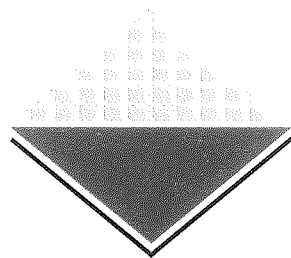


Cardiovascular Disease Series
Number 2

**Morbidity from
cardiovascular disease
in Australia**

**Catherine A Boyle
and
Annette J Dobson**



AUSTRALIAN INSTITUTE OF
HEALTH & WELFARE



The UNIVERSITY *of*
NEWCASTLE
AUSTRALIA

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CARDIOVASCULAR DISEASE SERIES
Number 2

COPY MADE ON BEHALF OF
AUSTRALIAN INSTITUTE OF HEALTH
& WELFARE

Morbidity from cardiovascular disease in Australia

Catherine A Boyle
and
Annette J Dobson

AUSTRALIAN INSTITUTE OF HEALTH AND WELFARE
AND
THE UNIVERSITY OF NEWCASTLE

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Preface

This paper is the second in a series of reports on cardiovascular disease in Australia. There are four other reports which will focus on other aspects of the disease: risk factors, mortality, medical care and costs, and the outline of a proposed monitoring and surveillance system. The aim of this report is to provide information on morbidity due to cardiovascular disease (International Classification of Diseases Version 9—Clinical Modification codes 390–459)¹ and to examine issues related to the presentation and interpretation of morbidity data.

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This paper is the second in a series of reports on cardiovascular disease in Australia. There are four other reports which will focus on other aspects of the disease: risk factors, mortality, medical care and costs, and the outline of a proposed monitoring and surveillance system.

The aim of this report is to provide information on morbidity due to cardiovascular disease (International Classification of Diseases Version 9—Clinical Modification codes 390–459)¹ and to examine issues related to the presentation and interpretation of morbidity data.

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Summary

This report presents a picture of morbidity from cardiovascular disease in Australia at the present time, from data currently available. Rates and numbers of heart attacks by sex, age and State or Territory have been estimated from routinely collected morbidity and mortality data with corrections based on validation studies from the Newcastle MONICA Project. Advantages and disadvantages of the three different methods of estimation are discussed. Event rates and case fatalities for the two Australian MONICA centres (Newcastle and Perth) are compared with rates from international MONICA centres. Sex- and age-specific numbers and rates of cerebrovascular disease from a population register in Perth are presented as well as data from other international stroke registers. Numbers of hospital admissions for other cardiovascular diseases are also provided. Age- and sex-specific numbers and rates of cardiovascular conditions from population health surveys are summarised. The report also highlights problems with the routinely collected data.

1 Introduction

Cardiovascular disease is a major cause of death and illness in Australia. In 1993, it accounted for 43.8% (53,240 registered deaths) of deaths from all causes, and it was a significant cause of premature death resulting in 63,150 person years of life lost before age 65.

This report presents a picture of morbidity (illness) from cardiovascular disease in Australia at the present time, from data currently available.

Box 1: International classification of cardiovascular disease

Cardiovascular disease (CVD) includes all diseases of the heart and the circulatory system. The Ninth revision of the International Classification of Diseases classifies CVD under the chapter 'Diseases of the Circulatory System (ICD-9-CM 390–459)' and includes the following:

- *rheumatic heart disease (ICD-9-CM 390–398)*
- *hypertensive disease (ICD-9-CM 401–405)*
- *ischaemic heart disease (ICD-9-CM 410–414)*
- *diseases of pulmonary circulation (ICD-9-CM 415–417)*
- *other forms of heart disease (ICD-9-CM 420–429)*
- *cerebrovascular disease (ICD-9-CM 430–438)*
- *diseases of the arteries, arterioles, and capillaries (ICD-9-CM 440–448)*
- *diseases of veins and lymphatics, and other diseases of the circulatory system (ICD-9-CM 451–459).*

1.1 Sources of morbidity data

Routinely collected data

At present the main source of data on cardiovascular disease morbidity is the hospital separations data. This report uses data from the 1991–92 (or closest available year) hospital separations data base. These data contain details of all public hospital admissions in Australia, and allow for one or more discharge diagnoses to be coded. Data for most States and Territories now also include details of private hospital admissions, however at the time of writing, private hospital admissions data were only available to the Australian Institute of Health and Welfare for three States. Within each State or Territory the State health department is responsible for the hospital separations data, except for hospitals administered by the Department of Veterans' Affairs, for which the Commonwealth Government is responsible. Mortality data are available from the Australian Bureau of Statistics (ABS) mortality files which contain information from death certificates.

Surveys

Information on morbidity may also be obtained from population surveys such as the Risk Factor Prevalence Surveys conducted by the National Heart Foundation of Australia²⁻⁴ and the National Health Surveys conducted by the Australian Bureau of Statistics.⁵⁻⁷

The WHO MONICA Project

During the past 10 years active monitoring of heart attacks has been undertaken by the two MONICA centres established in Newcastle (New South Wales) and Perth (Western Australia). The MONICA Project is a World Health Organization international epidemiological project whose aim is to MONITOR trends and determinants of Cardiovascular disease over a 10-year period (hence the name MONICA).⁸ The project involved collection of data on all suspected heart attacks in the study region during the specified time period, as well as conducting risk factor surveys. The age range for the study was 25–64 years, although some centres collected data for a wider age range. In the Newcastle centre, suspected heart attacks were registered for persons aged 25–69 years, while Perth registered suspected cases aged 25–64 years. The Perth centre also conducted a stroke register for an 18-month period. However, the heart attack registration phase of the study has been completed and at present there is no active surveillance or monitoring of cardiovascular disease in Australia.

1.2 Estimates of morbidity from cardiovascular disease

Two major components of cardiovascular disease are acute myocardial infarction (AMI) or heart attack (ICD-9-CM 410) and cerebrovascular disease or stroke (ICD-9-CM 430–438). Because of their importance, morbidity due to these conditions will be examined separately.

2 Acute myocardial infarction

2.1 Problems with the data

As part of the quality control procedure for the Newcastle MONICA Project, all MONICA registrations were linked with records of hospital admissions to examine the accuracy of the hospital discharge diagnosis code for AMI (ICD-9/ICD-9-CM 410). All MONICA cases registered at eight public hospitals in the study area between 27 August 1986 and 31 December 1991 were linked to the public hospital separations data for the same period. The MONICA Project protocol has four diagnostic categories for non-fatal events and four diagnostic categories for fatal events (the categories are not identical for fatal and non-fatal events). The classification of 'definite AMI' is assigned to cases determined to have had an AMI by algorithms based on the results of electrocardiograms (ECGs), cardiac enzyme levels, signs and symptoms of the event and, where relevant, necroscopy findings.

Using MONICA data as the 'gold standard' the sensitivity and positive predictive value of the hospital discharge diagnosis code of 410 can be determined. The sensitivity is defined as the proportion of cases with a MONICA diagnosis of 'definite AMI' which have a hospital discharge diagnosis coded 410; the positive predictive value is the proportion of AMIs in the hospital discharge data (i.e. those coded 410) which are definite AMIs according to the MONICA criteria.

For the Hunter Area Inpatients Statistics Collection, up to five discharge diagnoses can be coded. For the accuracy study all five possible discharge diagnoses were examined and the final hospital diagnosis was categorised to the most severe heart disease-related condition in any of the discharge diagnoses.

Table 1 compares the MONICA diagnosis of acute myocardial infarction (AMI) with *any* of the five possible hospital discharge diagnoses coded 410 for non-fatal cases for the eight public hospitals involved in the Newcastle MONICA Project during the study period defined above. Of the 2,071 MONICA registrations with a diagnosis of AMI, 1,634 had a hospital discharge coded 410 resulting in a sensitivity of 79% (95% CI: 77%–81%).⁹ There were 2,492 records with a hospital discharge coded 410, of which 1,634 had a MONICA diagnosis of AMI—a positive predictive value (PPV) of 66% (95% CI: 64%–67%).

The 11,628 patients not in MONICA did not fit the criteria for MONICA registration. Initially the records were checked for all patients with a hospital discharge diagnosis coded 410 who had not been registered with MONICA. Table 1 excludes 81 patients who were considered ineligible, who resided outside the study area, or who may have been missed by MONICA. The remaining 352 records in this category represent patients who were discharged alive from hospital but died within 28 days of the event (a MONICA fatal case), those who were transferred or readmitted within 28 days and were already registered, and patients for whom the discharged diagnosis had been miscoded.

Table 1: Any hospital discharge diagnosis coded AMI by MONICA diagnosis for non-fatal cases aged 25–69 years who were admitted to one of the eight Lower Hunter Area public hospitals during the period 27.8.86 to 31.12.91

Hospital discharge diagnosis	MONICA diagnosis					Total
	Definite AMI	Possible AMI	Ischaemic cardiac arrest	Not AMI	Not in MONICA	
410 (AMI)	1,634	403	13	90	352	2,492
411 (subacute AMI)	124	627	1	56	425	1,233
412 (old AMI)	51	194	6	29	1,620	1,900
413 (angina)	101	625	0	62	902	1,690
414 (other IHD)	73	257	10	52	4,076	4,468
426–429 (other heart disease)	27	76	11	19	2,834	2,967
786.5 (chest pain)	32	379	0	32	1,419	1,862
Other	29	85	3	24	0	141
Total	2,071	2,646	44	364	11,628	16,753

Source: Boyle and Dobson⁹

Sensitivity was statistically significantly higher for men (82%) than for women (71%) and also decreased with increasing age. Sensitivity was calculated for the five age groups 25–44, 45–54, 55–59, 60–64 and 65–69 years with values of 89%, 81%, 78%, 78% and 74% respectively. There were also statistically significant differences in sensitivity among hospitals with values ranging from 71% to 83%. However sensitivity did not vary significantly by year of admission for the period of this study. Positive predictive value of the hospital discharge diagnosis code 410 varied significantly only with hospital, ranging from 55% to 71%. A positive predictive value of 55% indicates that almost half of the admissions coded 410 were not in fact due to AMI.

Sensitivity was also significantly higher for patients with no history of AMI (89%) compared with those with a history of AMI (61%) or other ischaemic heart disease (IHD) (68%); higher for current smokers (86%) compared with ex-smokers (74%) or those who had never smoked (76%); and lower for those with a self-reported history of high blood pressure (76%) compared with those with no history of high blood pressure (82%). Positive predictive value of these risk factors could not be calculated because risk factor data were only available on MONICA registrations and some patients with a hospital discharge diagnosis coded 410 had not been registered by MONICA.

Because the data available to the Australian Institute of Health and Welfare (AIHW) for some States for 1991–92 (or closest available year) included only the principal discharge diagnosis, the *principal* hospital discharge diagnosis only was also compared with the MONICA diagnosis, as shown in Table 2. The sensitivity and positive predictive value of the principal discharge diagnosis code of AMI (410) were 76% (95% CI: 74%–78%) and 70% (95% CI: 68%–72%).

Table 2: Principal hospital discharge diagnosis coded AMI by MONICA diagnosis for non-fatal cases aged 25-69 years who were admitted to one of the eight Lower Hunter Area public hospitals during the period 27.8.86 to 31.12.91

Hospital discharge diagnosis	MONICA diagnosis					Total
	Definite AMI	Possible AMI	Ischaemic cardiac arrest	Not AMI	Not in MONICA	
410 (AMI)	1,577	354	10	71	251	2,263
411 (subacute AMI)	126	618	0	55	350	1,149
412 (old AMI)	2	3	0	0	1	6
413 (angina)	110	651	0	58	466	1,285
414 (other IHD)	61	162	1	34	1,625	1,883
426-429 (other heart disease)	56	110	21	27	1,812	2,026
786.5 (chest pain)	55	543	0	52	1557	2,207
Other	84	205	12	67	0	368
Total	2,071	2,646	44	364	6,062	11,187

Source: Boyle and Dobson⁹

Table 3: Cause of death diagnosis for death certification codes and MONICA diagnosis for fatal cases aged 25-69 years who died in one of the five Lower Hunter Local Government Areas between 27.8.86 and 31.12.91

Death certificate diagnosis	MONICA diagnosis					Total
	Definite AMI	Possible AMI	Not AMI	Not in MONICA	Insufficient data ^(a)	
410 (AMI)	317	597	24	0	302	1,240
414 (other IHD) ^(b)	46	191	40	0	89	366
426-429 (other heart disease)	0	3	2	47	2	54
Other	34	70	49	0	65	218
Total	397	861	115	47	458	1,878

(a) Includes cases with no autopsy, no history of typical or atypical or inadequately described symptoms, no previous history of chronic ischaemic heart disease and no other diagnosis

(b) No deaths were coded 411-413

Source: Boyle and Dobson⁹

These results have important implications for use of morbidity data. Firstly, the number of hospital discharges coded ICD-9-CM 410 will be an overestimate of the true number of heart attacks (because the positive predictive value is lower than the sensitivity). Also comparisons of numbers and rates of admissions for heart attacks by sex, age group and geographic region may reflect variations in sensitivity and positive predictive value as well as real differences between the groups.

A further study by the Newcastle MONICA Project examined the accuracy of death certificate data for people aged 25-69 years who had died in one of the five Lower Hunter Local Government Areas between 27 August 1986 and 31 December 1991. Death certificate records with principal cause of death coded 410-414 were compared with MONICA diagnostic categories of 'definite AMI', 'possible AMI' and 'insufficient data for diagnosis'. The latter two categories are considered to represent fatal cases of AMI which do not have enough information to be classified as 'definite AMI' based on the MONICA diagnostic algorithms.

For non-fatal data, AMIs are represented by the ICD code of 410; for fatal cases the codes 410–414 are considered to represent deaths due to ischaemic heart disease.

A comparison of mortality data and MONICA data is shown in Table 3.⁹ The sensitivity and positive predictive value of the mortality data are very good for death certificate codes 410–414 compared with the combined MONICA categories of definite, possible and insufficient data. There were 1,716 deaths defined as AMI deaths by MONICA of which 1,542 had the cause of death coded 410–414—this resulted in a sensitivity of 90%. Of the 1,606 deaths registered at the Newcastle registry office with principal cause of death coded 410–414, 1,542 or 96% were considered to be AMI deaths according to the MONICA diagnosis.

Another problem with the hospital separations data is that the information provided to the Institute for 1991–92 (or closest available year) was not the same for all States and Territories. For example, for Western Australia and Tasmania there is no field differentiating between fatal and non-fatal separations. New South Wales, Victoria and the Australian Capital Territory provided five discharge diagnoses, the Northern Territory provided seven discharge diagnoses, hospitals administered by the Department of Veterans' Affairs provided two diagnoses, and Queensland, Western Australia, South Australia and Tasmania provided only the principal discharge diagnosis. Some States and Territories provided data from public and private hospitals while others only included data on public hospitals. Table A1 in Appendix A gives details for the hospital separations data provided by each State and Territory.

It is important to note that the hospital separations data provided to Australian Institute of Health and Welfare report admissions by hospital rather than address of the patient. This may affect the estimates for some States or Territories, since the closest major hospital for some locations will not necessarily be in the State of residence of the patient. For example people who live near the Australian Capital Territory or close to the Victorian border may be admitted to a hospital in these locations, rather than to a New South Wales hospital.

The hospital separations data do not include information on patients who are treated at home or have undiagnosed conditions. For AMI it is estimated that less than 1% of cases are home-treated¹⁰ but it is difficult to estimate the number of undiagnosed infarcts. This type of information can only be determined from a longitudinal or cohort study, such as the Framingham study where all subjects are followed-up over time and checked for disease on a regular basis. Analysis of 30 years of follow-up of the Framingham population demonstrated that more than 25% of AMIs were undiagnosed, of which half were 'silent' AMIs (those for which the patient had no symptoms) while for the remainder of cases the symptoms were so atypical that an AMI was never suspected.¹¹

2.2 Estimates of numbers and rates

There are two different techniques which can be used to estimate numbers of cases and rates of AMI in Australia. The first method involves adjusting the hospital separations data by a factor defined as 'positive predictive value divided by the sensitivity'. This method was used by Reznik et al. in the 1980s¹² as part of a study to determine the incidence of AMI from hospital records in New South Wales and Queensland. This technique can be demonstrated from the diagram below, which compares hospital discharge diagnosis with the 'true' diagnosis.

		True diagnosis		
		AMI	Not AMI	
Hospital discharge diagnosis	AMI	a	b	a + b
	Not AMI	c	d	
		a + c		

Figure 1: Hospital discharge diagnosis compared with 'true diagnosis'

The number of hospital separations coded 410 is given by the value $a + b$, while the true number of heart attacks which we wish to estimate is given by the value $a + c$. The value can be determined in the following way.

$$\begin{aligned}
 (a + c) &= (a + b) \times \frac{(a + c)}{(a + b)} \\
 &= (a + b) \times \frac{a}{(a + b)} / \frac{a}{(a + c)} \\
 &= (a + b) \times \frac{PPV}{sensitivity}
 \end{aligned}$$

The positive predictive value and sensitivity can be obtained by a validation study of hospital discharge diagnosis, such as those obtained from the Newcastle MONICA accuracy study.⁹ An alternative method of estimating numbers and rates of heart attacks involves the use of the mortality data and case fatality rates.

This report provides three estimates of numbers of non-fatal and total heart attacks as described below. Estimates are provided for five age groups of men: 25–44, 45–54, 55–59, 60–64, and 65–69 years. Because of small numbers of events in younger women, only four age categories were used for women: 25–54, 55–59, 60–64 and 65–69. Estimates could only be provided for age groups between 25 and 69 years because the multipliers used to adjust the morbidity and mortality data were based on MONICA data for these ages only.

Method 1

For estimates of non-fatal heart attacks, the number of hospital separations in each age and sex group with *principal* discharge diagnosis coded 410 was multiplied by a factor defined as the 'positive predictive value divided by the sensitivity'. The most recent data available at the time of writing for each State and Territory were used—1990 for Queensland, 1990–91 for the Northern Territory and 1991–92 for all other States and Territories. Table A1 in Appendix A describes the data available from each State and Territory. It was not possible to differentiate between fatal and non-fatal separations for Western Australia and Tasmania (since this code was not included in the data provided to the Institute). As a result, estimates of the number of non-fatal separations were obtained by applying the average proportion of non-fatal separations to all separations from the other States and Territories.

The positive predictive value (PPV) and sensitivity were obtained from the Newcastle MONICA Project study on the accuracy of hospital records, using hospital separations with a principal discharge diagnosis coded 410 as the definition of hospital AMI.⁹ Initially PPV and

sensitivity were calculated for the five age groups of men and four age groups of women described above. For both men and women the values were similar for all ages, and there was no trend for increasing age. Therefore to increase power, one overall estimate was obtained for men and one for women. Table B1 in Appendix B shows the estimates of PPV and sensitivity used. To obtain an estimate for the total number of heart attacks the average annual number of deaths coded 410–414 for the period 1990–92 was added to the estimate of the number of non-fatal events.

Method 2

This is similar to Method 1 except that estimates were determined from the number of hospital separations with *any* discharge diagnosis coded 410. The PPV and sensitivity were obtained using any of five possible discharge diagnoses coded 410 as a hospital AMI. These estimates are provided in Appendix B. For Queensland, South Australia, Western Australia and Tasmania, only the principal discharge diagnosis was available, therefore only two groups of estimates are provided for these States. The number of discharge diagnoses available for each State and Territory are provided in Table A1 in Appendix A.

Method 3

For each age and sex group, the average annual number of deaths coded 410–414 over the period 1990–92 was multiplied by the ratio of the number of non-fatal cases of AMI to the number of fatal cases of AMI. The numbers of non-fatal and fatal cases were obtained by the aggregation of five years of MONICA registrations (1989–93) as shown in Table B1 of Appendix B. Because of small values, numbers were obtained for four age groups of men—25–54, 55–59, 60–64, and 65–69 years—and only two age groups of women—25–59 and 60–69 years. To estimate the total number of heart attacks by this method, the number of Australian Bureau of Statistics deaths coded 410–414 was multiplied by the ratio of the total number of MONICA cases to the number of MONICA fatal cases determined from the same time period and age groups described above.

Rates and confidence intervals

Population rates of non-fatal and total events were calculated by dividing the estimated number of events by the estimated population for each age group at 30 June 1992.¹³ Age-standardised rates were calculated for each State and Territory for men and women separately by direct standardisation using the estimated Australian population at 30 June 1992 as the standard. The rate for each age group was multiplied by the proportion of the Australian population in that group and these values then summed to provide a total estimate for each State and Territory.

Ninety-five per cent confidence intervals were calculated for all estimates as described in Appendix B.

Results

Tables C1–C8 in Appendix C show the estimated numbers and rates of non-fatal heart attacks (with 95% confidence intervals) determined by the three methods by sex and age group for each of the eight States and Territories. The estimates for all events are shown in Tables C9–C18 in Appendix C.

Tables 4 and 5 show the estimated numbers and rates of heart attacks in Australia by age and sex, determined by Methods 1 and 3. Data for Method 2 has not been included because estimates are not available for all States.

It is important to note here that private hospital data is not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table 4: Numbers and rates of non-fatal heart attacks in Australia, by sex and age group, estimated by two different methods

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	1,261	(1,217, 1,305)			46	(44, 48)		
	3	815	(681, 949)			30	(25, 35)		
45-54 (men only)	1	2,622	(2,531, 2,714)			260	(251, 269)		
	3	2,141	(1,788, 2,494)			212	(177, 247)		
25-54 (women only)	1			839	(784, 895)			23	(21, 24)
	3			520	(394, 646)			14	(11, 17)
55-59	1	1,766	(1,705, 1,828)	530	(495, 565)	473	(456, 489)	145	(135, 155)
	3	1,231	(984, 1,477)	509	(386, 633)	330	(264, 396)	139	(106, 173)
60-64	1	2,234	(2,156, 2,313)	908	(848, 968)	617	(596, 639)	249	(232, 265)
	3	2,015	(1,687, 2,343)	613	(515, 711)	557	(466, 647)	168	(141, 195)
65-69	1	2,461	(2,375, 2,547)	1,396	(1,303, 1,488)	757	(731, 784)	396	(369, 422)
	3	2,340	(2,004, 2,676)	1,179	(991, 1,366)	720	(616, 823)	334	(281, 387)
Total ^(a)	1	10,345	(9,983, 10,707)	3,673	(3,430, 3,916)	215	(207, 222)	77	(72, 82)
	3	8,542	(7,891, 9,192)	2,821	(2,545, 3,096)	177	(164, 191)	59	(53, 65)

(a) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table 5: Numbers and rates of all heart attacks in Australia, by sex and age group, estimated by two different methods

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	1,615	(1,571, 1,659)			59	(57, 60)		
	3	1,169	(1,035, 1,304)			43	(38, 47)		
45-54 (men only)	1	3,553	(3,461, 3,645)			352	(343, 361)		
	3	3,072	(2,719, 3,424)			305	(270, 340)		
25-54 (women only)	1			1,093	(1,037, 1,148)			30	(28, 31)
	3			773	(647, 899)			21	(18, 24)
55-59	1	2,694	(2,632, 2,755)	778	(743, 813)	721	(705, 738)	213	(203, 223)
	3	2,158	(1,912, 2,405)	758	(634, 881)	578	(512, 644)	207	(174, 241)
60-64	1	3,838	(3,760, 3,916)	1,443	(1,383, 1,503)	1,061	(1,039, 1,082)	396	(379, 412)
	3	3,618	(3,291, 3,946)	1,149	(1,051, 1,246)	1,000	(909, 1,090)	315	(288, 342)
65-69	1	4,826	(4,740, 4,912)	2,426	(2,333, 2,518)	1,485	(1,458, 1,511)	688	(661, 714)
	3	4,705	(4,369, 5,041)	2,209	(2,021, 2,396)	1,447	(1,344, 1,550)	626	(573, 679)
Total ^(a)	1	16,526	(16,164, 16,887)	5,740	(5,497, 5,983)	343	(336, 351)	120	(115, 125)
	3	14,722	(14,072, 15,373)	4,888	(4,613, 5,164)	306	(292, 319)	102	(97, 108)

a) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

The hospital based estimates are consistently higher than those calculated from the mortality data except for the Northern Territory where the reverse is true. There are several possible reasons for this.

1. All estimates assume that coding practices in all States and Territories are fairly similar. To check this the proportion of coronary heart disease diagnoses (ICD-9 410-414) which were coded as AMIs (ICD-9 410) were examined for each State and Territory for both hospital separations data and mortality data. These tables are provided in Appendix D. For the hospital separations data the proportions are much higher for the Northern Territory than for all other States or Territories, although numbers are very small. Victoria has the next highest proportions. Estimates for all States and Territories (except for the Northern Territory) vary by only a few per cent although New South Wales generally has the lowest proportion of separations coded 410-414 which are due to AMI (410). However the rates of deaths due to AMI (ICD-9 410) divided by deaths due to all ischaemic heart disease (ICD-9 410-414) vary much more. This may indicate differences in coding or in the amount of information available which may cause some mortality-based estimates to be somewhat unreliable.
2. The estimates obtained from adjustment of the mortality data are based on case fatality rates from the Newcastle MONICA study population. If these rates are high compared with other Australian populations then the number and rates of total events for other areas may be underestimated. Comparison of case fatality rates between Newcastle and Perth demonstrate that for men, case fatality is slightly higher in Newcastle.^{14,15}
3. Hospital data are not available for the same time period for all States and Territories and mortality data are averaged over a later period than hospital data. Since mortality is decreasing we may expect slightly lower mortality for later years.
4. Some States and Territories provide the Australian Institute of Health and Welfare with separations data from public hospitals only, while others provide separations from public and private hospitals. The number of AMIs admitted to or occurring in private hospitals is unknown. The sensitivity and positive predictive value of the hospital data was based on public hospital separations only. Although private hospitals were not investigated, the nature of the hospital has been shown to influence sensitivity and positive predictive value and it is likely that sensitivity and PPV would be different for private hospitals. This may be of concern in larger private hospitals where acute heart attack cases may be treated, or where cardiovascular surgical procedures are performed since recent AMIs may be coded to 410. The proportion of public and private hospital beds which are available in private hospitals varies across States and Territories from 17% in the Australian Capital Territory to 32% in Victoria.¹⁶
5. Variation among hospitals in sensitivity and PPV for hospital discharge diagnosis codes is a cause of concern. Tertiary hospitals and small country hospitals are likely to have different accuracy and this is difficult to control for. Although the number of AMIs treated in small hospitals may not be large, this is not the case in tertiary hospitals.
6. Hospital separations data also include readmissions and transfers. Although this is accounted for to some degree by the PPV/sensitivity multiplier, if readmission or transfer rates in other areas differ from those in the Hunter then the adjustment may not be appropriate. This is also the case with coding errors.
7. Although sensitivity and PPV did not vary from year to year in the Newcastle MONICA study this may not always be the case in the future. Recent improvements in and increased availability of angioplasty and other procedures is likely to increase the rate of readmission and transfers. It may also increase the number of coding errors, since admissions may still be coded as 410 up to eight weeks after the event. This will then decrease the PPV of the hospital separations data.

Anecdotal evidence from the Hunter Region indicates that there has been an increase in the number of transfers between regional hospitals and the John Hunter Hospital in the last couple of years which could lead to a decrease in PPV.

8. The estimates determined from hospital separations data are based on location of hospital rather than address of the patient. The number of patients hospitalised in a State or Territory different to their usual residence is unknown. However, the problem may be significant for the Australian Capital Territory, for example when the number of cross-border hospitalisation is likely to be a relatively higher percentage of the total separations than for other States and Territories.

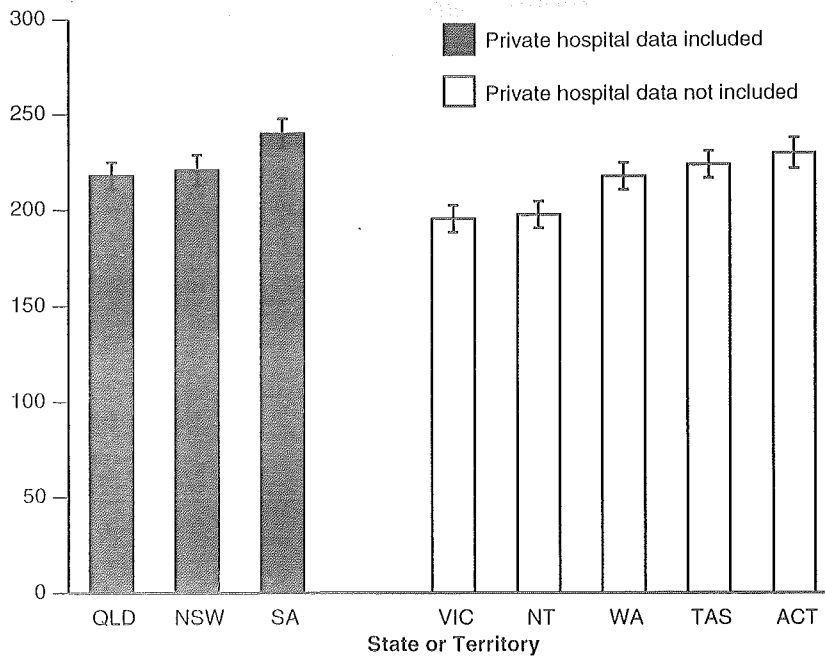
Although the effect of each of these issues may be only small, they could in total cause fairly large discrepancies in the estimates. Unfortunately it is difficult to determine which are the best estimates, and we can only use the values as a guide to the range of possible estimates of the extent of morbidity from AMI.

The major assumption made for the calculation of these estimates is that the sensitivity and PPV values and the ratio of non-fatal to fatal and total to fatal cases obtained for the Hunter Area are similar in all States and Territories. This assumes that coding practices in all States and Territories are fairly similar, which may not necessarily be the case.

Figures 2a and 2b show the age-standardised rates of non-fatal heart attacks for each State and Territory for men determined by Method 1 and Method 3 respectively. Similar results for women are shown in Figures 3a and 3b. Age-standardised rates of all heart attacks for men and women determined by Methods 1 and 3 are given in Figures 4a, 4b, 5a and 5b. As mentioned previously, State of admission is defined by the location of the hospital rather than State of residence of the patient.

For men, the Northern Territory has the highest rate of all heart attacks estimated by both methods. For women, the rates of non-fatal and total heart attacks are lowest in Victoria and highest in the Northern Territory for both methods of estimate. As mentioned previously, these data exclude heart attacks treated only in private hospitals in Victoria, Western Australia, Tasmania, the Australian Capital Territory and the Northern Territory, so rates may not be directly comparable.

Non-fatal heart attacks per 100,000^(a) per year with 95% confidence interval

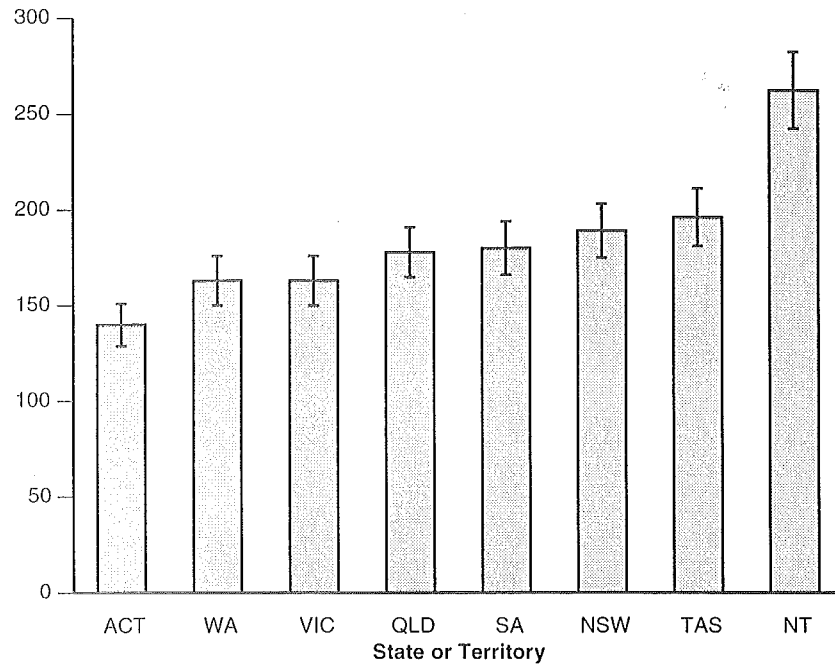


(a) Estimated by Method 1

Refer to Tables C1-C8

Figure 2a: Age-standardised rates of non-fatal heart attacks for men aged 25-69 by State or Territory estimated from hospital separations data for 1990 (Qld), 1990-91 (NT), 1991-92 (all others)

Non-fatal heart attacks per 100,000^(a) per year with 95% confidence interval

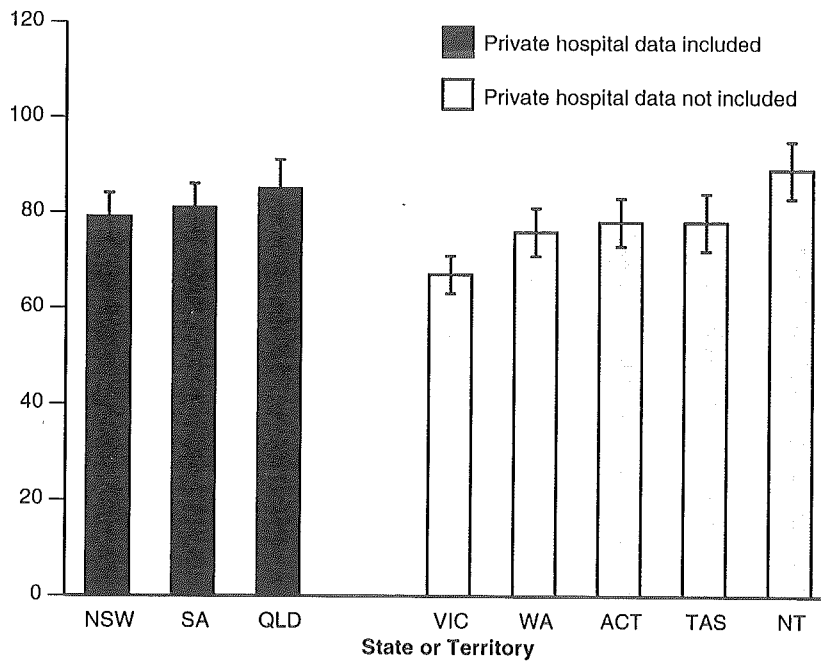


(a) Estimated by Method 3

Refer to Tables C1-C8

Figure 2b: Age-standardised rates of non-fatal heart attacks for men aged 25-69 by State or Territory estimated from average annual mortality data for 1990-92

Non-fatal heart attacks per 100,000^(a) per year with 95% confidence interval

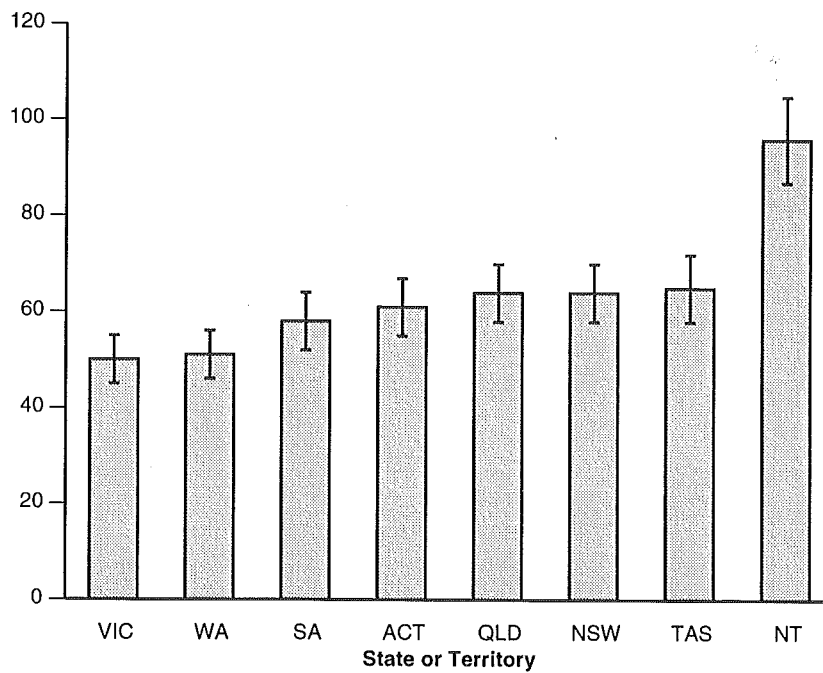


(a) Estimated by Method 1

Refer to Tables C1-C8

Figure 3a: Age-standardised rates of non-fatal heart attacks for women aged 25-69 by State or Territory estimated from hospital separations data for 1990 (Qld), 1990-91 (NT), 1991-92 (all others)

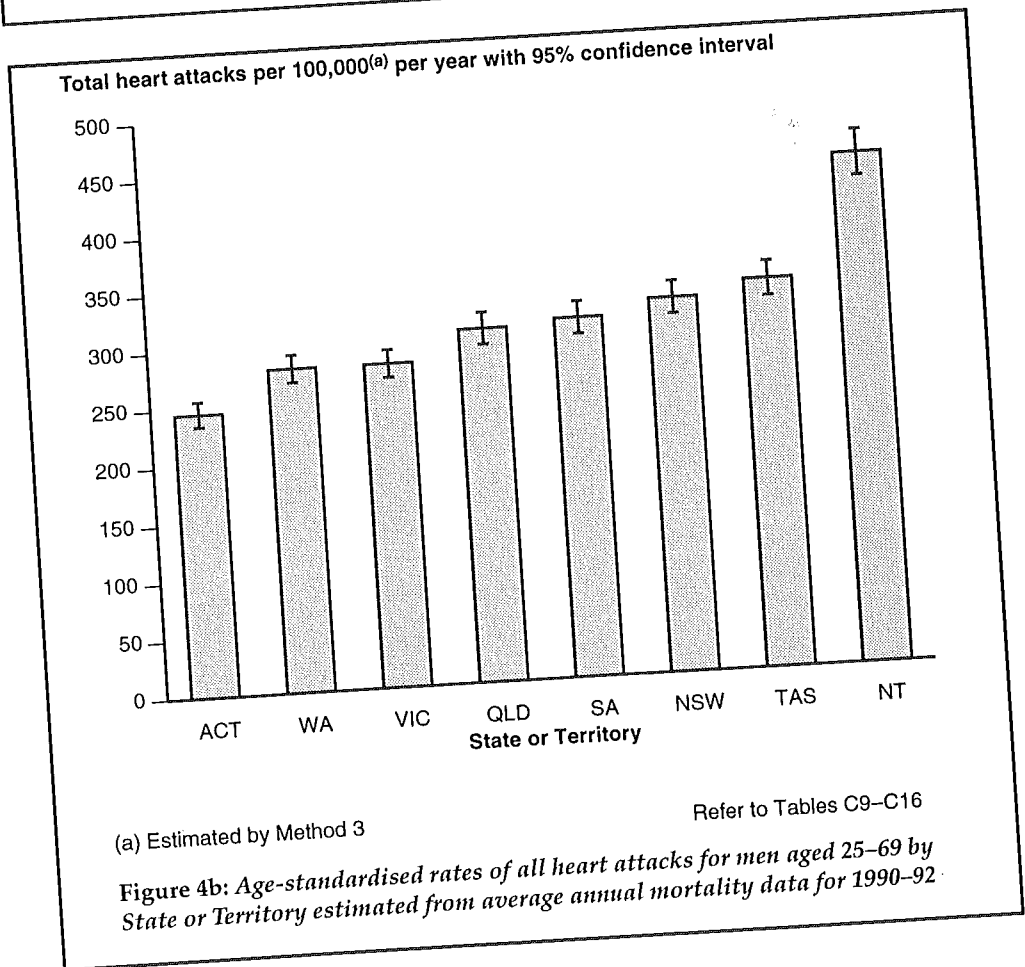
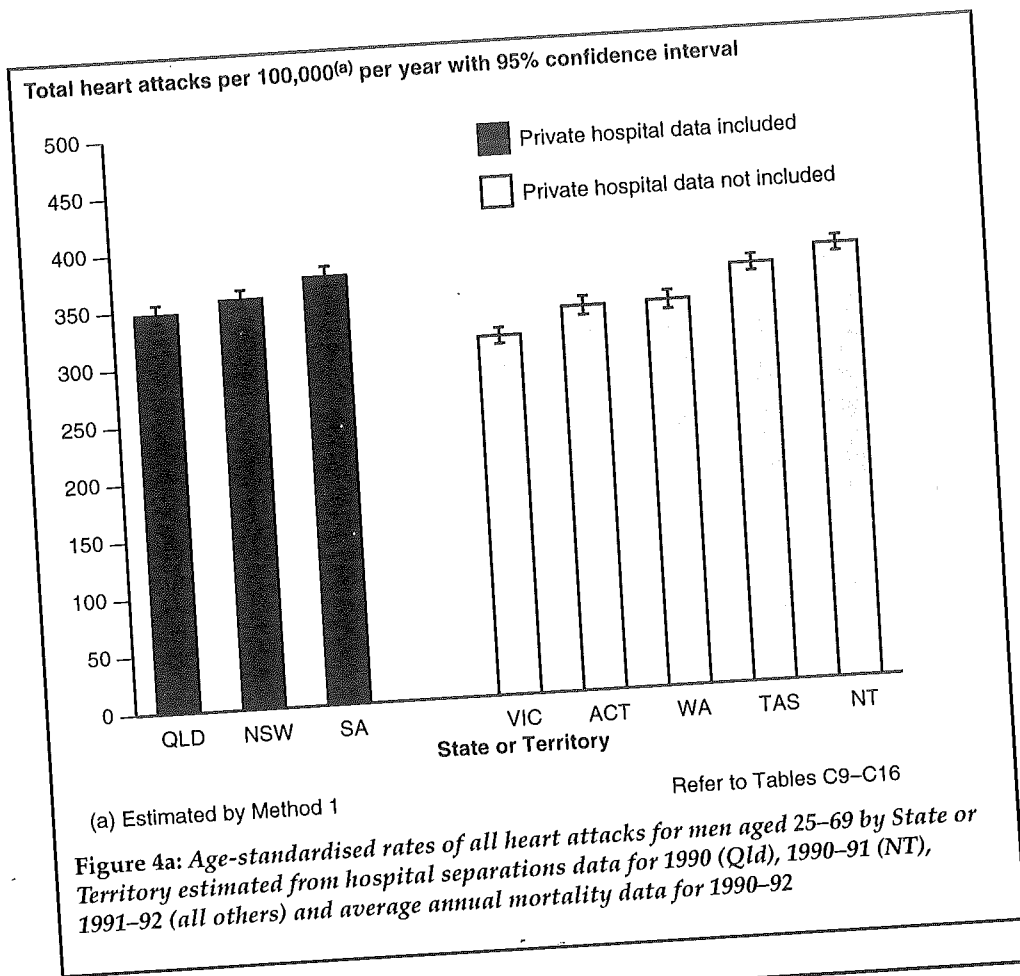
Non-fatal heart attacks per 100,000^(a) per year with 95% confidence interval



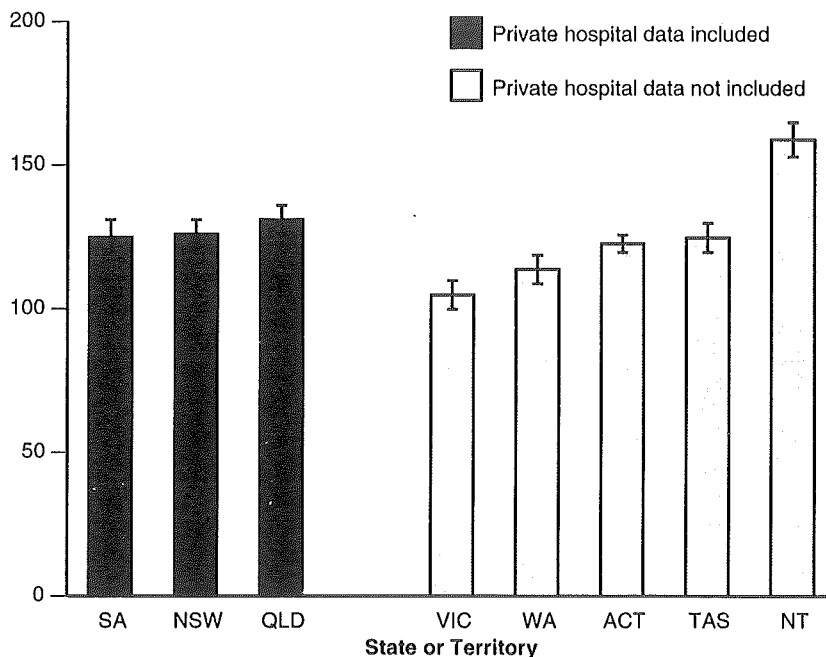
(a) Estimated by Method 3

Refer to Tables C1-C8

Figure 3b: Age-standardised rates of non-fatal heart attacks for women aged 25-69 by State or Territory estimated from average mortality data for 1990 (Qld), 1990-91 (NT), 1991-92 (all others) and average annual mortality data for 1991-92



Total heart attacks per 100,000^(a) per year with 95% confidence interval

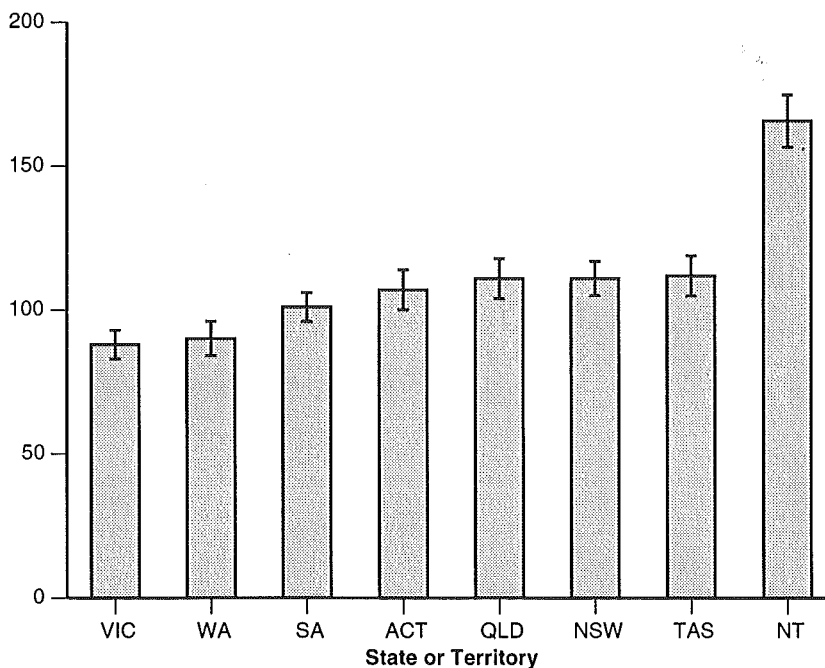


(a) Estimated by Method 1

Refer to Tables C9-C16

Figure 5a: Age-standardised rates of all heart attacks for women aged 25-69 by State or Territory estimated from hospital separations data for 1990 (Qld), 1990-91 (NT), 1991-92 (all others) and average annual mortality data for 1990-92

Total heart attacks per 100,000^(a) per year with 95% confidence interval



(a) Estimated by Method 3

Refer to Tables C9-C16

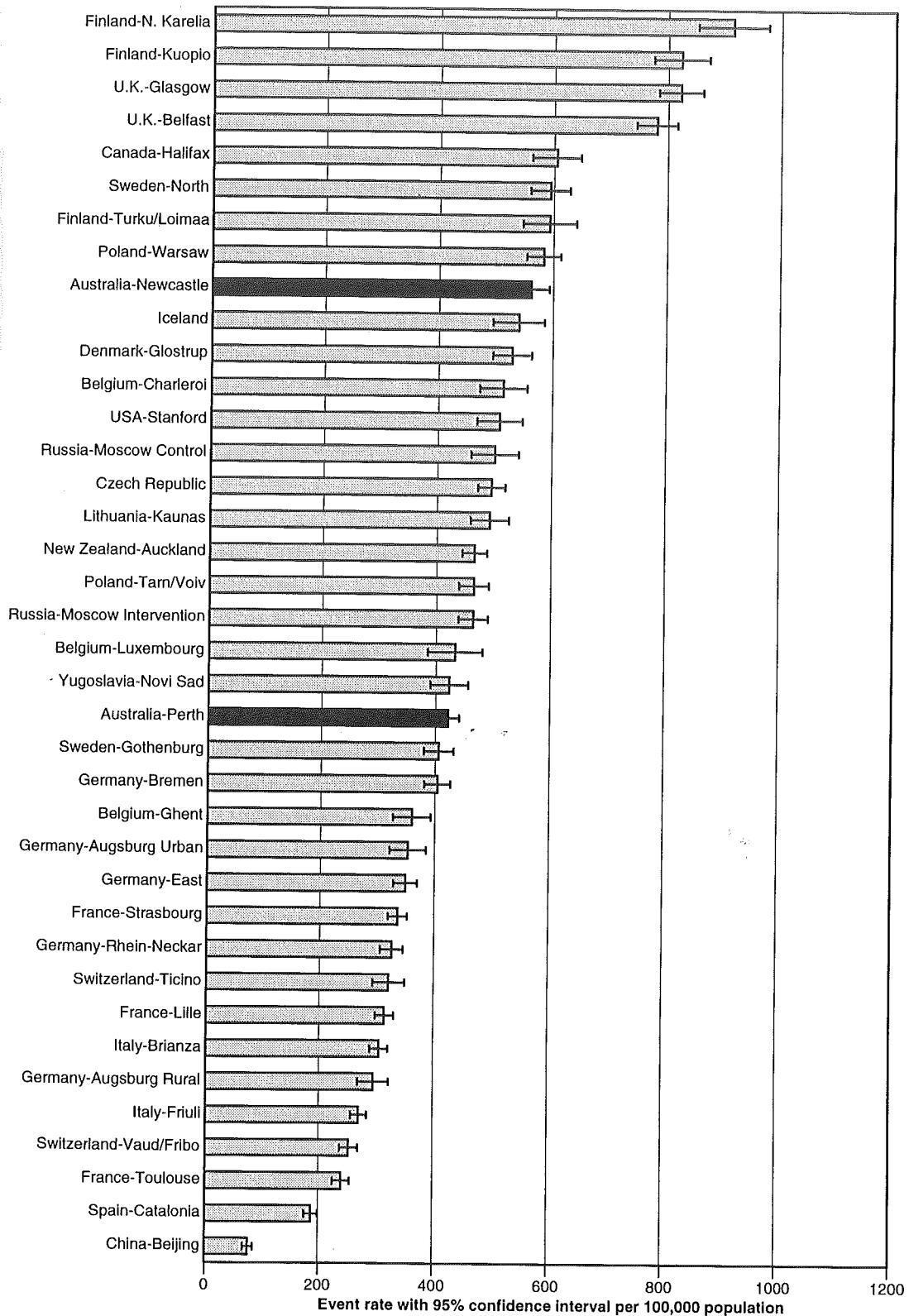
Figure 5b: Age-standardised rates of all heart attacks for women aged 25-69 by State or Territory estimated from average annual mortality data for 1990-92

2.3 International comparisons

International comparisons for events rates for AMI can be obtained from the MONICA Project. Figures 6 and 7 compare the heart attack rates and case fatality rates respectively for men in 38 MONICA centres.¹⁵ Event and case fatality rates for women are shown in Figures 8 and 9. International comparisons of death rates only are shown in the report on mortality.¹⁷ For both men and women, rates of heart attacks were higher for Newcastle than for Perth, and were ranked higher for women than for men. For men the MONICA centre in Newcastle had the ninth highest event rate, while the rate in Perth was ranked 22nd of the 38 centres. Women in Newcastle had the 3rd highest event rate of all MONICA centres, and those in Perth rated sixteenth overall.

However case fatality rates in both Australian centres were relatively low compared with the other MONICA centres. The case fatality rate for men in Perth rated equal second lowest while for Newcastle it was equal sixth lowest. The rankings for women in Newcastle and Perth were sixth and seventh lowest respectively.

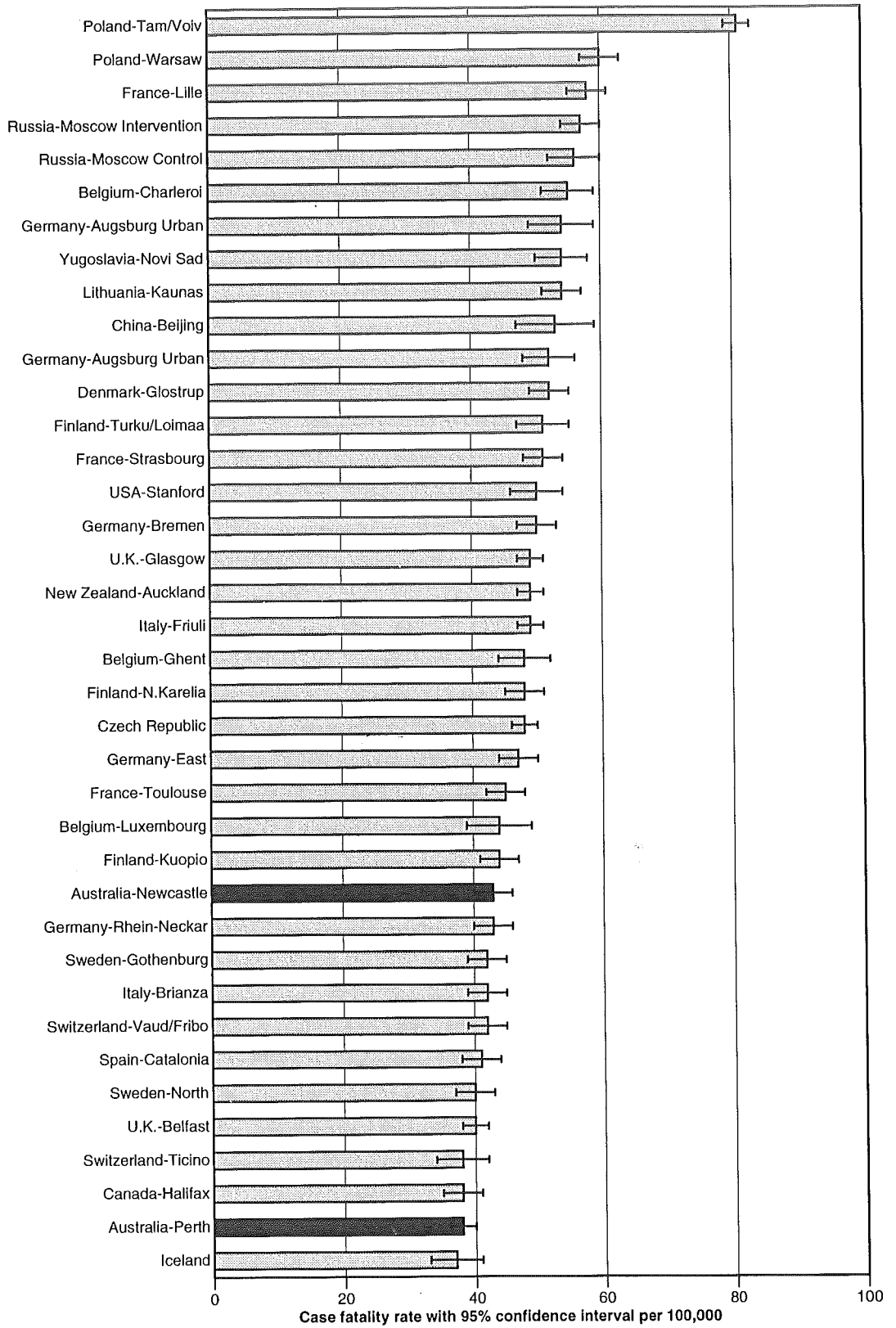
MONICA study population



Source: WHO MONICA Project Principal Investigators¹⁵

Figure 6: Age-standardised annual event rates with 95% confidence intervals for men aged 35-64 from 38 MONICA study populations

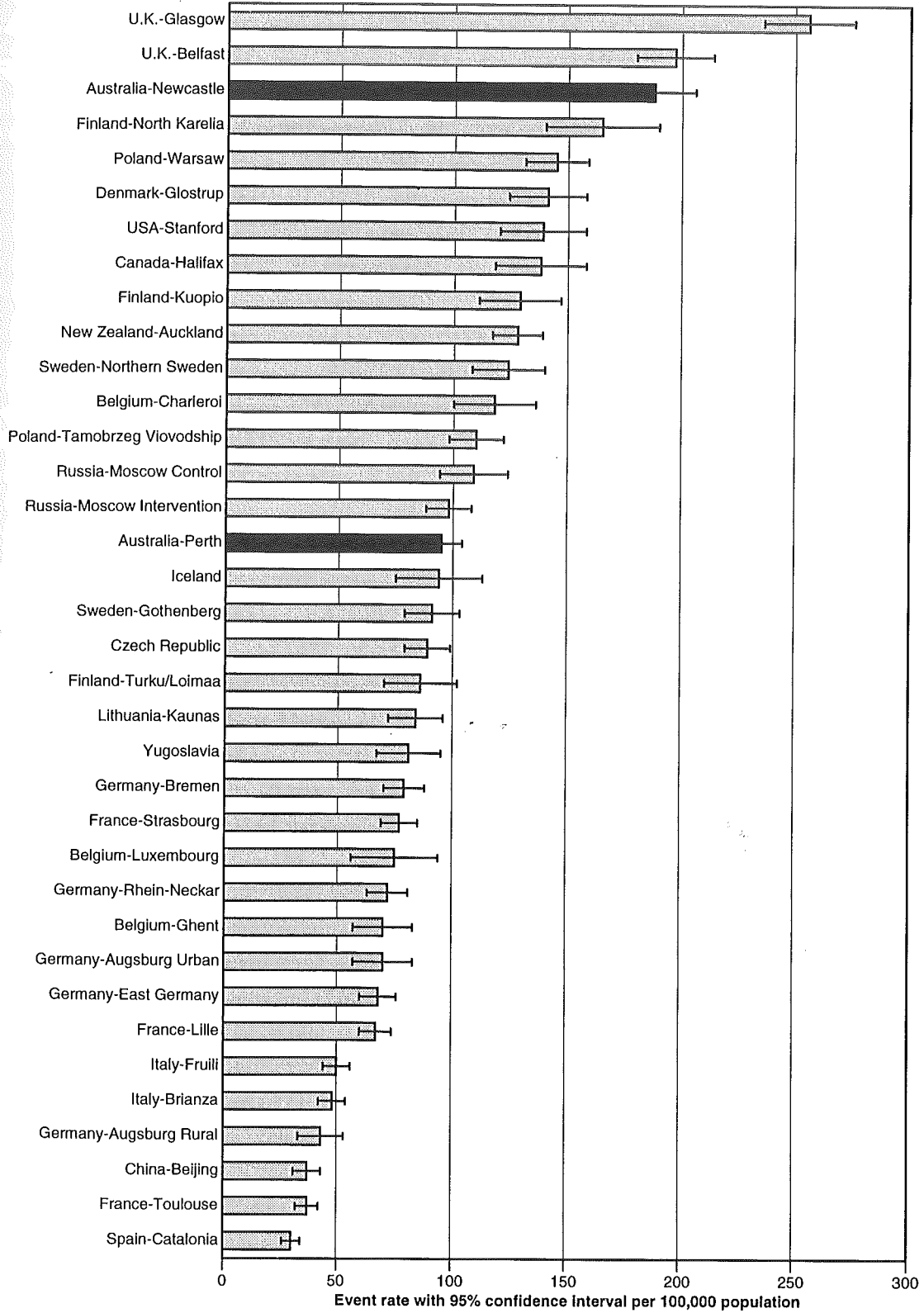
MONICA study population



Source: WHO MONICA Project Principal Investigators¹⁵

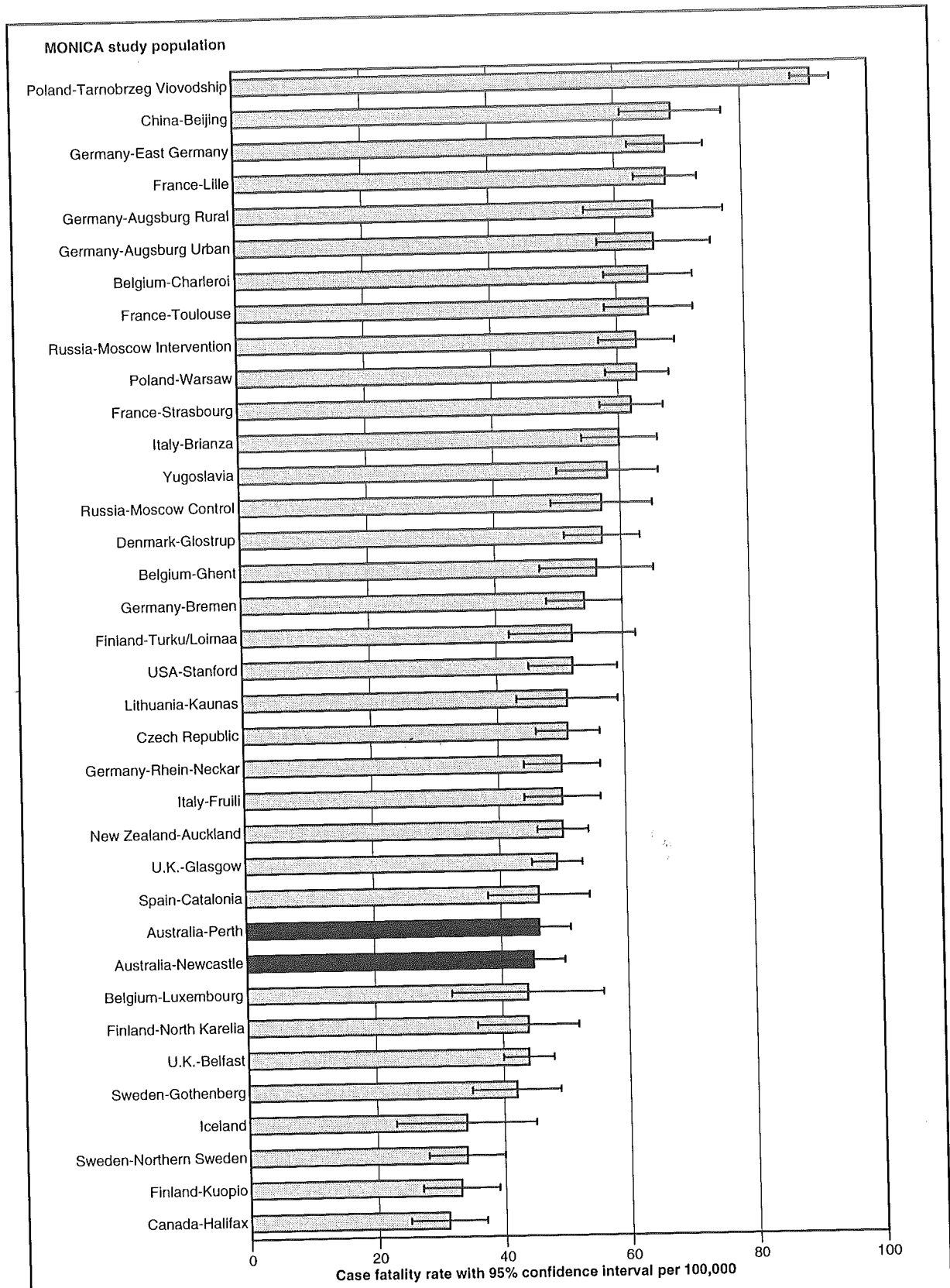
Figure 7: Age-standardised annual case fatality rates with 95% confidence intervals for men aged 35-64 from 38 MONICA study populations

MONICA study population



Source: WHO MONICA Project Principal Investigators¹⁵

Figure 8: Age-standardised annual event rates with 95% confidence intervals for women aged 35-64 from 36 MONICA study populations



Source: WHO MONICA Project Principal Investigators¹⁵

Figure 9: Age-standardised annual case fatality rates with 95% confidence intervals for women aged 35-64 from 36 MONICA study populations

3 Cerebrovascular disease

3.1 Problems with the data

The hospital separations data for stroke generally underestimate the true incidence of the problem because people are not always hospitalised if their condition is not severe.

Three epidemiological studies on stroke have been conducted in Australia: a population-based study in Melbourne in 1978–79,¹⁸ a hospital-based study in Brisbane in 1984,¹⁹ and a population study in Perth in 1989–90 in conjunction with the MONICA Project.²⁰

The most recent study conducted in Perth showed that 20% of all strokes in this population were managed either at home or in a nursing home.²⁰ The investigators reported that the likelihood of a patient being admitted to hospital after a stroke decreased significantly with increasing age. While only 12% of stroke cases under 65 years of age were not admitted to hospital, 38% of patients aged 85 or over were managed outside hospital. These patients would not be included in any hospital inpatient statistics on stroke. As a result, the incidence of stroke in persons aged 85 years and over obtained from hospital separations data represents only 62% of total stroke cases in that age group.

3.2 Estimates of numbers and rates

Table 6 shows the number and rate of all strokes occurring in Perth between 20 February 1989 and 19 August 1990.²⁰ Applying the age-specific rates to the Australian population the investigators reported an estimated number of approximately 37,000 strokes each year.

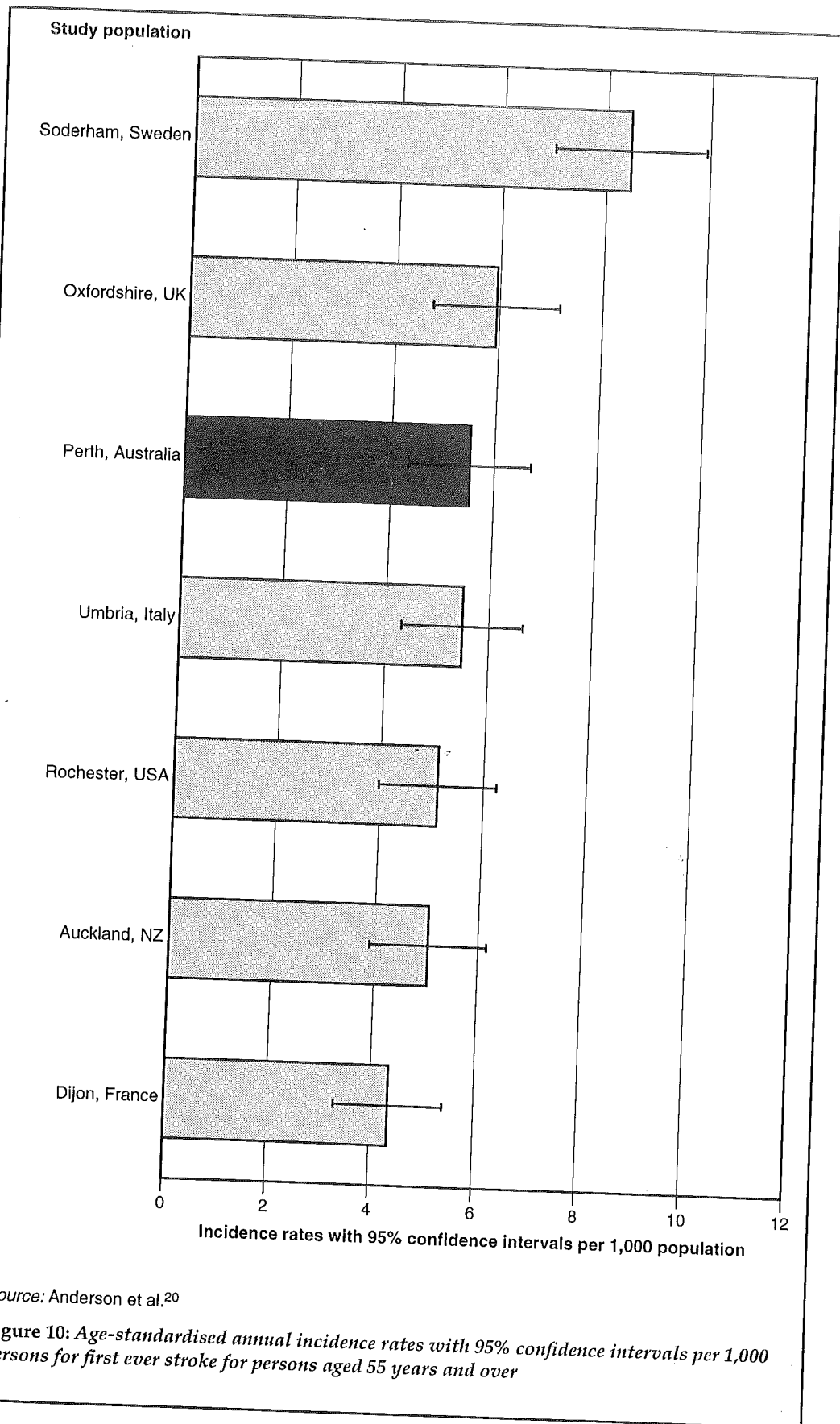
The age-standardised annual event rate was 190 per 100,000 for men and 109 per 100,000 for women in 1989–90; the crude death rate from stroke in 1992 was 69 per 100,000 population.

3.3 International comparisons

Figure 10 shows the annual age-standardised incidence rates per 1,000 persons for first ever stroke for persons aged 55 years and over in increasing order of magnitude for seven different countries.²⁰ Incidence of stroke was similar for all studies except for that conducted in Sweden where the incidence was higher.

Table 6: Number and rate of all strokes (first ever and recurrent) in Perth, Western Australia, 1989-90

	Annual event rates per 100,000 persons		
	Number	Rate	95% CI
Men			
	0	0	-
0-14	2	11	0-29
15-24	1	5	0-11
25-34	7	45	4-86
35-44	13	119	40-198
45-54	50	462	305-619
55-64	89	1,408	1,050-1,765
65-74	93	2,784	2,098-3,470
75-84	26	3,913	2,070-5,755
85+	281	272	233-310
All ages	-	190	163-217
Standardised rate			
Women			
	1	6	0-20
0-14	2	10	0-27
15-24	3	17	0-30
25-34	3	22	0-52
35-44	9	86	57-181
45-54	16	157	63-251
55-64	55	683	462-904
65-74	110	1,900	1,465-2,335
75-84	56	3,103	2,108-4,098
85+	255	244	207-281
All ages	-	109	88-129
Standardised rate			



4 Other cardiovascular disease morbidity

Table 7 shows the number of patients discharged alive from hospital for other cardiovascular diseases for men and women.

Table 7: *Non-fatal hospital separations for cardiovascular disease*

Disease	ICD-9-CM	Number of separations ^(a) per year	
		Men	Women
Rheumatic heart disease	390-398	656	1,221
Hypertensive disease	401-405	3,235	5,614
Acute myocardial infarction	410	17,308	8,723
Other ischaemic heart disease	411-414	50,968	27,472
Diseases of pulmonary circulation	415-417	1,689	1,939
Acute pericarditis	420	388	128
Acute and subacute endocarditis	421	331	184
Acute myocarditis	422	54	36
Other diseases of pericardium	423	747	301
Other diseases of endocardium	424	2,467	1,722
Cardiomyopathy	425	1,674	721
Conduction disorders	426	1,953	1,461
Cardiac dysrhythmias	427	10,798	9,935
Heart failure	428	15,749	15,822
Ill-defined heart disease	429	340	284
Other heart disease	426-429	28,840	27,502
Other forms of heart disease	420-429	34,501	30,594
Cerebrovascular disease	430-438	19,374	17,626
Atherosclerosis	440	1,503	1,094
Aortic aneurysm	441	2,437	734
Other aneurysm	442	594	289
Other peripheral vascular disease	443	3,311	2,203
Arterial embolism and thrombosis	444	3,649	2,330
Polyarteritis nodosa and allied conditions	446	419	498
Other disorders of arteries and arterioles	447	1,084	863
Disease of capillaries	448	184	286
Diseases of arteries, arterioles and capillaries	440-448	13,181	8,297
Phlebitis and thrombophlebitis	451	884	1,123
Portal vein thrombosis	452	9	22

(continued)

Table 7 (continued): *Non-fatal hospital separations for cardiovascular disease*

Disease	ICD-9-CM	Number of separations ^(a) per year	
		Men	Women
Other venous embolism and thrombosis	453	2,466	2,604
Varicose veins of lower extremities	454	4,624	11,245
Haemorrhoids	455	9,666	7,943
Varicose veins of other sites	456	2,137	526
Noninfectious disorders of lymphatic channels	457	180	312
Hypotension	458	1,054	1,460
Other disorders of circulatory system	459	454	435
Diseases of veins and lymphatics, and other diseases of circulatory system	451-459	21,474	25,670
All CVD	390-459	162,386	127,156

(a) Non-fatal separations for Western Australia and Tasmania estimated by applying the average proportion of non-fatal to all separations from the other States and Territories

Notes: All data are for 1991-92 except for Queensland (1990) and Northern Territory (1990-91).

Private hospital data not available for Victoria, Western Australia, Tasmania, Northern Territory and Australian Capital Territory.

Source: Australian Institute of Health and Welfare

5 Data from other sources

The National Heart Foundation of Australia has conducted three Risk Factor Prevalence Surveys in 1980, 1983 and 1989.²⁻⁴ These were conducted in each of the six State capital cities in 1980 and 1983. For the 1989 survey, the Territory capitals (Darwin and Canberra) were also included. Participants in the surveys had physical measurements and a blood sample taken as well as completing a questionnaire on sociodemographic characteristics, risk factors, and medical conditions and treatment. The first two surveys included participants aged 25-64 years while the most recent survey included a younger five-year age group and an older five-year age group, i.e. 20-69 years.

Due to differences in the ages and cities of the samples, data from the three surveys are not directly comparable therefore only the results from the most recent survey are presented here.

The Australian Bureau of Statistics has undertaken three national health surveys: the 1977-78 Australian Health Survey, the 1983 Australian Health Survey, and the 1989-90 National Health Survey.⁵⁻⁷ The 1989-90 National Health Survey covered about 22,200 dwellings and data was collected on 54,241 individuals on a variety of risk factors and health problems, including cardiovascular conditions.²¹

In the most recent National Heart Foundation Risk Factor Prevalence Survey there were 9,279 respondents of whom 4,552 were male and 4,727 were female.⁴ Of these, 90 (1.4%) men and 47 (0.9%) women reported that they were on treatment for angina. Using mid-1992 population estimates based on the 1991 census it is estimated that there are around 77,500 men and 49,300 women aged between 20 and 69 years receiving treatment for angina. However these numbers must be interpreted with caution, since this assumes that the prevalence of angina treatment is similar across the country and that there is no response bias with regard to these conditions.

Tables 8 and 9 show the number and proportion of men and women reporting cardiovascular conditions in the National Heart Foundation 1989 Risk Factor Prevalence Survey and the ABS 1989-90 National Health Survey respectively. Participants in the National Heart Foundation survey were asked had they ever been told that they had high blood pressure, angina, a heart attack or a stroke. During the 1989-90 National Health Survey, the participants were asked to report any long-term conditions which were then categorised by the ABS. Although not all conditions are comparable between the surveys, the ABS survey found consistently lower rates of stroke and high blood pressure.

Table 8: Number and proportion of men and women aged 25–64 reporting cardiovascular conditions in the National Heart Foundation 1989 Risk Factor Prevalence Survey

	Age group								Total	
	25–34		35–44		45–54		55–64			
Have you ever been told that you have:	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Men										
High blood pressure	111	11	194	16	200	23	245	32	750	20
Angina	3	0.3	6	0.5	29	3	77	10	115	3
Heart attack	2	0.2	10	0.8	26	3	68	9	106	3
Stroke	1	0.1	4	0.3	4	0.5	22	3	32	0.8
Women										
High blood pressure	131	12	191	15	224	25	268	36	814	20
Angina	3	0.3	11	0.9	7	0.8	28	4	49	1
Heart attack	1	0.1	6	0.5	7	0.8	20	3	34	0.9
Stroke	1	0.1	3	0.2	5	0.6	9	1	18	0.5

Source: Risk Factor Prevalence Study Management Committee⁴

Table 9: Number and proportion of men and women aged 25–64 reporting long-term cardiovascular conditions in the Australian Bureau of Statistics 1989–90 National Health Survey

Type of condition	Age group								Total	
	25–34		35–44		45–54		55–64			
	n ('000)	%	n ('000)	%	n ('000)	%	n ('000)	%	n ('000)	%
Men										
Atherosclerosis	0.4	0.03	0.9	0.07	1.5	0.16	5.9	0.80	8.6	0.20
Heart disease	2.6	0.20	9.3	0.70	17.5	2.00	46.9	6.00	76.3	2.00
Hypertension	21.3	2.00	61.6	5.00	94.7	10.00	142.0	19.00	319.5	7.00
Ill-defined heart conditions	3.9	0.30	9.8	0.80	7.8	0.80	10.0	1.00	31.4	0.70
Stroke	0.3	0.02	2.1	0.20	1.8	0.20	7.9	1.00	12.1	0.30
Women										
Atherosclerosis	0.0	0.00	0.0	0.00	1.6	0.20	2.7	0.40	4.3	0.10
Heart disease	4.7	0.30	6.2	0.50	9.7	1.00	23.4	3.00	44.1	1.00
Hypertension	18.8	1.00	48.4	4.00	109.5	13.00	167.1	23.00	343.8	8.00
Ill-defined heart conditions	19.7	1.00	9.2	0.70	10.0	1.00	12.0	2.00	50.9	1.00
Stroke	1.8	0.10	1.6	0.10	2.4	0.30	4.1	0.60	9.9	0.20

Source: AIHW derived from ABS 1989–90 National Health Survey

6 Health differentials

An examination of sociodemographic differentials for self-reported prevalence of chronic disease of the circulatory system has been undertaken by Mathers²² based on data from the 1989–90 National Health Survey. Definitions of the variables used in this analysis are given in Box 6.1. The analysis is based on the estimated proportion of people aged 25–64 years who reported that they had a serious or intermediate chronic cardiovascular illness defined by the ICD-9-CM chapter on diseases of the circulatory system. The differentials are expressed separately for men and women in terms of rate ratios and have been standardised to the 1988 total mid-year Australian population. The rate ratios are obtained by dividing the age-standardised prevalence rate of each subgroup by the age-standardised prevalence rate of the reference group. For each variable of interest, the reference group was chosen because it was either the largest subgroup or had the best health status.

Figure 11 shows the rate ratios for self-reported prevalence of cardiovascular conditions for various sociodemographic groups. Tables of data are given in Appendix E. The self-reported prevalence rate of chronic disease of the circulatory system among those aged 25–64 was statistically significantly lower for men than for women ($p < 0.01$). This result appears unusual in that all other data such as mortality rates and morbidity rates presented earlier, as well as the National Heart Foundation data, indicate that men have higher mortality and morbidity from cardiovascular disease than women of the same age range.

Self-reported prevalence was also significantly lower for:

- women who had never been married compared with those now married;
- men born in Europe compared with those born in Australia;
- women born in Asia compared with those born in Australia; and
- men and women who spoke a language other than English.

The prevalence was significantly higher for:

- men and women not in the work force compared with those employed;
- men and women unemployed compared with those who work 25 hours or more;
- men and women overweight or obese compared with those not overweight or obese; and
- men with moderate or high alcohol risk compared with those with low alcohol risk.

Box 2: Definitions for sociodemographic differentials

Self-reported chronic disease of the circulatory system—the estimated percentage of people who reported one or more serious or intermediate chronic illness from the ICD-9 chapter 'Diseases of the Circulatory System'. Each person is counted once only in this indicator. Data was obtained from the ABS 1989–90 National Health Survey.

Marital status

Never married

Married—includes persons in a defacto relationship

Previously married—separated, divorced or widowed

Family composition

Couple with dependent children

Couple with no dependent children

Single parent with dependent children

Single with no dependents but not living alone

Single and living alone

Family income

Lower boundaries for family income categories:

Low—\$0

Medium—\$23,400

High—\$39,560

Education

Low—no schooling or left before age 15, no qualifications since

Medium—left school before age 15, qualifications since; or left school at age 15 or more, no qualifications since

High—left school at age 15 or more, qualifications since

Employment status

Employed—persons who reported they worked in a job, a business or on a farm at the time of interview (either full or part-time for one or more hours per week) other than unpaid voluntary work

Unemployed—persons who reported they did not work in a job, a business or on a farm at the time of interview, and who actively looked for work at some time during the previous four weeks

Not in workforce—persons who were neither employed or unemployed as defined above

Hours worked

25 hours or more—person who usually works 25 hours or more per week (in main job), including paid or unpaid overtime

15–24 hours—person who usually works 15–24 hours per week (in main job), including paid or unpaid overtime

1–14 hours—person who usually works 1–14 hours per week (in main job), including paid or unpaid overtime

Not employed—person who works less than one hour per week, excluding unpaid voluntary work (i.e. person who is unemployed or not in the workforce)

Occupation

Professional/tech/admin—ASCO groups 1, 2 and 3 (i.e. managers and administrators, professionals, and para-professionals)

Clerical/sales/service—ASCO groups 5 and 6 (i.e. clerks, salespersons and personal service workers)

Trades/transport/labour—ASCO groups 4, 7 and 8 (i.e. tradespersons, plant and machinery operators, and drivers, labourers and related workers)

(continued)

Box 2 (continued): Definitions for sociodemographic differentials

Socioeconomic area

Men and women aged 25–64 years were classified into quintiles of socioeconomic disadvantage according to the value of the Index of Relative Socioeconomic Disadvantage (IRSD) for their Statistical Local Area (SLA) of usual residence as follows:

- 1st quintile—IRSD \geq 1066.0 (least disadvantage)*
- 2nd quintile— $1021.6 \leq$ IRSD $<$ 1066.0*
- 3rd quintile— $990.1 \leq$ IRSD $<$ 1021.6*
- 4th quintile— $963.0 \leq$ IRSD $<$ 990.1*
- 5th quintile—IRSD $<$ 963.0 (greatest disadvantage)*

State/Territory

Based on State or Territory of usual residence

Region

Metropolitan—capital city statistical divisions for the six states. All of the Australian Capital Territory
Non-metropolitan—other (including all of the Northern Territory)

Country of birth

Australia

United Kingdom, Ireland—United Kingdom and Ireland (Eire)

Other Europe—includes Eastern Europe, USSR and Baltic States

Asia—Middle East, South East Asia, Southern Asia

Other—North East Asia (including China, Hong Kong, Japan, Korea), Northern and Southern Africa, the Americas, New Zealand and the Pacific region

Language spoken

English language—English spoken at home or person born in Australia, United Kingdom, or New Zealand

Other—language other than English spoken at home (and person born overseas in countries other than the United Kingdom and New Zealand)

Lifestyle factors

Overweight and obesity

Not overweight or obese—body mass index \leq 25.0 kg/m²

Overweight or obese—body mass index $>$ 25.0 kg/m²

Inactivity

Active—persons who reported undertaking any physical exercise for recreation, sport or health/fitness reasons in the last two weeks. Physical exercise included walking, moderate exercise and vigorous exercise

Inactive—persons who reported undertaking no physical exercise for recreation, sport or health/fitness reasons in the last two weeks

Smoking status

Non-smoker—persons not currently a smoker (i.e. never smoked or ex-smoker)

Smoker—current smoker

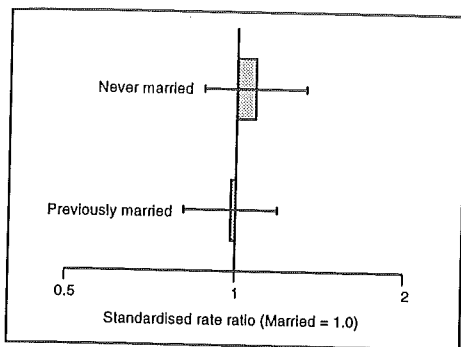
Alcohol risk

Calculated from self-reported alcohol consumption on each of the last seven days. The classification of alcohol risk is based on recommendations of the National Health and Medical Research Council

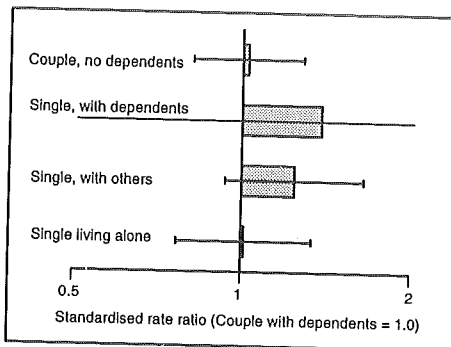
Low risk—men and women whose reported average daily consumption of ethanol did not exceed 50 ml and 25 ml respectively

Moderate/high risk—men and women whose reported average daily consumption of ethanol exceeded 50 ml and 25 ml respectively

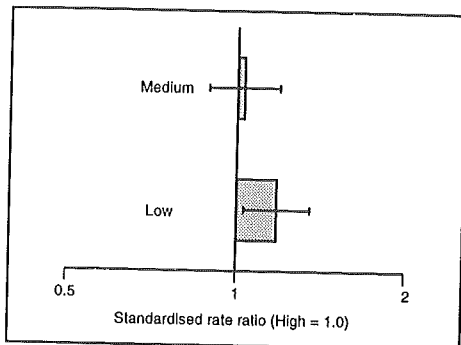
Marital status



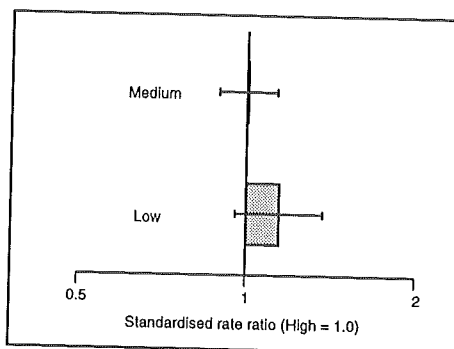
Family composition



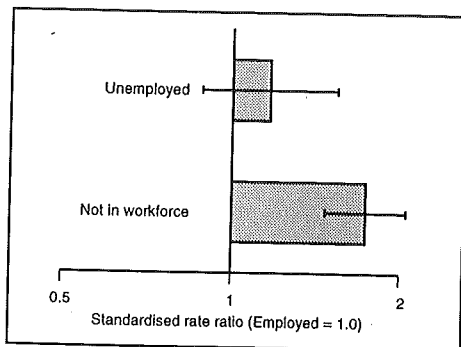
Family income



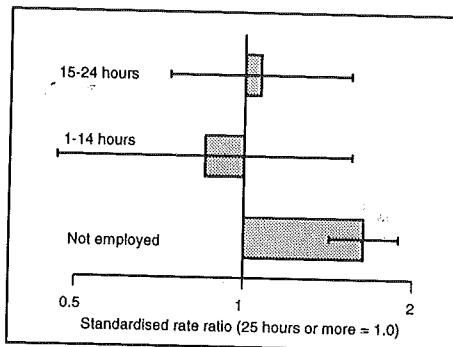
Education



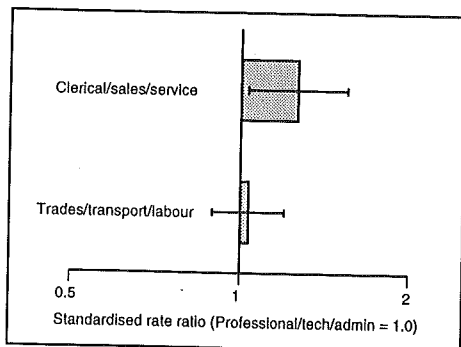
Employment status



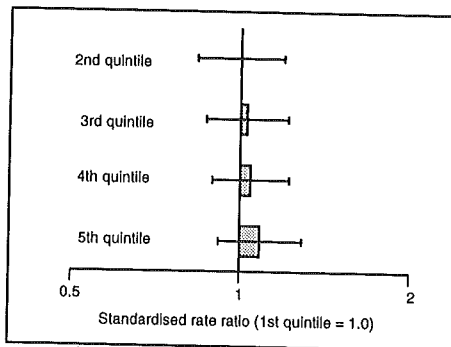
Hours worked



Occupation



Socioeconomic disadvantage

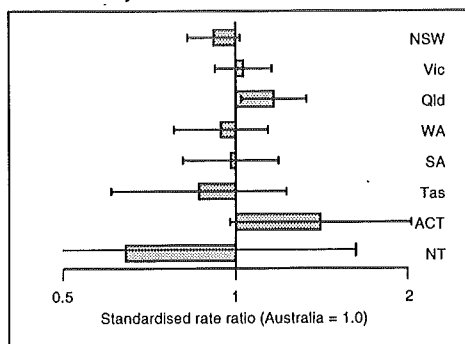


Notes: Rates directly age-standardised to the 1988 total Australian population. Rate ratios are presented graphically using a logarithmic scale—the vertical axis represents a rate ratio of 1.0 and rate ratios of 0.5 and 2.0 are represented by equal length bars extending outwards from the vertical in opposite directions. Error bars represent the 95% confidence intervals for the rate ratios.

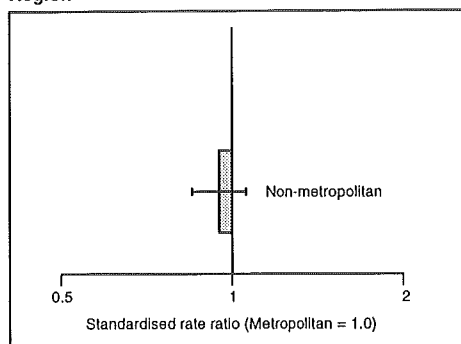
Source: Mathers²²

Figure 11a: Differentials in cardiovascular morbidity by various sociodemographic variables, men aged 25–64

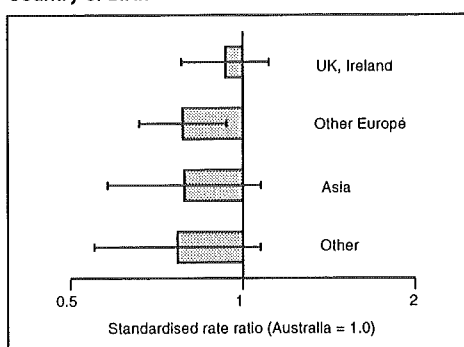
State/Territory



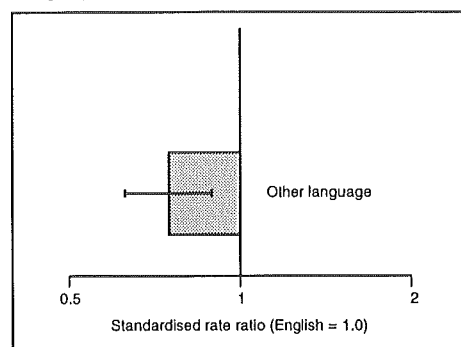
Region



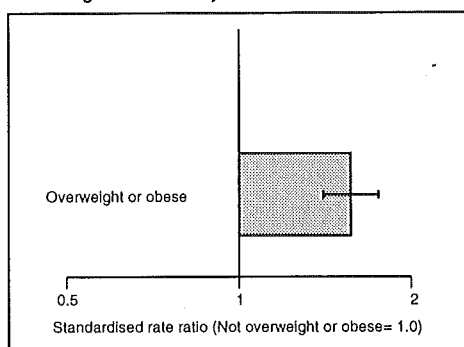
Country of birth



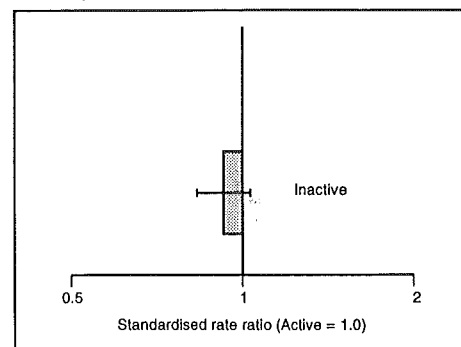
Language spoken



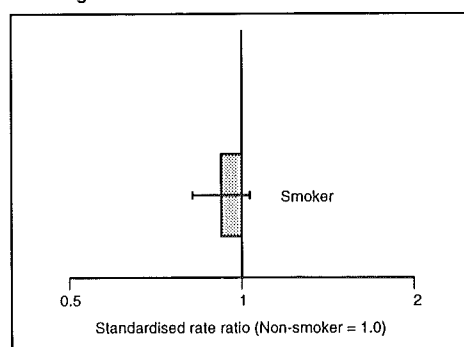
Overweight and obesity



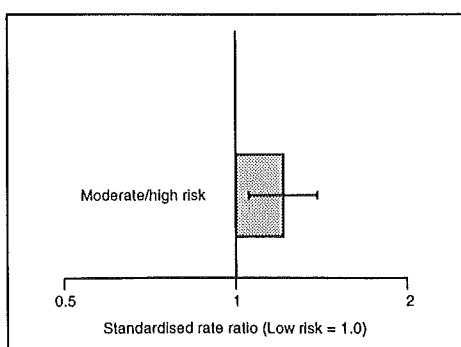
Inactivity



Smoking status



Alcohol risk



Notes: Rates directly age-standardised to the 1988 total Australian population.

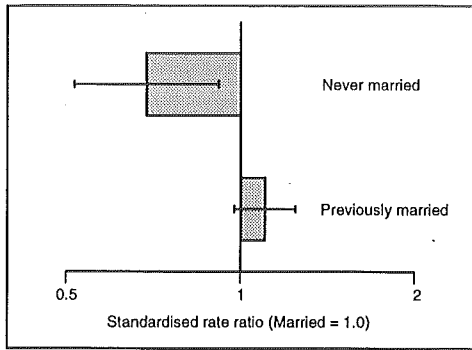
Rate ratios are presented graphically using a logarithmic scale—the vertical axis represents a rate ratio of 1.0 and rate ratios of 0.5 and 2.0 are represented by equal length bars extending outwards from the vertical in opposite directions.

Error bars represent the 95% confidence intervals for the rate ratios.

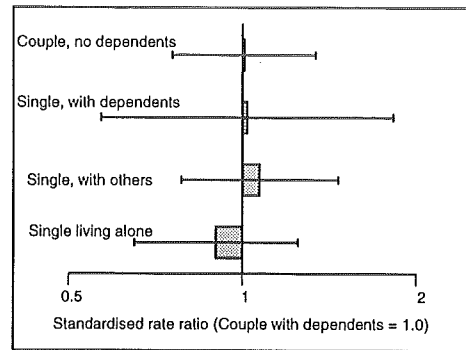
Source: Mathers²²

Figure 11a (continued): Differentials in cardiovascular morbidity by various sociodemographic variables, men aged 25–64

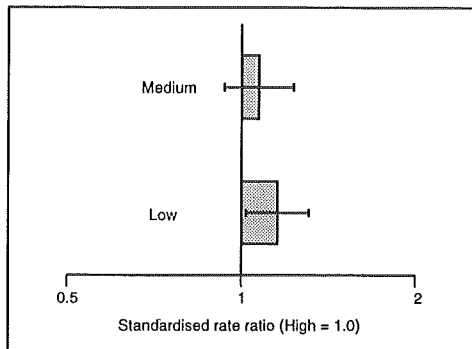
Marital status



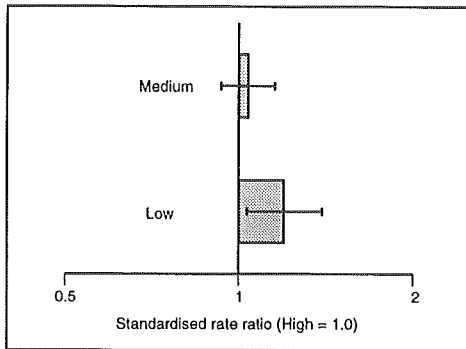
Family composition



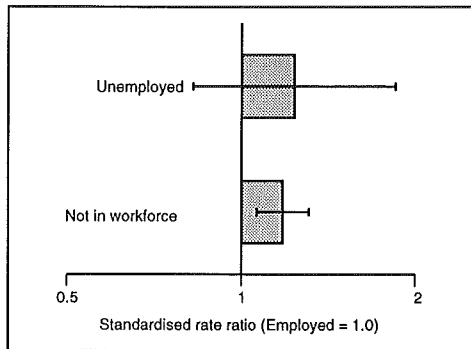
Family income



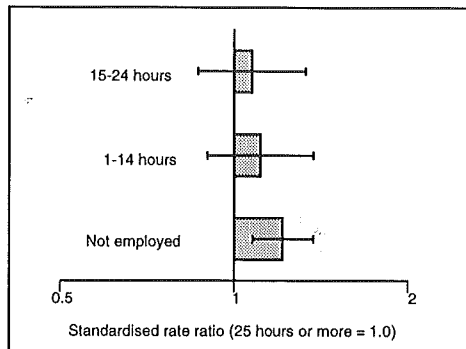
Education



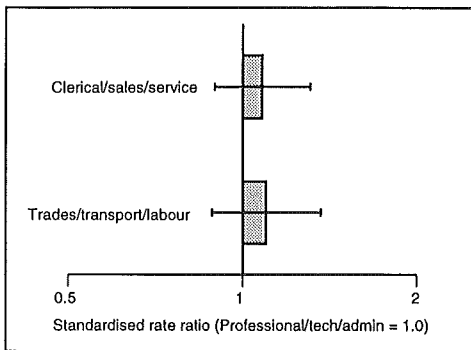
Employment status



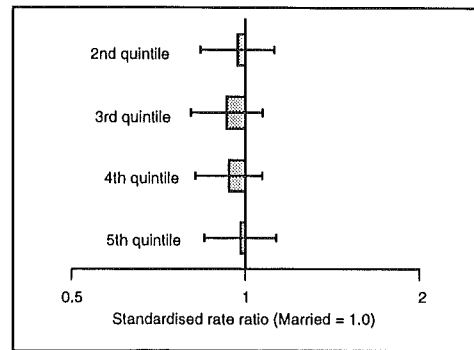
Hours worked



Occupation



Socioeconomic disadvantage



Notes: Rates directly age-standardised to the 1988 total Australian population.

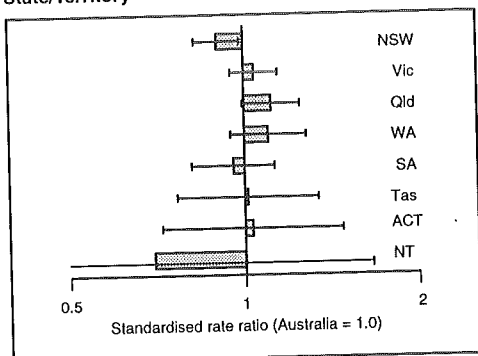
Rate ratios are presented graphically using a logarithmic scale—the vertical axis represents a rate ratio of 1.0 and rate ratios of 0.5 and 2.0 are represented by equal length bars extending outwards from the vertical axis in opposite directions.

Error bars represent the 95% confidence intervals for the rate ratios.

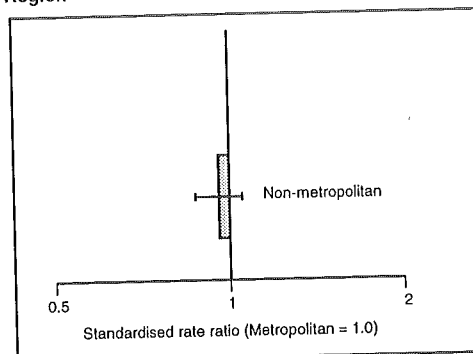
Source: Mathers²²

Figure 11b: Differentials in cardiovascular morbidity by various sociodemographic variables, women aged 25–64

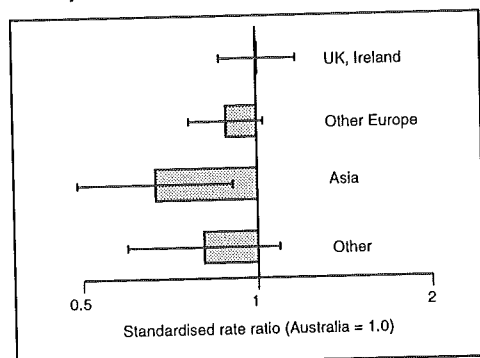
State/Territory



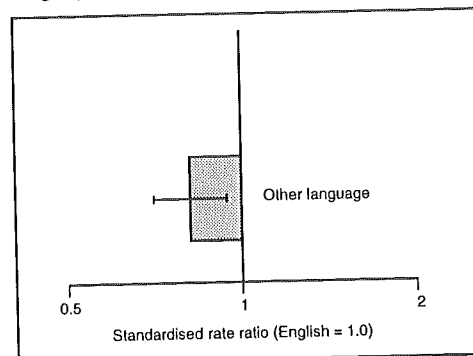
Region



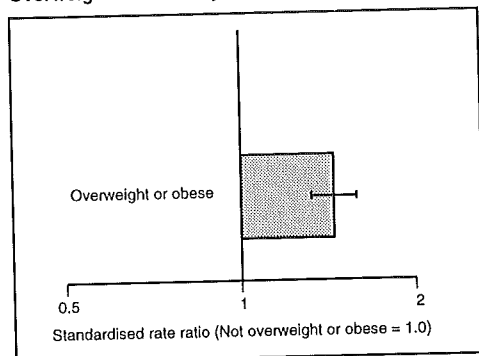
Country of birth



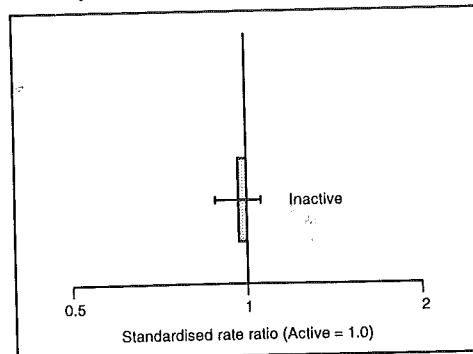
Language spoken



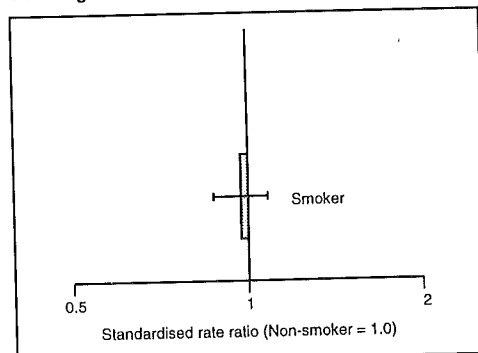
Overweight and obesity



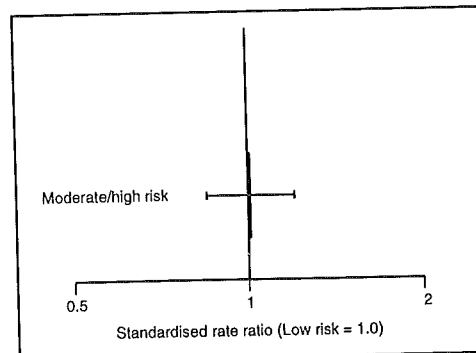
Inactivity



Smoking status



Alcohol risk



Notes: Rates directly age-standardised to the 1988 total Australian population.

Rate ratios are presented graphically using a logarithmic scale—the vertical axis represents a rate ratio of 1.0 and rate ratios of 0.5 and 2.0 are represented by equal length bars extending outwards from the vertical in opposite directions.

Error bars represent the 95% confidence intervals for the rate ratios.

Source: Mathers²²

Figure 11b (continued): Differentials in cardiovascular morbidity by various sociodemographic variables, women aged 25–64

7 Gaps and deficiencies

Information on cardiovascular disease in Aboriginal and Torres Strait Islander peoples is limited however several sources include data of reasonable quality. For example, the identification of Aboriginal and Torres Strait Islander peoples is fairly reliable in mortality data from South Australia, Western Australia and Northern Territory, and in hospital separations data from South Australia, Western Australia, Northern Territory and Northern Territory. The Australian Bureau of Statistics 1994 National Aboriginal and Torres Strait Islander Survey also provides information on the self-reported prevalence of short-term and chronic illness. However, estimates of PPV and sensitivity specifically for Aboriginal and Torres Strait Islander peoples are not available.

No estimate is available of the accuracy of hospital separations data or mortality data for those aged 70 or over, or for conditions other than AMI.

Research indicates that official statistics on stroke underestimate the true incidence.

Although reasonable estimates of numbers of heart attacks can be obtained at present by using estimates of PPV/sensitivity or case fatality data, these estimates have been obtained from data collected by the Newcastle MONICA Project. It is expected that these estimates will change over time and will be invalid in a short period of time.

At the time of writing, separations data for private hospitals were not provided to the Australian Institute of Health and Welfare for Victoria, Western Australia, Tasmania, the Northern Territory and the Australian Capital Territory, resulting in incomplete information or underestimates for these States and Territories. The latest available data (1992-93) includes private hospital separations data for all States and Territories except Victoria and the Northern Territory.

Appendix A

Hospital morbidity data

Table A1: Nature of hospital separation data available to the Australian Institute of Health and Welfare for each State or Territory and for hospitals run by the Department of Veterans' Affairs

State or Territory	Time period ^(a)	Type of hospital	Field included for death in hospital	Number of diagnoses	% of public & private hospitals which are private for 1991-1992 ^(c)
NSW	1991-92	Public and private	Yes	5	23
Vic	1991-92	Public only	Yes	5	32
Qld	1990	Public and private	Yes	1	30
WA	1991-92	Public only	Yes	1	30
SA	1991-92	Public and private	No	1	30
Tas	1991-92	Public only	No	1	30
ACT	1991-92	Public only	Yes	5	17
NT	1990-91	Public only	Yes	2	20
DVA ^(b)	1991-92	DVA ^(b)	Yes	2	-

(a) All data are provided by financial year, except for Queensland where data are provided by calendar year

(b) Department of Veterans' Affairs

(c) Data obtained from hospitals and health services yearbook¹⁶

Appendix B

Estimates of multipliers and calculation of 95% confidence intervals for numbers and rates of heart attacks

Estimates of multipliers

Table B1: Multipliers and standard errors used to calculate numbers and rates of non-fatal and total heart attacks

Sex and age group	PPV/sensitivity							
	Principal diagnosis of 410 only		Diagnosis of 410 in any diagnostic field		Non-fatal/fatal		Total/fatal	
	Estimate	Standard error	Estimate	Standard error	Estimate	Standard error	Estimate	Standard error
Men								
25-44	0.816	0.039	0.768	0.036	2.300	0.193	3.300	0.193
45-54	0.881	0.032	0.821	0.030	2.300	0.193	3.300	0.193
55-59	0.903	0.037	0.841	0.035	1.327	0.136	2.327	0.136
60-64	0.868	0.034	0.768	0.030	1.257	0.104	2.257	0.104
65-69	0.932	0.035	0.840	0.031	0.989	0.072	1.989	0.072
Total	0.886	0.016	0.810	0.015	-	-	-	-
Women								
25-54	0.950	0.067	0.846	0.059	2.052	0.254	3.052	0.254
55-59	1.020	0.085	0.927	0.076	2.052	0.254	3.052	0.254
60-64	0.988	0.058	0.888	0.052	1.144	0.093	2.144	0.093
65-69	1.036	0.064	0.909	0.054	1.144	0.093	2.144	0.093
Total	1.002	0.034	0.893	0.029	-	-	-	-

Notes: There appeared to be little difference in PPV/sensitivity between age groups for men or women, therefore the combined all-age estimate was used for calculations.

PPV/sensitivity calculated from 5 years and 4 months of MONICA data 27 August 1986 to 31 December 1991.

Non-fatal/fatal and total/fatal calculated from 5 years of MONICA data 1989-93.

Variance of multipliers

Estimates of the variance of each of the multiplying factors used were obtained by Taylor Series expansion:

$$\text{var}\left(\frac{PPV}{\text{sensitivity}}\right) \approx \frac{(a+c)(b+c)}{(a+c)^3}$$

where:

a is the number of cases with discharge diagnosis 410 and MONICA definite AMI;
 b is the number of cases with discharge diagnosis 410 but not MONICA definite AMI;
 c is the number of cases with MONICA definite AMI but not discharge diagnosis 410; and
 a , b and c were obtained from the MONICA study on the accuracy of hospital separations data.⁹

$$\text{var}\left(\frac{\text{non-fatal}}{\text{fatal}}\right) \approx \frac{Y^2 + XY}{X^3}$$

where:

X is the number of fatal cases;
 Y is the number of non-fatal cases; and
 X and Y were obtained from five years of MONICA data 1989-93.
 Similarly,

$$\text{var}\left(\frac{\text{total}}{\text{fatal}}\right) \approx \frac{Y^2 + XY}{X^3}$$

where:

X is the number of fatal cases;
 Y is the number of non-fatal cases; and
 X and Y were obtained from five years of MONICA data 1989-93

$$\left(\text{since } \frac{\text{total}}{\text{fatal}} = 1 + \frac{\text{non-fatal}}{\text{fatal}}\right)$$

Confidence intervals for numbers of events

For numbers of *non-fatal* events within each age group and overall estimated by Methods 1 and 2, 95% confidence intervals were obtained by the formula:

$$n_i * \left(\frac{PPV}{\text{sensitivity}}\right) \pm 1.96 * \sqrt{n_i^2 * \text{var}\left(\frac{PPV}{\text{sensitivity}}\right)}$$

where n_i is the number in group i with hospital discharge diagnosis coded 410.

For numbers of *non-fatal* events *within each age group* estimated by Method 3, 95% confidence intervals were obtained by the formula:

$$f_i * \left(\frac{\text{non-fatal}}{\text{fatal}} \right)_i \pm 1.96 * \sqrt{f_i^2 * \text{var} \left(\frac{\text{non-fatal}}{\text{fatal}} \right)_i}$$

where f_i is the number in group i with cause of death coded 410-414.

For *overall* numbers of *non-fatal* events estimated by Method 3, 95% confidence intervals were obtained by the formula:

$$\sum \left[f_i * \left(\frac{\text{non-fatal}}{\text{fatal}} \right)_i \right] \pm 1.96 * \sqrt{\sum \left[f_i^2 * \text{var} \left(\frac{\text{non-fatal}}{\text{fatal}} \right)_i \right]}$$

where f_i is the number in group i with cause of death coded 410-414.

For numbers of *total* events *within each age group* and *overall* estimated by Methods 1 and 2, 95% confidence intervals are obtained by the formula:

$$\left[n_i * \left(\frac{\text{PPV}}{\text{sensitivity}} \right) + f_i \right] \pm 1.96 * \sqrt{n_i^2 * \text{var} \left(\frac{\text{PPV}}{\text{sensitivity}} \right)}$$

where:

n_i is the number in group i with hospital discharge diagnosis coded 410; and

f_i is the number in group i with cause of death coded 410-414.

For numbers of *total* events *within each age group* estimated by Method 3, 95% confidence intervals were obtained by the formula:

$$f_i * \left(\frac{\text{total}}{\text{fatal}} \right)_i \pm 1.96 * \sqrt{f_i^2 * \text{var} \left(\frac{\text{total}}{\text{fatal}} \right)_i}$$

where f_i is the number in group i with cause of death coded 410-414.

For *overall* numbers of *total* events estimated by Method 3, 95% confidence intervals were obtained by the formula:

$$\sum \left[f_i * \left(\frac{\text{total}}{\text{fatal}} \right)_i \right] \pm 1.96 * \sqrt{\sum \left[f_i^2 * \text{var} \left(\frac{\text{total}}{\text{fatal}} \right)_i \right]}$$

where f_i is the number in group i with cause of death coded 410-414.

Confidence intervals for rates of events

For rates of *non-fatal* events within each age group estimated by Methods 1 and 2, 95% confidence intervals were obtained by the formula:

$$\frac{n_i * 100,000}{pop_i} * \left(\frac{PPV}{sensitivity} \right) \pm 1.96 * \sqrt{\left(\frac{n_i * 100,000}{pop_i} \right)^2 * \text{var} \left(\frac{PPV}{sensitivity} \right)}$$

where:

n_i is the number in group i with hospital discharge diagnosis coded 410; and

pop_i is the State or Territory population for group i .

For rates of *non-fatal* events within each age group estimated by Method 3, 95% confidence intervals were obtained by the formula:

$$\frac{f_i * 100,000}{pop_i} * \left(\frac{non-fatal}{fatal} \right)_i \pm 1.96 * \sqrt{\left(\frac{f_i * 100,000}{pop_i} \right)^2 * \text{var} \left(\frac{non-fatal}{fatal} \right)_i}$$

where:

f_i is the number in group i with cause of death coded 410–414; and

pop_i is the State or Territory population for group i .

For rates of *total* events within each age group estimated by Methods 1 and 2, 95% confidence intervals were obtained by the formula:

$$\left[\left(\frac{n_i * 100,000}{pop_i} * \left(\frac{PPV}{sensitivity} \right) \right) + f_i \right] \pm 1.96 * \sqrt{\left(\frac{n_i * 100,000}{pop_i} \right)^2 * \text{var} \left(\frac{PPV}{sensitivity} \right)}$$

where:

n_i is the number in group i with hospital discharge diagnosis coded 410;

f_i is the number in group i with cause of death coded 410–414; and

pop_i is the State or Territory population for group i .

For rates of *total* events within each age group estimated by Method 3, 95% confidence intervals were obtained by the formula:

$$\left[\frac{f_i * 100,000}{pop_i} * \left(\frac{total}{fatal} \right)_i \right] \pm 1.96 * \sqrt{\left(\frac{f_i * 100,000}{pop_i} \right)^2 * \text{var} \left(\frac{total}{fatal} \right)_i}$$

where:

f_i is the number in group i with cause of death coded 410–414; and

pop_i is the State or Territory population for group i .

For age-standardised rates of non-fatal events estimated by Methods 1 and 2, 95% confidence intervals were obtained by the formula:

$$\sum \left[\frac{n_i * 100,000}{pop_i} * r_i * \left(\frac{PPV}{sensitivity} \right) \right] \pm 1.96 * \sqrt{\left[\sum \left(\frac{n_i * 100,000}{pop_i} \right)^2 * r_i^2 \right] * \text{var} \left(\frac{PPV}{sensitivity} \right)}$$

where:

n_i is the number in group i with hospital discharge diagnosis coded 410;

pop_i is the State or Territory population for group i ; and

r_i is the Australian population proportion for group i .

For age-standardised rates of non-fatal events estimated by Method 3, 95% confidence intervals were obtained by the formula:

$$\sum \left[\frac{f_i * 100,000}{pop_i} * r_i * \left(\frac{non - fatal}{fatal} \right)_i \right] \pm 1.96 * \sqrt{\sum \left[\left(\frac{f_i * 100,000}{pop_i} \right)^2 * r_i^2 * \text{var} \left(\frac{non - fatal}{fatal} \right)_i \right]}$$

where:

f_i is the number in group i with cause of death coded 410-414;

pop_i is the State or Territory population for group i ; and

r_i is the Australian population proportion for group i .

For age-standardised rates of total events estimated by Methods 1 and 2, 95% confidence intervals were obtained by the formula:

$$\sum \left[\left(\frac{n_i * 100,000}{pop_i} * \left(\frac{PPV}{sensitivity} \right) + f_i \right) * r_i \right] \pm 1.96 * \sqrt{\left[\sum \left(\frac{n_i * 100,000}{pop_i} \right)^2 * r_i^2 \right] * \text{var} \left(\frac{PPV}{sensitivity} \right)_i}$$

where:

n_i is the number in group i with hospital discharge diagnosis coded 410;

f_i is the number in group i with cause of death coded 410-414;

pop_i is the State or Territory population for group i ; and

r_i is the Australian population proportion for group i .

For age-standardised rates of total events estimated by Method 3, 95% confidence intervals were obtained by the formula:

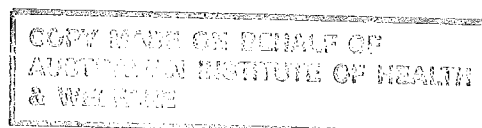
$$\sum \left[\left(\frac{f_i * 100,000}{pop_i} * \left(\frac{total}{fatal} \right)_i \right) * r_i \right] \pm 1.96 * \sqrt{\sum \left[\left(\frac{f_i * 100,000}{pop_i} \right)^2 * r_i^2 * \text{var} \left(\frac{total}{fatal} \right)_i \right]}$$

where:

f_i is the number in group i with cause of death coded 410-414;

pop_i is the State or Territory population for group i ; and

r_i is the Australian population proportion for group i .



Appendix C

Numbers and rates of non-fatal and total heart attacks by age, sex and State or Territory

Table C1: Numbers and rates of non-fatal heart attacks for New South Wales, by sex and age group, estimated by three different methods

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	436	(421, 451)			47	(45, 48)		
	2	475	(458, 491)			51	(49, 53)		
	3	289	(241, 337)			31	(26, 36)		
45-54 (men only)	1	961	(927, 994)			278	(268, 287)		
	2	1,101	(1062, 1139)			318	(307, 329)		
	3	822	(687, 957)			237	(198, 277)		
25-54 (women only)	1			309	(288, 329)			25	(23, 26)
	2			335	(313, 356)			27	(25, 28)
	3			196	(148, 243)			16	(12, 19)
55-59	1	650	(627, 673)	201	(188, 215)	497	(480, 515)	156	(146, 167)
	2	743	(717, 769)	226	(211, 240)	569	(549, 589)	175	(164, 187)
	3	469	(375, 563)	209	(158, 260)	359	(287, 431)	162	(123, 202)
60-64	1	802	(774, 830)	354	(330, 377)	625	(603, 647)	270	(253, 288)
	2	918	(886, 951)	403	(377, 429)	716	(691, 741)	308	(288, 328)
	3	742	(622, 863)	243	(204, 281)	579	(485, 673)	186	(156, 215)
65-69	1	861	(831, 891)	474	(443, 505)	743	(717, 769)	373	(348, 398)
	2	997	(962, 1032)	540	(505, 575)	860	(830, 891)	425	(398, 452)
	3	867	(743, 991)	440	(370, 510)	748	(641, 856)	346	(291, 401)
Total ^(a)	1	3,710	(3580, 3839)	1,338	(1249, 1426)	221	(213, 228)	79	(74, 84)
	2	4,234	(4085, 4383)	1,504	(1407, 1601)	252	(243, 261)	89	(83, 95)
	3	3,190	(2946, 3434)	1,088	(982, 1194)	189	(175, 204)	64	(58, 71)

(a) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 2 based on any discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C2: Numbers and rates of non-fatal heart attacks for Victoria, by sex and age group, estimated by three different methods

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	280	(270, 290)			40	(39, 42)		
	2	287	(277, 298)			41	(40, 43)		
	3	193	(161, 225)			28	(23, 32)		
45-54 (men only)	1	578	(557, 598)			228	(220, 236)		
	2	606	(585, 628)			240	(231, 248)		
	3	463	(387, 539)			183	(153, 213)		
25-54 (women only)	1			169	(158, 180)			18	(17, 19)
	2			188	(176, 201)			20	(19, 21)
	3			103	(78, 128)			11	(8, 14)
55-59	1	409	(395, 424)	120	(112, 128)	425	(410, 440)	127	(118, 135)
	2	445	(430, 461)	120	(112, 127)	462	(446, 479)	126	(118, 134)
	3	297	(237, 356)	111	(84, 138)	308	(247, 370)	117	(88, 145)
60-64	1	526	(508, 545)	201	(188, 215)	563	(543, 582)	213	(199, 227)
	2	555	(535, 574)	219	(205, 233)	593	(572, 614)	231	(216, 246)
	3	497	(416, 578)	125	(106, 145)	532	(445, 618)	133	(111, 154)
65-69	1	601	(580, 622)	346	(323, 368)	722	(697, 747)	374	(349, 399)
	2	624	(602, 646)	381	(357, 406)	749	(723, 776)	413	(386, 439)
	3	550	(471, 629)	286	(241, 332)	660	(565, 755)	310	(261, 359)
Total^(a)	1	2,394	(2311, 2478)	836	(781, 892)	195	(188, 202)	67	(63, 72)
	2	2,518	(2429, 2607)	908	(849, 967)	205	(198, 212)	73	(68, 78)
	3	2,000	(1848, 2152)	626	(564, 688)	163	(150, 175)	50	(45, 55)

(a) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 2 based on any discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C3: Numbers and rates of non-fatal heart attacks for Queensland, by sex and age group, estimated by two different methods^(a)

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	213	(206, 221)			46	(44, 47)		
	3	156	(131, 182)			33	(28, 39)		
45-54 (men only)	1	475	(458, 491)			268	(259, 278)		
	3	373	(312, 435)			211	(176, 246)		
25-54 (women only)	1			175	(164, 187)			28	(26, 29)
	3			117	(89, 145)			18	(14, 23)
55-59	1	299	(289, 310)	84	(79, 90)	474	(458, 491)	139	(130, 148)
	3	199	(159, 238)	81	(62, 101)	315	(252, 378)	134	(102, 167)
60-64	1	386	(373, 400)	170	(159, 182)	640	(617, 662)	282	(263, 301)
	3	328	(274, 381)	108	(90, 125)	543	(454, 631)	178	(150, 207)
65-69	1	414	(399, 428)	240	(225, 256)	758	(731, 784)	423	(395, 451)
	3	402	(344, 459)	200	(168, 232)	736	(630, 842)	352	(296, 408)
Total ^(b)	1	1,788	(1725, 1850)	670	(626, 715)	218	(211, 226)	85	(79, 90)
	3	1,458	(1347, 1568)	506	(456, 556)	178	(165, 192)	64	(58, 70)

(a) Principal discharge diagnosis only available for Queensland

(b) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C4: Numbers and rates of non-fatal heart attacks for South Australia, by sex and age group, estimated by two different methods^(a)

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	149	(144, 154)			66	(63, 68)		
	3	56	(47, 65)			25	(21, 29)		
45-54 (men only)	1	249	(240, 258)			302	(291, 313)		
	3	169	(142, 197)			206	(172, 239)		
25-54 (women only)	1			71	(66, 76)			23	(22, 25)
	3			38	(28, 47)			12	(9, 15)
55-59	1	165	(159, 171)	54	(51, 58)	516	(498, 534)	170	(159, 182)
	3	114	(91, 137)	38	(28, 47)	357	(286, 429)	118	(90, 147)
60-64	1	194	(187, 201)	86	(80, 92)	599	(578, 619)	262	(245, 280)
	3	195	(163, 227)	59	(49, 68)	602	(504, 700)	179	(150, 207)
65-69	1	248	(239, 257)	137	(128, 146)	811	(783, 840)	410	(383, 438)
	3	226	(193, 258)	116	(98, 134)	739	(633, 845)	347	(292, 402)
Total ^(b)	1	1,004	(969, 1040)	349	(326, 372)	240	(232, 249)	81	(76, 87)
	3	761	(702, 819)	250	(226, 274)	180	(166, 194)	58	(52, 63)

(a) Principal discharge diagnosis only available for South Australia

(b) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C5: Numbers and rates of non-fatal heart attacks for Western Australia, by sex and age group, estimated by two different methods^(a)

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	106	(103, 110)			40	(38, 41)		
	3	70	(58, 81)			26	(22, 30)		
45-54 (men only)	1	229	(221, 237)			237	(229, 245)		
	3	189	(158, 221)			196	(164, 229)		
25-54 (women only)	1			74	(69, 79)			21	(19, 22)
	3			37	(28, 46)			10	(8, 13)
55-59	1	167	(161, 172)	40	(37, 43)	492	(475, 509)	123	(115, 131)
	3	96	(76, 115)	42	(32, 52)	282	(226, 339)	128	(97, 159)
60-64	1	214	(207, 222)	62	(58, 66)	681	(657, 705)	201	(188, 215)
	3	156	(130, 181)	48	(40, 55)	495	(415, 576)	155	(130, 179)
65-69	1	224	(216, 232)	133	(124, 142)	825	(796, 854)	469	(438, 500)
	3	192	(164, 219)	84	(71, 97)	706	(604, 807)	295	(248, 342)
Total ^(b)	1	940	(907, 973)	310	(289, 330)	217	(210, 225)	76	(71, 81)
	3	702	(649, 756)	210	(190, 231)	163	(150, 175)	51	(46, 56)

(a) Principal discharge diagnosis only available for Western Australia

(b) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C6: Numbers and rates of non-fatal heart attacks for Tasmania, by sex and age group, estimated by two different methods^(a)

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	34	(32, 35)			47	(46, 49)		
	3	23	(19, 27)			32	(27, 38)		
45-54 (men only)	1	65	(62, 67)			244	(235, 252)		
	3	66	(55, 77)			249	(208, 290)		
25-54 (women only)	1			18	(17, 19)			19	(17, 20)
	3			16	(12, 20)			17	(13, 21)
55-59	1	42	(40, 43)	15	(14, 16)	418	(403, 433)	150	(140, 160)
	3	31	(25, 37)	14	(11, 18)	311	(249, 373)	143	(109, 178)
60-64	1	71	(68, 73)	25	(23, 27)	721	(696, 746)	253	(236, 269)
	3	60	(51, 70)	19	(16, 23)	614	(514, 714)	196	(165, 227)
65-69	1	79	(76, 82)	43	(40, 46)	868	(838, 899)	439	(410, 468)
	3	74	(63, 84)	34	(29, 39)	810	(694, 926)	346	(291, 401)
Total^(b)	1	290	(280, 300)	101	(94, 108)	223	(216, 231)	78	(72, 83)
	3	254	(234, 273)	84	(76, 92)	196	(181, 211)	65	(58, 71)

(a) Principal discharge diagnosis only available for Tasmania

(b) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C7: Numbers and rates of non-fatal heart attacks for Northern Territory, by sex and age group, estimated by three different methods

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	17	(16, 17)			52	(50, 54)		
	2	17	(16, 18)			53	(51, 55)		
	3	19	(16, 22)			60	(50, 69)		
45-54 (men only)	1	21	(21, 22)			224	(216, 232)		
	2	19	(19, 20)			205	(198, 212)		
	3	35	(29, 41)			372	(311, 433)		
25-54 (women only)	1			8	(7, 9)			21	(20, 23)
	2			9	(8, 10)			24	(22, 25)
	3			8	(6, 9)			20	(15, 25)
55-59	1	9	(9, 9)	7	(7, 7)	357	(345, 370)	380	(355, 405)
	2	8	(8, 8)	6	(6, 7)	326	(315, 338)	338	(316, 360)
	3	11	(8, 13)	5	(4, 6)	428	(342, 514)	259	(196, 322)
60-64	1	13	(13, 14)	2	(2, 2)	736	(710, 762)	146	(136, 155)
	2	12	(12, 13)	2	(2, 2)	673	(649, 697)	130	(121, 138)
	3	13	(11, 15)	4	(3, 4)	719	(602, 836)	277	(233, 322)
65-69	1	6	(6, 6)	4	(4, 4)	546	(527, 565)	430	(402, 459)
	2	6	(6, 7)	4	(3, 4)	570	(550, 590)	384	(359, 408)
	3	11	(9, 12)	5	(4, 6)	929	(796, 1062)	533	(448, 617)
Total ^(a)	1	66	(64, 69)	21	(20, 22)	197	(190, 204)	89	(83, 94)
	2	63	(61, 65)	21	(19, 22)	187	(181, 194)	83	(77, 88)
	3	89	(81, 96)	21	(19, 23)	262	(242, 282)	96	(87, 105)

(a) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91)

Method 2 based on any discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C8: Numbers and rates of non-fatal heart attacks for the Australian Capital Territory, by sex and age group, estimated by three different methods

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	26	(25, 27)			52	(50, 54)		
	2	25	(24, 26)			51	(49, 52)		
	3	8	(7, 10)			17	(14, 20)		
45-54 (men only)	1	46	(44, 48)			265	(256, 275)		
	2	46	(45, 48)			266	(256, 275)		
	3	22	(19, 26)			128	(107, 149)		
25-54 (women only)	1			15	(14, 16)			23	(21, 24)
	2			13	(13, 14)			20	(19, 21)
	3			5	(4, 7)			8	(6, 10)
55-59	1	26	(25, 27)	8	(7, 9)	503	(485, 521)	165	(154, 176)
	2	25	(24, 26)	9	(8, 10)	491	(474, 509)	184	(172, 196)
	3	15	(12, 18)	10	(7, 12)	286	(229, 343)	197	(149, 245)
60-64	1	27	(26, 28)	7	(7, 7)	654	(631, 677)	170	(159, 182)
	2	28	(27, 28)	8	(8, 9)	655	(632, 678)	195	(183, 208)
	3	23	(20, 27)	8	(6, 9)	558	(468, 649)	185	(156, 215)
65-69	1	28	(27, 29)	18	(17, 19)	830	(801, 859)	470	(439, 501)
	2	28	(27, 28)	16	(15, 17)	806	(777, 834)	419	(392, 446)
	3	20	(17, 23)	13	(11, 15)	579	(496, 662)	348	(293, 403)
Total ^(a)	1	153	(148, 159)	48	(45, 51)	229	(221, 237)	78	(73, 83)
	2	151	(146, 157)	46	(43, 49)	226	(218, 234)	75	(71, 80)
	3	89	(82, 95)	36	(32, 40)	140	(129, 151)	61	(55, 67)

(a) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 2 based on any discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C9: Numbers and rates of all heart attacks for New South Wales, by sex and age group, estimated by three different methods

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	562	(546, 577)			60	(59, 62)		
	2	600	(584, 617)			64	(63, 66)		
	3	415	(367, 462)			45	(39, 50)		
45-54 (men only)	1	1,318	(1284, 1352)			381	(371, 390)		
	2	1,458	(1419, 1497)			421	(410, 432)		
	3	1,179	(1044, 1315)			341	(302, 380)		
25-54 (women only)	1			404	(383, 424)			32	(31, 34)
	2			430	(408, 452)			34	(33, 36)
	3			291	(243, 338)			23	(19, 27)
55-59	1	1,004	(981, 1027)	303	(290, 317)	768	(751, 785)	236	(225, 246)
	2	1,097	(1071, 1123)	328	(313, 342)	839	(819, 859)	254	(243, 266)
	3	823	(729, 917)	311	(260, 362)	630	(558, 702)	242	(202, 281)
60-64	1	1,393	(1365, 1421)	566	(542, 589)	1,086	(1064, 1108)	433	(415, 450)
	2	1,509	(1477, 1541)	615	(589, 641)	1,176	(1151, 1202)	470	(450, 490)
	3	1,333	(1212, 1454)	455	(416, 493)	1,039	(945, 1133)	348	(318, 377)
65-69	1	1,737	(1707, 1767)	859	(827, 890)	1,499	(1473, 1525)	675	(651, 700)
	2	1,873	(1838, 1908)	925	(890, 960)	1,617	(1587, 1647)	728	(700, 755)
	3	1,743	(1619, 1868)	825	(755, 895)	1,505	(1397, 1612)	649	(594, 704)
Total ^(a)	1	6,013	(5884, 6143)	2,132	(2043, 2220)	357	(349, 364)	126	(121, 131)
	2	6,537	(6388, 6687)	2,298	(2201, 2395)	388	(379, 397)	136	(130, 141)
	3	5,494	(5250, 5737)	1,882	(1776, 1988)	325	(311, 340)	111	(105, 117)

(a) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 2 based on any discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C10: Numbers and rates of all heart attacks for Victoria, by sex and age group, estimated by three different methods

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	364	(354, 374)			52	(51, 54)		
	2	371	(361, 382)			53	(52, 55)		
	3	277	(245, 309)			40	(35, 44)		
45-54 (men only)	1	779	(759, 799)			308	(300, 316)		
	2	808	(786, 829)			319	(311, 328)		
	3	665	(588, 741)			263	(232, 293)		
25-54 (women only)	1			220	(208, 231)			23	(22, 24)
	2			239	(227, 251)			25	(24, 27)
	3			154	(129, 179)			16	(14, 19)
55-59	1	633	(619, 647)	174	(166, 182)	657	(642, 672)	183	(175, 192)
	2	669	(653, 685)	174	(166, 181)	694	(678, 711)	183	(175, 191)
	3	521	(461, 580)	165	(138, 192)	540	(479, 602)	173	(145, 202)
60-64	1	922	(903, 940)	311	(298, 324)	986	(966, 1006)	329	(314, 343)
	2	950	(931, 970)	328	(314, 343)	1016	(995, 1037)	347	(332, 362)
	3	893	(812, 974)	235	(215, 255)	955	(868, 1041)	248	(227, 270)
65-69	1	1,157	(1136, 1178)	596	(573, 619)	1389	(1364, 1414)	645	(620, 670)
	2	1,180	(1158, 1202)	632	(607, 656)	1416	(1390, 1443)	683	(657, 710)
	3	1,105	(1027, 1184)	537	(491, 582)	1327	(1232, 1422)	581	(532, 630)
Total ^(a)	1	3,855	(3771, 3938)	1,301	(1245, 1356)	313	(306, 320)	105	(100, 109)
	2	3,978	(3890, 4067)	1,372	(1314, 1431)	323	(316, 330)	110	(106, 115)
	3	3,461	(3309, 3613)	1,090	(1028, 1152)	281	(269, 293)	88	(83, 93)

(a) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 2 based on any discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C11: Numbers and rates of all heart attacks for Queensland, by sex and age group estimated by two different methods^(a)

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	281	(274, 289)			60	(58, 62)		
	3	224	(199, 250)			48	(42, 53)		
45-54 (men only)	1	637	(621, 654)			360	(351, 369)		
	3	536	(474, 597)			303	(268, 337)		
25-54 (women only)	1			232	(221, 244)			37	(35, 38)
	3			174	(146, 202)			27	(23, 32)
55-59	1	449	(439, 460)	124	(118, 129)	712	(695, 728)	205	(195, 214)
	3	348	(309, 388)	121	(101, 1141)	552	(489, 615)	200	(167, 233)
60-64	1	647	(633, 660)	264	(253, 276)	1,072	(1049, 1094)	438	(419, 457)
	3	588	(535, 642)	202	(184, 219)	974	(886, 1063)	334	(306, 362)
65-69	1	820	(805, 834)	415	(399, 431)	1,502	(1475, 1528)	731	(703, 759)
	3	808	(750, 865)	375	(343, 406)	1,480	(1374, 1585)	659	(603, 719)
Total ^(b)	1	2,834	(2772, 2897)	1,036	(991, 1080)	347	(339, 354)	131	(126, 137)
	3	2,504	(2394, 2615)	871	(821, 921)	307	(293, 320)	111	(104, 117)

(a) Principal discharge diagnosis only available for Queensland

(b) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C12: Numbers and rates of all heart attacks for South Australia, by sex and age group, estimated by two different methods^(a)

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	173	(168, 178)			76	(74, 79)		
	3	80	(71, 90)			35	(31, 39)		
45-54 (men only)	1	323	(314, 331)			391	(381, 402)		
	3	243	(215, 271)			295	(261, 329)		
25-54 (women only)	1			89	(85, 94)			29	(28, 31)
	3			56	(47, 65)			18	(15, 21)
55-59	1	251	(245, 257)	72	(69, 76)	785	(767, 803)	228	(217, 239)
	3	200	(177, 223)	56	(47, 65)	626	(555, 698)	176	(147, 205)
60-64	1	349	(343, 356)	137	(132, 143)	1,078	(1057, 1099)	419	(401, 436)
	3	351	(319, 382)	110	(101, 119)	1,082	(984, 1179)	335	(307, 364)
65-69	1	476	(468, 485)	239	(229, 248)	1,558	(1530, 1586)	713	(686, 741)
	3	454	(422, 487)	217	(199, 236)	1,486	(1380, 1592)	650	(595, 705)
Total ^(b)	1	1,572	(1537, 1607)	538	(515, 561)	373	(364, 381)	125	(119, 130)
	3	1,328	(1270, 1387)	439	(415, 464)	312	(298, 326)	101	(96, 107)

(a) Principal discharge diagnosis only available for South Australia

(b) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C13: Numbers and rates of all heart attacks for Western Australia, by sex and age group, estimated by two different methods^(a)

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	137	(133, 140)			51	(49, 52)		
	3	100	(89, 112)			37	(33, 41)		
45-54 (men only)	1	311	(303, 319)			322	(314, 330)		
	3	272	(241, 303)			282	(249, 314)		
25-54 (women only)	1			92	(87, 97)			26	(25, 27)
	3			55	(46, 64)			15	(13, 18)
55-59	1	239	(233, 244)	60	(58, 63)	705	(688, 722)	185	(177, 193)
	3	168	(148, 187)	62	(52, 72)	495	(439, 552)	190	(159, 221)
60-64	1	338	(331, 346)	104	(100, 108)	1,075	(1051, 1099)	336	(323, 350)
	3	280	(254, 305)	89	(82, 97)	889	(809, 970)	290	(265, 314)
65-69	1	418	(410, 426)	207	(198, 215)	1,538	(1510, 1567)	727	(969, 758)
	3	385	(358, 413)	157	(144, 171)	1,419	(1317, 1520)	553	(506, 600)
Total ^(b)	1	1,442	(1409, 1475)	463	(442, 483)	336	(328, 343)	114	(109, 119)
	3	1,205	(1151, 1258)	364	(343, 384)	281	(269, 294)	90	(84, 95)

(a) Principal discharge diagnosis only available for Western Australia

(b) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C14: Numbers and rates of all heart attacks for Tasmania, by sex and age group, estimated by two different methods^(a)

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	44	(42, 45)			62	(60, 63)		
	3	33	(29, 37)			47	(41, 52)		
45-54 (men only)	1	93	(91, 96)			352	(344, 361)		
	3	95	(84, 105)			357	(316, 398)		
25-54 (women only)	1			26	(25, 27)			27	(26, 28)
	3			24	(20, 28)			25	(21, 29)
55-59	1	65	(64, 66)	22	(21, 23)	652	(638, 667)	220	(210, 230)
	3	54	(48, 61)	21	(18, 25)	545	(483, 607)	213	(178, 248)
60-64	1	119	(116, 121)	42	(40, 44)	1,210	(1184, 1235)	424	(407, 441)
	3	108	(99, 118)	36	(33, 40)	1,102	(1002, 1202)	368	(336, 399)
65-69	1	153	(150, 156)	73	(70, 76)	1,687	(1657, 1718)	742	(713, 771)
	3	148	(137, 158)	64	(58, 69)	1,629	(1513, 1745)	649	(594, 704)
Total^(b)	1	474	(464, 484)	163	(156, 170)	364	(357, 372)	125	(120, 130)
	3	438	(419, 458)	146	(138, 154)	337	(322, 351)	112	(105, 118)

(a) Principal discharge diagnosis only available for Tasmania

(b) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C15: Numbers and rates of all heart attacks for the Northern Territory, by sex and age group, estimated by three different methods

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	25	(25, 26)			78	(76, 80)		
	2	25	(25, 26)			79	(77, 81)		
	3	28	(24, 31)			85	(76, 95)		
45-54 (men only)	1	37	(36, 37)			386	(378, 394)		
	2	35	(34, 35)			367	(359, 374)		
	3	51	(45, 56)			534	(472, 595)		
25-54 (women only)	1			12	(11, 12)			31	(30, 33)
	2			13	(12, 13)			34	(32, 35)
	3			11	(9, 13)			30	(25, 35)
55-59	1	17	(17, 17)	9	(9, 10)	680	(667, 692)	506	(481, 531)
	2	16	(16, 16)	9	(8, 9)	649	(638, 661)	465	(443, 487)
	3	19	(16, 21)	7	(6, 8)	751	(665, 837)	386	(323, 449)
60-64	1	24	(23, 24)	5	(5, 5)	1309	(1283, 1334)	388	(378, 398)
	2	22	(22, 23)	5	(5, 5)	1245	(1222, 1269)	372	(364, 381)
	3	23	(21, 25)	7	(7, 8)	1292	(1175, 1409)	520	(476, 564)
65-69	1	17	(17, 17)	8	(8, 9)	1485	(1466, 1504)	896	(867, 924)
	2	17	(17, 17)	8	(8, 8)	1509	(1489, 1529)	849	(824, 874)
	3	21	(20, 23)	9	(9, 10)	1868	(1734, 2001)	998	(913, 1083)
Total ^(a)	1	119	(117, 121)	35	(33, 36)	377	(370, 384)	159	(153, 165)
	2	116	(114, 118)	34	(33, 36)	368	(361, 374)	153	(147, 158)
	3	141	(134, 149)	35	(32, 37)	442	(422, 462)	166	(157, 175)

(a) Rates age-standardised to mid-1992 Australian population

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 2 based on any discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Table C16: Numbers and rates of all heart attacks for the Australian Capital Territory, by sex and age group, estimated by three different methods

Age group	Method	Number of events				Rate per 100,000			
		Men		Women		Men		Women	
		Number	(95%CI)	Number	(95%CI)	Rate	(95%CI)	Rate	(95%CI)
25-44 (men only)	1	29	(28, 30)			59	(57, 61)		
	2	29	(28, 30)			58	(56, 60)		
	3	12	(11, 13)			24	(22, 27)		
45-54 (men only)	1	56	(11, 13)			321	(312, 330)		
	2	56	(54, 57)			322	(312, 331)		
	3	32	(28, 36)			184	(163, 205)		
25-54 (women only)	1			18	(17, 19)			27	(25, 28)
	2			16	(15, 17)			24	(23, 25)
	3			8	(7, 9)			12	(10, 14)
55-59	1	37	(36, 38)	13	(12, 13)	718	(163, 205)	261	(250, 272)
	2	36	(35, 37)	14	(13, 14)	707	(690, 724)	280	(268, 292)
	3	26	(23, 29)	14	(12, 17)	501	(444, 559)	293	(245, 341)
60-64	1	46	(45, 47)	14	(13, 14)	1098	(1075, 1121)	333	(321, 344)
	2	46	(45, 47)	15	(14, 15)	1100	(1077, 1123)	357	(245, 370)
	3	42	(38, 46)	14	(13, 16)	1003	(912, 1094)	348	(318, 377)
65-69	1	48	(47, 49)	30	(29, 31)	1415	(1386, 1444)	774	(743, 805)
	2	48	(47, 48)	28	(27, 29)	1391	(1363, 1420)	723	(696, 750)
	3	40	(37, 43)	25	(23, 27)	1165	(1082, 1248)	652	(597, 707)
Total ^(a)	1	216	(211, 222)	74	(71, 77)	335	(327, 343)	123	(120, 128)
	2	214	(209, 220)	72	(69, 75)	332	(324, 340)	121	(116, 126)
	3	152	(145, 158)	62	(58, 65)	245	(234, 256)	107	(100, 113)

(a) Rates age-standardised to mid-1992 Australian population.

Notes: Method 1 based on principal discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 2 based on any discharge diagnosis coded 410 for 1991-92 financial year except for Queensland (1990) and Northern Territory (1990-91).

Method 3 based on annual principal cause of death 410-414 averaged over 1990-92.

Hospital separations data for private hospitals not included for Victoria, Western Australia, Tasmania, Australian Capital Territory and Northern Territory.

Appendix D

Number of separations and deaths coded 410, 410-414 and proportion of 410-414 coded 410

Table D1: Number of non-fatal hospital separations with principal discharge diagnosis coded 410, by State or Territory, sex and age group

Age group	State or Territory							Total	
	NSW	VIC	QLD	SA	WA	TAS	NT		ACT
Men									
25-44	492	316	241	168	120	38	19	29	1,423
45-54	1,084	652	536	281	258	73	24	52	2,960
55-59	734	462	338	186	188	47	10	29	1,994
60-64	906	594	436	219	242	80	15	31	2,523
65-69	972	679	467	280	253	89	7	32	2,779
Total	4,188	2,703	2,018	1,134	1,061	327	75	173	11,679
Women									
25-54	308	169	175	71	74	18	8	15	838
55-59	201	120	84	54	40	15	7	8	529
60-64	353	201	170	86	62	25	2	7	906
65-69	473	345	240	137	133	43	4	18	1,393
Total	1,335	835	669	348	309	101	21	48	3,666

Table D2: Number of non-fatal hospital separations with principal discharge diagnosis coded 410–414, by State Territory, sex and age group

Age group	State or Territory								Total
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	
Men									
25–44	1,840	900	811	524	436	109	36	90	4,746
45–54	4,985	2,270	1,991	1,158	1,044	300	64	218	12,030
55–59	3,594	1,624	1,328	913	739	230	18	136	8,582
60–64	4,732	2,231	1,745	1,119	927	310	37	148	11,249
65–69	4,949	2,349	1,851	1,346	968	325	11	167	11,966
Total	20,101	9,374	7,726	5,060	4,114	1,274	166	759	48,574
Women									
25–54	1,768	812	714	338	353	113	27	60	4,185
55–59	1,169	545	424	282	220	67	14	42	2,763
60–64	1,791	890	729	475	375	125	10	76	4,471
65–69	2,436	1,355	1,039	660	549	182	9	93	6,323
Total	7,164	3,602	2,906	1,755	1,497	487	60	271	17,742

Table D3: Proportion of non-fatal hospital separations with principal discharge diagnosis coded 410–414 which coded 410, by State or Territory, sex and age group (%)

Age group	State or Territory								Total
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	
Men									
25–44	27	35	30	32	28	35	53	32	30
45–54	22	29	27	24	25	24	38	24	25
55–59	20	28	25	20	25	20	56	21	23
60–64	19	27	25	20	26	26	41	21	22
65–69	20	29	25	21	26	27	64	19	23
Total	21	29	26	22	26	26	45	23	24
Women									
25–54	17	21	25	21	21	16	30	25	20
55–59	17	22	20	19	18	22	50	19	19
60–64	20	23	23	18	17	20	20	9	20
65–69	19	25	23	21	24	24	44	19	22
Total	19	23	23	20	21	21	35	18	21

Table D4: Number of non-fatal hospital separations with any discharge diagnosis coded 410, by State or Territory, sex and age group

Age group	State or Territory								Total
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	
Men									
25-44	586	355	241	168	120	38	21	31	1,560
45-54	1,359	749	536	281	258	73	24	57	3,337
55-59	918	550	339	281	188	47	10	31	2,269
60-64	1,134	685	436	219	244	80	15	34	2,847
65-69	1,231	771	469	282	255	89	8	34	3,139
Total	5,229	3,110	2,021	1,136	1,065	327	78	187	13,153
Women									
25-54	375	211	175	71	74	18	10	15	949
55-59	253	134	84	54	40	15	7	10	597
60-64	451	245	170	86	62	25	2	9	1,050
65-69	605	427	240	138	134	43	4	18	1,609
Total	1,684	1,017	669	349	310	101	23	52	4,205

Table D5: Number of non-fatal hospital separations with any discharge diagnosis coded 410-414, by State or Territory, sex and age group

Age group	State or Territory								Total
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	
Men									
25-44	2,276	1,034	811	524	437	109	43	102	5,336
45-54	6,395	2,723	1,993	1,159	1,046	300	76	240	13,932
55-59	5,135	2,117	1,329	913	740	231	23	168	10,656
60-64	7,266	3,083	1,748	1,122	931	313	42	184	14,689
65-69	8,625	3,665	1,869	1,372	989	336	16	215	17,087
Total	29,697	12,622	7,750	5,090	4,143	1,289	200	909	61,700
Women									
25-54	2,619	1,036	714	339	353	113	34	67	5,275
55-59	1,874	766	425	283	220	67	18	53	3,706
60-64	3,178	1,301	729	475	375	125	12	101	6,296
65-69	4,628	2,176	1,042	663	552	185	13	127	9,386
Total	12,299	5,279	2,910	1,760	1,500	490	77	348	24,663

Table D6: Proportion of non-fatal hospital separations with any discharge diagnosis coded 410-414 which are coded 410, by State or Territory, sex and age group (%)

Age group	State or Territory								Total
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	
Men									
25-44	26	34	30	32	27	35	49	30	29
45-54	21	28	27	24	25	24	32	24	24
55-59	18	26	26	20	25	20	43	18	21
60-64	16	22	25	20	26	26	36	18	19
65-69	14	21	25	21	26	26	50	16	18
Total	18	25	26	22	26	25	39	21	21
Women									
25-54	14	20	25	21	21	16	29	22	18
55-59	13	17	20	19	18	22	39	19	16
60-64	14	19	23	18	17	20	17	9	17
65-69	13	20	23	21	24	23	31	14	17
Total	14	19	23	20	21	21	30	15	17

Table D7: Average annual number of deaths due to acute myocardial infarction (ICD-9 410) for 1990-92, by State or Territory, sex and age group

Age group	State or Territory								Total
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	
Men									
< 25	1	2	1	0	2	0	0	0	6
25-44	88	39	46	16	18	8	5	2	222
45-54	254	95	112	52	45	22	10	7	597
55-59	244	128	108	56	43	16	4	8	608
60-64	410	246	184	110	78	32	6	12	1,077
65-69	600	353	300	168	122	52	6	10	1,612
70-74	708	442	339	197	125	56	6	15	1,888
75-79	810	508	384	225	156	68	5	15	2,172
80-84	599	447	302	173	143	51	3	7	1,726
85 +	460	356	231	137	117	34	1	6	1,341
Total	4,174	2,615	2,007	1,135	850	339	47	81	11,249
Women									
< 25	0	0	0	0	0	0	0	0	1
25-54	70	29	39	14	12	7	2	2	175
55-59	72	37	29	13	13	5	2	3	173
60-64	154	67	70	39	28	13	2	5	378
65-69	272	167	127	78	48	20	3	6	720
70-74	476	286	199	113	79	34	2	10	1,200
75-79	665	467	291	181	125	52	3	15	1,799
80-84	723	537	317	198	161	58	1	9	2,004
85+	964	722	446	302	193	66	0	16	2,709
Total	3,397	2,313	1,517	938	659	256	15	66	9,161

Table D8: Average annual number of deaths due to ischaemic heart disease (ICD-9 410-414) for 1991-93, by State or Territory, sex and age group

Age group	State or Territory							Total	
	NSW	VIC	QLD	SA	WA	TAS	NT		ACT
Men									
< 25	2	2	1	1	2	0	1	0	9
25-44	126	84	68	24	30	10	8	4	354
45-54	357	201	162	74	82	29	15	10	931
55-59	354	224	150	86	72	23	8	11	927
60-64	591	396	261	155	124	48	10	19	1,603
65-69	876	556	406	228	194	74	11	20	2,365
70-74	1,031	682	484	273	204	87	8	22	2,792
75-79	1,204	769	546	307	241	96	7	26	3,196
80-84	922	675	451	264	219	80	4	13	2,627
85+	757	587	373	210	195	60	2	11	2,194
Total	6,220	4,175	2,901	1,622	1,363	507	74	135	16,998
Women									
< 25	0	0	0	0	0	0	0	0	1
25-54	95	50	57	18	18	8	4	3	253
55-59	102	54	40	18	20	7	2	5	248
60-64	212	110	94	51	42	17	3	7	536
65-69	385	250	175	101	73	30	4	12	1,030
70-74	669	402	288	157	123	46	3	15	1,705
75-79	969	654	419	249	180	76	3	24	2,574
80-84	1,087	790	485	279	235	88	3	17	2,984
85+	1,678	1,230	779	472	348	124	1	29	4,661
Total	5,198	3,540	2,337	1,347	1,040	396	24	111	13,992

Table D9: Average annual proportion of deaths due to ischaemic heart disease (ICD-9 410-414) attributed to acute myocardial infarction (ICD-9 410) for 1991-92, by State or Territory, sex and age group (%)

Age group	State or Territory								Total
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	
Men									
< 25	40	71	50	50	83	100	50	0	63
25-44	70	46	68	67	59	83	60	45	63
45-54	71	47	69	71	54	77	67	72	64
55-59	69	57	72	66	60	70	46	73	66
60-64	69	62	70	71	63	66	61	63	67
65-69	68	64	74	74	63	70	59	52	68
70-74	69	65	70	72	61	64	75	66	68
75-79	67	66	70	73	65	71	71	58	68
80-84	65	66	67	66	66	64	77	54	66
85+	61	61	62	65	60	57	40	53	61
Total	67	63	69	70	62	67	63	60	66
Women									
< 25	100	100	100	0	100	0	0	0	100
25-54	73	57	68	78	69	88	64	88	69
55-59	71	69	72	71	62	71	71	57	70
60-64	73	61	74	75	66	78	60	75	71
65-69	71	67	73	77	65	67	69	49	70
70-74	71	71	69	72	64	73	50	69	70
75-79	69	71	69	73	70	69	80	63	70
80-84	66	68	65	71	68	66	44	52	67
85+	57	59	57	64	55	53	0	56	58
Total	65	65	65	70	63	65	61	60	65

Appendix E

Figure tables

Table E1: Sociodemographic and lifestyle differentials in the prevalence of self-reported chronic disease of the circulatory system by sex, (25–64-year-olds), 1989–90

Sociodemographic variable	Men		Women	
	Prevalence rate ^(a) (%)	Rate ratio	Prevalence rate ^(a) (%)	Rate ratio
Sex (reference group—women)	11.8	0.71*	16.6	1.00
Marital status				
Married (reference group)	11.8	1.00	16.5	1.00
Never married	12.7	1.08	11.4	0.69*
Previously married	11.6	0.98	18.2	1.10
Family composition				
Couple, with dependents (reference group)	11.1	1.00	15.9	1.00
Couple, no dependents	11.4	1.02	16.1	1.01
Single, with dependents	15.4	1.39	16.2	1.02
Single, with others	13.8	1.24	17.1	1.07
Single, living alone	11.2	1.01	14.4	0.90
Income				
High (reference group)	11.1	1.00	15.3	1.00
Medium	11.5	1.03	16.4	1.07
Low	13.2	1.18	17.7	1.15
Education				
High (reference group)	11.6	1.00	15.7	1.00
Medium	11.6	1.01	16.3	1.04
Low	13.2	1.14	18.9	1.20
Employment status				
Employed (reference group)	10.3	1.00	15.2	1.00
Unemployed	12.1	1.17	18.7	1.23
Not in work force	18.0	1.74*	17.9	1.18*
Hours worked				
25 hours or more (reference group)	10.2	1.00	14.7	1.00
15–24 hours	10.9	1.07	15.8	1.08
1–14 hours	8.7	0.85	16.3	1.11
Not employed	16.7	1.64*	17.9	1.22*

(continued)

Table E1 (continued): Sociodemographic and lifestyle differentials in the prevalence of self-reported chronic disease of the circulatory system by sex, (25-64-year-olds), 1989-90

Sociodemographic variable	Men		Women	
	Prevalence rate ^(a) (%)	Rate ratio	Prevalence rate ^(a) (%)	Rate ratio
Occupation				
Professional/tech/admin (reference group)	9.8	1.00	14.4	1.00
Clerical/sales/service	12.4	1.27	15.6	1.08
Trades/transport/labour	10.2	1.03	15.8	1.10
Socioeconomic disadvantage				
1st quintile (reference group)	11.4	1.00	17.1	1.00
2nd quintile	11.4	1.00	16.6	0.97
3rd quintile	11.8	1.03	15.9	0.93
4th quintile	11.9	1.04	16.1	0.94
5th quintile	12.4	1.09	16.8	0.98
State/Territory				
Australia (reference group)	11.8	1.00	16.6	1.00
NSW	10.8	0.92	14.9	0.90
Vic	12.2	1.03	17.3	1.04
Qld	13.8	1.17	18.5	1.11
WA	11.2	0.94	18.2	1.10
SA	11.6	0.98	15.9	0.96
Tas	10.2	0.86	16.8	1.01
ACT	16.7	1.41	17.1	1.03
NT	7.6	0.64	11.6	0.70
Region				
Metropolitan (reference group)	12.1	1.00	16.8	1.00
Non-metropolitan	11.4	0.95	16.2	0.96
Country of birth				
Australia (reference group)	12.6	1.00	17.3	1.00
UK, Ireland	11.7	0.93	17.3	1.01
Other Europe	9.9	0.79*	15.3	0.88
Asia	9.9	0.79	11.5	0.67*
Other	9.6	0.77	13.9	0.81
Language spoken				
English (reference group)	12.2	1.00	16.9	1.00
Other language	9.1	0.75*	13.8	0.82*

(continued)

Table E1 (continued): Sociodemographic and lifestyle differentials in the prevalence of self-reported chronic disease of the circulatory system by sex, (25–64-year-olds), 1989–90

Sociodemographic variable	Men		Women	
	Prevalence rate ^(a) (%)	Rate ratio	Prevalence rate ^(a) (%)	Rate ratio
Overweight and obesity				
Not overweight or obese (reference group)	9.1	1.00	14.2	1.00
Overweight or obese	14.3	1.57*	20.5	1.45*
Inactivity				
Active (reference group)	12.2	1.00	16.8	1.00
Inactive	11.3	0.93	16.2	0.97
Smoking status				
Non-smoker (reference group)	12.1	1.00	16.6	1.00
Smoker	11.1	0.92	16.1	0.97
Alcohol risk				
Low risk (reference group)	11.5	1.00	16.6	1.00
Moderate/high risk	13.9	1.21*	16.7	1.01

(a) All rates age-standardised to the 1988 total Australian population

* $p < 0.01$

Source: Mathers²²

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Morbidity from cardiovascular disease in Australia is the second in a series of publications monitoring cardiovascular disease in Australia. The report presents a picture of morbidity from cardiovascular disease at the present time, drawn from currently available data. It also examines issues related to the presentation and interpretation of morbidity data.

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