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Sara Allin, Cristina Masseria and Elias Mossialos

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THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

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Corresponding author
LSE Health and Social Care
London School of Economics and Political Science
Cowdray House J404
Houghton Street
WC2A 2AE
Email: s.m.allin@lse.ac.uk

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Abstract

Horizontal equity in health care service use is an area that remains relatively unexamined in the literature on older people. The purpose of this study is to investigate the extent of income-related inequity in the use of GP, inpatient, outpatient and dental services among individuals aged 65 and over in the United Kingdom between 1997 and 2003 using a panel analysis of data from the British Household Panel Survey. The probability of GP, outpatient, dentist or inpatient service use between 1997 and 2003 was predicted using multiple random effects probit panel models, and the estimates used to calculate income-related horizontal inequity. The results indicate that individuals on a lower income are significantly less likely to visit a GP, specialist or dentist than the better-off, although they have significantly greater need (the reverse is seen for dental care). However, after adjusting for differences in need, horizontal inequity is found with utilization favouring those on a higher income for all service areas, but not significantly in hospital care.

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1. Introduction

Health systems with universal health care coverage aspire to achieve horizontal equity, commonly defined as equal access to health care services for equal need. While equal access presupposes that individuals are given equal opportunities to access services, the goal of equal utilization for equal need implies a different set of conditions. Although inequity in utilization may not solely reflect inappropriate or unfair differentials in service use, revealing instead different preferences or culture (Oliver and Mossialos 2004), it is the measure of equity most commonly studied to date. In this paper we investigate utilization of health services in the absence of data on access, consistent with other studies.

There has been considerable research in the area of equity in utilization of health services in past decades focussing on the general adult population and using cross-sectional data sources. Studies in the United Kingdom (UK) are not conclusive, although they suggest that utilization of primary care and hospital services, after adjusting for health care need, is equitable or pro-poor, whereas preventive and specialist care tends to favour the better off. Some empirical studies and reviews of the literature contend that GP and inpatient service use is pro-poor (O'Donnell and Propper 1991; Nolan 1994; Propper 1998; Goddard and Smith 2001; Dixon et al 2006), while others argue that the distribution of health services favours the wealthy (Le Grand 1978; Le Grand 1991; Sutton et al 2002). Moreover, pooling data from the Health Survey for England (HSE) (1994-1999), Sutton and colleagues found that while higher income and educational attainment do not have an impact on GP use, they are associated with higher use of inpatient and outpatient care (Sutton et al 2002). More recent analyses of the HSE suggests that in England while low income individuals are more likely to visit a GP, they have less use of secondary care than would be predicted based on need (Morris et al 2005). Specifically in the case of arthritis care, while the probability of receiving both NHS and private care is driven by illness severity, the better educated are more likely to use private care, and once NHS care is taken, they still receive more care (Propper et al 2005).

To measure income-related inequity, we employ similar methodology to two recent cross-sectional analyses of the UK adult population that found contradictory results. The first used 1996 European Community Household Panel data, and found that after controlling for differences in need across income groups, there is a slight pro-rich inequity in the probability of contacting a GP and more significant pro-rich inequity in specialist care (van Doorslaer et al 2004). The second used 2001 British Household Panel Survey data and found no significant pro-rich inequity in GP, specialist or inpatient services, although dentist services were significantly pro-rich (van Doorslaer and Masseria 2004). The lack of a consensus can be attributed to the phrasing of the survey questions and different measurement of health care need.

While there have been significant contributions to the evidence on equity in the use of services in the UK adult population, there has been relatively scant attention paid to investigating equity among the older population: the highest consumers of health services who face potentially greater difficulties in accessing health services. Barriers to access that may exist in the general population are likely to be more pronounced among older people, in particular the most elderly. Limitations in mobility, insufficient social support, and reduced access to health and health care information sources such as the internet probably increase with age. These barriers are unlikely to be equally distributed across socio-economic groups, with well-educated, more financially secure older people experiencing less barriers to access than the less educated, lower income groups. These differences are likely to be reflected in differential, inequitable patterns of service use across income groups.

Several European studies have investigated socio-economic differences in the use of services among the older population after adjusting for self-reported health status. In Sweden, high socio-economic position predicts having at least one health care contact among those over 60, but not under (Merlo et al 2003). Higher income is associated with physicians service use in Finland and Switzerland (Hakkinen and Luoma 1995; Schellhorn et al 2000). Higher income and higher education is also associated with an increased probability of consulting a GP, having an outpatient visit, and hospital stay in London (Nelson et al 2002; Evandrou 2003). Higher educational status also relates to dental, inpatient care and surgery in a study based on an analysis of the Survey on Health, Ageing and Retirement in Europe (Santos-Eggimenn et al 2005). While it appears that the evidence is indicative of inequity in utilization of health services in the older population in some countries, the literature to date is limited to cross-sectional data.

Therefore, the purpose of the present study is to contribute to the literature on inequity in older people in the UK by measuring income-related inequity after controlling for differences in need in the use of GP, outpatient, inpatient and dental services with longitudinal data from the period 1997 to 2003. The advantages of a panel structure are various. On the one hand, it allows us to consider the dynamic structure of the relationship between health, income and health care use; and on the other, it allows us to control for unobserved cross-section heterogeneity.

2. Data description

This study was conducted using data from the British Household Panel Survey (BHPS).[1] Using panel data allows us to correct for unobserved heterogeneity. The BHPS is a longitudinal cohort survey of adult members of a nationally representative sample of British households, including Scotland, Northern Ireland and Wales. The latest wave of the BHPS with available data was collected in 2003 (Wave 13). The survey collects data from all adult members of the household. Those in the initial sample are followed until they refuse to participate, die, or are lost to follow-up. The present study included all

individuals aged 65 or over in the period 1997 to 2003[2], as 1997 was the first year that included information on private medical insurance coverage. Only those with complete responses were included in the analysis, therefore those with proxy respondents (due to inability to respond themselves) were excluded. The percentage of proxy respondents is around 2%. Further information on the methodology of the BHPS is available from the online documentation.[3]

Socio-economic variables include educational level, housing tenure and income. Educational qualifications are separated into three groups: no qualifications; non-advanced qualifications (including apprenticeships and secondary education); and advanced qualifications (higher degree, first degree, teaching and 'other' qualifications). Housing tenure is included as a categorical variable: whether the individual owns his or her home, rents from a local or housing authority, or rents privately.

Income is measured as gross household income in the last month, which is derived from disaggregated income sources including labour and non-labour income, transfer income, investment income, benefit income and pension income. Income is equivalized for household composition using the BHPS equivalization scale.

Other socio-demographic factors are included in the models. Individual coverage with private medical insurance (PMI; either through an employer/previous employer or an individual plan) is included in the analysis. Region and time dummies are included in order to capture crude differences in health care supply, and also possible changes over time. Region is divided into six broad categories: London (as the reference category); south-east England (excluding London); the rest of England; Wales; Scotland; and Northern Ireland. Marital status is categorized as: married; divorced, separated or never married; and widowed. Information on whether or not the individual currently smokes was also included.

Measures of need are examined separately and are approximated from several health indicators, in order to most accurately capture health care need. Information on self-reported health status came from the following question: "Please think back over the last 12 months about how your health has been. Compared to people of your own age, would you say that your health has on the whole been: excellent, good, fair, poor, or very poor?" In wave 9 of the BHPS (1999), self-assessed health is measured differently with the question: "In general would you say your health is: excellent, very good, fair, or poor". In light of the inconsistency in the measurement of self-assessed health throughout the panel, we created only three categories: (1) excellent or very good; (2) good or fair; (3) poor or very poor (for a detailed discussion of this methodological problem, see Hernandez-Quevedo et al 2005). Additional health indicators include whether or not the respondent has any of the fifteen listed health problems in the survey[4], which is used to create a variable indicating the presence of three or more health problems[5]

in order better to capture the severity of co-morbidity. A further dummy variable for limitations in daily activities due to health problems is also considered

In addition to the above indicators of health status, other demographic variables related to need were also considered: age and sex. Age is measured at the time of the interview, and is grouped into 5-year age bands: 65-69; 70-74; 75-79; 80-84, and 85 and over. In the case of dental care, only age and sex were considered for the estimates of 'need-related' utilization .The health variables were not used as proxies for need since a preliminary analysis showed that healthy, younger individuals are more likely to access dental care than those who have more self-reported health problems.

Health service use is measured by the following questions: 'approximately how many times have you talked to, or visited a GP or family doctor about your own health [in the past year]? Have you yourself made use of hospital consultant/outpatient services [in the past year]? Have you been in hospital or clinic as an in-patient overnight or longer [in the past year]? Have you had a dental check-up [in the past year]?

The proportion of people who used any of the above health care services are outlined in Table 1 for each year in addition to the sample sizes and average age of the population under analysis. The increase in sample size over the period results both from individuals ageing thus entering the age 65+ age group, and additional individuals being included in the sample as they enter a household with an original sample member.

Table 1. Description of the data

Year	Sample size	Mean age	% visited GP	% visited outpatient	% admitted to hospital	% visited dentist
1997	1,939	74.2	84.2	32.9	15.38	37.2
1998	1,914	74.5	84.7	36.7	17.08	39.7
1999	2,788	74.2	84.3	39.1	18.26	38.8
2000	2,737	74.0	85.8	41.5	16.92	40.6
2001	3,293	74.2	86.0	40.3	16.52	42.9
2002	2,817	74.2	86.1	41.5	15.58	45.6
2003	2,786	74.3	85.6	43.3	15.61	45.2

3. Methods

In order to measure income-related inequality and inequity, concentration (inequality) indices were calculated according to the indirect standardization approach using a 'convenient regression' (Kakwani et al 1997; Wagstaff and van Doorslaer 2000; van Doorslaer et al 2004). The inequality index (Cm) would reach zero if all individuals had equal probability of seeking health care, regardless of income; the inequity index (HI) would be zero if after controlling for differences in need across income groups, individuals on different income would have equal probability of service use. The HI would be positive (negative) if higher income individuals were more (less) likely to use health care than those with lower income, after standardising for need. The index of the distribution of need according to income (Cn) is negative if greater need is concentrated among the worse off, and vice versa. In other words, the horizontal inequity index addresses the question: after controlling for differences in need (as measured by health status and other need-related demographic factors)[6] across income groups, are individuals on higher income more likely to use health care services than lower income comparators?

By using seven waves of the BHPS (unbalanced panel) it is possible to correct for individual-specific unobservable effects in the error term (Wooldridge, 2002). Estimates of each health care use (GP, specialist, hospital or dental care) are obtained by using a probit model where the dependent variable y_i equals one if the individual used health care or zero otherwise.

$$y = 1 \quad \text{if } y^* > 0$$
$$y = 0 \quad \text{otherwise}$$

where,

$$y_{it}^* = X'_{it}\,\beta + Z'_{it}\,\delta + a_i + \varepsilon_{it} \qquad (1)$$

X and *Z* are the vectors of need and non-need variables, and the error term is represented by two components, a_i and ε_{it}. The former is the individual effect that is treated as random while the latter is the idiosyncratic disturbance.

The random effect model will provide efficient estimates of β and δ and will also provide information on how much of the variability in health care use is due to individual effect.
Under the assumptions that α_i and ε_{it} are normally distributed and independent of X, it is possible to Integrate αi out to obtain the sample log-likelihood function:

$$\ln L = \sum_{i=1}^{n} \left\{ \ln \int_{-\infty}^{+\infty} \prod_{t=1}^{T} \left(\Phi[(2y_{it-1})(X'_{it}\beta + Z'_{it} + a)] f(a) da \right) \right\} \quad (2)$$

This integral can be approximated by the Gauss-Hermite quadrature, and if we assume that α_i is normally distributed with mean 0 and variance σ^2, then the contribution of each individual to the sample likelihood function can be written as:

$$L = \int_{-\infty}^{+\infty} (1/\sqrt{2\pi\sigma_a^2}) \exp(-a^2/2\sigma_a^2) \{ \prod_{t=1}^{T} \Phi[(2y_{it-1})(X'_{it}\beta + Z'_{it} + a)] \} da \quad (3)$$

The random effect probit model estimates are obtained using STATA 9.0.

4. Results

The results of the random effects probit models for the probability of each health care service use during the period 1997 to 2003 are reported in Table 2. The health care need indicators are most strongly associated with health service use in all health service areas except dental care, where younger age groups and women are more likely to seek dental care.

Among the socio-economic factors, holding private medical insurance (PMI) is significantly associated with all four health service areas, in particular with dental care where individuals with PMI are 50% more likely to have seen a dentist in the past year. Home ownership and higher educational qualifications are significantly associated with outpatient and, more strongly, dental services. Regional effects are less significant. Compared to those living in London, individuals in Northern Ireland are less likely to have an outpatient visit. Those living in Scotland have increased probability of a GP visit and an inpatient stay. Finally, individuals in England (excluding the south-east), Wales, Scotland, or Northern Ireland are less likely than those living in London to have a dental check-up.

Inclusion of the time dummies in the analyses allows trends to be revealed in utilization of health care over the seven-year period. It appears that the probabilities of outpatient and dental visits increase over time, which may be related to supply factors such as an increased availability of specialists and dentists. Finally, the results of the panel analysis reveal significant income effects in dental, outpatient and inpatient care, and less so in primary (GP) care.

Table 2. Factors associated with health service use (coefficients and standard errors)

	GP visit		Outpatient		Inpatient		Dentist	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Log of income	0.03	0.03	**0.08**	0.03	**0.06**	0.03	**0.25**	0.04
Health/demographic indicators (need)								
Fair health	**0.53**	0.04	**0.48**	0.03	**0.51**	0.03		
Poor health	**0.88**	0.07	**0.88**	0.04	**1.08**	0.04		
>3 health problems	**0.51**	0.05	**0.38**	0.03	**0.17**	0.03		
Health limits behaviour	**0.20**	0.06	**0.13**	0.04	**0.18**	0.04		
Disabled	0.06	0.04	**0.13**	0.03	**0.14**	0.03		
Female	**0.13**	0.05	0.00	0.04	**-0.18**	0.04	**0.28**	0.07
70-74	0.03	0.05	0.04	0.04	0.06	0.04	**-0.22**	0.05
75-79	**0.11**	0.06	0.00	0.04	**0.20**	0.04	**-0.59**	0.07
80-84	0.08	0.07	0.07	0.05	**0.27**	0.05	**-0.89**	0.09
85+	0.04	0.08	0.01	0.06	**0.33**	0.06	**-1.27**	0.12
Socioeconomic and regional indicators								
Not married	**-0.23**	0.07	-0.09	0.05	0.07	0.05	-0.04	0.10
Widowed	**-0.14**	0.05	**-0.09**	0.04	**0.12**	0.04	**-0.27**	0.07
Smoker	**-0.28**	0.06	**-0.24**	0.04	**-0.20**	0.05	**-0.72**	0.08
Owns home	0.06	0.05	**0.13**	0.04	-0.02	0.04	**0.66**	0.08
Rents privately	0.10	0.10	**0.05**	0.07	0.01	0.08	**0.36**	0.12
PMI	**0.23**	0.08	**0.17**	0.06	**0.13**	0.06	**0.53**	0.10
Non-advanced	0.00	0.05	**0.15**	0.04	0.01	0.04	**0.89**	0.08
Advanced qualifications	0.08	0.07	**0.17**	0.05	0.02	0.05	**1.46**	0.10
South-east England	0.17	0.12	0.05	0.09	-0.03	0.09	0.28	0.19
Rest of England	0.14	0.11	0.01	0.08	0.01	0.08	-0.21	0.17
Wales	0.09	0.12	-0.09	0.09	0.05	0.09	**-0.43**	0.18
Scotland	**0.31**	0.12	0.08	0.09	**0.23**	0.09	**-0.68**	0.18
N. Ireland	**0.29**	0.12	**-0.32**	0.09	0.13	0.09	-0.30	0.18
Time dummies								
1998 (Wave 8)	0.00	0.06	**0.11**	0.05	0.05	0.06	**0.14**	0.06
1999 (Wave 9)	0.01	0.06	**0.27**	0.05	**0.22**	0.05	**0.14**	0.06
2000 (Wave 10)	0.03	0.06	**0.25**	0.05	-0.01	0.05	**0.16**	0.06
2001 (Wave 11)	0.03	0.06	**0.28**	0.05	-0.02	0.05	**0.29**	0.06
2002 (Wave 12)	0.03	0.06	**0.29**	0.05	-0.08	0.06	**0.27**	0.07
2003 (Wave 13)	0.03	0.06	**0.38**	0.05	-0.01	0.06	**0.20**	0.07

Note: Coefficients in **bold** are significant at $p<0.05$

The analyses of the concentration indices confirm and strengthen the results obtained with the probability models (Table 3). Inequality (Cm) is pro-rich in all four health service areas, although not significant in hospital care. Thus, the better off are significantly more likely to have a GP, outpatient and dental visit. However, the distribution of need, as predicted on the basis of health status indicators, age

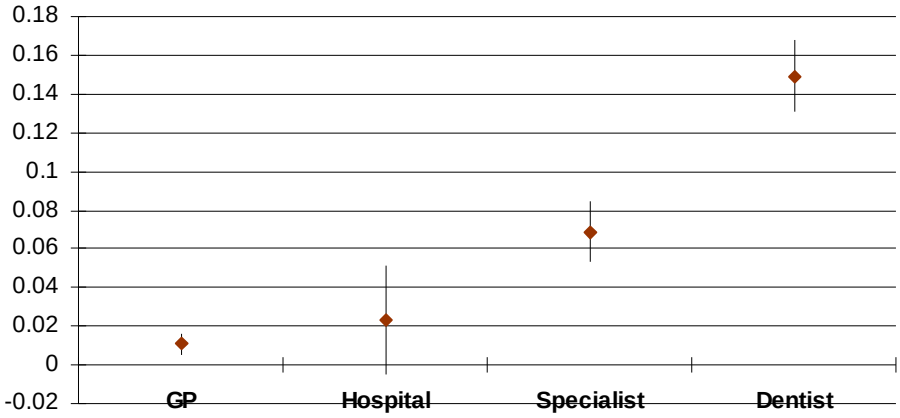
categories and sex, is concentrated among lower income groups. The need concentration index (Cn), is indeed negative and statistically significant for the probability of GP, outpatient and hospital care; only for dental care need is distributed in favour of the better off. These pro-poor distributions of need add to the already pro-rich inequality in three of the four health service areas. Once need differences are standardized for, income-related inequality is positive in all service areas, although only significantly for GP, specialist and dental care (See Figure 1). In the case of inpatient care, the pro-poor inequality in need is almost entirely compensated by the pro-poor inequality in the unstandardized admission probability. Particularly high levels of inequity are seen in specialist and dental care.

Table 3. Income-related inequality in probability of GP, outpatient, inpatient and dentist use

	GP	Outpatient	Inpatient	Dentist
Cm	0.006	0.047	-0.011^{ns}	0.182
Cn	-0.005	-0.022	-0.034	0.034
HI	0.011	0.069	0.023^{ns}	0.143

Note. NS is not significant. All others significant at $p<0.05$

Figure 1. Horizontal inequity (and 95% confidence intervals) in health service use among over 65s



As a sensitivity analysis, individuals who reported to have accessed inpatient, specialist, or dental services from the private sector were excluded from the analyses. Inequity in inpatient care completely disappeared when private patients were excluded, although the significant pro-rich inequity remained in specialist and dental care despite an observed reduction in the severity (See Table 4).

Table 4. Income-related inequality in probability of outpatient, dental and inpatient care, NHS only

	Outpatient	Inpatient	Dentist
Cm	0.021 [ns]	-0.033	0.132
Cn	-0.020	-0.032	0.027
HI	0.040	-0.001 [ns]	0.105

Note. NS is not significant. All others significant at p<0.05

5. Discussion

The purpose of the present study was to investigate the degree of income-related inequity in the use of health services among older people in the UK in the period 1997-2003 using a panel data approach. Results support the existence of significant pro-rich inequity to varying degrees in GP, outpatient and dental care. No significant income-related inequity could be found for inpatient admissions.

Indicators of need as measured by self-assessed health, activity limitations, number of health problems, and disability were most strongly associated with health care utilization as predicted (e.g. McColl and Shortt 2006), with the exception of dental care. However, higher socio-economic status as indicated by income, education, home-ownership and holding private medical insurance is also significantly associated with a greater likelihood of health service utilization.

It has been argued that individuals who are better educated, or the middle classes, have a louder 'voice' allowing them better to navigate the health system (Hirschman 1970; Dixon et al 2006). Therefore, the more privileged may be better able to acknowledge their needs, identify the services available, and make demands on their GPs for more complex services. However it is likely that a multitude of factors, both individual and cultural, and both at the demand and supply-side, interact to affect utilization (Healy and McKee 2004). It has also been suggested that higher utilization among more privileged individuals may be explained by greater willingness to seek care and more appropriate responses to symptoms. For example, among the over-60 age group, those in higher socio-economic groups are significantly more likely to express immediate health seeking behaviour (Adamson et al 2003).

GP visits

Despite the finding that indicators of need are most strongly associated with GP service use, non-need factors are also significant, namely being a non-smoker, a woman, being married, and holding PMI.

Since take-up of PMI is associated with several other socio-economic factors such as education, holding more pro-conservative views and voting preferences, and income (King and Mossialos 2005), it is likely that these factors, and not access to the private sector per se, are driving this relationship.

Studies of inequity in use of primary care in the general population in the UK, however, reveal conflicting findings. While some evidence suggests that individuals on higher income are less likely to see their GP than those on lower income (van Doorslaer and Masseria 2004; Morris et al 2005); other studies find that higher income significantly increases the likelihood (although not the volume) of a GP visit (van Doorslaer et al 2004; Bago d'Uva 2005).

But for older people it seems that inequity does not disappear, and may even be more pro-rich. Other studies of service use among older people find some inequity in GP services: higher education and higher income are associated with greater primary care use (Nelson et al 2002; Evandrou 2003). Similar effects of income on physician service use among older people has been shown in Finland (Hakkinen and Luoma 1995).These findings are supported by the present study revealing a significant pro-rich inequity in GP visits.

Inpatient care

With regards to inpatient care, the probability of an inpatient stay appears to be greater among the higher income groups once need is controlled for, although not significantly. The strongest correlate of inpatient service use is health status. While women are more likely to have visited their GP, men are more likely to have been admitted to hospital, perhaps reflecting lower take-up of primary, preventive health services. However, higher income, holding PMI and living in Scotland are also significantly positively associated with spending at least one night in hospital.

It is interesting to note that when the individuals who used private inpatient care are excluded from the analysis (5% of the those who reported at least one night in hospital), the positive effect of income and PMI on the probability of having an inpatient stay (in NHS hospitals only) is no longer significant (results not reported); the non-need adjusted inequality becomes significantly pro-poor, and the needs-adjusted income-related inequity almost reduces to zero. This finding suggests that the use of inpatient care in the NHS is distributed according to need, but the existence of an extensive private sector may create income-related inequities in utilization even if at present pro-rich inequity is not significant.

The results of the present study are similar to those of previous studies which have shown that while income appears not be related to hospital use among older people in London (Evandrou 2003), higher education may be (Nelson et al 2002). Moreover, studies of income-related inequity in hospital use in the

UK general population did not find any evidence of inequity (Masseria et al 2004; van Doorslaer et al 2004; van Doorslaer and Masseria 2004).

It is possible that the lack of significant inequity found in hospital use in the present study, and in previous studies of the general population, is driven by the omission of elective day surgery from the analysis. Many argue that lower socio-economic groups are using less elective, day surgery than their level of need would require. For instance, the poor appear to have higher need for hernia repair, yet lower operation rates (Seymour and Garthwaite 1999). Therefore, further analyses are needed examining income-related inequity in elective versus emergency care, and day versus inpatient care.

Outpatient care

Outpatient service use favours rich older people over the poor. Among the factors significantly associated with outpatient visits are indicators of wealth and socio-economic status such as home ownership, higher education, and PMI. Also, individuals in Northern Ireland are less likely than those in London to have an outpatient visit. The regional variation observed, including the significantly lower likelihood of using outpatient care in Northern Ireland compared to London, and the lower (but not significantly so) likelihood in regions outside of London could be attributed to the considerably greater proportion of private activity among consultants (as measured by the proportion of consultants on part-time contracts) in the south-east of England compared to the rest of the UK (King and Mossialos 2005).

As with inpatient care, it was possible to separate NHS and private sector outpatient activity. When NHS outpatient care was examined on its own, the significant pro-rich inequity remained, but decreased by about a third (Table 4). Moreoever, while the impact of income on service use remained (as revealed through the panel random effects probit model), the association between PMI and outpatient service use disappeared, as seen with inpatient care (results not reported). Therefore, unlike inpatient care, within the NHS, income-related inequity is still significant in utilization of outpatient care.

While inequity in use of specialist care has not been studied directly among the older population, evidence from the UK and English adult populations is inconsistent. Some find significant income-related inequity in specialist services favouring those on higher income (van Doorslaer et al 2004) (Morris et al 2005), while others do not (van Doorslaer and Masseria 2004).

Dental care

The most significant degree of pro-rich inequity was found in dental care. Unlike inpatient and outpatient care, when dental care in the public sector (NHS) is examined separately, income-related inequity favouring the higher income groups decreases only slightly. Also, income and PMI remain significantly

associated with a dentist visit. This finding further supports the assertion that hefty user fees in the NHS are most likely deterring individuals on lower incomes from seeking dental care.

The regional variation in dental care use is worth noting, where individuals living in London are significantly more likely to have a dental check-up than those living in Scotland, Wales, and to a lesser extent in Northern Ireland. It is possible this observation results from a higher concentration of dentists practising in London than the rest of the UK (NHS Dental Practice Board 2002). The impact of supply on utilization needs to be considered in further depth. However, it is likely that this regional discrepancy could be attributed to a higher concentration of oral health care need in London than in Scotland, Northern Ireland and Wales. Some evidence to support this claim is that the proportion of the general population who have lost their natural teeth, therefore requiring less oral health care, is much higher in Scotland (18%) and Wales (17%) than in England (12%) (Office for National Statistics 1998).

The probability of visiting a dentist increased significantly over the seven-year period. This trend has been shown in other studies and attributed to such things as increasing wealth, greater interest in personal appearance, and an increase in the proportion of older individuals retaining their original teeth (Batchelor 2004).

The observation that individuals with advanced educational qualifications were 150% more likely than those with no qualifications to have had a dentist visit is quite striking, and is likely to play a significant role in driving income-related inequity. Similar results are seen in a study of older people in ten European countries: only 29% of individuals reporting no, or only primary, education reported a dentist visit, compared to 73% of those in tertiary education (Santos-Eggimenn et al 2005).

Also, it is the younger individuals (65-69 year olds) who are more likely to use dental care services, which may be due to a lower prevalence of edentulousness among the younger cohort. This finding is consistent with previous studies of older people in Europe; 63% of individuals aged 50-54 had contact with a dentist, compared to only 25% of those aged 85 and older (Santos-Eggimenn et al 2005). Although many older people, particularly those aged 80 and over, may have lost their natural teeth, dental prostheses still require regular check-ups and adjustments. Furthermore, a recent report in the UK stated that more than one half of individuals over 85 still retain at least a few natural teeth (British Society of Gerodontology 2005); and the proportion of over 65s who are edentulous has fallen from 79% in 1978 to 46% in 1998 (Office for National Statistics 1998).

Despite many older individuals having special dental needs, such as treatment for tooth decay and gum disease, 82% of the over-60 age group receive no financial assistance for the significant user charges in

the public sector (NHS patients have to pay 80% of the treatment costs) (Robinson et al 2004). It is not surprising, therefore, that income-related inequity in use of dental care favouring the wealthy is substantial.

The increasingly cosmetic nature of the majority of dental care begs the question - is equity in dental care utilization a worthy goal? On the one hand, it can be argued that dental care is a luxury good, and therefore variation in utilization across income groups is acceptable. However, on the other hand, one can argue that because some dental care is necessary, contributes to improved health status, and that cosmetic services can improve well-being, all individuals should have an equal opportunity to benefit from these services, regardless of income.

Limitations

There are several potential biases in self-reported health measures that should be addressed. First, errors in self-reporting have been found to vary systematically across socio-economic groups (O'Donnell and Propper 1991), which is consistent with the finding that lower socio-economic groups tend to underreport longstanding illness (Adamson et al 2003). This may then lead to underestimation of inequalities across socio-economic or income groups. Second, despite the presence of many physical symptoms, older people often rate their overall health as good, suggesting a bias towards optimism (Dening et al 1998).

In its defence, several studies have supported the validity of self-reported health status, demonstrating significant relationships with other measures of health status including physician assessments and utilization data (Mossey and Shapiro 1982; Blaxter 1985). Moreover, self-reported health has been shown to predict future mortality better than other measures (Mossey and Shapiro 1982; Idler et al 1990; Sutton et al 1999), thus it is likely to be the best available proxy for health care need. Unlike many previous studies investigating utilization patterns among older people that standardize for need using one indicator of general health (self-assessed health status), this analysis included a rich set of morbidity measures, including health problems and activity limitations, that allow for a more accurate measurement of need.

Self-reported utilization may also be biased due to effects of social desirability or recall bias. Some researchers believe self-reporting of physician visits may be unreliable (Roberts et al 1996). Recall for hospital visits is generally better than for physician contacts (Barer et al 1982); however, using a one-year recall period is a common limitation of time series survey data.

Moreover, as the data from the BHPS come from private households, institutionalized individuals are not included in the analysis. Approximately 20% of those aged 85 and over live in institutions, and since entry to an institution is strongly affected by health, marital status, and socio-economic variables (Grundy and Sloggett 2003), the present analysis may be biased - however, it is uncertain in which direction. Individuals residing in institutions may have better access to basic health services, e.g. in the form of nursing but may face difficulties in accessing services higher up in the system perhaps due to age, or other factors such as discrimination. If this is the case, then estimates of inequity would be underestimated in the present analysis.

The present analyses used regional dummies to approximate supply variations. While regional dummies provide some possible indication of the impact of supply on utilization patterns, the measurement is rather crude. Thus, the absence of more accurate supply-side information in this analysis is an important limitation, one which we are planning to address in the next phase of our analysis. It is likely that some of the observed inequality would be partly explained by differences in supply, with wealthier individuals living in better served neighbourhoods. Indeed in England, supply of health care services was found to have a positive impact on utilization, and there was strong evidence of supply-based horizontal inequity (Morris et al 2005)[7].

Finally, as mentioned at the outset, this area of research is limited to the investigation of income-related inequity in utilization of health care services, and not access to care. Therefore, our study does not account for barriers to access and resulting inequalities, potentially stemming from factors other than income. Also macro-level studies such as ours may mask important differences within the sectors analysed; for instance inequity may be more pronounced in some specialties than others. Therefore, micro-level studies investigating inequity in a particular service or disease area would complement the present research.

6. Conclusions

The present study offers some support for the claim that health care service use is inequitable, favouring those on higher income among the older population in the UK. Despite being in better health (in terms of the number of health problems, self-reported health status, and activity limitations), wealthier older people are significantly more likely to see a doctor, have an outpatient visit and see a dentist, with a similar although non-significant trend seen in hospital admission. While a recent, cross-sectional analysis of equity in service use among the general British population only found significant inequity in dental care and not in other areas of medical care (van Doorslaer and Masseria 2004), it appears that income matters more among the older age groups. This is the first study to investigate equity in service use specifically among older people and to measure the presence and extent of inequity using a panel data approach. As the highest users of health care, and with potentially more barriers to access, more attention should be paid to patterns of service use among older people and to addressing existing inequalities

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Notes

[1] The data and tabulations used in this publication were made available through the ESRC Data Archive. The ESRC Research Centre originally collected the data on Microsocial Change at the University of Essex (now incorporated within the Institute for Social and Economic Research). Neither the original collectors of the data nor the Archive bear any responsibility for the analyses or interpretations presented here.

[2] Respondents may be present from between one and seven waves. 20% of the sample contributed to all seven waves, 13% contributed to the last five, 11% to the last three, 8% to the first five, 4.5% to the last wave, 4% to the last four (27% had other patterns; i.e. were missing for one or more waves in the middle).

[3] The Institute for Social and Economic Research website. http://www.iser.essex.ac.uk/ulsc/bhps/doc/ [1 February 2006]

[4] The 15 health problems listed are: problems with arms, hands or legs; sight; hearing; skin conditions/allergy; chest/breathing; heart/blood pressure; stomach or digestion; diabetes; anxiety or depression; alcohol or drugs; epilepsy; migraine; cancer; stroke; other.

[5] The threshold of 3 health problems was informed by an analysis of older people using BHPS data (Scott et al 2001). Sensitivity analyses were performed to determine the impact of changing the threshold to 2 and 4 health problems. Results are not significantly affected and therefore are not reported here.

[6] The analysis of dental care did not include the same needs variables for standardization; only age and sex were included.

[7] This analysis included four ward-level supply variables: the Index of Multiple Deprivation (IMD) access domain score; average proportion of outpatients seen within 26 weeks at the providers used by ward residents; average GPs per 1000 patients at the practices at which the ward residents are registered, and average distance to acute providers used. It does not distinguish private from NHS providers and does not include number of hospital beds.

For further information on this or any of the Health publications contact:

Champa Heidbrink
Managing Editor
LSE Health
The London School of Economics and Political Science
Houghton Street
London WC2A 2AE

Tel: + 44 (0)20 7955 6840
Fax: + 44 (0)20 7955 6090

Email: c.heidbrink@lse.ac.uk
Website: www.lse.ac.uk/collections/LSEHealth/