

Comparison of two scores for allocating resources to doctors in deprived areas

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Abstract

Current proposals in the general practitioner contract include additional payments to doctors working among deprived populations. The underprivileged area score will be used to identify local authority wards with the greatest levels of deprivation, thus acting as the basis for distributing considerable resources. Two methods of identifying deprived populations—the underprivileged area score and the material deprivation score—were compared to determine whether they result in similar allocation of resources to regions. Financial allocations to regions based on figures derived from the contract differed considerably if the material deprivation score was used instead of the underprivileged area score: Northern and Mersey regions gained over 50% of their allocation whereas East Anglia, Oxford, and South West Thames regions lost more than 30% of theirs.

Such differences have considerable implications for doctors working among deprived populations as up to £60m each year might be distributed by these payments.

Introduction

One element of the recently published new contract for general practice¹ concerns the notion of extra payments for doctors working among deprived populations. Such an idea has some attractions whether or not the profession accepts the principle of returning to a greater emphasis on capitation fees as outlined in the NHS review.²

General practitioners who work in deprived areas are generally recognised to face more problems of intractable workloads than their colleagues who work in more advantaged areas. Standardised mortality ratios, though a poor proxy for morbidity,³ show variations in health among the regions of England and Wales,⁴ with life expectancy for men being considerably worse in the north than in the south. A causal relation between deprivation and health is difficult to refute. When Jarman surveyed the opinions of 2587 general practitioners he found that many doctors regarded social factors such as unemployment, poor housing, and elderly people living alone as having a direct effect on workload (and, by implication on health).⁵ Later, Townsend *et al* showed a correlation between "material deprivation" and health in the Northern region.⁶

From the perspective of an individual doctor providing care in a disadvantaged area the resulting increase in workload can have the effect of reducing practice income. Thus a doctor with an increased workload for each patient is less able to provide care for a large list of patients than a doctor who works in a more advantaged area. This situation pertains to the current contract but will be reinforced under the new arrangements, which put greater emphasis on payments per person.

Proposals to enhance the income of doctors who work with disadvantaged populations therefore have merit. Appendix B of the contract describes the introduction of a "deprivation supplement" to the basic practice allowance. Doctors will be paid a supplement for each patient on their list who lives in a local authority ward that has been identified as disadvantaged. A sliding scale of payments is proposed, according to the degree of disadvantage ascribed to a ward. Considerable sums of money will be allocated by using the deprivation supplement. To take an extreme case, the categorisation of 2000 of a doctor's patients as severely disadvantaged might increase practice income by as much as £14 000 each year. Given such implications for resources the choice of scoring method to establish which wards are to be regarded as deprived is clearly considerably important.

The contract proposes that wards are ranked according to Jarman's underprivileged area score.⁷ From an organisational perspective this proposal has merit in that the score will already have been computed for the whole of England and the system is ready to implement. The score was not, however, derived specifically to provide a means of determining payment for general practitioners.

In a previous study we showed some differences in the ranking of wards inhabited by patients from a single practice when scored both by the underprivileged area and by the material deprivation score.^{7,8} In the present paper, we take the issue of differences between these two methods further by comparing the consequences for resource allocation at regional level of each of the scoring methods.

Methods

Underprivileged area and material deprivation scores were computed from 1981 census data for each of 8478 wards in England. We have used the underprivileged area eight variables score as described by Irving and Rice⁹ and Mays and Bevan.¹⁰ The eight variables are the percentages of: (1) old age pensioners living alone; (2) children under five years old; (3) people living in single parent households; (4) unskilled workers; (5) unemployed people; (6) people living in overcrowded conditions (more than one person in each room); (7) people who had moved in past year; and (8) people from ethnic minority groups.

These eight census variables were derived from 13 original "social factors" that general practitioners were asked to weight (on a scale of zero to nine) as increasing workload or contributing to pressure of work. Each of the 13 factors was chosen as a result of the analysis of inner city health care undertaken by the London Health Planning Consortium (the Acheson report).¹¹ To calculate an overall score each of these variables is transformed to approximate to a normal distribution, and the transformed variables are converted to

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standardised scores (with a mean of zero and standard deviation of one). The overall score is a weighted sum of the eight standardised variables, the weights being those derived from Jarman's original survey in 1981.

Material deprivation scores were computed by the method described by Townsend *et al.*⁶ The score comprises four census variables: (1) the percentage unemployed; (2) the percentage of households without access to a car; (3) the percentage of homes that are not owner occupied; and (4) the percentage of overcrowded homes (more than one person living in each room). The authors used an unweighted sum of standardised scores for these variables; two of the variables required a logarithmic transformation before they were standardised. Townsend *et al* described their choice of variables at some length. Unemployment was chosen because "it carries implications for a general lack of material resources and the insecurity to which this gives rise. In short, unemployment is the harbinger of other misfortune." In rather similar vein lack of a car was chosen as an indicator of generally low income areas. Not owning a home was also regarded as reflecting lack of wealth as well as income, and the variable concerning overcrowding was selected to give a more general guide to living circumstances and housing conditions.

As the proposals in the new contract are only outlined we had to estimate the sliding scale that would take account of the relative deprivation of a ward. Accordingly, we chose to take the sliding scale proportions to be the most deprived 5%, 10%, and 15% of the distribution of wards in England and Wales. We calculated full deprivation supplement as £7 per person each year by following the example and calculation on page 32 of the contract. We postulated that the most deprived 5% of wards would attract the full £7, the intermediate group in the 5% to 10% group would attract £5.50, and the less deprived group, from 10% to 15%, would attract £4 per person.

The distribution of the most deprived 5%, 10%, and 15% of wards has been computed across the 14 regions of England by both scoring methods. Monetary values were attributed to each deprived ward based on its population. Wales and Scotland were excluded from the computation as a modified "Jarman index" will be used to define deprivation. At the time of writing we are unsure how the index will take account of housing and standardised mortality ratios.

Results

Table I shows the distributions of the most deprived populations in England, scored by both measures. For all but five regions the differences in distributions between the two scoring methods are small. When material deprivation score is used in place of under-

privileged area score, however, the numbers of wards classed as being in the most deprived 5% show substantial increases for the northern and Mersey regions (almost twice as many wards) with quite substantial reductions in the number of deprived wards for North East Thames, South East Thames, and North Western regions. Furthermore, within the most deprived 5% (424) of the wards classified by the material deprivation score 29 (6.8%) are not classified as so by the underprivileged area score. Of the most deprived 5% of the underprivileged area scored wards, however, only 10 (2.4%) are not selected by the material deprivation score. This may be a further indication that the two scores are measuring different aspects of deprivation.

Table II shows the financial impact of the different effects of the two scoring methods on each region.

TABLE II—Allocation to regions of deprivation supplement (£m) by underprivileged area score and material deprivation score

Region	Underprivileged area score	Material deprivation score
Northern	4.59	8.12
Yorkshire	6.23	5.51
Trent	4.31	5.33
East Anglia	0.99	0.72
North West Thames	5.20	3.89
North East Thames	8.23	7.52
South East Thames	5.92	4.90
South West Thames	1.94	1.25
Wessex	1.08	0.95
Oxford	1.79	1.05
South Western	1.34	1.07
West Midland	7.74	8.54
Mersey	3.85	5.57
North Western	7.83	6.51
England	61.04	60.93

Although the total number of residents living in the most deprived 15% of the distribution is remarkably similar for each scoring method (10 982 000 by the underprivileged area score and 10 994 000 by the material deprivation score), considerable differences in populations occur at the regional level owing to the differing numbers and populations of wards selected. These differences are even more pronounced when the financial effects are considered by using the capitation fees postulated above. As the overall populations of the deprived wards in England for each scoring method are virtually identical the choice of method has no overall financial effect. Within an overall sum of £60m, however, some regions gain considerably under the material deprivation score compared with under the underprivileged area score whereas others lose appreciable amounts. Taking the full £7 supplement alone Mersey region gets almost twice as much whereas Oxford region loses almost half and East Anglia attracts no funding.

Discussion

Neither of the two scoring methods was originally conceived as a means of paying doctors. In effect the two methods measure different aspects of the deprivation problem: the material deprivation score is a measure of deprivation whereas the underprivileged area score is a general practitioner weighted opinion on the effect of deprivation on workload. The arguments for and against the appropriateness of each of the scoring methods under given circumstances have been presented by several authors, for example Mays and Bevan.¹⁰ Also, we have shown previously how the two scoring methods provide differing results in the ranking of wards domiciled by the patients of one general practice.^{7,8}

From the perspective of doctors' income it could be argued that to use a score based on doctors' own

TABLE I—Distribution of most deprived populations in England according to underprivileged area score and material deprivation score with cut off parts of 5%, 10%, and 15%

Region	Underprivileged area score			Material deprivation score		
	5%	5-10%	10-15%	5%	5-10%	10-15%
Northern	300 274	245 143	284 109	572 786	437 048	427 156
Yorkshire	430 618	395 330	260 723	317 168	316 427	387 185
Trent	323 859	228 637	196 953	260 991	354 571	387 206
East Anglia	41 296	53 436	100 947		53 120	107 129
North West Thames	315 389	312 981	317 800	277 960	203 201	207 532
North East Thames	684 604	438 272	257 296	584 077	364 611	356 021
South East Thames	416 486	370 303	242 459	334 763	292 724	236 490
South West Thames	44 606	209 385	119 318	33 692	78 874	144 071
Wessex	49 235	83 825	69 438	34 775	74 701	73 214
Oxford	57 991	142 175	149 874	27 895	62 008	128 040
South Western	44 282	72 372	157 250	31 605	68 519	117 221
West Midland	442 836	378 296	639 812	521 227	491 687	545 859
Mersey	218 872	244 647	244 294	426 473	327 020	196 692
North Western	516 848	465 714	413 840	463 435	397 471	270 955
England	3 887 196	3 640 516	3 454 113	3 886 847	3 521 982	3 584 771

opinions—for example, the underprivileged area score—would be undesirable in principle. Furthermore, the new contract will provide additional resources for health surveillance for children under five years and elderly people over 75, together with a weighting per person for people aged 65 and over. Thus two of the underprivileged area variables are already to some extent provided for in the new contract. Additionally, the variables reflecting the extent of unemployment and proportion of unskilled workers are closely linked whereas mobility is not only the prerogative of disadvantaged families.

By using only four variables without weighting the material deprivation score has the advantage of being more sharply focused on deprivation. These features initially drew us to comparing the two methods in one practice, and the variability of the results led us to question whether using underprivileged area score rather than material deprivation score was appropriate for determining deprivation supplements. A further advantage of the material deprivation score is that Townsend *et al* have shown a positive correlation between material deprivation and an "overall health index" comprising the three variables: (1) standardised mortality ratio of people aged 0-64; (2) percentage of low birth weights; and (3) percentage permanently sick.⁶

The first two of these variables have the advantage of being updated annually. Though we acknowledge that standardised mortality ratios are poor proxies for morbidity, there may be advantage in using a deprivation score that has a proved correlation with a measure of health. Clearly there are some considerable differences in allocation of deprivation supplements to regions depending on which scoring method is used, again raising the question of the choice of method. Indeed, it may be that neither is the most appropriate as they both depend on decennial census data. In 1993 the supplement will still be based on data collected in April 1981, and we share Carr-Hill's concerns about the validity of out of date data.¹² Additionally, a local authority ward is quite a large unit both in absolute terms, with populations over 5000 on average, and in relation to a general practice catchment area. We have shown previously how census enumeration districts with an average population under 500 can show quite severe pockets of deprivation that are not apparent in the overall ward score.^{7,8} A person labelled "deprived" can change state with a change of domicile across a boundary. Instant "deprivation" or "non-deprivation" is therefore created.

Depending on which score is used and which cut off points are used on the frequency distribution of deprivation (we considered 5%, 10%, and 15% as

plausible) the effect on regional deprivation supplement budgets can be quite substantial. Even in the 5% most disadvantaged of the wards general practitioners working in Mersey region would gain an extra £1.4m each year if material deprivation scores rather than underprivileged area scores were used. If each general practitioner had 1000 of these additional people on his or her list 200 doctors in Mersey would each gain £7000 each year at the expense of losing regions.

This paper raises more questions than it answers. Given the differences between the two scoring methods, there are winners and losers in every region. We are unable to firmly recommend one of the methods as the most appropriate, although we have indicated that, on balance, there may be a case for using the material deprivation score rather than underprivileged area score. Further work clearly needs to be commissioned to find an indicator of deprivation that is available more than once every decade. If the underprivileged area score is to be used a review of the weightings applied to the scale in 1991 will be required as the original weightings⁵ will also be 10 years old and possibly less appropriate.

Payments to doctors working in deprived areas will redistribute substantial sums of money. The methods used in allocating these scarce resources should be considered carefully, and further research is necessary to ensure that they are allocated appropriately.

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ONE HUNDRED YEARS AGO

The few words of feeble protest which I timidly uttered last week on the tedious tyranny of post-prandial prosianness at medical dinners have, I find, been taken in good part. The letters which I have received utter one long sigh of retrospective suffering seasoned by prospective satisfaction at the hope of future relief. I was not surprised at a little good-tempered banter on the subject at the very successful dinner of the Metropolitan Counties Branch, but the good effects were visible, and were much appreciated. The "toast list" offered the glorious prospect of seventeen speeches; but Dr. Ord gave the loyal toasts in the true military style, which I ventured to commend, heartily and cordially, but without speeches. There were only two songs, which were quite enough, an excellent band having played all through the dinner; and the speaking, which was throughout pointed and brief, was got through in gallant style in an hour and a half. The toast list, however, was felt to be far too long, and several of the speakers complained of having "no notice." One speaker complained good-naturedly that it was

hard to be expected to be "witty" without possessing the natural gift. I had suggested, however, many other alternatives, and, in the absence of any other kind of humour, there remains the "soul of wit," which is at every man's command. "I tried above all things," said an eloquent but long-winded preacher to the celebrated Robert Hall, who was sitting among his congregation, "not to be tedious;" to which came the candid reply, "Ah, but you were tedious." That is apt to be the fate of the most eloquent orators after dinner, if they are lengthy. The Yankee explanation of why the lions did not eat Daniel when he intruded in their den was told dramatically and at length on Friday evening. Briefly, it was because they recoiled before the prospect of being required to make "an after-dinner speech." It is an excellent moral. Our lions are expected nowadays to make a great many speeches, and do not always do it well. To roar like a sucking dove is a rare accomplishment.

(*British Medical Journal* 1889;ii:92)