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bulletin 25

Australian health inequalities

2 Trends in male mortality by broad occupational group

Executive summary

- This bulletin examines and compares long-term mortality trends among Australian men aged 20–59 in two broad occupational groups that reflect socioeconomic status. The time period is 1966–2001 and the groups are 'manual' and 'non-manual'.
- For this 35-year period, mortality rates for manual workers have generally been significantly higher. This applies to all-cause mortality rates and to most major causes of death.
- Male all-cause mortality rates have been falling steadily since the early 1970s for both non-manual and manual workers, but the absolute difference in rates between the two groups has not narrowed.
- Therefore, when measured as a gap between the mortality rates, all-cause mortality inequalities among men employed in manual and non-manual occupations have remained unchanged over the period.
- Inequalities vary according to specific causes of death. In some cases, inequalities are small or insignificant. In other cases, such as ischaemic heart disease, mortality rates of manual workers were once lower than among the non-manual.
- For each of 17 causes of death examined here, however, mortality rates are now higher among men in manual occupations, significantly so in 13 causes of death.

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Trends in male mortality by broad occupational group

Introduction

Although the overall health status of Australians compares favourably with other developed countries (AIHW 2004a; OECD 2003), health status within the Australian population varies between different population groups. Illness and death have been shown to occur at higher rates among socioeconomically disadvantaged people, such as those with lower incomes or lower education, or who are unemployed (AIHW 2004a). Health may also vary according to sex, region of residence or country of birth.

These health inequalities have received considerable interest in Australia during the last decade (Mathers 1994; Draper et al. 2004). Evidence on present health inequalities and socioeconomic position is clear and can help guide public health measures. However, what is less well known is the pattern of these socioeconomic inequalities over a longer time period, and whether the 'gap' has narrowed or widened. A historical approach may provide clues to the factors behind these inequalities and act as a measure of the effect of social policies.

One good source of this kind of information is the death certificate. It identifies a person's cause of death and for males it also provides longer term data on occupation. It can therefore provide longer term trends linking an important indicator of socioeconomic status —occupation—to an important health outcome, death. Occupation is one of a number of closely related measures of socioeconomic status, along with income, education and others (Kunst 1997; Mackenbach & Kunst 1997; Harris et al. 1999).

This bulletin examines and compares long-term mortality trends among Australian males in two broad occupational groups that reflect socioeconomic status, namely 'manual' and 'non-manual' workers.

Methods

Data on deaths among employed males aged 20–59 years for the period 1966–2001 were extracted from the AIHW National Mortality Database. This database includes information on age at death, cause of death and occupation of the deceased, and is derived from data supplied by the Registrars of Births, Deaths and Marriages in each state and territory.

Data availability—specifically labour force estimates by occupation and age—limits the commencement year to 1966. Further, this analysis cannot include females because death certificate information on the occupation of female decedents was not collected until 1985.

In order to examine mortality among different occupational groups over a long time period, both mortality and occupation in death registrations and population estimates must be classified consistently. Hence, causes of death coded for the years 1966–1967 to the Seventh Revision of the International Classification of Diseases (ICD–7), for 1968–1978 to the Eighth Revision (ICD–8) and for 1998–2001 to the Tenth Revision (ICD–10) were reclassified to the Ninth Revision (ICD–9) using published 'mapping' approaches (ABS 1981; Taylor 1992; ABS 2002).

For the years 1966–1989, the occupation of the deceased was classified to major groups of the Classification and Classified List of Occupations, commonly known as CCLO (ABS Cat. No. 1206.0). For the years 1990–2001, occupation was classified to the Australian Standard Classification of Occupations, commonly known as ASCO (ABS 1986).

Occupations of decedents classified using ASCO major groups were mapped back to CCLO major groups, using a link file developed by the Australian Bureau of Statistics (ABS), and based on a 5% sample of the 1986 census (ABS 1988). The consolidated CCLO major groups were then allocated to one of two broad occupational categories—labelled 'manual' or 'non-manual' (Table 1). This approach has been used in previous inequality research examining occupation (Mathers 1994; Kunst et al. 1998). These manual and non-manual occupational categories form the basis for the exploration of differences in mortality in this study. The manual group comprised 64% of the population examined for 1966 and 51% for 2001.

Table 1: Allocation of CCLO major groups to broad 'manual' and 'non-manual' occupational categories

Manual	Group 4: Farmers, fishermen, hunters, timbergetters and related workers
	Group 5: Miners, quarrymen and related workers
	Group 6: Workers in transport and communication
	Group 7/8: Tradesmen, production process workers and labourers not elsewhere classified
Non-manual	Group 0: Professional, technical and related workers
	Group 1: Administrative, executive and managerial workers
	Group 2: Clerical workers
	Group 3: Sales workers
	Group 9: Service, sport and recreation workers

To express deaths among manual and non-manual workers as rates for their occupation, estimates of the base at-risk population were extracted from ABS Labour Force Surveys. These are conducted four times per year during February, May, August and November (ABS unpublished microfiche tables; ABS Cat. No. 6291.0.55.001). The number of employed males in each of the four surveys, categorised by age group and occupational major group, was averaged, to minimise seasonal variation and to provide an annual estimate of population. Estimates for the period August 1986 to May 1996, originally classified using ASCO, were reclassified to CCLO using the aforementioned ABS linkage file. Estimates for the period August 1996 to November 2001, originally classified using ASCO version 2 (ABS 1997), were reclassified to ASCO using a second ABS linkage file (ABS 1998), and then reclassified a second time to CCLO. Again, these estimates were then apportioned to manual and non-manual categories.

Annual mortality rates for males in manual and non-manual occupations were calculated using the five- and ten-year age groups 20–24, 25–34, 35–44, 45–54 and 55–59, and were directly age-standardised to the 1991 total mid-year Australian population. Rates were calculated for all-causes and specific leading causes of death.

Box 1 discusses the measures used to assess inequality, and Box 2 discusses some of the data issues associated with the analysis that follows.

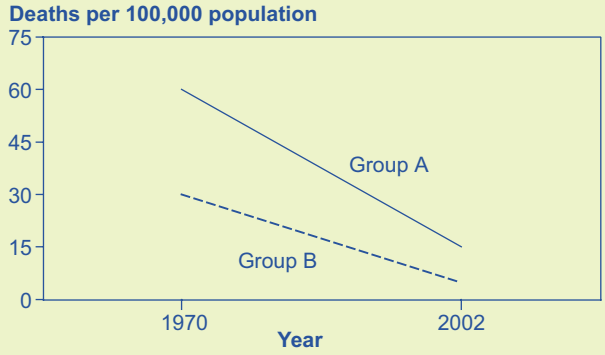
Trends in male mortality by broad occupational group

Box 1: Measuring differences in mortality

Is there a 'best way' to measure health inequality? The answer is no—it often needs several perspectives.

In this bulletin two groups are compared as one way of measuring inequality. A standard way of doing this is to express the rate of one group as a ratio of the other—for example, 'the men have three times the women's rate of heart disease deaths'. Technically, this can be described as a 'mortality ratio' of 3. It is a well-accepted and easily understood approach.

But consider the example in the figure below:



In the figure both group A and group B have had a huge fall in mortality rates from 1970 to 2002. Also, the gap between the two groups—the difference between their rates—has narrowed markedly too. In 1970 the gap was 30 deaths per 100,000 and in 2002 it was only 10. But the **ratio** *of A/B has now increased despite this, from 2 in 1970 (60/30) to 3 in 2002 (15/5). The problem is that ratios can become larger when the rates become smaller, even when the absolute difference is small.*

Has health really worsened for group A in our example? Its 2002 position, relative to group B, is now worse, so in that sense the inequality has 'widened'. But in other terms group A's health has clearly improved and the absolute gap has actually narrowed.

In this particular bulletin the situation is dealt with by presenting both aspects of the story—using both absolute measures (gaps) and relative ones (ratios). Inequalities defined by the former will be termed the 'gap inequality' and those by the latter as the 'ratio inequality'.

If a choice had to be made as to which of the two measures is preferable for measuring trends in inequality, however, it would be the gap. To understand this further, consider a situation which is the precise mirror image of the figure above. In this case, both rates would now be increasing and the gap would be progressively widening—but the ratio of A/B would be progressively falling. Would anyone really want to suggest that inequality was actually reducing? No, they would go with the gap and say it was increasing.

Continued...

Box 1 (continued): Measuring differences in mortality

Other aspects

There is a range of other ways of looking at health inequality, too. Some methods divide the population into a number of groups rather than the approach taken here of examining two broad groups. They may then only compare the two groups at each extremity; or they may compare how each group varies from the one next to it, and so forth.

Other approaches also consider how many people may be in disadvantaged groups, not just the groups' degree of disadvantage. This can give an estimate of the total proportion of the population that can be regarded as disadvantaged.

So ideally a broad context is needed to make full judgments about health inequality. We would like to know not only about comparative rates between groups but whether the rates are high or low by some accepted standard, the numbers within those groups and hence their overall distribution, and how any of these things have changed over time. Ratios at any particular point in time are always of interest, but should still be viewed in this wider context where possible. For assessing trends, however, the gap is the realistic measure.

Box 2: Data issues

Several data issues influence the comparison of mortality rates between occupational groups.

First, occupation of female decedents was not collected until 1985. This bulletin, which contains analysis back to 1966, therefore does not include females.

The second issue is the comparability and adequacy of the occupation data in death registrations and in the ABS labour force surveys. The lack of comparability between the two data sources may result in so-called 'numerator–denominator bias' (Bennett 1996; Kunst 1997). Occupation data collected in ABS labour force surveys refer to the current job or the job held in the previous week. The survey asked standard labour force and occupation questions that produce detailed information for coding by the ABS into labour force and occupation categories. In contrast, occupation data contained in death registrations come separately from the eight state and territory Registrars of Births, Deaths and Marriages, and these registries ask relatives and friends questions about the deceased person's occupation that vary according to the jurisdiction and are different from those in the labour force surveys. Mostly, the 'usual occupation' of the deceased is asked, but the 'main occupation' (or task) or simply 'the occupation' of the deceased is also asked in some jurisdictions. Given these differences, it can be expected that there will be inconsistencies in the occupation data between jurisdictions.

Continued...

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Box 2 (continued): Data issues

Also of significance is that the usual occupation or main occupation reported in death certificates is often the 'best' or 'highest' occupation held by the deceased in their lifetime (Kunst 1997). This may place some people in the non-manual category when they belong in the manual group, and a misclassification like this—in either direction—will tend to reduce the apparent health differences between the two groups.

Third, the ABS labour force survey does not collect occupation data for those not currently in the labour force. To achieve consistency with data from the labour force survey, deceased persons who were not in the labour force at the time of death, as well as those with occupations not adequately described, were excluded from this analysis. This exclusion, amounting to about 20 per cent of total male deaths, may lead to an underestimate of mortality differences between occupational classes, since those not in the labour force, including those unemployed, are likely to be more socioeconomically disadvantaged and have a higher level of mortality than those in the labour force (Kunst et al. 1998).

Also, issues such as the rigour of mapping procedures between revisions of occupational classifications and between revisions of death classifications, and the allocation of CCLO major groups to broad manual and non-manual categories may be further sources of data confounding. The best attempt has been made to map data accurately between occupational and cause-of-death revisions to ensure common classifications.

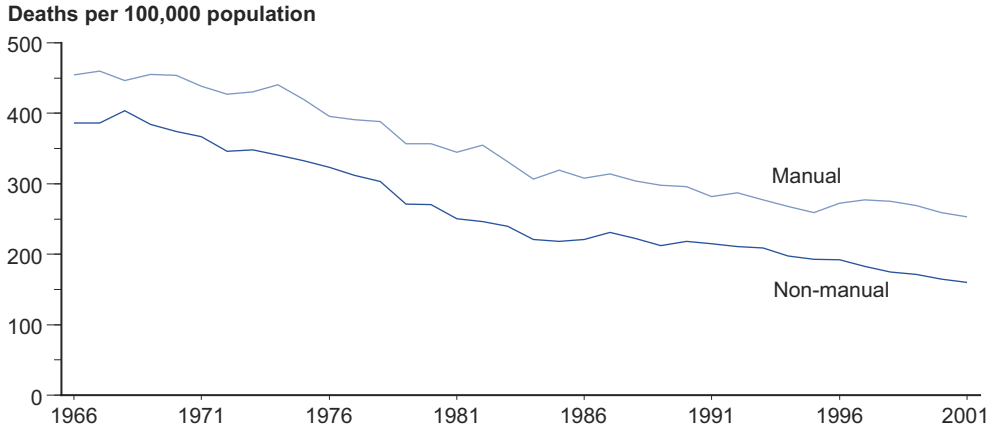
Each of these data issues may have some effect on rates of mortality among manual and non-manual occupational groups. However, these effects should not be so great as to negate the order of magnitude or direction of mortality inequalities. And, as mentioned above, they are more likely to lead to an underestimate of inequality, rather than an overestimate.

Results

Overall mortality

Mortality rates from all causes of death combined among males working in both manual and non-manual occupations declined markedly during the period 1966 to 2001 (Figure 1). For males in manual occupations, overall mortality declined from 450 deaths per 100,000 population in 1966, to 250 deaths per 100,000 population in 2001, a decline of 44%. For males in non-manual occupations, mortality declined from 390 deaths per 100,000 population in 1966 to 160 deaths in 2001, a decline of 59%. Declines have been consistent for both groups and at a similar rate, but slowed somewhat after the mid-1980s.

Figure 1: Age-standardised mortality rates among males aged 20–59, 1966–2001



The overall mortality rate among male manual workers was significantly higher than that among males in non-manual occupations. This basic difference persisted throughout the 35 years between 1966 and 2001 (Figure 1). The degree of difference, the 'gap inequality' (see Box 1) also persisted over the period and certainly did not reduce, fluctuating between 50 and 100 deaths per 100,000 population (Figure 2).

Figure 2: Difference between mortality rates for males aged 20–59, manual and non-manual occupations, 1966–2001

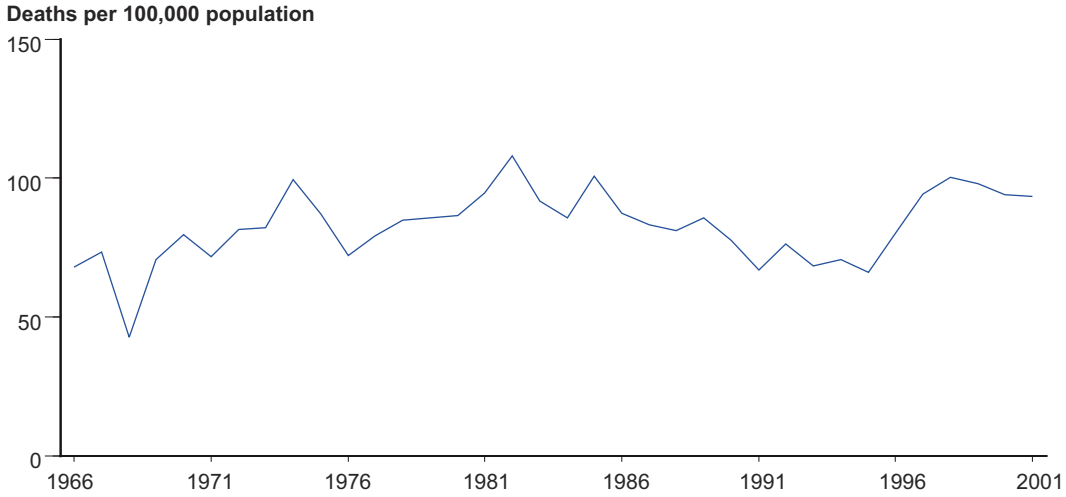


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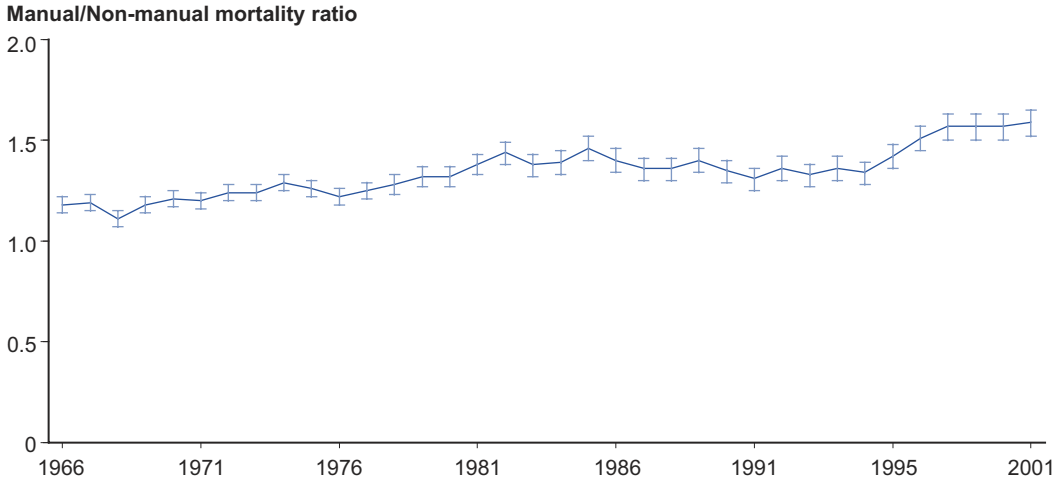
Figure 3 presents the ratios of mortality rates for males in manual occupations and non-manual occupations. These ratios show that not only did the 'ratio inequality' in deaths among males in manual and non-manual occupations persist throughout the period, but it also increased (but see Box 1).

Figure 3: Standardised mortality ratios between manual and non-manual occupations, males aged 20–59, 1966–2001, with 95% confidence interval



Note: Standardised mortaliy ratios are presented with a 95% confidence interval. See Abbreviations and definitions.

In 1966, the mortality rate for males in manual occupations was 20% higher than for males in non-manual occupations, corresponding to a mortality ratio of 1.2. By 2001, this ratio inequality had widened to 60% (ratio of 1.6). However, the gap inequality remained essentially the same over the period. These findings also need to be interpreted in the light of substantial falls in mortality among both groups.

Although the ratio inequality in mortality rates widened for the two groups between 1966 and 2001, it did not do so in a uniform fashion. A steady widening of the ratios between 1966 and 1985 was followed by a period of stability, or even of slight narrowing, to the mid-1990s, and then a further widening in the second half of the 1990s onward compared with the first half.

Most deaths occur in the older age groups—for the years 1996–2000, there were 2,612 deaths among employed males aged 20–24, and 12,741 deaths among employed males aged 55–59. The inequality in mortality noted in Figure 3, therefore, is largely driven by mortality among males in these older age groups.

Cause-specific mortality

Four of the most common causes of death among males in this age group are now examined more closely, and a number of other causes of death are summarised.

Mortality rates for most causes of death among males aged 20–59 declined over the period 1966–2001. These declines took place for males in both manual and non-manual occupations, but to varying extents, resulting in varying mortality inequalities for specific causes of death. For each cause, however, mortality rates are currently higher among males in manual occupations and significantly so in 13 of the 17 examined (Table 2).

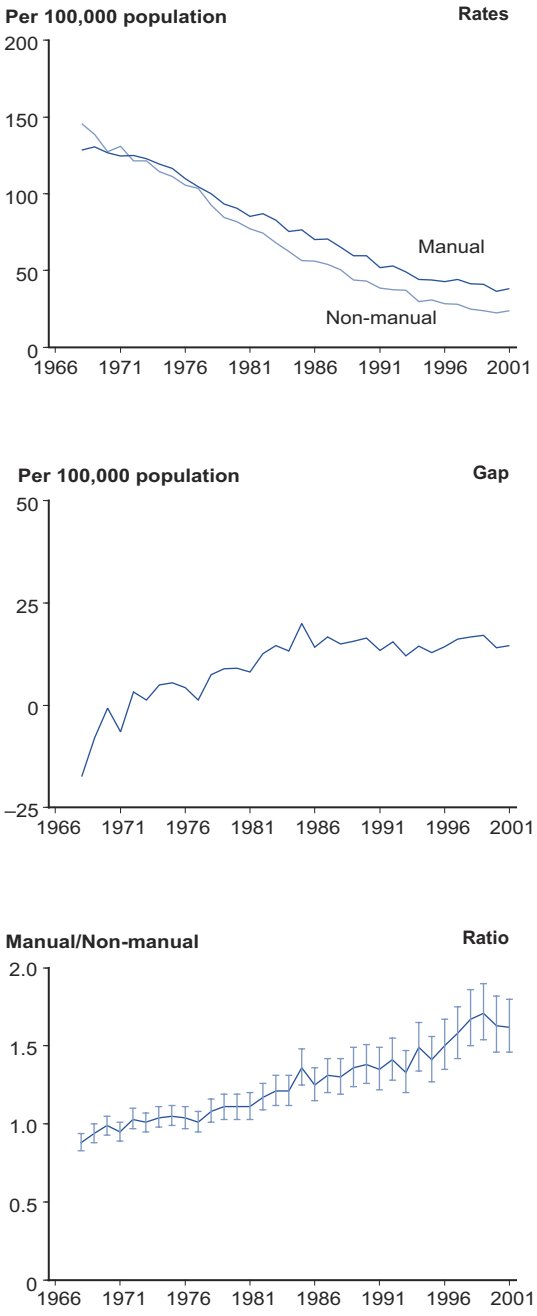
Ischaemic heart disease

The most common cause of death in Australia is ischaemic heart disease (IHD), also known as coronary heart disease. In 2002, it claimed over 26,000 male and female lives—20% of all deaths in that year. IHD is more common among socioeconomically disadvantaged persons. Australians living in the most disadvantaged areas had considerably higher death rates from IHD than their counterparts from the least disadvantaged areas in 2000–02: 25% higher for males and 29% higher for females (AIHW 2004b). Excess body weight increases the risk of developing cardiovascular disease, and socioeconomically disadvantaged persons, including persons without post-school qualifications, or persons in quintiles of lower equivalent income, tend towards greater obesity (AIHW: O'Brien & Webbie 2003). Those at a socioeconomic disadvantage are also more likely to have diabetes and to smoke, further risk factors for IHD (AIHW 2004b).

IHD has been more common among males in manual occupations for a considerable period, but this was not always so. Figure 4 shows that the mortality rate was significantly higher among males in non-manual occupations in the late 1960s, but since then has been overtaken by mortality among males in manual occupations. IHD mortality rates have declined substantially for both groups, but generally more so among non-manual workers. The gap between manual and non-manual rates widened until the mid-1980s, and has remained steady since (Figure 4, middle).

The ratio inequalities have continued to widen (Figure 4, bottom). Mortality rates are currently 60% higher among males in manual occupations, although the base on which these inequalities are calculated is substantially lower in 2001 than it was in the 1960s. Among males aged 20–59 in non-manual occupations, mortality declined from 1,662 deaths (146 per 100,000 population) in 1968 to 590 deaths (24 per 100,000 population) in 2001. For males in manual occupations, mortality declined from 2,769 deaths (128 per 100,000 population) in 1968 to 872 deaths (38 per 100,000 population) in 2001.

Figure 4: Ischaemic heart disease among males aged 20–59 in manual and non-manual occupations, age-standardised mortality rates, gap between rates and standardised mortality ratio



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Two previous Australian studies have also examined changing socioeconomic inequalities in cardiovascular disease. Burnley (1999) noted that occupational status differentials in myocardial infarction (heart attack) mortality between professional and managerial groups and manual occupation groups in New South Wales increased between 1969–73 and 1990–94. Acute myocardial infarction mortality declined more rapidly in the professional managerial, and clerical and sales groups. Bennett (1996) found that mortality from coronary heart disease and stroke at the end of the 1970s was higher among lower socioeconomic groups, as measured using three categories of occupation. These inequalities continued to widen during the early 1980s, stabilised thereafter and persisted into the 1990s.

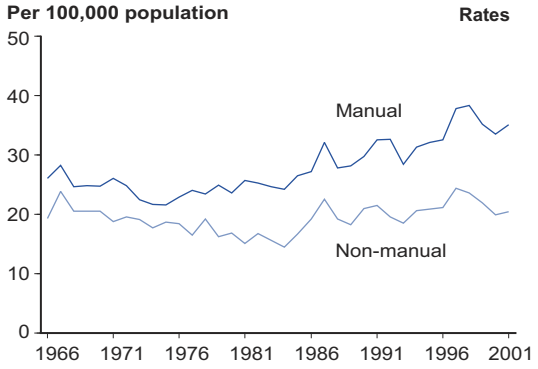
Suicide and self-inflicted injury

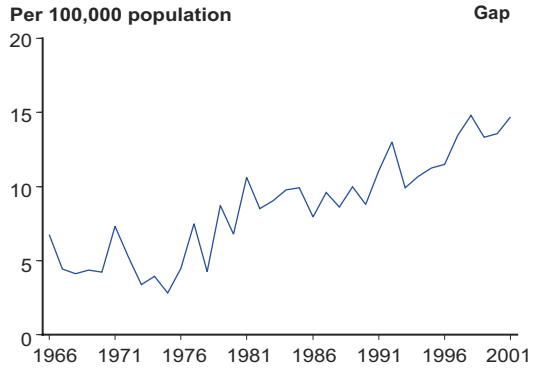
A second major cause of death among this age group is suicide and self-inflicted injury. Suicide is a prominent public health and social problem in Australia. Currently, more than 2,500 people die through suicide each year, and over 80% of these are males (Steenkamp & Harrison 2000).

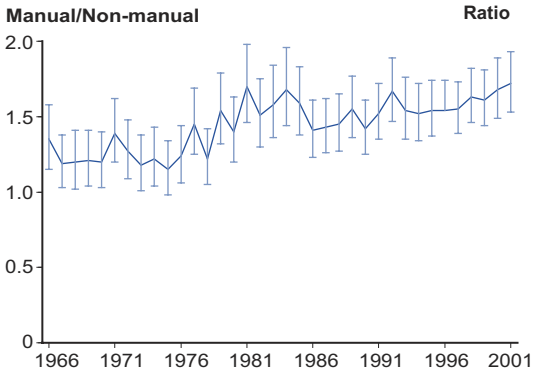
Previous research has found increased risk of suicide among lower socioeconomic groups. Burnley (1994) found higher suicide mortality among manual workers, and further elevated risk when manual occupational status was combined with never-married, divorced or widowed marital status. More broadly, male suicide is strongly associated with socioeconomic disadvantage, as measured by indices of economic resources, and education and occupation (Page et al. 2002).

Suicide is more common among males employed in manual occupations (Figure 5, top), and the rate of death is increasing for these men, from at least the mid-1980s and perhaps the mid-1970s; they increased from 26 per 100,000 population in 1966 to 35 per 100,000 population in 2001. The rate among males employed in non-manual

Figure 5: Suicide and self-inflicted injury among males aged 20–59 in manual and non-manual occupations, age-standardised mortality rates, gap between rates and standardised mortality ratio







occupations has shown little net change over the same period, from 19 per 100,000 population in 1966 to 20 per 100,000 population in 2001. Because of this, the gap inequality between the two groups is widening (Figure 5, middle). Mortality ratio inequalities have also increased, with the rate now more than 50% higher among males in manual occupations (Figure 5, bottom).

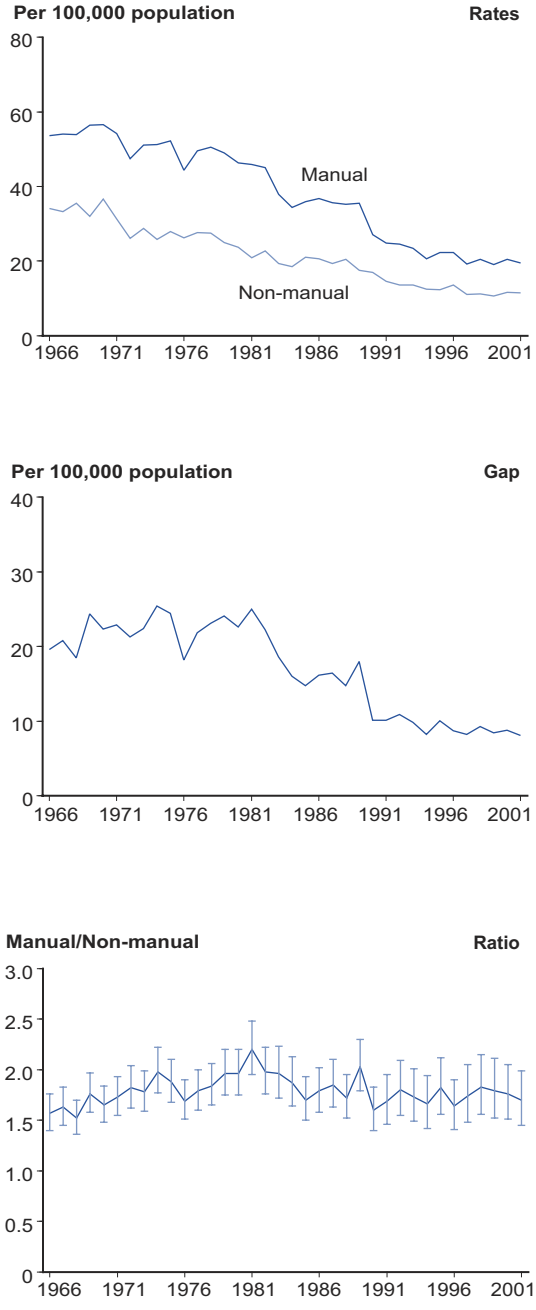
Both individual risk factors, such as previous suicide attempts, mental illness and feelings of hopelessness, and wider contextual factors, such as family, relationships and socioeconomic status, could be considered as affecting suicidal behaviours (Page et al. 2002).

Motor vehicle traffic accidents

Transport accidents, including motor vehicle traffic accidents, caused the death of 1,907 persons in 2002, of which three-quarters were males. Motor vehicle traffic accidents are responsible for 27% of the total injury burden in Australia (Mathers et al. 1999). Although road deaths are prominent as a cause of injury mortality, their rates for both manual and non-manual groups have declined steadily since the early 1970s. A number of public health initiatives, including compulsory use of seat-belts and helmets, targeting drink-driving, improved vehicle and road design, and lower speed limits have played a part in this.

Figure 6 shows that, again, mortality rates for motor vehicle traffic accidents are significantly higher among males in manual occupations than in non-manual occupations. The gap between manual and non-manual death rates narrowed markedly between the early 1980s and 1990s (Figure 6, middle). Regardless, the mortality ratio inequality has been consistent over the last 35 years, with rates among males in manual occupations remaining more than 50% higher than among males in non-manual occupations (Figure 6, bottom). This is because of the progressively lower rates for both groups (see Box 1).

Figure 6: Motor vehicle traffic accidents among males aged 20–59 in manual and non-manual occupations, age-standardised mortality rates, gap between rates and standardised mortality ratio



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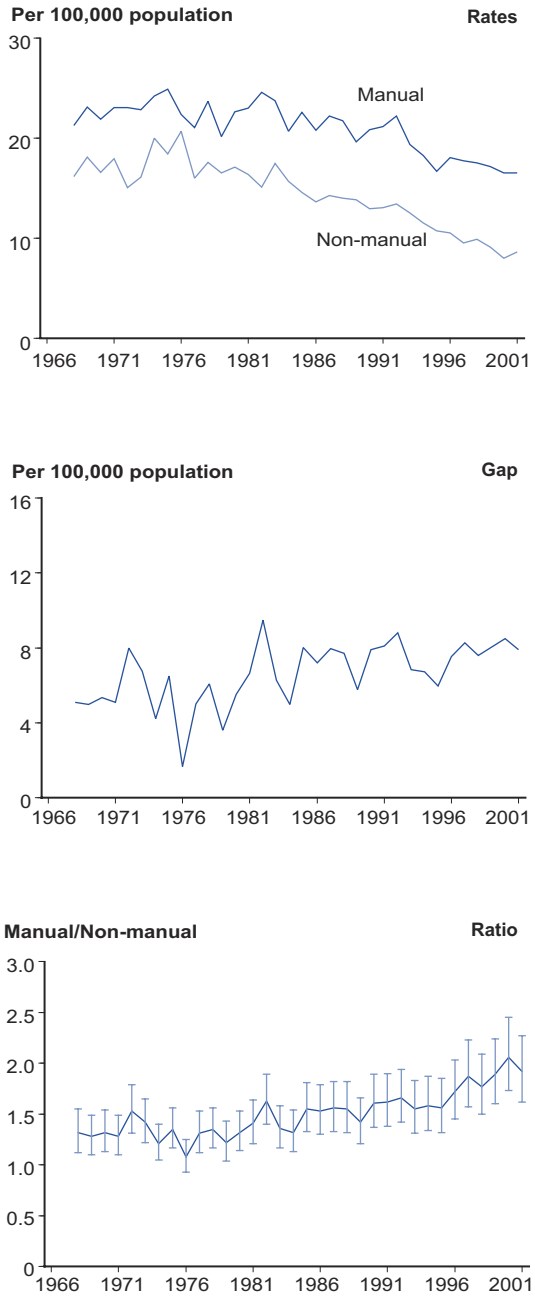
Lung cancer

Lung cancer is another notable cause of death among males aged 20–59. The major risk factor for lung cancer is tobacco smoking. In 2001, 21% of males aged 14 years and over were daily smokers. Further, males living in the most disadvantaged areas of Australia were much more likely to smoke than those living in the least disadvantaged areas (25% compared with 16%) (AIHW 2004b). The higher use of tobacco among more disadvantaged areas almost certainly translates into higher incidence and mortality from lung cancer. Smith, Taylor and Coates (1996) observed a strong negative gradient in the association of lung cancer with socioeconomic status. Lung cancer, along with other cancers associated with tobacco smoking—mouth, pharynx, oesophagus, pancreas and bladder—was most common in lower socioeconomic status urban males and females in New South Wales.

Figure 7 shows trends in lung cancer mortality among males working in manual and non-manual occupations. Since at least the late 1960s, rates of mortality have been significantly higher among males in manual occupations. Rates began to show significant decline in the early 1980s, so that in 2001 deaths were 17 per 100,000 among males in manual occupations, and 9 per 100,000 for males in non-manual occupations. Absolute gaps in lung cancer mortality between the manual and non-manual groups have shown some increase in the last two decades, as have the mortality ratios. The mortality was 40% higher among males in manual occupations in 1981 whereas in 2001 it was 90% higher.

Although Australia has a successful tobacco control record by international standards, males in lower socioeconomic groups afford an opportunity for still greater health gains against tobacco-related diseases such as lung cancer.

Figure 7: Lung cancer among males aged 20–59 in manual and non-manual occupations, age-standardised mortality rates, gap between rates and standardised mortality ratio



Mortality rate ratio summary: 17 causes of death and total

Standardised mortality ratios for leading causes of death among males aged 20–59, covering five-year intervals between 1966 and 2000, are summarised in Table 2. Among these 17 causes of death, several trends are apparent.

Table 2: Standardised mortality ratios for causes of death among males aged 20–59 in manual and non-manual occupations, 1966–1970 to 1996–2000

ICD–9 cause of death	1966–70	1971–75	1976–80	1981–85	1986–90	1991–95	1996–00
151, Cancer of stomach	1.39*	1.34*	1.14	1.69*	1.26*	1.41*	1.35*
153–154, Cancer of colon & rectum	0.76*	0.81*	0.81*	0.87*	0.91	1.01	1.22*
157, Cancer of pancreas	1.33*	1.00	0.93	1.13	0.90	1.24*	1.34*
162, Cancer of trachea, bronchus & lung	1.30*	1.35*	1.25*	1.45*	1.54*	1.60*	1.86*
172, Malignant melanoma of skin	0.80*	0.64*	0.71*	0.83*	0.85	0.90	1.16
191–192, Cancer of brain & nervous system	0.86	0.87	0.87	0.89	0.93	1.00	1.09
204–208, Leukaemia	0.90	0.96	0.92	1.04	1.02	1.00	1.11
250, Diabetes	0.86	0.89	0.97	1.25*	1.20	1.36*	1.43*
304, Drug dependence	1.78	2.49*	2.05*	1.59*	2.27*	1.85*	2.10*
410–414, Ischaemic heart disease	0.94*	1.01	1.07*	1.21*	1.32*	1.40*	1.62*
430–438, Stroke	1.01	1.11*	1.26*	1.47*	1.60*	1.40*	1.56*
480–487, Pneumonia & influenza	2.00*	1.99*	1.92*	1.81*	1.89*	1.53*	1.78*
490–493, Bronchitis, emphysema & asthma	1.17	1.27*	1.33*	1.51*	1.31*	1.56*	1.51*
531–533, Ulcer of stomach & duodenum	1.67*	1.70*	1.89*	1.90*	1.99*	1.52	1.47
571, Cirrhosis of liver	1.08	1.27*	1.48*	1.71*	1.74*	1.55*	1.79*
E810–E819, Motor vehicle traffic accidents	1.62*	1.83*	1.84*	1.95*	1.80*	1.74*	1.75*
E950–E959, Suicide & self-inflicted injury	1.23*	1.24*	1.37*	1.61*	1.45*	1.55*	1.60*
All causes of death	**1.17***	**1.24***	**1.28***	**1.41***	**1.38***	**1.34***	**1.53***

* Rate ratio is significantly different from 1.00 (non-manual occupations) at the 5% level.

First, there is a group of diseases where mortality rates among males in manual occupations are significantly higher, and the ratio inequality has tended to increase. These diseases include lung cancer (steady increase in the ratio inequality since at least the early 1980s), cirrhosis of the liver, and suicide and self-inflicted injury. This is also the trend for all causes of death combined (Figure 3).

Second, in another group of diseases mortality rates among males working in manual occupations are consistently and significantly higher than among males in non-manual occupations—at least between 1966 and 2000—and the inequality as measured by mortality ratios has remained much the same. These diseases include stomach and pancreas cancers; drug dependence; pneumonia and influenza; bronchitis, emphysema and asthma; stomach ulcer; and motor vehicle traffic accidents.

Last, in a further group of diseases mortality was previously higher among males in non-manual occupations, but is now higher among males in manual occupations. These diseases include colorectal cancer, diabetes, ischaemic heart disease, and perhaps

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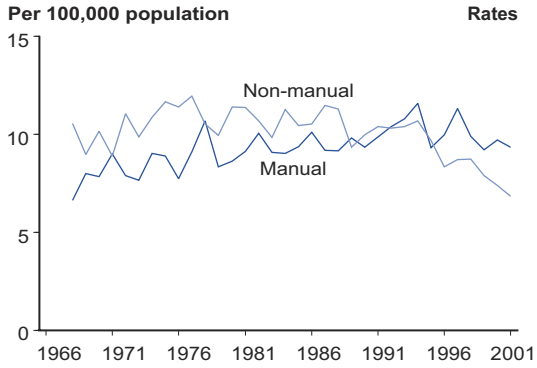
malignant melanoma, brain and central nervous system cancer, and stroke, although small numbers of deaths for some diseases often make it difficult to determine trends.

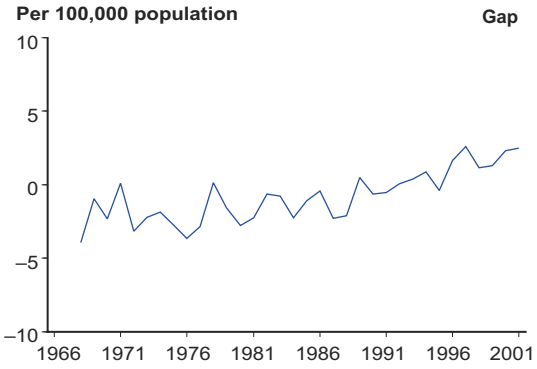
In considering these inequalities, it should be noted that for the great majority of causes of death, rates of mortality have declined over the period 1966–2001 for both these broad occupational groups. The exceptions are diabetes, where rates have increased since the early 1980s among males in both manual and non-manual occupations, and suicide (Figure 5), along with some cancers such as colorectal (Figure 8), melanoma, and brain and central nervous system, where rates have increased among males in manual occupations only.

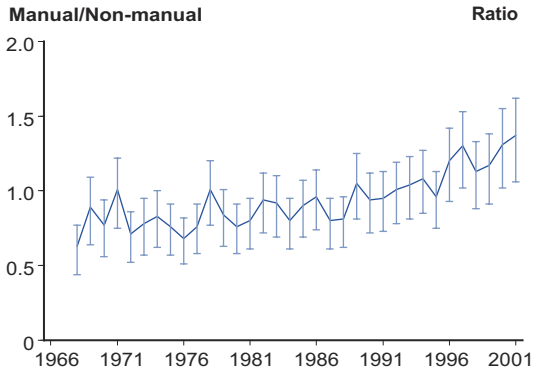
For the years 1996–2000, there were no causes of death among those examined here where mortality rates were higher among males in non-manual occupations. This emphasises the point that although rates for workers in both manual and non-manual occupations have declined for almost all causes of death, the general position of manual workers in relation to non-manual workers has worsened.

Previous research had noted that mortality rates for diseases such as colorectal cancer, brain and central nervous system cancer, and melanoma were higher among males working in non-manual occupations (McMichael & Hartshorne 1982; McMichael 1985; Turrell & Mathers 2000a). Current data indicate that over time a transition has taken place, so that the limited health advantages once enjoyed by males in manual occupations have disappeared, resulting in these diseases also being added to their burden of inequality. Figure 8 gives an example of this 'crossover' effect and shows the trend in the mortality rate ratio for colorectal cancer. Note that this crossover occurred quite recently, being completed in the mid-1990s.

Figure 8: Colorectal cancer among males aged 20–59 in manual and non-manual occupations, age-standardised mortality rates, gap between rates and standardised mortality ratio







Discussion

Some limitations of this study have been summarised in Box 2, namely the inability to include women in the analysis, potential numerator–denominator mismatch arising from varying data collection methods, misassignment into the two broad occupational groups, and exclusion of those unemployed at the time of death. However, as explained, this analysis is conservative because the latter three of these limitations would tend to reduce the apparent differences between the two groups, not exaggerate them. Also, there is no reason to expect that these limitations would affect the analysis of trends.

In addition, it would probably have been possible to divide the occupations into a hierarchy of groups rather than just the two broad ones examined here, in order to examine if there is a graded relationship between occupational status and mortality levels. However, that relationship has been examined in numerous studies in Australia and overseas (Wilkinson & Marmot 2003; AIHW 2004a) and the distinctive focus of this analysis has been on longer term trends.

This study has shown that mortality inequalities have been a persistent feature of Australian society for at least the last few decades. This inequality has overwhelmingly been to the health disadvantage of a group that is disadvantaged in other ways as well, despite significant improvements in its mortality rates over the years. It may be a matter of philosophy whether the overall mortality inequality has remained steady or increased during the 35-year period (see Box 1). However, it is beyond dispute that, at the very least, inequality examined this way has shown no improvement over the period examined.

There has also been a clear trend from one perspective: initially in the period those in manual occupations were disadvantaged by having higher mortality rates for seven of the 17 major causes of death examined, but were advantaged by having lower rates for ischaemic heart disease and two of the cancers. By the second half of the 1990s, however, they had no advantages across these 17 causes and had higher mortality rates for 13 of them. Put another way, over the past few decades the general position of manual workers in relation to non-manual workers has worsened.

In general terms, these findings are consistent with the few other Australian studies that have examined inequalities in longer term mortality trends, though over shorter and less recent periods (Bennett 1996; Hayes et al. 2002). These inequalities among socioeconomic groups have also been observed not only in Australia but in most other developed countries (Turrell & Mathers 2000b).

It should be noted, however, that there are some favourable trends from other perspectives. For example, the proportion of employed Australian males in the 'manual' category has fallen from 64% to 51% over the years examined, which would tend to reduce the total number at a health disadvantage. And using a different approach, Draper et al. (2004) recently reported a narrowing of the gap in absolute total mortality rates between the most and least disadvantaged fifths (based on the area they lived in) of Australian males aged 25–64 between 1985–1987 and 1998–2000, and similarly with females.

However, the challenge remains how to explain these inequalities and what to do about them. In most cases the inequalities noted here are unlikely to be due to the functions

and features of the actual occupation or place of employment, although there may be elevated risks of illness or accident associated with some occupations such as mining, farming or labouring. In addition, Lawson and Black (1993) have argued that generally the health differences in Australia do not appear to be due to lack of resources available to lower socioeconomic groups. However, the common implication between this and many other studies is that health, in this case mortality, is strongly affected by people's social and economic circumstances (Harris et al. 1999). Turrell and Mathers (1999, 2000a) suggest a range of reasons in a recent conceptual framework that describes numerous multilevel and diverse socioeconomic determinants of health inequalities. Some of these determinants include education, employment, income, occupation and housing, as well as health behaviours such as diet and nutrition, smoking, physical activity and preventive health care use. The relative contributions and the interaction of each of these determinants have yet to be fully understood.

An implicit goal in most health inequality research is that these inequalities should be reduced or, more preferably, eliminated. Reduction of inequalities might take place by attempting to reduce mortality rates for the most disadvantaged group relative to those of the most advantaged group, if indeed the levels for the most advantaged group are seen as acceptable. (Of course, inequalities could also be eliminated by allowing mortality levels for the most advantaged group to increase to those of the most disadvantaged, but no one would argue that this is a desirable health outcome.) Attempting such reduction must be seen as a worthwhile endeavour, and will not be without cost.

Considering the duration of many of them, these inequalities may appear to be entrenched. But the demonstration of a previous social class crossover for some diseases, coupled with evidence that many of the determinants can be changed (Beaglehole & Magnus 2002), strongly suggests otherwise. However, an evidence base for when, how and to what degree change should be attempted has yet to be developed.

Recent Australian Government initiatives such as the Health Inequalities Research Collaboration have aimed to add to this evidence base, with a stated goal of enhancing Australia's knowledge on causes and effective responses to health inequalities, and then applying this evidence to reduce these inequalities (DoHA 2004). International initiatives in the United States of America, the United Kingdom and the Netherlands have also been launched in order to tackle their own health inequalities (Dixon et al. 2000; SEGV-II 2001).

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Abbreviations and definitions

ABS—Australian Bureau of Statistics.

Age standardisation—A method of removing the influence of age when comparing populations with different age structures. This is usually necessary because the rates of many diseases vary strongly (usually increasing) with age. The age structures of the different populations are converted to the same 'standard' structure, then the disease rates that would have occurred with that structure are calculated and compared.

AIHW—Australian Institute of Health and Welfare.

ASCO—Australian Standard Classification of Occupations.

CCLO—Classification and Classified List of Occupations.

Confidence interval—A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or higher chance of doing so.

DoHA—Australian Government Department of Health and Ageing.

HIRC—Health Inequalities Research Collaboration.

ICD—International Classification of Diseases.

IHD—Ischaemic heart disease.

OECD—Organisation for Economic Co-operation and Development.

QUT—Queensland University of Technology.

Standardised Mortality Ratio—Here, a measure of death from a condition for males working in manual occupations relative to males working in non-manual occupations. A ratio of 1.13 among manual workers would indicate a rate that is 13% higher than among non-manual workers.

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