Deprivation and cause specific morbidity: evidence from the Somerset and Avon survey of health

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Abstract

***Objective*—To investigate the association between cause specific morbidity and deprivation in order to inform the debates on inequalities in health and health services resource allocation.**

***Design*—Cross sectional postal questionnaire survey ascertaining self reported health status, with validation of a 20% sample through general practitioner and hospital records.**

***Setting*—Inner city, urban, and rural areas of Avon and Somerset.**

***Subjects*—Stratified random sample of 28080 people aged 35 and over from 40 general practices.**

***Main outcome measures*—Age and sex standardised prevalence of various diseases; Townsend deprivation scores were assigned by linking postcodes to enumeration districts. Relative indices of inequality were calculated to estimate the magnitude of the association between socioeconomic position and morbidity.**

***Results*—The response rate was 85·3%. The prevalence of most of the conditions rose with increasing material deprivation. The relative index of inequality, for both sexes combined, was greater than 1 for all conditions except diabetes. The conditions most strongly associated with deprivation were diabetic eye disease (relative index of inequality 3·21; 95% confidence interval 1·84 to 5·59), emphysema (2·72; 1·67 to 4·43) and bronchitis (2·27; 1·92 to 2·68). The relative index of inequality was significantly higher in women for asthma ($P<0·05$) and in men for depression ($P<0·01$). The mean reporting of prevalent conditions was 1·07 for the most deprived fifth of respondents and 0·77 in the most affluent fifth ($P<0·001$).**

***Conclusions*—Material deprivation is strongly linked with many common diseases. NHS resource allocation should be modified to reflect such morbidity differentials.**

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Introduction

The strong link between deprivation and mortality has been well documented.[1-6] The association between deprivation and morbidity has been investigated to a lesser extent, with many of the studies using only general indicators of ill health[7] or a few disease specific measures.[8] A recent King's Fund report brought the issue of inequalities in health into sharp focus, particularly highlighting the paucity of evidence regarding inequalities in the health of women and of people aged 65 and over.[9] The aging population in the United Kingdom[10] is set to inflate the overall prevalence of morbidity; research must investigate the possibility that, as well as dying younger, those with greatest material deprivation may also experience the greatest physical and mental illness, disability, and handicap.

Ascertainment of the burden of morbidity in a defined population has proved an essential but elusive goal because of the absence of sufficiently detailed, large scale databases.[11] The morbidity statistics from general practice[12] provide a useful guide but record only patient consultations, and the general household survey[13] does not break down long term illness by condition. Thus debate has centred on how well measures such as mortality, health services utilisation statistics, and data derived from the census can act as proxies for morbidity.

The use of mortality data to inform the allocation of health services resources, as in the Resource Allocation Working Party formulas,[14] has long been recognised to be limited.[1,15] Their use in estimating the burden of non-life threatening but resource intensive conditions, such as musculoskeletal disorders, has been criticised.[16] Health services utilisation figures have also been criticised as a poor proxy for morbidity[17] because of the influence of variations in supply, demand, and professional decision making, as well as the dubious quality of data recording and coding.[18]

Despite a decade of calls for the need to measure the distribution of morbidity at a local level,[19] there is a lack of clear evidence for the strength of association between many non-life threatening illnesses, such as musculoskeletal disease or eye problems, and deprivation. We explored the association between self reported morbidity and deprivation in the Somerset and Avon survey of health, a large population study conducted in 1994-5.

Methods

SAMPLING

The study population was obtained by using a multistage sampling frame.[20] The first stage units were the general practices of Avon and Somerset that had a minimum list size of 1000 patients aged 35 years and over. Forty general practices representing a mix of urban, inner city, and rural areas were selected. The mean underprivileged area score of the study practices was 0·16, similar to that of all Avon and Somerset practices (0·10), and scores ranged from −20·61 (affluent) to 21·01 (deprived). Six practices were from deprived areas of south Bristol; eight were from a mixture of affluent suburbs and deprived housing estates in north west Bristol; nine were from inner city and urban areas of east Bristol and rural towns and villages in north east Avon; and 17 were from rural areas and coastal towns of south Avon and Somerset. A ratio of 2:1 for larger practices (those with three or more partners) to smaller practices meant that an "equal probability of selection method" was used.[20]

The sampling frame for each practice was the register of patients held by Avon and Somerset family health service authorities. A fixed number of second

stage units, 702 participants from each practice, was selected from the family health service authority list, using a random sample stratified by age and sex, resulting in a total sample of 28 080 individuals. The number of men and women in each 10 year age band reflected the age structure of Avon and Somerset in the 1991 census.

DATA COLLECTION AND VALIDATION

A prepiloted, self completed, postal questionnaire including questions on general health was used. The respondents were asked whether a doctor had ever told them that they had a particular disease. Extensive piloting showed which lay terms should be used to achieve maximum comprehension.

Each questionnaire was accompanied by a letter countersigned by the participant's general practitioner. After one postal reminder, which included a duplicate questionnaire, a telephone prompt was given to all non-responders whose telephone numbers could be obtained. Those who were willing answered the questions over the telephone with a trained interviewer. All who could not be contacted by telephone were sent a third postal reminder and questionnaire. Addresses of the non-responders were checked against the electoral register before the third mailing, and lists were sent to the general practices to establish information about recent deaths, hospitalisation, or change of address.

Validation of the self reported questionnaire was undertaken by trained research staff by ascertainment of the morbidity status of a 20% sample of responders from general practitioner held computerised records, case notes, and hospital information. Confirmation of a "positive" case was restricted to those where there was reported evidence from the general practitioner or hospital records. The sensitivity and specificity of each question was calculated. Sensitivity was defined as the proportion of people recorded in their general practice case notes as having a disease, who claimed in their questionnaire to have this disease; specificity referred to the proportion of people who were free of the disease according to their medical notes and who did not claim to have the disease in their questionnaire.

STATISTICAL METHODS, INCLUDING DERIVATION OF RELATIVE INDEX OF INEQUALITY

The postcodes of all responders to the screening questionnaire were linked to enumeration districts, allowing the Townsend deprivation score[3] (derived from the 1991 census) to be assigned. This enabled the responders to be ranked and sorted into fifths according to the deprivation score attached to their postcode. The top fifth represented participant reported morbidity in the top 20% most affluent enumeration districts in Avon and Somerset; the bottom fifth represented the most deprived enumeration districts. Age and sex specific morbidity rates were calculated for each fifth and for each condition, and the data were then standardised by age and sex, both individually and combined. The reference for the standardisation was the population of Avon and Somerset. A test for trend was carried out using logistic regression with deprivation scored as 1 (affluent) to 5 (deprived) and treated as a continuous variable.

The relative index of inequality[21,22] was chosen for the analysis because it provides a single comparable indicator of the degree of inequality across socioeconomic categories and is sensitive to changes in the distribution of population across socioeconomic groups.[21] The relative index of inequality, in the context of this study, is the proportionate increase in morbidity associated with an increase in socioeconomic deprivation from 0 to 1: from the top to the bottom of the socioeconomic hierarchy. The index reveals differences that are systematically related to an ordering of groups from high to low socioeconomic position. The larger the relative index of inequality, the greater the degree of inequality across the socioeconomic hierarchy

For calculation of the relative index of inequality, the population was divided into fifths using the rank of the Townsend score for each enumeration district. The socioeconomic position of each age and sex group within each fifth was assigned a value between 0 and 1 according to the proportion of respondents with a higher socioeconomic position than the midpoint of each fifth. Logistic regression was used to relate the socioeconomic position to the prevalence of each reported disease.[23,24] Exponentiation of the regression coefficient resulted in an odds ratio: the relative index of inequality. If the prevalence was low, for example less than 0·1, the odds ratio could be interpreted as the relative risk for having the disease at the bottom compared to the top of the socioeconomic hierarchy.

The relative index of inequality was calculated by using the statistical package EGRET.[25] The analysis was undertaken for men and women separately and then for the sexes combined. Age group, sex, and socioeconomic position were the explanatory variables. The difference between the resulting relative index of inequality for men and women was tested by adding an interaction term for socioeconomic position and sex into the model.

Results

Of the original sample of 28 080 people, 22 966 returned a questionnaire (81·8%). The denominator was adjusted to 26 931 to take account of the 1149 people who were excluded because they either had moved out of the family health service authority catchment area or had died. This increased the response rate to 85·3% (men 83·4%, women 86·9%). Table 1 shows the age and sex breakdown of responders and non-responders. The poorest response for both sexes was in those over the age of 85. Men aged 35-44 showed the lowest response (77·9%) among study participants of working age. Logistic regression was used to test whether age or sex were significantly related to the observed pattern of response; for both age and sex the differences were highly significant ($P < 0·001$).

The postcodes of the respondents covered 50% of enumeration districts in Avon and Somerset. Only four people from the original sample, of whom two were

Table 1—*Number (percentage) of responders and non-responders by age and sex*

	Responders (n=22 966)	Non-responders (n=3965)	Total
Men			
35-44	2715 (77·9)	772 (22·1)	3487
45-54	2440 (81·0)	573 (19·0)	3013
55-64	2238 (86·9)	338 (13·1)	2576
65-74	1900 (91·1)	185 (8·9)	2085
75-84	933 (87·4)	135 (12·6)	1068
≥85	157 (73·4)	57 (26·6)	214
Total	10 383 (83·4)	2060 (16·6)	12 443
Women			
35-44	3085 (85·1)	542 (14·9)	3627
45-54	2705 (86·9)	409 (13·1)	3114
55-64	2473 (91·0)	246 (9·0)	2719
65-74	2377 (91·0)	238 (9·0)	2615
75-84	1541 (85·1)	269 (14·9)	1810
≥85	402 (66·7)	201 (33·3)	603
Total	12 583 (86·9)	1905 (13·1)	14 488

responders, had postcodes which could not be assigned to an enumeration district. For the purpose of these analyses 170 (0·6%) questionnaires were excluded because the relevant questions were not completed.

Table 2 summarises the results of the validation, which involved a 20% sample (4574) in which self reported illness could be linked with general practitioner records for 4170 (18%). Specificities were above 90%, except for musculoskeletal disorders. Sensitivities were more variable, being particularly low for bronchitis and depression.

Table 2—*Validation of screening questionnaire in 4170 patients*

Condition	No of respondents reporting condition	Sensitivity (%)	Specificity (%)
Musculoskeletal	1369	62	79
Angina	263	71	98
Myocardial infarction	125	56	99
Asthma	293	71	98
Bronchitis	383	29	94
Emphysema	37	63	99
Cataract	230	64	98
Diabetic eye disease	38	64	99
Glaucoma	86	62	99
Hypertension	860	72	92
Depression	407	33	95
Stroke	103	51	99
Diabetes	127	69	100

Table 3 reports the age standardised prevalences (with standard errors) for men for each of the diseases reported across the fifths. The trend showed a significant increase in prevalence from the top fifth to the bottom fifth for musculoskeletal disease, angina, myocardial infarction, bronchitis, emphysema, depression, and stroke. A similar pattern emerged for women (table 4), where these diseases, with the addition of asthma and diabetic eye disease, were significantly more prevalent in the more deprived groups. The mean number of diseases reported by both sexes combined for the most affluent fifth was 0·77 compared with 1·07 for the most deprived fifth. The difference of 0·30 (95% confidence interval 0·26 to 0·34) was highly significant ($P<0·001$).

When both age and sex were included in the logistic regression model (table 5) all conditions except diabetes had a relative index of inequality greater than 1, indicating that those in the most deprived fifth had a higher chance of reporting the disease than those in the most affluent fifth. The lower confidence limit was above 1 for musculoskeletal disorders, angina, myocardial infarction, bronchitis, emphysema, diabetic eye disease, and stroke. Diabetic eye disease was most strongly related to socioeconomic position, followed by emphysema and bronchitis.

Tests of the difference between the relative index of inequality for men and women with each condition (table 5) showed significant differences for asthma ($P=0·05$; higher in women) and depression ($P=0·001$; higher in men). The pooled relative index of inequality and confidence interval was not given for these two conditions because there was a significant interaction between sex and socioeconomic position.

Discussion

The Somerset and Avon Survey of Health focused on a population aged 35 years and over, selected by a multistage sampling procedure from 40 general practices in the west country. It found a positive association between deprivation and many diseases, mirroring the inequalities already found for mortality.[3] As Wilkinson stated, "in so far as the shortening of life is associated with poor social and economic circumstances, class differences in health represent a double injustice: life is short where its quality is poor."[26]

Table 3—*Age standardised prevalence per 100 (SE) of self reported diseases by deprivation category for men*

Condition	1st fifth (n=2597)	2nd fifth (n=2367)	3rd fifth (n=1624)	4th fifth (n=1696)	5th fifth (n=2024)	P value (test for trend)
Musculoskeletal diseases	14·1 (0·607)	15·1 (0·637)	16·1 (0·788)	16·1 (0·766)	17·7 (0·730)	<0·001
Angina	4·4 (0·377)	5·5 (0·413)	5·5 (0·486)	5·5 (0·484)	6·9 (0·485)	<0·001
Myocardial infarction	3·2 (0·320)	3·7 (0·348)	4·0 (0·422)	4·5 (0·447)	4·8 (0·408)	<0·001
Asthma	5·6 (0·406)	6·1 (0·443)	6·2 (0·543)	6·4 (0·538)	6·4 (0·490)	0·18
Bronchitis	5·2 (0·399)	6·3 (0·450)	7·3 (0·576)	7·7 (0·578)	9·1 (0·562)	<0·001
Emphysema	1·1 (0·196)	1·1 (0·192)	1·0 (0·217)	1·1 (0·226)	2·1 (0·280)	0·002
Cataract	2·8 (0·304)	2·8 (0·297)	3·0 (0·360)	2·2 (0·316)	3·4 (0·343)	0·45
Diabetic eye disease	0·5 (0·124)	0·6 (0·143)	0·9 (0·205)	1·0 (0·218)	0·7 (0·167)	0·05
Glaucoma	1·1 (0·192)	1·4 (0·217)	1·5 (0·264)	1·3 (0·246)	1·3 (0·221)	0·46
Hypertension	14·0 (0·804)	14·3 (0·631)	13·7 (0·747)	14·4 (0·744)	15·4 (0·701)	0·12
Depression	3·9 (0·347)	4·8 (0·397)	5·9 (0·531)	6·2 (0·527)	6·9 (0·510)	<0·001
Stroke	2·0 (0·268)	1·8 (0·246)	1·3 (0·240)	2·3 (0·325)	2·6 (0·311)	0·03
Diabetes	2·4 (0·276)	2·5 (0·288)	3·7 (0·415)	2·7 (0·353)	2·1 (0·282)	0·83

Table 4—*Age standardised prevalence per 100 (SE) of self reported diseases by deprivation category for women*

Condition	1st fifth (n=3035)	2nd fifth (n=2651)	3rd fifth (n=1838)	4th fifth (n=2162)	5th fifth (n=2516)	P value (test for trend)
Musculoskeletal diseases	27·3 (0·794)	28·6 (0·798)	30·6 (1·00)	30·5 (0·933)	34·5 (0·909)	<0·001
Angina	3·8 (0·372)	4·4 (0·377)	4·6 (0·452)	4·4 (0·414)	5·8 (0·444)	0·002
Myocardial infarction	1·5 (0·240)	1·9 (0·256)	1·7 (0·289)	1·8 (0·280)	2·5 (0·301)	0·03
Asthma	6·4 (0·446)	5·2 (0·451)	7·5 (0·632)	7·0 (0·552)	9·8 (0·594)	<0·001
Bronchitis	7·5 (0·488)	9·1 (0·519)	9·0 (0·654)	10·2 (0·653)	13·2 (0·674)	<0·001
Emphysema	0·4 (0·110)	0·5 (0·125)	0·8 (0·199)	0·8 (0·182)	0·9 (0·180)	0·008
Cataract	5·6 (0·435)	6·0 (0·419)	4·6 (0·448)	6·1 (0·461)	5·2 (0·404)	0·64
Diabetic eye disease	0·6 (0·146)	0·5 (0·137)	0·6 (0·178)	0·7 (0·180)	1·5 (0·235)	<0·001
Glaucoma	1·7 (0·269)	2·2 (0·274)	1·2 (0·241)	1·7 (0·258)	2·1 (0·271)	0·72
Hypertension	18·9 (0·718)	19·5 (0·730)	18·6 (0·872)	18·4 (0·807)	19·2 (0·764)	0·87
Depression	10·1 (0·543)	10·5 (0·571)	11·4 (0·726)	12·5 (0·719)	12·7 (0·666)	<0·001
Stroke	1·6 (0·244)	2·0 (0·250)	2·1 (0·321)	2·2 (0·292)	2·4 (0·292)	0·04
Diabetes	2·6 (0·302)	2·4 (0·286)	2·1 (0·321)	2·1 (0·307)	2·4 (0·303)	0·56

Table 5—*Age standardised relative indices of inequality. Values are relative index of inequality (95% confidence interval)*

Condition	Men	Women	Total	P value for interaction
Musculoskeletal diseases	1·47 (1·22 to 1·77)	1·57 (1·36 to 1·82)	1·53 (1·36 to 1·72)	0·22
Angina	1·77 (1·32 to 2·38)	1·69 (1·22 to 2·34)	1·74 (1·40 to 2·16)	0·61
Myocardial infarction	1·86 (1·32 to 2·38)	1·73 (1·06 to 2·83)	1·82 (1·38 to 2·41)	0·56
Asthma	1·20 (0·92 to 1·57)	1·81 (1·42 to 2·31)	*	0·04
Bronchitis	2·22 (1·71 to 2·86)	2·33 (1·87 to 2·90)	2·27 (1·92 to 2·68)	0·43
Emphysema	2·54 (1·40 to 4·63)	3·18 (1·35 to 7·47)	2·72 (1·67 to 4·43)	0·81
Cataract	1·17 (0·78 to 1·76)	0·93 (0·68 to 1·26)	1·01 (0·79 to 1·30)	0·70
Diabetic eye disease	2·18 (0·99 to 4·80)	4·69 (2·13 to 10·34)	3·21 (1·84 to 5·59)	0·10
Glaucoma	1·25 (0·69 to 2·23)	1·10 (0·66 to 1·81)	1·16 (0·79 to 1·69)	0·95
Hypertension	1·17 (0·96 to 1·41)	0·99 (0·83 to 1·17)	1·06 (0·94 to 1·21)	0·65
Depression	2·24 (1·69 to 2·98)	1·44 (1·17 to 1·75)	*	<0·01
Stroke	1·67 (1·04 to 2·69)	1·65 (1·03 to 2·66)	1·66 (1·19 to 2·33)	0·98
Diabetes	0·96 (0·63 to 1·44)	0·88 (0·57 to 1·36)	0·92 (0·69 to 1·24)	0·92

*Relative index of inequality is not recorded where there is significant interaction between sex and socioeconomic position.

This study collected morbidity, as opposed to mortality, data from a population sample.[3] Unlike published statistics recorded from general practices,[12] the results of this study were not based on current or recent consultations with health professionals. A crucial issue relates to the validity and generalisability of the results, which are dependent on the response rate and the accuracy of self reported diseases.

The response rate may be influenced by the quality of data on the sampling frame. Because of reported inaccuracies of family health service authority data[27] we chose to check names and addresses of non-responders against other sources: general practice records and the electoral register. Sampling close to the date of questionnaire distribution kept down inaccuracies caused by death or incorrect addresses to 4·04%, similar to the 4·1% reported by Bickler *et al.*[27] The letters accompanying the questionnaires were countersigned by the participating general practitioners, showing their support for the study and emphasising that the research was being carried out in partnership with the practice. This may have improved the response rate.

In explaining why those aged 85 and over produced the highest rate of non-response, it should be remembered that the numbers in that age group were small. Those aged under 55, however, comprised half the sample and were the next poorest responders. This, however, should not affect the results greatly since the diseases included in this study primarily affect those over 55 years of age.

ISSUES SURROUNDING THE USE OF SELF REPORTED DATA

The accuracy of self reported morbidity data is problematic, and validation measures are essential. Self reported health status depends not only on the presence of objective health problems but also on personal perceptions of health and ill health, behavioural responses to a perceived health problem, and the propensity to report health problems.[23] The Whitehall II study found clear differences in health risk behaviour between employment grades,[8] and a recent review of studies on illness behaviour suggested that class differences may influence self reported health measures independently of any differences in morbidity.[28] A validated, self reported study found that people in lower employment grades tended to underreport minor psychiatric disorders when compared with those from higher grades, and this was likely to lead to the attenuation of socioeconomic differentials in minor psychiatric disorders in people from the lower grades.[29]

Unlike many previous studies, our study compared self reported morbidity with data recorded in general practitioner records and hospital letters. The quality of information available from general practice case notes is influenced by consultation behaviour, accuracy of diagnosis, and the mechanisms of data recording, storage, and retrieval. In this instance, specificities are influenced by the propensity of general practitioners to record those health problems that they relate verbally to patients. Musculoskeletal disorders—the commonest problem reported by respondents—may be mentioned by general practitioners in passing, but not recorded in the notes, as these symptoms may be seen as normal in older individuals. Sensitivities, in contrast, will be lowered by general practitioners not discussing with patients the diagnoses recorded in their notes. This may particularly relate to depression, with general practitioners being unwilling to discuss their impression directly with the patient. Sensitivities will also be lowered by the chronic but fluctuating nature of these illnesses, in that past instances recorded in the notes may not be recalled, particularly when the severity of the condition has changed.

The use of the terms sensitivity and specificity may therefore be misleading in this respect, as they imply that medical records offer a gold standard and that those problems not recorded in records are "false positives" and those not reported by patients as "false negatives." An individual's own assessment regarding some of the more subjective conditions, such as musculoskeletal disorders and depression, may have meaning, whether or not the diagnosis is recorded in medical notes. An aim of future studies must be to improve both quality and ascertainment of diagnoses.

The usefulness of indices of deprivation, such as those developed by Carstairs[2 30] and Townsend[3] as proxies for morbidity has been much debated,[8 30–36] and their reliance on opaque and statistically complex transformations aggregated at ward and enumeration district level has been criticised.[37 38] There have been calls for a simpler approach[39] and for more individual data about general practice patients rather than using census data.[40] We used the Townsend score to act simply as an ecological marker to describe the areas from which our study population was drawn. The Townsend score was chosen because it has been shown to perform well when explaining variation in a range of health measures and it adheres closely to the concept of material deprivation.[41]

The fact that the geographical area of recruitment included people drawn from 50% of the enumeration districts in the counties of Avon and Somerset suggests that our sample had good coverage. As areas of dense housing may have more households per enumeration district than more affluent areas, our fifths contain equal numbers of enumeration districts but different numbers of people. For this reason, the relative index of inequality was particularly applicable because it is sensitive to changes in the population distribution across socioeconomic groups.

COMPARISONS WITH PREVIOUS EVIDENCE

This study extends evidence of the relation between deprivation and particular forms of morbidity. An increase in the prevalence of disease with decreasing socioeconomic position has previously been reported for cardiovascular disease[8 42 43] and respiratory disease.[8 17 31 43 44] Our morbidity data were congruent with social class differentials in mortality[45] and they accord with the Whitehall II study,[8] which showed a clear increase in the prevalence of self reported angina and chronic bronchitis in the lower grades of employment in the civil service. The health interview survey in the United States[43] showed a significant increase in the prevalence of both heart problems and heart attack in those with fewer years

of formal education. This relation also existed for asthma, bronchitis, lung disease, and diabetes.

In contrast to our results, diabetes and hypertension were more common in lower grade male civil servants aged 35-55 years.[8] The Whitehall II results were based on detailed questionnaires, examinations, and blood tests, whereas the Somerset and Avon survey of health relied on self reported prevalence. As diabetes and hypertension may be asymptomatic or exist in the absence of medical consultation, the results of the Somerset and Avon survey may reflect inadequate use of preventive services, leading to an underestimate of the prevalences in those with higher deprivation scores. The absence of a relation between these conditions and deprivation in women accorded with the Whitehall findings.

A strong association of asthma, bronchitis, and depression with the Jarman score and unemployment statistics was reported in a study of 22 electoral wards in Rotherham.[31] Self reported morbidity questionnaires were used, but the study failed to show a strong relation between arthritis and deprivation. The health interview survey in the Netherlands, however, found that self reported prevalences of chronic obstructive lung disorders, diabetes, heart disorders, and arthritis were more common in lower socioeconomic groups.[46] The Somerset and Avon survey of health found a strong association between deprivation and musculosketal disorders, with clear implications for health care priorities.

The results of the health and lifestyle survey of 9000 adults,[47] which included questions on self reported morbidity and physiological and psychological measures of health status, were consistent with those of the Somerset and Avon survey of health: those in lower income groups were significantly more likely to report more than one condition.[48] The strong relation between deprivation and depression found by the Somerset and Avon survey of health is consistent with recently published findings showing the association between deprivation and suicidal behaviour.[49]

IMPLICATIONS FOR HEALTH SERVICE PROVISION AND RESOURCE ALLOCATION

For certain conditions—for example, glaucoma and diabetic eye disease—self reporting is heavily influenced by use of "preventive" ophthalmic services since these are conditions where there is low diagnostic confidence among general practitioners.[50] The differential use of these services across social classes, influenced by factors such as perceived risk and financial considerations, may lead to an underestimate in prevalence in the more deprived social classes. The tendency for a smaller differential for diabetes, but higher differentials for diabetic eye disease, may be explained by later presentation, poorer compliance with treatment, and less use of screening services. This indicates a need to target more effective screening in deprived areas to deal with this remediable cause of blindness.

The findings of this study have important implications for health services resource allocation. With rising numbers of people aged 65 and over, the prevalence of disease and associated disability is set to increase. Many of the conditions reported in this study place considerable demands on primary care teams and hospital services, with the prospect of a future heavier burden of morbidity in the most deprived areas. This has obvious implications for the funding of health and social care and community care programmes. To ascertain the degree to which resource allocation formulas, traditionally based on mortality, may need to be modified in order to account sufficiently for morbidity, further studies investigating the association of deprivation, mortality, and morbidity are required.

Key messages

- Inequalities in morbidity exist for many common diseases
- The relative index of inequality is a useful tool for analysing self reported morbidity and informing debates on inequalities in health
- Diabetic eye disease, bronchitis, and emphysema are most closely associated with deprivation
- Broader socioenvironmental factors may also be implicated and merit increased attention
- The heavy burden of disease in the most deprived groups, particularly among elderly people, warrants attention in planning of the health service and resource allocation

Four main categories of explanation have been considered to underlie socioeconomic differentials in mortality—artefact, social selection, cultural or behavioural variables, and a materialist explanation.[4] These have been particularly well studied with respect to mortality from cardiovascular disease.[51] Little similar work exists in relation to differences in morbidity. The challenge for future research is to elucidate possible explanations for the relations with specific diseases and determining whether these stem from environmental or health behavioural factors or from differential use of preventive health services.

The association found in this study between deprivation and broad categories of morbidity is undeniable. Although existing research has explored this theme for some diseases, such as cardiovascular and respiratory disorders, certain of the new results presented here are potentially of great importance. In particular, the pronounced differential across socioeconomic groups for sight threatening diabetic eye disease raises clear questions regarding the detection and quality of management of diabetics and is a strong pointer to the necessity for focused action in deprived areas. Consideration of effective action should precede the more detailed aetiological research which undoubtedly is needed.

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Always check the references

When I was a trainee an ophthalmology consultant gave me some useful advice: "Always check that the claims made in articles and textbooks are supported by the references." This may seem obvious, but for many of us such an activity is time consuming and spare time is in short supply. Consequently we tend to believe what authors tell us, so long as they support their assertions with a reliable looking reference or two. This, however, can lead to the propagation of medical myths. When I was a student the fable of the fat, fair, female, and 40 year old gall stone sufferer was recounted at every surgical ward round. No doubt medical textbooks continue to be peppered with these old wives tales.

My consultant recalled a curious example from a respected ophthalmology textbook which contained a small print statement about a rare complication of a human eye disorder. Never having seen or heard of it, he set out on a paperchase to find the source of the claim, only to discover that the problem had never been described in anything larger than the single celled protozoan *Paramecium* and its rudimentary "eye" apparatus.

Recently, I came across an equally bizarre example from the other end of the animal kingdom, related to misuse of lysergide (LSD). Various papers reported rare fatalities when LSD was taken in overdose. Eventually I tracked down the original source of this information, an article entitled: "LSD and its effect on a male Asiatic elephant."[1] This extraordinary case report was published in *Science* in 1962. Elephants taking LSD, even by the wayward standards of the 1960s, sounded somewhat surreal. Investigators had already tried the drug on cats and rhesus macaques and were working their way through the animal kingdom until they arrived at the largest living land mammal. The authors, two psychiatrists and a zoo keeper justified the experiment as an attempt to simulate the periodic mental disturbance that male elephants suffer known as going "on musth."

In humans a dose of 100 μg of LSD is sufficient to produce hallucinations. Tusko the elephant was given 297 mg, delivered by a rifle powered cartridge fired into his gluteal mucle. There follows a disturbing account of poor Tusko's demise. He started by trumpeting and rushing around his pen, became uncoordinated, collapsed in status epilepticus, and finally died after one hour and 40 minutes. The main effect of the article is to impel the reader to send a large cheque to the Royal Society for the Prevention of Cruelty to Animals or sign up for the Animal Liberation Front.

Following up references may certainly lead researchers into unexpected territory, but it is essential to know whether they actually confirm the statements they are cited to support.—JOHN DUNN *is a visiting researcher in Sao Paulo, Brazil*

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We welcome filler articles of up to 600 words on topics such as *A memorable patient, A paper that changed my practice, My most unfortunate mistake,* or any other piece conveying instruction, pathos, or humour. If possible the article should be supplied on disk.