However, it should be noted that due to small numbers of births in some Authorities, the rates may not be representative on an annual basis.<sup>3</sup>

### 5.2.1 Maternal Race and Maternal Age

Of the 97 liveborn babies who died within the first 28 days of life, 14 (8.9/1000) were born to teenage mothers. In the age group where the highest number of births occurred (25-29 years) the neonatal mortality rate was 3.3/1000. The rate of neonatal deaths among babies of Aboriginal mothers (9.9/1000) is higher than that for babies of Caucasian women (3.5/1000) (Table 9).



**TABLE 9 : NEONATAL DEATHS BY MATERNAL RACE AND MATERNAL AGE IN WESTERN AUSTRALIA IN 1992**

Maternal Age	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
≤15	1	24	-	-	40	-	-	1	-	1	65	15.4
16	1	94	10.6	2	67	29.9	-	1	-	3	162	18.5
17	1	207	4.8	3	79	38.0	-	4	-	4	290	13.8
18	1	326	3.1	3	99	30.3	-	10	-	4	435	9.2
19	2	485	4.1	-	104	-	-	28	-	2	617	3.2
≤19	6	1136	5.3	8	389	20.6	-	44	-	14	1569	8.9
20-24	12	4448	2.7	5	521	9.6	-	239	-	17	5208	3.2
25-29	27	7874	3.4	-	319	-	2	497	4.0	29	8690	3.3
30-34	22	6344	3.5	-	138	-	1	535	1.9	23	7017	3.3
35-39	8	1980	4.0	1	37	27.0	1	272	3.7	10	2289	4.4
40-44	3	308	9.7	-	5	-	1	46	21.7	4	359	11.1
≥45	-	10	-	-	-	-	-	1	-	-	11	-
<b>TOTAL</b>	<b>78</b>	<b>22100</b>	<b>3.5</b>	<b>14</b>	<b>1409</b>	<b>9.9</b>	<b>5</b>	<b>1634</b>	<b>3.1</b>	<b>97</b>	<b>25143</b>	<b>3.9</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Rate/1000 livebirths.

### 5.2.2 Maternal Race and Parity

Fifty two (4.1/1000) neonatal deaths were to women with a previous parity of one or two. A higher rate was recorded for babies of women with parity of three or four (4.8/1000) (Table 10).

**TABLE 10 : NEONATAL DEATHS BY MATERNAL RACE AND PARITY IN WESTERN AUSTRALIA IN 1992**

Parity	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
0	28	8674	3.2	5	383	13.1	1	645	1.6	34	9702	3.5
1-2	41	11356	3.6	8	632	12.7	3	801	3.7	52	12789	4.1
3-4	9	1830	4.9	1	286	3.5	1	158	6.3	11	2274	4.8
≥5	-	240	-	-	108	-	-	30	-	-	378	-
<b>TOTAL</b>	<b>78</b>	<b>22100</b>	<b>3.5</b>	<b>14</b>	<b>1409</b>	<b>9.9</b>	<b>5</b>	<b>1634</b>	<b>3.1</b>	<b>97</b>	<b>25143</b>	<b>3.9</b>

Excludes births < 500 grams birthweight.

<sup>1</sup> Rate/1000 livebirths.

### 5.2.3 Maternal Race and Plurality

These data show an overall neonatal death rate of 3.4/1000 livebirths for singleton births and 21.8/1000 livebirths for twin births. There were no neonatal deaths among triplet births and no triplet births to either Aboriginal women or women of other races (Table 11).

**TABLE 11: NEONATAL DEATHS BY MATERNAL RACE AND PLURALITY IN WESTERN AUSTRALIA IN 1992**

Plurality	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
Singleton	65	21484	3.0	13	1387	9.4	5	1604	3.1	83	24475	3.4
Twins	13	590	22.0	1	22	45.5	-	30	-	14	642	21.8
Triplets	-	26	-	-	-	-	-	-	-	-	26	-
<b>TOTAL</b>	<b>78</b>	<b>22100</b>	<b>3.5</b>	<b>14</b>	<b>1409</b>	<b>9.9</b>	<b>5</b>	<b>1634</b>	<b>3.1</b>	<b>97</b>	<b>25143</b>	<b>3.9</b>

Excludes births < 500 grams birthweight.

† Rate/1000 livebirths.

### 5.2.4 Maternal Race and Birthweight

In broad terms and as reported for stillbirths, neonatal mortality proportions for all races fell as birthweight rose. The rate of low birthweight neonatal deaths among babies born to Aboriginal mothers (53.3/1000) is higher than for low birthweight neonatal deaths of babies born to Caucasian women (34.9/1000) (Table 12, Figure IV).

**TABLE 12: NEONATAL MORTALITY BY MATERNAL RACE AND BIRTHWEIGHT DISTRIBUTION IN WESTERN AUSTRALIA IN 1992**

Birthweight (grams)	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
500-999	21	72	291.7	5	10	500.0	2	7	(285.7)	28	89	314.6
1000-1499	12	128	93.8	1	9	(111.1)	-	8	-	13	145	89.7
1500-1999	6	232	25.9	-	25	-	-	16	-	6	273	22.0
2000-2499	8	822	9.7	2	106	(18.9)	-	76	-	10	1004	10.0
<2500	47	1345	34.9	8	150	53.3	2	107	(18.7)	57	1511	37.7
2500-2999	14	3244	4.3	2	318	(6.3)	1	334	(3.0)	17	3896	4.4
3000-3499	13	8237	1.6	4	527	(7.6)	-	676	-	17	9440	1.8
3500-3999	1	6882	(0.1)	-	322	-	2	401	(5.0)	3	7605	(0.4)
4000-4499	1	2157	(0.5)	-	76	-	-	110	-	1	2343	(0.4)
≥4500	2	326	(6.1)	-	16	-	-	6	-	2	348	(5.7)
<b>TOTAL</b>	<b>78</b>	<b>22100</b>	<b>3.5</b>	<b>14</b>	<b>1409</b>	<b>9.9</b>	<b>5</b>	<b>1634</b>	<b>3.1</b>	<b>97</b>	<b>25143</b>	<b>3.9</b>

Excludes births <500 grams birthweight.

† Rate/1000 livebirths.

( ) Where n<5 rate has been bracketed.

### 5.2.5 Maternal Race and Age at Neonatal Death

The majority (75.0%) of neonatal deaths occurred in the first week of life, 49.5% occurring within the first 48 hours of life. Among babies of Aboriginal women 71.4% of neonatal deaths occurred in the first seven days of life compared with 75.6% of babies born to Caucasian women (Table 13).

**TABLE 13 : AGE AT NEONATAL DEATHY BY MATERNAL RACE IN WESTERN AUSTRALIA IN 1992**

Age at Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other			
	No.	%	No.	%	No.	%	No.	%
< day 1	24	30.8	5	35.7	2	40.0	31	32.0
day 1	12	15.4	4	28.6	1	20.0	17	17.5
day 2	9	11.5	-	-	-	-	9	9.3
day 3	5	6.4	-	-	1	20.0	6	6.2
day 4	3	3.9	-	-	-	-	3	3.1
day 5	3	3.9	-	-	-	-	3	3.1
day 6	1	1.3	-	-	-	-	1	1.0
day 7	2	2.6	1	7.1	-	-	3	3.1
day ≤ 7	59	75.6	10	71.4	4	80.0	73	75.3
day 8 - 14	10	12.8	3	21.4	1	20.0	14	14.4
day 15 - 21	6	7.7	1	7.1	-	-	7	7.2
day 22 - 28	3	3.9	-	-	-	-	3	3.1
<b>TOTAL</b>	<b>78</b>	<b>100.0</b>	<b>14</b>	<b>100.0</b>	<b>5</b>	<b>100.0</b>	<b>97</b>	<b>100.0</b>

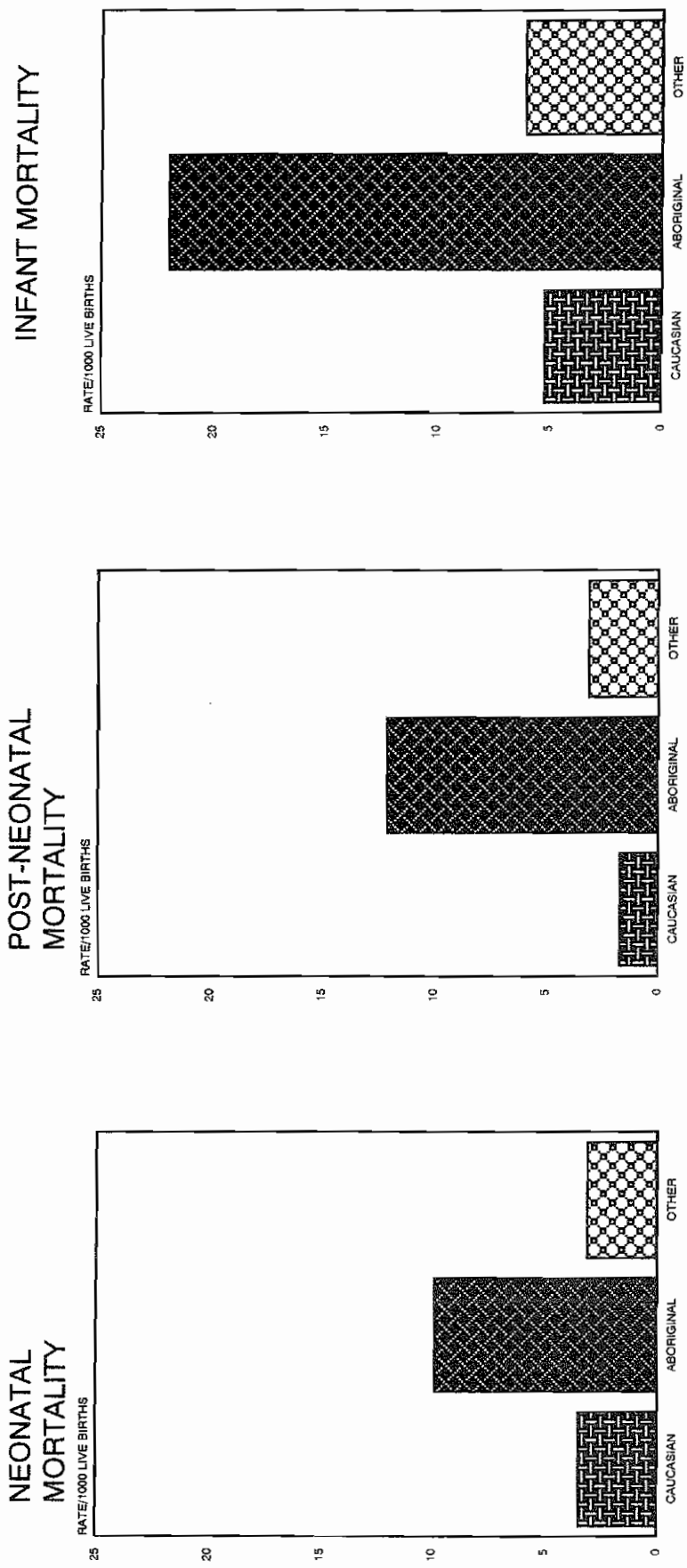
Excludes births <500 grams birthweight

### 5.2.6 Causes of Neonatal Deaths

Lethal congenital malformation in 40 babies (41.2%) and low birthweight for 33 babies (34.0%) were the main causes of neonatal death in the 1992 birth cohort (Table 14).

FIGURE V

NEONATAL, POST-NEONATAL AND INFANT MORTALITY,  
 ABORIGINAL AND NON-ABORIGINAL,  
 WESTERN AUSTRALIA, 1992



Excludes births less than 500 grams birthweight

SOURCE: MIDWIVES' NOTIFICATION SYSTEM  
 REGISTRAR GENERAL'S OFFICE  
 COMMUNITY AND CHILD HEALTH SERVICES

**TABLE 14 : CAUSE OF NEONATAL DEATH BY MATERNAL RACE IN WESTERN AUSTRALIA IN 1992**

Cause of Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other			
	No.	%	No.	%	No.	%	No.	%
Lethal Congenital Malformation	33	42.3	5	35.7	2	40.0	40	41.2
Low Birth Weight (<2500g)	26	33.3	5	35.7	2	40.0	33	34.0
Asphyxia	11	14.1	-	-	1	20.0	12	12.4
Pregnancy conditions	1	1.3	1	7	-	-	2	2.1
Infections	4	5.1	-	-	-	-	4	4.1
Hydrops fetalis	-	-	-	-	-	-	-	-
Other	2	2.6	-	-	-	-	2	2.1
Sudden Infant Deaths	-	-	3	21.4	-	-	3	3.1
Unknown	1	1.3	-	-	-	-	1	1.0
<b>TOTAL</b>	<b>78</b>	<b>100.0</b>	<b>14</b>	<b>100.0</b>	<b>5</b>	<b>100.0</b>	<b>97</b>	<b>100.0</b>

Excludes births < 500 grams birthweight.

### 5.3 Post Neonatal Deaths

There were 60 post-neonatal deaths identified among the 1992 livebirths, providing a rate of 2.4/1000 livebirths (Table 15 and Table 37).

Post-neonatal mortality for babies of Aboriginal women was 12.1/1000 livebirths, seven times the rate of 1.7/1000 for babies of Caucasian women. For babies born to women of other races the rate was 3.1/1000 (Table 15, Table 30 and Figure IV).

Post-neonatal deaths in relation to Health Authority of maternal residence are shown in Table 15. It should be noted however, that due to small numbers of births in some Authorities the rates do vary from year to year and may be considered unrepresentative on an annual basis (Table 15).

TABLE 15 :  
POST-NEONATAL AND INFANT MORTALITY BY HEALTH AUTHORITY OF MATERNAL RESIDENCE AND MATERNAL RACE IN WESTERN AUSTRALIA IN 1992

Health Service Management Region of Maternal Residence	Maternal Race															
	Caucasian			Aboriginal			Other			Total						
	Post-Neonatal No.	Rate	Infant No.	Rate	Infant No.	Rate	Post-Neonatal No.	Rate	Infant No.	Rate	Post-Neonatal No.	Rate	Infant No.	Rate		
<u>Metropolitan</u>																
North	7	1.4	24	4.9	2	(17.5)	2	(17.5)	3	(7.7)	5	12.8	12	2.2	31	5.8
East	6	1.2	27	5.4	5	(16.6)	5	27.6	-	-	2	(3.6)	9	1.6	34	5.9
South	11	1.9	32	5.7	5	(13.5)	5	33.8	1	(2.3)	2	(4.6)	14	2.2	39	6.3
<u>Non-Metropolitan</u>																
Northern	1	(1.1)	2	(2.3)	7	(6.2)	7	14.5	1	(10.1)	1	(10.1)	5	3.4	10	6.9
Western	2	(1.2)	4	(2.5)	7	22.4	7	31.4	-	-	-	-	7	3.7	11	5.8
Central	4	(4.1)	9	9.3	3	(7.0)	3	(21.1)	-	-	-	-	5	4.4	12	10.5
Southern	7	2.2	18	5.8	2	(8.7)	2	(17.4)	-	-	-	-	8	2.4	20	6.1
<u>Outside WA</u>																
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>38</b>	<b>1.7</b>	<b>116</b>	<b>5.2</b>	<b>31</b>	<b>12.1</b>	<b>17</b>	<b>22.0</b>	<b>5</b>	<b>3.1</b>	<b>10</b>	<b>6.1</b>	<b>60</b>	<b>2.4</b>	<b>157</b>	<b>6.2</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Post-neonatal death rate/1000 livebirths.

<sup>2</sup> Infant death rate/1000 livebirths.

( ) Where n<5 rate has been bracketed.

SOURCE : MIDWIVES' NOTIFICATION SYSTEM  
REGISTRAR GENERAL'S OFFICE  
CHILD AND COMMUNITY HEALTH SERVICES

### 5.3.1 Maternal Race and Maternal Age

The rate of post-neonatal deaths among babies of teenage women was 6.4/1000 livebirths. Among babies born to Aboriginal women 6 (15.4/1000) post-neonatal deaths were to teenage mothers. (Table 16).

**TABLE 16 :** POST-NEONATAL DEATHS BY MATERNAL RACE AND MATERNAL AGE IN WESTERN AUSTRALIA IN 1992

Maternal Age	Maternal Race											
	Caucasian			Aboriginal			Other			Live		
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
≤15	-	24	-	-	40	-	-	1	-	-	65	-
16	-	94	-	-	67	-	-	1	-	-	162	-
17	1	207	4.8	-	79	-	-	4	-	1	290	3.4
18	1	326	3.1	2	99	20.2	-	10	-	3	435	6.9
19	2	485	4.1	4	104	38.5	-	28	-	6	617	9.7
≤19	4	1136	3.5	6	389	15.4	-	44	-	10	1569	6.4
20-24	12	4448	2.7	7	521	13.4	2	239	8.4	21	5208	4.0
25-29	13	7874	1.7	3	319	9.4	2	497	4.0	18	8690	2.1
30-34	6	6344	0.9	1	138	7.2	-	535	-	7	7017	1.0
35-39	3	1980	1.5	-	37	-	1	272	3.7	4	2289	1.7
40-44	-	308	-	-	5	-	-	46	-	-	359	-
≥45	-	10	-	-	-	-	-	1	-	-	11	-
<b>TOTAL</b>	<b>38</b>	<b>22100</b>	<b>1.7</b>	<b>17</b>	<b>1409</b>	<b>12.1</b>	<b>5</b>	<b>1634</b>	<b>3.1</b>	<b>60</b>	<b>25143</b>	<b>2.4</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Rate/1000 livebirths.

### 5.3.2 Maternal Race and Conjugal State

Higher rates of post-neonatal mortality were recorded for babies of single women (7.6/1000) and babies of separated, divorced or widowed women (5.0/1000), than for women socially supported by a partner in a marriage or defacto relationship (1.8/1000) (Table 17).

**TABLE 17:** POST-NEONATAL DEATHS BY MATERNAL RACE AND CONJUGAL STATE IN WESTERN AUSTRALIA IN 1992

Conjugal State	Maternal Race									Total		
	Caucasian			Aboriginal			Other			Live		
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
Single	9	1845	4.9	9	478	18.8	-	57	-	18	2380	7.6
Married/defacto	28	20074	1.4	8	921	8.7	5	1568	3.2	41	22563	1.8
Other	1	181	5.5	-	10	-	-	-	-	1	200	5.0
<b>TOTAL</b>	<b>38</b>	<b>22100</b>	<b>1.7</b>	<b>17</b>	<b>1409</b>	<b>12.1</b>	<b>5</b>	<b>1634</b>	<b>3.1</b>	<b>60</b>	<b>25143</b>	<b>2.4</b>

Excludes births < 500 grams birthweight.

<sup>1</sup> Rate/1000 livebirths.

<sup>2</sup> Other includes separated, divorced and widowed.

### 5.3.3 Maternal Race and Parity

Almost one third (26.7%) of babies who died in the post-neonatal period were born to primiparous mothers, and a further 51.7% were to women with a parity of 1-2. The rates for these groups were 1.6/1000 for primiparous women, 2.4/1000 for women with parity 1-2, 4.8/1000 for women with parity 3-4 and 5.3/1000 for women with parity of 5 or more. (Table 18).

**TABLE 18: POST-NEONATAL DEATHS BY MATERNAL RACE AND PARITY IN WESTERN AUSTRALIA IN 1992**

	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
0	13	8674	1.5	2	383	5.2	1	645	1.6	16	9702	1.6
1-2	15	11356	1.3	12	632	19.0	4	801	5.0	31	12789	2.4
3-4	9	1830	4.9	2	286	7.0	-	158	-	11	2274	4.8
≥5	1	240	4.2	1	108	9.3	-	30	-	2	378	5.3
<b>TOTAL</b>	<b>38</b>	<b>22100</b>	<b>1.7</b>	<b>17</b>	<b>1409</b>	<b>12.1</b>	<b>5</b>	<b>1634</b>	<b>3.1</b>	<b>60</b>	<b>25143</b>	<b>2.4</b>

Excludes births < 500 grams birthweight.

† Rate/1000 livebirths.

### 5.3.4 Maternal Race and Plurality

Examination of the 60 post-neonatal deaths in 1992 by plurality revealed that for singleton births the rate was 2.3/1000 and for multiple births the rate was 6.0/1000 livebirths. Among twin babies the post-neonatal death rate was 6.2/1000. (Table 19).

**TABLE 19: POST-NEONATAL DEATHS BY MATERNAL RACE AND PLURALITY IN WESTERN AUSTRALIA IN 1992**

Plurality	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
Singleton	34	21484	1.6	17	1387	12.3	5	1604	3.1	56	24475	2.3
Twins	4	590	6.8	-	22	-	-	30	-	4	642	6.2
Triplets	-	26	-	-	-	-	-	-	-	-	26	-
<b>TOTAL</b>	<b>38</b>	<b>22100</b>	<b>1.7</b>	<b>17</b>	<b>1409</b>	<b>12.1</b>	<b>5</b>	<b>1634</b>	<b>3.1</b>	<b>60</b>	<b>25143</b>	<b>2.4</b>

Excludes births < 500 grams birthweight.

† Rate/1000 livebirths.



### 5.3.5 Maternal Race and Birthweight

Overall the trend was for post-neonatal mortality proportions to increase as birthweight fell. The post-neonatal rate for low birthweight babies of Aboriginal mothers (40.0/1000) was higher than the rate for low birthweight babies of Caucasian women (9.7/1000) (Table 20).

**TABLE 20: POST-NEONATAL MORTALITY BY MATERNAL RACE AND BIRTHWEIGHT DISTRIBUTION IN WESTERN AUSTRALIA IN 1992**

Birthweight (grams)	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
500-999	3	72	(41.7)	1	10	(100.0)	1	7	(142.9)	5	89	56.2
1000-1499	3	128	(23.4)	-	9	-	-	8	-	3	145	(20.7)
1500-1999	4	232	(17.2)	-	25	-	-	16	-	4	273	(14.7)
2000-2499	3	822	(3.6)	5	106	(47.2)	-	76	-	8	1004	8.0
<2500	13	1345	9.7	6	150	40.0	1	107	(9.3)	20	1511	13.2
2500-2999	5	3244	1.5	4	318	(12.6)	1	334	(3.0)	10	3896	2.6
3000-3499	10	8237	1.2	4	527	(7.6)	1	676	(1.5)	15	9440	1.6
3500-3999	8	6882	1.2	2	322	(6.2)	2	401	(5.0)	12	7605	1.6
4000-4499	2	2157	(0.9)	1	76	(13.2)	-	110	-	3	2343	(1.3)
≥4500	-	326	-	-	16	-	-	6	-	-	348	-
<b>TOTAL</b>	<b>38</b>	<b>22100</b>	<b>1.7</b>	<b>17</b>	<b>1409</b>	<b>12.1</b>	<b>5</b>	<b>1634</b>	<b>3.1</b>	<b>60</b>	<b>25143</b>	<b>2.4</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Rate/1000 livebirths.

( ) Where n<5 rate has been bracketed.

### 5.3.6 Causes of Post Neonatal Death

The major cause of post-neonatal deaths in Western Australia continued to be Sudden Infant Death Syndrome (36.7%) (Table 21). Sudden Infant Death Syndrome was largely responsible for an increase in the rate of post neonatal deaths of babies of Aboriginal mothers from 13.6/1000 in 1987 to 16.8/1000 in 1988. These rates reduced to 14.7/1000 in 1989 and 10.4/1000 in 1990, then rose to 14.4/1000 in 1991 and 12.1/1000 in 1992.

Lethal congenital malformation remained the second highest known cause, to which 14 (23.3%) post-neonatal deaths were attributed. The percentage of post-neonatal deaths due to infection fell from 13.5% in 1988 and 13.0% in 1989 to 9.2% in 1990, then rose to 15.6% in 1991 and 33.3% in 1992. (Table 21).

**TABLE 21 : CAUSE OF POST-NEONATAL DEATH BY MATERNAL RACE IN WESTERN AUSTRALIA IN 1992**

Cause of Death	Maternal Race						Total 1992	
	Caucasian		Aboriginal		Other		No.	%
	No.	%	No.	%	No.	%		
Sudden Infant Death	16	41.0	6	37.5	-	-	22	36.7
Lethal Congenital Malformation	11	28.2	-	-	3	60.0	14	23.3
Extremely Low Birthweight (<1000g)	1	2.6	1	5.9	1	20.0	3	5.0
Infection - Respiratory	2	5.3	7	41.2	-	-	9	15.0
Infection - Meningitis	2	5.3	-	-	-	-	2	3.3
Infection - Other	1	2.6	3	17.6	-	-	4	6.7
Other	5	12.8	-	-	1	20.0	6	10.0
Unknown	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>38</b>	<b>100.0</b>	<b>17</b>	<b>100.0</b>	<b>5</b>	<b>100.0</b>	<b>60</b>	<b>100.0</b>

Excludes births <500 grams birthweight.

### 5.3.7 Seasonal Incidence of Post-Neonatal Deaths

The highest percentages of post-neonatal deaths from Sudden Infant Death Syndrome was during the January-March seasonal quarter of the year (Table 22).

**TABLE 22 CAUSE OF POST-NEONATAL DEATH BY SEASONAL INCIDENCE IN WESTERN AUSTRALIA IN 1992**

Cause of Death	Jan-Mar		Apr - Jun		Jul-Sep		Oct-Dec		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Sudden Infant Death	7	43.8	3	21.4	7	38.9	5	41.7	22	36.7
Lethal Congenital Malformation	4	25.0	3	21.4	2	11.1	5	41.7	14	23.3
Infection	4	25.0	6	42.9	8	44.4	2	16.7	20	33.3
Other/Unknown	1	6.3	2	14.3	1	5.6	-	-	4	6.7
<b>TOTAL</b>	<b>16</b>	<b>100.0</b>	<b>14</b>	<b>100.0</b>	<b>18</b>	<b>100.0</b>	<b>12</b>	<b>100.0</b>	<b>60</b>	<b>100.0</b>

Excludes births <500 grams birthweight.

SOURCE: MDWIVES' NOTIFICATION SYSTEM  
REGISTRAR GENERAL'S OFFICE

## 6. PERINATAL MORTALITY IN WESTERN AUSTRALIA IN THE 1992 BIRTH COHORT

### 6.1 Perinatal Mortality

There were 212 perinatal deaths identified in the 1992 birth cohort which gave a perinatal mortality rate of 8.4/1000 total births (Table 3 and Table 23). This compares with rates of 10.2/1000 in 1989, 7.9/1000 in 1990 and 8.1/1000 in 1991. Among babies born to Aboriginal women the rate (21.7/1000) was higher than for perinatal deaths of babies of Caucasian women (7.4/1000) and for perinatal deaths of babies born to women of other races (9.7/1000) (Table 23).

**TABLE 23 :** STILLBIRTHS, NEONATAL AND PERINATAL MORTALITY BY MATERNAL RACE IN WESTERN AUSTRALIA IN 1992

Type of Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other			
	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Stillbirths	87	3.9	17	11.9	11	6.7	115	4.6
Neonatal Mortality	78	3.5	14	9.9	5	3.1	97	3.9
Perinatal Mortality	165	7.4	31	21.7	16	9.7	212	8.4

Excludes births <500 grams birthweight.

<sup>1</sup> Stillbirth & Perinatal Death rate/1000 total births.

<sup>2</sup> Neonatal Death rate/1000 livebirths.

Perinatal deaths in relation to Health Authority of maternal residence are shown in Table 3. It should be noted however, that due to small numbers of births in each country division, the rates do vary on an annual basis (Table 3).

### 6.2 Maternal Race and Maternal Age

Perinatal mortality is lowest for babies of women aged 20-24 years, (6.1/1000) and the risk increases toward the extremes of the fertile age group.

Twenty seven (17.1/1000) perinatal deaths were among babies of women in their teenage years. Another 22 (8.2/1000) perinatal deaths were among babies of women aged 35 years or more (Table 24).

**TABLE 24 : PERINATAL DEATHS BY MATERNAL RACE AND MATERNAL AGE IN WESTERN AUSTRALIA IN 1992**

Maternal Age	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate
≤15	1	24	41.7	-	40	-	1	2	-	2	66	30.3
16	1	94	10.6	2	67	29.9	-	1	-	3	162	18.5
17	1	207	4.8	5	81	61.7	-	4	-	6	292	20.5
18	4	329	12.2	4	100	40.0	-	10	-	8	439	18.2
19	3	486	6.2	5	109	45.9	-	28	-	8	623	12.8
≤19	10	1140	8.8	16	397	40.3	1	45	22.2	27	1582	17.1
20-24	25	4461	5.6	7	523	13.4	-	239	-	32	5223	6.1
25-29	55	7902	7.0	4	323	12.4	8	503	15.9	67	8728	7.7
30-34	59	6381	9.2	1	139	7.2	4	538	7.4	64	7058	9.1
35-39	12	1984	6.0	3	39	76.9	2	273	7.3	17	2296	7.4
40-44	4	309	12.9	-	5	-	1	46	21.7	5	360	13.9
≥45	-	10	-	-	-	-	-	1	-	-	11	-
<b>TOTAL</b>	<b>165</b>	<b>22187</b>	<b>7.4</b>	<b>31</b>	<b>1426</b>	<b>21.7</b>	<b>16</b>	<b>1645</b>	<b>9.7</b>	<b>212</b>	<b>25258</b>	<b>8.4</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Rate/1000 total births.

### 6.3 Maternal Race and Parity

The perinatal mortality rate of babies born to primiparous women was 8.7/1000 and the rate for babies born to women with a parity of 1-2 was 7.9/1000. A higher rate of perinatal deaths (8.3/1000) was recorded among babies of women with a parity of 3 or more (Table 25).

**TABLE 25 : PERINATAL DEATHS BY MATERNAL RACE AND PARITY IN WESTERN AUSTRALIA IN 1992**

Parity	Caucasian			Aboriginal			Other			Total		
	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate
0	64	8710	7.3	12	390	30.8	9	653	13.8	85	9753	8.7
1-2	84	11399	7.4	13	637	20.4	5	803	6.2	102	12839	7.9
3-4	17	1838	9.3	3	288	10.4	2	159	12.6	19	2285	8.3
≥5	-	240	-	3	111	27.0	-	30	-	3	381	7.9
<b>TOTAL</b>	<b>165</b>	<b>22187</b>	<b>7.4</b>	<b>31</b>	<b>1426</b>	<b>21.7</b>	<b>16</b>	<b>1645</b>	<b>9.7</b>	<b>212</b>	<b>25258</b>	<b>8.4</b>

Excludes births < 500 grams birthweight.

<sup>1</sup> Rate/1000 total births.

#### 6.4 Maternal Race and Birthweight

More than half (61.3%) of all perinatal deaths (130 82.0/1000) were babies of low birthweight (<2500 grams).

In general terms the perinatal mortality in all racial groups increased as birthweight fell, the exception being for babies in  $\geq 4000$  gram categories. Rates in races other than for babies of Caucasian women are based on small numbers and therefore statistically unreliable. (Table 26).

TABLE 26: PERINATAL DEATHS BY MATERNAL RACE AND BIRTHWEIGHT DISTRIBUTION IN WESTERN AUSTRALIA IN 1992

Birthweight (grams)	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate
500-999	42	93	451.6	9	14	642.9	3	8	(375.0)	54	115	469.6
1000-1499	25	141	177.3	3	11	(272.7)	1	9	(111.1)	29	161	180.1
1500-1999	16	242	66.1	5	30	166.7	1	17	(58.8)	22	289	76.1
2000-2499	19	833	22.8	2	106	(18.9)	4	80	(50.0)	25	1019	24.5
<2500	102	1309	77.9	19	161	118.0	9	114	78.9	130	1584	82.0
2500-2999	25	3255	7.7	4	320	(12.5)	2	335	(3.0)	31	3910	7.9
3000-3499	27	8251	3.3	6	529	11.3	1	677	(1.5)	34	9457	3.6
3500-3999	7	6888	1.0	1	323	(3.1)	4	403	(9.9)	12	7614	1.6
4000-4499	2	2158	(0.9)	-	76	-	-	110	-	2	2344	(0.9)
$\geq 4500$	2	326	(6.1)	1	17	58.8	-	6	-	3	349	(8.6)
<b>TOTAL</b>	<b>165</b>	<b>22187</b>	<b>7.4</b>	<b>31</b>	<b>1426</b>	<b>21.7</b>	<b>16</b>	<b>1645</b>	<b>9.7</b>	<b>212</b>	<b>25258</b>	<b>8.4</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Rate/1000 total births.

( ) Where n<5 rate has been bracketed.

#### 6.5 Maternal Race and Babies' Sex

There were 106 (8.1/1000) male and 104 (8.5/1000) female perinatal deaths among those babies born in 1992. A further two stillborn babies of Aboriginal women, of indeterminate sex were recorded.

Among babies born to Caucasian women the perinatal death rate for males (7.3/1000) was similar for the perinatal death rate for females (7.6/1000). The rate of perinatal deaths among male babies of Aboriginal woman (20.9/1000) was also similar to the perinatal death rate for females (19.7/1000) and among babies of women of other races the rates were 8.3/1000 male and 11.2/1000 female (Table 27).

**TABLE 27 : PERINATAL DEATHS BY MATERNAL RACE AND SEX IN WESTERN AUSTRALIA IN 1992**

Sex	Maternal Race											
	Caucasian			Aboriginal			Other			Total		
	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate
Male	83	11430	7.3	16	764	20.9	7	844	8.3	106	13038	8.1
Female	82	10757	7.6	13	660	19.7	9	801	11.2	104	12218	8.5
<b>TOTAL</b>	<b>165</b>	<b>22187</b>	<b>7.4</b>	<b>29</b>	<b>1424</b>	<b>20.4</b>	<b>16</b>	<b>1645</b>	<b>9.7</b>	<b>210</b>	<b>25256</b>	<b>8.3</b>

Excludes births <500 grams birthweight and two babies of indeterminate sex.

<sup>1</sup> Rate/1000 total births.

### 6.6 Maternal Race and Conjugal State

One sixth (14.2/1000) of perinatal deaths were among babies of women reported as socially unsupported by a partner. This represents an increase since the 1991 cohort report (11.2/1000). The increased social acceptance of defacto relationships may have influenced reporting (Table 28).

**TABLE 28 : PERINATAL DEATHS BY MATERNAL RACE AND CONJUGAL STATE IN WESTERN AUSTRALIA IN 1992**

Conjugal State	Maternal Race											
	Caucasian			Aboriginal			Other			Total		
	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate
Single	14	1849	7.6	18	488	36.9	2	59	33.9	34	2396	14.2
Married/defacto	151	20157	7.5	13	928	14.0	14	1577	8.9	178	22662	7.9
<sup>2</sup> Other	-	1981	-	-	10	-	-	9	-	-	200	-
<b>TOTAL</b>	<b>165</b>	<b>22187</b>	<b>7.4</b>	<b>31</b>	<b>1426</b>	<b>21.7</b>	<b>16</b>	<b>1645</b>	<b>9.7</b>	<b>212</b>	<b>25258</b>	<b>8.4</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Rate/1000 total births.

<sup>2</sup> Other includes separated, divorced and widowed.

## 7. INFANT MORTALITY IN WESTERN AUSTRALIA IN THE 1992 BIRTH COHORT

### 7.1 Infant Deaths

There were 157 infant deaths identified amongst the 25143 livebirths in 1992. Of these, 97 were neonatal deaths and 60 were post-neonatal deaths. The infant mortality rate for Western Australia in 1992 was 6.2/1000 livebirths (Tables 15 and 29).

Infant mortality among babies born to Aboriginal women (22.0/1000) was more than three times that for babies born to non-Aboriginal women (Table 41, Figure V). The difference between these groups reduced from 18.9/1000 in 1985, 12.5/1000 in 1986, 11.7/1000 in 1987, 22.5/1000 in 1988, 15.5/1000 in 1989, 10.2/1000 in 1990, then rose to 14.2/1000 in 1991 and rose further to 16.7/1000 in 1992 (Table 41).

### 7.2 Maternal Race and Maternal Age

The infant mortality rate is greatest for babies of teenage women (15.3/1000). The infant mortality rate for babies of Aboriginal teenage mothers (36.0/1000) was higher than that for babies of Caucasian teenage mothers (8.8/1000) (Table 29).

TABLE 29 : INFANT DEATHS BY MATERNAL RACE AND MATERNAL AGE IN WESTERN AUSTRALIA IN 1992

Maternal Age	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
≤15	1	24	41.7	-	40	-	-	1	-	1	65	15.4
16	1	94	10.6	2	67	29.9	-	1	-	3	162	18.5
17	2	207	9.7	3	79	38.0	-	4	-	5	290	17.2
18	2	326	6.1	5	99	50.5	-	10	-	7	435	16.1
19	4	485	8.2	4	104	38.5	-	28	-	8	617	13.0
≤19	10	1136	8.8	14	389	36.0	-	44	-	24	1569	15.3
20-24	24	4448	5.4	12	521	23.0	2	239	8.4	38	5208	7.3
25-29	40	7874	5.1	3	319	9.4	4	497	8.0	47	8690	5.4
30-34	28	6344	4.4	1	138	7.2	1	535	1.9	30	7017	4.3
35-39	11	1980	5.6	1	37	27.0	2	272	7.4	14	2289	6.1
40-44	3	308	9.7	-	5	-	1	46	21.7	4	359	11.1
≥45	-	10	-	-	-	-	-	1	-	-	11	-
<b>TOTAL</b>	<b>116</b>	<b>22100</b>	<b>5.2</b>	<b>31</b>	<b>1409</b>	<b>22.0</b>	<b>10</b>	<b>1634</b>	<b>6.1</b>	<b>157</b>	<b>25143</b>	<b>6.2</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Rate/1000 livebirths.

### 7.3 Maternal Race and Conjugal State

The infant mortality rate (14.3/1000) among babies born to single, separated, divorced or widowed women is far greater than the rate for babies of women reported to be in a marriage or defacto relationship (5.3/1000) (Table 30).

**TABLE 30** INFANT DEATHS BY MATERNAL RACE AND CONJUGAL STATE IN WESTERN AUSTRALIA IN 1992

Congugal State	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
Single	19	1845	10.3	17	478	35.6	-	57	-	36	2380	15.1
Married/defacto	96	20074	4.8	14	921	15.2	10	1568	6.4	120	22563	5.3
Other	1	181	5.5	-	10	-	-	9	-	1	200	5.0
<b>TOTAL</b>	<b>116</b>	<b>22100</b>	<b>5.2</b>	<b>31</b>	<b>1409</b>	<b>22.0</b>	<b>10</b>	<b>1634</b>	<b>6.1</b>	<b>157</b>	<b>25143</b>	<b>6.2</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Rate/1000 livebirths.

<sup>2</sup> Other includes separated, divorced and widowed.

#### 7.4 Maternal Race and Parity

Overall, the highest rate of infant death was recorded among babies of women whose parity was 3 to 4 (9.7/1000).

**TABLE 31 :** INFANT DEATHS BY MATERNAL RACE AND PARITY IN WESTERN AUSTRALIA IN 1992

Parity	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
0	41	8674	4.7	7	383	18.3	2	645	3.1	50	9702	5.2
1-2	56	11356	4.9	20	632	31.6	7	801	8.7	83	12789	6.5
3-4	18	1830	9.8	3	286	10.5	1	158	6.3	22	2274	9.7
≥5	1	240	4.2	1	108	9.3	-	30	-	2	378	5.3
<b>TOTAL</b>	<b>116</b>	<b>22100</b>	<b>5.2</b>	<b>31</b>	<b>1409</b>	<b>22.0</b>	<b>10</b>	<b>1634</b>	<b>6.1</b>	<b>157</b>	<b>25143</b>	<b>6.2</b>

Excludes births < 500 grams birthweight.

<sup>1</sup> Rate/1000 livebirths.

#### 7.5 Maternal Race and Plurality

Infant mortality for twins (28.0/1000) was four times the rate for singleton births (5.7/1000). The infant death rate (28.8/1000) for twin babies born to Caucasian women in 1992 was higher than the rate (18.2/1000) in 1991 (Table 32).



**TABLE 32: INFANT DEATHS BY MATERNAL RACE AND PLURALITY IN WESTERN AUSTRALIA IN 1992**

Plurality	Maternal Race									Total		
	Caucasian			Aboriginal			Other			Total		
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
Singleton	99	21484	4.6	30	1387	21.6	10	1604	6.2	139	24475	5.7
Twins	17	590	28.8	1	22	45.5	-	30	-	18	642	28.0
Triplets	-	26	-	-	-	-	-	-	-	-	26	-
<b>TOTAL</b>	<b>116</b>	<b>22100</b>	<b>5.2</b>	<b>31</b>	<b>1409</b>	<b>22.0</b>	<b>10</b>	<b>1634</b>	<b>6.1</b>	<b>157</b>	<b>25143</b>	<b>6.2</b>

Excludes births < 500 grams birthweight.

<sup>1</sup> Rate/1000 livebirths.

### 7.6 Maternal Race and Babies' Sex

The infant death rates were 7.2/1000 male and 5.3/1000 female. Among babies born to Caucasian women the infant death rate for males (5.7/1000) was higher than the infant death rate for females (4.8/1000). For babies of Aboriginal mothers the infant death rate for males (31.6/1000) was higher than the infant death rate for females (10.8/1000) and for infants of women of other races the infant death rate for males (4.8/100) was lower than the infant death rate for females (7.5/1000) (Table 33).

**TABLE 33 : INFANT DEATHS BY MATERNAL RACE AND SEX IN WESTERN AUSTRALIA IN 1992**

Sex	Maternal Race									Total		
	Caucasian			Aboriginal			Other			Total		
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
Male	65	11389	5.7	24	759	31.6	4	838	4.8	93	12986	7.2
Female	51	10711	4.8	7	650	10.8	6	796	7.5	64	12157	5.3
<b>TOTAL</b>	<b>116</b>	<b>22100</b>	<b>5.2</b>	<b>31</b>	<b>1409</b>	<b>22.0</b>	<b>10</b>	<b>1634</b>	<b>6.1</b>	<b>157</b>	<b>25143</b>	<b>6.2</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Rate/1000 livebirths.

### 7.7 Maternal Race and Birthweight

Low birthweight (less than 2500 grams) babies comprised less than half (49.0%) of all infant deaths. A rate of 51.0/1000 livebirths was recorded for low birthweight babies. Babies with birthweight of 3500 grams or more had the highest chance of survival with an infant mortality rate of 2.0/1000. An infant mortality rate (93.3/1000) for low birthweight babies of Aboriginal women was higher than the rate (44.6/1000) for low birthweight babies of Caucasian women (Table 34).

**TABLE 34: INFANT MORTALITY BY MATERNAL RACE AND BIRTHWEIGHT DISTRIBUTION IN WESTERN AUSTRALIA IN 1992**

Birth weight (grams)	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
500-999	24	72	333.3	6	10	600.0	3	7	(428.6)	33	89	370.8
1000-1499	15	128	117.2	1	9	(111.1)	-	8	-	16	145	110.3
1500-1999	10	232	43.1	-	25	-	-	16	-	10	273	36.6
2000-2499	11	822	13.4	7	106	66.0	-	76	-	18	1004	17.9
<2500	60	1345	44.6	14	150	93.3	3	107	(28.0)	77	1511	51.0
2500-2999	19	3244	5.9	6	318	18.9	2	334	(6.0)	27	3896	6.9
3000-3499	23	8237	2.8	8	527	15.2	1	676	(1.5)	32	9440	3.4
3500-3999	9	6882	1.3	2	322	(6.2)	4	401	(10.0)	15	7605	2.0
4000-4499	3	2157	(1.4)	1	76	(13.2)	-	110	-	4	2343	(0.2)
≥4500	2	326	(6.1)	-	16	-	-	6	-	2	348	(5.7)
<b>TOTAL</b>	<b>116</b>	<b>22100</b>	<b>5.2</b>	<b>31</b>	<b>1409</b>	<b>22.0</b>	<b>10</b>	<b>1634</b>	<b>6.1</b>	<b>157</b>	<b>25143</b>	<b>6.2</b>

Excludes births <500 grams birthweight.

<sup>1</sup> Rate/1000 livebirths.

( ) Where n<5 rate has been bracketed.

## 7.8 Maternal Race and Age at Infant Death

Almost half (63.1%) the infant deaths occurred in the neonatal period, with most (91.7%) deaths occurring within 24 weeks of birth (Table 35).

**TABLE 35: INFANT DEATHS BY MATERNAL RACE AND AGE AT DEATH IN WESTERN AUSTRALIA IN 1992**

Age at Death in Weeks	Maternal Race						Total	
	Caucasian		Aboriginal		Other			
	No.	%	No.	%	No.	%	No.	%
1-4	79	68.1	15	48.4	5	50.0	99	63.1
5-8	5	4.3	4	12.9	-	-	9	5.7
9-12	6	5.2	3	9.7	1	10.0	10	6.4
13-16	7	6.0	-	-	-	-	7	4.5
17-20	8	6.9	3	9.7	1	10.0	12	7.6
21-24	3	2.6	3	9.7	1	10.0	7	4.5
25-52	8	6.9	3	9.7	2	20.0	13	8.3
<b>TOTAL</b>	<b>116</b>	<b>100.0</b>	<b>31</b>	<b>100.0</b>	<b>10</b>	<b>100.0</b>	<b>157</b>	<b>100.0</b>

Excludes births <500 grams birthweight.

## 7.9 Causes of Infant Death

The major causes of infant deaths remain lethal congenital malformations for 54 (34.4%) babies, Sudden Infant Death Syndrome for 35 (15.9%) and low birthweight (<2500 grams) for 33 (21.0%) babies. Infection remained a significant cause of infant mortality among babies of Aboriginal mothers (Table 36).

**TABLE 36 : CAUSE OF INFANT DEATHS AND MATERNAL RACE IN WESTERN AUSTRALIA IN 1992**

Cause of Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other			
	No.	%	No.	%	No.	%	No.	%
Lethal Congenital Malformation	44	33.9	5	16.1	5	50.0	54	34.4
Low Birth Weight (<2500g)	26	22.4	5	16.1	2	20.0	33	21.0
Asphyxia	11	9.5	-	0	1	10.0	12	7.6
Pregnancy conditions	1	0.9	1	3.2	-	0	2	1.3
Infections	10	8.6	11	35.5	1	10.0	22	14.0
Hydrops fetalis	-	0	-	0	-	0	-	0.0
Other	7	6.0	-	0	1	10.0	8	5.1
Sudden Infant Deaths	16	13.8	9	29.0	-	0	25	15.9
Unknown	1	0.9	-	0	-	0	1	0.6
<b>TOTAL</b>	<b>116</b>	<b>100.0</b>	<b>31</b>	<b>100.0</b>	<b>10</b>	<b>100.0</b>	<b>157</b>	<b>100.0</b>

Excludes births <500 grams birthweight.

**TABLE 37 : NEONATAL, POST-NEONATAL AND INFANT MORTALITY BY MATERNAL RACE IN WESTERN AUSTRALIA IN 1992**

Type of Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other			
	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Neonatal Mortality	78	3.5	14	9.9	5	3.1	97	3.9
Post-Neonatal Mortality	38	1.7	17	12.1	5	3.1	60	2.4
Infant Mortality	116	5.2	31	22.0	10	6.1	157	6.2

Excludes births <500 grams birthweight.

Neonatal, post-neonatal and infant mortality rates/1000 livebirths.

TABLE 38 : PERINATAL AND INFANT MORTALITY BY MATERNAL AGE, PLURALITY AND SEX IN WESTERN AUSTRALIA IN 1992

Conjugal	Perinatal Mortality						Infant Mortality									
	Aboriginal		Non-Aboriginal		Total		Aboriginal		Non-Aboriginal		Total					
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate				
<u>Maternal</u>																
Age ≤15	-	40	-	26	2	(30.3)	-	40	-	25	1	(40.0)	1	65	1	(15.4)
16-19	16	357	44.8	1159	9	7.8	14	349	40.1	1155	9	7.8	23	1504	23	15.3
20-29	11	846	13.0	13105	88	6.7	15	840	17.9	13058	70	5.4	85	13898	85	6.1
30-39	4	178	(22.5)	9176	77	8.4	2	175	(11.4)	9131	42	4.6	44	9306	44	4.7
•40	-	5	-	366	5	13.5	-	5	-	356	4	(11.2)	4	361	4	(11.1)
Total	31	1426	21.7	23832	181	7.6	31	1409	22.0	23734	126	5.3	157	25143	157	6.2
<u>Plurality</u>																
Singleton	29	1403	20.7	23179	161	6.9	30	1387	21.6	23088	109	4.7	139	24475	139	5.7
Multiple	2	23	(87.0)	653	20	30.6	1	22	(45.5)	644	17	26.3	18	668	18	26.9
Total	31	1426	21.7	23832	181	7.6	31	1409	22.0	23734	126	5.3	157	25143	157	6.2
<u>Sex</u>																
Male	16	764	20.9	12274	90	7.3	24	759	31.6	12227	69	5.6	93	12986	93	7.2
Female	13	660	19.7	11558	91	7.9	7	650	10.8	11507	57	5.0	64	12157	64	5.3
Total	29	1424	20.4	23832	181	7.6	31	1409	22.0	23734	126	5.3	157	25143	157	6.2

Excludes births <500 grams birthweight.

Excludes two stillbirths to Aboriginal women with indeterminate sex.

<sup>1</sup> Perinatal death rate/1000 total births.

<sup>2</sup> Infant death rate/1000 livebirths.

( ) Where n<5 rate has been bracketed.

## 8. TRENDS IN BIRTHS, PERINATAL AND INFANT MORTALITY IN WESTERN AUSTRALIA 1980 - 1992

### 8.1 Crude Birth Rates and Total Births 1980 - 1992

Over the past decade, the crude birth rate for Western Australia has gradually reduced from 16.6/1000 in 1982 to 15.2/1000 in 1992.

Among Aboriginal women, the crude birth rate remained relatively stable ranging between 33.0/1000 and 35.5/1000. These rates remain approximately twice the rates for non-Aboriginal women (Table 39, Figure VI).

TABLE 39 : CRUDE BIRTH RATES FOR ABORIGINAL AND NON-ABORIGINAL WESTERN AUSTRALIAN BIRTHS 1980-1992

Year	Aboriginal			Non-Aboriginal			Total		
	Live Births	Popn	Crude Birth Rate	Live Births	Popn	Crude Birth Rate	Live Births	Popn	Crude Birth Rate
*1980	1029	32598	31.6	19595	1236470	15.8	20624	1269068	16.2
1981	1093	31351	34.9	20948	1268705	16.5	22041	1300056	17.0
1982	1113	32874	33.9	21071	1306025	16.1	22184	1338899	16.6
1983	1135	34395	33.0	21737	1334655	16.3	22872	1369050	16.7
1984	1176	35919	32.7	21607	1355318	15.9	22783	1391237	16.4
1985	1235	37440	33.0	21903	1381124	15.9	23138	1418564	16.3
1986	1230	38964	31.6	22463	1420055	15.8	23693	1455923	16.3
1987	1328	39948	33.2	22676	1456300	15.6	24004	1493041	16.1
1988	1428	41028	34.8	23534	1494139	15.8	24962	1531841	16.3
1989	1430	42093	34.0	23913	1536341	15.6	25343	1574986	16.1
1990	1537	43251	35.5	24289	1569798	15.5	25826	1609528	16.0
1991	1462	44325	33.0	23339	1591742	14.7	24801	1636067	15.2
1992	1409	45385	31.0	23734	1611965	14.7	25143	1657350	15.2

SOURCE : Livebirths - MIDWIVES' NOTIFICATION SYSTEM  
 Population data - ESTIMATED RESIDENT POPULATION BY AGE, SEX AND ABORIGINALITY  
 1981-1992, Health Services Statistics and Epidemiology Branch, HDWA January 1994  
 \*1980 population data - Australian Bureau Of Statistics - Cat. No. 3201.0.  
 Aboriginal population data - Child And Community Health Services

### 8.2.1 Stillbirths, Neonatal and Perinatal Mortality 1980 - 1992

Western Australian stillbirth rates showed a general downward trend from 7.5/1000 total births in 1980 to 4.6/1000 in 1992 (Table 40).

Consideration of stillbirth rates and racial groups showed stillbirths among babies of non-Aboriginal women followed this trend while the rates decreased from 7.2/1000 in 1980 to 4.1/1000 in 1992. Among babies of Aboriginal women, stillbirth rates were less consistent in their decline and remained more than double the rate for stillbirths among babies of non-Aboriginal women (Table 40).

FIGURE VI

# CRUDE BIRTH RATES AND RACIAL GROUPING FOR WESTERN AUSTRALIAN BIRTHS, 1980-1992

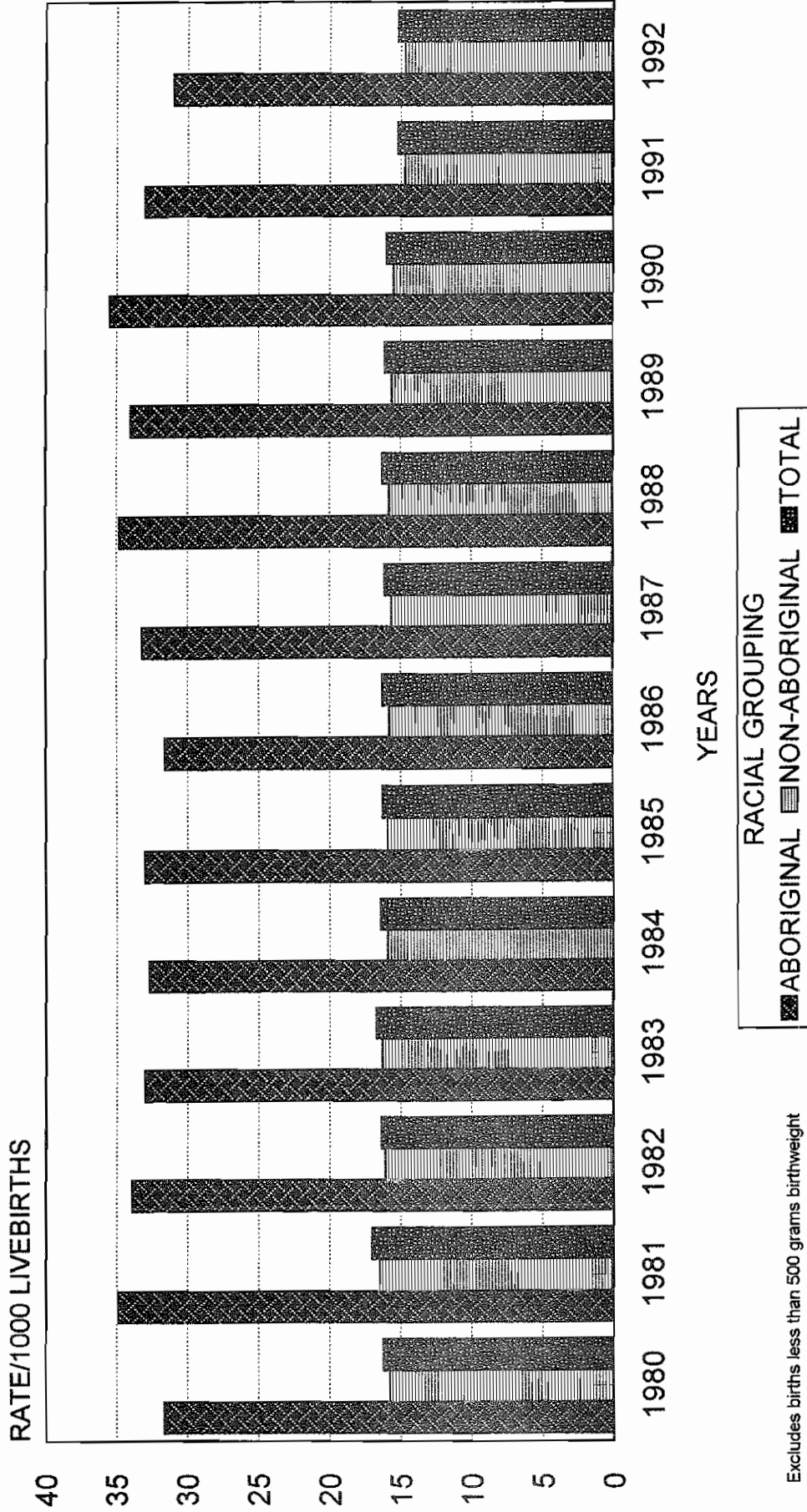


FIGURE VII

**STILLBIRTH PROPORTIONS AND RACIAL GROUPING OF BIRTHS IN W.A. 1980-1992**

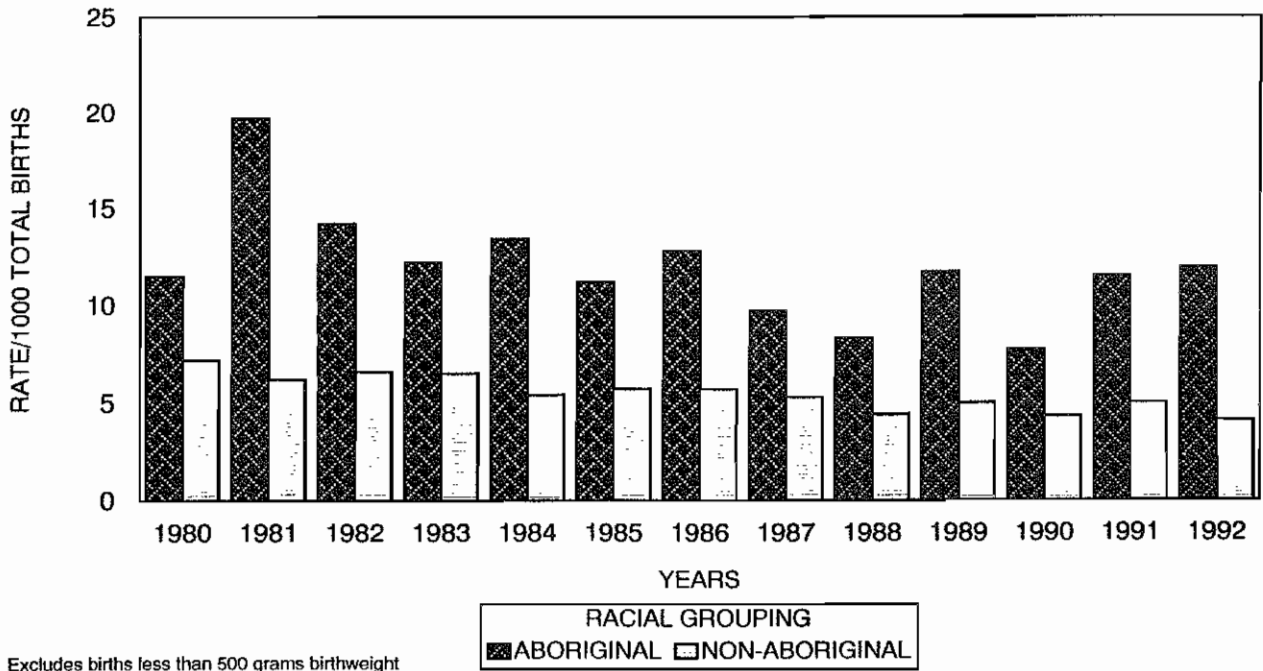


FIGURE VIII

**PERINATAL MORTALITY AND RACIAL GROUPING FOR WESTERN AUSTRALIAN BIRTHS, 1980-1992**

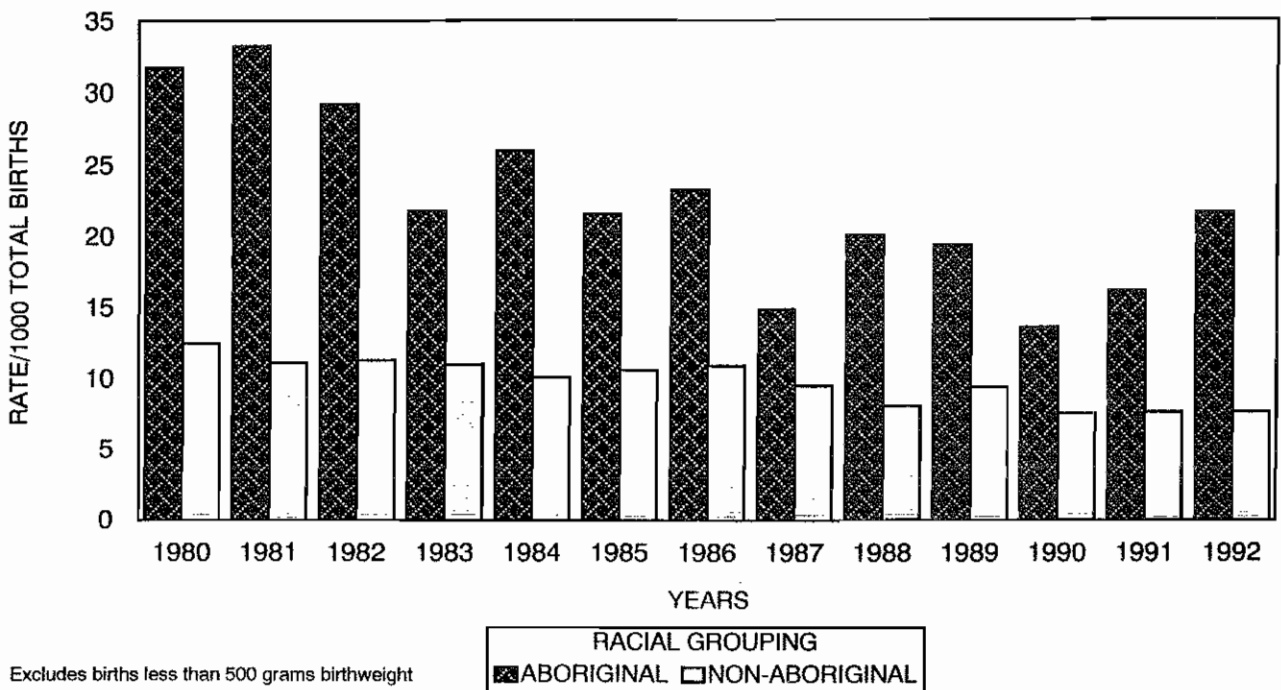


TABLE 40 : STILLBIRTHS, NEONATAL AND PERINATAL MORTALITY FOR ABORIGINAL AND NON-ABORIGINAL BIRTHS IN WESTERN AUSTRALIA 1980-1992

Year	Stillbirths						Neonatal Mortality						Perinatal Mortality					
	Aboriginal		Non-Aboriginal		Total		Aboriginal		Non-Aboriginal		Total		Aboriginal		Non-Aboriginal		Total	
	No.	(1)	No.	(1)	No.	(1)	No.	(2)	No.	(2)	No.	(2)	No.	(3)	No.	(3)	No.	(3)
1980	12	11.5	143	7.2	155	7.5	21	20.4	104	5.3	125	6.1	33	31.7	247	12.5	280	13.5
1981	22	19.7	131	6.2	153	6.9	15	13.7	103	4.9	118	5.4	37	33.2	234	11.1	271	12.2
1982	16	14.2	139	6.6	155	6.9	17	15.3	101	4.8	118	5.3	33	29.2	240	11.3	273	12.2
1983	14	12.2	143	6.5	157	6.8	11	9.7	97	4.5	108	4.7	25	21.8	240	11.0	265	11.5
1984	16	13.4	118	5.4	134	5.8	15	12.8	101	4.7	116	5.1	31	26.0	219	10.1	250	10.9
1985	14	11.2	136	5.7	150	6.4	13	10.5	96	4.4	109	4.7	27	21.6	232	10.6	259	11.1
1986	16	12.8	130	5.7	146	6.1	13	10.6	116	5.2	129	5.4	29	23.3	246	10.9	275	11.5
1987	13	9.7	121	5.3	134	5.5	7	5.3	96	4.2	103	4.3	20	14.9	217	9.5	237	9.8
1988	12	8.3	105	4.4	117	4.7	17	11.9	87	3.7	104	4.2	29	20.1	192	8.1	221	8.8
1989	17	11.7	121	5.0	138	5.4	11	7.7	110	4.6	121	4.8	28	19.4	231	9.4	259	10.2
1990	12	7.7	106	4.3	118	4.5	9	5.9	78	3.2	87	3.4	21	13.6	184	7.5	205	7.9
1991	17	11.5	117	5.0	134	5.4	7	4.8	61	2.6	68	2.7	24	16.2	178	7.6	202	8.1
1992	17	11.9	98	4.1	115	4.6	14	9.9	83	3.5	97	3.9	31	21.7	181	7.6	212	8.4

Excludes births <500 grams birthweight.

1980 - 1983 based on year of death.

1984 - 1992 based on year of birth.

(1) Stillbirth Rates/1000 total births.

(2) Neonatal Mortality Rate/1000 livebirths.

(3) Perinatal Mortality Rate/1000 total births.

SOURCE : MIDWIVES' NOTIFICATION SYSTEM  
REGISTRAR GENERAL'S OFFICE



### 8.2.2 Neonatal Mortality

The neonatal mortality rate for babies born to Aboriginal women remained higher than the neonatal mortality rate for babies born to non-Aboriginal women.

The rate of neonatal mortality among babies of Aboriginal women has reduced during the thirteen year period from 1980-1992. The rate of 20.4/1000 livebirths in 1980 reduced to 9.9/1000 livebirths in 1992. For babies of non-Aboriginal women, neonatal mortality rates reduced from 5.3/1000 in 1980 to 3.5/1000 in 1992 (Table 40, Figure IX).

### 8.2.3 Perinatal Mortality

Comparison of perinatal mortality for 1984-91, the seven years where the birth cohort method was employed, showed that overall the rate has decreased from 10.9/1000 total births in 1984 to 8.4/1000 in 1992. Overall a reduction of 5.1/1000 (13.5/1000 in 1980 to 8.4/1000 in 1992) occurred over thirteen years. It was apparent that the reduction in the perinatal mortality among babies of Aboriginal women from 31.7/1000 in 1980 to 21.7/1000 in 1992, was greater than among babies born to non-Aboriginal women over the same period (Table 40).

## 8.3 Neonatal, Post-neonatal and Infant Mortality 1980 - 1992

Over the thirteen year period from 1980 to 1992 neonatal and infant mortality rates reduced in Western Australia. Post-neonatal mortality rates showed minimal change over the same period. The neonatal mortality rate reduced from 6.1/1000 in 1980 to 3.9/1000 in 1992. Rates for post-neonatal deaths decreased slightly from 3.2/1000 in 1980 to 2.4/1000 in 1992 and infant mortality rates reduced from 9.3/1000 in 1980 to 6.2/1000 in 1992 (Table 41, Figure X, Figure XI).

Among babies of Aboriginal women a reduction in infant mortality from 31.1/1000 in 1980 to 18.8/1000 in 1987 was shown. The rate increased again to 28.7/1000 in 1988 and 22.4/1000 in 1989 but then decreased to 16.3/1000 in 1990, 19.2/1000 in 1991 and 22.0/1000 in 1992 (Table 41).

Infant mortality rates among babies of Aboriginal women at more than three times the rate for babies of non-Aboriginal women, should be noted for the differences in age at death (Table 35) and the cause of death (Table 36). The rate of deaths of babies born to Aboriginal women during the post-neonatal period was six times the rate of deaths among babies of non-Aboriginal women.

TABLE 41: NEONATAL, POST-NEONATAL AND INFANT MORTALITY FOR ABORIGINAL AND NON-ABORIGINAL BIRTHS IN WESTERN AUSTRALIA 1980-1992

Year	Neonatal Mortality				Post-Neonatal Mortality				Infant Mortality									
	Aboriginal		Non-Aboriginal		Aboriginal		Non-Aboriginal		Aboriginal		Non-Aboriginal							
	No.	(1)	No.	(1)	No.	(1)	No.	(1)	No.	(1)	No.	(1)						
1980	21	20.4	104	5.3	125	6.1	11	10.7	55	2.8	66	3.2	32	31.1	159	8.1	191	9.3
1981	15	13.7	103	4.9	118	5.4	6	5.5	63	3.0	69	3.1	21	19.2	166	7.9	187	8.5
1982	17	15.3	101	4.8	118	5.3	11	9.9	69	3.3	80	3.6	28	25.2	170	8.1	198	8.9
1983	11	9.7	97	4.5	108	4.7	17	15.0	59	2.7	76	3.3	28	24.7	156	7.2	184	8.0
1984	15	12.8	101	4.7	116	5.1	14	11.9	75	3.5	89	3.9	29	24.7	176	8.1	205	9.0
1985	13	10.5	96	4.4	109	4.7	19	15.4	58	2.6	77	3.3	32	25.9	154	7.0	186	8.0
1986	13	10.6	116	5.2	129	5.4	12	9.8	59	2.6	71	3.0	25	20.3	175	7.8	200	8.4
1987	7	5.3	96	4.2	103	4.3	18	13.6	64	2.8	82	3.4	25	18.8	160	7.1	185	7.7
1988	17	11.9	87	3.7	104	4.2	24	16.8	58	2.5	82	3.3	41	28.7	145	6.2	186	7.5
1989	11	7.7	110	4.6	121	4.8	21	14.7	56	2.3	77	3.0	32	22.4	166	6.9	198	7.8
1990	9	5.9	78	3.2	87	3.4	16	10.4	71	2.9	87	3.4	25	16.3	149	6.1	174	6.7
1991	7	4.8	61	2.6	68	2.7	21	14.4	56	2.4	77	3.1	28	19.2	117	5.0	145	5.8
1992	14	9.9	83	3.5	97	3.9	17	12.1	43	1.8	60	2.4	31	22.0	126	5.3	157	6.2

Excludes births <500 grams birthweight.

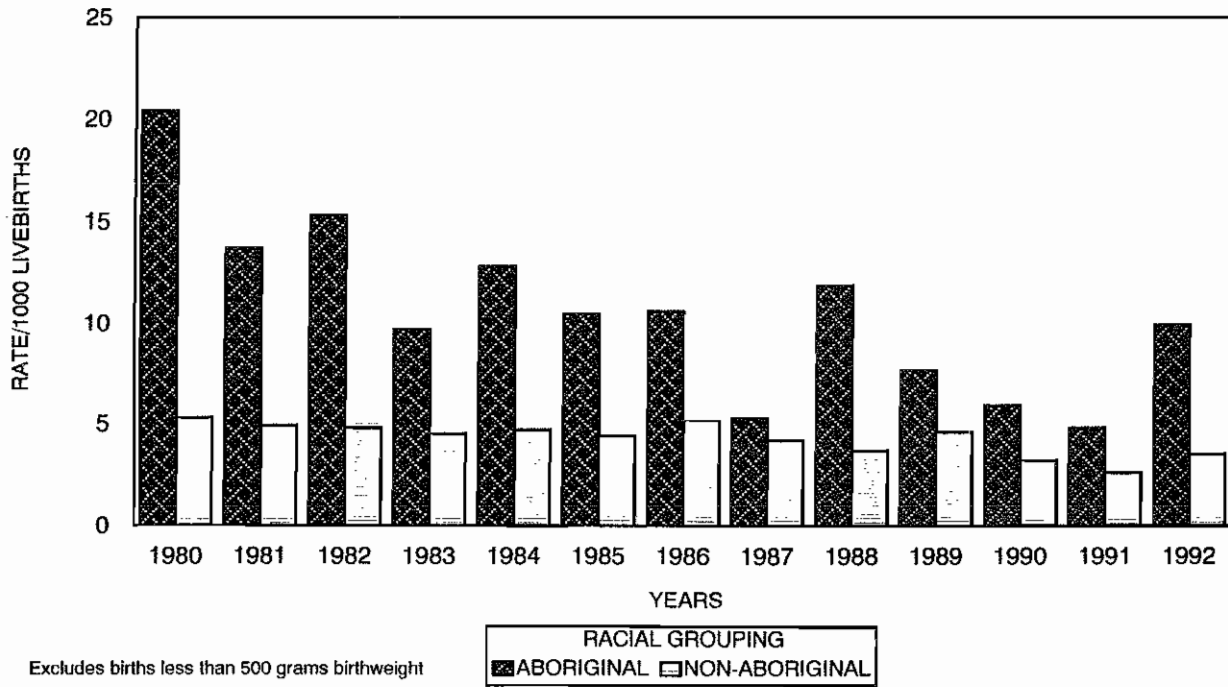
1980 - 1983 based on year of death.

1984 - 1992 based on year of birth.

(1) Neonatal, Post-Neonatal and Infant Mortality Rate/1000 livebirths.

SOURCE: MIDWIVES' NOTIFICATION SYSTEM  
REGISTRAR GENERAL'S OFFICE

**FIGURE IX**  
**NEONATAL MORTALITY AND RACIAL GROUPING**  
**FOR WESTERN AUSTRALIAN BIRTHS, 1980-1992**



**FIGURE X**  
**POSTNEONATAL MORTALITY, RACIAL GROUPING**  
**FOR WESTERN AUSTRALIAN BIRTHS, 1980-1992**

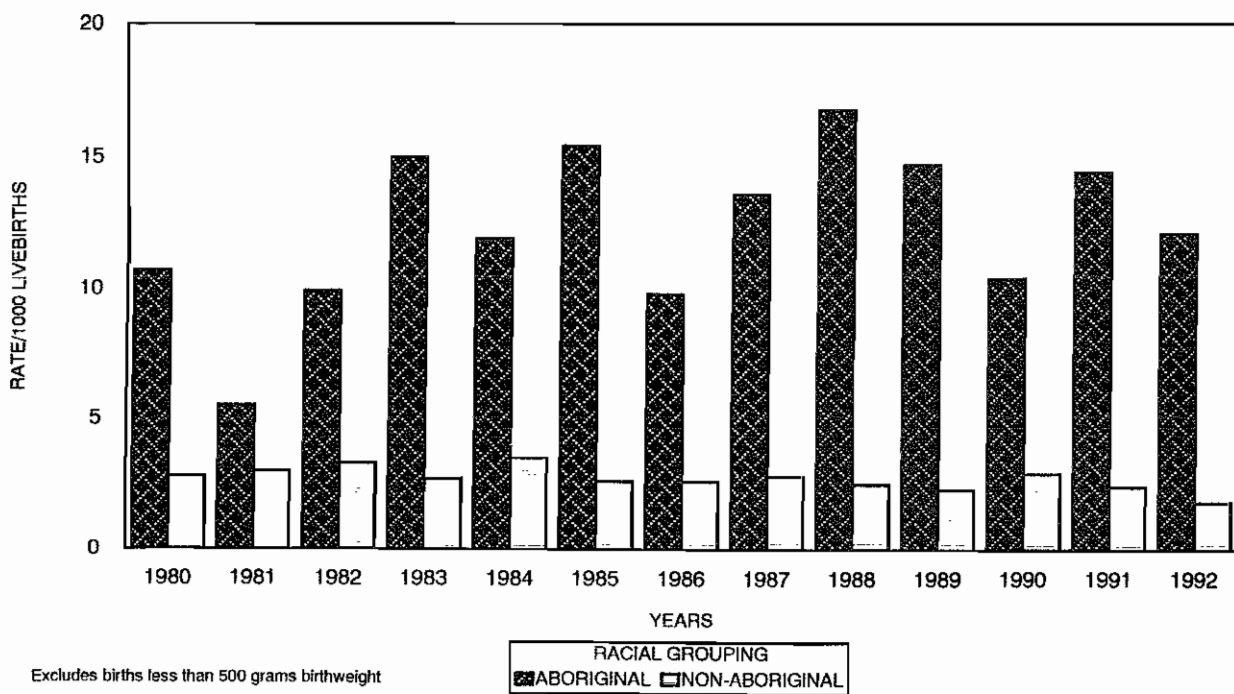
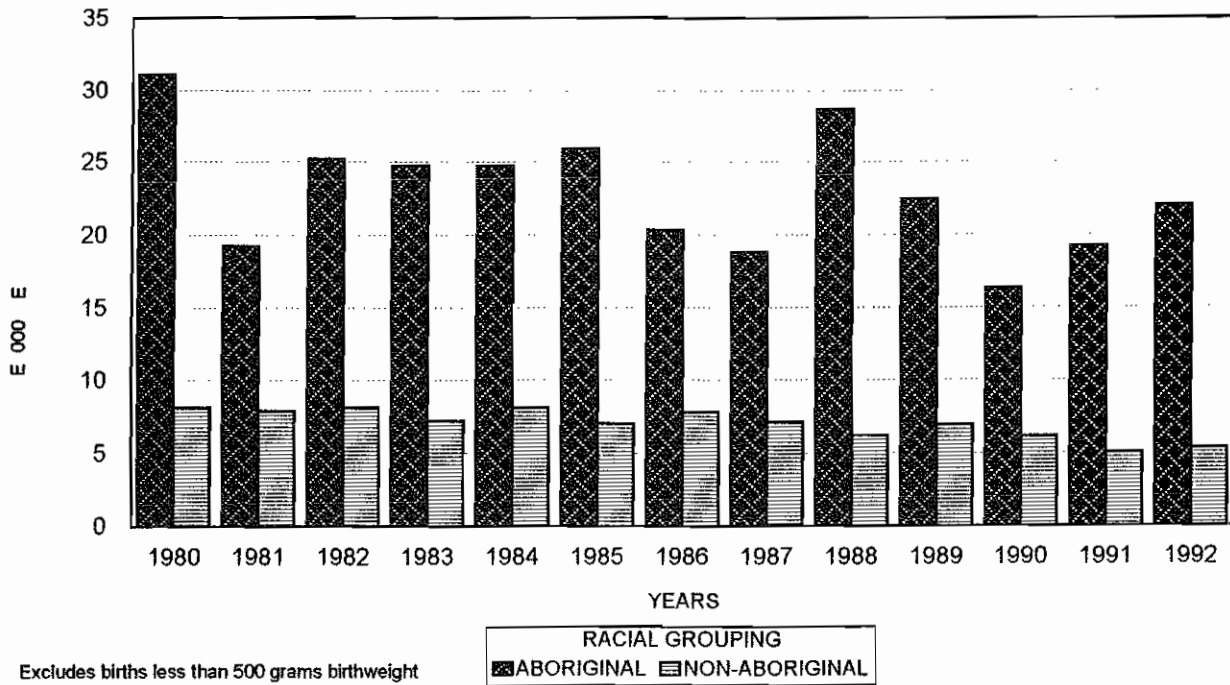


FIGURE XI

**INFANT MORTALITY AND RACIAL GROUPING FOR  
WESTERN AUSTRALIAN BIRTHS, 1980-1992**



**REFERENCES**

1. Gee, V. Perinatal Statistics in Western Australia. Tenth Annual Report of the Midwives' Notification System for 1992. Health Department of Western Australia, Perth. October 1993.
2. Gee, V. Perinatal and Infant Mortality Identified by Maternal Race. The 1991 Western Australian Birth Cohort, Health Department of Western Australia, Perth. April 1994.
3. Holman, C.D.J. and Quadros, C.F. Health and Disease in the Aboriginal Population of the Kimberley Region of Western Australia 1980-1985. Health Department of Western Australia, Perth. 1986.

Health Act (Midwifery Nurses) Regulations Form 2  
**NOTIFICATION OF CASE ATTENDED**  
 PARTICULARS RELATING TO MOTHER

Hospital .....

PRINT  
 IN  
 BLOCK  
 LETTERS.

SURNAME		UNIT RECORD No.	
FORENAMES		BIRTH DATE	
ADDRESS OF USUAL RESIDENCE		POSTCODE	
MAIDEN NAME		TELEPHONE NUMBER	

Current Conjugal State:

single ( ) 1  
 married (incl. de facto) ( ) 2  
 other ( ) 3 (please specify) \_\_\_\_\_

Race: (please specify)

Caucasian ( ) 1  
 Aboriginal (full or part) ( ) 2  
 Other ( ) 3 (please specify) \_\_\_\_\_

Height (cms) \_\_\_\_\_

**PREGNANCY**

PREVIOUS PREGNANCIES (excluding this pregnancy)

Total number of: \_\_\_\_\_

Previous Pregnancies: \_\_\_\_\_

Previous children now living: \_\_\_\_\_

born alive, now dead: \_\_\_\_\_

stillborn: \_\_\_\_\_

THIS PREGNANCY

Date of LMP: \_\_\_\_\_

This date - certain ( ) 1  
 - not certain ( ) 2

Expected due date: \_\_\_\_\_

Complications of Pregnancy:

Threatened abortion (under 20 weeks) ( ) A  
 urinary tract infection ( ) B  
 pre eclampsia ( ) C  
 APH - placenta praevia ( ) D  
 - abruptio ( ) E  
 - other ( ) F  
 prem. rupture of membranes ( ) G  
 other ..... H

Medical Conditions: \_\_\_\_\_

**LABOUR AND DELIVERY**

Onset of Labour:

spontaneous ( ) A  
 induced ( ) B  
 no labour ( ) D

Augmentation of Labour: no ( ) 1  
 yes ( ) 2

Presentation:

vertex ( ) 1  
 breech ( ) 2  
 other ( ) 3

Type of Delivery:

normal ( ) A  
 vacuum - successful ( ) B  
 - failed ( ) C  
 forceps - successful ( ) D  
 - failed ( ) E  
 breech manoeuvre ( ) F  
 caesarean - elective ( ) G  
 - emergency ( ) H

Anaesthesia/Analgesia:

none ( ) Z  
 general ( ) A  
 epidural/spinal ( ) B  
 other ( ) C

Hours of established labour: \_\_\_\_\_

Complications of Labour, Delivery: (include reason for Caesarean)

precipitate delivery ( ) A  
 fetal distress ( ) B  
 prolapsed cord ( ) C  
 cord tight around neck ( ) D  
 cephalopelvic disproportion ( ) E  
 other ..... F

**BABY**

Separate Form for each Baby.

Adoption: Yes ( ) No ( )

Birth Date: \_\_\_\_\_

Time (24 hr. clock): \_\_\_\_\_

Plurality:

single birth ( ) 1  
 first twin ( ) 2  
 second twin ( ) 3  
 other multiple birth: ( ) 4  
 (specify baby number \_\_\_ of \_\_\_)

Sex: male ( ) 1  
 female ( ) 2

Condition: liveborn ( ) 1  
 stillborn ( ) 2

Birthweight (grams): \_\_\_\_\_

Length (cms): \_\_\_\_\_

Head circumference (cms): \_\_\_\_\_

Time to establish unassisted regular breathing (mins): \_\_\_\_\_

Resuscitation:

none ( ) 0  
 intubation ( ) 3  
 oxygen only ( ) 8  
 other .....

Apgar Score:

1 min: \_\_\_\_\_

5 mins: \_\_\_\_\_

Estimated Gestation (weeks): \_\_\_\_\_

Birth Defects: .....

Birth Trauma (Eg. cephalhaematoma): .....

**COMPLETE SECTION ON SEPARATION.**  
 Attach to Mother and Baby's Inpatient Summaries (HA22). Forward to Health Services Statistics and Epidemiology Branch, Health Dept of Western Australia P.O. Box 817Z, Stirling Street, PERTH 6849 after discharge of mother and/or baby whichever is later. Guidelines for completion of this form available from above address.

**MIDWIFE**

Name .....

Signature .....

Reg. No. .... Date .....

**BABY'S SEPARATION DETAILS**

Date of Discharge/Transfer or Death: \_\_\_\_\_

Type of Separation:

Discharged home ( ) 1  
 Died ( ) 2  
 Transferred to ( ) 3

Special Care (whole days only): \_\_\_\_\_

Separate HA22 for baby: yes, attached ( ) 12

**HEALTH DEPARTMENT COPY**

MEDICAL CERTIFICATE OF CAUSE OF PERINATAL DEATH

To be completed in respect of—
(i) a child not born alive, of at least 20 weeks gestation or 400 grammes weight
(ii) a live born child dying within twenty-eight days after birth

Note: Please ✓ in relevant boxes thus [✓]
PARTICULARS RELATING TO MOTHER

1. Full Name ..... 2. Age ..... years

3. Address of usual residence .....

4. Parity .....

PARTICULARS RELATING TO CHILD ABORIGINAL: YES [ ] NO [ ]

5. Name, if given .....

6. Sex: Male [ ] Female [ ]

7. Place of death .....

8. Time and date of birth ..... a.m. [ ] p.m. [ ] 19.....

9. This birth was: Single [ ] Twin [ ] Triplet [ ]

10. Weight at birth ..... grammes

11. Period of gestation..... completed weeks from first day of last menstrual period to date of delivery

12. HEART BEAT CEASED:

- (a) Before labour commenced [ ]
(b) During labour but before delivery [ ]
(c) Before delivery but not known whether before or during labour [ ]
(d) After delivery [ ]
(e) Not known whether before or after delivery [ ]

If heart beat ceased before labour commenced, please estimate how long before--
..... hours or ..... days

If heart beat ceased after delivery, please state time—
..... a.m. ..... p.m. and date .....

13. BREATHING:

Did the child breathe after complete expulsion or extraction from the mother?
Yes [ ] No [ ]

CAUSE OF DEATH

14. Post mortem: carried out [ ] : to be carried out Yes [ ] No [ ]

Is cause of death shown below based on post mortem Yes [ ] No [ ]

PART I

A. CAUSES IN CHILD OR FOETUS

Disease or condition directly leading to death.....

due to [ ]
due to [ ]

B. MATERNAL OR OTHER CONDITIONS OR CAUSES GIVING RISE TO THE UNDERLYING CAUSE ABOVE

due to.....

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

PART II

OTHER SIGNIFICANT CONDITIONS in child, foetus or mother contributing to the death, but not related to the disease or condition causing it .....

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

Signature ..... Date .....

Name ..... Address .....

(Block Letters)

For Office Use Only

Registration Number

Vertical registration number box with numbers 1-14 and corresponding checkboxes.

Approximate Interval Between Onset and Death

R.G. 356

WESTERN AUSTRALIA  
REGISTRATION OF BIRTHS, DEATHS, AND MARRIAGES ACT, 1961

Registrar to enter No. of death entry.

## MEDICAL CERTIFICATE OF CAUSE OF DEATH

(For use only by a legally qualified medical practitioner who has been in attendance during deceased's last illness.  
If Deceased less than 29 days old use Form R.G. 364)

Aboriginal: Yes  No

Name of Deceased.....

Sex..... Date of Death..... 19.....

Age as stated to me..... Date last seen alive by me..... 19.....

Place of Death.....

\*Post Mortem Carried Out  ; To be Carried Out  ; Not to be Carried Out

Approximate Interval between onset and death

**CAUSE OF DEATH**  
(IN BLOCK LETTERS)

**DIRECT CAUSE—**  
Disease or condition directly  
leading to death † (a).....

due to—

**ANTECEDENT CAUSES—**  
Morbid conditions, if  
any, giving rise to the  
above cause stating  
the underlying con-  
dition last (b).....

due to—

(c).....

OTHER SIGNIFICANT CONDITIONS CONTRIBUTING TO DEATH BUT NOT RELATED TO THE DISEASE OR CONDITION  
CAUSING IT

† See Fly Leaf—This means the disease, injury or complication which caused death—NOT the mode of dying, as e.g., heart failure, assthenia, etc.

If operation performed on Deceased within 3 months of Death specify condition for which performed .....  
..... and Date of Operation .....

If this case has been reported to the Coroner, enter "Yes" here .....

I hereby certify that I was in medical attendance during the abovenamed Deceased's last illness and that the particulars and cause of death above written are true to the best of my knowledge and belief.

Name.....  
(block letters)

Signature

Address.....

Professional Title

Date.....

**NOTE—SECTION 41 of the abovementioned Act provides that in case of the death of any person who has been attended in his last illness by a duly qualified medical practitioner, such practitioner shall forthwith after the death complete and sign a certificate of the cause of death in the form approved by the Registrar General and give it to the person required by the Act to furnish information concerning such death.**

\* Please tick appropriate box.

29737/11/63—2M SES—MAG 144





**Validation of the Perinatal and  
Infant Mortality Register in  
Western Australia**

**1991-1992**

**Marisa Gilles  
MB ChB, BSc., MPH, FAFPHM**

**Epidemiology and Health Statistics Section  
July 1994**

## **The Western Australian Perinatal and Infant Mortality Register**

Perinatal and infant mortality rates are acknowledged public health indicators for evaluating improvements in socio-economic status and assessing the health of a nation.<sup>1</sup> Their importance to the public are reflected in the media coverage perinatal and infant mortality rates receive regularly. Continual efforts are being made to reduce these rates to a minimum and ensure that every measure is taken to prevent unnecessary perinatal and infant deaths.<sup>2</sup>

The surveillance of perinatal and infant mortality includes not only details of the event, death, but also a number of other variables associated with the mother and baby throughout gestation, until this event. This provides information which can be examined in order to design interventions to improve the outcome.

In Western Australia the Maternal and Child Health unit of the Public Health Surveillance Collections Section of the Epidemiology and Health Statistics Section produce the West Australian Midwives Notification System (MNS) which forms the basis of the deaths file. It has an international reputation based on its use in many case controlled studies, providing a valuable resource to a variety of users including the Institute of Child Health Research in Perth.

Perinatal and infant mortality data has been collected in Western Australia since 1980 and has been computerised since 1985. Details of all perinatal and infant deaths are collected. Information is manually collated from the Midwives' Notification system, Hospital Morbidity System, Register General's Office and a variety of other miscellaneous sources, including the newspapers! During this process it contributes to two other registers: the Birth Defects register and the Child Accident surveillance system. It is also used for investigations of randomly selected perinatal deaths.

The variables collected are:

- Baby's forenames and surname
- Mothers forenames and surnames
- Race and sex
- Birthweight and gestation
- Plurality
- Date and place of birth
- Date and place of death
- Type of stillbirth if applicable
- Type of death
- Birth defect
- Details of the cause of death if available
- Post mortem results if carried out
- Name of medical officer certifying death

The data are then manually linked to the corresponding birth cohort to attach other variables eg. parity of mother, maternal age, obstetric complications, etc. and finally analysed to produce the annual report on perinatal and infant mortality statistics.

The recognised definitions used in the register are listed below:

**Stillbirth-** Is the complete expulsion or extraction from its mother, of a product of conception of at least 20 weeks gestation or 400 grams birthweight, which after separation did not show any sign of life

**Neonatal Death-** The death of a live born infant within 28 days of birth.

**Infant Death-** The death of a live born infant within the first year of life.

**Perinatal Mortality Rate-** The number of stillbirths and neonatal deaths per 1000 total births in a year.

**Infant Mortality Rate (IMR)** The number of infant deaths per 1000 live births in a year.

### **Validation of the System**

To validate the Midwives' Notification System Death files (MNS death files) the rates were compared with two other sources of information: the Hospital Morbidity Data System (HMDS) and the post mortem reports from the forensic department at Sir Charles Gairdner Hospital.

### **Hospital Morbidity Data System.**

Data on all discharges from all hospitals in Western Australia are held by the Health Department of Western Australia and form the Hospital Morbidity Data System (HMDS). A print out was obtained of all hospital discharges between 1991 and 1992, for babies and infants up to one year of age with the separation code of death.

This method identified 2 deaths not in the MNS death file. However only one death was absent from the card system. An error in collating the two lists must have occurred. The second death was not registered at the Register General's, further investigation discovered that the death certificate had been given to the parents, who were responsible for the burial. It apparently never reached the RG's office for registration.

### **Validation against coroner reports for deaths requiring a post mortem**

Most perinatal deaths requiring a post mortem are carried out in the forensic department at Charles Gairdner Hospital. All perinatal post mortem reports for the years 1991 and 1992 were examined and compared with our register.

This identified 3 deaths not in the MNS death file, one of which, a SIDS case, was recorded on the card system and had already been identified through the HMDS. A closer look at these omissions reveal that 2 were Aboriginal from remote communities. One of the deaths was still being processed by the RG's office and was kept in a separate file of out station, mainly Aboriginal communities. It was acknowledged by the staff at the RG's office that these deaths can take years to process, the file was checked for any other perinatal or infants deaths not yet recorded in the register.

This study has revealed one unrecorded death for the 1991 birth cohort and 3 unrecorded deaths in 1992. The reasons for the omissions are clear in two cases and unclear in a further two cases. Possibly human error, in the transferring of data from the card system to the death file.

Two-by-two table summarising data from validation of the perinatal and infant mortality in 1991

	Dead	Not Dead	Total
Recorded dead	378	0	378
Recorded alive	1	24,252	24,253
Total	379	24,252	24,631

Two-by-two table summarising data from the validation of the perinatal and infant mortality in 1992

	Dead	Not Dead	Total
Recorded dead	330	0	330
Recorded alive	3	24,994	24,997
Total	333	24,994	25,237

This results in a sensitivity of 99.7% for 1991 and of 99.1% for 1992. The predictive positive value (PPV) for 1991 and 1992 is 100% with no babies or infants recorded dead who were still alive.

### Comparison with other data collections

An acknowledged way to approach the validation of a data base is to compare the results it produces with other similar data collections.<sup>3</sup> Most countries in the world collect information on perinatal and infant mortality. There are a variety of inclusion criteria used by each state and country to determine these rates and it is important to standardise the criteria before comparison with others (Appendix I). By convention only those pregnancies which resulted in a final product of conception having a birthweight equal to or greater than 500grams are used for national comparisons<sup>4</sup>. The rates produced by the MNS death files were compared with rates in other states in Australia and in New Zealand.<sup>5,6,7,8,9</sup> There is a good agreement in the rates of perinatal and infant mortality in all the other states apart for the Northern Territory which has used a lower cut off for inclusion into the registry\* and has a young mobile population with many of the non Aboriginal women moving interstate to have their babies and a higher proportion of isolated Aboriginal women with high risk pregnancies. This suggests that the register represents the true number of perinatal and infant deaths in Western Australia. (Table 1)

**Table 1. Rates of perinatal and infant mortality by Country or State**

Country/State	CBR	Perinatal Mortality Rate/1000 births			Infant Mortality Rate per 1000 live births		
		A	NA	Total	A	NA	Total
New Zealand				8.1			8.4
Northern Terr.	20.3	32.2 *	5.6*	21.23*	26.9 *	8.5*	14.7*
Victoria	14.6			9.2			5.5
South Australia	13.5	34.3*	9.4*	8.1			5.4
W.Australia	15.2	16.2	7.3	8.1	19.2		5.8

\* This data includes all births of at least 400g birthweight/or 20 weeks gestation  
A-Aboriginal, NA- Non-Aboriginal

### Discussion

The value of a register is dependant on the completeness and accuracy of the information it contains and on the way the information is used. The MNS death files provides a valuable database used to monitor the rates of perinatal and infant mortality and as an indicator of health in Western Australia. It provides a method of follow up for later investigations of perinatal and infant deaths, contributes to two other registers, and is accessed by a number of individuals and organisations to provide valuable background data for research.

This evaluation revealed 4 deaths not recorded in the final register, and identified a file in the RG's office that could result in inaccuracies if not referred to regularly. Annual checking of the post mortem reports at the forensic pathology department of Sir Charles Gairdner Hospital would also provide a valuable check on the data.

Despite these omissions at present the register has a high sensitivity and predictive positive value.

### References:

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