PAPERS

Deprivation and general practitioner workload

R Balarajan, P Yuen, D Machin

Abstract

***Objectives*—To examine general practitioner consultations by demographic and socioeconomic variables and to derive a method of measuring the impact of relative deprivation on general practitioner workload.**

***Design*—The study was based on general practitioner consultations reported in the general household surveys of 1983-7, covering a sample of 129 987 individuals in Great Britain. Odds ratios for general practitioner consultations were obtained for selected variables among children (0-15 years), men (16-64), women (16-64), and elderly people (≥65). These were then used to derive deprivation indices specific to electoral wards for use in general practice.**

***Setting*—Great Britain, with particular findings illustrated by English electoral wards and the conurbations of London, Manchester, Merseyside, and the West Midlands.**

***Results*—Council tenure increased the likelihood of consultation significantly in all four groups. Odds ratios were raised in children, men, and women with no access to a car. Birth in the New Commonwealth or Pakistan yielded high odds ratios in men, women, and elderly people but not in children. Marginally increased consultation rates were evident in the manual socioeconomic groups in women, elderly people, and children with a single parent mother. The deprivation indices for general practice derived using these odds ratios varied substantially among English electoral wards with, for example, anticipated general practitioner consultations in the electoral ward of Hulme, Manchester, being 24% higher than the average ward in England as a result of local attributes, and consultations in the Cheam South ward of Sutton, London, 11% lower than average.**

***Conclusion*—This deprivation index for general practice overcomes several shortcomings expressed about the underprivileged area score, which has been adopted in the 1990 contract as a basis for allocating deprivation supplements to general practitioners. The proposed index can be applied nationwide.**

Introduction

General practitioner workload varies widely[1] and is related to the socioeconomic characteristics of the practice population.[2-4] In particular, consultation rates are reported to be higher among unemployed people,[5] ethnic minorities,[6,7] and the children of single mothers.[8] The social attributes of a practice population are most likely to affect the workload of general practitioners in urban areas, especially the inner cities, where the proportions of disadvantaged people are generally highest. Without the prospect of adequate remuneration the incentive to enter into practice in deprived areas, or to invest in ongoing practices in such areas, is likely to decline.[9]

The current general practitioner contract[10] includes supplementary payments to general practitioners working in areas containing deprived populations, the areas having been ranked according to the underprivileged area score.[11] This score was not, however, developed specifically as a method for remunerating general practitioners for differential workload, and its use for this purpose has been questioned on several counts.[9,12-17] In comparing the effect of the underprivileged area score with that of Townsend's material deprivation score[18] in allocating deprivation supplements, Hutchinson *et al* estimated that such payments could amount to £60m annually, with considerable regional differences in the amounts allocated depending on the index used.[13] They emphasised the need for further research to develop an appropriate indicator.

In this study we investigated the effects on general practitioner workload of demographic and socioeconomic factors, using the British general household surveys for the years 1983-7. We generated weighting factors for a range of variables that were then used to derive deprivation indices for general practice. These indices measure the anticipated change in general practitioner workload arising from the particular socioeconomic characteristics of individual electoral wards. The method overcomes several of the concerns expressed about the underprivileged area score and could be applied to determine general practitioner budgets. Although the methodology applies to Great Britain in general, in view of the extensive volume of data we have illustrated the methodology with English electoral wards, in particular the conurbations of London, Manchester, Merseyside, and the West Midlands.

Methods

GENERAL HOUSEHOLD SURVEY

The general household survey is a sample survey of the population resident in private households in Great Britain, conducted by the Office of Population Censuses and Surveys annually since 1971. Each year some 25 000 individuals from about 10 000 households are interviewed on demographic and social characteristics, housing, employment, education, and health. The questions on uptake of health care are comprehensive and cover consultation with a doctor, attendance at an outpatient or accident and emergency department, and inpatient admission. We focused on consultations with a doctor, including consultations at home or over the telephone, in the two weeks before the interview.

The general household survey data sets for the years 1983-7 were combined for the analysis, covering interviews with 129 987 individuals from a sample of 50 448 private households in Britain.

DEMOGRAPHIC AND SOCIOECONOMIC VARIABLES

Variables influencing general practitioner consultation were selected by their availability for defined geographical areas such as enumeration districts or

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electoral wards in the national census small area statistics data files. The variables used were age, sex, marital status of mother (for children), country of birth, housing tenure, socioeconomic group, access to a car, and elderly people living alone. All but the 20 smallest of the 8489 electoral wards in England were used for illustration.

ANNUAL GENERAL PRACTITIONER CONSULTATION RATES

Age-sex specific annual consultation rates determined from a sample of general practitioners are available from the third national morbidity study for 1981-2 (fig 1).[19] Age-specific rates in males showed a U shaped distribution, being lowest between the ages of 5 and 44. In females the rates were lowest in girls aged 5-14 and raised in women of childbearing age (15-44). Consultation rates for females exceeded those for males in each age group. Although annual consultation rates scaled up from the general household survey data for a two week reference period showed a similar pattern to these annual rates, we used the rates from the third national morbidity study to generate the expected number of consultations as they are for a full year and hence are more robust.

TABLE I—*Age and sex adjusted odds ratios (95% confidence interval) for target groups*

	Children (0-15 years)	Men (16-64 years)	Women (16-64 years)	Elderly (≥65 years)
Socioeconomic group:				
Non-manual	1	1	1	1
Manual	1·04 (0·97 to 1·12)	1·06 (0·98 to 1·14)	1·06 (1·01 to 1·13)	1·08 (1·00 to 1·17)
Housing tenure:				
Owner occupier	1	1	1	1
Private tenant	1·03 (0·91 to 1·16)	1·04 (0·92 to 1·16)	1·10 (1·00 to 1·20)	1·06 (0·95 to 1·20)
Council tenant	1·11 (1·02 to 1·21)	1·28 (1·18 to 1·39)	1·23 (1·15 to 1·31)	1·18 (1·09 to 1·28)
Access to a car:				
Yes	1	1	1	1
No	1·14 (1·05 to 1·25)	1·14 (1·05 to 1·24)	1·12 (1·05 to 1·19)	
County of birth:				
United Kingdom	1	1	1	1
New Commonwealth or Pakistan	0·96 (0·84 to 1·09)	1·38 (1·19 to 1·61)	1·26 (1·11 to 1·44)	1·53 (1·10 to 2·15)
Marital status of mother:				
Married	1			
Single, divorced, separated, or widowed	1·11 (1·00 to 1·25)			
Living alone:				
Yes				1
No				1·06 (0·98 to 1·15)

TABLE II—*Deprivation scores for target groups in selected electoral wards of four conurbations, calculated on the basis of England=1*

	Children (0-15 years)	Men (16-64 years)	Women (16-64 years)	Elderly people (≥65 years)
Greater London:				
Spitalfields (Tower Hamlets)	1·09	1·41	1·27	1·20
Carlton (Brent)	1·14	1·31	1·24	1·22
Liddle (Southwark)	1·13	1·30	1·23	1·20
Emerson Park (Havering)	0·93	0·87	0·89	0·91
Cheam South (Sutton)	0·92	0·87	0·89	0·89
Cranham West (Havering)	0·93	0·87	0·88	0·89
Greater Manchester:				
Hulme (Manchester)	1·15	1·35	1·24	1·20
Moss Side (Manchester)	1·12	1·29	1·21	1·20
Ardwick (Manchester)	1·13	1·27	1·21	1·17
West Bramhall (Stockport)	0·93	0·89	0·91	0·92
Norden and Bamford (Rochdale)	0·93	0·87	0·89	0·90
East Bramhall (Stockport)	0·92	0·86	0·89	0·88
Merseyside:				
Everton (Liverpool)	1·16	1·25	1·21	1·14
Vauxhall (Liverpool)	1·16	1·24	1·20	1·13
Ward No 1 (Knowsley)	1·14	1·22	1·18	1·13
Harington (Sefton)	0·93	0·88	0·90	0·93
Ravenmeols (Sefton)	0·94	0·88	0·90	0·91
Sudell (Sefton)	0·93	0·88	0·89	0·91
West Midlands:				
Duddeston (Birmingham)	1·15	1·28	1·22	1·17
Newtown (Birmingham)	1·12	1·29	1·22	1·17
Ladywood (Birmingham)	1·16	1·27	1·21	1·17
Knowle (Solihull)	0·92	0·87	0·90	0·92
Streetly (Walsall)	0·92	0·86	0·89	0·89
St Alphege (Solihull)	0·92	0·86	0·89	0·89

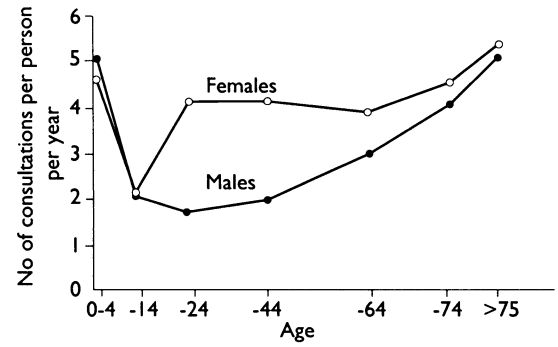

FIG 1—*Consultation with a general practitioner. Source: third national morbidity study, 1981-2*

MODELLING

Four groups—children aged 0 to 15 years, men aged 16 to 64, women aged 16 to 64, and elderly people aged 65 or over—were identified because they have dissimilar patterns of consultation. This division avoids the necessity for a statistical model that includes interaction terms. For children, the characteristics of the head of the household were used, and we did not include car ownership among elderly people as it showed a strong interaction with age.

Logistic regression as described by Altman[20] was used to fit the models to examine the influence of the variables specified in table I on the probability of consulting a general practitioner. This allowed the odds ratios adjusted for age and, where appropriate, sex, and their 95% confidence intervals to be derived for the variables under consideration. The data structure of the census files available for public use constrained the possible models to those with main effect terms only. No selection procedures were used in the modelling process as external evidence suggested that all variables considered here are likely to influence consultation rates to a greater or lesser extent.

DEPRIVATION SCORES AND DEPRIVATION INDICES

The odds ratio derived for each socioeconomic variable was applied to the corresponding socioeconomic population structure in each electoral ward to obtain a weighted population. This weighted population was then controlled for the total population in England to generate separate deprivation scores for children, men, women, and elderly people in each ward. These scores were then combined with the age-sex specific consultation rates to obtain deprivation indices (Appendix). Some detailed findings and maps are presented for the conurbations of London, Manchester, Merseyside, and the West Midlands.

Results

SOCIOECONOMIC FACTORS

Table I shows the age adjusted odds ratios and the corresponding 95% confidence intervals for the four target groups. Consultations were higher among children whose head of household did not have access to a car (odds ratio 1·14), who lived in council housing (1·11), and who had single (including widowed, divorced, or separated) mothers (1·11).

In men, consultations were significantly higher among those born in the New Commonwealth or Pakistan (1·38), those in council properties (1·28), and those without access to a car (1·14). Council housing and birth in the New Commonwealth or Pakistan also significantly increased consultation in women (1·23 and 1·26, respectively), as did lack of access to a car (1·12) and being in the manual socioeconomic group (1·06).

Among the elderly people, council tenancy and manual occupations before retirement were associated

with a higher consultation rate (1·18 and 1·08, respectively), as was being born in the New Commonwealth or Pakistan (1·53), but living alone seemed to have little influence (1·06).

Table II shows deprivation scores for the four groups for selected wards of the four conurbations of London, Manchester, Merseyside, and the West Midlands. These wards were selected as those with the highest or lowest deprivation indices (see below). High values were seen for Newtown, Birmingham, where for men the deprivation score was 1·29; for Everton, Liverpool, (1·25); Spitalfields, Tower

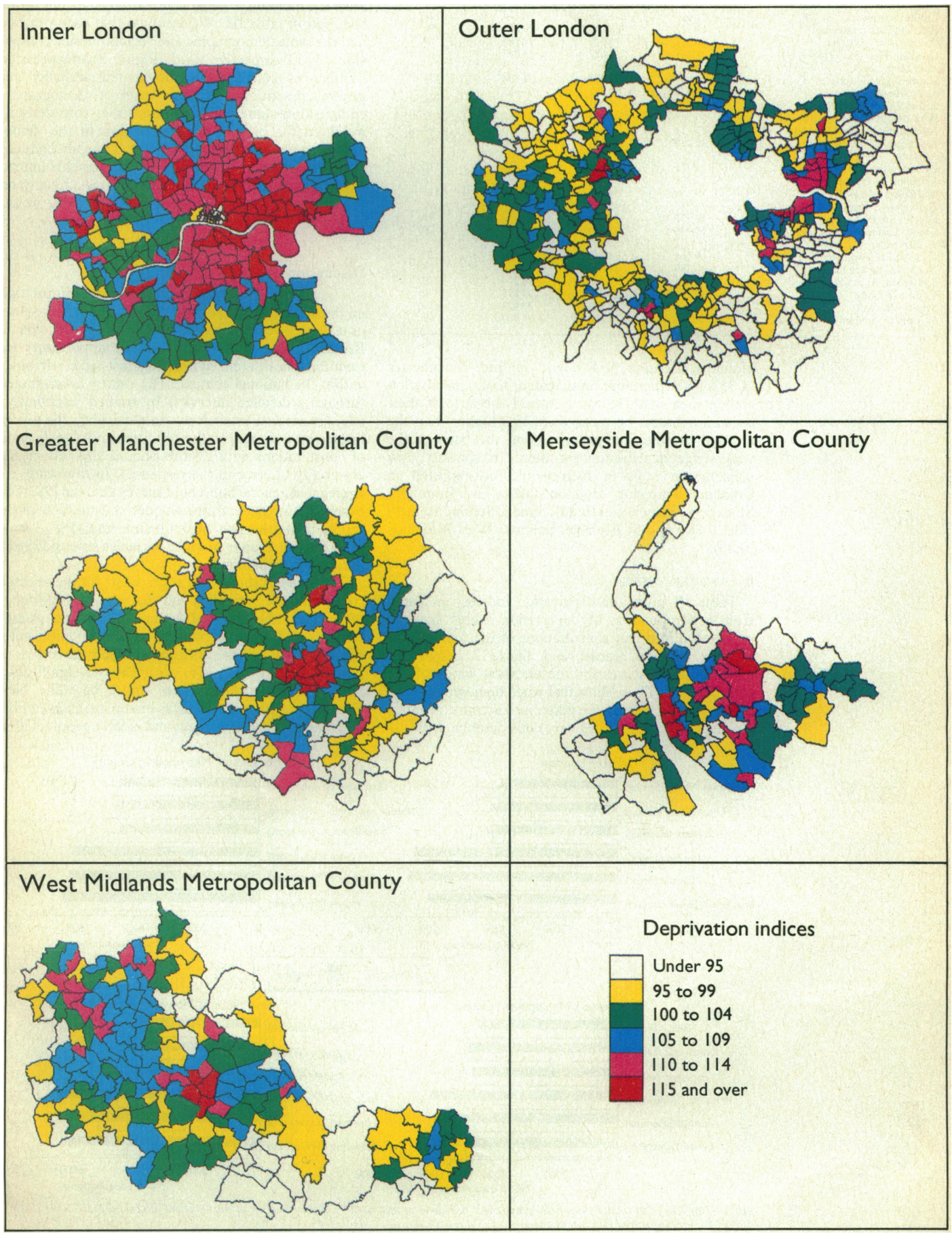

FIG 2—*Deprivation indices for general practice*

TABLE III—*Population, consultation, and deprivation indices in selected electoral wards from four conurbations, calculated on the basis of England=100*

	Census population, 1981	Expected consultations	Weighted consultations	Deprivation index
Greater London:				
Spitalfields (Tower Hamlets)	6 415	15 884	19 526	123
Carlton (Brent)	7 002	19 306	23 534	122
Liddle (Southwark)	11 644	31 649	38 176	121
Emerson Park (Havering)	9 327	22 272	20 051	90
Cheam South (Sutton)	5 887	13 570	12 089	89
Cranham West (Havering)	7 821	16 657	14 857	89
Greater Manchester:				
Hulme (Manchester)	9 907	25 354	31 334	124
Moss Side (Manchester)	9 073	23 205	27 655	119
Ardwick (Manchester)	14 573	36 241	43 076	119
West Bramhall (Stockport)	15 359	37 218	33 987	91
Norden and Bamford (Rochdale)	11 311	28 771	25 876	90
East Bramhall (Stockport)	16 239	40 391	35 948	89
Merseyside:				
Everton (Liverpool)	13 471	34 235	40 636	119
Vauxhall (Liverpool)	12 003	30 284	35 671	118
Ward No 1 (Knowsley)	13 158	34 642	40 244	116
Harington (Sefton)	14 377	35 295	32 013	91
Ravenmeols (Sefton)	12 557	31 481	28 617	91
Sudell (Sefton)	15 745	37 030	33 423	90
West Midlands:				
Duddeston (Birmingham)	9 506	24 943	29 936	120
Newtown (Birmingham)	12 389	31 757	37 736	119
Ladywood (Birmingham)	10 926	29 527	35 274	119
Knowle (Solihull)	10 537	26 863	24 275	90
Streetly (Walsall)	14 066	33 561	29 922	89
St Alphege (Solihull)	10 851	24 698	22 007	89

Hamlets, London (1·41); and Hulme, Manchester (1·35). We therefore anticipated that consultation among men in these wards would, because of their social attributes, be more than 25% higher than the average consultations estimated on the basis of the ward's age distribution for men. In contrast, low consultation rates in men would be expected in Cranham, Havering, London (0·87); East Bramhall, Stockport, Manchester (0·86); Sudell, Sefton, Merseyside (0·88); and St Alphege, Solihull, West Midlands (0·86).

DEPRIVATION INDEX

Table III gives the deprivation indices calculated from a combination of deprivation scores and the expected number of consultations of the four groups for the selected wards, and figure 2 shows the distribution of scores for the electoral wards of the conurbations. These show that when demographic and socioeconomic factors are taken into account the anticipated consultation rates vary considerably, typically with higher rates expected in the recognisable deprived areas (such as Tower Hamlets, London) and low rates expected in the affluent areas such as Bramhall, in the Manchester conurbation.

To place these results in the context of a general practice with a typical list size of 2000 we have estimated the number of consultations that would arise annually for a general practitioner in the wards specified in table III. We assumed that each practice had the same demographic and socioeconomic composition as its respective ward. Figure 3 compares the number of consultations anticipated annually per general practitioner on the basis of demographic composition alone with the number of consultations weighted for deprivation in addition to the demographic structure of the population. Thus, in London, Spitalfields (the most deprived ward in Tower Hamlets) would generate 1135 more consultations annually on this basis; in contrast, Cheam South, Sutton, would expect 503 fewer consultations per practice.

Discussion

The general household survey provides information on the demographic, socioeconomic, and health status of a large, representative sample of households in Britain. It therefore offers a unique opportunity for examining health related issues against social attributes within the national context. The survey is conducted through a detailed interview by trained interviewers who are briefed extensively. In particular, the guidelines to interviewers on the definition and classification of consultations with doctors should also reduce the possibility of error in the responses. In this study we aggregated general household survey data for 1983-7 to examine how general practitioner consultation rates, reported for the two weeks before interview, varied according to a range of social variables among 129 987 individuals in Britain.

The analysis showed clear gradients for the selected socioeconomic variables, and the relative importance of each variable differed in the four age-sex groups examined. Living in council housing significantly raised general practitioner consultation rates in all four groups. Lack of access to a car showed significantly higher odds ratios in those under 65. The New Commonwealth or Pakistan as birthplace showed high odds ratios in men, women, and elderly people. Other

FIG 3—*Impact of deprivation on general practitioner workload as measured by annual number of consultations of general practitioner (list size 2000) in selected wards of four conurbations*

significant indicators of excess consultations were manual socioeconomic group for women and in elderly people, and having a single parent mother for children. The variables chosen for study were those readily available at electoral ward level, and hence the models fitted provide a means of estimating odds ratios when other variables are taken into account. In no sense are the models a "best fit" or necessarily the most parsimonious available.

The weighted effect of the socioeconomic characteristics of electoral ward populations on general practitioner consultations is measured by the deprivation index, which indicates the resources required to meet the appropriate workload. The maps show that considerable variation in resource is required. For example, wards in London range from −11% on top of the basic allocation in the Cheam South ward of Sutton to 23% for a practice in the Spitalfields ward of Tower Hamlets. A general practitioner with a practice list of 2000 in Spitalfields would be expected to have an additional 1135 consultations and a general practitioner in Cheam South would have 503 less than the average.

One difficulty with the use of consultation rates to determine resource allocation is that they reflect demand rather than need. Among socially deprived groups utilisation rates probably underestimate need. In the absence of measures that reflect genuine need, however, current national practice is the best available proxy on which to base the distribution of resources. A more sensitive index based on local rather than national practice could be devised, but this would require extensive local surveys.

The approach adopted here has the inbuilt advantage that the influence of demographic and social factors used for resource allocation can be monitored and adjusted in accordance with the latest data from the general household survey or national morbidity studies. As the social structure changes the contribution of different factors could change. For example, if patterns of house ownership change the contribution of this variable to the deprivation score and hence the deprivation index is also likely to alter. This method also provides a sensitive measure for monitoring changes in general practice.

This method can be applied to smaller geographical areas such as enumeration districts or practice populations. This would, however, require data for these areas to be made available on the social variables selected. The advantage of disaggregation below the electoral ward level is likely to be marginal, since the profile of the ward in which the practice is located should in most instances be sufficiently representative for setting the appropriate remuneration. If a practice contains parts of more than one ward the score could be determined on a proportionate basis.

The use of census information—particularly from the 1981 census, which is now more than 10 years old—as the basis for policy making has long been questioned,[15] but, until at least 1993 it is the only socioeconomic information available by small geographical areas for use in health care planning. We assumed that the proportion of individuals having the selected attributes (namely, housing tenure, access to a car, socioeconomic group, and country of birth) changes slowly over the years in contrast to the more volatile variables such as unemployment. For this reason we did not include the levels of unemployment in the analysis. We nevertheless recognise that such factors might and should influence the distribution of resource, perhaps on a short term basis.

The validity of using the underprivileged area score as the basis for determining deprivation supplements, as proposed in the general practitioner contract,[10] has given increasing concern.[9 12-17] The scoring, based initially on the opinions of a sample of doctors about factors influencing workload, is subjective and not derived from actual utilisation, and it could incorporate an urban bias. The scores derived are not "independent" of each other and do not allow for the age structure of the practice population, an important influence on general practitioner workload. It is also questionable whether a system of remunerating doctors should be based on their own opinions. In an analysis for Scotland the deprivation scores and health indicators (standardised mortality ratio and census measure of the permanently sick) were shown to have a weaker association with the underprivileged area score than with some other scores.[21] The authors of that study questioned some of the variables included in the underprivileged area score and concluded that demography and concepts of disadvantage should be kept distinct in determining payments to general practitioners.

The deprivation index proposed here avoids most of these shortcomings. It is based on data from large national surveys and could be updated annually. It is based on actual utilisation rates and is applicable at the smallest geographical level or for a given practice population. There is some confirmation of its applicability from a recent study that examined the workload of two general practices in Spitalfields.[22]

General practitioners' workload is influenced by many considerations, and it varies widely.[1] Deprivation is generally acknowledged to be an important determinant. Moreover, recent evidence shows that investment and innovation in general practice is also related to local environmental factors, and that practices in socially deprived areas fare worse in these terms.[23] Without substantial supplements for such practices, incentives for trainees to enter practice in deprived areas, and the quality of care available, will decline.[9] As deprivation payments will amount to substantial sums of money the basis for allocating them should be considered carefully. The proposed index lends itself to application nationwide.

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Appendix

Derivation of deprivation scores and deprivation indices for general practitioner workload

Assuming that there are k electoral wards in England under consideration, then there are, for example, N_i ($i=1,\ldots,k$) men in ward i aged 16 to 64 of which M_i are of the manual socioeconomic group and the remainder are in the non-manual group. The odds ratio for excess of consultation is 1·06 (table I) for the manual group and this leads to an effective number of men in the ward for consultation as

$$n_i=(N_i-M_i)+1{\cdot}06M_i$$
$$=N_i+0{\cdot}06M_i$$

The total number of these men in England is the sum of their numbers in each ward, that is $N=\Sigma N_i$, the total effective number of men is $n=\Sigma n_i$ and their ratio is $W=N/n$. The individual n_i of each electoral ward is then scaled relative to England as a whole and expressed as a proportion of its own population of men, giving

$$p_{Si}=Wn_i/N_i$$

The S denotes adjustment for socioeconomic group.

Similar calculations for tenure (T), car ownership (C), and country of birth (B) give for each ward p_{Ti}, p_{Ci} and p_{Bi} and their product is the deprivation score:

$$DS_i=p_{Si}\,p_{Ti}\,p_{Ci}\,p_{Bi}$$

which provides the final scaling factor relating to men in the ward, taking account of the various socioeconomic characteristics (the deprivation score of table II).

Similar calculations are applied to children, women, and elderly people.

For each electoral ward the actual age-sex structure is available so that by applying the age-sex specific consultation rates from the national morbidity study to the individual wards the expected number of consultations are calculated (table III, column 2) and totalled for England. The weighted consultations take account of the ward specific deprivation scores for the four groups standardised against the total number of expected consultations for England. Finally, the deprivation index (table III, column 4) is the ratio of these two consultation estimates.

Screening for cervical cancer by direct inspection

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Abstract

***Objective*—To assess the efficacy of visual screening for cervical cancer in the maternal and child health setting.**

***Design*—Clinical and cytological screening.**

***Setting*—Maternal and child health centres, Delhi.**

***Subjects*—44 970 women attending the centres from May 1988 to March 1991.**

***Results*—238 cancers in early stages (0-IIa) were detected cytologically and proved through biopsy. Prevalence of cancer in women defined as high risk through examination by speculum was 29/1000 as compared to 1·53/1000 among women with a normal looking cervix. Though only 11·4% women belonged to the high risk category, 63% had early stage cancer. If all women with bleeding symptoms were included in the high risk category, the yield of cancer would be 71·4% (170/238) by referring only 15·6% of women attending maternal and child health centres for further evaluation through cytology or colposcopy.**

***Conclusion*—Though visual screening is a sub-optimal strategy in comparison to the cytological screening, it may be useful where there is a heavy load of prevalent cancer and where cytological screening may not be available for years to come.**

Introduction

Cervical cancer is the leading malignancy among Indian women, with about 90 000 new cases occurring every year. Unfortunately the facilities for nationwide cytological screening do not exist because trained staff are few. It has been estimated that even with a 12-fold increase in staff trained in cytology, only about a quarter of women over the age of 35 could be screened by the turn of the century. Therefore, there is a distinct need for an alternative strategy to detect cancer at an early stage. One such strategy is visual screening: the visual examination of the cervix of asymptomatic women so as to detect cancer at an early stage.[1,2] Such a strategy is not expected to decrease the incidence of invasive cancer, but it would decrease mortality through early detection.

We have shown that it is possible to detect about 50% of cervical cancers at an early stage (stage 0-IIa) through visual screening.[2] This is in sharp contrast to the prevailing situation, when only 5% of women with cancer report to the treatment centre at an early stage. Such a strategy, if feasible, is to be implemented in the existing maternal and child health services. This paper assesses the efficacy of direct visual inspection of the cervix for early detection of cervical cancer.

Materials and methods

A total of 44 970 women attending maternal and child health centres in Delhi were screened clinically as well as cytologically. These centres provide maternal and child health care to the women of reproductive age, including gynaecological check ups, antenatal services, family planning services, and treatment for infertility. Most women attending the centres had minor symptoms such as vaginal discharge, backache, and vague abdominal pain.

Cancers were detected through cytology and confirmed through biopsy directed by colposcopy. The clinical symptoms and the findings of the vaginal pelvic examination as well as of examination by speculum were recorded on a pretested form. The rates of malignancy per 1000 women screened were calculated for women presenting with each symptom. Women with symptoms with similar malignancy rates were grouped into four categories: symptom free; symptoms other than bleeding, including vaginal discharge, painful abdomen, backache, itching vulva; menstrual problems such as scanty periods, menstrual irregularities, prolonged periods, heavy periods; bleeding symptoms, which consisted of intermenstrual bleeding and contact bleeding (table I).

The rates of malignancies per 1000 women screened were calculated for women with different clinical signs as described on examination by speculum. The clinical signs with similar malignancy rates were grouped into three categories: normal looking cervix; a low risk category that included cervicitis, cervical erosions, cervical polyps, and prolapsed uterus; a high risk category that included erosions that bled on touch, small growths, and a suspicious looking cervix. We calculated 95% confidence intervals for the prevalence of cancer in different categories of symptoms and signs.[3]

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