

Health and Deprivation Indicators in West Yorkshire Health Authority

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Summary

This paper shows the areas within West Yorkshire Health Authority (WYHA) that are most deprived, as measured by two well-established indices. It also compares these deprivation indices with unemployment, morbidity and mortality statistics.

The Townsend index is described and the scores for WYHA mapped at both electoral ward and enumeration district level. It is then compared with the Department of Employment's figures for unemployment for the Calderdale wards.

The Jarman index is described and compared with the Townsend index.

A measure of morbidity is compared with the Townsend and Jarman indices. Limiting long-term illness (from the 1991 census) shows some relationship with both indices.

Comparing mortality measures with the deprivation indices shows there is a clear relationship between the standardised mortality ratio (SMR) for under 65 year olds and the Townsend index. Suicide is also considered, but it does not correlate with the Townsend index.

In conclusion, the data show that high levels of premature death are linked with areas of high levels of deprivation in WYHA. Death by suicide does not appear to be linked in the same way.

In addition, the Department of Employment's unemployment figures are closely correlated with the Townsend deprivation score. As these data are available monthly they can be used as a proxy for measuring deprivation as the census data become out of date.

Introduction

The Black Report (1980) established a link between deprivation and lack of health over a decade ago, so it is only natural for a health authority to be interested in locating the most deprived areas within its district. This has been done by calculating deprivation indices for the area. These have been compared with a variety of other indicators to show the strengths of the relationships between deprivation and demand on GP services, morbidity and mortality.

Townsend Index

The Townsend index was developed in the mid-1980's, using data from the 1981 census and was first used in "Inequalities in Health in the Northern Region" (Townsend et al, 1986). It is widely seen as an indicator of material deprivation, but may overlook some groups, such as the elderly poor and the rural poor.

The Townsend index was chosen because it is a well-established indicator of deprivation. Also, it is easy to calculate and all the necessary data were available at the time. There are four equally weighted socioeconomic variables in the Townsend index:

- economically active residents unemployed
- households with no car
- households not owner occupied
- households that are overcrowded (ie, more persons than rooms).

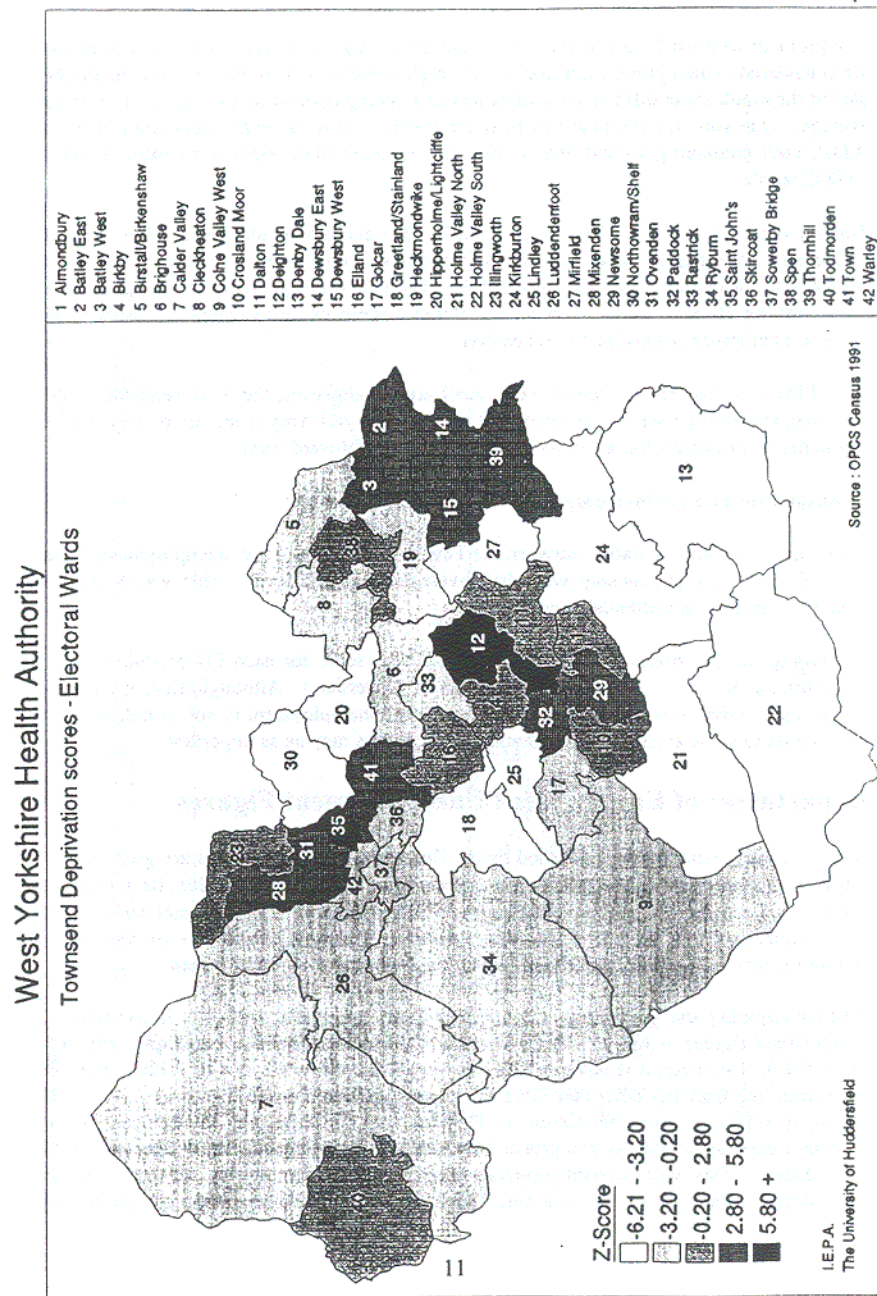
Townsend Index - Wards

Townsend scores were calculated for electoral wards within West Yorkshire Health Authority (WYHA) and mapped to show the geographical distribution (see Map 1). The two wards with the highest scores are St John's in Halifax and Deighton in Huddersfield. Most of the deprived wards are around the main centres of population: Halifax, Huddersfield, Dewsbury and Batley. This is pretty much as expected, given previous work, particularly the Jarman underprivileged area (UPA) scores from the 1981 census, and local perceptions of the area.

Elland, Todmorden and Spenningsdale wards are in the middle range of values. Many of the remaining wards are mostly rural. This may be a reflection of the Townsend index's weakness in relation to identifying rural deprivation. For example, ownership of a car may be as much to do with where a household is situated as whether it can afford one; a household in a rural area may consider a car more necessary than one nearer a town centre where work, shops and services are more easily accessible.

Each of the four variables was compared with the Townsend score for each ward to see how well they individually explained the total score. By plotting the total scores against the scores for each factor, it is possible to see how closely they are related. (Statistical Note. This can be confirmed by calculating the correlation coefficient, R, and the goodness of fit, R². The correlation coefficient can vary between -1 and +1; if R = -1 there is a perfect negative relationship, if R = 0 there is no relationship and if R = +1 there is a perfect positive relationship. Consequently, the value of R² can vary between 0 and 1; the closer the value of R² is to 1, the better the fit of the regression line.)

The unemployment scores are very closely correlated with the Townsend scores (R² = 0.95) (see Chart 1). The other three variables fared less well, although all were still high. This shows that unemployment is the most clear indicator of deprivation in the Townsend index at ward level.



Townsend Index - Enumeration Districts

One problem with working at ward level is that the average of several factors across an area are considered. Unemployment might be very high in part of a ward but very low in another part of the ward; these differences will cancel and unemployment across the ward might be average. One way to overcome this to some extent is to work with enumeration districts (EDs), each containing around 400 to 500 people, rather than wards, containing 9,000 to 19,000 people.

Townsend scores were calculated for EDs in WYHA and the results mapped (see Map 2). This clearly shows great variation within several wards; some wards have some of the most deprived and least deprived EDs. Most of the EDs with a high score are in the main urban areas: Halifax, Huddersfield, Dewsbury and Batley. There are also isolated EDs with a high score in Todmorden, Elland and Cleckheaton.

With EDs it is possible to identify very small areas. However, the Townsend index still considers the average across the whole ED and this may still vary from one part of the ED to another, although the variation should be smaller than at ward level.

Townsend Index and Unemployment - Enumeration Districts

Given the very high correlation between the Townsend scores and the unemployment scores at ward level, this relationship was also investigated at ED level. This was looked at separately for EDs in Calderdale and Kirklees.

Comparing the Townsend score with the unemployed score for each ED produced strong relationships ($R^2 = 0.87$ in Kirklees; $R^2 = 0.85$ in Calderdale). Although high, these were not as high as that at ward level. This suggests that unemployment is not as indicative of the Townsend score at ED level and that the other factors may be as important.

Department of Employment Unemployment Figures

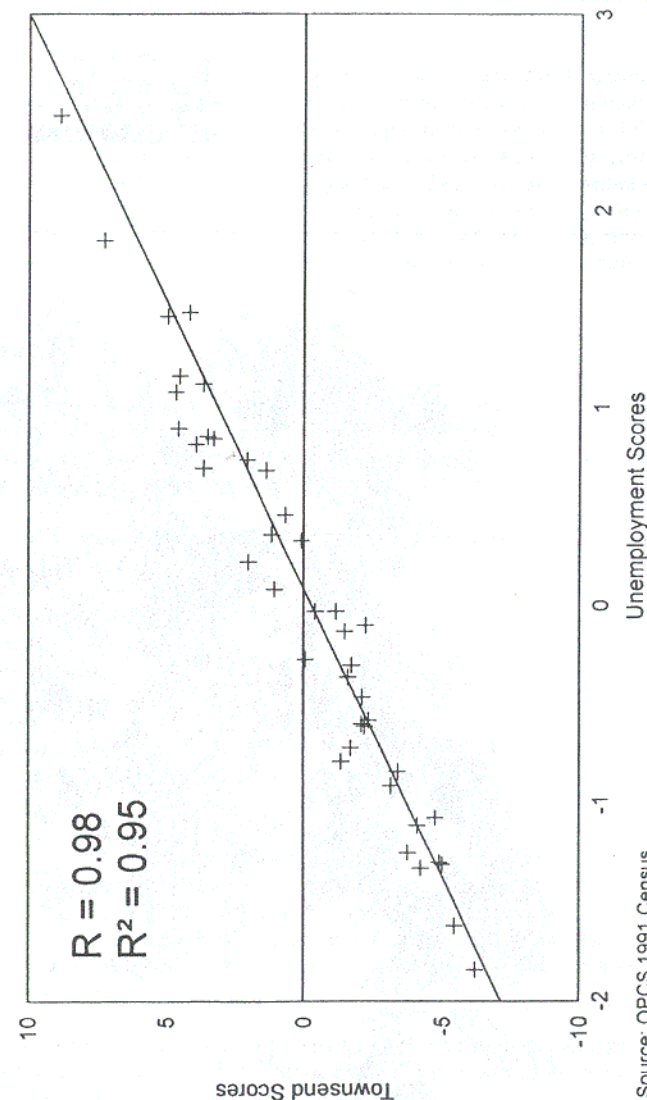
Ward unemployment figures published by the Department of Employment are given for the wards used at the time of the 1981 census. Since then, the wards in Kirklees have changed and it is not possible to compare 1991 census wards with those from ten years earlier. The same wards are still used in Calderdale, however, allowing comparison of the census unemployment figures with those supplied by the Department of Employment.

When comparing the percentage unemployed from the census with the Department of Employment figures at April 1991 for wards in Calderdale, there is a very high correlation ($R^2 = 0.95$). However, it is obvious from the graph that one ward is a lot further from the regression line than any other (see Chart 2). Investigations showed this to be Town ward, which includes the main Job Centre in Halifax. At the time, any unemployed person without a permanent address or a proper postcode was given the address or postcode of the Job Centre. This will probably explain almost all the discrepancy between the two percentages in this ward. By excluding Town from the graph, an almost perfect fit was

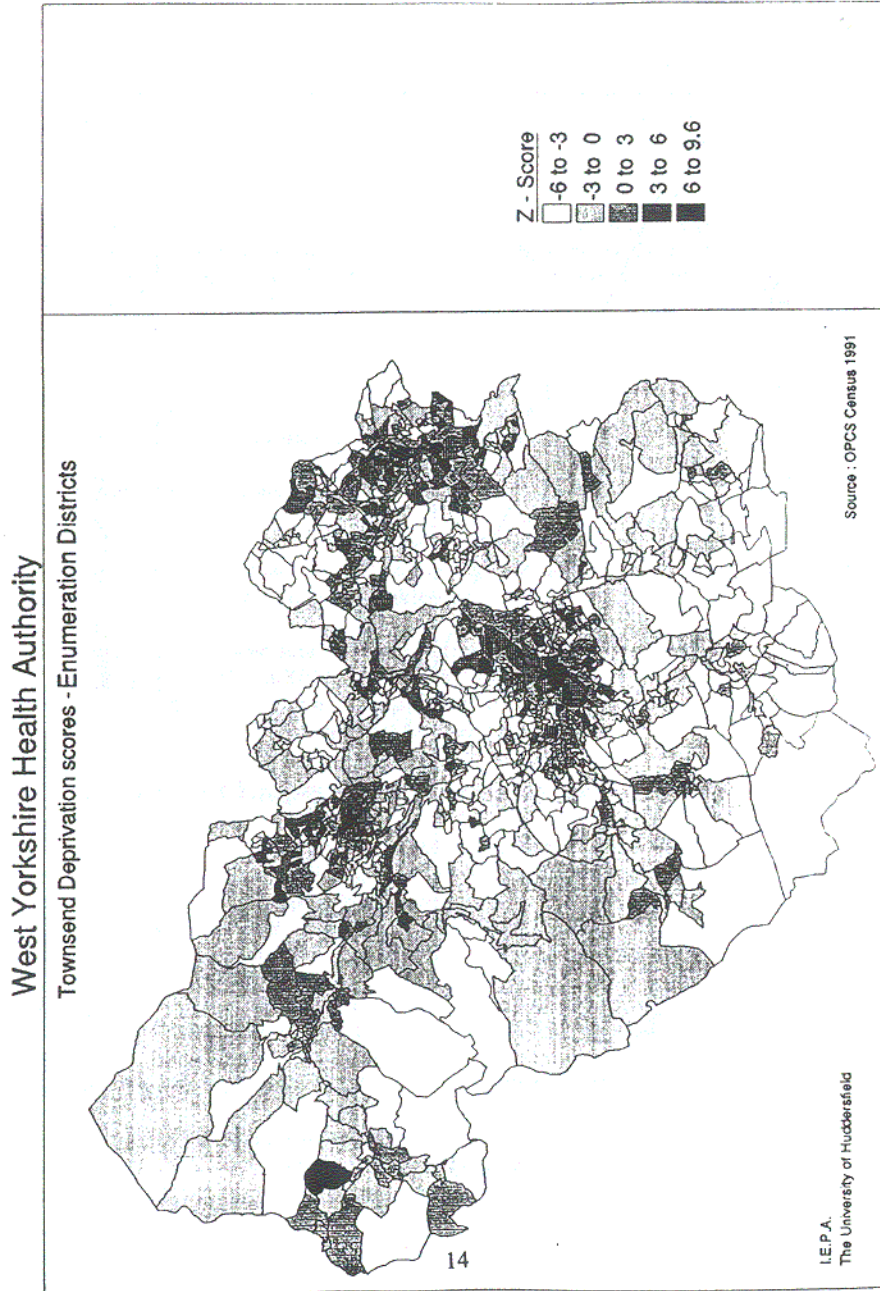
Chart 1

Townsend Scores and Unemployment Scores

Wards in West Yorkshire Health Authority



Map 4



achieved ($R^2 = 0.99$). Part of the remaining discrepancy may be due to the figures being counted on different dates in April 1991.

The actual numbers of people unemployed may be quite different from the census and the Department of Employment. However, the fact that there is a very high correlation between the two sources of data suggests one is indicative of the other.

The relationship between the Townsend unemployment scores and the Department of Employment's unemployment figures was explored ($R^2 = 0.94$). This is very similar to the correlation between the Townsend scores and the unemployment scores ($R^2 = 0.95$). The slight difference may be because only the 18 wards in Calderdale were being compared, rather than all 42 wards in WYHA. It could be argued, therefore, that since unemployment is very strongly correlated with the Townsend scores, the Department of Employment's unemployment figures are a very good proxy for the Townsend index. Therefore, the Department of Employment's unemployment figures could be used as an indicator of deprivation, especially as the census becomes more out of date.

Jarman Index

The Jarman index, or UPA score, was developed primarily "as a measure of the potential workload or pressure on the services of general practitioners" (Jarman et al, 1991). It was devised following the return of a postal questionnaire by GPs, with 1802 returned questionnaires being suitable for analysis (Jarman, 1983).

The Jarman index is made up of the following socioeconomic variables taken from the census, which are given with their respective weights:

lone pensioners	6.62
children under 5	4.64
one parent families	3.01
unskilled workers	3.74
unemployed	3.34
overcrowded	2.88
changed address in previous year	2.68
ethnic minority	2.50

The Jarman index is often used as an indicator of deprivation, although this is not what it was designed to be. Comparing Townsend scores with Jarman scores for wards in WYHA showed a very high correlation ($R^2 = 0.94$) (see Chart 3). This suggests that areas with a high level of material deprivation are likely to be those that create a high workload for GPs. This can only be partly explained by the fact that two of the factors used (unemployment and overcrowding) are the same.

The Jarman scores were compared with the Department of Employment's unemployment figures for Calderdale wards (R^2 of 0.88). Although the relationship was not quite as high as with the Townsend scores, it is nonetheless high.

Percentages Unemployed

Wards in Calderdale

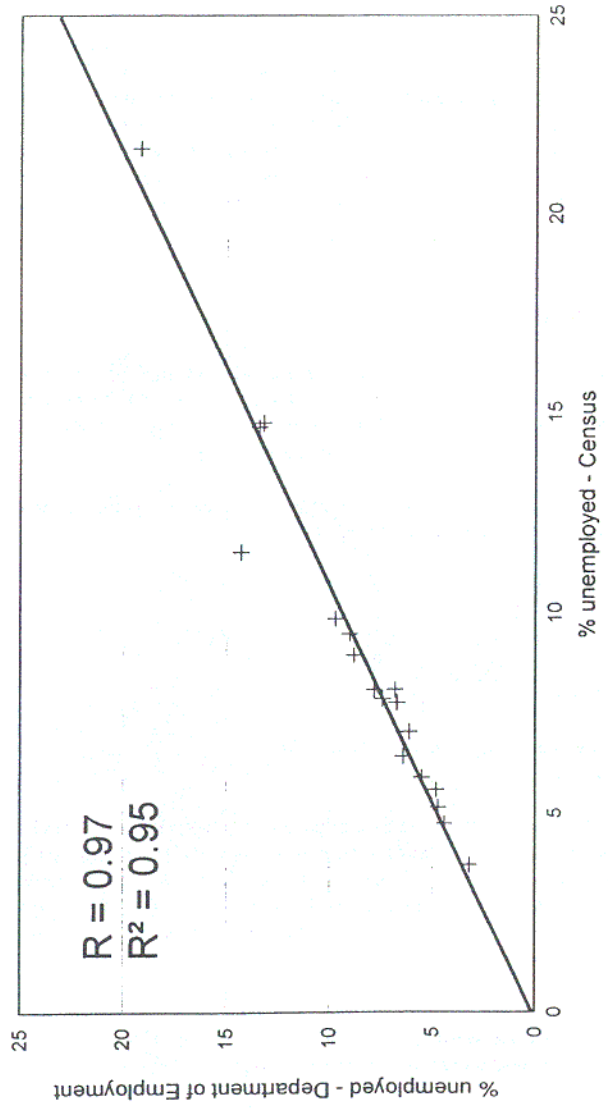


Chart 2

Sources: OPCS 1991 Census and Department of Employment

Townsend Scores and Jarman Scores

Wards in West Yorkshire Health Authority

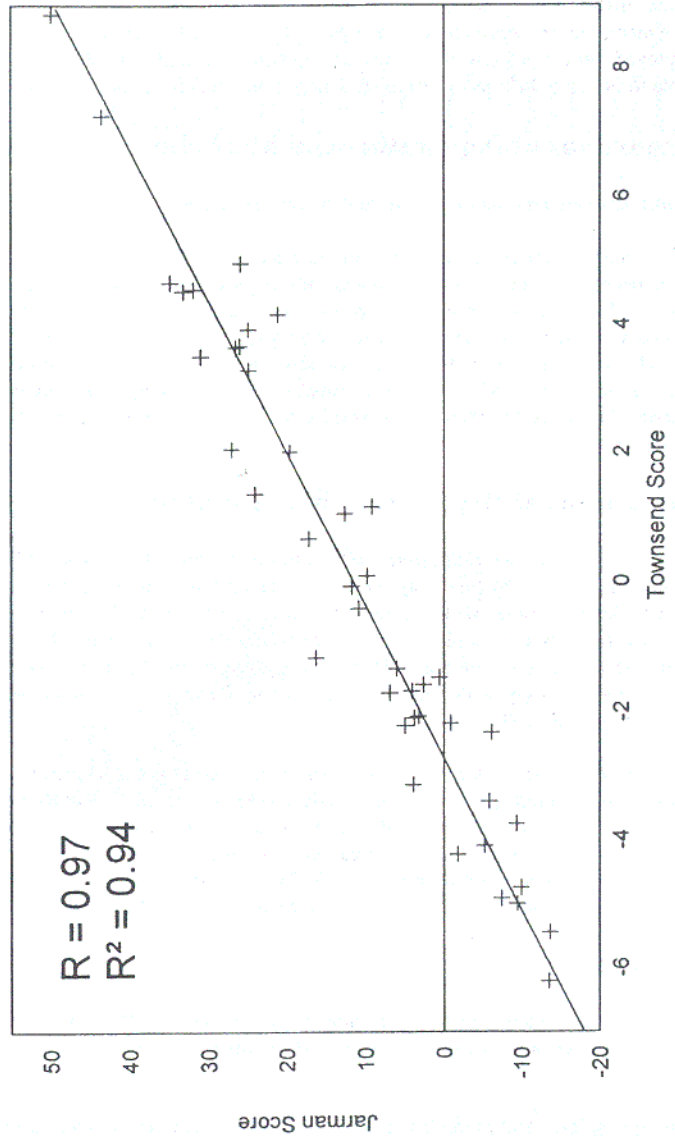


Chart 3

Source: OPCS 1991 Census

The Jarman index is important for health organisations because the UPA scores calculated from 1981 census data formed the basis for many years of the extra payments to GPs who had patients living in deprived areas. Since UPA scores calculated from the 1991 census correlate highly with unemployment, both from the census and the Department of Employment, future deprivation payments to GPs could be based on the percentage of unemployed people in a ward. This information is available monthly, so it would be possible to use up to date information on which to base the deprivation payments.

Comparisons of Deprivation and Morbidity

The links between deprivation and morbidity were examined.

The 1991 census included a question about the health of residents for the first time. It asked whether people had any long-term illness, health problem or handicap that limited daily activities. The percentages of such people were calculated for each ward and this was compared separately with the Townsend scores and the Jarman scores (in both cases $R^2 = 0.58$). This indicates the evidence for correlation between the deprivation indices and this measure of morbidity is relatively weak. However, the percentage of people with a limiting long-term illness has not been age standardised; if this was done, the relationship may be quite different.

Comparisons of Deprivation and Mortality

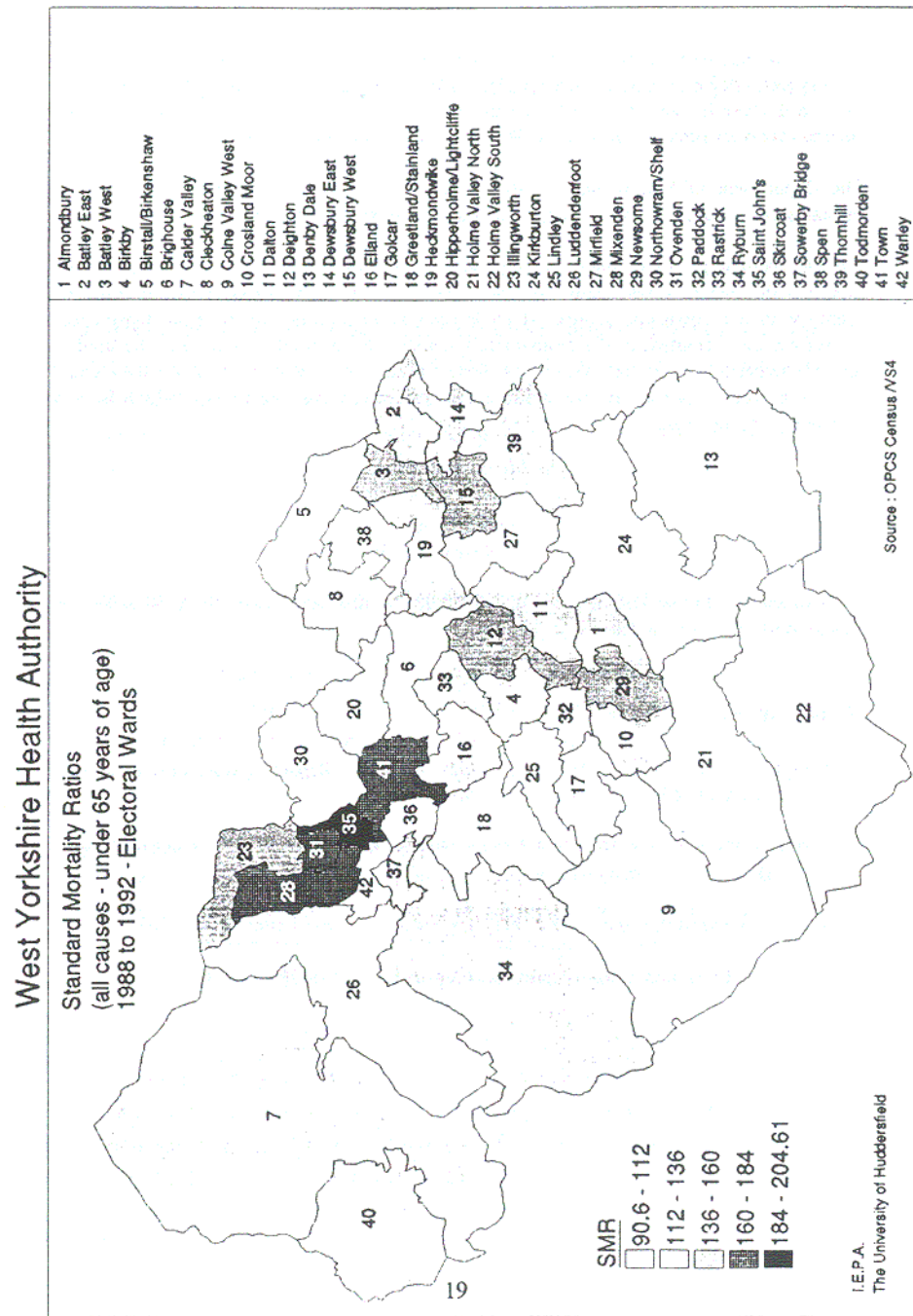
The Townsend scores were compared with standardised mortality ratios (SMRs) for under 65 year olds ($R^2 = 0.75$) (see Map 3). This relationship is quite strong, suggesting that premature death is more likely in deprived areas. The relationship between the Jarman scores and the SMRs for under 65 year olds was not quite as strong ($R^2 = 0.67$). This confirms what was seen with the 1981 census data, where the Townsend index seemed "to correlate more strongly with standardised mortality ratios than the underprivileged area score" (Jarman et al, 1991).

The Townsend scores were also compared with suicide rates. Overall, this showed practically no relationship ($R^2 = 0.05$). The data were divided into Calderdale and Kirklees, as Calderdale has a much higher incidence of suicide than Kirklees. However, there was no evidence of correlation between deprivation and suicide in Calderdale ($R^2 = 0.29$); in Kirklees, there was no relationship ($R^2 = 0.02$). This is an interesting finding and may reflect the fact that the factors influencing suicide are affecting all socioeconomic groups.

Conclusion

It is shown that premature death is correlated with deprivation in WYHA. This supports the need for resources to be focused on areas of deprivation in order to address inequalities in health.

Deaths from suicide and morbidity measured by limiting long-term illness do not appear to be correlated with deprivation. The lack of correlation of limiting long-term illness with



deprivation may be because the data were not age-standardised. Limiting long-term illness is more likely to be seen in the elderly; if there is a relatively high number of elderly people in a ward, there is likely to be a higher incidence of limiting long-term illness. There are several relatively prosperous wards in WYHA with a high number of elderly people.

The Department of Employment's statistics for unemployment correlate highly with the Jarman scores, which has been used as the basis for deprivation payments to GPs.

The Department of Employment's unemployment figures for April 1991 also correlate very highly with unemployment from the 1991 Census. Both unemployment figures correlate highly with the Townsend scores, which is seen as an indicator of material deprivation. Therefore, the Department of Employment's statistics for unemployment could be used to identify materially deprived areas. As these figures are published monthly, they could provide a much more up to date indicator of deprivation than the census, which is only updated every ten years.

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