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IS YORKSHIRE AND THE HUMBER SUFFERING FROM WIDENING HEALTH INEQUALITIES?

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The government has made tackling health inequalities one of its top priorities. This article investigates spatial variations in mortality in the region and demonstrates that whilst life expectancy is rising, mortality disparities are widening.

Patterns of health across the United Kingdom are well known with areas in Scotland, Wales and the North East of England consistently found to experience the worst levels of health. In contrast to this, southern England and especially areas in the South East experience the best levels of health. This broad regional analysis does not provide information on the extent to which health inequalities operate at finer spatial scales. In this article, we consider trends in health inequalities within Yorkshire and the Humber at the ward and district scales (including Unitary Authorities) by looking at mortality disparities.

Our research compares two periods, 1990-1992 and 1996-1998, using levels of inequality experienced by the whole population but also by different demographic and social groups. Standardised mortality ratios (SMRs) and life expectancy at birth have been calculated and used as indicators of health status. SMRs are death rates adjusted to remove the influence of age structure. To calculate the SMRs and life expectancy statistics, annual mortality figures and mid-year populations at risk have been averaged over three years to account for yearly variation in the data. Townsend deprivation scores have been used to quantify deprivation in 1991, whilst the DETR/ DTLR Index of Multiple Deprivation 2000 was used to quantify deprivation in 1998. All the results are presented for 1998 geographical boundaries, with all statistics harmonised to this standard year.

INTRA-REGIONAL MORTALITY

Areas in rural North Yorkshire generally experience lower levels of mortality than those areas in the mostly urban and industrial South Yorkshire. Furthermore, the relatively affluent suburban areas also display lower mortality levels than the more deprived inner city areas. These trends are evident in Figure 1, which shows male SMRs in 1990-92, but are also consistent over time with the distribution of mortality in 1996-98 following similar patterns.

Lower Swaledale, a ward in Richmondshire, has the lowest male SMR for both time periods, values of 14 and 38 respectively. In contrast, Tong and Bradford Moor, both wards of Bradford, have the highest male SMRs, of 153 and 150 respectively, in 1990-92. In 1996-98, these two wards were still amongst the worst in the region but were not as low in the rankings as they were in 1990-92. Scorton ward in Richmond was also amongst the worst five wards in both periods, with SMRs of 158 and 162 respectively.

Wards in North Yorkshire on average have the lowest SMRs, whilst wards in South Yorkshire have the highest. This is consistent for both 1990-92 and 1996-98. North Yorkshire, though, consistently has the highest standard deviations (21.95 and 22.18) showing that it has a large range of SMRs as indicated by the maximum and minimum for the region being 14 and 158 respectively in 1990-92 and 28 and 174 in 1996-98. The standard deviations for SMRs in the Humber for both periods are also high. This is explained by the relatively low SMRs in the rural parts of the county and the high SMRs in the urban areas, such as in Kingston-upon-Hull.

LIFE EXPECTANCY

It is evident that areas of worst health have persisted over the decade. In 1990-92 and 1996-98, average district life expectancy at birth was lower in the region than for England and Wales for both males and females. The 1996-98 levels, though, were higher than those for 1990-92 indicating absolute improvements in health over the period (Table 1). Average district life expectancy figures mask inter-district variation as shown by the maximum and minimum figures calculated. Ryedale was consistently found to have the longest life expectancy for males and females over both time periods. Bradford and Calderdale had the lowest life expectancies in 1990-92 for males and females, though in 1996-98, Kingston upon Hull and Barnsley had the lowest life expectancies at birth.

Ordering the expectancies into quintiles and comparing the average life expectancy for the highest and lowest quintiles provides interesting results (Table 2). It is evident that inequalities for males are consistently higher than for females over the time period. It is also apparent that the difference between the highest and lowest quintiles for males and females is widening over time.

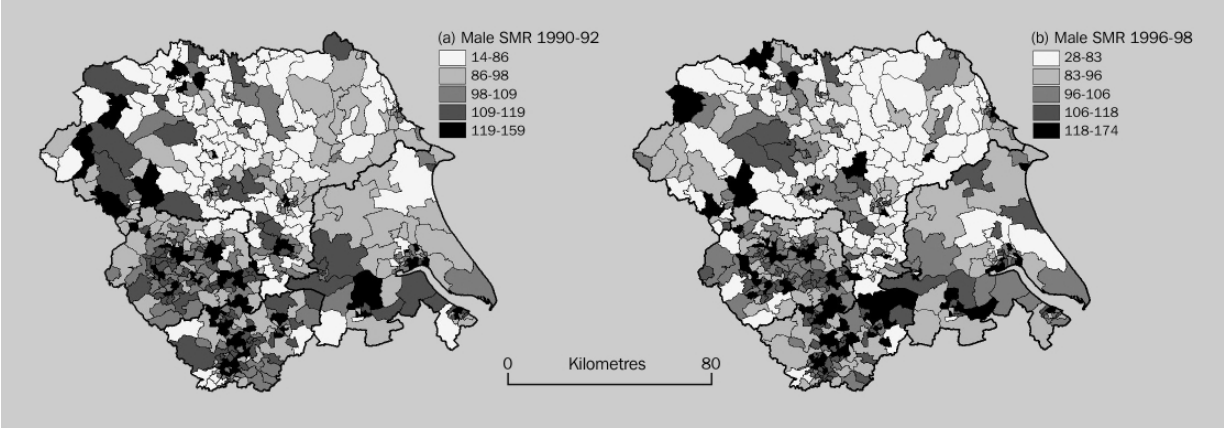

Figure 1. Male SMRs for wards in Yorkshire and the Humber, 1990-92 and 1996-98

TABLE 1. Life expectancy at birth (in years) by gender for all districts in Yorkshire and the Humber, 1990-92 and 1996-98

YEAR	GENDER	AVERAGE	MINIMUM	MAXIMUM	RANGE	ST. DEV.
1990-92	Males	73.1	71.7	75.7	3.9	1.10
	Females	78.7	77.6	80.4	4.5	1.30
1996-98	Males	74.7	73.0	77.5	2.8	0.78
	Females	79.7	78.3	81.4	3.1	1.00

TABLE 2. Average life expectancy at birth (in years), by quintile, for districts and wards in Yorkshire and the Humber, 1990-92 and 1996-98

	DISTRICT				WARD			
	MALES		FEMALES		MALES		FEMALES	
	'90-92	'96-98	'90-92	'96-98	'90-92	'96-98	'90-92	'96-98
Lowest Quintile	71.9	73.3	77.7	78.4	70.0	71.4	76.0	76.7
Highest Quintile	74.7	76.7	79.7	81.2	77.4	84.2	83.0	85.2
Difference	2.8	3.4	2.0	2.7	7.4	12.8	6.9	8.5

TABLE 3. IMD scores for districts in Yorkshire and the Humber, 1990-92 and 1996-98

	MALE			FEMALE		
	'90-92	'96-98	DIFF	'90-92	'96-98	DIFF
Child (0-14)	7.89	7.57	-0.32	7.50	7.67	0.17
Adult (16-64)	2.91	3.66	0.75	3.21	3.24	0.02
Retired (65+)	1.82	2.08	0.26	2.03	2.13	0.10
Total	2.65	2.95	0.30	3.51	2.94	-0.58

In 1990-92, the lowest male quintile had an average life expectancy of 71.9 years, compared to 74.7 years for the highest quintile – a difference of 2.8 years. In 1996-98, this difference increased by 0.6 years to 3.4 years difference in life expectancy. This trend was also true for females, though the differences were less: 2.0 years in 1990-92 and 2.7 years in 1996-98. Analysis of these trends at the ward scale reveals even more startling differences as shown in Table 2. It is clear from these results that health inequalities in the region are widening and that the gap between the lowest and highest quintiles is greater at the ward scale than for districts. It is also evident that males experience greater inequalities than females.

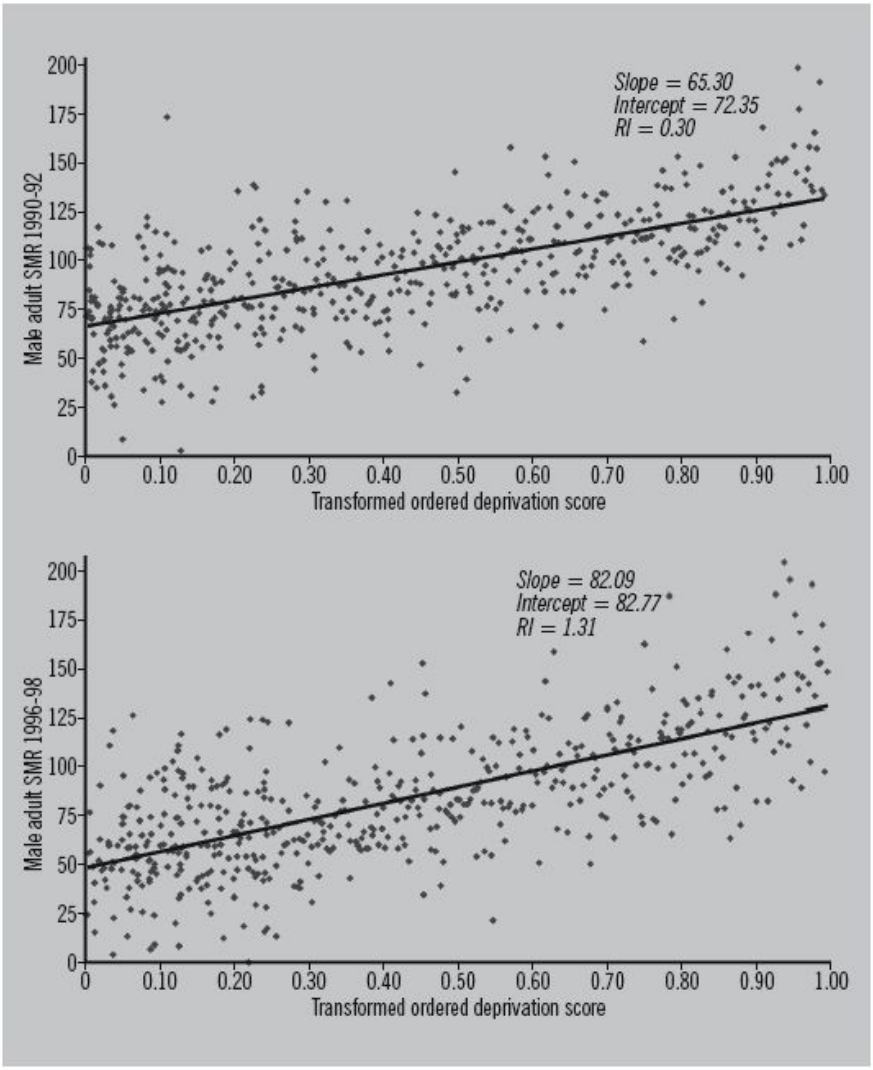

Figure 2. Male adult relative index of inequality, 1990-92 and 1996-98

FURTHER INDICES OF MORTALITY DISPARITY

Attention now focuses on mortality inequalities by age group. Standardized mortality ratios were calculated for three age groups using the age disaggregation in the vital statistics data as a guide to the groupings – children, adults and the retired.

Two indices were used to quantify more precisely the degree of inequality in mortality experience: the Index of Mortality Disparity (IMD) and the Relative Index of Inequality (RII) (Dorling *et al.*, 2000; Dorling personal communication, 2002). These indexes use the information for all wards and districts, whereas the previous measures are dependent on fewer observations. The IMD compares the relative distribution of population to the relative distribution of mortality. The absolute difference between the two distributions is summed over the whole region and then divided by two. The index has a range from 0 to 100 with 0 indicating an even distribution of mortality, whilst 100 indicates a very uneven distribution.

In this analysis, the IMD has been used to measure the inequality in mortality distributions within different demographic groups both at district and ward scales, whilst the RII is used to investigate the inequality experienced between different types of groups (social or economic). In this analysis the calculation of the RII involves plotting a ward's 'transformed ordered deprivation score' against its SMR. The transformation process involves ordering the wards according to deprivation, from lowest to highest, and then calculating the percentage of the region's population more deprived than the population of each ward. A regression line is then fitted and the index score calculated as the slope of the line divided by its intercept (where the line cuts the vertical axis).

IMD inequalities were found to be higher for males than females both at district and ward scales. Disaggregating the indices by age shows that inequalities within the retired age groups are consistently the lowest

over the time period, with retired females having the lowest levels of inequality. The child age groups show great variability between gender and years – caused by the relatively low levels of mortality on which the figures are based. As a result of this, it is the adult ages for both males and females that show the most constant levels of greater inequality.

Table 3 shows that the male adult age group has shown the greatest change over time (difference calculated as 1996-98 score minus 1990-92 score). Therefore not only is mortality distribution between male adults amongst the most unequal in the region, it is also the age group in which inequalities are growing the fastest.

These trends persist when examined in relation to deprivation. Results for the analysis using the RII are consistent with that of the IMD. The scores demonstrate that inequalities in mortality ratios between affluent and deprived wards are widening over time, with male adult mortality ratios widening the most. The RII score is 0.90 in 1990-92 and 1.31 in 1996-98 (Figure 2). This is still true when wards are ordered into quintiles to remove the effect that extreme wards will have on the results.

CONCLUSION

In conclusion, it has been shown that absolute levels of health in the region are increasing. People's health improved between 1990-92 and 1996-98 as shown by life expectancy at birth increasing by an average of 1.5 years for districts in the region. Relative improvements in health, though, have been variable between areas. At both district and ward scales, it has been shown that relatively healthy areas have been getting healthier at a faster rate than the least healthy areas. This has led to increased polarisation of results and so an increase in mortality inequality between areas has resulted. It has also been found that males experience greater levels of inequality than females and the retired age groups show the lowest levels of inequality and adult ages the greatest.

REFERENCE

Dorling, D., Davey Smith, G. and Shaw, M. (2000) Analysis of trends in premature mortality by Labour voting in the 1997 general election, *British Medical Journal, 322:* 1336-7.