HOSPITAL ADMISSION RATES: EFFECT OF SOCIAL DEPRIVATION – FULL REPORT

Valerie Seagrott, Alastair Mason and Michael Goldacre

National Centre for Health Outcomes Development

March 2004

UNIT OF HEALTH-CARE EPIDEMIOLOGY

UNIVERSITY OF OXFORD

REPORT MR13

UNIVERSITY OF OXFORD

record-based

O U T C O M E

measures

UHCE OXFORD REPORT MR13

HOSPITAL ADMISSION RATES: EFFECT OF SOCIAL DEPRIVATION

Val Seagroatt, Alastair Mason and Michael Goldacre

National Centre for Health Outcomes Development

March 2004

EXECUTIVE SUMMARY

Objectives

For selected diseases and operations, to determine whether admission rates are influenced by socio-economic status.

Procedure

The project has been organised into the following stages:

- Choice of a deprivation measure.
- Creation of a linked file of national Hospital Episode Statistics (HES) for England, including linkage to ONS mortality data; and linkage of the deprivation score to each HES record.
- Calculation of hospital admission rates for each local authority for selected diseases; and assessment of whether variation between authorities' admission rates is associated with their populations' socio-economic status.
- Assessment of pilot results and proposals for further investigation into the effect of socio-economic status on access to and outcomes of hospital care.

Choice of preferred measure

We have used the Index of Multiple Deprivation 2000 (IMD 2000). This is the measure of deprivation constructed by Mike Noble and his team at Oxford University and it is the measure now favoured by Government departments and used by the DETR. These are ward-based indices.

Creation of file incorporating IMD 2000

Using the postcodes on each HES record, we have linked the IMD 2000 scores at ward level to each individual record on the linked HES-ONS file (technical details available on request).

Analysis

Age-standardised admission rates were calculated for each condition for each local authority area. The rates for each LA were compared with the area's IMD2000 score.

Conclusions

Most but not all diseases showed positive associations between admission rates and deprivation, i.e. higher admission rates with increasing deprivation. The strength of association varied considerably from disease to disease.

HOSPITAL ADMISSION RATES AND DEPRIVATION

Introduction

Data from HES on hospital admission rates for 14 clinical conditions were used for the pilot. The aim was to include a number of conditions for which variation by socio-economic status in admission rates is known or highly likely because of known variation in mortality rates for the disease (e.g. myocardial infarction, stroke, lung cancer, chronic obstructive pulmonary disease) and others where information about social class gradients is not well established. The 14 conditions selected for this initial analysis are shown in the Table.

Method and results

The IMD 2000 scores, summarised at LA level, range from 4, indicating the least deprived area, to 61, indicating the most deprived area. For each of the 14 conditions, the coefficients (Pearson's r) of correlation between the LAs' admission rates and their corresponding IMD 2000 scores were calculated. Regression lines were fitted to these data. The calculation of the square of the correlation coefficients (r^2) was used to give an indication of amount of variation in the LA rates that could be explained (in statistical terms) by deprivation. The magnitude of the correlation coefficients and the percentage of the variation explained by the fitted regression lines give a more appropriate assessment of the strength of the association than relying just on the statistical significance of the correlation coefficients. However, some caution is needed in their interpretation. Deprivation may be associated with other factors, and it may be that these factors rather than deprivation itself, are the important cause of variation as an example, see discussion on tuberculosis, below).

The relationships between LA admission rates and IMD 2000 for the 14 conditions are illustrated in the four figures shown below (others available on request). There was a significant association between admission rates and IMD scores for all diseases studied except multiple sclerosis and appendicitis.

Of the disease studies, chronic obstructive pulmonary disease and lung cancer were the conditions that showed the strongest correlations between admission rates and deprivation (Annex Table). For example, chronic obstructive pulmonary disease gave a correlation coefficient of 0.81; and the regression line of the rates fitted against deprivation accounted for 65% of the variation between the LAs in their admission rates. Acute myocardial infarction, stroke, peptic ulcer, diabetes mellitus and head injury also showed moderately strong correlations with IMD 2000 with coefficients of 0.48, 0.56, 0.43, 0.61 and 0.58, respectively. Admission rates for fractured neck of femur showed less correlation (r = 0.25 with 6% explained).

Tuberculosis showed some association between LA admission rates and deprivation but inspection of the figure showed that some of the highest rates were not necessarily in those LAs with the highest deprivation. For instance, Leicester had the second highest rate (28.9 admissions per 100,000 population), yet its IMD 2000 score was 40 – high but not as high as some other LAs. Some of the LAs with the highest rates – Tower Hamlets, Leicester, Newham, Hackney and Camden – were those authorities with high proportions of ethnic minorities. Moreover, some LAs had relatively very low rates yet these LAs covered a wide range of deprivation scores (figures available on request). It seemed likely that ethnicity rather than multiple deprivation is the stronger determinant of variation in admission rates for tuberculosis.

The remaining conditions studied – rheumatoid arthritis, Crohn's disease, multiple sclerosis, appendicitis and breast cancer – showed little correlation between LA admission rates and deprivation.

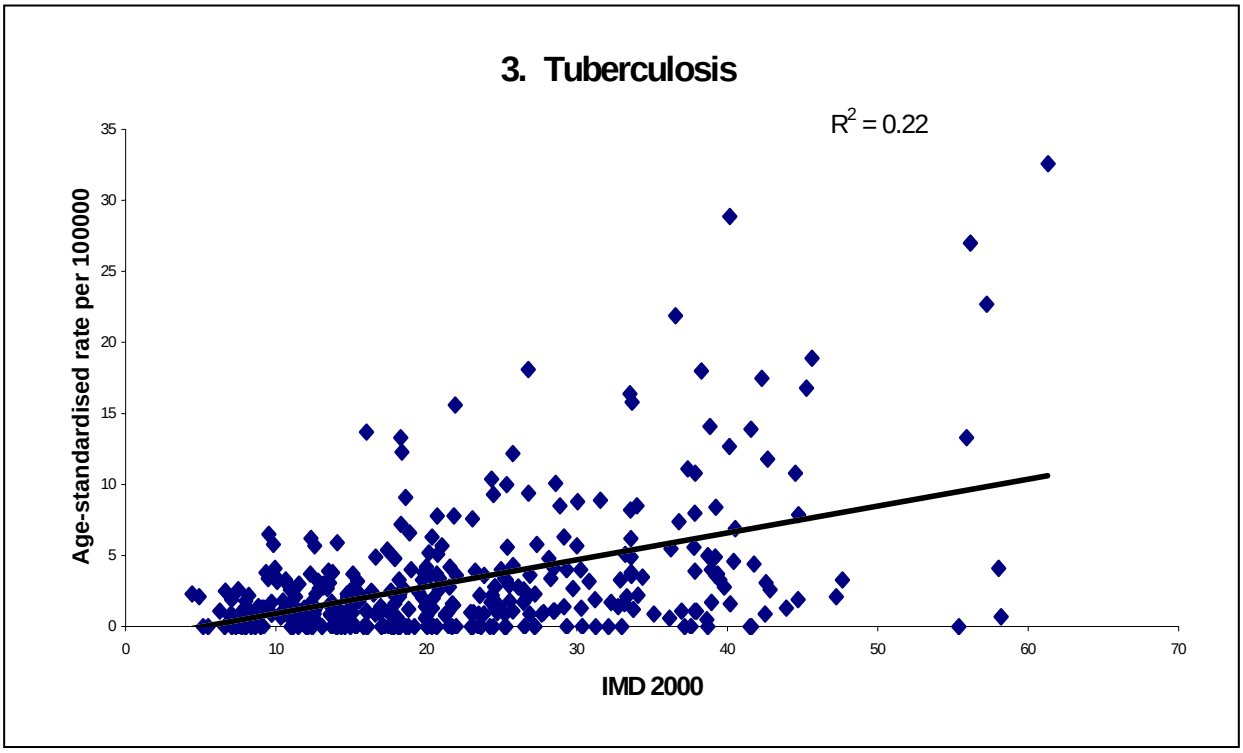
Conclusions

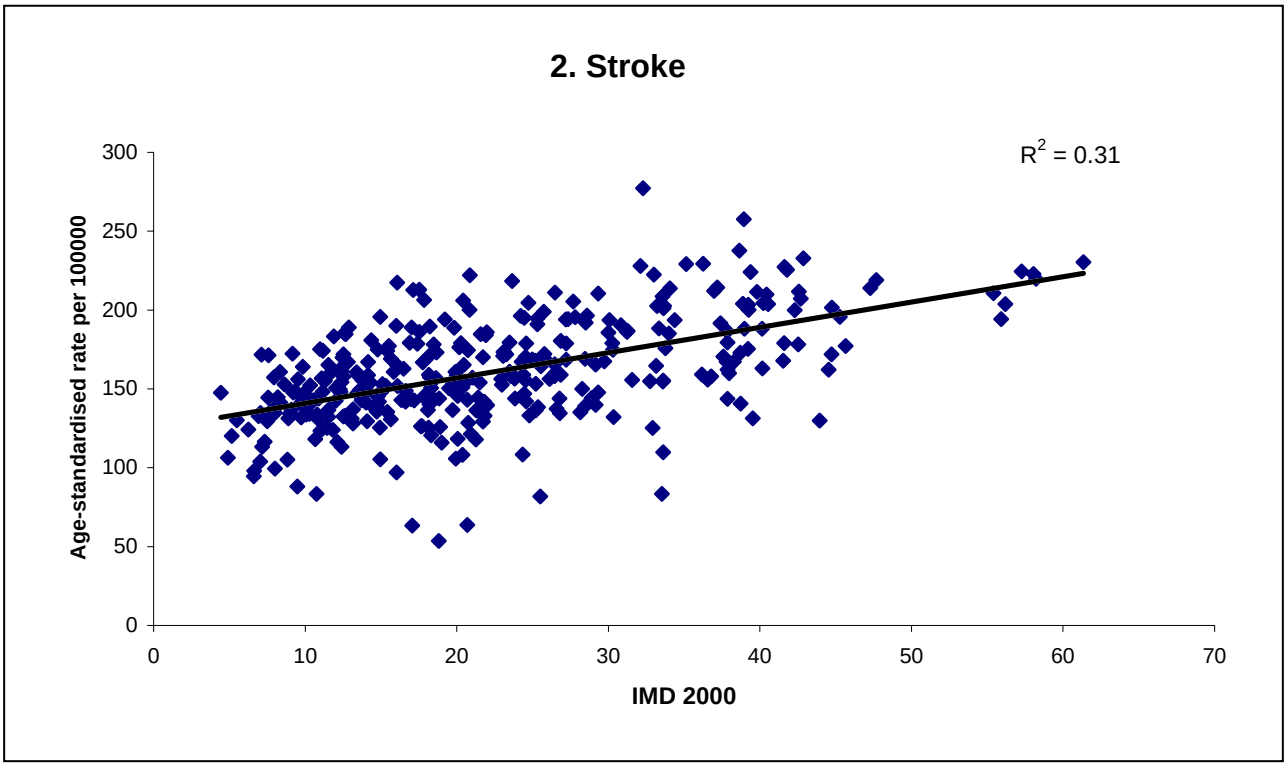
Admission rates, comparing LAs, are strongly correlated with deprivation (as measured by IMD2000) for some conditions but not for others. We conclude that it is not possible to generalise about whether or not deprivation should be taken into account in analysing and interpreting variation in admission rates. This needs to be assessed on a case by case basis.

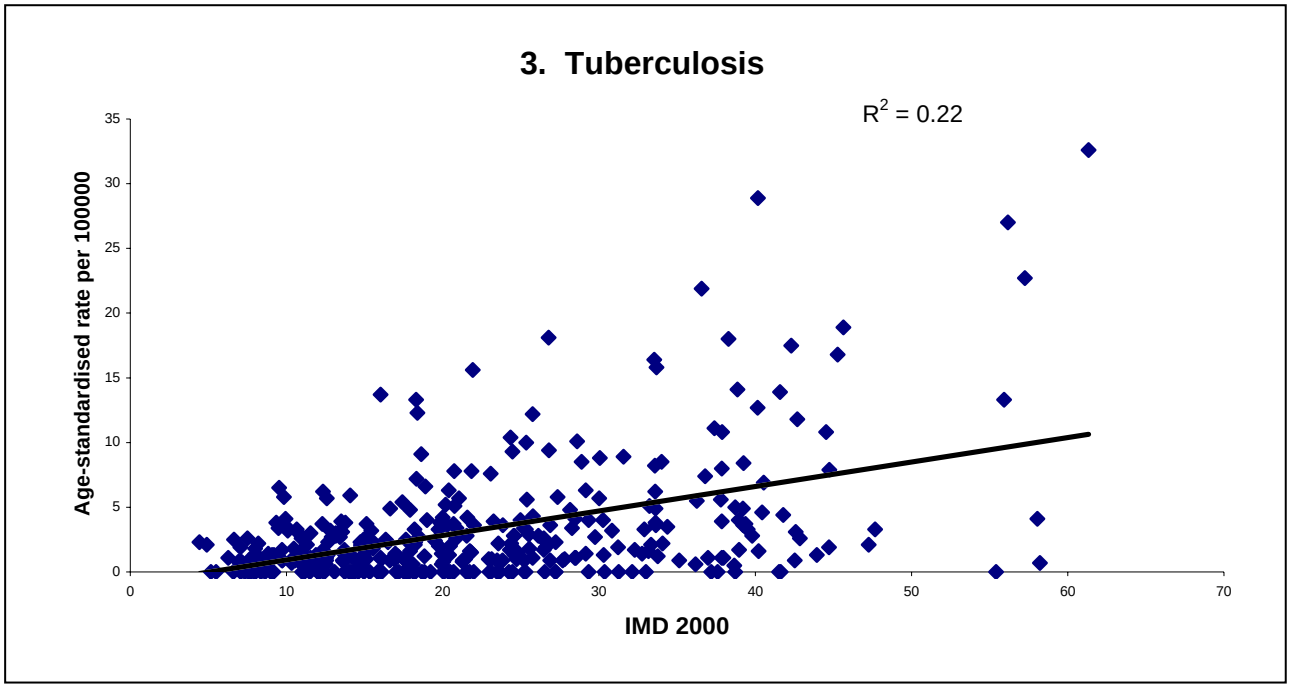
Further work

- To perform similar analyses for a wider range of diseases and for common and important operations to build up a full profile of which conditions do show associations with deprivation and which do not.
- To perform similar analyses for individual specialties to determine whether generalisations can be made for the workload of individual specialties.
- To examine geographical differences in admission rates by such measures as region, north/south, and other factors such as proportion of ethnic minorities, to determine how much, if any, of the association with deprivation can be attributed to these factors.

ANNEX: Graphs showing association between admission rates for each local authority area and the area's IMD score






3. Tuberculosis
R2 = 0.22
Age-standardised rate per 100000
IMD 2000
0
5
10
15
20
25
30
35
0
10
20
30
40
50
60
70

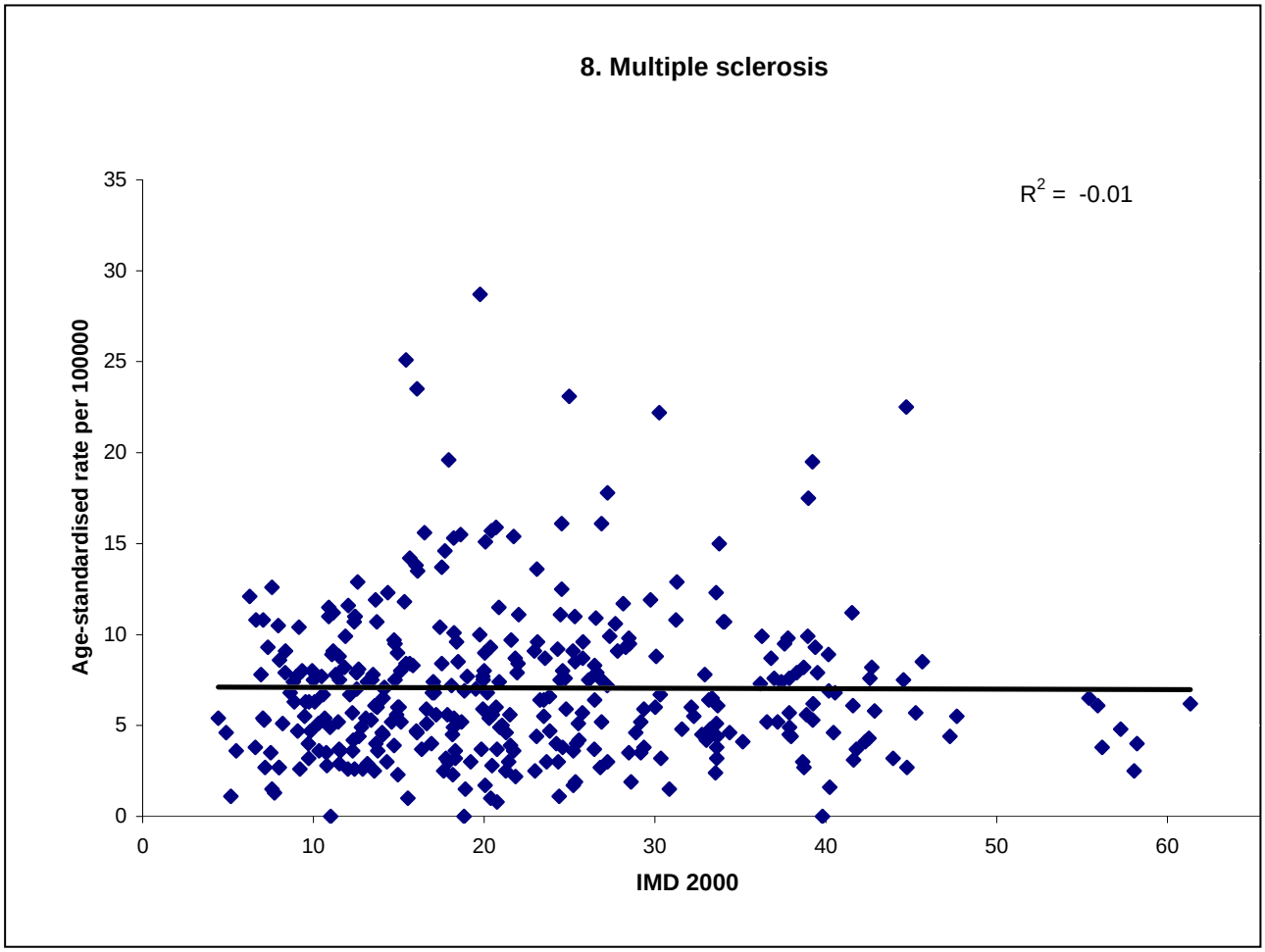

8. Multiple sclerosis
R2 = -0.01
Age-standardised rate per 100000
IMD 2000
0
5
10
15
20
25
30
35
0
10
20
30
40
50
60

Table: Correlation between deprivation (IMD 2000) and hospital admission rates for local authorities (LAs) for 14 selected primary diagnoses: correlation coefficients (Pearson's r) and percentage of the variation between LAs in their admission rates that can be explained by deprivation*.

Group	Diagnosis	Correlation coefficient*	% variation explained
1	Chronic obstructive pulmonary disease	0.81	65%
2	Lung cancer	0.66	44%
3	Diabetes mellitus	0.61	37%
4	Head injury	0.58	33%
5	Stroke	0.56	31%
7	Tuberculosis	0.47	22%
8	Peptic ulcer	0.43	19%
9	Crohn's disease	0.32	10%
10	Fracture of femur	0.25	6%
11	Rheumatoid arthritis	0.20	4%
12	Breast cancer	0.15	2%
13	Multiple sclerosis	-0.01	0%
14	Appendicitis	-0.08	0%

* Technically, the percentage of variation that can be explained by the line fitted to the rates (r^2, expressed as a percentage)

† For all conditions except multiple sclerosis and appendicitis, the correlation coefficients were statistically significant ($p < 0.01$).