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bulletin 37

Socioeconomic inequalities in cardiovascular disease in Australia

Current picture and trends since 1992

Highlights

Current picture for those aged 25–74

- In 2002, adults from the most disadvantaged areas of Australia had significantly higher death rates from cardiovascular disease (CVD), coronary heart disease (CHD) and stroke than adults from the least disadvantaged areas—between 1.6 and 1.9 times as high.
- If everyone experienced the same death rates as those in the least disadvantaged areas, around 28% of deaths from CVD as a whole, 32% of deaths from CHD and 24% of deaths from stroke would have been avoided in 2002. This translates to over 3,400 CVD deaths, which includes 2,300 CHD deaths and 430 stroke deaths. Put another way, these excess deaths can be regarded as being due to socioeconomic inequality.
- In 2003–04, adults living in the most disadvantaged areas of Australia also had significantly higher hospitalisation rates—a marker for more serious disease— for all CVD, as well as for CHD emergencies and stroke, compared with those living in the least disadvantaged areas. The comparison of the rates of the most and least disadvantaged areas—relative inequality measured as the rate ratio—ranged between 1.3 and 2.4.

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- If everyone experienced the same hospitalisation rate as that in the least disadvantaged areas, around 16% of all CVD hospitalisations, and 38% of emergency CHD and 24% of stroke hospitalisations, would have been avoided in 2003–04. This translates to almost 45,400 CVD hospitalisations, which includes over 22,500 for CHD emergencies and just over 3,400 for stroke.

Trends for those aged 25–74

- The falls in CVD death rates between 1992 and 2002 for all socioeconomic groups were accompanied by decreases in the size of the gap—i.e. absolute inequality—between the rates of the most disadvantaged and the least disadvantaged areas for CVD as a whole and for CHD. However, the rate ratio increased for all CVD, and for CHD and stroke.
- Over the 10-year period from 1992 to 2002, the proportion of deaths due to socioeconomic inequality increased for all CVD (from 21% to 28%), CHD (from 22% to 32%) and stroke (from 17% to 24%).
- Despite falls in hospitalisation rates for all socioeconomic groups between 1996–97 and 2003–04, relative inequality did not change significantly for all CVD and for stroke. Absolute inequality fell for CVD as a whole.
- For CHD hospitalisations, the picture is quite different. Trends could be analysed for acute coronary syndrome (acute myocardial infarction and unstable angina). For this group, relative inequality increased (from 1.4 to 1.8 for males and from 1.7 to 2.2 for females).
- Over the period from 1996–97 to 2003–04, the proportion of hospitalisations due to socioeconomic inequality increased substantially for acute coronary syndrome (from 19% to 32% for males and from 28% to 41% for females).

1. Introduction

It has been well established in Australia that people who are socioeconomically disadvantaged experience higher rates of cardiovascular disease mortality than other Australians (Draper et al. 2004; AIHW 2004; AIHW: Dunn et al. 2002; Burnley & Rintoul 2002; Turrell & Mathers 2001; Burnley 1998; Bennett 1996; Mathers 1994). Further, there is evidence that the differential has widened, with relative CVD mortality inequality between Australians from the most disadvantaged areas and those from the least disadvantaged areas being higher in recent years than it was in the mid-1980s (Draper et al. 2004; Turrell & Mathers 2001). A similar trend of widening socioeconomic inequalities in CVD mortality has also been observed in other OECD countries (NZ MOH 2005; Singh and Siahpush 2002; Marang-van de Mheen et al. 1998).

This bulletin examines inequalities in CVD mortality over the 10-year period from 1992 to 2002 and hospitalisations over the period 1996–97 to 2003–04 for people aged 25–74 years to try to answer the following key questions in relation to mortality and significant morbidity requiring hospitalisation:

1. What is the current level of CVD inequality in Australia?
2. Has CVD inequality become larger or smaller over time or has it remained stable?

This analysis includes a number of commonly used statistical measures to describe inequality. Measures of both *absolute* and *relative* inequality are provided, as both of these are needed to provide a full picture of inequality. For both the absolute and relative perspectives, we have included measures of *effect* that describe the size of the inequality, and also measures of *impact* in terms of excess deaths and hospitalisations resulting from the inequality. Further details on these measures are provided in Section 3 'Methods'.

2. Background: What do we already know?

Cardiovascular disease (CVD)—and coronary heart disease (CHD) and stroke in particular—is a major health problem in Australia. In 2002, CVD accounted for 38% of deaths from all causes (ABS 2005) and 26% of deaths from all causes in people aged 25–74 years. In 2002, CHD and stroke (ICD codes I60–I64) accounted for 70% of all CVD deaths and 75% of CVD deaths in people aged 25–74 years. In 2003–04, CVD accounted for 7% of all hospitalisations and 6% of hospitalisations for people aged 25–74 years (AIHW National Hospital Morbidity Database). In the same year, CHD and stroke accounted for 44% of all CVD hospitalisations and 45% of CVD hospitalisations for people aged 25–74 years.

Most information on CVD inequalities published in the past refers to deaths. In 2000–2002, Australians in the most disadvantaged areas experienced considerably higher death rates from CVD than those in the least disadvantaged areas (rate ratio of 1.21, i.e. 21% higher for males of all ages, and rate ratio of 1.20, i.e. 20% higher for females of all ages). Similarly, Australians in the most disadvantaged areas experienced considerably higher all-ages death rates from CHD than those in the least disadvantaged areas (25% higher for males and 29% higher for females). However, for deaths from cerebrovascular disease (using ICD codes I60–I69), which includes stroke, there were no significant differences in the all-ages death rates between the most and least disadvantaged areas (AIHW 2004).

Draper et al. (2004) found that, compared with those from the least disadvantaged areas, males aged 25–64 years from the most disadvantaged areas had a 112% higher CVD mortality rate in 1998–2000 (i.e. rate ratio comparing most disadvantaged to least disadvantaged of 2.12); females aged 25–64 years from the most disadvantaged areas had a 127% higher CVD mortality rate (i.e. rate ratio of 2.27). For CHD, the mortality rate among the most disadvantaged males and females aged 25–64 years was 207% and 270% higher, respectively, than the rates for their least disadvantaged counterparts. In contrast to the socioeconomic differential in the all-ages death rates for cerebrovascular disease cited in the previous paragraph, people aged 25–64 years from the most disadvantaged areas of Australia also had significantly higher death rates from cerebrovascular disease (using ICD codes I60–I69) (93% higher for males and 84% higher for females) compared with the those in the least disadvantaged areas. Draper et al. (2004) also found that between 1985–87 and 1998–2000, relative CVD mortality inequality among people aged 25–64 widened, whereas absolute CVD mortality inequality narrowed.

Longer term trends in CHD mortality inequalities based on occupation are also important, though data limitations mean that these trends can be examined for working-age males only. Recent work comparing mortality rates for male manual and non-manual workers has shown that absolute inequality for those aged 20–69 years increased between the late 1960s and the mid-1980s, but has remained fairly stable since then. In contrast, relative inequality increased steadily throughout this period (AIHW: de Looper & Magnus 2005). Interestingly, this analysis showed that in the late

1960s non-manual workers had higher CHD mortality rates than manual workers. However, relative positions reversed around 1970, and since then manual workers have had higher rates than non-manual workers.

Although CVD accounted for 25% of all deaths in males and 17% of all deaths in females aged 25–64 in 1998–2000 (ABS 2000), its contribution to the total number of excess deaths associated with socioeconomic differences in mortality over that period was even greater—31% for males and 27% for females aged 25–64 years (Draper et al. 2004).

It is also known that there are inequalities in the presence of risk factors for CVD. For example, smoking and inadequate physical activity are more common in the most disadvantaged groups (AIHW 2004). Obesity is also more common among the most disadvantaged groups, with the rate for the most disadvantaged women being nearly double that of the least disadvantaged women (AIHW: O'Brien & Webbie 2003). Further, the most disadvantaged are also more likely than the least disadvantaged to report having three or more risk factors for cardiovascular disease (AIHW: O'Brien 2005).

Although information has been published on inequalities in CVD mortality, it does not incorporate the more recent data, and there is only limited information on trends in these inequalities. Little information has been published on inequalities in hospitalisations for CVD in Australia. However, recent data on inequalities in overall hospitalisations show a socioeconomic gradient with the most disadvantaged having higher rates than the least disadvantaged. This is particularly the case when same-day admissions are excluded (AIHW 2005: 176). In addition, results for some specific groups within CVD (angina and congestive cardiac failure) have shown clear gradients across socioeconomic groups (AIHW 2005: 76).

3. Methods

Measures of socioeconomic status

The measure of socioeconomic status used to examine CVD inequalities in this analysis is the 1996 Australian Bureau of Statistics (ABS) area-based Index of Relative Socioeconomic Disadvantage (IRSD). This index is one of several constructed by the ABS to classify areas on the basis of social and economic information collected in the 1996 Census of Population and Housing. The IRSD is derived from social and economic characteristics of the local area such as low income, low educational attainment, high levels of public sector housing, high unemployment, and jobs in relatively unskilled occupations.

The area-based index was chosen as the measure of socioeconomic status for this bulletin as it is the only available socioeconomic measure that can be used for hospital data and across a wide age and sex range for mortality data. In this analysis, we have chosen to use the 1996 IRSD (the approximate mid-point of our time trend) for all the years analysed so that changes between census years in the methods used to construct the index would not affect the analysis of trends in inequalities. A similar approach has been used in other analyses of trends in socioeconomic inequalities (Singh & Siahpush 2002). However, this approach will not reflect the impact of changes in an area's socioeconomic status large enough to move a statistical local area (SLA) from one quintile to another. These changes do not appear to be large, and are further covered in Section 6 'Discussion'.

Individual hospital morbidity and mortality records were classified into quintiles of socioeconomic disadvantage according to the value of IRSD for the SLA of usual residence. Quintile 1 includes the most disadvantaged SLAs and quintile 5 the least disadvantaged SLAs. SLAs were grouped into quintiles so that each quintile contained approximately 20% of the total Australian population. Data for years where the SLA boundaries were not based on the 1996 classification were mapped to the 1996 boundaries using population concordance files.

It is important to note that not all areas of Australia are included in the construction of the socioeconomic indexes. The ABS excludes Census Collection Districts with a very low population or a very low proportion of people responding to some Census questions (ABS 2004). In this bulletin, hospital and death records that could not be mapped to a quintile of socioeconomic disadvantage were excluded.

It is also important to note that the IRSD at the SLA level is an area-based measure of socioeconomic status. It reflects the socioeconomic status of all people living in the area, and an individual's socioeconomic status may differ from that of this area-based index. However, individuals do tend to live in areas where other residents have similar socioeconomic status. Area-based measures also reflect aspects of socioeconomic status other than those relating to an individual's socioeconomic status (such as environmental effects), which may also be determinants of health (Diez Roux 2002; Leyland 2005). Area-based measures generally understate the inequality in health at the individual level.

Mortality data

The Australian Institute of Health and Welfare (AIHW) National Mortality Database is the source of the mortality data used in this report. For CVD as a whole and for CHD, data were extracted for deaths occurring in 1992, 1997 and 2002 where CVD or CHD was the underlying cause of death. For stroke, to account for random variations due to the smaller number of deaths, data were extracted for deaths occurring in the two-year periods 1992–1993, 1997–1998 and 2001–2002 where stroke was the underlying cause of death.

The International Classification of Diseases, Ninth Revision (ICD-9) was used to identify cardiovascular disease deaths in 1992 (and 1993 for stroke), and deaths in 1997 and later were identified using the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10)—see Table 1 for ICD codes used.

Table 1: International Classification of Disease codes used in this analysis

	ICD-9 and ICD-9-CM	ICD-10 and ICD-10-AM
Cardiovascular disease	390–459	I00-I99
Coronary heart disease	410–414	I20–I25
Acute myocardial infarction and unstable angina	410, 411.1	I20.0, I21
Stroke[(a)]	430–434, 436	I60-I64

(a) The ICD codes used to identify stroke are a subset of the codes used for cerebrovascular disease, i.e. ICD-9 430–438 and ICD-10 I60–I69.

Note: ICD-9 codes used for 1992 and 1993 mortality data; ICD-9-CM codes used for 1996–97 hospital data; ICD-10 used for all other mortality data and ICD-10-AM used for all other hospital data.

The comparability of mortality data over the period examined in this bulletin, i.e. from 1992 to 2002, is affected by the move from manual to automated cause of death coding from 1 January 1997, and the introduction of ICD-10 for classifying deaths registered from 1 January 1999. To adjust for the break in the deaths time series resulting from these changes, the ABS coded some 1996 deaths data using both ICD-9 (manual coding) and ICD-10 (automatic coding), which allowed comparability factors between ICD-9 and ICD-10 to be derived. The comparability factors for CVD and CHD are 1.00 and 1.01 respectively (ABS 2005), and the comparability factor for stroke was calculated as 0.83 from data provided by the ABS. These comparability factors were used to adjust the number of CHD deaths in 1992 and the number of stroke deaths in 1992–1993, identified using ICD-9 to be comparable with the number that would have been identified using ICD-10.

As described above, each CVD death was classified to a quintile of socioeconomic disadvantage according to the value of the 1996 IRSD for the SLA of usual residence. In each of the years analysed, only around 1% of deaths could not be mapped to a quintile of socioeconomic disadvantage.

Hospital data

The AIHW National Hospital Morbidity Database is the source of the hospital data used in this report. The database contains demographic, diagnostic, procedural and administrative information on episodes of care for patients admitted to hospital. The data are episode-based so it is not possible to count patients individually. For this study, data were selected on principal diagnosis for the financial years 1996–97, 1998–99, 2001–02 and 2003-04 using ICD codes outlined in Table 1. Data for earlier years could not be used because the location of residence variable was of insufficient quality. Each hospitalisation was classified to a quintile of socioeconomic disadvantage based on the 1996 IRSD for the SLA of usual residence.

A number of hospitalisations could not be mapped to a quintile of disadvantage and were thus excluded from the analysis—20% of CVD hospitalisations in 1996–97, 1% in 1998–99, 1% in 2001–02, and 1% in 2003–04. The large number in 1996–97 is due to Queensland region of residence data for that year being supplied at a larger geographical unit than SLA. For this reason, all Queensland data have been excluded from the 1996–97 analysis. Among other states and territories in 1996–97, only 2% of CVD hospitalisation could not be mapped to a quintile of socioeconomic disadvantage.

Excluding Queensland from the 1996–97 analysis changed the proportion of the population in each quintile slightly. Instead of 20% of the population being in each quintile group, the percentages of the non-Queensland population in quintiles 1–5 were 18%, 20%, 21%, 19% and 22%. As the redistribution occurred across the quintiles rather than being concentrated at one end of the socioeconomic distribution, it is unlikely that the exclusion of Queensland changes the inequality measures greatly.

Hospital data for CVD reflect both admissions for cases of the disease requiring immediate hospitalisation and admissions for elective procedures. Appendix Table A1 shows CVD hospitalisations classified as ‘emergency’ or ‘elective’. CVD hospitalisations were 54% emergency and 42% elective in 2003–04, with the remainder not assigned or not reported. A fairly large proportion (38%) of CHD hospitalisations were elective, compared with only

10% for stroke. As the particular interest of this analysis is on mortality and significant morbidity indicated by needing hospitalisation, it is the emergency hospitalisations that are of most interest in the two specific disease groups. This does not mean that elective admissions are not significant cases of CHD, but rather that there are different drivers for elective and emergency admissions which are not considered in this analysis. It is known that the socioeconomic pattern in admissions for coronary procedures is complex, particularly for coronary angioplasty where the highest procedure rates are observed for the higher socioeconomic groups (AIHW 2005: 63). This is the opposite pattern to what is expected based on CHD mortality and morbidity measures. Additionally, the types of procedures may vary by socioeconomic status such as greater use of drug-eluting stents in the more advantaged rather than base metal stents. However, data are limited and are not considered here. Therefore, the CHD results presented here include only the emergency cases where possible.

The urgency of admission variable used to separate emergency and elective hospitalisations was not available for the 1996–97 and 1998–99 results presented here. But by using a more specific set of ICD codes than the whole CHD group (selecting admissions using only the acute myocardial infarction (AMI) and unstable angina codes listed in Table 1), we were able to include most of the emergency cases and exclude most of the elective cases (Table A1). Tables A2 and A3 confirm that the proportion of admissions in each urgency group and the proportion of CHD admissions in the AMI/unstable angina group have been stable over the analysis period. We have therefore analysed trends over time using the AMI and unstable angina subset rather than all CHD codes. This, in effect, includes the major acute events associated with CHD, often called 'acute coronary syndrome' (Grech & Ramsdale 2003).

Age-standardised rates and confidence intervals

Age-standardised rates for hospitalisations and deaths were used to remove the influence of age when comparing populations with different age structures. This was done using direct age-standardisation by applying the 5-year age-specific rates to the 2001 Australian population.

Information on the calculation of confidence intervals used in this analysis is available in Appendix B.

Inequality measures

A number of commonly used measures of health inequality are used in this report including measures of *effect* and measures of *impact,* both in absolute and relative terms (Mackenbach & Kunst 1997, NZ MOH 2005). The measures of effect (rate difference and rate ratio) summarise the absolute and relative gap or inequality between people living in the most disadvantaged and least disadvantaged areas (see also Draper et al. 2004 and AIHW: de Looper & Magnus 2005 for other examples using these measures). The measures of impact ('excess' and 'excess %') represent the inequality in terms of numbers of cases (see also NZ MOH 2005 for other examples using these measures). Impact measures are affected by both the size of the inequality and the size of the populations at risk. See Box 1 for definitions of these measures and Appendix B for a worked example of the calculations.

Both absolute and relative measures of inequality are important and reflect different aspects of inequality (Mackenbach & Kunst 1997, Vagero & Erikson 1997). Absolute measures indicate the actual magnitude of the inequality (using the measures *rate difference* and *excess* in this report), while relative measures compare the relative size of the inequality (using the measures *rate ratio* and *excess %* in this report). Both of these types of measures may have limitations if used in isolation. For example, absolute measures are strongly influenced by the number of cases in the population as a whole, and therefore it may be difficult to interpret comparisons between different disease groups, or between males and females. As a ratio, relative measures will become very large as the denominator becomes small, also limiting interpretation.

Box 1: Inequality measures used in this report

Rate difference *is an absolute measure of effect and is calculated as the rate for each quintile minus the rate for the least disadvantaged quintile.*

Rate ratio *is a relative measure of effect and is calculated as the rate for each quintile divided by the rate for the least disadvantaged quintile.*

Excess *number of cases is an absolute measure of impact calculated (for each quintile) as the difference between the observed and expected number of cases (for each age/sex group). The excess for all quintiles is also summed to calculate the total excess. It represents the number of cases that would have been avoided if the rate for the least disadvantaged quintile applied to the other quintiles.*

Excess % *is a relative measure of impact. For each quintile it is the excess number of cases as a percentage of all cases for that quintile. A total excess % is also calculated by summing the excess cases for each group and presenting this as a percentage of all cases. It is interpreted as the percentage of cases that would have been avoided if the rate for the least disadvantaged quintile applied to the other quintiles.*

Interpretation

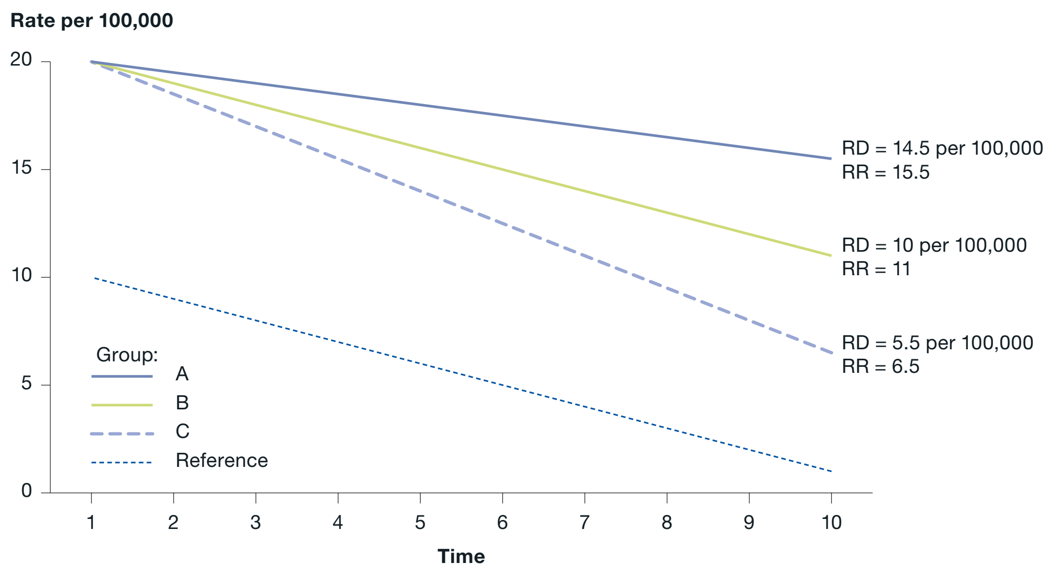
Summarising the interpretation of results obtained using these measures of inequality:

- absolute effect (rate difference) indicates how many extra cases there are per 100,000 in one group compared with another
- relative effect (rate ratio) indicates proportionally how much higher the rate for one group is compared with another (e.g. 2 times as high)
- absolute effect (excess) is the number of extra cases that would be avoided if all groups had the same rate as the least disadvantaged group
- relative impact (excess %) is the percentage of total cases that would be avoided if all groups had the same rate as the least disadvantaged group.

Although it is important to use a range of measures to fully describe the inequality, it can be difficult to make a judgment when taking all these measures together, particularly when examining trends over time. But we can simplify the interpretation somewhat because we know that the trends in the rates for the disease groups examined here have been decreasing over time.

Figure 1 shows the three main scenarios that may occur in an environment of decreasing rates (described here using effect measures calculated from rates per 100,000, but similar comments could be made for impact measures which would be based on a scale showing the number of cases).

- Comparing group A with the reference group: rate difference increasing (the trend lines are moving apart), rate ratio increasing substantially; indicating both absolute and relative inequality are increasing.
- Comparing group B with the reference group: rate difference staying the same (the lines are parallel), rate ratio increasing; indicating absolute inequality is stable but relative inequality is increasing.
- Comparing group C with the reference group: rate difference decreasing (the lines are moving closer together), rate ratio increasing in this example but it can actually increase or decrease depending on how close the rates become (NZ MOH 2005). In the general case, absolute inequality will decrease and relative inequality may increase or decrease.



Note: RD = rate difference; RR = rate ratio.

Figure 1: Scenarios for decreasing trends in rates and the impact on inequality measures

These scenarios highlight the importance of using both relative and absolute measures, as one perspective alone will not provide a full description of the changing inequality. Comparing group A with the reference group is clearly the situation where inequality is increasing substantially, as both absolute and relative inequality are increasing. Comparing group B with the reference group results in relative (but not absolute) inequality increasing until it is undefined when the rate for the reference group reaches zero. In that case the disease is eradicated from the reference group and has become a disease that is solely found in the comparison group, clearly a significant case of inequality. Comparing group C with the reference group is the 'best' situation of the three in terms of inequality.

4. How large are inequalities now?

4.1 Mortality

Cardiovascular disease 2002

In 2002, CVD death rates for females aged 25–74 increased with increasing level of socioeconomic disadvantage; for males, rates increased steadily from quintile 5 (the least disadvantaged) to quintile 3, were similar for quintiles 2 and 3, but increased again for quintile 1 (the most disadvantaged) (Figure 2).

Males from the most disadvantaged areas (quintile 1) had an age-standardised CVD death rate 1.7 times as high as those from the least disadvantaged areas (quintile 5) (Table A4). Even males in quintile 4 had a CVD death rate 1.3 times that of males in quintile 5. In terms of absolute inequality, the difference in CVD death rates between the least disadvantaged males and the other socioeconomic groups ranged from 30 deaths per 100,000 for quintile 4 to 69 deaths per 100,000 for quintile 1 (the most disadvantaged).

For females, the CVD death rate for the most disadvantaged was 1.8 times as high as that for the least disadvantaged; those from quintile 4 had a CVD death rate 1.3 times that of the least disadvantaged. The difference in CVD death rates between the least disadvantaged females and the other socioeconomic groups ranged from 11 deaths per 100,000 for quintile 4 to 36 deaths per 100,000 for quintile 1.

If all people aged 25–74 years had experienced the same age-specific rate of CVD mortality in 2002 as those living in the least disadvantaged areas of Australia, approximately 27% of CVD deaths in males (2,278 deaths) and 31% of CVD deaths in females (1,149 deaths) could have been avoided. More than one-third of the excess CVD mortality in males (838 deaths) and almost 40% in females (439 deaths) occurred among the most disadvantaged (quintile 1).

Coronary heart disease 2002

Death rates from CHD in 2002 in people aged 25–74 were also significantly higher among those from the most disadvantaged areas of Australia compared with those from the least disadvantaged areas, with a clear socioeconomic gradient observed for both males and females (Figure 3).

The CHD death rate for the most disadvantaged males was 1.8 times that of the least disadvantaged males; the most disadvantaged females had a CHD death rate twice that of the least disadvantaged females (Table A5). Even males and females from quintile 4 had CHD death rates 1.3 times those of the least disadvantaged.

Absolute differences in CHD death rates between the least disadvantaged males (quintile 5) and those from the other socioeconomic groups ranged from 21 deaths per 100,000 population for quintile 4 to 52 deaths per 100,000 for quintile 1. For females, absolute inequality in CHD death rates compared with the least disadvantaged ranged from 6 deaths per 100,000 for quintile 4 to 19 deaths per 100,000 for quintile 1.

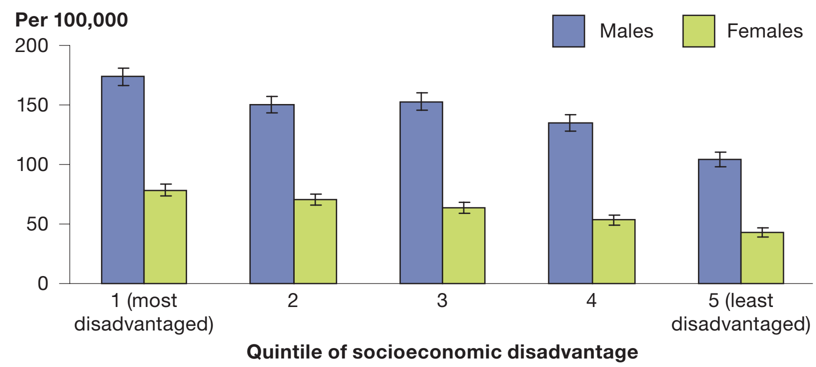
Around 30% of CHD deaths in males aged 25–74 years (1,644 deaths) and 36% in females aged 25–74 years (674 deaths) could have been avoided if all areas of Australia had experienced the same rates of CHD mortality in 2002 as the least disadvantaged areas. More than one-third of this excess CHD mortality occurred among those living in the most disadvantaged areas of Australia.

Stroke 2001–2002

In 2001–2002, death rates for stroke were significantly higher among people from the most disadvantaged areas of Australia compared with those living in the least disadvantaged areas for both males and females (Figure 4). However, although the death rate for stroke was higher for the most disadvantaged compared with the least disadvantaged, there was not a clear gradient of increasing mortality across quintiles of increasing disadvantage, as quintile 2 had lower rates than quintile 3, and males from quintile 3 had the same death rate as those from quintile 1 (the most disadvantaged).

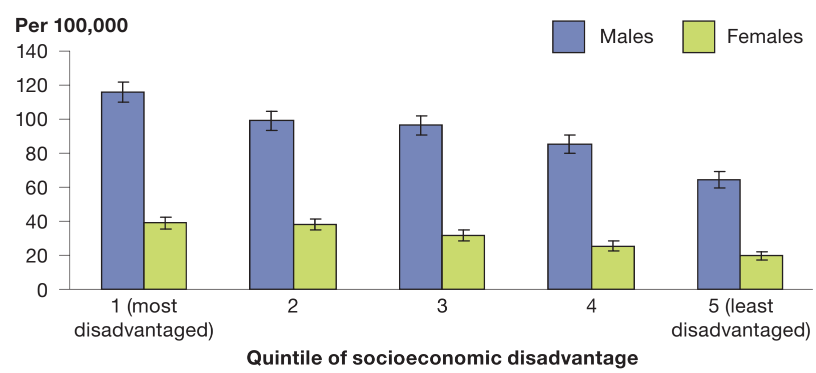
The rate ratio for stroke mortality comparing the most disadvantaged with the least disadvantaged was 1.5 for males and 1.6 for females; while the corresponding absolute rate differences were 7 and 6 deaths per 100,000 (Table A6).

Just under one-quarter of all stroke deaths in persons aged 25–74 years (252 deaths in males and 178 deaths in females) could have been avoided if people from all areas of Australia had experienced the same rates of stroke mortality in 2001–2002 as the least disadvantaged areas. Approximately 35% of this excess stroke mortality occurred among those living in the most disadvantaged areas of Australia.



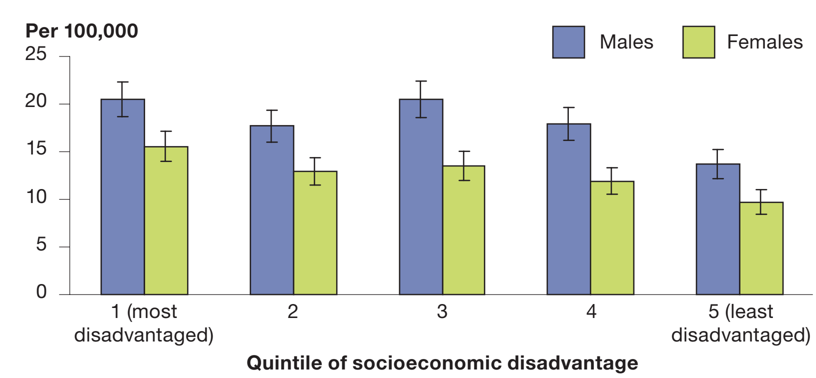
Note: Age-standardised to the 2001 Australian population aged 25–74 years.
Source: AIHW Mortality Database.

Figure 2: Cardiovascular disease mortality by quintile of socioeconomic disadvantage, 25–74 year olds, 2002



Note: Age-standardised to the 2001 Australian population aged 25–74 years.
Source: AIHW Mortality Database.

Figure 3: Coronary heart disease mortality by quintile of socioeconomic disadvantage, 25–74 year olds, 2002



Note: Age-standardised to the 2001 Australian population aged 25–74 years.
Source: AIHW Mortality Database.

Figure 4: Stroke mortality by quintile of socioeconomic disadvantage, 25–74 year olds, 2001–2002

4.2 Hospitalisations 2003–04

Cardiovascular disease

There is a consistent socioeconomic gradient in the hospitalisation rates for cardiovascular disease in people aged 25–74 in 2003–04 with the lowest rates occurring for the least disadvantaged increasing to the highest rates for the most disadvantaged (Figure 5). The hospitalisation rates for males ranged between 2,422 and 3,167 per 100,000 between the least and most disadvantaged. The equivalent range for females was from 1,382 to 1,932 per 100,000 (Table A7).

To quantify the relative inequality, the hospitalisation rate for the most disadvantaged males (quintile 1) was 1.3 times as high as for the least disadvantaged (quintile 5). Even quintile 4 had rates 1.1 times as high as for quintile 5. For females the rate ratios were larger than for males: the hospitalisation rate for the most disadvantaged females was 1.4 times as high as for the least disadvantaged (Table A7).

In terms of the absolute inequality, the difference in the hospitalisation rate for the most and least disadvantaged was 744 per 100,000 for males and 550 per 100,000 for females. A clear gradient is present across all the five quintiles (Table A7).

The impact of this inequality was around 45,400 'excess' hospitalisations—26,170 for males and 19,207 for females. In other words, these hospitalisations would not have occurred if all quintiles had the same hospitalisation rate as that of the least disadvantaged group. This is 15% of all male and 19% of all female hospitalisations for CVD (Table A7).

Coronary heart disease

Hospitalisation rates for CHD in 2003–04 for people aged 25–74 also differed across socioeconomic groups, again with a clear gradient. For both males and females, the lowest rates occurred in the least disadvantaged group—1,024 and 333 per 100,000 for males and females respectively (Table A8). The rates then increase across the quintiles, reaching 1,482 and 629 per 100,000 for males and females in the most disadvantaged group.

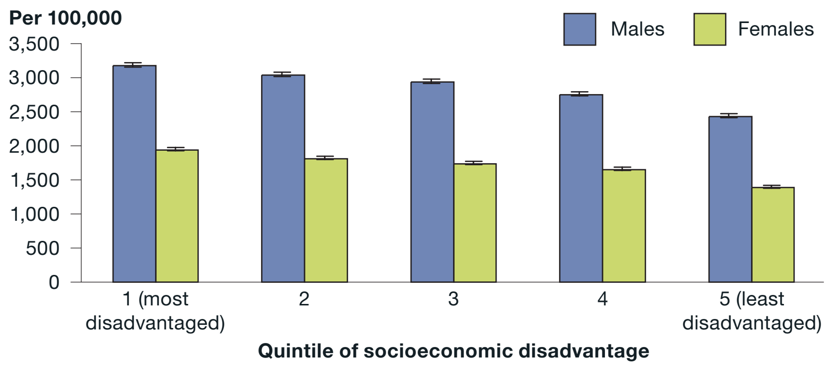
As outlined in the methods section, this analysis of CHD hospitalisations focuses on the subset that is emergency admissions. Therefore, the remainder of the results in this section are for CHD admissions that were classified as emergency admissions.

Rates for emergency CHD hospitalisations in 2003–04 increased in a clear gradient as the level of socioeconomic disadvantage increased, with rates rising from 437 to 847 per 100,000 for males, and from 172 to 407 per 100,000 for females (Figure 6). The differences between each quintile were significant except between quintiles 2 and 3 for females. For males, this corresponds to a rate ratio (relative inequality) of between 1.9 and 1.4 in quintiles 1 to 4 and a rate difference (absolute inequality) of between 410 and 185 per 100,000 (Table A8).

This is a total excess of over 14,600 hospitalisations—or 36% of CHD emergency hospitalisations—that would have been avoided if all groups had experienced the hospitalisation rates of the least disadvantaged. For females, the relative inequality was higher than for males (ranging between 2.4 and 1.5); the absolute inequality was lower (235 to 89 per 100,000) reflecting the lower hospitalisation rates for females. There were an extra 7,868 CHD emergency hospitalisations for females that would not have occurred if all female groups experienced the same hospitalisation rates as the least disadvantaged, corresponding to 43% of all female CHD emergency hospitalisations.

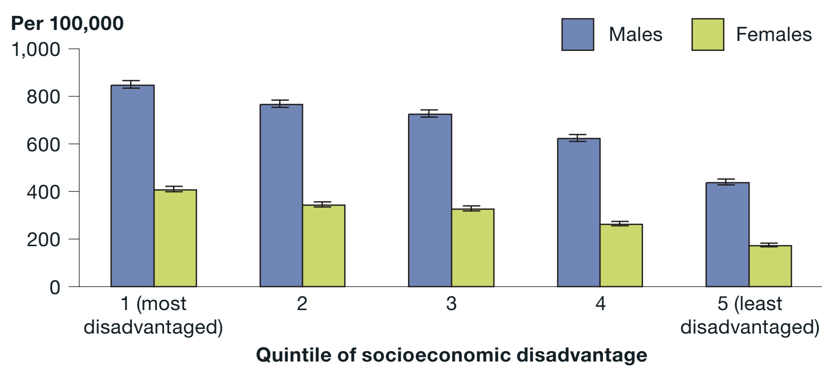
Stroke

Stroke hospitalisations for people aged 25–74 in 2003–04 show a similar pattern across socioeconomic groups to the CHD emergency hospitalisations. For males, the rates ranged from 113 to 162 per 100,000, and for females the range was from 72 to 117 per 100,000 (Figure 7; Table A10). Although the rates for the least disadvantaged were significantly different from all the other groups, there was overlap in the confidence intervals between some of the other groups. For the most disadvantaged, the rate ratio was 1.4 for males and 1.6 for females, and the corresponding rate differences were 49 and 40 per 100,000. This results in just over 3,400 extra hospitalisations than would have been expected if the hospitalisation rate for all groups equalled that experienced by the least disadvantaged—22% of stroke hospitalisations for males, and 26% for females.



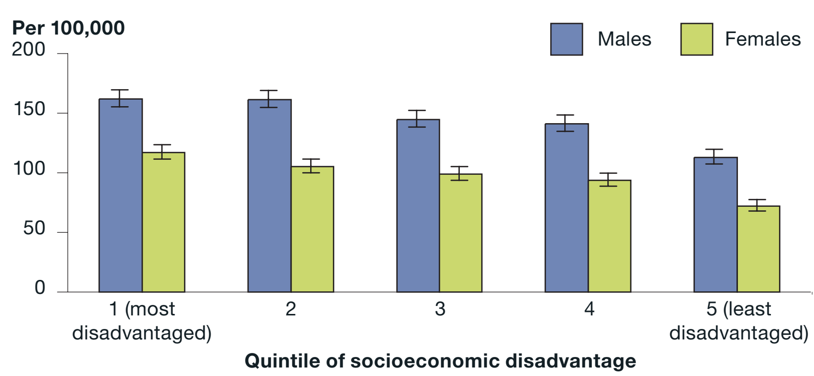
Note: Age-standardised to the 2001 Australian population aged 25–74 years.
Source: AIHW National Hospital Morbidity Database.

Figure 5: Cardiovascular disease hospitalisations by quintile of socioeconomic disadvantage, 25–74 year olds, 2003–04



Note: Age-standardised to the 2001 Australian population aged 25–74 years.
Source: AIHW National Hospital Morbidity Database.

Figure 6: Coronary heart disease emergency hospitalisations by quintile of socioeconomic disadvantage, 25–74 year olds, 2003–04



Note: Age-standardised to the 2001 Australian population aged 25–74 years.
Source: AIHW National Hospital Morbidity Database.

Figure 7: Stroke hospitalisations by quintile of socioeconomic disadvantage, 25–74 year olds, 2003–04

5. How have inequalities changed over the last 10 years?

5.1 Mortality, 1992–2002

Cardiovascular disease

Between 1992 and 2002, the age-standardised death rates for CVD fell for both males and females aged 25–74 years in all five quintiles of socioeconomic disadvantage (Table A4). For males, the fall in the age-standardised CVD death rate ranged from 43% in quintiles 1 and 3 to 51% in quintile 5 (the least disadvantaged). For females, the fall in the age-standardised CVD death rate ranged from to 44% in quintile 2 to 52% in quintiles 4 and 5.

Despite the fall in CVD death rates over the 10-year period, relative inequality in CVD mortality for the most disadvantaged compared with the least disadvantaged actually increased for males, with the rate ratio rising from 1.4 in 1992 to 1.7 in 2002 (Figure 8). However, the absolute difference in CVD death rates between the most and least disadvantaged males narrowed from 92 deaths per 100,000 population in 1992 to 69 deaths per 100,000 population in 2002 (Figure 8; Table A4).

For females, relative inequality in CVD mortality increased between 1992 and 1997 (from 1.6 to 1.9) but then remained fairly stable between 1997 and 2002 (1.8); absolute inequality fell over the 10-year period from 54 deaths per 100,000 population in 1992 to 36 deaths per 100,000 in 2002.

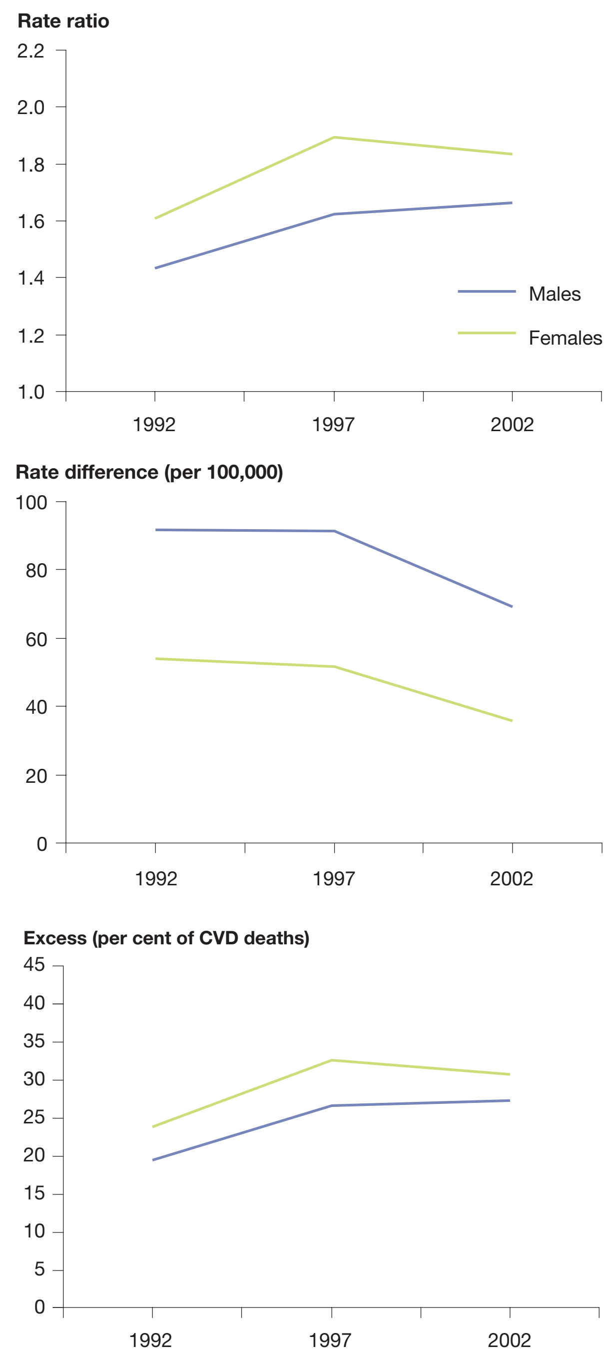
However, comparing only the most disadvantaged with the least disadvantaged does not tell us about inequality in CVD mortality in quintiles 2, 3 and 4. To account for this, the trend in excess CVD mortality was also examined. For males, excess CVD mortality increased from 19% in 1992 to 27% in 1997 and was still 27% in 2002 (Figure 8; Table A4). For females, excess CVD mortality increased from 24% in 1992 to 33% in 1997 but then remained fairly stable at 31% in 2002.

Coronary heart disease

Age-standardised death rates for CHD also fell between 1992 and 2002 for both males and females aged 25–74 years in all five quintiles of socioeconomic disadvantage (Table A5). For males the largest fall occurred in the least disadvantaged group (a 56% decline). Similarly, the least disadvantaged females experienced the largest fall in CHD death rates over the 10-year period (a 60% decline).

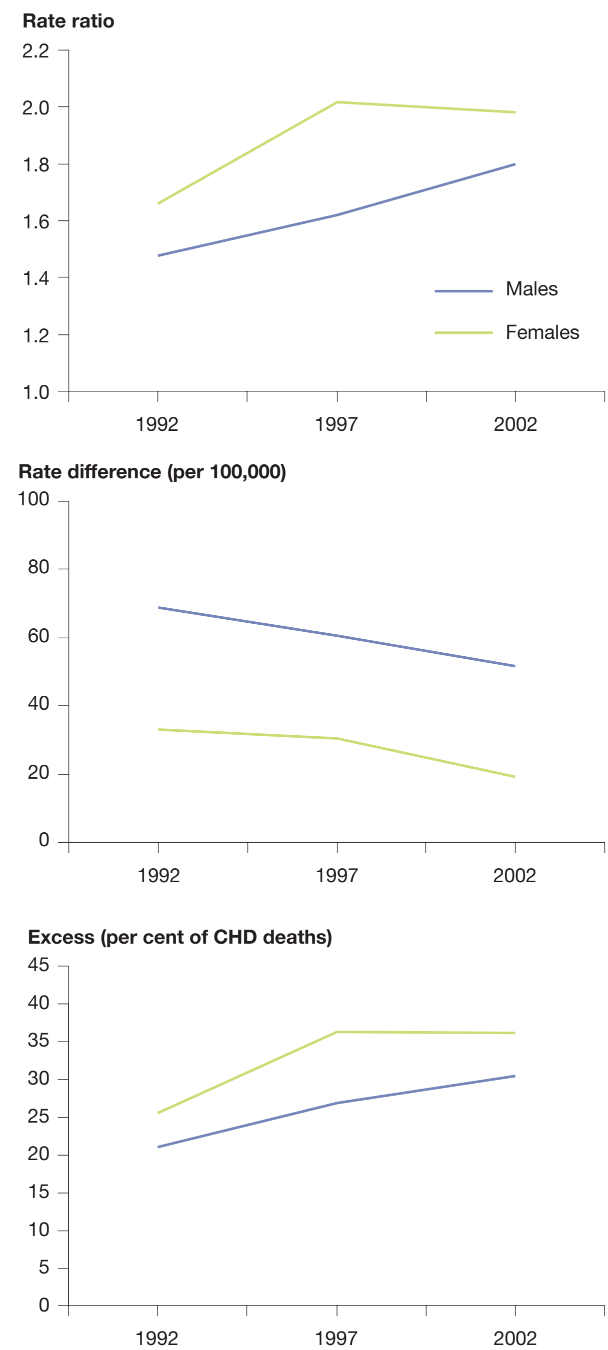
Between 1992 and 2002, there was an increase for males in CHD relative inequality mortality with the rate ratio increasing from 1.5 to 1.8, but there was a decline in absolute inequality (from 69 deaths per 100,000 in 1992 to 52 deaths per 100,000 in 2002) (Figure 9). For females, relative inequality increased between 1992 (rate ratio of 1.7) and 1997 (rate ratio of 2.0) but then remained stable in 2002 (rate ratio of 2.0); the absolute difference in CHD death rates fell from 33 deaths per 100,000 in 1992 to 19 deaths per 100,000 in 2002.

Over the 10-year period, an increasing trend in the excess proportion of CHD deaths was observed in males (from 21% to 30%); for females, the proportion of CHD deaths that could have been avoided increased from 26% in 1992 to 36% in 1997 but then remained stable (Figure 9; Table A5).



Note: Rate ratio and rate difference compare most disadvantaged and least disadvantage quintiles.
Source: AIHW Mortality Database.

Figure 8: Inequality measures for cardiovascular disease mortality, 25–74 year olds, 1992–2002



Note: Rate ratio and rate difference compare most disadvantaged and least disadvantage quintiles.
Source: AIHW Mortality Database.

Figure 9: Inequality measures for coronary heart disease mortality, 25–74 year olds, 1992–2002

Stroke mortality

A decreasing trend in age-standardised death rates for stroke was also observed for both males and females aged 25–74 years in all five quintiles of socioeconomic disadvantage between 1992–1993 and 2001–2002 (Table A6).

In terms of relative stroke mortality inequality, the rate ratio comparing death rates for quintile 1 with quintile 5 increased for males from 1.3 in 1992–1993 to 1.6 in 1997–1998 but then remained fairly stable at 1.5 in 2001–2002; for females the corresponding rate ratio increased from 1.5 in 1992–1993 to 1.6 in 2001–2002 (Figure 10).

Absolute inequality in stroke mortality increased between 1992–1993 and 1997–1998 for males (from 8 to 10 deaths per 100,000 population) but then fell in 2001–2002 (to 7 deaths per 100,000 population) (Figure 10). For females there was very little change in absolute inequality in stroke mortality over the 10-year period, from 7 deaths per 100,000 population in 1992–1993 to 6 deaths per 100,000 population in 2001–2002.

Excess stroke mortality in males increased from 16% in 1992–1993 to 25% in 1997–1998 and then remained fairly stable at 24% in 2001–2002; for females excess stroke mortality increased over the 10-year period from 18% in 1992–1993 to 23% in 2001–2002 (Figure 10).

5.2 Hospitalisations 1996–97 to 2003–04

Cardiovascular disease

Over the period 1996–97 to 2003–04, hospitalisation rates for CVD in people aged 25–74 fell for both males and females. These falls were observed for all five socioeconomic groups analysed (Table A7).

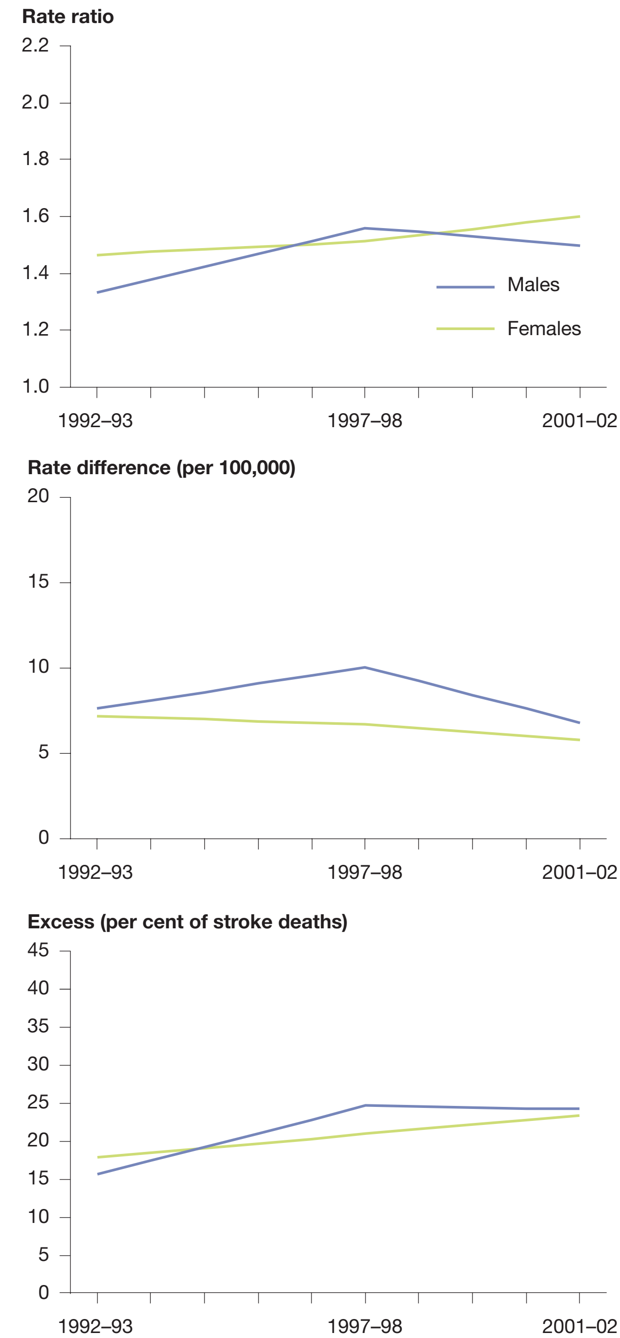
Over this period, the relative inequality (rate ratio) was fairly stable for males and females, though absolute inequality (rate difference) fell (Figure 11). This pattern also appears when comparing the three middle groups with the least disadvantaged for males and females (Table A7).

This variation across the socioeconomic distribution is summarised in the total excess measures which show the extra hospitalisations that resulted due to the inequality, calculated as the difference between the number observed and the number expected if the hospitalisation rate for the least disadvantaged group had applied across all groups. The total number of excess CVD hospitalisations decreased from over 46,000 in 1998–99 to 45,400 in 2003–04. As a percentage of all CVD hospitalisations, the excess (see Figure 11) decreased for males (16% to 15%) and females (from 20% to 19%).

Coronary heart disease—emergency admissions

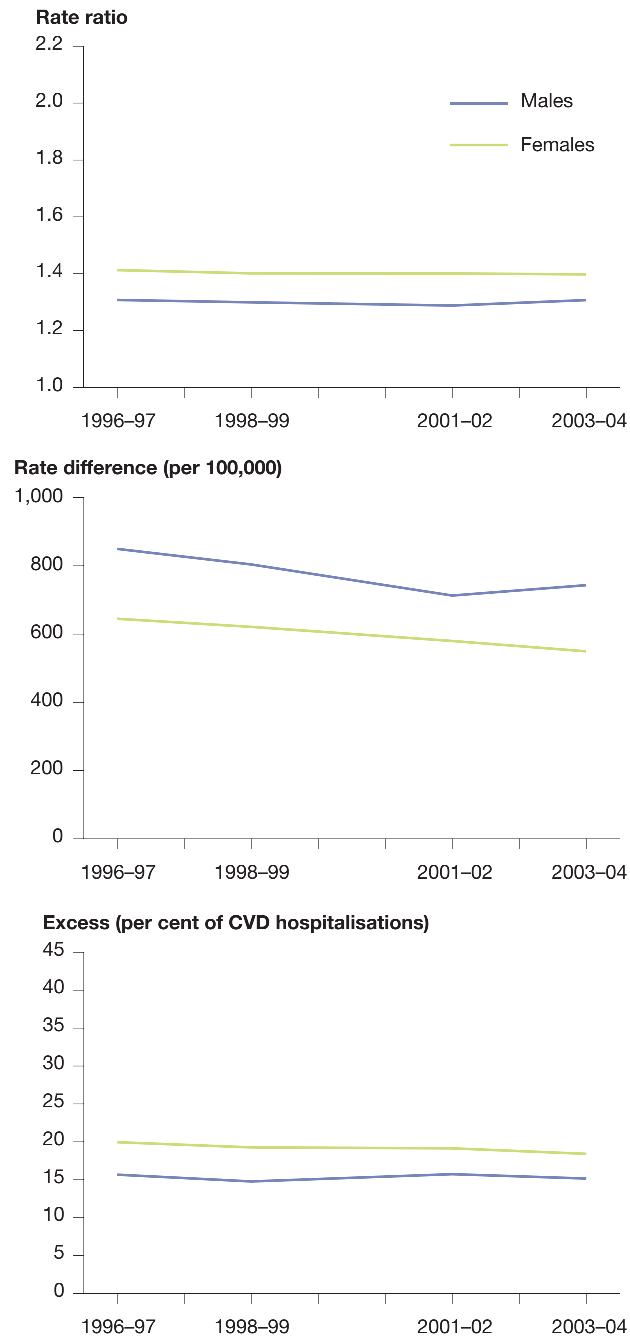
For both males and females aged 25–74 years, rates for the subset of CHD hospitalisations that were emergencies decreased between 2001–02 and 2003–04 in nearly all quintiles (Table A8). However, over the same period inequality appears to have increased. For males, relative inequality (indicated by rate ratios) increased for all groups, as did absolute inequality (rate differences). These changes resulted in increases in absolute terms (excess hospitalisations increased from 12,430 to over 14,600) and relative terms (the excess increased from 31% to 36% of CHD emergency hospitalisations).

The pattern is less clear for females in terms of relative and absolute inequality, with increases for most groups and stability or decreases for others. However, the net effect of these changes shows an increase in the excess number of hospitalisations for females—from around 7,300 to 7,900, or from 40% to 43% of CHD hospitalisations.



Note: Rate ratio and rate difference compare most disadvantaged and least disadvantage quintiles.
Source: AIHW Mortality Database.

Figure 10: Inequality measures for stroke mortality, 25–74 year olds, 1992–1993 to 2001–2002



Note: Rate ratio and rate difference compare most disadvantaged and least disadvantage quintiles.
Source: AIHW analysis of AIHW National Hospital Morbidity Database.

Figure 11: Inequality measures for cardiovascular disease hospitalisations, 25–74 year olds, 1996–97 to 2003–04

Acute myocardial infarction and unstable angina

Changes over the short period between 2001–02 and 2003–04 may not reflect longer term patterns. However, the urgency of admission (emergency or elective) variable is not available on the National Hospital Morbidity Database for data covering the 1990s. Therefore, to look at longer term trends we have used a subset of CHD hospitalisations that are more often emergency admissions—those for acute myocardial infarction (AMI) and unstable angina combined. Further details on this approach are provided in the Section 3 'Methods' earlier in this bulletin.

Over the period 1996–97 to 2003–04, the trend was towards decreasing hospitalisation rates across all socioeconomic groups for AMI and unstable angina combined for both males and females aged 25–74 years. However, as was the case for emergency CHD hospitalisation over the latter years of this period, inequality increased. Figure 12 shows the increases that occurred in both relative and absolute inequality between quintiles 1 and 5: rate ratios from 1.4 to 1.8 for males and 1.7 to 2.2 for females, and rate differences from 274 to 377 per 100,000 for males and from 170 to 205 per 100,000 for females (Table A9).

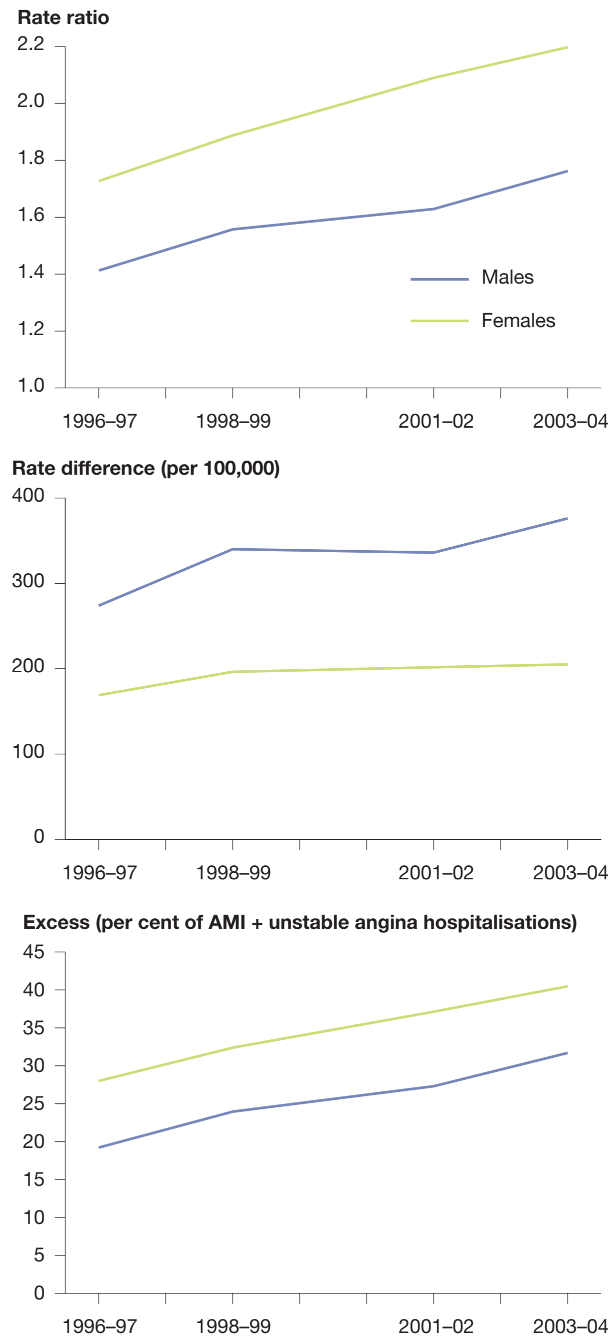
The impact of these increases is shown in the final graph in Figure 12. For males, the extra hospitalisations that would not have occurred if all groups experienced the same hospitalisation rate as the least disadvantaged accounted for 19% of all AMI and unstable angina hospitalisations in 1996–97. This percentage increased over the years examined, and was 32% in 2003–04. For females the excess as a percentage of all AMI and unstable angina hospitalisations was even higher and increased from 28% to 41% over the same period.

Stroke

Between 1996–97 and 2003–04, stroke hospitalisation rates for people aged 25–74 decreased in most socioeconomic groups, but many levelled off in more recent years (Table A10). Against this backdrop, the relative inequality increased slightly until 2001–02, but then remained fairly stable (Figure 13).

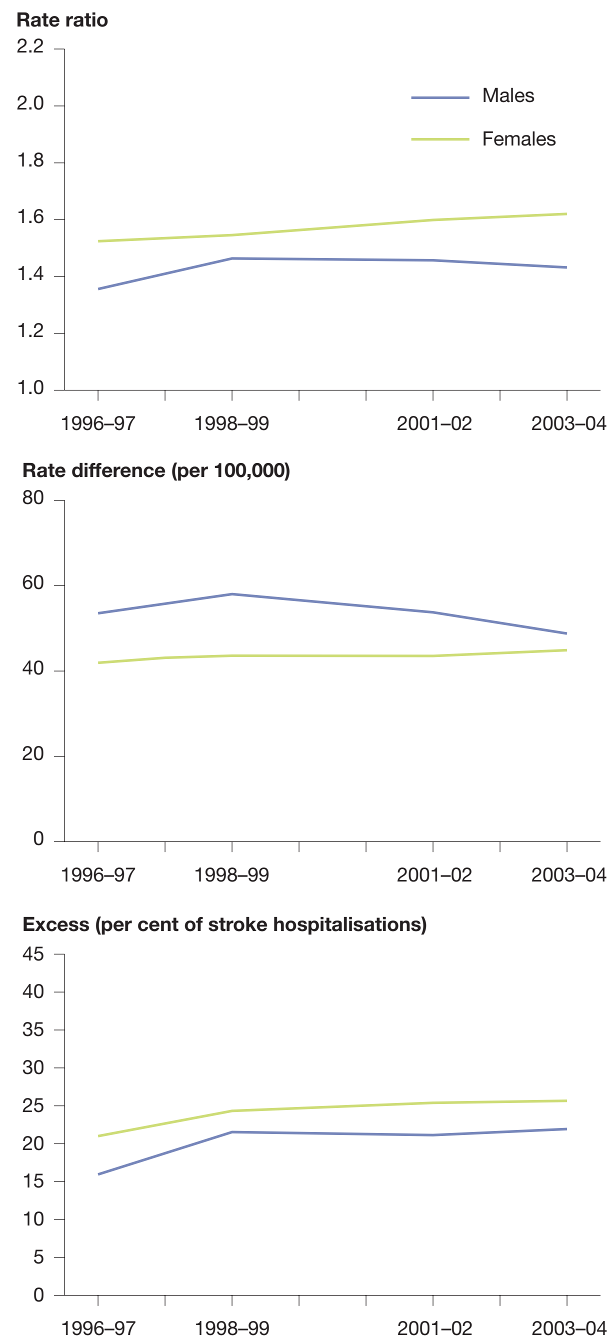
Absolute inequality remained fairly steady for females across the whole period, and until 2001–02 for males with a subsequent decline up to 2003–04 (Figure 13). The patterns were not consistent across all groups, as some showed increases and some decreases.

This volatility across all five groups is taken into account in the total excess measure. For both males and females, the number of excess stroke hospitalisations as a percentage of all stroke hospitalisations increased across most of the period (Figure 13).



Note: Rate ratio and rate difference compare most disadvantaged and least disadvantage quintiles.
Source: AIHW analysis of AIHW National Hospital Morbidity Database.

Figure 12: Inequality measures for hospitalisations for acute myocardial infarction and unstable angina, 25–74 year olds, 1996–97 to 2001–02



Note: Rate ratio and rate difference compare most disadvantaged and least disadvantage quintiles.
Source: AIHW analysis of AIHW National Hospital Morbidity Database.

Figure 13: Inequality measures for stroke hospitalisations, 25–74 year olds, 1996–97 to 2003–04

6. Discussion

This study has shown that socioeconomic inequalities in cardiovascular disease, coronary heart disease and stroke currently exist in Australia with the most disadvantaged Australians aged 25–74 years experiencing significantly higher mortality and hospitalisation rates from these conditions than the least disadvantaged. Further, for CHD mortality in males and females, all CVD mortality in females, and all CVD, CHD and stroke hospitalisations, there is a clear gradient of increasing age-standardised rates with rising socioeconomic disadvantage.

This study has also shown that, despite declines in CVD as a whole and for CHD and stroke mortality rates for all socioeconomic groups over the 10-year period from 1992 to 2002, comparison of inequality measures between the most disadvantaged and least disadvantaged groups indicates that:

- for males aged 25–74 years:
  - relative inequality in all CVD and CHD mortality increased, and absolute inequality declined
  - relative inequality in stroke mortality increased between 1992–1992 and 1997–1998 but then remained fairly stable, and absolute inequality increased between 1992–1992 and 1997–1998 but then fell in 2001–2002
- for females aged 25–74 years:
  - relative inequality in all CVD and CHD mortality increased between 1992 and 1997 but then fell in 2002
  - relative inequality in stroke mortality increased
  - absolute inequality in all CVD, CHD and stroke mortality fell.

These results are consistent with those reported by other Australian studies (Draper et al. 2004; Turrell & Mathers 2001) and are also consistent with findings internationally (NZ MOH 2005; Singh & Siahpush 2002; Marang-van de Mheen et al. 1998).

If all Australians experienced the same death rates as those living in the least disadvantaged areas, a considerable proportion (28%) of deaths in people aged 25–74 from CVD as a whole, as well as from CHD (32%) and stroke (24%), would have been avoided in 2002. Over the 10-year period from 1992 to 2002, excess CHD mortality in males aged 25–74 years and excess stroke mortality in females of the same age increased steadily. For all CVD and stroke in males, and for CHD in females, the proportion of excess deaths due to socioeconomic inequality among people aged 25–74 increased between 1992 and 1997 but then remained stable.

Over the period 1996–97 to 2003–04, hospitalisation rates fell for the CVD group and the CHD subgroup. For stroke, rates fell for the first part of the period, then levelled off in more recent years. Against these trends:

- relative socioeconomic inequality was fairly stable and absolute inequality fell for CVD hospitalisations overall
- in contrast, both relative and absolute inequality increased for hospitalisations for CHD events (AMI and unstable angina)

- for stroke, the picture is mixed, with relative and absolute inequality increasing then decreasing.

The impact of these inequalities in hospitalisations indicates that the gap between the least and most disadvantaged represented around 45,400 CVD hospitalisations—or 16% of all CVD hospitalisations in 2003–04. The relative impact for CHD emergency hospitalisations was even higher, with 38% being 'excess'. For stroke the proportion is around 24%. For CVD as a whole, these excess hospitalisations fell over the period examined, whereas for CHD events the percentage increased substantially, and for stroke it increased for most of the period.

The absolute inequality results in this analysis tend to largely reflect the number of cases. Hence it is much larger for hospitalisations than for mortality, larger for CVD than for the two subgroups, and larger for males than for females.

A number of notable patterns emerge when assessing the relative inequality results obtained here. Firstly, relative inequality tends to be larger for mortality than for hospitalisations. The exception to this is for CHD hospitalisations, where relative inequality is somewhat larger for hospitalisations than for mortality. Secondly, CHD has the largest relative inequality among the three disease groups studied, for both mortality and hospitalisation. And thirdly, relative inequality is larger for females than males in all cases analysed here.

In assessing these CVD inequalities, some limitations of this study should be borne in mind. These limitations include the exclusion of a very small number of hospital admissions and deaths that could not be classified to a quintile of relative socioeconomic disadvantage; coding changes over time affecting the classification of deaths and hospitalisations to CVD as a whole, CHD or stroke; and the need to map SLAs from all data sources (i.e. hospital morbidity, mortality and estimated resident population data) to 1996 boundaries to facilitate use of the 1996 IRSD. Although it is difficult to estimate the magnitude or likely direction of bias associated with these limitations, care has been taken to adjust for any bias where possible.

We have chosen to use one IRSD (the 1996 index) so that changes between census years in the methods used to construct the index would not affect the analysis of trends in inequalities. However, this approach does not reflect the impact of changes in an area's socioeconomic status large enough to move an SLA from one quintile to another. To quantify this impact, we examined the changes in quintile of relative socioeconomic disadvantage by SLA between 1996 and 2001. Of all SLAs, where the total population concordance for each SLA between the two years was 90% or more, 66% had the same quintile of relative socioeconomic disadvantage in both 1996 and 2001, 30% of SLAs moved up or down one quintile, just over 3% moved two quintiles, 0.4% moved three quintiles and one SLA moved 4 quintiles (i.e. from quintile 1 in 1996 to quintile 5 in 2001). These results imply that the impact of the movement of SLAs from one quintile to another between the two census years on the analysis undertaken in this study is not likely to be large.

Another point to note is that the particular estimates provided in this report represent the inequality when dividing the population into five equal-sized groups (quintiles)—a split commonly used for this type of analysis. Different estimates would be obtained if other population group sizes were studied. In particular, the estimates for the rate ratios and rate differences between the top and bottom groups (the extreme end of the distribution) could differ if groups of different sizes were studied.

This analysis covers current socioeconomic inequalities in CVD mortality and significant morbidity requiring hospitalisation as well as trends over time in these inequalities. Further analysis is warranted in many related areas, and two areas stand out in particular. Firstly, inequalities between Aboriginal and Torres Strait Islander peoples and other Australians remain large and are an important aspect of CVD inequalities in Australia. Although some analysis has been undertaken in this area from a cross-sectional perspective (AIHW 2004; ABS & AIHW 2005), current data characteristics limit analysis of trends over time. Secondly, this analysis has concentrated on 'significant morbidity requiring hospitalisation' and has not examined inequalities in the use of procedures in hospital. As indicated Section 3 'Methods', there are varying socioeconomic patterns for different types of CVD procedures which warrant further investigation.

This analysis provides up-to-date estimates of socioeconomic inequalities in CVD deaths and hospitalisations. It also provides estimates of how these trends have changed since 1992—information that has not been provided in detail in the past. The results show that inequalities remain in both mortality and hospitalisation rates for all CVD, and for CHD and stroke. Relative inequality increased for all disease groups studied for mortality, and for CHD and stroke hospitalisations (but not CVD hospitalisations). Absolute inequality was stable or decreased in nearly all cases. The exception is CHD hospitalisations where it increased.

Although these results provide an important addition to available information on inequalities in CVD in Australia, these inequalities need to continue to be monitored into the future. Longer term trends will provide an important perspective on the different impacts of CVD mortality and morbidity across the population.

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Appendix A

Table A1: Hospitalisations for CVD diagnostic groups by urgency of admission, 2003–04

	Urgency of admission					
	Emergency		Elective		Other[a]	
	Number	%	Number	%	Number	%
Cardiovascular disease	243,694	54.3	188,215	41.9	16,950	3.8
Coronary heart disease	95,834	58.4	62,723	38.2	5,669	3.5
Acute myocardial infarction and unstable angina	74,701	77.6	18,459	19.2	3,050	3.2
Other CHD	21,133	31.1	44,264	65.1	2,619	3.9
Stroke	28,220	84.5	3,444	10.3	1,752	5.2
Other CVD	119,640	47.6	122,048	48.6	9,529	3.8

(a) Includes 'not assigned' and 'not reported'.

Source: AIHW National Hospital Morbidity Database.

Table A2: Per cent of hospitalisations by urgency of admission, 25–74 year olds, 2000–01 to 2003–04

	AMI and unstable angina			All CHD		
Diagnosis	Emergency	Elective	Other[a]	Emergency	Elective	Other[a]
2000–01	75	23	2	53	45	2
2001–02	76	22	2	54	44	2
2002–03	76	21	3	54	43	3
2003–04	76	21	3	55	42	3

(a) Includes 'not assigned' and 'not reported'.

Notes

1. ICD-10-AM codes used are: AMI I21, unstable angina I20.0, all CHD I20–I25.
2. As 2000–01 was the first year that the urgency of admission variable was included on the database, data quality may not be as high as in other year.

Table A3: Per cent of hospitalisations by CHD subtype, 25–74 year olds, 1996–97 to 2003–04

Diagnosis	AMI	Unstable angina	*AMI and unstable angina*	Other CHD	All CHD
1996–97	19	34	*53*	47	100
1997–98	19	34	*53*	47	100
1998–99	20	35	*55*	45	100
1999–00	21	34	*55*	45	100
2000–01	22	34	*56*	44	100
2001–02	23	33	*56*	44	100
2002–03	25	30	*55*	45	100
2003–04	26	30	*56*	44	100

Note: ICD-10-AM codes used are: AMI I21, unstable angina I20.0, all CHD I20–I25. To ensure correct mapping between ICD versions, the ICD-9-CM codes used for 1996–97, 1997–98 and 1998–99 (some jurisdictions) were AMI 410, unstable angina 411.1 and 413.0, all CHD 410–414.

Table A4: Inequality in cardiovascular disease mortality by sex, 25–74 year olds, 1992 to 2002

			Quintile of disadvantage[a]					
		Year	1	2	3	4	5	Total
Males	Number of deaths	1992	3,107	2,741	2,484	2,203	2,009	12,543
		1997	2,681	2,342	2,197	1,821	1,507	10,548
		2002	2,121	1,816	1,721	1,518	1,182	8,357
	ASR[b] per 100,000	1992	303	281	270	246	212	
		1997	237	214	216	181	146	
		2002	174	150	153	135	104	
	Rate ratio (95% CI)	1992	1.43 (1.36–1.52)	1.33 (1.25–1.41)	1.28 (1.20–1.35)	1.16 (1.09–1.23)	1.00	
		1997	1.63 (1.53–1.73)	1.47 (1.38–1.56)	1.48 (1.38–1.58)	1.24 (1.16–1.32)	1.00	
		2002	1.66 (1.55–1.78)	1.44 (1.34–1.55)	1.46 (1.36–1.57)	1.29 (1.20–1.39)	1.00	
	Rate difference (95% CI)	1992	92 (77–106)	70 (55–84)	58 (44–72)	34 (20–48)	0	
		1997	91 (80–103)	68 (57–80)	70 (58–81)	35 (24–46)	0	
		2002	69 (60–79)	46 (37–55)	48 (39–58)	30 (21–39)	0	
	Excess	1992	920	669	539	308	0	2,436
		1997	1,010	732	708	353	0	2,803
		2002	838	551	549	340	0	2,278
	Excess %	1992	29.6	24.4	21.7	14.0	0.0	19.4
		1997	37.7	31.3	32.2	19.4	0.0	26.6
		2002	39.5	30.4	31.9	22.4	0.0	27.3
Females	Number of deaths	1992	1,559	1,323	1,257	1,105	997	6,241
		1997	1,315	1,114	978	864	678	4,949
		2002	983	885	727	624	512	3,732
	ASR[b] per 100,000	1992	143	126	125	112	89	
		1997	110	96	90	80	58	
		2002	78	71	63	54	43	
	Rate ratio (95% CI)	1992	1.61 (1.48–1.74)	1.42 (1.30–1.54)	1.41 (1.30–1.53)	1.26 (1.16–1.38)	1.00	
		1997	1.89 (1.73–2.07)	1.65 (1.50–1.81)	1.55 (1.41–1.71)	1.37 (1.24–1.52)	1.00	
		2002	1.83 (1.65–2.04)	1.65 (1.48–1.84)	1.48 (1.32–1.66)	1.25 (1.12–1.41)	1.00	
	Rate difference (95% CI)	1992	54 (45–63)	37 (28–46)	37 (28–45)	23 (15–32)	0	
		1997	52 (44–59)	38 (30–45)	32 (25–39)	22 (15–29)	0	
		2002	36 (29–42)	28 (22–34)	21 (15–27)	11 (5–16)	0	
	Excess	1992	556	369	351	214	0	1,490
		1997	607	429	344	235	0	1,615
		2002	439	345	237	128	0	1,149
	Excess %	1992	35.6	27.9	27.9	19.4	0.0	23.9
		1997	46.2	38.5	35.2	27.2	0.0	32.6
		2002	44.6	39.0	32.6	20.5	0.0	30.8

(a) Quintile 1 = most disadvantaged; Quintile 5 = least disadvantaged.

(b) Age-standardised rate (ASR) to the 2001 Australian population aged 25–74 years.

Source: AIHW Mortality Database.

Table A5: Inequality in coronary heart disease mortality by sex, 25–74 year olds, 1992 to 2002

		Year	Quintile of disadvantage[a] 1	2	3	4	5	Total
Males	Number of deaths	1992	2,179	1,929	1,736	1,521	1,370	8,734
		1997	1,793	1,589	1,490	1,208	1,010	7,090
		2002	1,415	1,200	1,088	965	733	5,400
	ASR[b] per 100,000	1992	213	198	188	169	144	
		1997	158	146	147	120	98	
		2002	116	99	96	85	64	
	Rate ratio (95% CI)	1992	1.48 (1.38–1.58)	1.38 (1.28–1.47)	1.31 (1.22–1.40)	1.17 (1.09–1.26)	1.00	
		1997	1.62 (1.50–1.75)	1.49 (1.38–1.61)	1.50 (1.39–1.63)	1.23 (1.13–1.34)	1.00	
		2002	1.80 (1.65–1.96)	1.54 (1.41–1.69)	1.50 (1.36–1.64)	1.33 (1.21–1.46)	1.00	
	Rate difference (95% CI)	1992	69 (57–81)	54 (42–66)	44 (32–56)	25 (14–37)	0	
		1997	61 (51–70)	48 (39–57)	49 (39–58)	22 (13–31)	0	
		2002	52 (44–59)	35 (27–42)	32 (25–39)	21 (14–28)	0	
	Excess	1992	686	515	410	229	0	1,840
		1997	674	511	493	225	0	1,904
		2002	623	419	365	236	0	1,644
	Excess %	1992	31.5	26.7	23.6	15.1	0.0	21.1
		1997	37.6	32.2	33.1	18.6	0.0	26.8
		2002	44.0	34.9	33.6	24.5	0.0	30.4
Females	Number of deaths	1992	914	781	764	603	566	3,627
		1997	730	624	548	469	351	2,722
		2002	491	480	365	295	234	1,865
	ASR[b] per 100,000	1992	83	73	76	61	50	
		1997	61	54	50	43	30	
		2002	39	38	32	25	20	
	Rate ratio (95% CI)	1992	1.66 (1.49–1.84)	1.46 (1.31–1.63)	1.52 (1.37–1.70)	1.21 (1.08–1.36)	1.00	
		1997	2.02 (1.78–2.29)	1.79 (1.57–2.03)	1.68 (1.47–1.92)	1.45 (1.26–1.66)	1.00	
		2002	1.98 (1.70–2.30)	1.93 (1.66–2.25)	1.62 (1.37–1.90)	1.29 (1.09–1.53)	1.00	
	Rate difference (95% CI)	1992	33 (26–40)	23 (17–30)	26 (19–33)	11 (4–17)	0	
		1997	31 (25–36)	24 (18–29)	20 (15–26)	13 (8–18)	0	
		2002	19 (15–24)	18 (14–23)	12 (8–16)	6 (2–10)	0	
	Excess	1992	343	238	249	98	0	928
		1997	360	267	219	143	0	989
		2002	238	229	139	67	0	674
	Excess %	1992	37.5	30.5	32.6	16.2	0.0	25.6
		1997	49.3	42.8	39.9	30.5	0.0	36.3
		2002	48.4	47.8	38.1	22.9	0.0	36.1

(a) Quintile 1 = most disadvantaged; Quintile 5 = least disadvantaged.

(b) Age-standardised to the 2001 Australian population aged 25-–74 years.

Source: AIHW Mortality Database.

Table A6: Inequality in stroke mortality by sex, 25–74 year olds, 1992 to 2002

		Year	Quintile of disadvantage[a] 1	2	3	4	5	Total
Males	Av. number of deaths	1992–1993	315	281	245	243	217	1,301
		1997–1998	317	278	262	232	188	1,276
		2001–2002	250	212	228	198	153	1,042
	ASR[b] per 100,000	1992–1993	30	28	26	27	23	
		1997–1998	28	25	25	23	18	
		2001–2002	21	18	21	18	14	
	Rate ratio (95% CI)	1992–1993	1.33 (1.18–1.51)	1.25 (1.10–1.41)	1.16 (1.02–1.33)	1.18 (1.04–1.34)	1.00	
		1997–1998	1.56 (1.38–1.77)	1.39 (1.22–1.58)	1.42 (1.24–1.62)	1.27 (1.10–1.45)	1.00	
		2001–2002	1.50 (1.30–1.72)	1.29 (1.12–1.50)	1.50 (1.30–1.73)	1.31 (1.13–1.52)	1.00	
	Rate difference (95% CI)	1992–1993	8 (4–11)	6 (2–9)	4 (1–7)	4 (1–7)	0	
		1997–1998	10 (7–13)	7 (4–10)	8 (5–10)	5 (2–8)	0	
		2001–2002	7 (4–9)	4 (2–6)	7 (4–9)	4 (2–7)	0	
	Av. excess	1992–1993	77	56	34	37	0	204
		1997–1998	111	78	77	49	0	315
		2001–2002	83	48	76	46	0	252
	Av. excess %	1992–1993	24.5	19.8	13.9	15.2	0.0	15.7
		1997–1998	35.0	28.1	29.5	21.1	0.0	24.7
		2001–2002	33.1	22.7	33.3	23.0	0.0	24.2
Females	Av. number of deaths	1992–1993	248	219	193	173	173	1,006
		1997–1998	238	204	192	165	154	954
		2001–2002	192	160	154	138	117	761
	ASR[b] per 100,000	1992–1993	23	21	19	17	15	
		1997–1998	20	17	18	15	13	
		2001–2002	16	13	14	12	10	
	Rate ratio (95% CI)	1992–1993	1.47 (1.28–1.68)	1.35 (1.17–1.55)	1.24 (1.07–1.43)	1.13 (0.97–1.31)	1.00	
		1997–1998	1.51 (1.31–1.74)	1.32 (1.14–1.53)	1.35 (1.16–1.57)	1.15 (0.99–1.35)	1.00	
		2001–2002	1.60 (1.36–1.88)	1.33 (1.13–1.58)	1.39 (1.17–1.65)	1.22 (1.03–1.46)	1.00	
	Rate difference (95% CI)	1992–1993	7 (5–10)	5 (3–8)	4 (1–6)	2 (0–4)	0	
		1997–1998	7 (4–9)	4 (2–6)	5 (2–7)	2 (0–4)	0	
		2001–2002	6 (4–8)	3 (1–5)	4 (2–6)	2 (0–4)	0	
	Av. excess	1992–1993	74	53	36	18	0	180
		1997–1998	79	49	49	22	0	200
		2001–2002	70	39	44	25	0	178
	Av. excess %	1992–1993	29.7	24.0	18.5	10.5	0.0	17.9
		1997–1998	33.3	24.2	25.5	13.5	0.0	21.0
		2001–2002	36.6	24.2	28.3	18.5	0.0	23.4

(a) Quintile 1 = most disadvantaged; Quintile 5 = least disadvantaged.

(b) Age-standardised to the 2001 Australian population aged 25–74 years.

Source: AIHW Mortality Database.

Table A7: Inequality in cardiovascular disease hospitalisations by sex, 25–74 year olds, 1996–97 to 2003–04

Sex	Measure	Year	Quintile of disadvantage[a] 1	2	3	4	5	Total
Males	ASR[b] per 100,000	1996–97	3,614	3,561	3,398	3,163	2,763	
		1998–99	3,491	3,402	3,221	2,976	2,686	
		2001–02	3,191	3,123	3,052	2,846	2,477	
		2003–04	3,167	3,027	2,926	2,740	2,422	
	Rate ratio	1996–97	1.31 (1.29–1.33)	1.29 (1.27–1.31)	1.23 (1.21–1.25)	1.14 (1.12–1.16)	1.00	
		1998–99	1.30 (1.29–1.33)	1.27 (1.25–1.29)	1.20 (1.17–1.21)	1.11 (1.08–1.12)	1.00	
		2001–02	1.29 (1.27–1.31)	1.26 (1.24–1.28)	1.23 (1.21–1.25)	1.15 (1.13–1.17)	1.00	
		2003–04	1.31 (1.29–1.33)	1.25 (1.23–1.27)	1.21 (1.19–1.23)	1.13 (1.11–1.15)	1.00	
	Rate difference	1996–97	850 (838–863)	798 (786–810)	635 (623–647)	400 (388–412)	0	
		1998–99	805 (793–816)	716 (704–727)	535 (524–546)	291 (279–302)	0	
		2001–02	714 (703–725)	645 (635–656)	575 (564–586)	369 (358–379)	0	
		2003–04	744 (734–755)	604 (593–615)	504 (493–514)	318 (307–328)	0	
	Excess[c]	1996–97	N/A	N/A	N/A	N/A	N/A	N/A
		1998–99	8,774	7,775	5,643	3,080	0	25,271
		2001–02	8,229	7,589	6,463	4,219	0	26,500
		2003–04	8,912	7,428	5,933	3,896	0	26,170
	Excess %	1996–97	22.9	22.1	18.6	12.6	0.0	15.7
		1998–99	22.5	20.7	16.7	9.8	0.0	14.8
		2001–02	21.9	20.6	18.9	13.1	0.0	15.7
		2003–04	23.1	20.0	17.3	11.9	0.0	15.2
Females	ASR[b] per 100,000	1996–97	2,208	2,119	2,077	1,883	1,562	
		1998–99	2,171	2,097	1,986	1,827	1,549	
		2001–02	2,026	1,908	1,857	1,722	1,446	
		2003–04	1,932	1,804	1,731	1,645	1,382	
	Rate ratio	1996–97	1.41 (1.38–1.44)	1.36 (1.33–1.39)	1.33 (1.30–1.36)	1.21 (1.18–1.23)	1.00	
		1998–99	1.40 (1.38–1.44)	1.35 (1.33–1.38)	1.28 (1.25–1.30)	1.18 (1.15–1.19)	1.00	
		2001–02	1.40 (1.37–1.43)	1.32 (1.29–1.35)	1.28 (1.26–1.31)	1.19 (1.17–1.22)	1.00	
		2003–04	1.40 (1.37–1.43)	1.31 (1.28–1.33)	1.25 (1.23–1.28)	1.19 (1.17–1.21)	1.00	
	Rate difference	1996–97	645 (635–656)	557 (546–567)	514 (504–524)	320 (310–331)	0	
		1998–99	622 (612–632)	548 (538–558)	437 (428–447)	278 (269–288)	0	
		2001–02	580 (570–589)	462 (452–471)	411 (402–421)	277 (267–286)	0	
		2003–04	550 (541–559)	422 (413–431)	348 (339–358)	262 (253–272)	0	
	Excess[c]	1996–97	N/A	N/A	N/A	N/A	N/A	N/A
		1998–99	6,982	6,131	4,663	2,995	0	20,772
		2001–02	6,812	5,546	4,624	3,196	0	20,178
		2003–04	6,640	5,282	4,081	3,205	0	19,207
	Excess %	1996–97	28.8	26.0	24.6	17.1	0.0	19.9
		1998–99	28.3	25.8	21.9	15.1	0.0	19.3
		2001–02	28.4	24.2	22.1	16.0	0.0	19.1
		2003–04	28.2	23.5	20.1	16.0	0.0	18.5

(a) Quintile 1 = most disadvantaged; Quintile 5 = least disadvantaged.

(b) Age-standardised to the 2001 Australian population aged 25–74 years.

(c) Excess cannot be calculated for 1996–97 due to missing Queensland data.

Source: AIHW National Hospital Morbidity Database.

Table A8: Inequality in CHD and CHD emergency hospitalisations by sex, 25–74 year olds, 2001–02 to 2003–04

		Year	Diagnosis	Quintile of disadvantage[a] 1	2	3	4	5	Total
Males	ASR[b] per 100,000	2001–02	CHD	1,496	1,453	1,368	1,225	1,068	
		2003–04		1,482	1,410	1,346	1,210	1,024	
		2001–02	CHD emerg.	847	772	737	632	477	
		2003–04		847	766	725	622	437	
	Rate ratio	2001–02	CHD	1.40 (1.37–1.43)	1.36 (1.33–1.39)	1.28 (1.25–1.31)	1.18 (1.15–1.20)	1.00	
		2003–04		1.45 (1.41–1.48)	1.38 (1.35–1.41)	1.31 (1.28–1.35)	1.18 (1.15–1.21)	1.00	
		2001–02	CHD emerg.	1.77 (1.72–1.83)	1.62 (1.56–1.67)	1.54 (1.49–1.60)	1.32 (1.28–1.37)	1.00	
		2003–04		1.94 (1.88–2.00)	1.75 (1.70–1.81)	1.66 (1.59–1.72)	1.42 (1.38–1.48)	1.00	
	Rate difference	2001–02	CHD	428 (419–437)	385 (376–394)	299 (291–308)	187 (178–196)	0	
		2003–04		458 (450–467)	386 (377–394)	322 (314–331)	186 (178–195)	0	
		2001–02	CHD emerg.	370 (362–377)	295 (287–302)	259 (253–268)	154 (146–161)	0	
		2003–04		410 (403–417)	329 (322–336)	288 (281–296)	185 (178–193)	0	
	Excess	2001–02	CHD	4,915	4,511	3,372	2,158	0	14,957
		2003–04		5,454	4,726	3,822	2,297	0	16,297
		2001–02	CHD emerg.	4,291	3,460	2,912	1,767	0	12,430
		2003–04		4,945	4,038	3,386	2,235	0	14,605
	Excess %	2001–02	CHD	27.8	26.3	22.1	15.2	0.0	19.5
		2003–04		30.0	27.1	24.3	15.9	0.0	20.9
		2001–02	CHD emerg.	43.1	38.0	35.4	24.6	0.0	31.1
		2003–04		47.9	42.8	39.9	29.9	0.0	35.7
Females	ASR[b] per 100,000	2001–02	CHD	652	580	529	479	356	
		2003–04		629	568	539	450	333	
		2001–02	CHD emerg.	410	349	319	279	184	
		2003–04		407	343	326	262	172	
	Rate ratio	2001–02	CHD	1.83 (1.76–1.90)	1.63 (1.57–1.69)	1.48 (1.43–1.54)	1.34 (1.29–1.40)	1.00	
		2003–04		1.89 (1.82–1.96)	1.71 (1.64–1.77)	1.62 (1.56–1.69)	1.35 (1.30–1.41)	1.00	
		2001–02	CHD emerg.	2.23 (2.12–2.35)	1.90 (1.81–2.00)	1.74 (1.65–1.83)	1.52 (1.44–1.61)	1.00	
		2003–04		2.36 (2.24–2.48)	1.99 (1.89–2.09)	1.89 (1.78–1.98)	1.52 (1.44–1.60)	1.00	
	Rate difference	2001–02	CHD	296 (289–303)	224 (217–231)	173 (166–179)	123 (116–130)	0	
		2003–04		296 (289–305)	235 (228–245)	206 (200–216)	117 (111–126)	0	
		2001–02	CHD emerg.	226 (220–233)	165 (159–171)	135 (130–142)	96 (90–102)	0	
		2003–04		235 (229–241)	170 (164–176)	154 (148–160)	89 (84–95)	0	
	Excess	2001–02	CHD	3,464	2,681	1,925	1,415	0	9,485
		2003–04		3,581	2,950	2,415	1,424	0	10,369
		2001–02	CHD emerg.	2,661	1,981	1,512	1,105	0	7,259
		2003–04		2,853	2,134	1,794	1,087	0	7,868
	Excess %	2001–02	CHD	44.1	38.0	32.4	25.8	0.0	31.0
		2003–04		45.8	41.0	38.3	26.3	0.0	33.6
		2001–02	CHD emerg.	54.1	46.8	42.3	34.5	0.0	40.0
		2003–04		56.7	49.4	47.1	34.5	0.0	42.6

(a) Quintile 1 = most disadvantaged; Quintile 5 = least disadvantaged.

(b) Age-standardised to the 2001 Australian population aged 25–74 years.

Source: AIHW National Hospital Morbidity Database.

Table A9: Inequality in AMI and unstable angina hospitalisations by sex, 25–74 year olds, 1996–97 to 2003–04

		Year	Quintile of disadvantage[a] 1	2	3	4	5	Total
Males	ASR[b] per 100,000	1996–97	938	896	832	824	664	
		1998–99	949	873	814	754	609	
		2001–02	871	798	791	679	534	
		2003–04	870	810	770	669	493	
	Rate ratio	1996–97	1.41 (1.37–1.46)	1.35 (1.31–1.40)	1.25 (1.21–1.30)	1.24 (1.20–1.29)	1.00	
		1998–99	1.56 (1.52–1.61)	1.43 (1.39–1.48)	1.34 (1.29–1.37)	1.24 (1.19–1.27)	1.00	
		2001–02	1.63 (1.58–1.68)	1.49 (1.45–1.54)	1.48 (1.43–1.53)	1.27 (1.23–1.32)	1.00	
		2003–04	1.76 (1.71–1.82)	1.64 (1.59–1.70)	1.56 (1.50–1.60)	1.36 (1.31–1.40)	1.00	
	Rate difference	1996–97	274 (265–282)	232 (224–241)	168 (160–176)	160 (152–169)	0	
		1998–99	339 (331–348)	264 (257–273)	205 (197–213)	145 (137–153)	0	
		2001–02	336 (330–344)	264 (256–271)	257 (249–265)	145 (138–153)	0	
		2003–04	377 (369–384)	317 (309–324)	277 (269–284)	176 (168–183)	0	
	Excess[c]	1996–97	N/A	N/A	N/A	N/A	N/A	N/A
		1998–99	3,725	2,871	2,162	1,540	0	10,298
		2001–02	3,897	3,093	2,886	1,672	0	11,548
		2003–04	4,531	3,889	3,261	2,133	0	13,815
	Excess %	1996–97	28.1	25.3	20.2	19.7	0.0	19.3
		1998–99	35.2	29.9	25.4	19.5	0.0	23.9
		2001–02	38.1	32.8	32.6	21.7	0.0	27.3
		2003–04	42.7	39.0	36.1	26.5	0.0	31.7
Females	ASR[b] per 100,000	1996–97	403	373	335	319	233	
		1998–99	418	366	349	302	222	
		2001–02	387	332	308	270	185	
		2003–04	377	332	310	257	172	
	Rate ratio	1996–97	1.73 (1.64–1.82)	1.60 (1.52–1.69)	1.44 (1.36–1.52)	1.37 (1.29–1.44)	1.00	
		1998–99	1.89 (1.81–1.99)	1.65 (1.57–1.74)	1.57 (1.49–1.65)	1.36 (1.28–1.43)	1.00	
		2001–02	2.09 (1.99–2.20)	1.79 (1.70–1.89)	1.66 (1.57–1.74)	1.46 (1.38–1.54)	1.00	
		2003–04	2.20 (2.09–2.31)	1.94 (1.84–2.04)	1.80 (1.71–1.90)	1.50 (1.42–1.58)	1.00	
	Rate difference	1996–97	170 (163–176)	140 (133–146)	102 (96–109)	85 (79–92)	0	
		1998–99	197 (190–203)	144 (139–151)	127 (121–132)	81 (74–87)	0	
		2001–02	202 (197–209)	147 (141–153)	122 (115–127)	85 (79–91)	0	
		2003–04	205 (199–211)	161 (155–167)	138 (132–144)	85 (79–91)	0	
	Excess[c]	1996–97	N/A	N/A	N/A	N/A	N/A	N/A
		1998–99	2,221	1,610	1,341	863	0	6,036
		2001–02	2,384	1,757	1,365	977	0	6,484
		2003–04	2,503	2,019	1,615	1,033	0	7,169
	Excess %	1996–97	40.2	36.2	29.4	26.4	0.0	28.1
		1998–99	45.7	38.4	36.0	26.6	0.0	32.5
		2001–02	51.1	43.6	39.4	31.6	0.0	37.1
		2003–04	53.5	48.1	44.5	33.4	0.0	40.5

(a) Quintile 1 = most disadvantaged; Quintile 5 = least disadvantaged.

(b) Age-standardised to the 2001 Australian population aged 25–74 years.

(c) Excess cannot be calculated for 1996–97 due to missing Queensland data.

Source: AIHW National Hospital Morbidity Database.

Table A10: Inequality in stroke hospitalisations by sex, 25–74 year olds, 1996–97 to 2003–04

		Year	Quintile of disadvantage[a] 1	2	3	4	5	Total
Males	ASR[b] per 100,000	1996–97	204	190	182	176	150	
		1998–99	183	170	168	150	125	
		2001–02	171	155	160	141	118	
		2003–04	162	161	145	141	113	
	Rate ratio	1996–97	1.36 (1.26–1.46)	1.26 (1.18–1.36)	1.21 (1.13–1.30)	1.17 (1.08–1.26)	1.00	
		1998–99	1.46 (1.37–1.58)	1.36 (1.27–1.46)	1.35 (1.25–1.44)	1.20 (1.11–1.28)	1.00	
		2001–02	1.46 (1.36–1.56)	1.32 (1.23–1.42)	1.36 (1.27–1.46)	1.20 (1.12–1.29)	1.00	
		2003–04	1.43 (1.34–1.54)	1.43 (1.33–1.53)	1.28 (1.19–1.38)	1.25 (1.16–1.34)	1.00	
	Rate difference	1996–97	54 (48–59)	40 (34–45)	32 (26–37)	25 (20–31)	0	
		1998–99	58 (54–64)	44 (39–50)	43 (37–48)	25 (19–29)	0	
		2001–02	54 (49–59)	38 (33–43)	42 (37–47)	24 (19–29)	0	
		2003–04	49 (44–54)	48 (43–54)	32 (27–37)	28 (23–33)	0	
	Excess[c]	1996–97	N/A	N/A	N/A	N/A	N/A	N/A
		1998–99	646	496	456	264	0	1,861
		2001–02	638	446	471	272	0	1,826
		2003–04	592	595	368	337	0	1,893
	Excess %	1996–97	25.4	20.4	17.2	14.2	0.0	16.0
		1998–99	31.1	26.3	25.9	16.9	0.0	21.6
		2001–02	31.1	24.3	26.6	17.2	0.0	21.2
		2003–04	29.7	30.0	22.0	20.3	0.0	21.9
Females	ASR[b] per 100,000	1996–97	122	117	117	103	80	
		1998–99	124	117	117	94	80	
		2001–02	116	102	102	95	73	
		2003–04	117	105	99	94	72	
	Rate ratio	1996–97	1.52 (1.37–1.69)	1.46 (1.31–1.62)	1.46 (1.31–1.62)	1.29 (1.14–1.45)	1.00	
		1998–99	1.55 (1.43–1.69)	1.47 (1.35–1.59)	1.46 (1.33–1.58)	1.18 (1.07–1.28)	1.00	
		2001–02	1.60 (1.48–1.75)	1.40 (1.29–1.53)	1.41 (1.29–1.54)	1.30 (1.19–1.42)	1.00	
		2003–04	1.62 (1.49–1.76)	1.46 (1.34–1.59)	1.37 (1.26–1.50)	1.30 (1.19–1.42)	1.00	
	Rate difference	1996–97	42 (37–47)	37 (32–42)	37 (32–42)	23 (18–28)	0	
		1998–99	44 (40–49)	37 (33–42)	37 (31–41)	14 (9–18)	0	
		2001–02	44 (39–48)	29 (25–34)	30 (25–34)	22 (17–26)	0	
		2003–04	40 (35–44)	30 (26–35)	27 (22–31)	19 (15–24)	0	
	Excess[c]	1996–97	N/A	N/A	N/A	N/A	N/A	N/A
		1998–99	484	422	396	155	0	1,458
		2001–02	524	354	334	250	0	1,462
		2003–04	538	406	315	261	0	1,520
	Excess %	1996–97	29.8	26.3	27.0	17.8	0.0	21.0
		1998–99	33.8	31.2	31.4	15.1	0.0	24.3
		2001–02	37.2	28.5	28.9	22.9	0.0	25.3
		2003–04	37.3	30.9	27.2	23.3	0.0	25.7

(a) Quintile 1 = most disadvantaged; Quintile 5 = least disadvantaged.

(b) Age-standardised to the 2001 Australian population aged 25–74 years.

(c) Excess cannot be calculated for 1996–97 due to missing Queensland data.

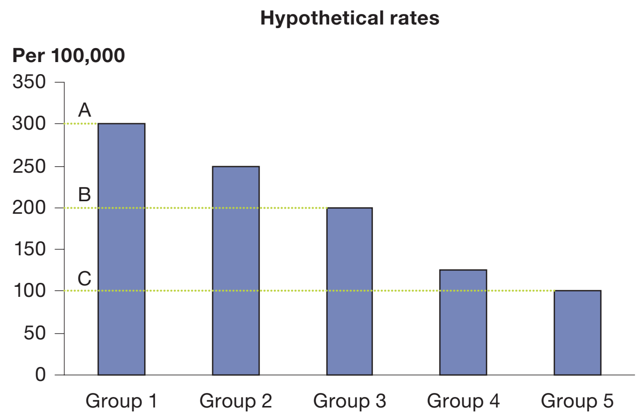
Source: AIHW National Hospital Morbidity Database.

Appendix B

Details on methods

Measures of inequality—worked example

There are a number of measures that can be used to indicate the level of health inequality between population groups. In this report we use the rate ratio, rate difference, excess and excess %. Further information on how these measures relate to one another and their interpretation are provided in section 3. Below is a summary of how these are calculated.



The figure provides a hypothetical example of rates for a health outcome. It is used below to explain the various inequality measures used in this report. It is assumed that each group has a population of 2,000,000.

Measures calculated for each group

These measures compare each group with the least disadvantaged group. In the hypothetical example, these would be calculated separately for Groups 1 to 4 compared with Group 5. The example below relates to the calculation for Group 1.

Rate ratio: a ratio to indicate the relative gap

Calculation: Rate for Group 1 divided by rate for highest socioeconomic group (Group 5)

= A/C

Worked example from hypothetical

A/C = 300 per 100,000/100 per 100,000

= 3

Interpretation: the rate for the most disadvantaged group is 3 times as high as for the least disadvantaged group

Rate difference: difference indicates the absolute gap

Calculation: Rate for Group 1 minus the rate for Group 5

= A – C

Worked example from hypothetical

A – C = 300 per 100,000 – 100 per 100,000 = 200 per 100,000

Interpretation: for the most disadvantaged group, there are 200 extra cases per 100,000 population compared to the least disadvantaged group

Excess: the number of cases that would have been avoided if the rate for the highest socioeconomic group (Group 5) applied to Group 1

Calculation: Rate difference converted to absolute number of cases

$$= (A - C) \times \text{population in Group 1}$$

This is equivalent to the observed number of cases in Group 1—the expected number that would have occurred if the rate for Group 5 had applied

$$= \text{Observed cases} - \text{Expected cases}$$

$$= A \times \text{Group 1 population} - C \times \text{Group 1 population}$$

Worked example from hypothetical

$A \times \text{Group 1 population} - C \times \text{Group 1 population}$

$$= 300/100{,}000 \times 2{,}000{,}000 - 100/100{,}000 \times 2{,}000{,}000$$

$$= 4{,}000$$

Interpretation: there were 4,000 cases in Group 1 that would have been avoided if the rate for Group 5 had applied to Group 1

In this report, to take into account differences in the age structures of the population groups, expected cases have been calculated by 5-year age groups and then summed to give the total number of expected cases. For example, the age-specific rates for Group 5 were applied to the age-specific population for Group 1 to calculate the expected number of cases for Group 1 by 5-year age groups. These were then summed to calculate the total number of expected cases for Group 1.

Excess %: the percentage of cases in Group 1 that would have been avoided if the rate for Group 5 had applied.

Calculation: Excess Group 1 cases as a percentage of all Group 1 cases

$$= (A - C) \times \text{Group 1 population}/[A \times \text{Group 1 population}] \times 100$$

$$= (A - C)/A \times 100$$

Worked example from hypothetical

$(A - C) / A \times 100$

$$= (300 \text{ per } 100{,}000 - 100 \text{ per } 100{,}000)/300 \text{ per } 100{,}000 \times 100$$

$$= 200/300 \times 100 = 67\%$$

Interpretation: 67% of Group 1 cases would have been avoided if the rate for Group 5 had applied to Group 1.

The four measures outlined above can also be calculated for Group 2, Group 3 and Group 4, comparing each of these with the highest socioeconomic group.

e.g. for Group 3: Rate ratio = 200/100 = 2

Rate difference = (200 – 100)/100,000 = 100 per 100,000

Excess = 100/100,000 × 2,000,000 = 2,000

Excess % = (200 – 100)/200 = 50%.

Measures summarising the inequality across all 5 groups

The two excess measures can be converted to measures summarising the inequality across all the 5 groups.

Total excess:

Total excess = excess Group 1 + excess Group 2 + excess Group 3 + excess Group 4

= (200 + 150 + 100 + 25)/100,000 × 2,000,000

= 9,500

Interpretation: There were 9,500 that would have been avoided if all groups had the same rate as the highest socioeconomic group.

Total excess %:

Total excess % = total excess/total cases × 100

Total cases = (300 + 250 + 200 + 125 + 100)/100,000 × 2,000,000

= 19,500

Total excess % = 9,500/19,500 × 100 = 48.7%

Interpretation: 48.7% of all cases would have been avoided if the rate for the highest socioeconomic group had applied to all groups.

Standard errors and statistical tests

Standard errors (SE) and confidence intervals (CI) were calculated for all age-standardised rates (ASR) and rate ratios (RR) using the following formulas:

Age-standardised rate

$$SE(ASR) = \sqrt{(\Sigma[((r_i \times P_i^2)/n_i) \times 100000]/P^2)}$$

$$95\%\ CI = ASR \pm (1.96 \times se)$$

where r_i = deaths or hospitalisation rate per 100,000 for age group i

n_i = population for age group i

P_i = standard population for age group i

P = total standard population

Rate ratio

$$95\%\ \mathrm{CI} = RR^{(1 \pm 1.96/\chi)} \qquad \text{(Parkin et al. 1992)}$$

$$\text{where } \chi = (ASR_{Qx} - ASR_{Q5})/\sqrt{(se(ASR_{Qx})^2 + se(ASR_{Q5})^2)}$$

Rate difference

$$se(RD) = \sqrt{(se(ASR_{Qx})^2 + se(ASR_{Q5})^2)}$$

$$\text{where } x = 1 \text{ to } 4$$

$$95\%\ \mathrm{CI} = RD \pm 1.96 \times se(RD)$$

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