Aboriginal deaths in Western Australia: 1985-89 and 1990-94

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Abstract

Objective: To examine death data for Aboriginal and non-Aboriginal persons in Western Australia (WA) in 1985-89 and 1990-94.

Methods: Population estimates were provided by the Health Information Centre of the WA Health Department based on data from the Australian Bureau of Statistics (ABS). Death data came from the WA Registrar-General's Office. Standard methods were used to obtain rates and levels of significance.

Results: Main causes of deaths among Aboriginal males in 1990-94 were circulatory conditions, respiratory, injury and poisoning, neoplasms and endocrine diseases; in Aboriginal females they were circulatory, neoplasms, endocrine diseases, respiratory diseases, and injury and poisoning. From 1985-89 to 1990-94, the Aboriginal male all-cause age-standardised death rates fell 3% (ns) while the non-Aboriginal male rate fell 11% ($p<0.05$). The Aboriginal female all-cause death rate rose 11% (ns) while the non-Aboriginal rate fell 5% ($p<0.05$). The all-cause death rate ratio (Aboriginal:non-Aboriginal) changed from 2.4 to 2.6 (males) and 2.5 to 2.9 (females). There was a major increase in deaths from endocrine diseases among Aborigines and non-Aborigines. This increase was proportionally much greater among Aborigines. In non-Aborigines there was a significant decrease in deaths from circulatory diseases (mainly ischaemic heart disease); this did not occur among Aborigines.

Conclusions: Over the study period, Aboriginal health standards, as reflected by death rates, apparently worsened relative to non-Aboriginal standards.

Implications: Better health promotion, disease prevention and disease care are required to help achieve acceptable health standards among Aboriginal peoples.

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Australia's Aborigines have higher death rates than non-Aboriginal people;[1-3] this is an important indicator of their health disadvantages. In Western Australia (WA), age-standardised death rates among Aboriginal males and females from 1983-89 were 2.6 and 3.0 times higher, respectively, than for non-Aborigines.[2] The excess deaths among Aboriginal people were mainly due to circulatory diseases, injury and poisoning, respiratory diseases and, in females, digestive and genitourinary diseases.

This report examines and compares Aboriginal and non-Aboriginal death rates in WA for the five-year periods 1985-89 and 1990-94 in order to assess trends over time.

Methods

Population estimates were provided by the Health Information Centre (HIC) of our Department, based on data supplied by the Australian Bureau of Statistics. Ages were grouped infants (<1 year), children (1-14 years), adolescents and young adults (15-29 years), adults (30-49 years), older adults (50-64 years), and elderly (65+ years of age).[4]

Death information is collected by the WA Registrar-General's Office. The cause of death is coded by the ABS according to the International Classification of Diseases – 9th Revision – Clinical Modification.[5] An abbreviated version of the database is maintained by the HIC. This report examined all deaths registered in WA from 1985-1994 inclusive, by year of registration. According to the ABS, Aboriginal deaths in WA have been recorded consistently since 1985 and are estimated to be >90% complete.[3]

Death rates

Age-standardised rates were calculated by the direct method[6] and were based on the age distribution of the standard world population.[7] Age-specific death rates were calculated as the number of deaths in a specific age and sex group divided by the population of that group. Rates are expressed per 10^5 person-years. Relative rates (RR) were calculated using the ratio of the Aboriginal: non-Aboriginal rate. The 95% confidence intervals of an age-standardised rate was calculated as:

$$1.96 \times [\Sigma_i \{r_i \times (1-r_i) \times w_i 2/n_i\}]^{1/2}$$

where:

w_i is the standard population of the ith age group

r_i is the age-specific rate

n_i is the population size of the ith age group

Rates are presented by ICD-9 chapter codes except for Chapter XVII (Injury and Poisoning) where external causes codes were used.

The relatively small Aboriginal population and the small numbers of deaths involved inevitably result in relatively large standard errors of the calculated rates. The information presented must, therefore, be considered cautiously.

Results

Age-specific death rates: 1990-94

Infants (<1 year)

In 1990-94 the all-cause death rates of Aboriginal infants were three times those of other infants (see Table 1). Among Aboriginal infants who died from conditions originating during the perinatal period, 46%

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Table 1: Major causes of mortality in Aboriginal infants compared with non-Aboriginal infants in WA, 1990-94.

A: Males		Aboriginal		Non-Aboriginal			
Rank	ICD-9 chapter	n[a]	Rate[b]	n[a]	Rate[b]	RR[c]	95% CI
1	Ill-defined (XVI)	26	631.8	86	145	4.4	2.8-6.8
2	Perinatal (XV)	24	583.2	140	236	2.5	1.6-3.8
3	Congenital (XIV)	11	267.3	114	192.2	1.4	0.8-2.6
4	Infectious (I)	7	170.1	7	11.8	14.4	5.0-41.0
5	Respiratory (VIII)	6	145.8	7	11.8	12.4	4.2-36.9
	All causes	**84**	**2041.3**	**382**	**643.9**	**3.2**	**2.5-4.0**
B: Females		**Aboriginal**		**Non-Aboriginal**			
Rank	**ICD-9 chapter**	**n[a]**	**Rate[b]**	**n[a]**	**Rate[b]**	**RR[c]**	**95% CI**
1	Ill-defined (XVI)	19	523	65	115.3	4.5	2.7-7.5
2	Perinatal (XV)	18	495.5	124	219.9	2.2	1.3-3.6
3	Congenital (XIV)	11	302.8	78	138.3	2.2	1.2-4.1
4	Respiratory (VIII)	6	165.2	7	12.4	13.3	4.5-39.6
5	Circulatory (VII)	4	110.1	3	5.3	20.8	4.6-92.9
	All causes	**63**	**1734.1**	**305**	**540.9**	**3.2**	**2.4-4.2**

Notes:
(a) n = number of deaths.
(b) rate = age-specific mortality rate per 10^5 person years.
(c)RR = ratio of Aboriginal to non-Aboriginal mortality rates.

of male deaths (n=11) and 50% of female deaths (n=9) were due to short gestation and low birthweight. Respiratory deaths among Aboriginal infants included four (67%) from pneumonia in males and five (83%) from acute respiratory infection in females. Rates of death from infectious diseases were much greater among Aboriginal infants than non-Aboriginal infants. The four circulatory disease deaths among Aboriginal infant females were all due to myocarditis.

Children (1-14 years)

During 1990-94, Aboriginal children aged 1-14 years had all-cause death rates four (males) and five times (females) higher than in their non-Aboriginal peers (see Table 2).

Injuries, especially due to motor vehicle accidents, were the major cause of deaths in both racial groups.

Table 2: Major causes of mortality in Aboriginal children aged 1-14 years compared with non-Aboriginal children aged 1-14 years in WA, 1990-94.

A: Males		Aboriginal		Non-Aboriginal			
Rank	ICD-9 chapter	n[a]	Rate[b]	n[a]	Rate[b]	RR[c]	95% CI
1	Injury (XVII)	21	51	88	10.1	5.0	3.1-8.0
	– MVTA[d]	7	17	34	3.9	4.4	2.0-9.9
2	Nervous (VI)	4	9.7	15	1.7	5.7	1.9-17.2
3	Congenital (XIV)	3	7.3	13	1.5	4.9	1.4-17.2
4	Infectious (I)	2	4.9	5	0.6	8.2	1.6-42.3
5	Respiratory (VIII)	1	2.4	1	0.1	24.0	1.5-383.7
	All causes	**32**	**77.7**	**169**	**19.3**	**4.0**	**2.7-5.8**
B: Females		**Aboriginal**		**Non-Aboriginal**			
Rank	**ICD-9 chapter**	**n[a]**	**Rate[b]**	**n[a]**	**Rate[b]**	**RR[c]**	**95% CI**
1	Injury (XVII)	13	32.8	54	6.6	5.0	2.7-9.2
	– MVTA[d]	5	12.6	20	2.4	5.2	2.0-13.8
2	Infectious (I)	5	12.6	7	0.9	14.0	4.4-44.1
3	Nervous (VI)	4	10.1	9	1.1	9.2	2.8-29.9
4	Neoplasms (II)	3	7.6	18	2.2	3.4	1.0-11.5
5	Circulatory (VII)	2	5	4	0.5	10.0	1.8-54.6
	All causes	**32**	**80.6**	**128**	**15.6**	**5.2**	**3.5-7.7**

Notes:
(a) n = number of deaths.
(b) Rate = age-specific mortality rate per 10^5 person years.
(c) RR = ratio of Aboriginal to non-Aboriginal mortality rates.
(d) MVTA = motor vehicle traffic accidents.

Table 3: Major causes of mortality in Aboriginal persons aged 15-29 years compared with non-Aboriginal persons aged 15-29 years in WA, 1990-94.

A: Males		Aboriginal		Non-Aboriginal			
Rank	ICD-9 chapter	n[a]	Rate[b]	n[a]	Rate[b]	RR[c]	95% CI
1	Injury (XVII)	77	222.3	857	88.2	2.5	2.0-3.2
	– MVTA[d]	35	101	352	36.2	2.8	2.0-4.0
	– Suicide	20	57.8	285	29.3	2.0	1.3-3.1
2	Circulatory (VII)	16	46.2	37	3.8	12.2	6.8-21.9
3	Respiratory (VIII)	8	23.1	9	0.9	25.7	9.9-66.6
4	Mental (V)	8	23.1	14	1.4	16.5	6.9-39.3
	– Drugs	5	14.4	1	0.1	144.0	16.8-1232.6
	– Alcohol	2	5.8	20	2	2.9	0.7-12.4
5	Nervous (VI)	4	11.5	21	2.2	5.2	1.8-15.1
	All causes	**126**	**363.7**	**1,066**	**109.7**	**3.3**	**2.7-4.0**
B: Females		**Aboriginal**		**Non-Aboriginal**			
Rank	**ICD-9 chapter**	**n[a]**	**Rate[b]**	**n[a]**	**Rate[b]**	**RR[c]**	**95% CI**
1	Injury (XVII)	23	65.2	208	22.2	2.9	1.9-4.5
	– Homicide	12	34	11	1.2	28.3	12.5-64.1
	– MVTA[d]	9	25.5	119	12.7	2.0	1.0-3.9
2	Circulatory (VII)	7	19.8	18	1.9	10.4	4.3-24.9
3	Nervous (VI)	4	11.3	13	1.4	8.1	2.6-24.8
4	Respiratory (VIII)	3	8.5	8	0.9	9.4	2.5-35.4
5	Digestive (IX)	3	8.5	3	0.3	28.3	5.7-140.2
	All causes	**45**	**127.6**	**351**	**37.5**	**3.4**	**2.5-4.6**

Notes:
(a) n = number of deaths.
(b) Rate = age-specific mortality rate per 10^5 person years.
(c) RR = ratio of Aboriginal to non-Aboriginal mortality rates.
(d) MVTA = motor vehicle traffic accidents.

Adolescents and young adults (15-29 years)

At these ages Aboriginal all-cause death rates were three times greater than for non-Aboriginals in 1990-94 (see Table 3). Injuries were the main cause of deaths in both groups. In Aboriginal and non-Aboriginal males, motor vehicle traffic accidents were the main cause of injury-related deaths followed by suicide. Homicide was the major cause of injury deaths among Aboriginal females compared with deaths from motor vehicle accidents among non-Aboriginal females. Diseases of the circulatory system were the second commonest cause of deaths. Acute myocardial infarction and rheumatic heart disease caused most of the circulatory deaths in Aboriginal males while rheumatic heart disease and cerebrovascular disease were the main contributors in Aboriginal females. Respiratory diseases and nervous system disorders and, in Aboriginal males, mental conditions relating to drug and alcohol use, were prominent causes of Aboriginal deaths.

Adults (30-49 years)

During 1990-94, Aboriginal men aged 30-49 years had an all-cause death rate >6 times the non-Aboriginal rate; in Aboriginal females the rate was 5.5 times the non-Aboriginal rate (see Table 4). Circulatory diseases (mainly acute myocardial infarction and ischaemic heart disease) and injuries were the leading cause of Aboriginal deaths. Injuries and neoplasms were the leading causes of death in non-Aboriginal males and females, respectively. The principal causes of injury-related deaths in Aboriginal males were motor vehicle accidents (30%), suicide (20%) and homicide (18%). Among non-Aboriginal males, suicide (43%) and motor vehicle accidents (22%) were the major causes of death from injury. The principal causes of injury-related deaths in Aboriginal females were homicide (38%) and motor vehicle accidents (29%); among non-Aboriginal females, the main causes were suicide (37%) and motor vehicle accidents (24%). There were no suicide deaths among Aboriginal females of this age. Pneumonia caused 67% (n=18) and 73% (n=8) of respiratory disease deaths among Aboriginal males and females, respectively. Of digestive system disease deaths, 74% (n=17) and 67% (n=8) were due to alcoholic liver disease among Aboriginal males and females, respectively. Endocrine diseases (predominantly diabetes) were the fifth major cause of death among Aboriginal males of this age group; they died from diabetes mellitus at more than 30 times the rate of non-Aboriginal males. The rates of death from neoplasms was similar for Aboriginal and non-Aboriginal females; however, Aboriginal females died from cancer of the cervix at four times the non-Aboriginal rate.

Older adults (50-64 years)

All-cause mortality rates were 4.6 times higher in Aboriginal males and 5.5 times higher in Aboriginal females than their non-Aboriginal peers in 1990-94 (see Table 5). Circulatory disease

Table 4: Major causes of mortality in Aboriginal persons aged 30-49 years compared with non-Aboriginal persons aged 30-49 years in WA, 1990-94.

A: Males		Aboriginal		Non-Aboriginal			
Rank	ICD-9 chapter	n[a]	Rate[b]	n[a]	Rate[b]	RR[c]	95% CI
1	Circulatory (VII)	64	282.3	388	30.8	9.2	7.1-12.0
	– Acute myocardial infarction	24	105.9	132	10.5	10.1	6.5-15.6
	– Ischaemic heart disease	19	83.8	129	10.2	8.2	5.1-13.3
2	Injury (XVII)	50	220.6	767	60.8	3.6	2.7-4.8
	– MVTA[d]	15	66.2	166	13.2	5.0	2.9-8.5
	– Suicide	10	44.1	332	26.3	1.7	0.9-3.2
	– Homicide	9	39.7	22	1.7	23.4	10.8-50.8
3	Respiratory (VIII)	27	119.1	34	2.7	44.1	26.6-73.1
4	Digestive (IX)	23	101.5	56	4.4	23.1	14.2-37.5
5	Endocrine (III)	16	70.6	125	9.9	7.1	4.2-11.9
	– Diabetes mellitus	12	52.9	21	1.7	31.1	15.3-63.2
	All causes	**221**	**974.9**	**1,936**	**153.6**	**6.4**	**5.6-7.4**
B: Females		**Aboriginal**		**Non-Aboriginal**			
Rank	**ICD-9 chapter**	**n[a]**	**Rate[b]**	**n[a]**	**Rate[b]**	**RR[c]**	**95% CI**
1	Circulatory (VII)	32	130.5	115	9.4	13.9	9.4-20.6
	– Acute myocardial infarction	11	44.9	25	2	22.4	11.0-45.5
	– Cerebrovascular disease	6	24.5	41	3.4	7.2	3.0-17.0
2	Injury (XVII)	24	97.9	244	19.9	4.9	3.2-7.4
	– Homicide	9	36.7	20	1.6	22.9	10.4-50.3
	– MVTA[d]	7	28.6	59	4.8	6.0	2.7-13.1
	– Suicide	0	–	90	7.3	–	–
3	Digestive (IX)	12	48.9	32	2.6	18.8	9.7-36.5
4	Respiratory (VIII)	11	44.8	30	2.5	17.9	9.0-35.7
5	Neoplasms (II)	11	44.8	573	46.8	1.0	0.6-1.8
	– Cervix	4	16.3	50	4.1	4.0	1.4-11.2
	All causes	**120**	**489.3**	**1,085**	**88.7**	**5.5**	**4.5-6.6**

Notes:
(a) n = number of deaths.
(b) Rate = age-specific mortality rate per 10^5 person years.
(c) RR = ratio of Aboriginal to non-Aboriginal mortality rates.
(d) MVTA = motor vehicle traffic accidents.

deaths, mainly acute myocardial infarction, ischaemic heart disease and cerebrovascular disease, were the main causes of death among Aboriginal people compared with neoplasms among non-Aboriginal people. Rates of death from circulatory diseases were much higher among Aboriginal people than in non-Aboriginal people. Endocrine deaths, which were mainly due to diabetes mellitus in Aboriginals, occurred at much higher rates than in non-Aboriginal persons. Deaths from respiratory diseases occurred at much higher rates among Aboriginals with most deaths due to pneumonia (46% in males, 43% in females) and chronic obstructive airway disease (COAD, 43% in males and females). Among Aboriginal females, 44% (n=4) of digestive system deaths were from alcoholic liver disease. Of the genitourinary deaths in Aboriginal females, 71% (n=5) were due to nephritis, nephrotic syndrome and nephrosis.

Elderly (65+ years)

During 1990-94, all-cause mortality rates were 1.6 times higher among elderly (65+ years) Aboriginal males and twice as high among elderly Aboriginal women than their non-Aboriginal peers (see Table 6). Circulatory diseases were the leading cause of deaths in elderly Aboriginal and non-Aboriginal persons. Neoplasms were the second commonest cause of death among elderly Aboriginal and non-Aboriginal women and among elderly non-Aboriginal males. Of the Aboriginal male deaths due to respiratory disease, 46% (n=21) were due to COAD and 37% (n=17) were due to pneumonia. Among elderly Aboriginal females, respiratory disease deaths included 43% (n=12) due to pneumonia and 39% (n=11) due to COAD. Deaths from diabetes mellitus occurred in Aboriginal males at 6.8 times, and in Aboriginal females at 8.4 times, the non-Aboriginal rates.

Age-standardised death rates: 1985-89 to 1990-94

The rate ratio of Aboriginal to non-Aboriginal deaths for males was 2.4 (CI 2.3-2.6) during 1985-89 compared with 2.6 (CI 2.5-2.8) during 1990-94 (see Table 7). Between 1985-89 and 1990-94, there was a significant decrease of 11% in all-cause age-standardised mortality rates among non-Aboriginal males and a non-significant fall of 3% among Aboriginal males.

There was a large and significant increase in age-standardised

mortality rates from endocrine diseases in Aboriginal males between 1985-89 and 1990-94. This was predominantly due to deaths from diabetes mellitus. Aboriginal males had small, but non-significant, decreases in deaths from circulatory disease, injury and poisoning, respiratory diseases, infectious and parasitic diseases, digestive disorders, mental disorders and genitourinary diseases and a small, non-significant increase in deaths from neoplasms over that time.

The rate ratio of age-standardised Aboriginal to non-Aboriginal deaths in females was 2.5 (CI 2.2-2.7) in 1985-89 compared with 2.9 (CI 2.7-3.1) during 1990-94 (see Table 8). Between 1985-89 and 1990-94, there was a significant decrease of 5% in all-cause age-standardised death rates among non-Aboriginal females; over that time there was a non-significant increase of 11% among Aboriginal females (see Table 8 for details). As with the Aboriginal males, small numbers make it unwise to comment on changes in any one disease with confidence.

Discussion

Death rates among Aboriginal persons in WA were much higher than in non-Aboriginal people from the mid-1980s to the mid-1990s. During 1990-94, the age-standardised all-cause death rate ratios were 2.6 for males and 2.9 for females. This is similar to 1983-89 when the age-standardised death rate ratios in WA were 2.6 for males and 3.0 for females.[2]

Between 1985-89 and 1990-94, the all-cause age-standardised death rate among Aboriginal males in WA decreased by 3%, but this was not significant. This compared with a significant 11% decrease among non-Aboriginal males. There was an increase in the male death rate ratio from 2.4 in 1985-89 to 2.6 in 1990-94 (p = ns) which suggests that the relative gap between age-standardised death rates (Aboriginal : non-Aboriginal) for males widened. A recent report using data from WA, South Australia and the Northern Territory indicated a slight and similar decrease in death rates in Indigenous and non-Indigenous males from 1985 to 1994.[3]

Table 5: Major causes of mortality in Aboriginal persons aged 50-64 years compared with non-Aboriginal persons 50-64 years old in WA,1990-94.

A: Males		Aboriginal		Non-Aboriginal			
Rank	ICD-9 chapter	n[a]	Rate[b]	n[a]	Rate[b]	RR[c]	95% CI
1	Circulatory (VII)	97	1514.2	1,538	288.7	5.2	4.2-6.4
	– Acute myocardial infarction	44	686.9	649	121.8	5.6	4.1-7.6
	– Ischaemic heart disease	21	327.8	483	90.7	3.6	2.3-5.6
	– Cerebrovascular disease	14	218.5	154	28.9	7.6	4.4-13.1
2	Neoplasms (II)	40	624.4	1,819	341.4	1.8	1.3-2.5
	– Trachea,bronchus,lung	12	187.3	541	101.5	1.8	1.0-3.2
	– Digestive organs,peritoneum	10	156.1	508	95.3	1.6	0.8-3.0
3	Respiratory (VIII)	28	437.1	217	40.7	10.7	7.2-15.9
4	Endocrine (III)	20	312.2	113	21.2	14.7	9.1-23.6
	– Diabetes mellitus	20	312.2	73	13.7	22.8	13.9-37.4
5	Injury (XVII)	17	265.4	296	55.6	4.8	2.9-7.8
	– MVTA[d]	9	140.5	62	11.6	12.1	6.0-24.3
	– Homicide	2	31.2	8	1.5	20.8	4.4-98.0
	All causes	**240**	**3746.5**	**4,327**	**812.2**	**4.6**	**4.0-5.2**
B: Females		**Aboriginal**		**Non-Aboriginal**			
Rank	**ICD-9 chapter**	**n[a]**	**Rate[b]**	**n[a]**	**Rate[b]**	**RR[c]**	**95% CI**
1	Circulatory (VII)	80	1077.7	483	95.2	11.3	8.9-14.3
	– Ischaemic heart disease	25	336.8	96	18.9	17.8	11.5-27.6
	– Acute myocardial infarction	19	256	170	33.5	7.6	4.7-12.2
	– Cerebrovascular disease	18	242.5	112	22.1	11.0	6.7-18.1
2	Neoplasms (II)	33	444.6	1,317	259.5	1.7	1.2-2.4
	– Digestive organs, peritoneum	9	121.3	333	65.6	1.8	0.9-3.5
	– Trachea,bronchus,lung	7	94.3	193	38	2.5	1.2-5.3
3	Endocrine (III)	28	377.2	56	11	34.3	21.8-54.0
	– Diabetes mellitus	26	350.3	43	8.4	41.7	25.6-67.8
4	Digestive (IX)	9	121.2	79	15.6	7.8	3.9-15.5
5	Respiratory (VIII)	7	94.3	103	20.3	4.6	2.1-9.9
6	Genitourinary (X)	7	94.3	17	3.3	28.6	11.9-69.0
	All causes	**182**	**2451.8**	**2,251**	**443.6**	**5.5**	**4.7-6.4**

Notes:
(a) n = number of deaths.
(b) Rate = age-specific mortality rate per 10^5 person years.
(c) RR = ratio of Aboriginal to non-Aboriginal mortality rates.
(d) MVTA = motor vehicle traffic accidents.

Among Aboriginal females in WA, there was a non-significant increase of 11% in the age-standardised death rate from 1985-98 to1990-94 compared with a significant decrease of 5% among non-Aboriginal females. There was an increase in the female death rate ratio from 2.5 in 1985-89 to 2.9 in 1990-94 (p = ns). As with males, this indicates a relative worsening of the situation between Aboriginal and non-Aboriginal females.

There are difficulties in statistical analysis associated with the relatively small numbers of absolute deaths, and the associated larger errors that result, among Aboriginal people. This limits our ability to comment further on the changes observed. There is a widespread perception that most Aboriginal people in Western Australia live in remote or rural areas. This is not the case. The majority of the State's Aboriginal population lives in the metropolitan areas of Perth/Fremantle and in the settled areas of the State's south-west. There are some regional differences in disease and mortality patterns throughout the State but, overall, these are not great, particularly when compared with the vast differences between Aboriginal and non-Aboriginal rates.

Our findings confirm that circulatory diseases are the leading cause of deaths among Aboriginal and non-Aboriginal people. These diseases (particularly ischaemic heart disease) contribute substantially to the excess Aboriginal deaths in early middle age. From 1985-89 to 1990-94, there was a non-significant decrease of 0.9% per year in deaths from circulatory diseases among Aboriginal males and a 1.8% per year increase, also not significant, in deaths from circulatory diseases among Aboriginal females. From 1972 to 1988, there was a 50% decrease in coronary heart disease mortality in the wider Australian community.[8,9] Our findings suggest that while deaths from circulatory diseases may be marginally improving among Aboriginal males, there appears to be no associated improvement, or perhaps a deterioration, among Aboriginal females;[1-3] the community-wide improvement is not occurring in Aboriginal people.

A major feature of our study was finding substantial increases in endocrine deaths among Aborigines and non-Aborigines; in Aboriginal people these deaths (85%) are mainly due to diabetes mellitus. These deaths increased in all four groups but the increase in death rates in Aborigines, particularly males, was substantially greater than in non-Aborigines. As mentioned, >85% of the deaths in this chapter, for both periods, were due to diabetes mellitus. Among non-Aboriginal people, 80% and 70% of

Table 6: Major causes of mortality in Aboriginal persons aged 65+ years compared with non-Aboriginal persons aged 65+ years old in WA, 1990-94.

A: Males		Aboriginal		Non-Aboriginal			
Rank	ICD-9 chapter	n[a]	Rate[b]	n[a]	Rate[b]	RR[c]	95% CI
1	Circulatory (VII)	108	3303.8	8,456	2379.8	1.4	1.2-1.7
	– Cerebrovascular disease	46	1407.2	1,686	474.5	3.0	2.2-4.0
	– Acute myocardial infarction	30	917.7	3,224	907.3	1.0	0.7-1.4
	– Ischaemic heart disease	14	428.3	2,012	566.2	0.8	0.5-1.4
2	Respiratory (VIII)	46	1407.2	1,888	531.3	2.6	1.9-3.5
3	Neoplasms (II)	36	1101.3	5,104	1436.4	0.8	0.6-1.1
	– Digestive organs, peritoneum	12	367	1,395	392.6	0.9	0.5-1.6
	– Trachea, bronchus, lung	9	275.3	1,315	370.1	0.7	0.4-1.3
4	Endocrine (III)	22	673	418	117.6	5.7	3.7-8.8
	– Diabetes mellitus	21	642.4	338	95.1	6.8	4.4-10.6
5	Injury (XVII)	10	305.9	334	94	3.2	1.7-6.0
	All causes	**264**	**8075.9**	**18,058**	**5082.1**	**1.6**	**1.4-1.8**
B: Females		**Aboriginal**		**Non-Aboriginal**			
Rank	**ICD-9 chapter**	**n[a]**	**Rate[b]**	**n[a]**	**Rate[b]**	**RR[c]**	**95% CI**
1	Circulatory (VII)	131	3408.8	9,333	2037.1	1.7	1.4-2.0
	– Cerebrovascular disease	49	1275	2,498	545.2	2.3	1.7-3.0
	– Acute myocardial infarction	31	806.7	2,997	654.2	1.2	0.8-1.7
	– Ischaemic heart disease	25	650.5	1,885	411.4	1.6	1.1-2.4
2	Neoplasms (II)	36	936.8	3,828	835.5	1.1	0.8-1.5
	– Digestive organs, peritoneum	6	156.1	1,210	264.1	0.6	0.3-1.3
	– Trachea,bronchus,lung	4	104.1	551	120.3	0.9	0.3-2.4
3	Endocrine (III)	34	884.7	527	115	7.7	5.4-10.9
	– Diabetes mellitus	30	780.6	427	93.2	8.4	5.8-12.2
4	Respiratory (VIII)	28	728.6	1,211	264.3	2.8	1.9-4.1
5	Mental (V)	18	468.4	441	96.3	4.9	3.0-7.8
	All causes	**296**	**7702.3**	**17,600**	**3841.5**	**2.0**	**1.8-2.2**

Notes:
(a) n= number of deaths.
(b) Rate = age-specific mortality rate per 10^5 person-years.
(c) RR = ratio of Aboriginal to non-Aboriginal mortality rates.

Table 7: Changes in age-standardised mortality rates for major causes of death among males in WA, 1985-89 to 1990-94.

A: Aboriginal ICD-9 chapter	1985-89 n[a]	1985-89 ASR[b] (95% CI)		1990-94 n[a]	1990-94 ASR[b] (95% CI)		% ASR[b] difference
Circulatory (VII)	296	555.6	(491.5-619.7)	285	507.4	(446.8-569.0)	-9
Respiratory (VIII)	109	196.3	(158.3-234.5)	116	194.3	(157.1-231.5)	-1
Injury (XVII)	159	192.3	(160.0-225.0)	180	182.1	(152.7-211.5)	-5
Neoplasm (II)	78	154	(119.3-188.7)	93	175.2	(138.7-211.6)	+14
Endocrine (III)	26	48.1	(29.3-66.9)	61	106.8	(79.0-134.6)	+122[c]
Digestive (IX)	57	93.4	(67.9-118.9)	45	67.4	(46.4-88.3)	-28
All causes	**914**	**1501.6**	**(1401.4-1601.8)**	**967**	**1453.7**	**(1357.3-1550.1)**	**-3**
B: Non-Aboriginal ICD-9 chapter	**1985-89 n[a]**	**1985-89 ASR[b] (95% CI)**		**1990-94 n[a]**	**1990-94 ASR[b] (95% CI)**		**% ASR[b] difference**
Circulatory (VII)	10,630	258	(253.1-262.9)	10,425	212.7	(208.6-216.8)	-18[c]
Respiratory (VIII)	2,055	49.5	(47.3-51.6)	2,156	43.7	(41.9-45.5)	-12[c]
Injury (XVII)	2,221	56.5	(54.1-58.8)	2,349	53.6	(51.4-55.8)	-5
Neoplasm (II)	6,715	165.2	(161.3-169.1)	7,461	156	(152.5-159.5)	-6[c]
Endocrine (III)	417	10.2	(9.2-11.2)	693	14.4	(13.2-15.6)	+41[c]
Digestive (IX)	813	20	(18.6-21.4)	760	15.9	(14.7-17.1)	-20[c]
All causes	**24,809**	**617.6**	**(610.0-625.2)**	**25,938**	**548.3**	**(541.6-555.0)**	**-11**[c]
C. Rate ratios of ASR (Aboriginal vs. non-Aboriginal)							
All causes		**2.4**	**(2.3-2.6)**		**2.6**	**(2.5-2.8)**	

Notes:
(a) n = number of deaths.
(b) ASR = age-standardised mortality rate per 10^5 person-years.
(c) p<0.05.

Table 8: Changes in age-standardised mortality rates for major causes of death among females in WA, 1985-89 to 1990-94.

A: Aboriginal ICD-9 chapter	1985-89 n[a]	1985-89 ASR[b] (95% CI)		1990-94 n[a]	1990-94 ASR[b] (95% CI)		% ASR[b] difference
Circulatory (VII)	201	356.3	(306.5-406.1)	256	419.4	(367.5-471.3)	+18
Respiratory (VIII)	50	75.8	(53.6-97.9)	56	81.3	(59.0-103.6)	+7
Injury (XVII)	63	73.9	(54.1-93.7)	73	71.2	(53.8-88.6)	-4
Neoplasm (II)	69	119.4	(90.6-148.2)	84	137	(107.2-166.8)	+15
Endocrine (III)	46	82.6	(58.2-106.9)	73	121.2	(93.0-149.4)	+47
Genitourinary (X)	42	75.8	(52.7-98.9)	28	47.1	(29.5-64.7)	-38
All causes	**617**	**971.7**	**(892.9-1050.5)**	**738**	**1076.3**	**(996.9-1155.7)**	**+11**
B: Non-Aboriginal ICD-9 chapter	**1985-89 n[a]**	**1985-89 ASR[b] (95% CI)**		**1990-94 n[a]**	**1990-94 ASR[b] (95% CI)**		**% ASR[b] difference**
Circulatory (VII)	9,445	176.3	(172.8-179.8)	9,956	158	(154.9-161.1)	-10*
Respiratory (VIII)	1,140	22.2	(20.8-23.6)	1,367	22.5	(21.3-23.7)	+1
Injury (XVII)	832	20.2	(18.8-21.6)	946	20.3	(18.9-21.7)	-
Neoplasm (II)	5,033	107	(104.1-109.9)	5,801	105.9	(103.1-108.6)	-1
Endocrine (III)	452	8.8	(8.0-9.6)	627	10.6	(9.8-11.4)	+20[c]
Genitourinary (X)	308	5.7	(5.1-6.3)	301	4.8	(4.2-5.4)	-16
All causes	**19,550**	**395.8**	**(390.1-401.5)**	**21,720**	**376.1**	**(371.0-381.2)**	**-5** [c]
C. Rate ratios of ASR (Aboriginal vs. non-Aboriginal)							
All causes		**2.5**	**(2.2-2.7)**		**2.9**	**(2.7-3.1)**	

Notes:
(a) n = number of deaths.
(b) ASR = age-standardised mortality rate per 10^5 person-years.
(c) p<0.05.

deaths were due to diabetes in 1985-89 and 1990-94, respectively. The recent increase in incidence, prevalence and deaths from diabetes in developing communities has been well documented, for example from the Pacific Rim countries of Asia, from the Eastern Mediterranean and from ethnic Indians in Fiji and Singapore.[10]

This paper has highlighted the much higher, and apparently increasing, relative death rates among Aboriginal people from so-called 'lifestyle diseases'. These include, most prominently, diseases of the circulatory system (particularly ischaemic heart disease), type 2 diabetes mellitus, diseases of the respiratory tract associated with smoking, and alcohol-related disorders. The increased rates of these diseases and the higher death rates associated with them are often attributed to genetic susceptibility combined with recent changes in risk factors such as westernised diets, the trend towards more sedentary living and the use or misuse of potentially harmful substances like tobacco and alcohol.[10-15] Recent and rapid increased risks and deaths have been documented in many Indigenous populations that are now in transition from hunter-gathering and traditional farming practices to cash economies (e.g. North American Indians, Alaskan native populations, Canadian Inuits, Pacific Islanders) as well as regions or countries that have or are rapidly becoming more industrialised, market-oriented and aligned with international economies (e.g. parts of Asia, Africa and the Middle East).[10,13,16-19] The burden of these so-called 'lifestyle' diseases, globally, is now so serious that it has been recognised by the World Health Organization.[20]

A five-year follow-up study among Aboriginal children and adolescents living in westernising, previously traditional communities in remote north-west Australia found a high prevalence of risk factors for diabetes mellitus and cardiovascular diseases with abnormalities of carbohydrate and lipid metabolism well established by late in the second decade of life.[21] This indicates an urgent need for earlier and more effective detection, screening, education and treatment programs.

The purpose of this paper was not to show, yet again, the serious inequalities in Aboriginal health statistics. We have documented the most serious causes of deaths in males and females at various ages and trends in death patterns in WA. There seems to be a widening of the relative gap between Aboriginal and non-Aboriginal death rates and that cardiovascular diseases, diabetes mellitus and diseases of the respiratory tract are among the most important. This has implications for reduction in risk factors such as diet, overweight, smoking and exercise. These are now priorities that are being used to devise more effective programs for improved Aboriginal health in WA.

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