Using unemployment rates to predict prescribing trends in England

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SUMMARY

Background. *There are many factors underlying trends in prescribing levels in England.*

Aim. *This study set out to examine prescribing trends and their relationship with three measures of morbidity.*

Method. *A study was undertaken examining the interrelations between basic prescribing parameters for the 90 family health services authorities in England for the year 1 April 1989 to 31 March 1990. The trends were examined for their associations with three factors which have been linked to morbidity levels: standardized mortality ratios, the Jarman index (through its use as a deprivation index), and unemployment rates.*

Results. *Analysis revealed a strong inverse association between the number of items prescribed per patient and the net ingredient cost per item for the family health services authorities. These two factors together determined the net ingredient cost per patient. Cluster analysis was found to segregate approximately the family health services authorities geographically: the northern, urban areas of England were characterized by a high number of low cost items per patient while the southern semi-rural areas had a low number of high cost items per patient. The trend was such that the former area had a higher overall net ingredient cost per patient. Unemployment rates were the most robust determinant of the inverse trend of number of items and cost of items and were comparable with standardized mortality ratios in their individual correlations with the prescribing net ingredient cost per patient. The Jarman index was the weakest of the predictors.*

Conclusion. *The results lend support to the argument that material deprivation, associated with unemployment, is an important determinant of prescribing trends, perhaps acting through its effect on morbidity, and that the Jarman index is a poor indicator of deprivation. The analysis alone cannot, however, determine cause and effect for the apparent relationship between unemployment and prescribing.*

Keywords: unemployment; prescribing rates; prescribing costs; irregularities in health; socioeconomic factors.

Introduction

THE link between deprivation in a community and ill health and mortality is now well established in the United Kingdom.[1-10] Reliable and consistent measures of material deprivation would therefore be of great use in health needs assessment and resource allocation. Several indices of deprivation have been created[5,11-15] but none has been verified as reliable, and two (the Jarman underprivileged area eight score and the Townsend material deprivation score) have been shown to be mutually inconsistent.[16] The most widely known and used of these indices is the Jarman index.[11,14] However, criticism of the use of this as a measure of deprivation by family health services authorities in determining primary care deprivation payments has been extensive.[17-20] This is not least because its original intention was as a measure of general practitioners' workload rather than deprivation in an area; deprivation is only one factor which could contribute to general practitioners' workload and so a link between the Jarman index and deprivation might be expected to be weak. Further criticism came in a study by Campbell and colleagues, who showed that the Jarman index was the least appropriate index for health authority use in service planning.[21] Furthermore, one of the component factors of the Jarman index, unemployment rates, was shown to be a better indicator of deprivation than the Jarman index itself in correlating with various morbidity measures.

As material deprivation is known to be linked to morbidity and mortality, it is reasonable to expect it to be linked to prescribing in primary care, assuming that detection of morbidity is comparably efficient in all geographical areas. Published work supports this claim and indeed variations in prescribing costs per patient in the 90 family health services authorities in England are essentially predictable in terms of simple demographic and morbidity factors.[22-24] However, these studies did not explore the underlying trends between the net ingredient cost per item and the number of items prescribed per patient. These factors are the basic parameters which combine to give the net ingredient cost per patient. Investigation of the relationships between these two factors will help to evaluate further the mechanisms underlying the trends in prescribing levels in England.

A study was undertaken to examine the trends in the net ingredient cost per item and the number of items prescribed per patient in the 90 family health services authorities in England for the year 1 April 1989 to 31 March 1990, and to investigate their relationship with three surrogate measures of morbidity: standardized mortality ratios, the Jarman index, and unemployment rates, the last two factors being associated with morbidity through their links with material deprivation.

Method

Prescribing data, the Jarman underprivileged area eight score and five-year all-causes standardized mortality ratios for ages 0–64 years were obtained for the 90 family health services authorities in England from the 1989–90 health services indicator dataset.[25] All data used in the unemployment analysis were obtained for 1989 from *Regional trends*.[26] The data that appear in this at district level can be adapted to family health services authority data as the boundaries are coterminous.

Prescribing costs

For the purposes of the analysis, net ingredient cost per item and number of items prescribed per patient were calculated using the resident population of the family health services authority according to Office of Population Censuses and Surveys data, rather than the registered population on general practitioners' lists, as the denominator. This helped to reduce the effect of inflated registered lists caused by the mobility of patients. The

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Submitted: 24 November 1992; accepted: 27 April 1993.

© *British Journal of General Practice*, 1994, **44**, 53-56.

advantage of using net ingredient costs (that is, the cost of the drug or appliance alone, rather than the total prescribing cost) has been discussed elsewhere.[24]

Unemployment rates

The official unemployment figures[26] relate to those persons claiming benefit (that is, unemployment benefit, income support or national insurance credits) at an unemployment benefit office. In order to appraise the sensitivity of the definition of unemployment to its correlation with prescribing variables, unemployment rates were defined in three ways: the percentage unemployed of the resident population in the family health services authority (according to Office of Population Censuses and Surveys data) who were aged 16 years and over but were under pensionable age; the percentage unemployed of employed plus unemployed people in the family health services authority; and the percentage of all registered unemployed people who were long-term unemployed, that is, had been claiming benefit for more than one year. It was believed that the first definition would be most representative of the family health services authority. Family health services authorities are not self-contained labour markets, especially in inner city areas and many people commute to work outside their resident family health services authority. Therefore, the second definition might be expected to relate less accurately to a family health services authority than the other two measures. The situation is further complicated by the fact that some people claim benefit outside their resident area. However, this would affect the first and the second definitions. The third definition was also used as it was felt that the levels of long-term unemployment might represent deprived areas more accurately than basic unemployment rates.

Analysis

Analysis compared the associations of the Jarman index, the three unemployment rates, and the standardized mortality ratio with the prescribing variables (number of items prescribed per patient, net ingredient cost per item and net ingredient cost per patient). Spearman rank correlation coefficients were used to eliminate the effects of departures from normal distributions in the variables under study.

Discriminant analysis was used to demonstrate the capacity of unemployment in the prediction of prescribing trends. The 90 family health services authorities in England were randomly assigned to one of two groups using the statistical package for the social sciences, *SPSS-PC*: one containing 41 authorities and the other containing 49. This process meant that a 50:50 split would not necessarily occur. The larger group was used to perform the analysis to enable the prescribing trends of the family health services authorities in the smaller group to be predicted. The prescribing trends were classified for the purposes of the discriminant analysis according to a low number of items prescribed per patient and a high cost per item (group 1) and a high number of items prescribed per patient and a low cost per item (group 2). Cluster analysis, using the standardized number of items prescribed per patient and net ingredient cost per item as variables, was used to select the code for each family health services authority. The variables used to predict the prescribing trends were the Jarman index, five year all-causes standardized mortality ratios and the three unemployment rates.

Results

Family health services authorities with higher numbers of items prescribed per patient were also found to have cheaper items ($r = -0.704$, $P<0.001$, Figure 1). These family health services authorities also had, in general, the highest prescribing costs per patient (mean cost for patients in group 2 family health services authorities was £46.38) and were predominantly northern urban areas of England, for example, Salford (10.6 items at £5.08 totalling £53.85 per patient). The southern semi-rural areas, for example Oxfordshire (6.0 items at £5.97 totalling £35.82 per patient), were characterized by low numbers of more expensive items at an overall cheaper cost per patient (mean cost for patients in group 1 family health services authorities was £41.04). These two groups identified by cluster analysis were then used in the discriminant analysis.

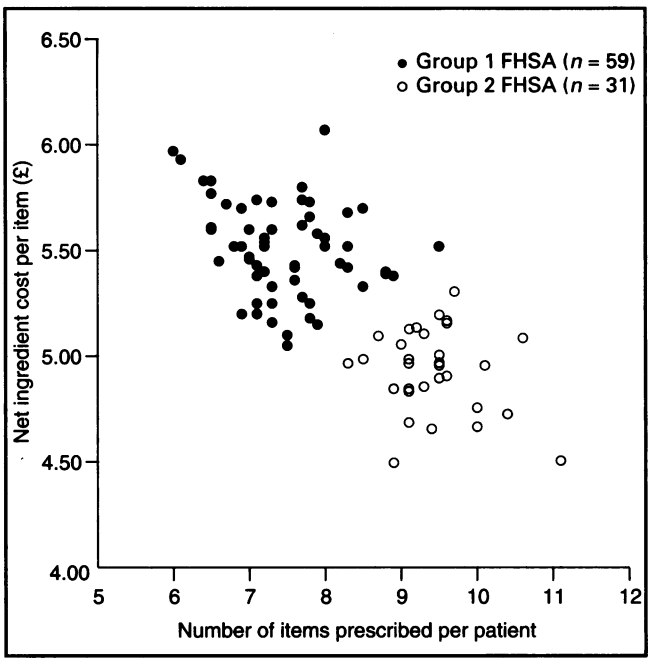

Figure 1. *Cluster analysis showing family health services authorities with a low number of items prescribed per patient and a high cost per item (group 1) and those with a high number of items prescribed per patient and a low cost per item (group 2) for 1 April 1989 to 31 March 1990.*

The correlation coefficients for the Jarman score, unemployment rates and standardized mortality ratio with prescribing variables are shown in Table 1. All three measures of unemployment and the standardized mortality ratio were found to have a closer correlation with the prescribing variables than the Jarman index. The three measures of unemployment were comparable in their associations with the prescribing variables.

Discriminant analyses found that of the predictors, unemployment rates were the best predictor of prescribing trends (Table 2). Ninety three per cent of family health services authorities were correctly classified as either having a low number of items prescribed per patient with a high net ingredient cost per item or a high number of items prescribed per patient with a low net ingredient cost per item from their unemployment rates (expressed as the percentage unemployed of the resident population aged between 16 years and pensionable age).

Discussion

The correlation between unemployment rates and number of items prescribed per patient has been reported by Chew,[27] who presented results for the 14 regional health authorities in England. The higher correlation coefficient found by Chew ($r = 0.89$, $P<0.001$) is not surprising considering the smaller number used. The same correlation was also found for the 90 family health services authorities in this study but strong correlations were also found to exist between unemployment rates and

Table 1. Correlation coefficients of deprivation measures and standardized mortality ratio with prescribing variables.

Index	Correlation coefficient of prescribing variable[a]		
	No. of items per patient	Net ingredient cost per item	Net ingredient cost per patient
Jarman index	0.530	–0.579	0.353
% unemployed of people aged 16 years to pensionable age	0.712	–0.710	0.524
% unemployed of employed + unemployed people	0.692	–0.612	0.571
% unemployed for more than one year of all unemployed people	0.703	–0.754	0.482
Standardized mortality ratio	0.733	–0.711	0.536

[a]All correlations are significant at the $P<0.001$ level.

the net ingredient cost per item and the net ingredient cost per patient.

The use of standardized mortality ratios and unemployment rates as simple predictors of net ingredient cost per patient (the dependent variable) has been discussed elsewhere.[24] The main objective of this study was to examine and explain the close links between net ingredient cost per item and number of items per patient. The approximate segregation of family health services authorities, which is predictable from unemployment rates, into northern urban areas with a high number of low cost items (and a high net ingredient cost per patient) and southern semi-rural areas with a low number of high cost items (low net ingredient cost per patient) suggests that material deprivation may be instrumental in the mechanism underlying the trend. The common link between high material deprivation (unemployment) and high prescribing costs is a high level of detected morbidity. This implies that areas of high morbidity have high numbers of prescribed items which are, on average, cheaper. The reasons for this relationship are not obvious but suggest that illness that is sensitive to the deprivation of an area is below average in ingredient costs of treatment.

Table 2. Predictors of prescribing trends in 41 family health services authorities.

Predicting factor	% of FHSAs correctly classified		
	Group 1 FHSAs[a] ($n = 26$)	Group 2 FHSAs[b] ($n = 15$)	FHSAs overall ($n = 41$)
Jarman index	*85*	*53*	*73*
% unemployed of people aged 16 years to pensionable age	*96*	*87*	*93*
% unemployed of employed + unemployed people	*92*	*67*	*83*
% unemployed for more than one year of all unemployed people	*92*	*93*	*93*
Standardized mortality ratio	*92*	*80*	*88*

n = number of family health services authorities. [a]Group 1 = low number of items prescribed per patient, high net ingredient cost per item, low net ingredient cost per patient. [b]Group 2 = high number of items prescribed per patient, low net ingredient cost per item, high net ingredient cost per patient.

It can be postulated that material deprivation causes increased morbidity which, in turn, causes increased prescribing costs if the morbidity is detected. A measure of material deprivation should therefore be strongly associated with prescribing. The results show that unemployment rates, as one indicator of deprivation, are a much better predictor of prescribing trends than the Jarman index, and suggest that unemployment may be a more sensitive predictor of the process of care, as expressed by prescribing patterns. This study offers further evidence of the weakness of the Jarman index as a measure of the process of medical care, in agreement with the work of Campbell and colleagues.[21] Furthermore, one cannot in this case, defend the Jarman index by arguing that it is a measure of general practitioners' workload, since high prescribing levels suggest high workload.

There is evidence that unemployment engenders both physical and mental ill health among those who are unemployed and their families, and those threatened with unemployment.[28-33] The strong link between unemployment and prescribing costs per patient for all patients (not just those who are unemployed) suggests that unemployment has an effect on the population as a whole — it insidiously causes deterioration in the status, wealth and morale of a community (implying an increase in deprivation) and thus increases morbidity. The evidence that unemployment also affects the families of those who are unemployed supports this by demonstrating the first step in the overall effect on the community.

It is interesting that no advantage was gained through the use of resident populations as the denominator in evaluating unemployment rates rather than number of employees and unemployed.

The results therefore show the usefulness of unemployment rates in the identification of health needs of areas, through their association with prescribing trends. Unemployment rates are readily available annually[21] for districts and authorities, unlike the Jarman index which relies on decennial census data or projections. Therefore, it would be expedient to use unemployment data in determining resource allocation to and service planning in district health authorities and family health services authorities. However, it is not envisaged that unemployment rates could be used at a practice level for resource allocation because practice figures for unemployment are as yet generally unavailable. Nevertheless, the increasing use of electronic data acquisition and storage in practices could mean that patients' occupation information is routinely recorded in the future. However, there is evidence that practice prescribing trends are inherently less predictable in terms of simple demographic and surrogate morbidity factors than aggregated trends[34,35] so it may be that prescribing levels in the practice are affected more by the general practitioners' behaviour and attitudes to prescribing.

It will be interesting to test and observe the usefulness of unemployment as a prescribing indicator with time. The general perception is that the recent UK recession has caused higher rises in unemployment rates in the south east of England than the north, and has had a greater impact on white collar workers compared with the previous recession. It will be interesting to see

whether this will result in a narrowing of the 'north–south' divide in prescribing costs.

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Acknowledgements

We thank Lincolnshire Family Health Services Authority for funding the research. We also thank David Whynes for many useful discussions and helpful advice.

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RCGP

Scientific Foundation Board

RESEARCH FUNDING

Applications are now being received for grants for research in or relating to general medical practice, for consideration at the May 1994 meeting of the Scientific Foundation Board. In addition to its general fund the Board also administers specific funds including the **Windebank Fund for research into diabetes.**

The Scientific Foundation Board's definition of research is catholic and includes educational research, observational as well as experimental studies, and accepts the methodologies of social science as valid. It is not in a position to fund educational activities.

If the study involves any intervention or raises issues of confidentiality it is wise to obtain advance approval from an appropriate research ethics committee otherwise a decision to award a grant may be conditional upon such approval.

Studies which do not, in the opinion of the Board, offer a reasonable chance of answering the question posed will be rejected. It may sometimes be useful to seek expert advice on protocol design before submitting an application.

Care should be taken to ensure that costs are accurately forecast and that matters such as inflation and salary increases are included.

The annual sum of money available is not large by absolute standards and grant applications for sums in excess of £15,000 are unlikely to be considered.

Chairman's action can be taken between meetings to approve grants of up to £1000. These may be particularly appropriate to fund pilot studies.

Application forms are obtainable for the Clerk to the Board at: The Scientific Foundation Board, 14 Princes Gate, London SW7 1PU. *The closing date for receipt of completed applications is 25 March 1994;* any forms received after that date will, unfortunately, be ineligible for consideration.