

## **Death and deprivation in Yorkshire 1981-83 and 1990-92.**

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Deprivation is a modern term for an ancient concept. It subsumes the narrower concept of poverty, which is often seen as a synonym for economic deprivation, to investigate the ways in which the goods, facilities and services available in a society are distributed, and the ways in which this impacts on the lives of the citizens. Deprivation is a normative term, as finding 'deprivation' amongst certain people, or groups of people, suggests that those deprived ought not to be, and should be restored to a non-deprived condition. It suggests as a norm, that a level of participation in society which to be available to all.

Deprivation is one of the most important determinants of the health of a population (Alcock 1993, Townsend 1993, Phillimore et al. 1994). An impressive body of evidence, much of which originated in this country (Townsend et al. 1988, Carstairs et al. 1991, Townsend and Davidson 1992, Whitehead 1992), as well as work in other European populations, and further afield, affirms the importance of deprivation as a cause of excess death and morbidity (Illsley 1990).

There is extensive evidence of an increasing gap between the health of those who are relatively deprived and those who are relatively affluent. Studies from the United Kingdom have

demonstrated a widening excess of mortality amongst the most deprived from the early 1960's onwards (Townsend and Whitehead 1992, Goldblatt 1988, Fox et al. 1990). Recently published work (Phillimore et al. 1994) confirms that this pattern has persisted into the 1990's .

Using routine data from the 1981 and 1991 censuses, and mortality data from the old Yorkshire RHA I have explored the impact of deprivation on mortality. Three commonly used deprivation scores were computed for the 1981 census data as described by the original authors (Jarman 1983, Carstairs and Morris 1991, and Townsend et al. 1988). For the 1991 census the authors kindly provided me with the necessary information (Jarman B, Senior M, Beattie A, and Carstairs V personal communications). All three deprivation scores were standardised to the Yorkshire RHA area for 1981 and 1991 separately.

Deaths over the age of 85 were excluded. Deaths to residents of institutions could be distinguished in 1981-83, but due to a coding change this was not possible for 1990-92. Therefore, all deaths registered to each ward were used in analysis. Subsidiary analyses were performed excluding wards with over 10% and over 5% of their population in institutions. The analysis was done using Poisson regression. This is an analogue of ordinary (or least squares, or 'Normal') regression which allows for the fact that the variation in the number of deaths between wards doesn't follow a normal distribution.

The total number of deaths in each ward was the dependent

variable, and the logarithm of the total number of deaths expected in each ward, standardised for age and sex, and calculated by the method of Breslow and Day (1975), was used as the offset, following the method of Alexander et al. (1990), (Clayton and Hills 1993). In essence this procedure amounts to doing regression analysis on the standardised mortality ratios (SMRs) for each area. Regression analyses were conducted in terms of the rate ratio for the change in mortality due to a one standard deviation change in the deprivation scores. This simplifies comparisons of the Jarman score with the other two, and comparisons with other studies.

The population of the study area was 3.5 million in 1981 and 3.7 million in 1991. Thus, approximately 21.3 million person years at risk are covered by this study. After excluding deaths amongst people aged 85 or over 108,945 deaths for 1981-1983 and 95,286 deaths for 1990-1992 remained for analysis. Between a quarter and 3 tenths of deaths amongst women, and 10 to 13 per cent of deaths amongst men are excluded by this age cutoff.

Figure 1 shows the mortality by age and sex, comparing 1981-1983 and 1990-1992. The consistent excess of male mortality, and an overall drop in death rates between the two time periods can be seen. Figure 2 compares mortality for the most deprived and the least deprived fifths of the population, across time. It shows that while death rates have fallen for those living in the least deprived areas, there has been little change for those living in the most deprived areas. Figure 2 suggests that for men between the ages of 20 and 35 living in the most deprived areas death rates have risen slightly.

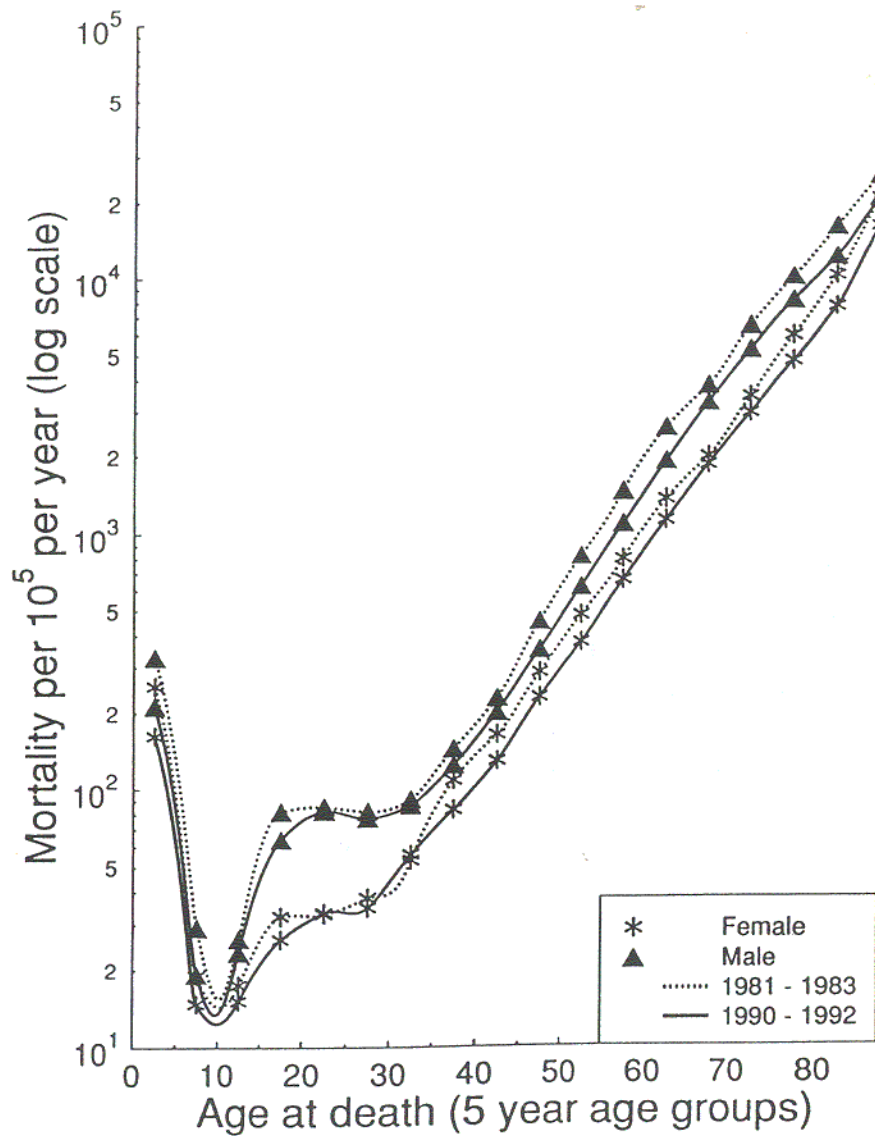
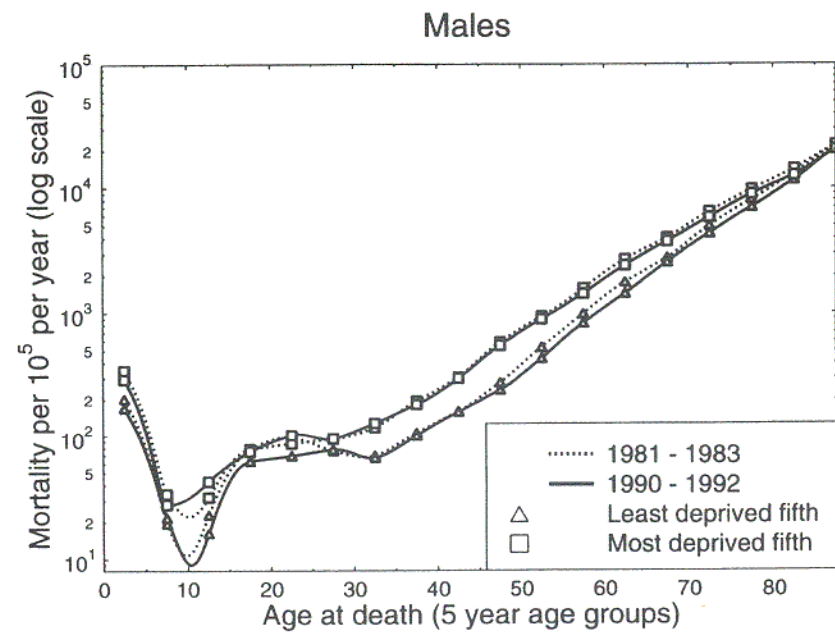
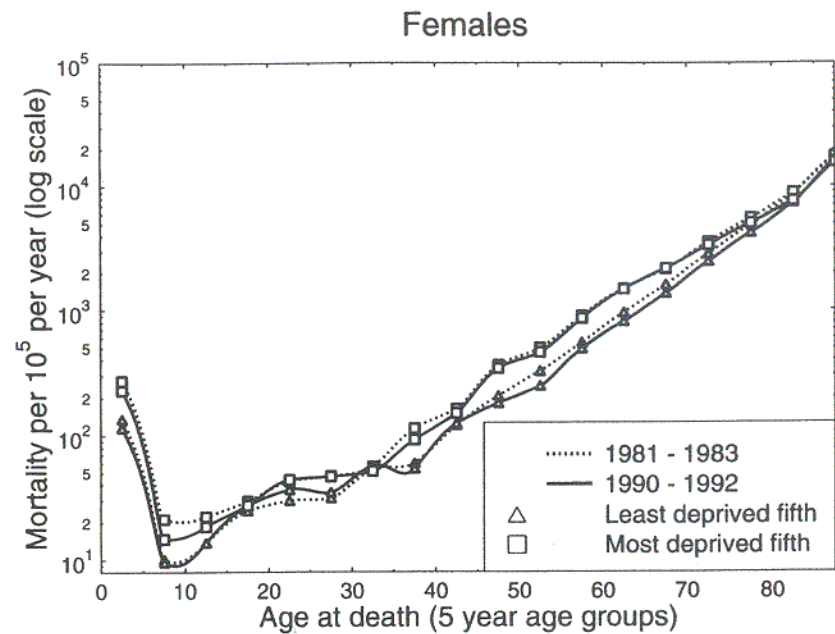


Figure 1 Death rates by age in five year age groups for males and females in 1980-83 and 1990-92, plotted on a logarithmic scale.



The results of the principal regression analysis are shown in Table 1. This clearly demonstrates that the relationship between deprivation and death has strengthened since 1981-83. For any given change in deprivation now, death rates will increase by 2 to 3% more than they would have increased in 1981-83. Table 2, which presents the results separately for each time period makes this clearer. The change in mortality for a change of one standard deviation in each of the three deprivation scores has increased significantly and substantially between 1981-83. Results for males and females are similar.

Townsend score	1981-83	1990-92
Rate ratio	1.076	1.100
95% CI	1.065 - 1.088	1.090 - 1.110

Table 1 Change in mortality rates for a one standard deviation change in the Townsend score for 1981-1983 and 1990-1992 separately.

Deprivation score	Townsend	Carstairs	Jarman
Score	1.08 1.07 - 1.09	1.07 1.06 - 1.08	1.08 1.07 - 1.09
Year	0.80 0.78 - 0.81	0.80 0.78 - 0.81	0.79 0.78 - 0.81
Score.Year	1.02 1.01 - 1.04	1.03 1.01 - 1.04	1.03 1.02 - 1.05

Table 2 Change in mortality rates for a change of one standard deviation in the deprivation scores, and change over time from 1980-1983 to 1990-1992.

It might be argued that the components of the deprivation scores have changed in meaning. For example since 1981 there have been significant changes in unemployment rates, and housing policy (Oppenheim 1993). Table 3 presents the results for a regression analysis similar to Table 2, but using the four components of the Townsend score. This suggests that the results cannot be explained by a shift in the importance of one component of the score alone.

Analyses were repeated omitting wards with more than 10% of their population in communal establishments, and then those with more than 5% of their population in communal establishments. Models were also fitted including terms for the proportion of the population in four age groups (0 to 84, 0 to 29, 30 to 64 and 65 to 84) living in communal establishments. There was no substantive difference

Component	Unemployed	Access to car	Tenure	Overcrowding
1981				
Rate ratio	1.07	1.10	1.06	1.05
95% CI	1.06 - 1.08	1.08 - 1.11	1.05 - 1.08	1.04 - 1.06

Table 3  
1991 Change in the mortality rates for a one standard deviation change in the components of the Townsend score for 1981-1983 and 1990-1992

Rate ratio	1.10	1.13	1.10	1.08
95% CI	1.09 - 1.11	1.11 - 1.14	1.09 - 1.11	1.07 - 1.09

communal establishments. There was no substantive difference between the results of these models and those presented here (data

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<b>Deprivation</b>	<b>1981-83</b>	<b>1990-92</b>	<b>Pooled</b>
<b>Top quintile</b>	<b>1.113</b>	<b>1.175</b>	<b>1.144</b>
<b>95% CI</b>	<b>1.099 - 1.128</b>	<b>1.159 - 1.191</b>	<b>1.133 - 1.154</b>
<b>Second quintile</b>	<b>1.073</b>	<b>1.076</b>	<b>1.081</b>
<b>95% CI</b>	<b>1.060 - 1.087</b>	<b>1.061 - 1.091</b>	<b>1.071 - 1.091</b>
<b>Middle quintile</b>	<b>0.981</b>	<b>0.985</b>	<b>0.982</b>
<b>95% CI</b>	<b>0.968 - 0.994</b>	<b>0.971 - 0.999</b>	<b>0.972 - 0.991</b>
<b>Fourth quintile</b>	<b>0.932</b>	<b>0.929</b>	<b>0.922</b>
<b>95% CI</b>	<b>0.919 - 0.945</b>	<b>0.915 - 0.942</b>	<b>0.912 - 0.931</b>
<b>Bottom quintile</b>	<b>0.902</b>	<b>0.861</b>	<b>0.885</b>
<b>95%CI</b>	<b>0.889 - 0.914</b>	<b>0.848 - 0.874</b>	<b>0.876 - 0.894</b>

**Table 4** Standardised mortality ratios for each quintile of deprivation for 1981-83 and 1990-92 separately and together.

between the results of these models, and those presented here (data not shown).

Standardised mortality ratios were calculated for the entire population of each quintile of wards, for 1981-83 and 1990-92 separately, and are shown in Table 4. Again this supports the other evidence for a widening of inequalities since 1981-83. The results for males and females separately are similar.

Using a variety of methods of analysis, I have shown, unsurprisingly, that the gap between rich and poor continues to widen. In 1981-83 a man could expect to live 4 years less to age 85 if he were in one of the most deprived areas in the region. By 1990-92 he could expect to live four and a half years less. For women the corresponding figures were 2.75 years in 1981-83 and 3.25 years in 1990-92. This trend affected all ages and both sexes, but was strongest for men aged 30 to 64 and women aged 0 to 29. It also affected everyone, except the most affluent. There is no evidence that any of the less affluent groups in society are catching up. There is an increased spread of mortality at every level of deprivation, compared with the most affluent.

From one perspective there is nothing surprising about the results of this survey. Wilkinson has argued that the principal determinant of health in a population is the equity of the income distribution in that population (Wilkinson 1992). Given the known changes in the distribution of income in the United Kingdom since 1979 (Department of Social Security 1993, Central Statistics Office

1994), our results are entirely predictable. In 1979 the top fifth of the population had an income which was 3.12 times greater than the bottom fifth, after housing costs. By 1990-91 the bottom fifth had lost 3% in real terms relative to their position in 1979, while the top fifth now had 4.67 times more disposable income than the bottom fifth (Central Statistics Office 1994).

Even though our results could have been predicted, they are still disturbing. At least a fifth of our population have gained very little benefit from the substantial decline in overall mortality since 1981-1983. At some ages their mortality experience has disimproved since then, although not as much as comparable groups in the Northern region (Phillimore et al. 1994). The relationship between deprivation and death is stronger now than it was 10 years ago, and applies across the entire spectrum of wealth and poverty in our society, at all ages up to age 85, and for both sexes.

The implications of this for individuals are depressing. At every age from birth onwards those living in the less affluent three fifths of the population die unnecessarily often, and unnecessarily early. By the age of 50 or so those living in the second most affluent group of wards also begin to lose years of life. This represents a major challenge for the National Health Service, and for all of those committed to the health of the people. WHO (1985) made reducing inequalities in health their first target in the 'Health for All' program. Judging by the results presented here the UK has a long way to go.

It would be easy to adopt a counsel of despair. The origins of

health inequalities seem to lie deep within the structure of our society, and particularly within our economic system, but there are opportunities for change. Whitehead (1992) and Benzeval Judge and Whitehead (1995) have many practical suggestions. The Department of Health is presently collecting details of interventions designed to reduce health inequalities (T. Sheldon personal communication). A brief consideration of the changes wrought by our predecessors in the 19<sup>th</sup> century public health movement, against a far more entrenched opposition, gives reason for optimism (Wohl 1983).

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