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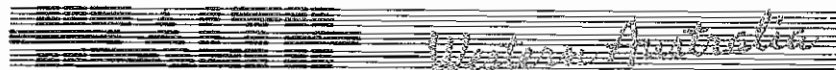
**THE 1993 WESTERN AUSTRALIAN  
BIRTH COHORT**

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

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

**DECEMBER 1995**

**Statistical Series / 42  
Health Department of  
Western Australia  
Perth**



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## TABLE OF CONTENTS

	<u>Page</u>
SUMMARY .....	iii
ACKNOWLEDGEMENTS .....	iv
TABLES.....	v
FIGURES.....	viii
1. INTRODUCTION .....	1
2. DATA COLLECTION.....	1
3. DEFINITIONS .....	2
4. BIRTHS IN WESTERN AUSTRALIA IN 1993 .....	5
4.1 Birth Incidence .....	5
4.2 Place of Birth .....	5
4.3 Maternal Place of Residence .....	5
4.4 Crude Birth Rate .....	5
4.5 Condition of Births .....	5
4.6 Maternal Age .....	5
5. STILLBIRTHS, NEONATAL AND POST-NEONATAL MORTALITY .....	10
IN WESTERN AUSTRALIA IN THE 1993 BIRTH COHORT	
5.1 <u>Stillbirths</u> .....	10
5.1.1 Maternal Race and Maternal Age .....	10
5.1.2 Maternal Race and Parity .....	11
5.1.3 Maternal Race, Condition and Plurality .....	11
5.1.4 Maternal Race and Birthweight .....	13
5.1.5 Causes of Stillbirths .....	13
5.2 <u>Neonatal Deaths</u> .....	14
5.2.1 Maternal Race and Maternal Age .....	14
5.2.2 Maternal Race and Parity .....	15
5.2.3 Maternal Race and Plurality .....	16
5.2.4 Maternal Race and Birthweight .....	16
5.2.5 Maternal Race and Age at Neonatal Death.....	17
5.2.6 Causes of Neonatal Deaths .....	17
5.3 <u>Post-Neonatal Deaths</u> .....	19
5.3.1 Maternal Race and Maternal Age .....	21
5.3.2 Maternal Race and Conjugal State.....	21
5.3.3 Maternal Race and Parity .....	22
5.3.4 Maternal Race and Plurality .....	22
5.3.5 Maternal Race and Birthweight .....	23
5.3.6 Causes of Post-Neonatal Death.....	23
5.3.7 Seasonal Incidence of Post Neonatal Deaths.....	24

## **TABLE OF CONTENTS** (Continued)

	<b><u>Page</u></b>
6. PERINATAL MORTALITY IN WESTERN AUSTRALIA IN THE 1993 BIRTH COHORT .....	25
6.1 Perinatal Mortality .....	25
6.2 Maternal Race and Maternal Age .....	25
6.3 Maternal Race and Parity .....	26
6.4 Maternal Race and Birthweight .....	27
6.5 Maternal Race and Babies' Sex .....	27
6.6 Maternal Race and Conjugal State .....	28
7. INFANT MORTALITY IN WESTERN AUSTRALIA IN THE 1993 BIRTH COHORT .....	29
7.1 Infant Deaths .....	29
7.2 Maternal Race and Maternal Age .....	29
7.3 Maternal Race and Conjugal State .....	30
7.4 Maternal Race and Parity .....	30
7.5 Maternal Race and Plurality .....	30
7.6 Maternal Race and Babies' Sex .....	31
7.7 Maternal Race and Birthweight .....	31
7.8 Maternal Race and Age at Infant Death .....	32
7.9 Causes of Infant Death .....	33
8. TRENDS IN BIRTHS, PERINATAL AND INFANT MORTALITY IN WESTERN AUSTRALIA IN 1980-1993 .....	35
8.1 Crude Birth Rates and Total Births, 1980-1993 .....	35
8.2	
8.2.1 Stillbirths, Neonatal and Perinatal Mortality .....	35
8.2.2 Neonatal Mortality .....	39
8.2.3 Perinatal Mortality .....	39
8.3 Neonatal, Post-neonatal and Infant Mortality, 1980-1993 .....	39
REFERENCES .....	42
APPENDICES	
A. Notification of Case Attended Form 2 .....	43
B. Medical Certificate of Cause of Perinatal Death .....	44
C. Medical Certificate of Cause of Death .....	45

## SUMMARY

The Midwives' Notification System of Western Australia identified 25266 births of  $\geq 500$  grams birthweight to 24916 women during 1993. Of these babies, 123 were stillborn and a further 114 liveborn babies died within the first twelve months (Tables 23 and 29).

Overall, the stillbirth rate was 4.9/1000 total births. Among babies born to Caucasian women the stillbirth rate was 4.4/1000, for babies of Aboriginal women 8.3/1000 and for babies of women of other races the rate was 8.0/1000 total births. The stillbirth rate of 4.9/1000 among singleton births was similar to that (4.3/1000) for multiple births (Table 6).

Of babies born to teenage women, 15 (10.0/1000) were stillborn (Table 4). Consideration of maternal parity showed a higher stillbirth rate for primiparous women (6.0/1000) than among babies of multiparous women (4.1/1000) (Table 5).

The causes of stillbirths were unexplained for 36 (29.3%) babies and the deaths of 23 (18.7%) babies were attributed to complications arising from extremely low birth weight ( $< 1000$  grams). Lethal congenital abnormalities were the cause of death for 22 (17.9%) stillbirths (Table 8).

There were 62 neonatal deaths, giving a neonatal mortality proportion of 2.5/1000 livebirths; for babies of Caucasian women the proportion was 2.2/1000, for babies of Aboriginal mothers 4.9/1000 and for babies of women of other races 3.5/1000 (Tables 3 and 10).

Post neonatal deaths numbered 52 (2.1/1000 livebirths) babies (Table 16). Twenty one (40.4%) of these were attributed to Sudden Infant Death Syndrome and 12 (23.1%) to lethal congenital malformations (Table 21).

The perinatal mortality rate was 7.3/1000 total births. For babies of Caucasian women the rate was 6.6/1000, for babies of Aboriginal women 13.2/1000 and babies of women of other races 11.4/1000. Perinatal deaths amongst babies born to Aboriginal teenage mothers (15.1/1000) was similar to the rate for babies born to Caucasian women in the same age group (15.3/1000) (Table 24). The rate of perinatal mortality among babies of single women and of babies of separated, divorced or widowed women (9.9/1000) was noticeably higher than the rate (7.0/1000) for babies of women reported to be socially supported by a male partner (Table 28).

Infant deaths numbered 114 and included 62 neonatal deaths and 52 post neonatal deaths. These numbers provide an overall infant death rate of 4.5/1000 livebirths (Table 37).

Among babies of Aboriginal women the infant mortality rate (14.0/1000) was more than three times the overall rate (4.5/1000). The fraction of infant deaths attributed to Sudden Infant Death Syndrome among babies of Aboriginal women (30.0%) was greater than the overall fraction of 20.2% (Table 36).

The major causes of infant death remain lethal congenital malformation (35.1%), Sudden Infant Death Syndrome (20.2%) and disorders related to low birthweight (25.4%) (Table 36).

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

Perinatal and infant mortality rates were 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 14.0/1000 in 1993, it still remains more than three times that of the overall infant mortality rate (4.5/1000) of livebirths in 1993 (Table 41).

## **ACKNOWLEDGEMENTS**

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## **TABLES**

	<b><u>Page</u></b>
<b>BIRTHS</b>	
1. Maternal Race and Condition of Births in Western Australia in 1993.....	4
2. Livebirths and Total Births by Health Authority of Maternal Residence and Maternal Race in Western Australia in 1993.....	7
<b>STILLBIRTHS, NEONATAL AND POST-NEONATAL MORTALITY</b>	
3. Stillbirths, Neonatal and Perinatal Deaths by Health Authority of Maternal Residence and Maternal Race in Western Australia in 1993.....	9
4. Stillbirths by Maternal Race and Maternal Age in Western Australia in 1993.....	10
5. Stillbirths by Maternal Race and Parity in Western Australia in 1993.....	11
6. Condition, Plurality and Maternal Race of Births in Western Australia in 1993.....	11
7. Stillbirth Proportion by Maternal Race and Birthweight Distribution in Western Australia in 1993.....	13
8. Cause of Stillbirth by Maternal Race in Western Australia in 1993.....	14
9. Neonatal Deaths by Maternal Race and Maternal Age in Western Australia in 1993.....	15
10. Neonatal Deaths by Maternal Race and Parity in Western Australia in 1993.....	15
11. Neonatal Deaths by Maternal Race and Plurality in Western Australia in 1993.....	16
12. Neonatal Mortality by Maternal Race and Birthweight Distribution in Western Australia in 1993.....	16
13. Age at Neonatal Death by Maternal Race in Western Australia in 1993.....	17
14. Cause of Neonatal Death by Maternal Race in Western Australia in 1993.....	19
15. Post-Neonatal and Infant Mortality by Health Authority of Maternal Residence and Maternal Race in Western Australia in 1993.....	20
16. Post-Neonatal Deaths by Maternal Race and Maternal Age in Western Australia in 1993.....	21
17. Post-Neonatal Deaths by Maternal Race and Conjugal State in Western Australia in 1993.....	21
18. Post-Neonatal Deaths by Maternal Race and Parity in Western Australia in 1993.....	22

**TABLES (Continued)**

	<b><u>Page</u></b>
19. Post-Neonatal Deaths by Maternal Race and Plurality in Western Australia in 1993 .....	22
20. Post-Neonatal Mortality by Maternal Race and Birthweight Distribution in Western Australia in 1993 .....	23
21. Cause of Post-Neonatal Death by Maternal Race in Western Australia in 1993 .....	24
22. Cause of Post-Neonatal Death by Seasonal Incidence in Western Australia in 1993 .....	24

**PERINATAL MORTALITY**

23. Stillbirths, Neonatal and Perinatal Mortality by Maternal Race in Western Australia in 1993 .....	25
24. Perinatal Deaths by Maternal Race and Maternal Age in Western Australia in 1993 .....	26
25. Perinatal Deaths by Maternal Race and Parity in Western Australia in 1993 .....	26
26. Perinatal Deaths by Maternal Race and Birthweight Distribution in Western Australia in 1993 .....	27
27. Perinatal Deaths by Maternal Race and Sex in Western Australia in 1993 .....	28
28. Perinatal Deaths by Maternal Race and Conjugal State in Western Australia in 1993 .....	28

**INFANT MORTALITY**

29. Infant Deaths by Maternal Race and Maternal Age in Western Australia in 1993 .....	29
30. Infant Deaths by Maternal Race and Conjugal State in Western Australia in 1993 .....	30
31. Infant Deaths by Maternal Race and Parity in Western Australia in 1993 .....	30
32. Infant Deaths by Maternal Race and Plurality in Western Australia in 1993 .....	31
33. Infant Deaths by Maternal Race and Sex in Western Australia in 1993 .....	31
34. Infant Mortality by Maternal Race and Birthweight Distribution in Western Australia in 1993 .....	32
35. Infant Deaths by Maternal Race and Age at Death in Western Australia in 1993 .....	32



## **TABLES (Continued)**

	<b><u>Page</u></b>
36. Cause of Infant Deaths and Maternal Race in Western Australia in 1993.....	33
37. Neonatal, Post-Neonatal and Infant Mortality by Maternal Race in Western Australia in 1993. ....	33
38. Perinatal and Infant Mortality of Maternal Age, Plurality and Sex in Western Australia in 1993. ....	34

## **BIRTH TRENDS**

39. Crude Birth Rates for Aboriginal and Non-Aboriginal Western Australian Births, 1980-1993. ....	35
40. Stillbirths, Neonatal and Perinatal Mortality for Aboriginal and Non-Aboriginal Births in Western Australia, 1980-1993. ....	38
41. Neonatal, Post-Neonatal and Infant Mortality for Aboriginal and Non-Aboriginal Births in Western Australia, 1980-1993. ....	40

## FIGURES

	<u>Page</u>
I Crude Birth Rate, Perinatal and Infant Mortality by Health Authority of Maternal Residence in Western Australia in 1993. ....	6
II Stillbirths, Neonatal and Perinatal Mortality, Aboriginal and Non-Aboriginal, Western Australia, 1993. ....	8
III Birthweight Distribution of Stillbirths in Western Australia in 1993. ....	12
IV Birthweight Distribution of Neonatal Deaths in Western Australia in 1993. ....	12
V Neonatal, Post-Neonatal and Infant Mortality, Aboriginal and Non-Aboriginal, Western Australia, 1993. ....	18
VI Crude Birth Rates and Racial Grouping for Western Australian Births, 1980-1993. ....	36
VII Stillbirth Proportions and Racial Grouping of Births in Western Australia, 1980-1993. ....	37
VIII Perinatal Mortality and Racial Grouping for Western Australian Births, 1980-1993. ....	37
IX Neonatal Mortality, Racial Grouping for Western Australian Births 1980-1993. ....	41
X Post-Neonatal Mortality and Racial Grouping for Western Australian Births 1980-1993. ....	41
XI Infant Mortality and Racial Grouping for Western Australian Births 1980-1993. ....	42

## **1. INTRODUCTION**

This report is the tenth 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 1993 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 tenth 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.

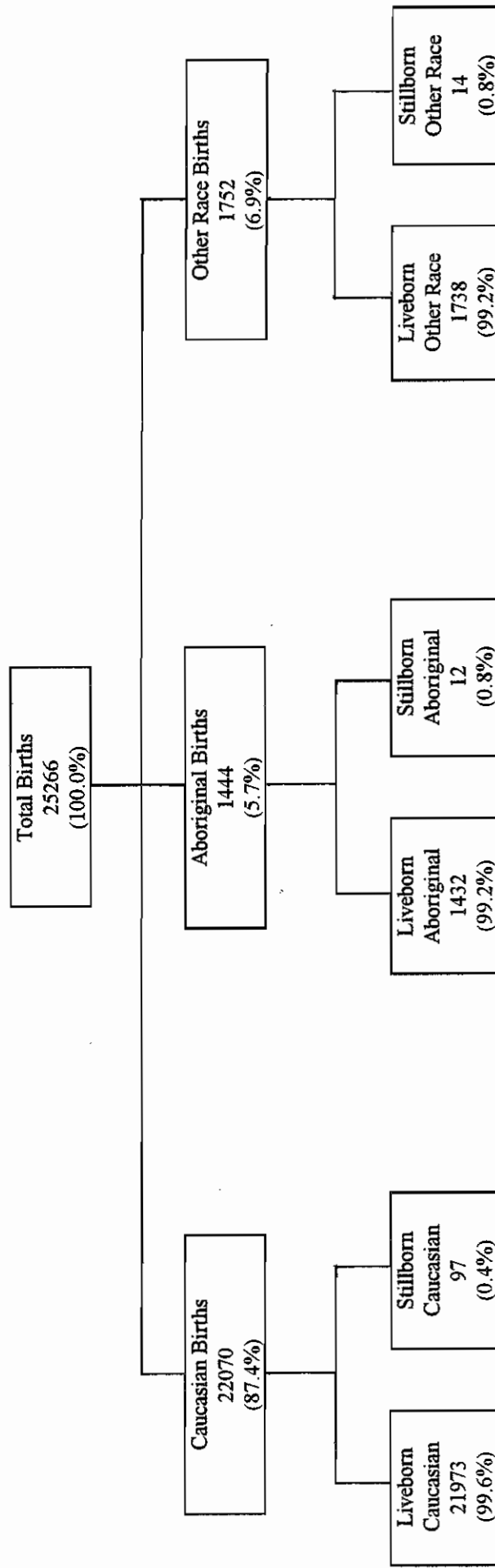
Aboriginal Includes persons of Australian-Aboriginal heritage (Australoid) or of mixed Aboriginal-caucasian heritage.

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 1993**



Excludes births less than 500 grams birthweight.

## **4. BIRTHS IN WESTERN AUSTRALIA IN 1993**

### **4.1 Births Incidence**

Midwives' forms received by this department indicate that 25266 babies were born to 24916 women during 1993. This report includes statistics only on those babies whose birthweight was equal to or greater than 500 grams.

Examination of births showed that 22070 (87.4%) were born to Caucasian women, 1444 (5.7%) to Aboriginal women and 1752 (6.9%) to women of other racial groups (Table 1).

### **4.2 Place of Birth**

The majority of births, 25085 (99.3%), occurred in hospital. Of these, births in metropolitan hospitals numbered 18882 (74.7%) and non-metropolitan hospital births were 6203 (24.6%).

There were 181 (0.7%) non hospital births including 79 (0.3%) born before arrival at hospital and 102 (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 17201 (69.0%) 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 15.0/1000 total population was identified for Western Australia during 1993. The area with the lowest crude birth rate (13.2/1000 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 123 (0.5%) babies were stillborn. Livebirths to Caucasian women numbered 21973 (99.6%) and stillbirths 97 (0.4%). Among Aboriginal women there were 1432 (99.2%) liveborn and 12 (0.8%) stillborn babies. For women of other races there were 1738 (99.2%) livebirths and 14 (0.8%) stillbirths (Table 1).

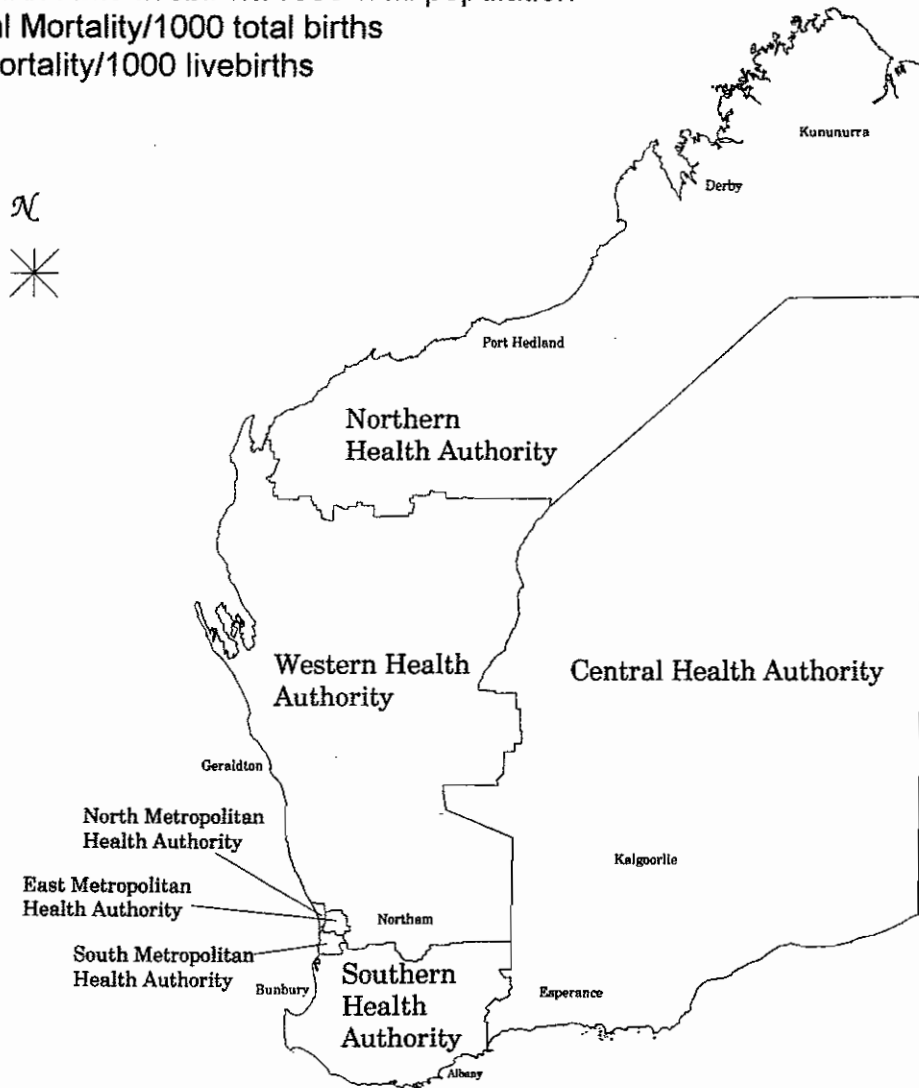
### **4.6 Maternal Age**

Consideration of maternal age shows that the highest percentage of women confined (33.7%), were in the 25 to 29 year age category. Women in their teenage years accounted for 6.0% of total confinements. Just over a quarter (27.7%) of Aboriginal women confined were teenagers. This contrasts with Caucasian women of whom 4.8% were teenagers and women of other races with 2.9% 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 1993**

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



Authority	Crude Birth Rate	Perinatal Mortality	Infant Mortality
Northern	20.7	8.6	7.2
Western	17.6	10.7	8.7
Central	20.5	10.0	5.5
Southern	14.8	6.0	2.7
North Metropolitan	13.2	6.8	4.3
East metropolitan	14.6	7.8	3.7
South Metropolitan	14.9	6.2	4.5
Total WA	15.0	7.3	4.5

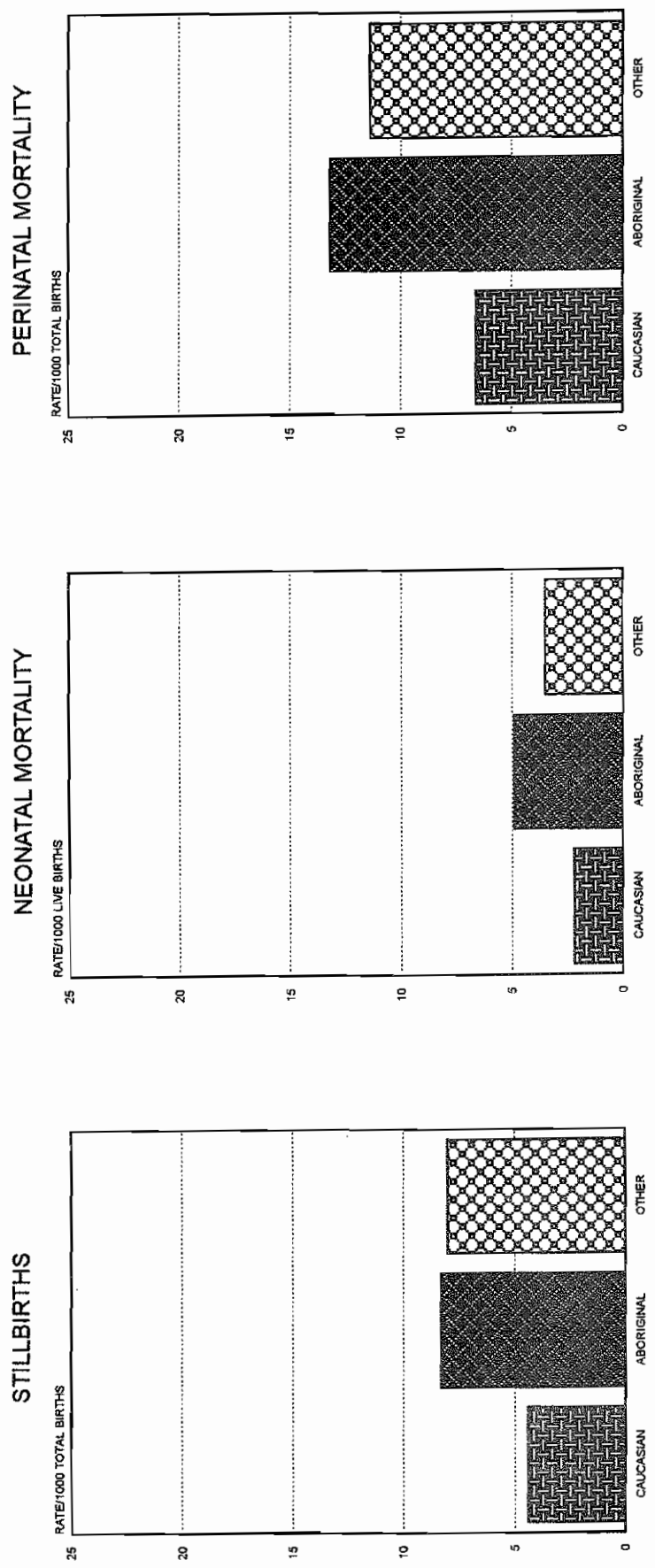


**TABLE 2: LIVEBIRTHS AND TOTAL BIRTHS BY HEALTH AUTHORITY OF MATERNAL RESIDENCE AND MATERNAL RACE IN WESTERN AUSTRALIA 1993**

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	4812	21.9	4828	21.9	123	8.6	124	8.6	471	32.6	474	27.1	5406	21.5	5426	21.5
East	4979	22.7	5003	22.7	199	13.9	201	13.9	539	37.3	544	31.1	5717	22.7	5748	22.7
South	5625	25.6	5648	25.6	152	10.6	155	10.7	466	32.3	470	26.8	6243	24.8	6273	24.8
<u>Non-Metropolitan</u>																
Northern	840	3.8	845	3.8	456	31.8	459	31.8	96	6.6	97	5.5	1392	5.5	1401	5.8
Western	1647	7.5	1655	7.5	246	17.2	247	17.1	56	3.9	56	3.2	1949	7.8	1958	7.7
Central	917	4.2	925	4.2	134	9.4	135	9.3	39	2.7	39	2.2	1090	4.3	1099	4.3
Southern	3138	14.3	3151	14.3	117	8.2	118	8.2	66	4.6	67	3.8	3321	13.2	3336	13.2
Outside WA	15	0.1	15	0.1	5	0.3	5	0.3	5	0.3	5	0.3	25	0.1	25	0.1
<b>TOTAL</b>	<b>21973</b>	<b>100.0</b>	<b>22070</b>	<b>100.0</b>	<b>1432</b>	<b>100.0</b>	<b>1444</b>	<b>100.0</b>	<b>1738</b>	<b>100.0</b>	<b>1752</b>	<b>100.0</b>	<b>25143</b>	<b>100.0</b>	<b>25266</b>	<b>100.0</b>

Excludes births <500 grams birthweight.

**FIGURE II**  
**STILLBIRTHS, NEONATAL AND PERINATAL MORTALITY,**  
**ABORIGINAL AND NON-ABORIGINAL,**  
**WESTERN AUSTRALIA, 1993**



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 1993

Health Authorities of Maternal Residence	Maternal Race																								
	Caucasian						Aboriginal						Other						Total						
	Stillbirths		Perinatal		Stillbirths		Perinatal		Stillbirths		Perinatal		Stillbirths		Perinatal		Stillbirths		Perinatal		Stillbirths		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	
Metropolitan	16	3.3	15	3.1	31	6.4	1	(8.1)	3	(6.3)	1	(2.1)	4	(8.4)	20	3.7	17	3.1	37	6.8	37	6.8	37	6.8	
North	24	4.8	10	2.0	34	6.8	1	(5.0)	5	9.2	3	(5.6)	8	14.7	31	5.4	14	2.4	45	7.8	45	7.8	45	7.8	
East	23	4.1	8	1.4	31	5.5	-	-	4	(8.5)	1	(2.1)	5	10.6	30	4.7	9	1.4	39	6.2	39	6.2	39	6.2	
South	5	5.9	1	(1.2)	6	7.1	2	(4.4)	1	(10.3)	-	-	1	(10.3)	9	6.4	3	(2.2)	12	8.6	12	8.6	12	8.6	
Non Metropolitan	8	4.8	9	5.5	17	10.3	2	(8.1)	-	-	1	(17.9)	1	(17.9)	9	4.6	12	6.2	21	10.7	21	10.7	21	10.7	
Northern	8	8.6	1	(1.1)	9	9.7	1	(7.5)	-	-	-	-	-	-	9	8.2	2	(1.8)	11	10.0	11	10.0	11	10.0	
Western	13	4.1	5	4.1	18	5.7	-	-	1	(8.5)	-	-	1	(14.9)	15	4.5	5	1.5	20	6.0	20	6.0	20	6.0	
Central	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Southern	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Outside WA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	97	4.4	49	2.2	146	6.6	7	4.9	19	13.2	14	8.0	6	3.5	20	11.4	123	4.9	62	2.5	185	7.3	185	7.3	

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 1993 BIRTH COHORT

### 5.1 Stillbirths

There were 123 stillbirths in Western Australia during the 1993 year which were equal to or greater than 500 grams birthweight. The stillbirth rate for the State was 4.9/1000 total births (Table 4).

The stillbirth rate for babies of Aboriginal women (8.3/1000) was high compared to that for babies of Caucasian women (4.4/1000) and for babies of women of other racial groups (8.0/1000).

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 10.0/1000 and for babies of Aboriginal teenage mothers the rate was 7.5/1000 total births. Among women aged 25-29 years, the group with the highest number of births overall, the stillbirth rate was 3.9/1000 total births. Among babies of women aged 35 years and over, 12 (4.2/1000) stillbirths occurred. (Table 4).

TABLE 4: STILLBIRTHS BY MATERNAL RACE AND MATERNAL AGE IN WESTERN AUSTRALIA IN 1993

Maternal Age	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Total	Rate	No.	Total	Rate	No.	Total	Rate	No.	Total	Rate
≤15	1	27	37.0	-	40	-	-	-	-	1	67	14.9
16	2	88	22.7	2	61	32.8	-	3	-	4	152	26.3
17	1	192	5.2	-	88	-	-	7	-	1	287	3.5
18	3	312	9.6	-	101	-	-	14	-	3	427	7.0
19	5	425	11.8	1	108	9.3	-	27	-	6	560	10.7
≤19	12	1044	11.5	3	398	7.5	-	51	-	15	1493	10.0
20-24	24	4293	5.6	2	538	3.7	3	256	11.7	29	5087	5.7
25-29	29	7684	3.8	3	296	10.1	1	530	1.9	33	8510	3.9
30-34	24	6574	3.7	3	159	18.9	7	586	11.7	34	7319	4.6
35-39	7	2169	3.2	1	45	22.2	2	282	7.1	10	2496	4.0
40-44	1	299	3.3	-	8	-	1	47	21.3	2	354	5.6
≥45	-	7	-	-	-	-	-	-	-	-	7	-
<b>TOTAL</b>	<b>97</b>	<b>22070</b>	<b>4.4</b>	<b>12</b>	<b>1444</b>	<b>8.3</b>	<b>14</b>	<b>1752</b>	<b>8.0</b>	<b>123</b>	<b>25266</b>	<b>4.9</b>

Excludes births <500 grams birthweight.

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

### 5.1.2 Maternal Race and Parity

Fifty nine (6.0/100) stillborn babies were to primiparous women compared with 51 (5.2/1000) in the 1992 birth cohort. For babies of women whose parity was three or more, the stillbirth rate was 19 (7.2/1000) in 1993. (Table 5).

**TABLE 5: STILLBIRTHS BY MATERNAL RACE AND PARITY IN WESTERN AUSTRALIA IN 1993**

Parity	Caucasian			Aboriginal			Other			Total		
	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate
0	52	8666	6.0	2	414	4.8	5	694	7.2	59	9774	6.0
1-2	33	11339	2.9	4	616	6.5	8	883	9.1	45	12838	3.5
3-4	10	1807	5.5	4	291	13.7	1	157	6.4	15	2255	6.7
≥5	2	258	7.8	2	123	16.3	-	18	-	4	399	10.0
<b>TOTAL</b>	<b>97</b>	<b>22070</b>	<b>4.4</b>	<b>12</b>	<b>1444</b>	<b>8.3</b>	<b>14</b>	<b>1752</b>	<b>8.0</b>	<b>123</b>	<b>25266</b>	<b>4.9</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 (4.3/1000) compares to a 4.9/1000 stillbirth rate for all singleton births. For singleton births the rate of stillbirths among babies of Aboriginal women (8.5/1000) is higher than for total births (4.9/1000) (Table 6).

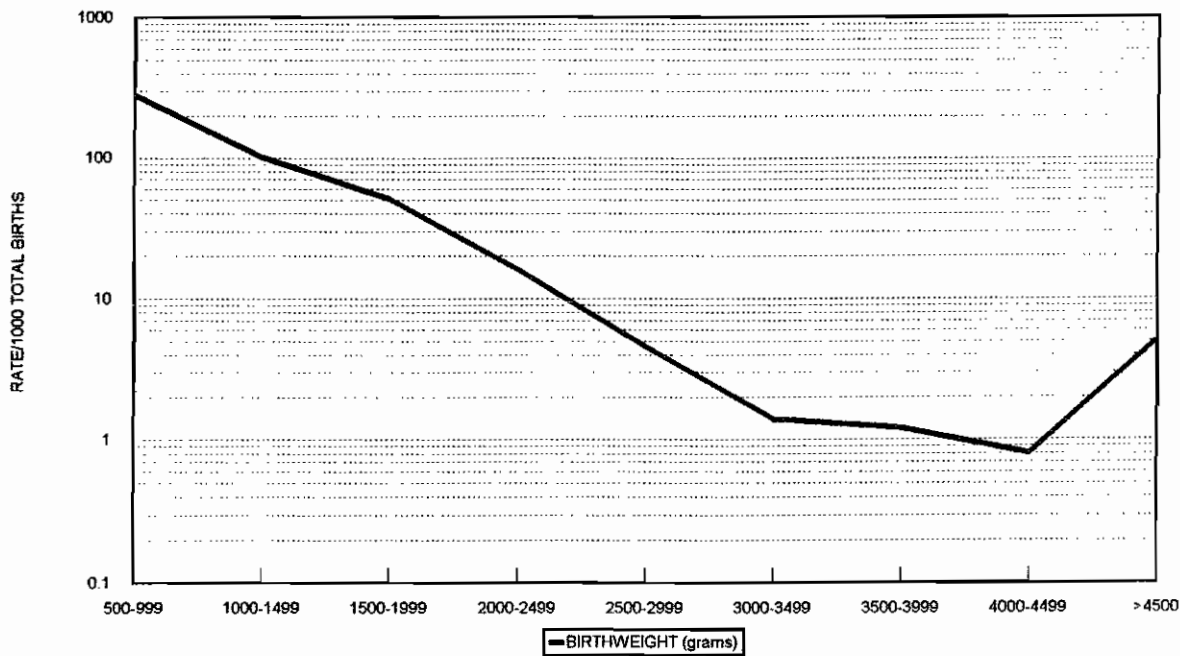
**TABLE 6: CONDITION, PLURALITY AND MATERNAL RACE OF BIRTHS IN WESTERN AUSTRALIA 1993**

		Plurality		
Maternal Race		Singleton	Multiple	Total
Caucasian	Total Births	21432	638	22070
	Live Births	21338	635	21973
	Stillbirths	94	3	97
	Rate	4.4	4.7	4.4
Aboriginal	Total Births	1416	28	1444
	Live Births	1404	28	1432
	Stillbirths	12	-	12
	Rate	8.5	-	8.3
Other	Total Births	1726	26	1752
	Live Births	1712	26	1738
	Stillbirths	14	-	14
	Rate	8.1	-	8.0
Total	Total Births	24574	692	25266
	Live Births	24454	689	25143
	Stillbirths	120	3	123
	Rate	4.9	4.3	4.9

Excludes births <500 grams birthweight.

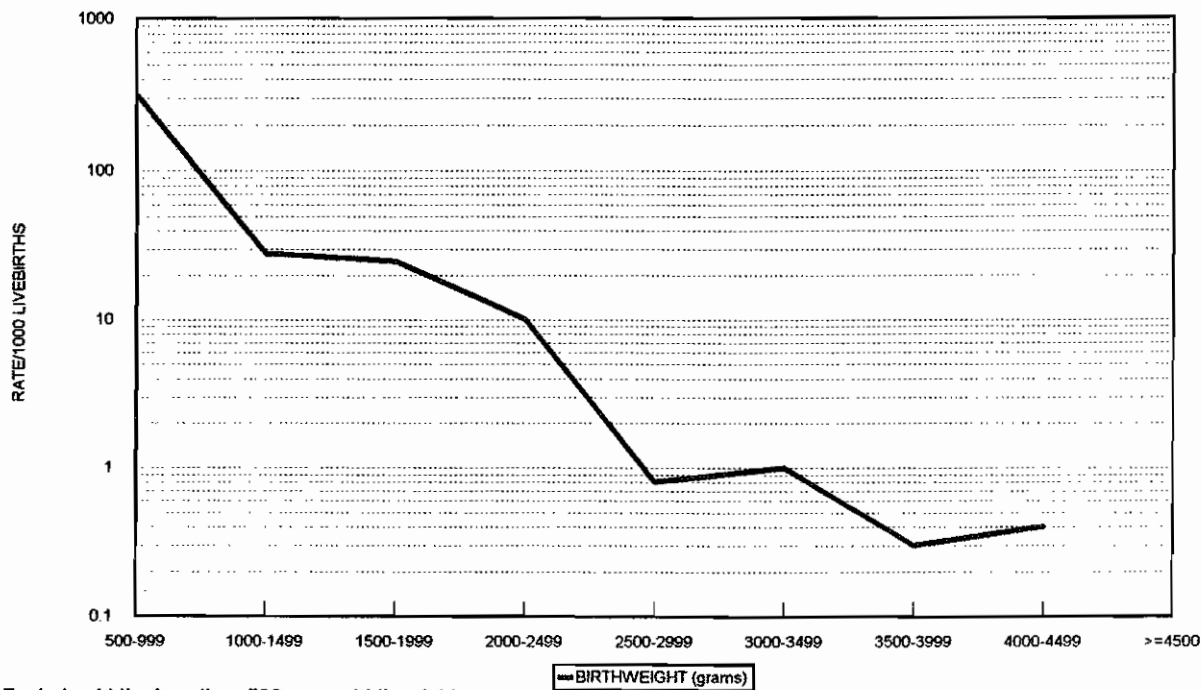
<sup>1</sup> Rate/1000 total births.

**FIGURE III  
BIRTHWEIGHT DISTRIBUTION OF STILLBIRTHS  
IN WESTERN AUSTRALIA IN 1993**



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

**FIGURE IV  
BIRTHWEIGHT DISTRIBUTION OF NEONATAL DEATHS  
IN WESTERN AUSTRALIA IN 1993**



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 50.1/1000. The lowest stillbirth rate (1.2/1000) was for babies with birthweight 3500-3999 grams. (Table 7 and Figure III).

**TABLE 7 : STILLBIRTH PROPORTION BY MATERNAL RACE AND BIRTHWEIGHT DISTRIBUTION IN WESTERN AUSTRALIA IN 1993**

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	28	91	307.7	3	18	(166.7)	1	5	(200.0)	32	114	280.7
1000-1499	14	111	126.1	-	32	-	2	16	(125.0)	16	159	100.6
1500-1999	9	248	36.6	2	28	(71.4)	4	20	(200.0)	15	296	50.7
2000-2499	14	834	16.8	1	101	(9.9)	1	73	(13.7)	16	1008	15.9
<2500	65	1284	50.6	6	179	33.5	8	114	70.2	79	1577	50.1
2500-2999	12	3207	3.7	3	338	(8.9)	3	388	(7.7)	18	3933	4.6
3000-3499	11	8173	1.3	1	516	(1.9)	1	721	(1.4)	13	9410	1.4
3500-3999	6	6845	0.9	1	305	(3.3)	2	400	(5.0)	9	7550	1.2
4000-4499	1	2203	(0.5)	1	91	(11.0)	-	113	-	2	2407	(0.8)
≥4500	2	358	(5.6)	-	15	-	-	16	-	2	389	(5.1)
<b>TOTAL</b>	<b>97</b>	<b>22070</b>	<b>4.4</b>	<b>12</b>	<b>1444</b>	<b>8.3</b>	<b>14</b>	<b>1752</b>	<b>8.0</b>	<b>123</b>	<b>25266</b>	<b>4.9</b>

Excludes births <500 grams birthweight.

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

( ) Where n<5 rate has been bracketed.

#### 5.1.5 Causes of Stillbirth

There were 36 (29.3%) stillborn babies with cause unknown and 23 (18.7%) stillbirths with extremely low birthweight. Lethal congenital malformations resulted in 22 (17.9%) stillbirths and a further 31 (25.2%) stillbirths resulted from complications of the placenta and/or cord (Table 8).

The high percentage of unexplained stillbirths may be reduced if autopsies were performed on more babies. Of the 123 stillborn babies, it is known that 86 (69.9%) had autopsies and 29 (23.6%) did not. It is not known whether the remaining 8 (6.5%) stillborn babies underwent autopsy.

Ninety six (78.0%) stillbirths were recorded as antepartum deaths, 16 (13.0%) were recorded as intrapartum deaths and for 11 (8.9%), the time of death was unknown.

**TABLE 8 : CAUSE OF STILLBIRTH BY MATERNAL RACE IN WESTERN AUSTRALIA IN 1993**

Cause of Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other		1993	
	No.	%	No.	%	No.	%	No.	%
Lethal Congenital Malformation	19	19.6	1	8.3	2	14.3	22	17.9
Extremely Low Birth Weight (<1000g)*	19	19.6	3	25.0	1	7.1	23	18.7
Unknown	28	28.9	2	16.7	6	42.9	36	29.3
Maternal: Obstetric	2	2.1	3	25.0	1	7.1	6	4.9
Maternal: Medical	3	3.1	2	16.7	-	-	5	4.1
Maternal: Hypertension	-	-	-	-	-	-	-	-
Placenta and Cord	26	26.8	1	8.3	4	28.6	31	25.2
Other	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>97</b>	<b>100.0</b>	<b>12</b>	<b>100.0</b>	<b>14</b>	<b>100.0</b>	<b>123</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 62 neonatal deaths among the 25143 livebirths in 1993<sup>1</sup>. The overall neonatal mortality proportion was 2.5/1000 livebirths. For babies of Aboriginal women neonatal mortality was 4.9/1000 livebirths which is higher than for babies of Caucasian women (2.2/1000) and the rate for babies of women of other races (3.5/1000) (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 62 liveborn babies who died within the first 28 days of life, 7 (4.7/1000) were born to teenage mothers. In the age group where the highest number of births occurred (25-29 years) the neonatal mortality rate was 2.1/1000. The rate of neonatal deaths among babies of Aboriginal mothers (4.9/1000) is higher than that for babies of Caucasian women (2.2/1000) (Table 9).



**TABLE 9 : NEONATAL DEATHS BY MATERNAL RACE AND MATERNAL AGE IN WESTERN AUSTRALIA IN 1993**

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	-	26	-	1	40	25.0	-	-	-	1	66	15.2
16	1	86	11.6	1	59	16.9	-	3	-	2	148	13.5
17	-	191	-	-	88	-	-	7	-	-	286	-
18	1	309	3.2	-	101	-	-	14	-	1	424	2.4
19	2	420	4.8	1	107	9.3	-	27	-	3	554	5.4
≤19	4	1032	3.9	3	395	7.6	-	51	-	7	1478	4.7
20-24	6	4269	1.4	2	536	3.7	1	253	4.0	9	5058	1.8
25-29	16	7655	2.1	1	293	3.4	1	529	1.9	18	8477	2.1
30-34	16	6550	2.4	1	156	6.4	3	579	5.2	20	7285	2.7
35-39	6	2162	2.8	-	44	-	1	280	3.6	7	2486	2.8
40-44	1	298	3.4	-	8	-	-	46	-	1	352	2.8
≥45	-	7	-	-	-	-	-	-	-	-	7	-
<b>TOTAL</b>	<b>49</b>	<b>21973</b>	<b>2.2</b>	<b>7</b>	<b>1432</b>	<b>4.9</b>	<b>6</b>	<b>1738</b>	<b>3.5</b>	<b>62</b>	<b>25143</b>	<b>2.5</b>

Excludes births <500 grams birthweight.

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

### 5.2.2 Maternal Race and Parity

Twenty three (1.8/1000) 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 (3.1/1000) (Table 10).

**TABLE 10 : NEONATAL DEATHS BY MATERNAL RACE AND PARITY IN WESTERN AUSTRALIA IN 1993**

Parity	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
0	25	8614	2.9	4	412	9.7	1	689	1.5	30	9715	3.1
1-2	19	11306	1.7	1	612	1.6	3	875	3.4	23	12793	1.8
3-4	4	1797	2.2	1	287	3.5	2	156	12.8	7	2240	3.1
≥5	1	256	3.9	1	121	8.3	-	18	-	2	395	5.1
<b>TOTAL</b>	<b>49</b>	<b>21973</b>	<b>2.2</b>	<b>7</b>	<b>1432</b>	<b>4.9</b>	<b>6</b>	<b>1738</b>	<b>3.5</b>	<b>62</b>	<b>25143</b>	<b>2.5</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 2.1/1000 livebirths for singleton births and 19.8/1000 livebirths for twin births. There were 4 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 1993**

Plurality	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
Singleton	38	21338	1.8	7	1404	5.0	6	1712	3.5	51	24454	2.1
Twins	7	599	11.7	-	28	-	-	26	-	7	653	10.7
Triplets	4	36	111.1	-	-	-	-	-	-	4	36	111.1
<b>TOTAL</b>	<b>49</b>	<b>21973</b>	<b>2.2</b>	<b>7</b>	<b>1432</b>	<b>4.9</b>	<b>6</b>	<b>1738</b>	<b>3.5</b>	<b>62</b>	<b>25143</b>	<b>2.5</b>

Excludes births < 500 grams birthweight.

<sup>1</sup> 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 (40.5/1000) is higher than for low birthweight neonatal deaths of babies born to Caucasian women (28.7/1000) (Table 12, Figure IV).

**TABLE 12: NEONATAL MORTALITY BY MATERNAL RACE AND BIRTHWEIGHT DISTRIBUTION IN WESTERN AUSTRALIA IN 1993**

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	20	63	317.5	4	15	(26.7)	2	4	(500.0)	26	82	317.1
1000-1499	3	97	(30.9)	1	32	(31.3)	-	14	-	4	143	(28.0)
1500-1999	6	239	)	-	26	-	1	16	(62.5)	7	281	24.9
2000-2499	6	820	25.1	2	100	(20.0)	2	72	(27.8)	10	992	10.1
			7.3									
<2500	35	1219	28.7	7	173	40.5	5	106	47.2	47	1498	31.4
2500-2999	3	3195	(0.9)	-	335	-	-	385	-	3	3915	(0.8)
3000-3499	8	8162	1.0	-	515	-	1	720	(1.4)	9	9397	1.0
3500-3999	2	6839	(0.3)	-	304	-	-	398	-	2	7541	(0.3)
4000-4499	1	2202	(0.5)	-	90	-	-	113	-	1	2405	(0.4)
≥4500	-	356	-	-	15	-	-	16	-	-	387	-
<b>TOTAL</b>	<b>49</b>	<b>21973</b>	<b>2.2</b>	<b>7</b>	<b>1432</b>	<b>4.9</b>	<b>6</b>	<b>1738</b>	<b>3.5</b>	<b>62</b>	<b>25143</b>	<b>2.5</b>

Excludes births <500 grams birthweight.

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

( ) Where n<5 rate has been bracketed.

### 5.2.5 Maternal Race and Age at Neonatal Death

The majority (79.0%) of neonatal deaths occurred in the first week of life, 59.6% occurring within the first 48 hours of life. Among babies of Aboriginal women 85.7% of neonatal deaths occurred in the first seven days of life compared with 79.6% of babies born to Caucasian women (Table 13).

**TABLE 13 : AGE AT NEONATAL DEATH BY MATERNAL RACE IN WESTERN AUSTRALIA IN 1993**

Age at Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other			
	No.	%	No.	%	No.	%	No.	%
< day 1	21	43.8	4	57.1	2	33.3	27	43.5
day 1	8	16.7	1	14.3	1	16.7	10	16.1
day 2	3	6.3	1	14.3	1	16.7	5	8.1
day 3	2	4.2	-	-	-	-	2	3.2
day 4	1	2.1	-	-	-	-	1	1.6
day 5	2	4.2	-	-	-	-	2	3.2
day 6	1	2.1	-	-	-	-	1	1.6
day 7	1	2.1	-	-	-	-	1	1.6
day ≤ 7	39	79.6	6	85.7	4	66.7	49	79.0
day 8 - 14	6	12.5	1	14.3	1	16.7	8	12.9
day 15 - 21	2	2.1	-	-	-	-	2	3.2
day 22 - 28	2	4.2	-	-	1	16.7	3	4.8
<b>TOTAL</b>	<b>49</b>	<b>100.0</b>	<b>7</b>	<b>100.0</b>	<b>6</b>	<b>100.0</b>	<b>62</b>	<b>100.0</b>

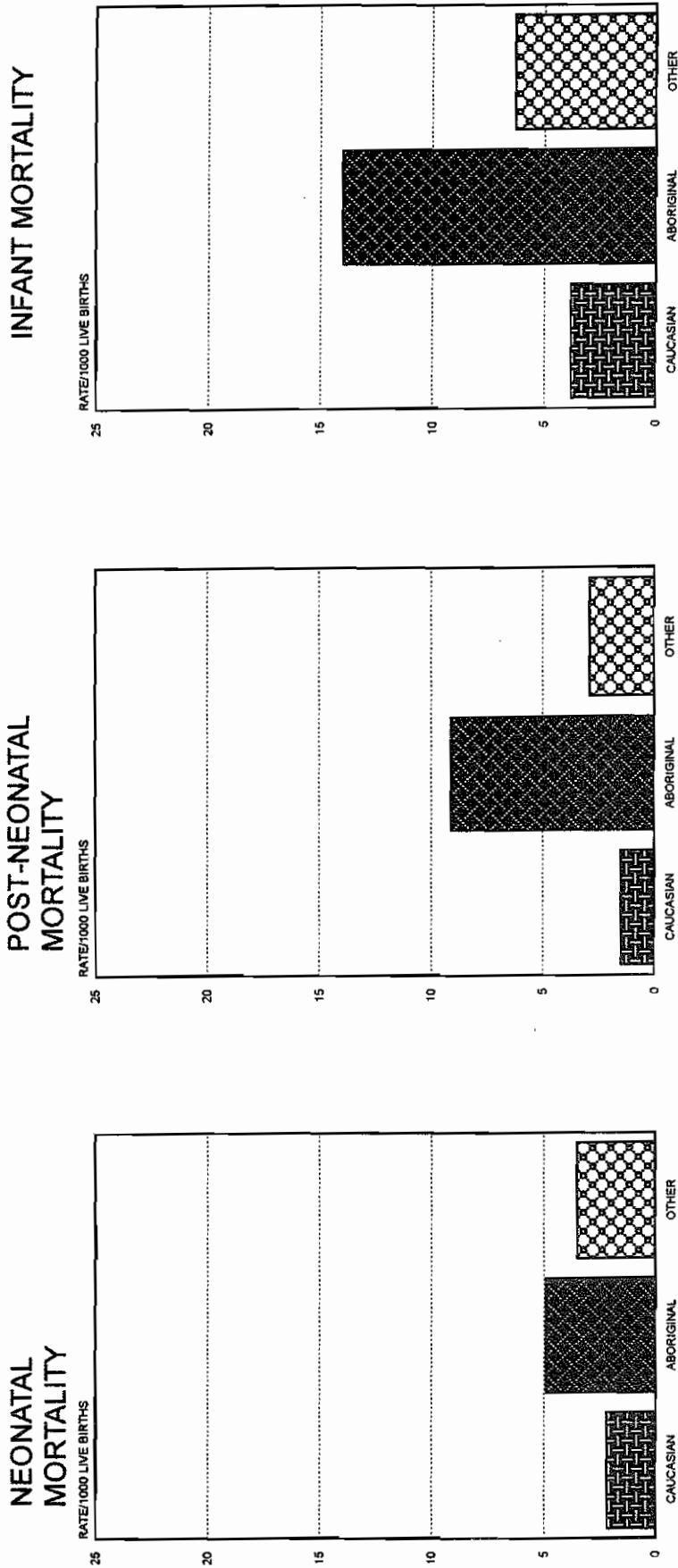
Excludes births <500 grams birthweight

### 5.2.6 Causes of Neonatal Deaths

Lethal congenital malformation in 28 babies (45.2%) and low birthweight for 27 babies (43.6%) were the main causes of neonatal death in the 1993 birth cohort (Table 14).

FIGURE V

NEONATAL, POST-NEONATAL AND INFANT MORTALITY,  
 ABORIGINAL AND NON-ABORIGINAL,  
 WESTERN AUSTRALIA, 1993



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 1993**

Cause of Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other			
	No.	%	No.	%	No.	%	No.	%
Lethal Congenital Malformation	23	46.9	1	14.3	4	66.7	28	45.2
Low Birth Weight (<2500g)	22	44.9	4	57.1	1	16.7	27	43.6
Asphyxia	1	2.0	-	-	1	16.7	2	3.2
Pregnancy conditions	1	2.0	-	-	-	-	1	1.6
Infections	-	-	-	-	-	-	-	-
Hydrops fetalis	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-
Sudden Infant Deaths	2	4.1	-	-	-	-	2	3.2
Unknown	-	-	2	28.6	-	-	2	3.2
<b>TOTAL</b>	<b>49</b>	<b>100.0</b>	<b>7</b>	<b>100.0</b>	<b>6</b>	<b>100.0</b>	<b>62</b>	<b>100.0</b>

Excludes births < 500 grams birthweight.

### 5.3 Post Neonatal Deaths

There were 52 post-neonatal deaths identified among the 1993 livebirths, providing a rate of 2.1/1000 livebirths (Table 15 and Table 37).

Post-neonatal mortality for babies of Aboriginal women was 9.1/1000 livebirths, six times the rate of 1.5/1000 for babies of Caucasian women. For babies born to women of other races the rate was 2.9/1000 (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 1993

Health Service Management Region of Maternal Residence	Maternal Race											
	Caucasian			Aboriginal			Other			Total		
	Post-Neonatal No.	Infant No.	Rate	Post-Neonatal No.	Infant No.	Rate	Post-Neonatal No.	Infant No.	Rate	Post-Neonatal No.	Infant No.	Rate
<u>Metropolitan</u>												
North	5	20	4.2	-	1	(8.1)	1	2	(4.2)	6	23	4.3
East	6	16	3.2	1	2	(10.0)	-	3	(5.6)	7	21	3.7
South	12	20	3.6	3	3	(19.7)	4	5	10.7	19	28	4.5
<u>Non-Metropolitan</u>												
Northern	2	3	(3.6)	5	7	15.4	-	-	-	7	10	7.2
Western	4	13	7.9	1	3	(12.2)	-	1	(17.9)	5	17	8.7
Central	2	3	(3.3)	2	3	(22.4)	-	-	-	4	6	5.5
Southern	3	8	2.5	1	1	(8.5)	-	-	-	4	9	2.7
<u>Outside WA</u>												
	-	-	-	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>34</b>	<b>73</b>	<b>3.3</b>	<b>13</b>	<b>20</b>	<b>14.0</b>	<b>5</b>	<b>11</b>	<b>6.3</b>	<b>52</b>	<b>114</b>	<b>4.5</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 2.7/1000 livebirths. Among babies born to Aboriginal women 2 (5.1/1000) post-neonatal deaths were to teenage mothers (Table 16).

**TABLE 16 :** POST-NEONATAL DEATHS BY MATERNAL RACE AND MATERNAL AGE IN WESTERN AUSTRALIA IN 1993

Maternal Age	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
≤15	-	26	-	-	40	-	-	-	-	-	66	-
16	-	86	-	-	59	-	-	3	-	-	148	-
17	-	191	-	-	88	-	-	7	-	-	286	-
18	1	309	3.2	-	101	-	-	14	-	1	424	2.4
19	1	420	2.4	2	107	18.7	-	27	-	3	554	5.4
≤19	2	1032	1.9	2	395	5.1	-	51	-	4	1478	2.7
20-24	10	4269	2.3	4	536	7.5	1	253	4.0	15	5058	3.0
25-29	8	7655	1.0	4	293	13.7	1	529	1.9	13	8477	1.5
30-34	10	6550	1.5	2	156	12.8	2	579	3.5	14	7285	1.9
35-39	4	2162	1.9	-	44	-	1	280	3.6	5	2486	2.0
40-44	-	298	-	1	8	125.0	-	46	-	1	352	2.8
≥45	-	7	-	-	-	-	-	-	-	-	7	-
<b>TOTAL</b>	<b>34</b>	<b>21973</b>	<b>1.5</b>	<b>13</b>	<b>1432</b>	<b>9.1</b>	<b>5</b>	<b>1738</b>	<b>2.9</b>	<b>52</b>	<b>25143</b>	<b>2.1</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 (4.0/1000) and babies of separated, divorced or widowed women (9.3/1000), than for women socially supported by a partner in a married or defacto relationship (1.8/1000) (Table 17).

**TABLE 17:** POST-NEONATAL DEATHS BY MATERNAL RACE AND CONJUGAL STATE IN WESTERN AUSTRALIA IN 1993

Conjugal State	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
Single	4	1863	2.1	6	524	11.5	-	95	-	10	2482	4.0
Married/defacto	29	19922	1.5	7	895	7.8	4	1629	2.5	40	22446	1.8
Other	1	188	5.3	-	13	-	1	14	71.4	2	215	9.3
<b>TOTAL</b>	<b>34</b>	<b>21973</b>	<b>1.5</b>	<b>13</b>	<b>1432</b>	<b>9.1</b>	<b>5</b>	<b>1738</b>	<b>2.9</b>	<b>52</b>	<b>25143</b>	<b>2.1</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 (26.9%) of babies who died in the post-neonatal period were born to primiparous mothers, and a further 55.8% were to women with a parity of 1-2. The rates for these groups were 1.4/1000 for primiparous women, 2.3/1000 for women with parity 1-2, 3.1/1000 for women with parity 3-4 and 5.1/1000 for women with parity of 5 or more. (Table 18).

**TABLE 18 :** POST-NEONATAL DEATHS BY MATERNAL RACE AND PARITY IN WESTERN AUSTRALIA IN 1993

Parity	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
0	10	8614	1.2	3	412	7.3	1	689	1.5	14	9715	1.4
1-2	19	11306	1.7	6	612	9.8	4	875	4.6	29	12793	2.3
3-4	5	1797	2.8	2	287	7.0	-	156	-	7	2240	3.1
≥5	-	256	-	2	121	16.5	-	18	-	2	395	5.1
<b>TOTAL</b>	<b>34</b>	<b>21973</b>	<b>1.5</b>	<b>13</b>	<b>1432</b>	<b>9.1</b>	<b>5</b>	<b>1738</b>	<b>2.9</b>	<b>52</b>	<b>25143</b>	<b>2.1</b>

Excludes births < 500 grams birthweight.

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

### 5.3.4 Maternal Race and Plurality

Examination of the 52 post-neonatal deaths in 1993 by plurality revealed that for singleton births the rate was 2.0/1000 and for multiple births the rate was 10.3/1000 livebirths. Among twin babies the post-neonatal death rate was 8.5/1000 (Table 19).

**TABLE 19:** POST-NEONATAL DEATHS BY MATERNAL RACE AND PLURALITY IN WESTERN AUSTRALIA IN 1993

Plurality	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
Singleton	30	21338	1.4	13	1404	9.2	5	1712	2.9	48	24454	2.0
Twins	3	599	5.0	-	28	-	-	26	-	3	353	8.5
Triplets	1	36	27.8	-	-	-	-	-	-	1	36	27.8
<b>TOTAL</b>	<b>34</b>	<b>21973</b>	<b>1.5</b>	<b>13</b>	<b>1432</b>	<b>9.1</b>	<b>5</b>	<b>1738</b>	<b>2.9</b>	<b>52</b>	<b>25143</b>	<b>2.1</b>

Excludes births < 500 grams birthweight.

<sup>1</sup> 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 (23.1/1000) was higher than the rate for low birthweight babies of Caucasian women (8.2/1000) (Table 20).

**TABLE 20: POST-NEONATAL MORTALITY BY MATERNAL RACE AND BIRTHWEIGHT DISTRIBUTION IN WESTERN AUSTRALIA IN 1993**

Birthweight (grams)	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
500-999	4	63	(63.5)	-	15	-	-	4	-	4	82	(48.8)
1000-1499	-	97	-	1	32	(31.3)	1	14	(71.4)	2	143	(14.0)
1500-1999	2	239	(8.4)	2	26	(76.9)	-	16	-	4	281	(14.2)
2000-2499	4	820	(4.9)	1	100	(10.0)	-	72	-	5	992	5.0
<2500	10	1219	8.2	4	173	(23.1)	1	106	(9.4)	15	1498	10.0
2500-2999	4	3195	(1.3)	3	335	(9.0)	-	385	-	7	3915	1.8
3000-3499	13	8162	1.6	5	515	9.7	3	720	(4.2)	21	9397	2.2
3500-3999	5	6839	0.7	-	304	-	1	398	(2.5)	6	7541	0.8
4000-4499	2	2202	(0.9)	1	90	(11.1)	-	113	-	3	2405	(1.2)
≥4500	-	356	-	-	15	-	-	16	-	-	387	-
<b>TOTAL</b>	<b>34</b>	<b>21973</b>	<b>1.5</b>	<b>13</b>	<b>1432</b>	<b>9.1</b>	<b>5</b>	<b>1738</b>	<b>2.9</b>	<b>52</b>	<b>25143</b>	<b>2.1</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 (40.4%) (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, rose to 14.4/1000 in 1991 and reduced again to 12.1/1000 in 1992 and 9.1/1000 in 1993 (Table 41)..

Lethal congenital malformation remained the second highest known cause, to which 12 (23.1%) 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, 33.3% in 1992 and 15.4% in 1993 (Table 21).

**TABLE 21 : CAUSE OF POST-NEONATAL DEATH BY MATERNAL RACE IN WESTERN AUSTRALIA IN 1993**

Cause of Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other		No.	%
	No.	%	No.	%	No.	%		
Sudden Infant Death	14	41.2	6	46.2	1	20.0	21	40.4
Lethal Congenital Malformation	9	26.5	1	7.7	2	40.0	12	23.1
Extremely Low Birthweight (<1000g)	2	5.9	-	-	-	-	2	3.8
Infection - Respiratory	2	5.9	-	-	1	20.0	3	5.8
Infection - Meningitis	1	2.9	1	7.7	-	-	2	3.8
Infection - Other	1	2.9	2	15.4	-	-	3	5.8
Other	3	8.8	2	15.4	1	20.0	6	11.5
Unknown	2	5.9	1	7.7	-	-	3	5.8
<b>TOTAL</b>	<b>34</b>	<b>100.0</b>	<b>13</b>	<b>100.0</b>	<b>5</b>	<b>100.0</b>	<b>52</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 July-September seasonal quarter of the year (Table 22).

**TABLE 22 CAUSE OF POST-NEONATAL DEATH BY SEASONAL INCIDENCE IN WESTERN AUSTRALIA IN 1993**

Cause of Death	Jan-Mar		Apr - Jun		Jul-Sep		Oct-Dec		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Sudden Infant Death	3	30.0	3	30.0	10	58.8	5	33.3	21	40.4
Lethal Congenital Malformation	2	20.0	4	40.0	1	5.9	5	33.3	12	23.1
Infection	-	-	-	-	4	23.5	4	26.7	8	15.4
Other/Unknown	5	50.0	3	30.0	2	11.8	1	6.7	11	21.2
<b>TOTAL</b>	<b>10</b>	<b>100.0</b>	<b>10</b>	<b>100.0</b>	<b>17</b>	<b>100.0</b>	<b>15</b>	<b>100.0</b>	<b>52</b>	<b>100.0</b>

Excludes births <500 grams birthweight.

SOURCE: MIDWIVES' NOTIFICATION SYSTEM  
REGISTRAR GENERAL'S OFFICE

## 6. PERINATAL MORTALITY IN WESTERN AUSTRALIA IN THE 1993 BIRTH COHORT

### 6.1 Perinatal Mortality

There were 185 perinatal deaths identified in the 1993 birth cohort which gave a perinatal mortality rate of 7.3/1000 total births (Table 3 and Table 23). This compares with rates of 10.2/1000 in 1989, 7.9/1000 in 1990, 8.1/1000 in 1991 and 8.4/1000 in 1992. Among babies born to Aboriginal women the rate (13.2/1000) was higher than for perinatal deaths of babies of Caucasian women (6.6/1000) and for perinatal deaths of babies born to women of other races (11.4/1000) (Table 23).

**TABLE 23 : STILLBIRTHS, NEONATAL AND PERINATAL MORTALITY BY MATERNAL RACE IN WESTERN AUSTRALIA IN 1993**

Type of Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other		No.	Rate
	No.	Rate	No.	Rate	No.	Rate		
Stillbirths	97	4.4	12	8.3	14	8.0	123	4.9
Neonatal Mortality	49	2.2	7	4.9	6	3.5	62	2.5
Perinatal Mortality	146	6.6	19	13.2	20	11.4	185	7.3

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 25-29 years, (6.0/1000) and the risk increases toward the extremes of the fertile age group.

Twenty two (14.7/1000) perinatal deaths were among babies of women in their teenage years. Another 20 (7.0/1000) 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 1993**

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	27	37.0	1	40	25.0	-	-	-	2	67	29.9
16	3	88	34.1	3	61	49.2	-	3	-	6	152	39.5
17	1	192	5.2	-	88	-	-	7	-	1	287	3.5
18	4	312	12.8	-	101	-	-	14	-	4	427	9.4
19	7	425	16.5	2	108	18.5	-	27	-	9	560	16.1
≤19	16	1044	15.3	6	398	15.1	-	51	-	22	1493	14.7
20-24	30	4293	7.0	4	538	7.4	4	256	15.6	38	5087	7.5
25-29	45	7684	5.9	4	296	13.5	2	530	3.8	51	8510	6.0
30-34	40	6574	6.1	4	159	25.2	10	586	17.1	54	7319	7.4
35-39	13	2169	6.0	1	45	22.2	3	282	10.6	17	2496	6.8
40-44	2	299	6.7	-	8	-	1	47	21.3	3	354	8.5
≥45	-	7	-	-	-	-	-	-	-	-	7	-
<b>TOTAL</b>	<b>146</b>	<b>22070</b>	<b>6.6</b>	<b>19</b>	<b>1444</b>	<b>13.2</b>	<b>20</b>	<b>1752</b>	<b>11.4</b>	<b>185</b>	<b>25266</b>	<b>7.3</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 9.1/1000 and the rate for babies born to women with a parity of 1-2 was 5.3/1000. A higher rate of perinatal deaths (10.6/1000) 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 1993**

Parity	Caucasian			Aboriginal			Other			Total		
	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate
	0	77	8666	8.9	6	414	14.4	6	694	8.6	89	9774
1-2	52	11339	4.6	5	616	8.1	11	883	12.5	68	12838	5.3
3-4	14	1807	7.7	5	291	17.2	3	157	19.1	22	2255	9.8
≥5	3	258	11.6	3	123	24.4	-	18	-	6	399	15.0
<b>TOTAL</b>	<b>146</b>	<b>22070</b>	<b>6.6</b>	<b>19</b>	<b>1444</b>	<b>13.2</b>	<b>20</b>	<b>1752</b>	<b>11.4</b>	<b>185</b>	<b>25266</b>	<b>7.3</b>

Excludes births < 500 grams birthweight.

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

#### 6.4 Maternal Race and Birthweight

More than half (68.1%) of all perinatal deaths (126, 79.9/1000) 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 1993

Birthweight (grams)	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
500-999	48	91	278.2	7	18	388.9	3	5	(600.0)	58	114	508.8
1000-1499	17	111	153.2	1	32	(31.3)	2	16	(125.0)	20	159	125.8
1500-1999	15	248	60.5	2	28	(71.4)	5	20	250.0	22	296	74.3
2000-2499	20	834	24.0	3	101	(29.7)	3	73	(41.1)	26	1008	25.8
<2500	100	1284	77.9	13	179	72.6	13	114	114.0	126	1577	79.9
2500-2999	15	3207	4.7	3	338	(8.9)	3	388	(7.7)	21	3933	5.3
3000-3499	19	8173	2.3	1	516	(1.9)	2	721	(2.8)	22	9410	2.3
3500-3999	8	6845	1.2	1	305	(3.3)	2	400	(5.0)	11	7550	1.5
4000-4499	2	2203	(0.9)	1	91	(11.0)	-	113	-	3	2407	(1.2)
$\geq 4500$	2	358	(5.6)	-	15	-	-	16	-	2	389	(5.1)
<b>TOTAL</b>	<b>146</b>	<b>22070</b>	<b>6.6</b>	<b>19</b>	<b>1444</b>	<b>13.2</b>	<b>20</b>	<b>1752</b>	<b>11.4</b>	<b>185</b>	<b>25266</b>	<b>7.3</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 112 (8.6/1000) male and 73 (6.0/1000) female perinatal deaths among those babies born in 1993.

Among babies born to Caucasian women the perinatal death rate for males (7.8/1000) was higher than the perinatal death rate for females (5.3/1000). The rate of perinatal deaths among male babies of Aboriginal woman (17.7/1000) was also higher than the perinatal death rate for females (8.5/1000) and among babies of women of other races the rates were 10.7/1000 male and 12.2/1000 female (Table 27).

**TABLE 27 : PERINATAL DEATHS BY MATERNAL RACE AND SEX IN WESTERN AUSTRALIA IN 1993**

Sex	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate
Male	89	11395	7.8	13	736	17.7	10	932	10.7	112	13063	8.6
Female	57	10675	5.2	6	708	8.5	10	820	12.2	73	12203	6.0
<b>TOTAL</b>	<b>146</b>	<b>22070</b>	<b>6.6</b>	<b>19</b>	<b>1444</b>	<b>13.2</b>	<b>20</b>	<b>1752</b>	<b>11.4</b>	<b>185</b>	<b>25266</b>	<b>7.3</b>

Excludes births <500 grams birthweight.

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

### 6.6 Maternal Race and Conjugal State

One sixth (9.9/1000) of perinatal deaths were among babies of women reported as socially unsupported by a partner. This represents a decrease since the 1992 cohort report (14.2/1000). 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 1993**

Conjugal State	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate	No.	Total Births	Rate
Single	19	1880	10.1	8	529	15.1	-	95	-	27	2504	10.8
Married/defacto	127	20002	6.3	11	902	12.2	20	1643	12.2	158	22547	7.0
<sup>2</sup> Other	-	188	-	-	13	-	-	14	-	-	215	-
<b>TOTAL</b>	<b>146</b>	<b>22070</b>	<b>6.6</b>	<b>19</b>	<b>1444</b>	<b>13.2</b>	<b>20</b>	<b>1752</b>	<b>11.4</b>	<b>185</b>	<b>25266</b>	<b>7.3</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 1993 BIRTH COHORT

### 7.1 Infant Deaths

There were 114 infant deaths identified amongst the 25143 livebirths in 1993. Of these, 62 were neonatal deaths and 52 were post-neonatal deaths. The infant mortality rate for Western Australia in 1993 was 4.5/1000 livebirths, a significant reduction from the rate of 6.2/1000 in 1992 (Tables 15 and 29).

Infant mortality among babies born to Aboriginal women (14.0/1000) 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, 16.7/1000 in 1992 and decreased to 10/1000 in 1993 (Table 41).

### 7.2 Maternal Race and Maternal Age

The infant mortality rate is greatest for babies of teenage women (7.4/1000). The infant mortality rate for babies of Aboriginal teenage mothers (12.7/1000) was higher than that for babies of Caucasian teenage mothers (5.8/1000) (Table 29).

TABLE 29 : INFANT DEATHS BY MATERNAL RACE AND MATERNAL AGE IN WESTERN AUSTRALIA IN 1993

Maternal Age	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
≤15	-	26	-	1	40	25.0	-	-	-	1	66	15.2
16	1	86	11.6	1	59	16.9	-	3	-	2	148	13.5
17	-	191	-	-	88	-	-	7	-	-	286	-
18	2	309	6.5	-	101	-	-	14	-	2	424	4.7
19	3	420	7.1	3	107	28.0	-	27	-	6	554	10.8
≤19	6	1032	5.8	5	395	12.7	-	51	-	11	1478	7.4
20-24	16	4269	3.7	6	536	11.2	2	253	7.9	24	5058	4.7
25-29	24	7655	3.1	5	293	17.1	2	529	3.8	31	8477	3.7
30-34	26	6550	4.0	3	156	19.2	5	579	8.6	34	7285	4.7
35-39	10	2162	4.6	-	44	-	2	280	7.1	12	2486	4.8
40-44	1	298	3.4	1	8	125.0	-	46	-	2	352	5.7
≥45	-	7	-	-	-	-	-	-	-	-	7	-
<b>TOTAL</b>	<b>83</b>	<b>21973</b>	<b>3.8</b>	<b>20</b>	<b>1432</b>	<b>14.0</b>	<b>11</b>	<b>1738</b>	<b>6.3</b>	<b>114</b>	<b>25143</b>	<b>4.5</b>

Excludes births <500 grams birthweight.

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

### 7.3 Maternal Race and Conjugal State

The infant mortality rate (6.3/1000) among babies born to single, separated, divorced or widowed women is greater than the rate for babies of women reported to be in a married or defacto relationship (4.3/1000) (Table 30).

**TABLE 30 :** INFANT DEATHS BY MATERNAL RACE AND CONJUGAL STATE IN WESTERN AUSTRALIA IN 1993

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	6	1863	3.2	9	524	17.2	-	95	-	15	2482	6.0
Married/defacto	76	19922	3.8	11	895	12.3	10	1629	6.1	97	22446	4.3
Other	1	188	5.3	-	13	-	1	14	71.4	2	215	9.3
<b>TOTAL</b>	<b>83</b>	<b>21973</b>	<b>3.8</b>	<b>20</b>	<b>1432</b>	<b>14.0</b>	<b>11</b>	<b>1738</b>	<b>6.3</b>	<b>114</b>	<b>25143</b>	<b>4.5</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 or more (6.8/1000).

**TABLE 31 :** INFANT DEATHS BY MATERNAL RACE AND PARITY IN WESTERN AUSTRALIA IN 1993

Parity	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
0	35	8614	4.1	7	412	17.0	2	689	2.9	44	9715	4.5
1-2	38	11306	3.4	7	612	11.4	7	875	8.0	52	12793	4.1
3-4	9	1797	5.0	3	287	10.5	2	156	12.8	14	2240	6.3
≥5	1	256	3.9	3	121	24.8	-	18	-	4	395	10.1
<b>TOTAL</b>	<b>83</b>	<b>21973</b>	<b>3.8</b>	<b>20</b>	<b>1432</b>	<b>14.0</b>	<b>11</b>	<b>1738</b>	<b>6.3</b>	<b>114</b>	<b>25143</b>	<b>4.5</b>

Excludes births < 500 grams birthweight.

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

### 7.5 Maternal Race and Plurality

Infant mortality for twins (15.3/1000) was almost four times the rate for singleton births (4.0/1000). The infant death rate (17.0/1000) for twin babies born to Caucasian women in 1993 was lower than the rate (28.8/1000) in 1992 (Table 32).



**TABLE 32: INFANT DEATHS BY MATERNAL RACE AND PLURALITY IN WESTERN AUSTRALIA IN 1993**

Plurality	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
Singleton	68	21338	3.2	20	1404	14.2	11	1712	6.4	99	24454	4.0
Twins	10	599	17.0	-	28	-	-	26	-	10	653	15.3
Triplets	5	36	138.9	-	-	-	-	-	-	5	36	138.9
<b>TOTAL</b>	<b>83</b>	<b>21973</b>	<b>3.8</b>	<b>20</b>	<b>1432</b>	<b>14.0</b>	<b>11</b>	<b>1738</b>	<b>6.3</b>	<b>114</b>	<b>25143</b>	<b>4.5</b>

Excludes births < 500 grams birthweight.

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

### 7.6 Maternal Race and Babies' Sex

The infant death rates were 5.3/1000 male and 3.7/1000 female. Among babies born to Caucasian women the infant death rate for males (4.8/1000) was higher than the infant death rate for females (2.7/1000). For babies of Aboriginal mothers the infant death rate for males (12.4/1000) was lower than the infant death rate for females (15.6/1000) and for infants of women of other races the infant death rate for males (6.5/1000) was higher than the infant death rate for females (6.1/1000) (Table 33).

**TABLE 33 : INFANT DEATHS BY MATERNAL RACE AND SEX IN WESTERN AUSTRALIA IN 1993**

Sex	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate	No.	Live Births	Rate
Male	54	11338	4.8	9	726	12.4	6	924	6.5	69	12988	5.3
Female	29	10635	2.7	11	706	15.6	5	814	6.1	45	12155	3.7
<b>TOTAL</b>	<b>83</b>	<b>21973</b>	<b>3.8</b>	<b>20</b>	<b>1432</b>	<b>14.0</b>	<b>11</b>	<b>1738</b>	<b>6.3</b>	<b>114</b>	<b>25143</b>	<b>4.5</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 just over half (54.4%) of all infant deaths. A rate of 41.4/1000 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 1.1/1000. An infant mortality rate (63.6/1000) for low birthweight babies of Aboriginal women was higher than the rate (36.9/1000) for low birthweight babies of Caucasian women (Table 34).

**TABLE 34: INFANT MORTALITY BY MATERNAL RACE AND BIRTHWEIGHT DISTRIBUTION IN WESTERN AUSTRALIA IN 1993**

Birth weight (grams)	Maternal Race									Total		
	Caucasian			Aboriginal			Other					
	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate	No.	Births	Rate
500-999	24	63	381.0	4	15	(266.7)	2	4	(500.0)	30	82	365.9
1000-1499	3	97	(30.9)	2	32	(62.5)	1	14	(71.4)	6	143	42.0
1500-1999	8	239	33.5	2	26	(76.9)	1	16	(62.5)	11	281	39.1
2000-2499	10	820	12.2	3	100	(300.0)	2	72	(27.8)	15	992	15.1
<2500	45	1219	36.9	11	173	63.6	6	106	56.6	62	1498	41.4
2500-2999	7	3195	2.2	3	335	(9.0)	-	385	-	10	3915	2.6
3000-3499	21	8162	2.6	5	515	9.7	4	720	(5.6)	30	9397	3.2
3500-3999	7	6839	1.0	-	304	-	1	398	(2.5)	8	7541	1.1
4000-4499	3	2202	(1.4)	1	90	(11.1)	-	113	-	4	2405	(1.7)
≥4500	-	356	-	-	15	-	-	16	-	-	387	-
<b>TOTAL</b>	<b>83</b>	<b>21973</b>	<b>3.8</b>	<b>20</b>	<b>1432</b>	<b>14.0</b>	<b>11</b>	<b>1738</b>	<b>6.3</b>	<b>114</b>	<b>25143</b>	<b>4.5</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

More than half (56.6%) of the infant deaths occurred in the neonatal period, with most (87.7%) deaths occurring within 24 weeks of birth (Table 35).

**TABLE 35 : INFANT DEATHS BY MATERNAL RACE AND AGE AT DEATH IN WESTERN AUSTRALIA IN 1993**

Age at Death in Weeks	Maternal Race						Total	
	Caucasian		Aboriginal		Other			
	No.	%	No.	%	No.	%	No.	%
1-4	50	59.8	8	40.0	7	63.6	65	56.6
5-8	8	9.8	1	5.0	1	9.1	10	8.9
9-12	3	3.7	-	-	1	9.1	4	3.5
13-16	8	9.8	2	10.0	1	9.1	11	9.7
17-20	4	4.9	1	5.0	-	-	5	4.4
21-24	1	1.2	3	15.0	1	9.1	5	4.4
25-52	9	10.8	5	25.0	-	-	14	12.3
<b>TOTAL</b>	<b>83</b>	<b>100.0</b>	<b>20</b>	<b>100.0</b>	<b>11</b>	<b>100.0</b>	<b>114</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 40 (35.1%) babies, Sudden Infant Death Syndrome for 23 (20.2%) and low birthweight (<2500 grams) for 29 (25.4%) babies. Infection remained a significant cause of infant mortality (Table 36).

**TABLE 36 : CAUSE OF INFANT DEATHS AND MATERNAL RACE IN WESTERN AUSTRALIA IN 1993**

Cause of Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other			
	No.	%	No.	%	No.	%	No.	%
Lethal Congenital Malformation	32	38.6	2	10.0	6	54.5	40	35.1
Low Birth Weight (<2500g)	24	28.9	4	20.0	1	9.1	29	25.4
Asphyxia	1	1.2	-	-	1	9.1	2	1.8
Pregnancy conditions	1	1.2	-	-	-	-	1	0.9
Infections	4	4.8	-	-	1	9.1	5	4.4
Hydrops fetalis	-	-	3	15.0	-	-	3	2.6
Other	3	3.6	2	10.0	1	9.1	6	5.3
Sudden Infant Deaths	16	19.3	6	30.0	1	9.1	23	20.2
Unknown	2	2.4	3	15.0	-	-	5	4.4
<b>TOTAL</b>	<b>83</b>	<b>100.0</b>	<b>20</b>	<b>100.0</b>	<b>11</b>	<b>100.0</b>	<b>114</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 1993**

Type of Death	Maternal Race						Total	
	Caucasian		Aboriginal		Other			
	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Neonatal Mortality	49	2.2	7	4.9	6	3.5	62	2.5
Post-Neonatal Mortality	34	1.5	13	9.1	5	2.9	52	2.1
Infant Mortality	83	3.8	20	14.0	11	6.3	114	4.5

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 1993

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	1	(25.0)	1	27	2	(29.9)	1	40	-	26	-	1	66	(15.2)
16-19	5	14.0	15	1068	20	14.0	4	355	6	1057	5.7	10	1412	7.1
20-29	8	9.6	81	12763	89	6.3	11	829	44	12706	3.5	55	13535	4.1
30-39	5	24.5	66	9611	71	6.9	3	200	43	9571	4.5	46	9771	4.7
≥40	-	-	3	353	3	(8.5)	1	8	1	351	(2.8)	2	359	(5.6)
Total	19	14.4	166	23822	185	7.0	20	1432	94	23711	4.0	114	25143	4.5
<u>Plurality</u>														
Singleton	19	14.6	152	23158	171	6.6	20	1404	79	23050	3.4	99	24454	4.0
Multiple	-	-	14	627	14	22.3	-	28	15	661	41.6	15	689	38.6
Total	19	14.4	166	23822	185	7.0	20	1432	94	23711	4.0	114	25143	4.5
<u>Sex</u>														
Male	13	736	99	12327	112	8.6	9	726	60	12262	4.9	69	12988	5.3
Female	6	708	67	10675	73	6.3	11	706	34	11449	3.0	45	12155	3.7
Total	19	1444	166	23822	185	7.3	20	1432	94	23711	4.0	114	25143	4.5

Excludes births <500 grams birthweight.

<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 - 1993

### 8.1 Crude Birth Rates and Total Births 1980 - 1993

Over the past decade, the crude birth rate for Western Australia has gradually reduced from 16.4/1000 in 1984 to 15.0/1000 in 1993.

Among Aboriginal women, the crude birth rate remained relatively stable ranging between 30.8/1000 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 1980-1993**

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
1993	1432	46492	30.8	23711	1629928	14.5	25143	1676420	15.0

SOURCE : Livebirths - MIDWIVES' NOTIFICATION SYSTEM  
 Population data - ESTIMATED RESIDENT POPULATION BY AGE, SEX AND ABORIGINALITY  
 1981-1993, Health Services Statistics and Epidemiology Branch, HDWA 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 - 1993

Western Australian stillbirth rates showed a general downward trend from 7.5/1000 total births in 1980 to 4.9/1000 in 1993 (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 4.7/1000 in 1993. Among babies of Aboriginal women, stillbirth rates were less consistent in their decline and remained approximately 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, 1980-1993

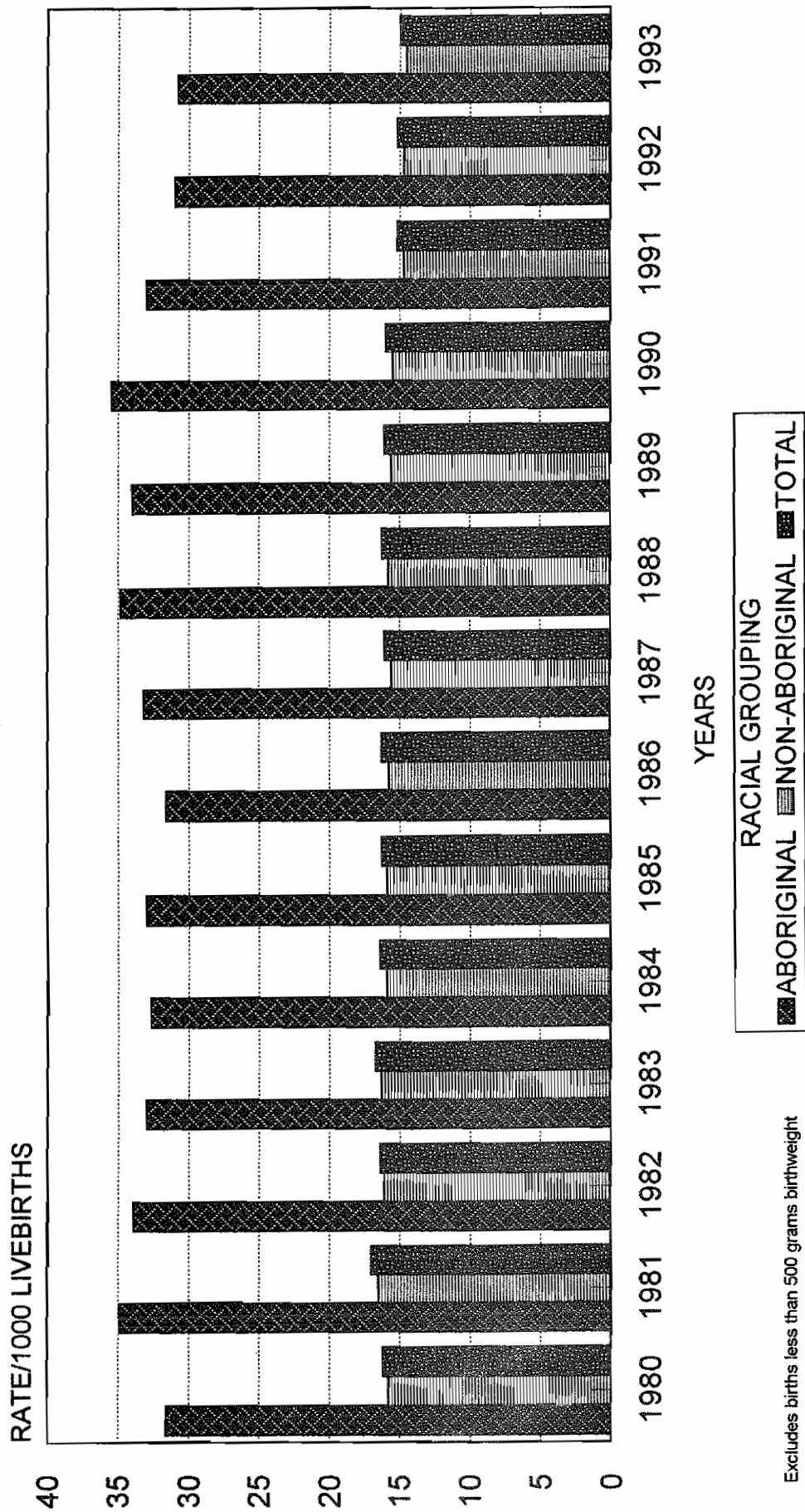


FIGURE VII

**STILLBIRTH PROPORTIONS AND RACIAL GROUPING OF BIRTHS IN W.A. 1980-1993**

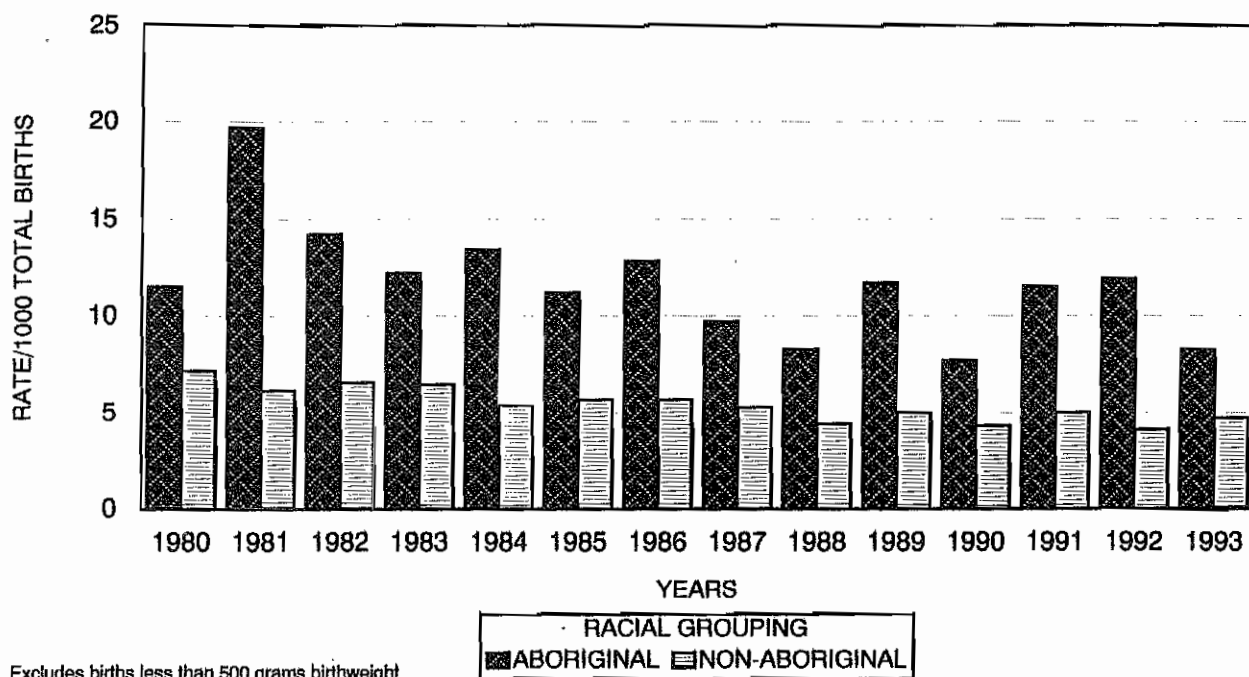


FIGURE VIII

**PERINATAL MORTALITY AND RACIAL GROUPING FOR WESTERN AUSTRALIAN BIRTHS, 1980-1993**

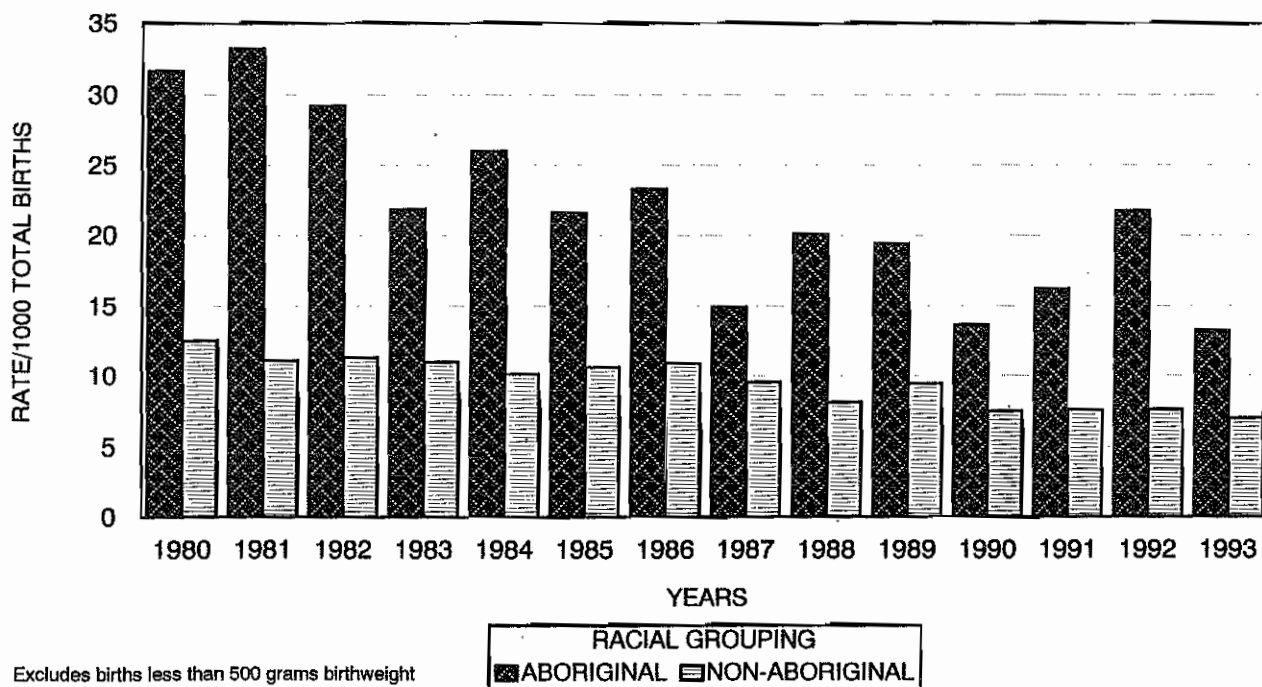


TABLE 40 : STILLBIRTHS, NEONATAL AND PERINATAL MORTALITY FOR ABORIGINAL AND NON-ABORIGINAL BIRTHS IN WESTERN AUSTRALIA 1980-1993

Year	Stillbirths				Neonatal Mortality				Perinatal Mortality									
	Aboriginal		Non-Aboriginal		Aboriginal		Non-Aboriginal		Aboriginal		Non-Aboriginal		Total					
	No.	(1)	No.	(1)	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
1993	12	8.3	111	4.7	123	4.9	7	4.9	55	2.3	62	2.5	19	13.2	166	7.0	185	7.3

1994

Excludes births <500 grams birthweight.

1980 - 1983 based on year of death.

1984 - 1993 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 1980-1993. The rate of 20.4/1000 livebirths in 1980 reduced to 4.9/1000 livebirths in 1993. For babies of non-Aboriginal women, neonatal mortality rates reduced from 5.3/1000 in 1980 to 2.3/1000 in 1993 (Table 40, Figure IX).

### 8.2.3 Perinatal Mortality

Comparison of perinatal mortality for 1984-93, the ten years where the birth cohort method was employed, showed that overall the rate has decreased from 10.9/1000 total births in 1984 to 7.3/1000 in 1993. Overall a reduction of 6.2/1000 (13.5/1000 in 1980 to 7.3/1000 in 1993) occurred over fourteen years. It was apparent that the reduction in the perinatal mortality among babies of Aboriginal women from 31.7/1000 in 1980 to 13.2/1000 in 1993, 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 - 1993

Over the fourteen year period from 1980 to 1993 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 2.5/1000 in 1993. Rates for post-neonatal deaths decreased slightly from 3.2/1000 in 1980 to 2.1/1000 in 1993 and infant mortality rates reduced from 9.3/1000 in 1980 to 4.5/1000 in 1993 (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, 22.0/1000 in 1992 and 14.0/1000 in 1993 (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 four 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 1980-1993

Year	Neonatal Mortality				Post-Neonatal Mortality				Infant Mortality									
	Aboriginal		Non-Aboriginal		Aboriginal		Non-Aboriginal		Aboriginal		Non-Aboriginal		Total					
	No.	(1)	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
1993	7	4.9	55	2.3	62	2.5	13	9.1	39	1.6	52	2.1	20	14.0	94	4.0	114	4.5

Excludes births <500 grams birthweight.

1980 - 1983 based on year of death.

1984 - 1993 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, 1980-1993**

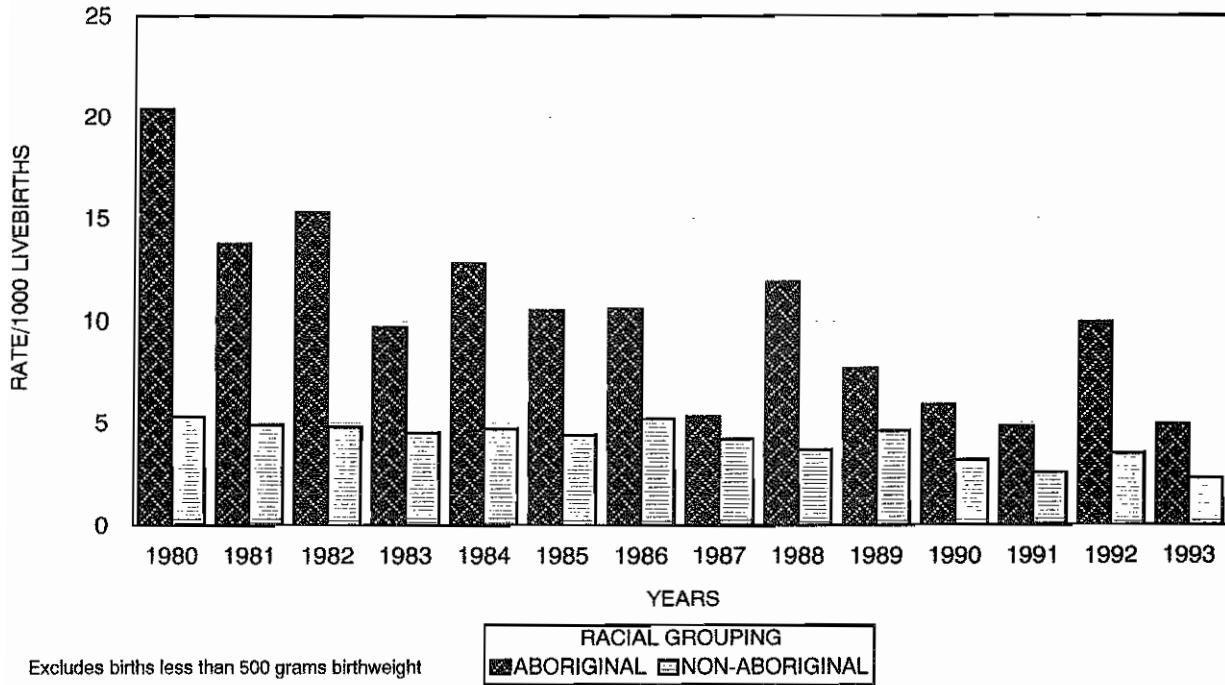


FIGURE X

**POSTNEONATAL MORTALITY, RACIAL GROUPING  
FOR WESTERN AUSTRALIAN BIRTHS, 1980-1993**

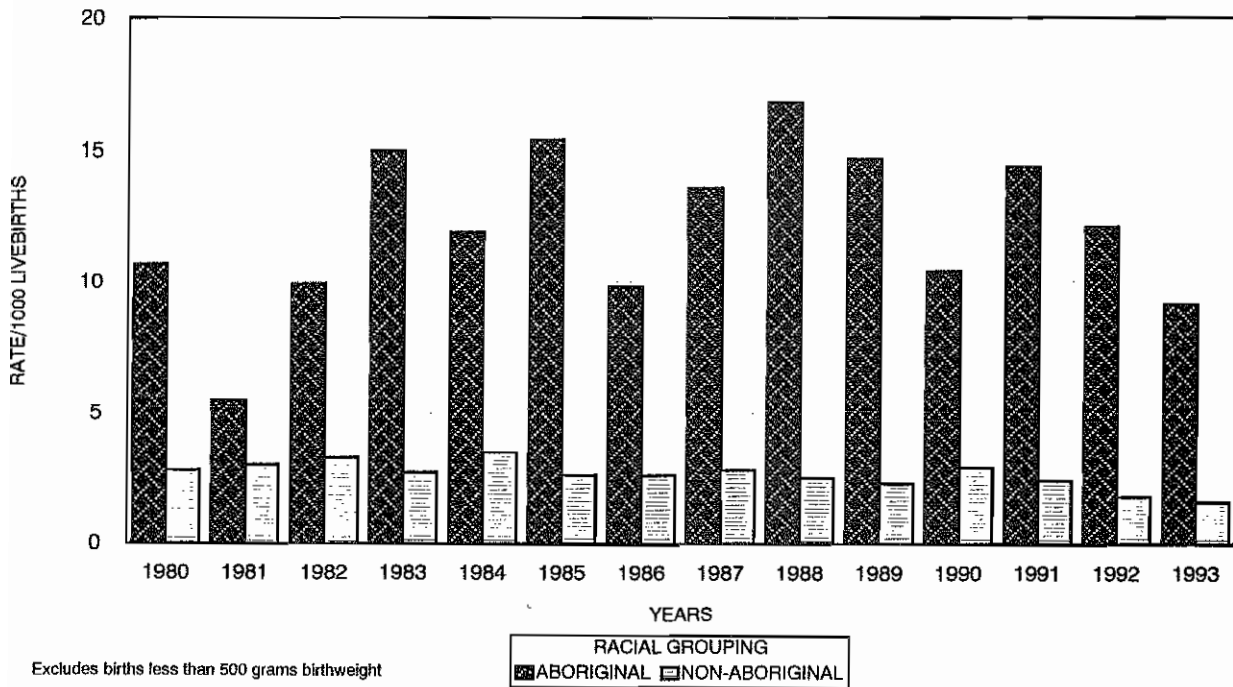
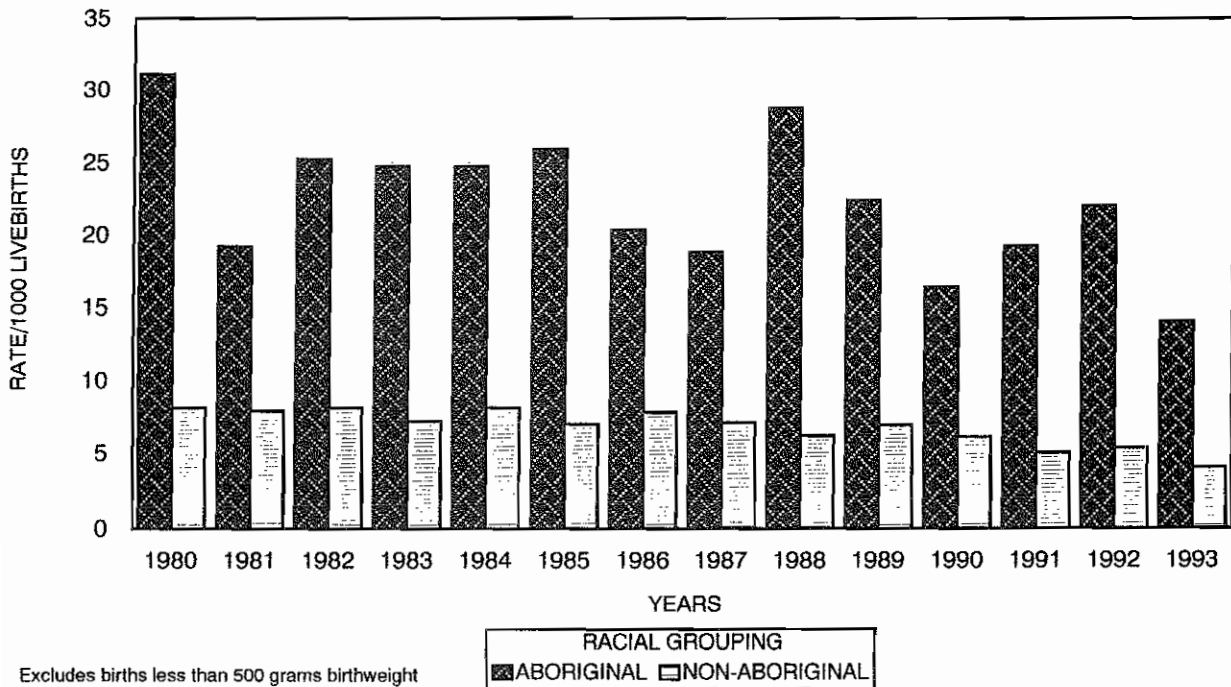


FIGURE XI

**INFANT MORTALITY AND RACIAL GROUPING FOR  
WESTERN AUSTRALIAN BIRTHS, 1980-1993**



**REFERENCES**

1. Gee, V. Perinatal Statistics in Western Australia. Eleventh Annual Report of the Midwives' Notification System for 1993. Health Department of Western Australia, Perth. October 1994.
2. Gee, V. Perinatal and Infant Mortality Identified by Maternal Race. The 1992 Western Australian Birth Cohort, Health Department of Western Australia, Perth. September 1995.
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 ( ) (please specify) [ ]

Race:

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

cephalo pelvic 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 ( ) 2

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 ..... 3.m.  19.....  
 ..... p.m.

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—  
 ..... 3.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—

**PART II**

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

**APPENDIX B**

For Office Use Only

Registration Number

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	

Approximate Interval Between Onset and Death

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

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

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

(Block Letters)

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. 384)

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-  
ditions 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.

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