

SOCIOECONOMIC-BASED MORTALITY DIFFERENTIALS IN QUEENSLAND, 1991-1993 AND 2001-2003

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Executive summary:

Socioeconomic inequalities in mortality have been repeatedly demonstrated worldwide [1-16] and within Australia and Queensland. Monitoring the extent of socioeconomic differentials in mortality in Queensland is required to inform policy directions.

In 2001-2003 the differential between mortality rates for all cause in the most socioeconomically disadvantaged areas of Queensland in comparison to the least socioeconomically disadvantaged areas, was similar to that of a decade earlier (1991-1993). For both time periods, across the socioeconomic gradient, mortality rates among those living in areas with greater socioeconomic disadvantage were higher than among those living in less disadvantaged areas.

Over the last 10 years, from 1991-1993 to 2001-2003, the mortality rates declined for all socioeconomic cohorts. These results were also observed for mortality due to cardiovascular disease and injury.

The specific causal factors underlying the excess mortality can not be concluded from this analysis. Further applied research is required on a global scale to increase our understanding of the relationship between socioeconomic disadvantage and health and to transform accumulated knowledge into action and positive health outcomes.

A more detailed description of socioeconomic differentials for a number of conditions and for various population groups in Queensland is reported in the Health Determinants Queensland report [17] (<http://qheps.health.qld.gov.au/PHS/Documents/hdq/22418dmp.htm>).

Introduction:

In March 2005 the World Health Organisation launched a Commission on Social Determinants of Health. This commission was instigated in recognition of the major impact that socioeconomic factors play in determining health status and outcomes throughout the world [18]. The impact of socioeconomic disadvantage has been demonstrated not only in the extreme differences in life expectancy between 'rich' and 'poor' nations, but also in the inequalities in morbidity and mortality within countries [18]. Socioeconomic inequalities in mortality have been demonstrated worldwide [1-16] and within Australia [19-32] and Queensland [33]. The difference is not only apparent at the extremes of 'rich' and 'poor' [34].

Rather, on every rung down the socioeconomic status (SES) ladder, from 'rich' to 'poor', people experience more sickness, shorter life expectancy and poorer health.

There is some evidence that the socioeconomic differentials in mortality rates have increased in recent times in some countries [1-4, 10-13, 29, 35]. In Australia in the period 1985-1987 to 1998-2000, the mortality differential associated with large area-based socioeconomic status increased slightly for males and remained constant for females [35]. In 1998-2000, mortality rates had decreased since 1985-1987 for all socioeconomic groups. Consistent with earlier studies, in 1998-2000 there were socioeconomic inequalities in mortality for each age cohort, by sex.

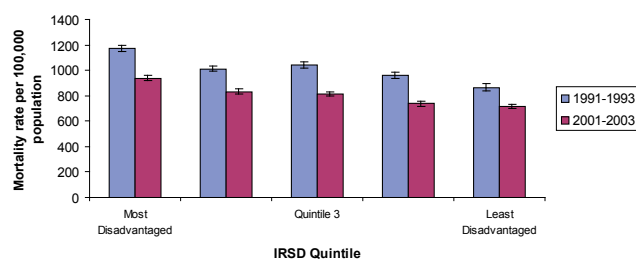
Additional measures of socioeconomic inequality and their impact on health, for example personal rather than area based socioeconomic status and income inequality within areas are beyond the scope of this analysis.

Assessment of the current mortality rates in Queensland in areas of socioeconomic difference, quantification of relative socioeconomic inequalities and the change in such over the past 10 years is required to inform policy directions.

Results:

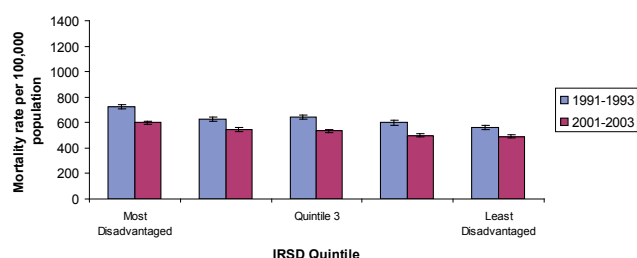
Between 1991-1993 and 2001-2003 for both males and females, the standardised mortality rate for all cause has declined for each socioeconomic quintile (Figures 1 and 2, respectively). However, the mortality rate was higher for those with higher levels of disadvantage and declines as disadvantage declines for both time periods. These patterns were also found for injury and cardiovascular disease (CVD)-related mortality, for males and females.

Figure 1: Mortality rate (all cause) by index of relative socioeconomic disadvantage quintile for males, Queensland 1991 - 1993 and 2001 - 2003



Source: Australian Bureau of Statistics, Causes of Death File Standardised to the 2001 Australian population

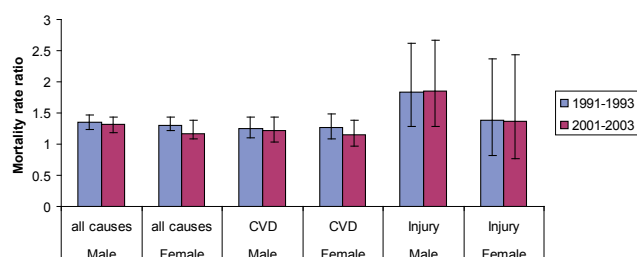
Figure 2: Mortality rate (all cause) by index of relative socioeconomic disadvantage quintile for females, Queensland 1991 - 1993 and 2001 - 2003



Source: Australian Bureau of Statistics, Causes of Death File Standardised to the 2001 Australian population

Overall, based on these broad area-based measures of inequality, there is no indication of a change in the SES-based differential over the last ten years for males and females for mortality due to all cause, CVD and injury (Table 1, Figure 3).

Figure 3: Ratios of mortality rates in most disadvantaged to least disadvantaged by cause and sex, Queensland 1991 - 1993 and 2001 - 2003



Source: Australian Bureau of Statistics, Causes of Death File Standardised to the 2001 Australian population

[Table 1. Relative mortality inequalities between the most and least disadvantaged quintiles based on the Index of relative socioeconomic disadvantage (IRSD) and the Index of Advantage/Disadvantage, males and females, Queensland 1991-1993 and 2001-2003.

Cause of death	Sex	1991-1993		2001-2003	
		RR*	95% CI	RR*	95% CI
All cause	Males	1.35	1.24-1.47	1.31	1.19-1.44
	Females	1.29	1.16-1.44	1.22	1.08-1.38
Cardio-Vascular Disease	Males	1.25	1.10-1.43	1.22	1.04-1.43
	Females	1.27	1.08-1.49	1.16	0.96-1.39
Injury	Males	1.83	1.29-2.61	1.85	1.28-2.67
	Females	1.38	0.81-2.37	1.37	0.77-2.43

* Rate ratio
Source: Australian Bureau of Statistics, Causes of Death File Standardised to the 2001 Australian population

Further detail regarding the methodology and results of this study are described in an internal report 'Socioeconomic-based mortality differentials in Queensland, 1991-1993 and 2001-2003: Technical Report', which can be requested from the Epidemiology Services Unit, Health Information Branch.

Discussion:

The analyses described in this report show that while mortality rates for all cause, CVD and injury have decreased over the last 10 years, there has been no change in the mortality differential related to socioeconomic status.

The results for Queensland females obtained in this study are similar to those obtained in the recent Australian study [35]. That is, very little change in the differential was reported for females over the past 10 years. The results differed slightly for males. The Australian study found a slight increase in all cause mortality differentials for men aged 25-64 years and 65 years and over and larger increases for other age groups, whereas the Queensland results showed no change for males. Differences in the methodology used for the two studies mean that the results are not directly comparable. It can, however be broadly concluded that the mortality differential is not decreasing in Queensland or nationally.

Summary and conclusions:

In Queensland, all cause mortality and mortality related to CVD and injury has declined over the past 10 years in all strata of socioeconomic status. However, mortality rates are higher in areas with more socioeconomic disadvantage and the differential in mortality rates related to socioeconomic disadvantage has not changed in the past decade.

The results of this study should be interpreted cautiously due to the limitations of the approach taken to estimate mortality by socioeconomic status. In particular, conclusions regarding the specific causal factors underlying the excess mortality can not be made based on this analysis. Further applied research is required, on a global scale, to increase our understanding of the relationship between socioeconomic disadvantage and health and to transform knowledge into action and positive health outcomes.

A more detailed description of socioeconomic differentials for a number of conditions and for various population groups in Queensland is reported in the Health Determinants Queensland report (HDQ) [17]. HDQ provides a summary of the most important factors influencing health status and areas of potential gain. It highlights areas in Queensland where socioeconomic disadvantage is most evident and lists interventions to address the health impact of such disadvantage. It has informed Queensland Health strategic initiatives and provides guidance to planners and policy makers working towards reduction of health inequalities.

Methodology:

SES-based differentials in mortality were compared for 1991-1993 and 2001-2003 for all cause mortality and mortality due to cardiovascular disease (CVD) and injury. CVD-related deaths were identified as those with cause of death codes within ICD9 390-459 and ICD10AM I00-I99. Injury-related deaths were those with cause of death codes within ICD9 800-999 and ICD10AM V01-Y98. Analyses included all ages and were conducted for males and females separately. The methodology was based on that used in a recent national study of this issue [35].

Defining socioeconomic disadvantage:

The Index of Relative Socioeconomic Disadvantage (IRSD) was used to quantify SES in order to make comparisons over time. This index was used because it has been measured consistently over time. The IRSD was developed by the Australian Bureau of Statistics (ABS) to categorise areas on the basis of their social and economic characteristics. Scores are allocated to geographical areas (collection districts) based on census data regarding characteristics of the people who live in that area. Information is included in this index regarding education, income, occupation, living conditions, wealth, access to services, Indigenous status and cultural and linguistic diversity. Further details regarding this index are available in a recent information paper produced by the ABS [36].

The ABS assigns scores for the indexes of socioeconomic status described above to each Statistical Local Area (SLA) in Australia based on index scores of the collection districts that make up that SLA. More details about this process can be obtained from the ABS information paper on this topic [36]. Index scores for SLAs are available from the ABS following each census collection. Thus, for this study, each SLA was assigned to a quintile based on index scores from the census closest to each time period of interest. Quintile assignment was performed so that each quintile contained roughly 20% of the Queensland population. Since SLA borders have changed over time

and the socioeconomic status of people living within an SLA can also change over time, the SLAs included in each quintile are not necessarily the same for each time period.

Calculation of rate ratios:

Rate ratios were used to quantify the mortality differential for each time period. Rate ratios were calculated by dividing the age standardised mortality rate for the most disadvantaged quintile by the age standardised mortality rate for the least disadvantaged quintile for a given time period. Rate ratios greater than 1 indicate higher mortality in the most disadvantaged quintile. Rate ratios and 95% confidence intervals are shown in Table 1 and are depicted graphically in Figure 3.

Most of the confidence intervals for the rate ratios do not include 1, which indicates that mortality was significantly higher in the most disadvantaged than in the least disadvantaged for males and females for most conditions for the two time periods (Table 1). The SES-based differential was larger for males than for females and was most pronounced for injury in males. Smaller numbers of deaths from injury among women are probably responsible for the large confidence intervals for this condition in both time periods.

The rate ratios for the two time periods are very similar for each condition and the confidence intervals overlap substantially (Figure 3).

References:

1. Crimmins, E.M. and Y. Saito, Trends in healthy life expectancy in the United States, 1970-1990: gender, racial, and educational differences. *Social Science and Medicine*, 2001. 52: 1629-1641.
2. Donkin, A., P. Goldblatt, and K. Lynch, Inequalities in life expectancy by social class 1972-1999. *Health Status Quarterly*, 2002. 15: 5-15.
3. Mackenbach, J.P., et al., Widening socioeconomic inequalities in mortality in six Western European countries. *International Journal of Epidemiology*, 2003. 32: 830-837.
4. Plavinski, S.L., S.I. Plavinskaya, and A.N. Klimov, Social factors and increase in mortality in Russia in the 1990s: Prospective cohort study. *British Medical Journal*, 2003. 326: 1240-1242.
5. Hurt, L.S., C. Ronsmans, and S. Saha, Effects of education and other socioeconomic factors on middle age mortality in rural Bangladesh. *Journal of Epidemiology and Community Health*, 2004. 58: 315-320.
6. Marmot, M., *Status syndrome*. 2004, London: Bloomsbury.
7. Mackenbach, J.P., *Socioeconomic inequalities in health in the Netherlands: Impact of a five year research programme*. *British Medical Journal*, 1994. 309: 1487-1491.
8. Ancona, C., et al., Coronary artery bypass graft surgery: Socioeconomic inequalities in access and in 30 day mortality: A population-based study in Rome, Italy. *Journal of Epidemiology and Community Health*, 2000. 54: 930-935.
9. Song, Y. and J.J. Byeen, Excess mortality from avoidable and non-avoidable causes in men of low socioeconomic status: A prospective study in Korea. *Journal of Epidemiology and Community Health*, 2000. 54: 166-172.

10. Borrell, C., et al., Widening social inequalities in mortality: the case of Barcelona, a southern European city. *Journal of Epidemiology and Community Health*, 1997. 51: 659-667.
11. Leyland, A.H., Increasing inequalities in premature mortality in Great Britain. *Journal of Epidemiology and Community Health*, 2004. 58: 296-302.
12. Marang-van de Mheen, P.J., et al., Socioeconomic differentials among men within Great Britain: time trends and contributory causes. *Journal of Epidemiology and Community Health*, 1998. 52: 214-218.
13. Regidor, E., J.L. Gutierrez-Fisac, and C. Rodriguez, Increased socioeconomic differences in mortality in eight Spanish provinces. *Social Science and Medicine*, 1995. 41: 801-807.
14. Fukuda, Y., K. Nakamura, and T. Takano, Cause-specific mortality differences across socioeconomic position of municipalities in Japan, 1973-1977 and 1993-1998: increased importance of injury and suicide in inequality for ages under 75. *International Journal of Epidemiology*, 2005. 34: 100-109.
15. Kunst, A.E. and J.P. Mackenbach, International variation in the size of mortality differences associated with occupational status. *International Journal of Epidemiology*, 1994. 23(4): 742-750.
16. Kunst, A.E. and J.P. Mackenbach, The size of mortality associated with educational level in nine industrial countries. *American Journal of Public Health*, 1994. 84(6): 932-937.
17. Queensland Health, et al., Health Determinants Queensland 2004. 2004, Public Health Services, Queensland Health: Brisbane.
18. Marmot, M., Social determinants of health inequalities. *Lancet*, 2005. 365: 1099-1104.
19. McMichael, A.J., Social class (as estimated by occupational prestige) and mortality in Australian males in the 1970's. *Community Health Studies*, 1985. IX(3): 220-230.
20. Mathers, C., Health differentials among adult Australians aged 25-64 years, in Health Monitoring Series No. 1, Australian Institute of Health and Welfare, Editor. 1994, AGPS: Canberra.
21. Mathers, C., Health differentials among older Australians, in Health Monitoring Series No. 2, Australian Institute of Health and Welfare, Editor. 1994, AGPS: Canberra.
22. Mathers, C., Health differentials among Australian children, in Health Monitoring Series No. 3, Australian Institute of Health and Welfare, Editor. 1995, AGPS: Canberra.
23. Mathers, C., Health differentials among young Australian adults, in Health Monitoring Series No. 4, Australian Institute of Health and Welfare, Editor. 1996, AGPS: Canberra.
24. Bennett, S., Socioeconomic inequalities in coronary heart disease and stroke mortality among Australian men, 1979-1993. *International Journal of Epidemiology*, 1996. 25(2): 266-275.
25. Burnley, I.H., Inequalities in the transition of ischemic heart disease mortality in New South Wales, Australia, 1969-1994. *Social Science and Medicine*, 1998. 47(9): 1209-1222.
26. Turrell, G., et al., Socioeconomic determinants of health: Towards a national research program and a policy and intervention agenda. 1999, Queensland University of Technology, School of Public Health: Canberra.
27. Glover, J., K. Harris, and S. Tennant, A social health atlas of Australia, Second edition. 1999, Public Health Information Development Unit, University of Adelaide: Adelaide.
28. Turrell, G. and K. Mengersen, Socioeconomic status and infant mortality in Australia: A national study of small urban areas, 1985-89. *Social Science and Medicine*, 2000. 50: 1209-1225.
29. Turrell, G. and C. Mathers, Socioeconomic inequalities in all-cause and specific-cause mortality in Australia: 1985-1987 and 1995-1997. *International Journal of Epidemiology*, 2001. 30: 231-239.
30. Hayes, L.J., et al., Socio-economic mortality differentials in Sydney over a quarter of a century, 1970-94. *Australian and New Zealand Journal of Public Health*, 2002. 26(4): 311-317.
31. Dobson, A.J., S. Halpin, and H. Alexander, Does the occupational structure of the Hunter Region explain the high rates of ischaemic heart disease among its men? *Australian Journal of Public Health*, 1991. 15: 172-177.
32. McElduff, P. and A.J. Dobson, Trends in coronary heart disease - has the socio-economic differential changed? *Australian and New Zealand Journal of Public Health*, 2000. 24(5): 465-473.
33. Siskind, V., J.M. Najman, and C. Veitch, Socioeconomic status and mortality revisited: An extension of the Brisbane area analysis. *Australian Journal of Public Health*, 1992. 16(3): 315-320.
34. World Health Organisation, Social determinants of health: The solid facts. 2003.
35. Draper, G., G. Turrell, and B. Oldenburg, Health inequalities in Australia: Mortality, in Health inequalities monitoring series No. 1. AIHW Cat. No. PHE55. 2004, Queensland University of Technology and the Australian Institute of Health and Welfare: Canberra.
36. Australian Bureau of Statistics, Socio-Economic Indexes for Areas, Catalogue No. 2039.0. 2003, ABS: Canberra.