Equity in the Utilization of Health Care in Ireland

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1.Introduction

Most people would agree that good health is a central component of quality of life and that effective health care services can be essential in maintaining this. The difficult question however is how such services should be financed and who should have access to which services and at what cost. The Irish health care system has developed a complex answer to this question over an extended period so that Ireland now has what Barrington (1987: 285) has described as an 'extraordinary symbiosis of public and private medicine'. For example, although those with a medical card (around 35% of the population) receive free dental, aural, optician and GP care, the rest of the population must pay at the point of delivery. Similarly, although public hospital care is available to the whole population subject to relatively small fees for those without medical cards, almost half of the population now have medical insurance which can be used in both private and public hospitals with hospital consultants catering for both public and private patients in public hospitals as well as private patients in private hospitals. The importance of private care and the extent of fee paying in Irish health care has led many to argue that the system is not available to all on the basis of need alone, but instead that personal circumstances may well determine the availability, extent of and speed of treatment.

This paper analyses the extent of equity of health service delivery across the income distribution in Ireland - that is the extent to which there is equal treatment for equal need irrespective of income. Although this initially sounds quite a simple problem, in fact there has been a substantial debate in the health economics literature as to how 'equity' should be defined and the implications this has for the methodology adopted. In the Irish context there has been surprisingly little work on either a conceptual or empirical level, the main contributions being by Tussing (1985), Nolan (1991) and Nolan et al. (1992), all of which used data from the 1980s, thus there is a serious need for new analyses of utilisation patterns in the Irish population and their determinants. One of the reasons for this paucity of analyses is a lack of information available to assess the question. The primary requirement is for information on the utilisation of a wide range of health care services and individual or household level data on income. From these data we can assess whether the extent of usage is roughly similar at different levels of income. However, in doing this we must also take account of differential 'need' for health care across the population, and the fact that this may well be correlated with income. The crucial question is whether people at different levels of income, but with the same need for health care utilise services to a similar extent or whether utilisation relative to needs is unevenly distributed across the income distribution. As well as information on health care usage and income then, we also need information on the health status of the individual. Luckily these data are all available to us in the form of the Living in Ireland Survey for 2000.

The paper is laid out as follows. In the next section we discuss the meaning of equity in studies of health care utilisation before outlining the approach that we will be taking. Following this we briefly describe the data used in this paper – the Living in Ireland Survey for the year 2000 (LII) in section three. In section four we examine the distribution of health care utilisation across the income distribution. In section five we use the level of expenditure on specific types of services to generate a unitary metric

of utilisation before examining the measures of health status that we have available in the LIS data file in section 6. In section 7 we compare the utilisation of health care services across the income distribution relative to 'need' as measured by several health status measures and attempt to assess whether the level of utilisation in different quintiles is equitable. In section 8 we adopt a more analytical statistical strategy and examine the equity of health care utilisation relative to need controlling for a number of factors that may confound the relationship. In section 9 we summarise the findings of the paper and attempt to draw out some conclusions.

2. Equity in Health Care Delivery

In health and health care as in many other areas of policy, 'equity' is often stated as an overarching concern that guides policy and practice[1]. In the health economics literature however there has been a long running debate about what aspect of equity in health care is important and how this should be measured. On the one hand some researchers (Le Grand 1982; Mooney 1983; Mooney et al. 1991; Mooney et al. 1992) have maintained that equity should be defined in terms of equal access to treatment whereas others (Culyer, van Doorslaer, & Wagstaff 1992b; O'Donnell & Propper 1991) hold that health economists should be analysing equity in the utilisation of healthcare. From the early 1980's Mooney (1983) and Le Grand (1982) have maintained that equity in most policy statements refers to equity of access to health care services in the sense that those with an equal need for treatment have equal opportunity to get it, or to put it another way face an equal cost of utilisation. The main argument put forward by the advocates of the access approach is that an individual's level of health care utilisation is determined by a range of factors that often have little to do with health care services per se and more to do with factors that shape the individual's demand for health care. One of these may be the 'need' for treatment, but even individuals with equal need may end up consuming different amounts of care if preferences differ (perhaps in the individuals' perception of the benefits of treatment) and if their marginal utilities of income differ. From this perspective, to attempt to measure the equity of utilisation is to be focusing on the wrong subject.

Culyer, van Doorslaer, & Wagstaff (1992b); Culyer, van Doorslaer, & Wagstaff (1992a) on the other hand have argued that although it is self evident that persons in equal need may end up consuming different levels of health care because their demand curves differ, we still need to know why the curves differ and whether the difference may in fact be due to differences in income. They use the example of differences in education between the rich and poor (Culyer, van Doorslaer, & Wagstaff 1992b: 94). If the poor have the same opportunities to receive care as the rich but have a lower take up rate simply because they are not as well informed, surely this would be a concern to policy makers and analysts alike? If so, simply examining the extent of and costs of access for the rich and poor would not be a fruitful research strategy. Using a measure of utilisation on the other hand we would be able to analyse the factors that explain the lack of take up of care among the poor. Given this, we would do well to study equity in the utilisation of health care since it is

[1] For instance, the Irish Health Strategy – 'Quality and Fairness: A Health System for You' (Department of Health and Children 2001) states that 'equity and fairness' is one of the four guiding principles by which the health care system will be shaped.

here that we would discover the true source of the inequalities between groups. Here we adopt the latter position and examine the wider question of the factors influencing the utilisation of health care and whether this is horizontally equitable in the sense that those in equal need receive the same level of treatment.

In the Irish context there are concerns both about the influence of the direct costs of gaining access to health care, but also more indirect influences. Inequity in the delivery and utilisation of healthcare is likely to occur where the incomes and resources available to consumers affects their take-up of available services and the behaviour of health care providers. Where there are financial and non-financial costs in contacting health care providers and receiving care these can influence the individuals decision to seek care. These costs can include out of pocket payments for particular services as well as more indirect costs such as the cost of travelling to services and work time foregone and of course these costs and their impact are themselves likely to vary across income groups. For example, those on lower incomes are more likely to have to use public transport to access medical services and this, particularly for those in rural areas on low income, is likely to impact on their incentive to seek care.

In Ireland charges for general practitioner, dental, aural and optician visits (at the point of delivery) may be an important influence on seeking care, with the greatest impact on those on low income but without medical card cover, since a fixed charge will have a greater impact on foregone utility for poorer consumers. Although public hospital care is subject to only relatively small or no charges at the point of delivery in Ireland, waiting lists for most forms of treatment mean that one's ability to pay for treatment directly, or having access to medical insurance which can pay will allow individuals to access treatment more quickly and may influence the individual's decision to seek treatment initially. Around 50% of the Irish population are currently medically insured either with VHI or BUPA.

Provider behaviour can also be influenced by the method of payment within the Irish system. The capitation method of payment used to refund GPs treating patients with medical card cover means that GPs have an incentive to see more private patients. Similarly in the hospital context, the fact that hospitals receive a fee for private patients rather than the prospective budget allotted to them from state funding may well influence their behaviour in allocating resources. Together these mechanisms mean that there may well be large differences between the utilisation and delivery of health care services to those in different parts of the income distribution.

As will be seen in section four, here we will analyse overall utilisation across a range of services by calculating a single metric for aggregating different types of utilisation which weights different serviceson the basis of an estimated unit cost for each. This is derived from the total expenditure on that service both by the state, private insurance companies and individual households, and divided by the estimated total number of times this service was used. This procedure in effect assumes that the 'benefit' derived by individuals from that service was the same for both private and public patients since we are using the average cost across the two. This procedure is only reasonable if one assumes that private and public services, or rather the service obtained by either paying privately or publicly are identical in terms of their health benefits. This would not be reasonable if one were trying to analyse the total utility

derived from taking the private rather than the public route since a night in a public hospital ward does not cost the same as one in a private bedroom and the latter is clearly worth more to the private patient, even if only in terms of the 'hotel' services provided. In terms of the health care received however there is little systematic evidence available for the Republic of Ireland. Evidence from Fadden (2003) in a pharmacy study of the over 70s before and after the extension of the medical card to this group has shown some difference in prescribing behaviour between GMS and non-GMS patients. The rate of prescribed generic drugs among GMS patients was roughly twice that among private patients. This is usually good practice since generic drugs are cheaper and on the whole, just as effective, but specific proprietary drugs can offer less side effects and a better interaction profile for particular patient types. She also notes that some patients complained of an inferior service after the change with GPs restricting GMS patients to certain hours of the day and not seeing GMS patients for regular check-ups. Wren (2003) has also argued that hospital care for public patients is also less effective than among private patients, the latter being given more time in hospital, more attention and a greater range of tests.

3.Data Sources

The LII Surveys form the Irish component of the European Community Household Panel (ECHP): an EU-wide project, co-ordinated by Eurostat, to conduct harmonised longitudinal surveys dealing with household income and labour situation in the member states. As well as extremely detailed information on income levels and sources, the LII data also includes information on other important topics of relevance to this paper including several self-assessed health status measures, health care utilisation and a wide range of socio-demographic characteristics. The first wave of the ECHP was conducted in 1994, and the same individuals and households were followed each year. The wave conducted in 2000, therefore, was the seventh wave of the survey. In 2000, the Irish sample of individuals and households followed from Wave 1 was supplemented by the addition of 1,500 new households to the total, in order to increase the overall sample size which had declined due to attrition since 1994. The objective of the sample design was to obtain a representative sample of private households in Ireland. Those living in institutions such as hospitals, nursing homes, convents, monasteries and prisons, are excluded from the target population, in line with the harmonised guidelines set down by Eurostat and standard practice adopted in surveys of this kind (such as the Household Budget Survey conducted by the Central Statistics Office).

The sampling frame used was the Register of Electors. This provides a listing of all adults age 18 and over who are registered to vote in the Dáil, Local Government or European Parliament elections. This means that the target sample selected using the ESRI's RANSAM procedure was a sample of *persons*, not of *households*. Since the probability of selection is greater for households with a larger number of registered voters, this means that the resulting sample will tend to over-represent larger households. This was taken into account in reweighting the sample for analysis.

The total number of households successfully interviewed in 1994 was 4,048, representing 57 per cent of the valid sample. The number of households and individuals being interviewed declined with attrition over time so in 2000 the original

sample was supplemented with an additional 1500 households selected using the same procedure.

The sample supplementation exercise, together with the follow-up of continuing households, resulted in a completed sample in 2000 of 11,450 individuals in 3,467 households. Individual interviews were conducted with 8,056 respondents, representing 93 per cent of those eligible (born in 1983 or earlier). This sample was reweighted to take account of sampling error from the actual population in 2000 and these weights are used throughout this paper, thus the data is fully representative of the Irish population in private households in that year.

4. Health Care Utilisation by Income

In this section we examine the pattern of health care utilisation across a range of services across the income distribution. The LII survey included questions (given to all survey respondents) on their use of health care services including consultations on their own behalf with GPs (including home visits), medical specialists (including out patient services), dentists and opticians in the last twelve months. The survey also asked about nights spent in hospital over the same period. Unfortunately, the LII survey did not include information on the number of prescriptions filled for respondents. To fill this gap, econometric models of the number of prescriptions were estimated using the 1987 Survey of Income Distribution, Poverty and Usage of State Services also carried out by the ESRI, and used to produce estimated numbers of prescriptions for each person.[2] Similarly, questions on usage of services were only asked of adult interviewees in 2000, and to estimate service usage for children in the household models were estimated of all services and prescriptions using the 1987 data which did contain information on children and these estimates were applied to the 2000 data.[3]

Using this information we gain a relatively detailed picture of utilisation in the last year and give some descriptive statistics on utilisation in Table 1:

Table 1: Use of Specific Health Care Services in 12 Months Previous to Interview in 2000

Service	% Visiting N times						
	0	1-5	6-10	11-20	21-50	50+	Mean
In Patient Nights	87.7	6.7	2.5	1.7	0.9	0.4	10.13
Doctor Visits	28.4	53.4	9.2	7.3	1.3	0.2	4.76
Dentist Visits	58.9	39.2	1.3	0.3	0	0	1.98
Optician Visits	72.7	27.1	0.1	0.0	0	0	1.23
Outpatient	75.5	21.6	2.0	0.6	0.1	0	2.96

Table 1 shows, as expected that the vast majority (88%) of people did not have any in-patient care in hospital in the last year. Of those that did have some, the largest

[2] The models included variables for age, number of GP visits, whether the person had a chronic illness, rural/urban location and medical card status, all of which were found to be highly significant

[3] These models included terms for the child's age, household income level, medical card status and parents GP usage, as well as the child's GP usage in models of other service use.

proportion had between 1 and 5 nights in hospital with the average for those who experienced 1 or more nights being just over 10. This is one night less on average for those having any stay than found by Nolan (1991) using survey data from 1987, which is consistent with the downward trend in length of stay shown by administrative statistics.

For visits to the general practitioner, on the other hand, the 2000 data show that over 70% see a doctor at least once in the year, with 53% attending between 1 and 5 times and a substantial 9% attending more than 10 times in the last 12 months. The mean number of doctor visits across the whole sample is almost identical to that found in 1987 at 3.4, with the mean for those attending at least once being almost 5.

When we look at visits to dentists, opticians and outpatients we see substantially lower figures with a large 59% not taking their dentists advice and staying away for the year and more than 70% not seeing an optician or attending an out patient clinic at a hospital (or attending accident and emergency).

Our central concern is how this pattern of utilisation is distributed across the income distribution, and this can be illustrated by first categorising people in terms of their position by disposable income quintile. With one-fifth of persons in each quintile, we can then look at the share of total utilisation for each service attributable to each. Table 2 shows that the bottom 40%, the two lowest income quintiles, have over half of all hospital nights and GP visits. The bottom one-fifth has 26% of in-patient nights and 30% of all GP visits. The high share of the lowest quintile is particularly pronounced in the case of prescriptions where the lowest 20% of the income distribution have over 37% of all prescriptions and the lowest two quintiles have over 60%.

When we look at the distribution of dentist and optician visits on the other hand we see the opposite pattern, with over 28% of dentist visits and 26% of optician visits occurring in the top income group. Table 2 also shows that out-patient hospital services tend to be more bimodally distributed, with the two bottom quintiles accounting for around 45% of all visits and the top quintile over 22%. Given that out-patient services here refer to both attendance at accident and emergency and visits to medical specialists (both in private and public hospitals) it may be that we are seeing different types of utilisation.

Table 2: Shares of Service Utilisation by Disposable Income Quintile

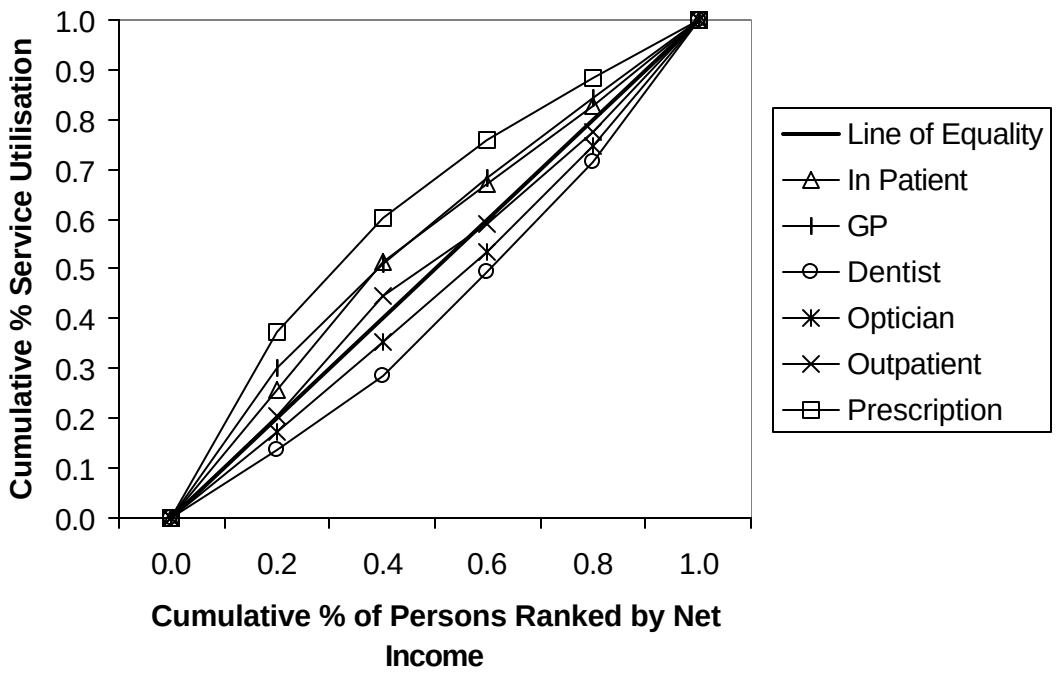
Income Quintile	In Patient Nights	Doctor Visits	Dentist Visits	Optician Visits	Out Patient Visits	Prescriptions
Lowest	25.7	30.0	13.7	17.3	20.7	37.3
2	25.5	21.2	14.9	17.9	23.8	22.8
3	16.1	17.3	20.7	18.2	14.7	15.8
4	15.3	15.9	22.4	21.2	18.6	12.5
Highest	17.4	15.7	28.4	25.5	22.3	11.6
CI	-0.138	-0.148	0.155	0.080	-0.019	-0.303

One way of capturing the pattern of utilisation across the income distribution, pioneered in this context by Wagstaff et al. (1991), is by using the 'concentration

curve'. This is produced by ranking individuals (or groups by income and charting the cumulative proportion of the population (from lowest to highest income) against the cumulative proportions of service use. If use is equally distributed across income groups then the curve will coincide exactly with the diagonal, or line of equality. On the other hand, if service use is concentrated in lower income groups the line will lie above the diagonal, and vice versa.

Figure 1 shows the concentration curves for the different types of service utilisation for Ireland in 2000. It illustrates that GP care, inpatient nights and prescriptions are concentrated among lower income groups, with prescriptions being most concentrated in this way followed by GP visits. On the other hand both dentist and optician visit curves lie below the diagonal, showing concentration among higher income groups. Interestingly, the curve for outpatient visits cuts across the diagonal from above to below in the upper reaches of the income distribution again suggesting different types of usage across the income distribution.

Figure 1: Health Service Utilisation Concentration Curve



Wagstaff et al (1991) have also put forward the concentration index as a summary measure of concentration, calculated as minus twice the area between the concentration curve and the diagonal and which ranges from –1 (all service use is among the most disadvantaged) to +1 (all use is among the most advantaged). The concentration index scores can be seen in Table 3, and range from –0.30 for prescriptions, the highest degree of concentration among lower income groups, to 0.16 for dental visits, the most concentrated among higher-income groups.

Table 3: Concentration Index for Different Utilisation Types, 2000						
	In Patient Nights	Doctor Visits	Dentist Visits	Optician Visits	Out Patient Visits	Prescriptions
CI	-0.138	-0.148	0.155	0.080	-0.019	-0.303

5. Aggregating Different Types of Utilisation

Having examined the extent of utilisation of a range of different health services across different income groups, we would like to be able to relate overall service use to the 'need' for services, as well as position in the income distribution. To do this we have to bring together two elements: a measure of health which summarises the 'need' which an individual has for health care services, and a measure of utilisation which aggregates the different types of service use, so that comparisons can be made between overall utilisation and need. In the next section we examine three different measures of health, but here we deal with the issue of finding a method for combining utilisation of different services into a single measure.

Although one could think of different methods for combining the measures of service utilisation, the most simple and consistent method is to derive a unit cost for each service, and use these as the weighting factors. We can then use these weights together with reported service use in the last 12 months in our survey to produce a measure of overall utilisation for each person in our sample. To estimate unit costs, expenditure on each health care service, by government, insurers and households, is aggregated and divided by the total usage of that service as reported in the LIS 2000. No differentiation is made between use of private and public services, with implications to which we return below.

5.1 Estimating Unit Costs

To estimate unit costs for different types of services, we begin with state expenditure on health care distinguishing:

- GMS spending on GPs and prescriptions
- The subsidy for drug purchase for non-medical card holders and drugs refunds for long-term illness
- Dental, ophthalmic and aural services funded under GMS
- The general hospital programme spending on Regional, Public Voluntary and Health Board County Hospitals as well as a proportion of spending on District Hospitals.

We include only non-capital costs and do not include expenditure on income maintenance programs administered by the Department of Health and Children. Similarly, expenditure on long-stay hospitals and homes as well as psychiatric hospitals is not included, as our sample covers only private households. Expenditure on day care for the disabled or psychiatric treatment are also excluded since information was not gathered in the survey which would allow these to be allocated to households. To avoid double counting, charges accruing from private and semi-private accommodation in public hospitals are deducted from the overall acute hospital expenditure total.

Expenditure on the general hospital program includes both in-patient and out-patient care, so establishing the separate cost of out-patient care becomes very difficult. To derive an estimate of expenditure on out-patient care, which includes day surgery, we estimated that the cost was six times greater than the current cost of a GP visit which amounted to €193.50. This estimate is speculative, but varying the amounts was found to not affect the overall patterns and moreover is the same cost ratio as used in Nolan (1991) and so facilitates comparisons. It should also be born in mind that this unit cost is the average of day surgery cases and outpatient visits, the former being considerably more expensive. Unfortunately, the wording of the LII question conflated day surgery and out patient visits.

Expenditure by VHI on hospital care was taken from published figures with an estimate for BUPA expenditure derived from the average VHI expenditure multiplied by the current number of BUPA policyholders that we estimate to be 5% of the VHI total. This is probably an over estimate of BUPA expenditure given the younger profile of BUPA policy holders.

Household health care spending on GP, dentist, medical specialist and optician visits as well as out of pocket expenditure on nights in hospital was derived from the Household Budget Survey for 1999/2000. That is, we derived the households total out-of-pocket expenditure on health care services and then divided this by the number of visits to each service type during the period of interest.

Combining these different sources of current expenditure and dividing them by service use among individuals in the LIS data we get the following estimates of the unit cost, in terms of overall resource use, for each type of utilisation:

- € 32.25 per GP visit
- € 325.12 per night in hospital
- € 30.74 per prescription
- € 99.44 per visit dentists visit
- € 27.54 per visit to an optician
- € 47.67 per prescription under the long-term illness scheme
- € 193.50 per out patient visit

6. Measuring Health Status

Blaxter (1989) has classified morbidity measures as falling into three main types depending on the underlying conceptual model: the *medical*, the *functional* and the *subjective*. The first defines health in terms of deviation from some physiological norm, the second defines ill health in terms of lack of ability to perform 'normal' tasks and roles and the last is defined in terms of the individual's perception. The LII 2000 data includes an example of all three of these different types of measures which we could use, although each has a slightly different relationship to the income distribution. In terms of the medical model, the LII survey includes a variable on whether the person has chronic physical or mental health problem, illness or disability. It also includes a question which asks whether the respondent has 'cut

down' or not done any of the things which they would normally have done due to a physical or mental health problem which allows us to construct a functional measure of limiting illness. The LII survey also includes a measure based on the individual's subjective assessment in the form of a question asking 'in general, how good would you say your health is?' with outcome measures from very good to very bad via fair. Whilst these measures are certainly simple, there is good evidence (for example in Blaxter) that such measures are close analogues of clinically assessed health status and good predictors of outcomes such as mortality.

A more serious problem would seem to be the possibility that particular groups may respond to the measures in different ways. For example, there is evidence (Bowling 1991) that women are more negative about their health status and more likely to seek help for a given condition than men. It is also possible that comparator groups are an important aspect of self assessed health and thus we may find that the reported health of those in groups where the average health status is lower may well be 'standardised' in comparison to the group rather than to an overall societal standard. In this paper we will be controlling for various factors in our analyses and, as described above, are fortunate in that the LIS data has three different measures of health that can be used. Using these techniques we should be able to limit the impact of any such reporting biases.

The relationship of each of these measures of health to income can once again be illustrated by graphing the concentration curves, as shown in Figure 2. Here the subjective measure has been dichotomised between those with less than fair health and all others (c.f. van Doorslaer *et al*. 1997). Inequality in the distribution of ill health using this dichotomisation is more pronounced than if only those professing very bad health are used, but as we will go onto see, the more inequitable formulation is actually more useful for analysis.

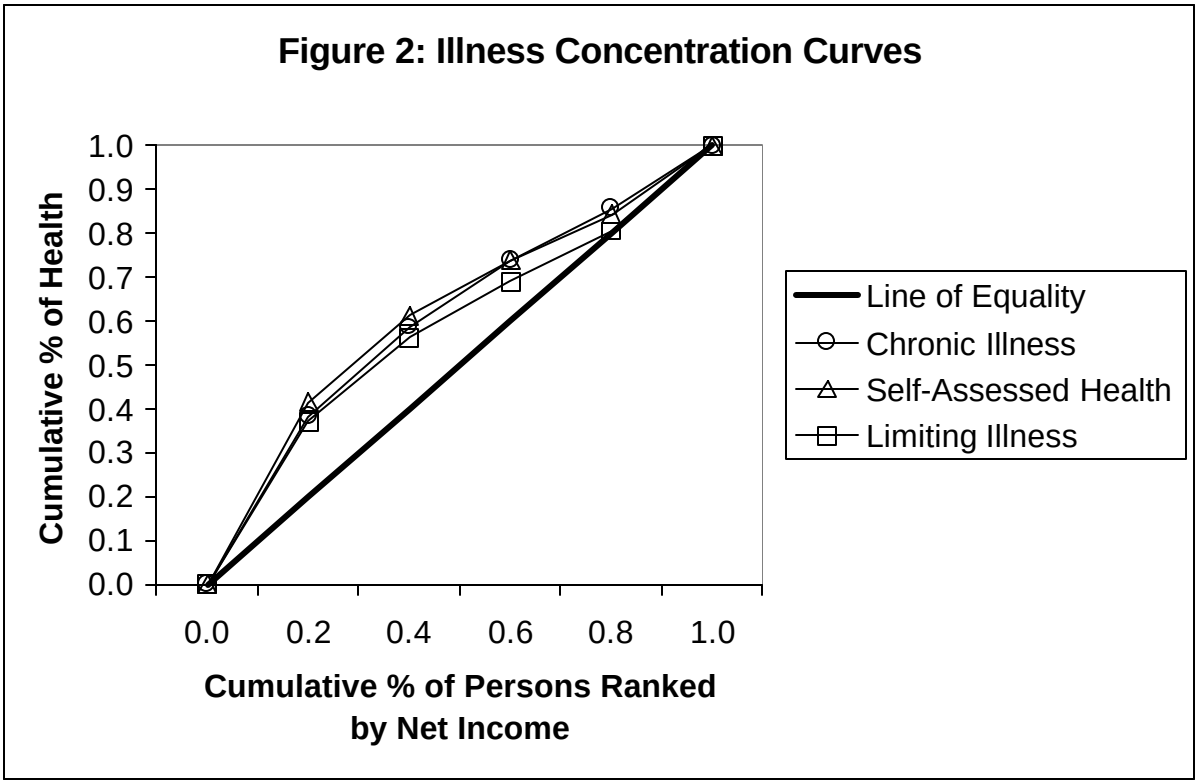


Figure 2 and Table 4 show that all three measures are concentrated among those in the lower part of the income distribution (the lines all being above the line of equality), but the extent of concentration varies. The functional measure is least concentrated among the poor, followed by the medical measure of chronic illness, with the subjective, self-assessed measure of morbidity being most unequally distributed across income groups.

Table 4: Distribution of Ill-Health by Disposable Income Quintile

Income Quintile	% of those Limited by Illness	% of those with Chronic Illness	% of those with < Good SAH
Lowest	37.2	38.4	41.5
2	19.1	20.3	19.7
3	12.6	15.2	12.6
4	11.5	11.7	10.5
Highest	19.6	14.5	15.8
Concentration Index	-0.181	-0.237	-0.256

As with the measures of utilisation we can also derive the concentration index to get a more precise measure of inequality for the health measures, and these are also shown in Table 4. This confirms that the functional measure of limiting illness is least concentrated among the worse off, with a Concentration Index of –0.18. This is followed by the chronic illness measure (-0.237), with the self-assessed measure most unequal at –0.256. It is clear that different measures lead to rather different results, although all are unevenly distributed to the detriment of those on lower incomes. Any

of these measures of health is of course a rather crude indicator of those aspects of the person's health that would require medical intervention and the take-up of services, but in the current context they do allow us to produce a benchmark on which to improve subsequently with more in-depth information about health.

7. Comparing Utilisation to Need

Having computed an aggregate utilisation figure for each individual we can now compare this to the health measures, by computing for each the proportions of utilisation/imputed expenditure found in each quintile group. This is shown in Table 5. We see that the bottom quintile has a higher share of utilisation than the other quintiles, at 30%, with the middle rather than the top quintiles having a below-average share. This pattern is broadly similar to that found by Nolan (1991) using data for 1987, although the proportion accruing to the top quintile is now considerably higher at 20.5% compared to 15.4% in 1987.

If we compare the distribution of utilisation to that of limiting illness, Table 5 shows that the latter is considerably more concentrated towards the bottom of the income distribution, with the bottom quintile accounting for over 37% of all cases. The chronic illness measure is slightly more concentrated towards the bottom of the income distribution (bottom quintile accounting for 38%), and the self-assessed measure more unequal still with 42% of all those with less than good self-assessed health in the bottom quintile. As both utilisation and the illness measures are concentrated among the more disadvantaged, the concentration indices are all negative, although the coefficient for utilisation is less negative than for the illness measures.

Table 5: Distribution of Health Care Utilisation and Chronic Illness by Disposable Income Quintile

Income Quintile	% of Utilisation	% of those Limited by Illness	% of those with Chronic Illness	% of those with < Good SAH
Lowest	29.6	37.2	38.4	41.5
2	20.6	19.1	20.3	19.7
3	15.4	12.6	15.2	12.6
4	14.0	11.5	11.7	10.5
Highest	20.5	19.6	14.5	15.8
Concentration Index	-0.104	-0.181	-0.237	-0.256
HI		0.077	0.133	0.152

Wagstaff et al (1989) have suggested that these concentration indices can be used to derive an overall summary measure of equity, or health inequality measure (HI):

$$HI=C^{exp} - C^{ill}$$

Where C^{exp} is the concentration index for expenditure and C^{ill} is the index for illness. If health care expenditures are allocated across income groups in proportion to their share of those reporting illness, then $C^{exp}=C^{ill}$ and HI=0. If HI is positive this implies

that there is inequity favouring the better off and if negative, inequity favouring the worse off. Table 5 shows that HI in this instance is positive suggesting that the distribution of utilisation relative to ill-health favours the more advantaged. Moreover, the HI for bad self-assessed health is almost twice that for limiting illness.

The HI for 2000 for chronic illness is substantially larger than that found for 1987 in Nolan (1991), where the figure was 0.088 compared to 0.133 in 2000, suggesting that inequity on this measure at least, has increased. The increase stems both from a growing inequality in the distribution of chronic illness and a movement of expenditure toward the better off.

The categorisation by income used so far has been on the basis of disposable income, but it is important to also look at the difference made when household incomes are adjusted to take household size into account. For this purpose we adopt the standard approach and calculate equivalised income, dividing total income by an equivalence scale which takes the value 1 for the first adult in the household, 0.66 for any subsequent adults, and 0.33 for each child. (This facilitates comparisons to Nolan's results for 1987). Table 6 shows the results when individuals in the sample are categorised by equivalised income.

Comparison with Table 5 shows first that the bottom quintile now accounts for a lower proportion of utilisation than with unadjusted income, as does the top quintile, while that of the middle three quintiles increases. A similar picture emerges for chronic illness and limiting illness where the proportion of illness in the bottom and top quintiles falls substantially whereas the share of the middle three quintiles increases. For the SAH measure the picture of change is similar except here the second and third quintile shares grow at the expense of the fifth and first.

Table 6: Distribution of Health Care Expenditure and Chronic Illness by Equivalent Income Quintile

Income Quintile	% of Utilisation	% of those Limited by Illness	% of those with Chronic Illness	% of those with <Good SAH
Lowest	25.4	31.2	32.9	36.2
2	22.8	22.4	24.1	22.4
3	16.6	15.9	18.5	17.9
4	16.6	13.6	12.4	10.3
Highest	18.6	17.0	12.1	13.2
Concentration Index	-0.097	-0.154	-0.225	-0.253
HI		0.057	0.128	0.156

These changes lead to C^{exp} and C^{ill} becoming less negative, leading to a smaller HI for limiting and chronic illness, but the drop in C^{exp} for the SAH measure is more substantial than the C^{ill}, thus the HI index becomes more positive at 0.156. On the other hand, the equivalisation process actually reduces the CI for the chronic and limiting measures considerably.

We can look at the patterns of utilisation and illness in more detail in Table 7, which gives the imputed expenditure per person chronically ill as well as the total imputed

expenditure by quintile. Rather than produce figures for all three measures here we use the chronic illness measure that we found lay between the SAH and limiting illness measures. While the lowest quintile has the highest utilisation of health care, we see that the lowest quintile actually has the lowest imputed expenditure per person ill, because of the large proportion of respondents in this quintile with a chronic illness. On the other hand the small number of ill respondents in the highest quintile means that this group receive the highest imputed expenditure per person ill, around twice that of the lowest quintile.

Table 7: Distribution of Health Care Expenditure, Chronic Illness and Imputed Expenditure per Person Ill

Quintile	Population	Chronic Illness	Rate/ 1000	% Ill	Cum %Ill	Exp Per Person	Exp Per Person Ill	% Exp	Cum % Exp
1	1611	550.6	341.8	32.9	32.9	1243.84	3639.55	25.3	25.3
2	1611	403.5	250.5	24.1	57.0	1117.00	4459.79	22.7	48.2
3	1611	309.7	192.2	18.5	75.6	813.93	4234.44	16.6	64.8
4	1611	206.9	128.4	12.4	87.9	813.51	6335.81	16.6	81.4
5	1611	201.9	125.3	12.1	100.0	912.23	7279.95	18.6	100.0

If we use the SAH measure rather than that for chronic illness this difference is accentuated, with the highest quintile receiving 2.5 times the funding per person "ill" that the lowest quintile receives.

8. Testing for Inequity

It seems clear from these descriptive analyses that the higher rate of morbidity in lower income groups means that the higher level of health care utilisation and expenditure among these groups is not equivalent to their 'need'. However, in analysing the impact on income on expenditure controlling for need we also need to control for other factors that may confound the relationship. The results in Tables 5 and 6 showed that the use of equivalised income rather than net income affects the results considerably (by virtue of the number and age of the people in the household). This is also true of a number of other factors that may well influence the take up of health care. For example, previous Irish research (Nolan 1991) has shown that sex and urban or rural location, social class, income, health status as well as age all significantly influence the probability of visiting a GP and the annual number of visits. These factors are also significant predictors of use of inpatient hospital services.

Given this, here we adopt a more analytical approach by standardising the measure of expenditure on healthcare (our service use measure) to take account of variations in the distribution of predictors of usage. Our aim is to re-estimate the concentration index used earlier (C^{exp}), but this time control for factors which may confound the relationship between the health status of the individual and expenditure on health including age, sex and location. That is, we want to estimate the partial correlation of the confounding variables sex, age and location on total health expenditure conditional on health status. If after this procedure HI is still positive we will have

evidence that the distribution of health expenditure is actually skewed toward the better off even when we have controlled for health status.

To estimate the concentration index we use a direct standardisation method based on regression:

$$\hat{y}_i^{DS} = \hat{y}_g^{DS} = \hat{a}_g + \sum_j \hat{b}_{jg}\bar{x}_j + \sum_k \hat{g}_k \bar{z}_{kg}$$

Where ordinary least squares estimates of group parameters ($\acute{a}_g$, $\hat{a}_{jg}$, $\tilde{a}_{kg)}$, sample means of confounding variables ($\overline{X}_j$) and group specific means of the non-confounding variable ($\overline{Z}_{kg}$) are used to generate directly standardised estimates of total health expenditure $\hat{y}_i^{DS}$. This equation is used to derive a concentration index controlling for the fact that individual observations only vary between, but not within quintiles. Using this procedure we can derive an estimate of the concentration index for expenditure, which also adjusts standard errors and can predict expenditure shares for each quintile.

Table 8 gives the resulting figures from this standardisation, though here we only show results for two of the health measures – limiting illness and self-assessed health, which cover the range for the health measures. It shows that once we control for the partial correlation of age, sex and location conditional on limiting illness, the quintile pattern remains much the same except that the figure for the lowest two and highest quintiles have been lowered marginally and the third quintile has been raised to 17.8% from 16.6%.

Table 8: Distribution of Standardised Health Care Utilisation by Equivalent Income Quintile Controlling for Age, Sex, location and Level of 'Need'

Income Quintile	% of Utilisation (Limiting Health)	% of Utilisation (SAH)
Lowest	25.1	26.7
2	22.3	22.4
3	17.8	17.2
4	16.3	15.6
Highest	18.5	18.1
Concentration Index	-0.08*	-0.102*
(Standard Error)	(0.023)	(0.029)
HI	0.074	0.151

*=P<0.05

These adjustments mean that the concentration index for utilisation/imputed expenditure increases from –0.097 unstandardised to –0.08 (P>0.05) standardised, suggesting that even standardising for a range of factors and the distribution of limiting illness, is still skewed to the lower end of the income distribution. However, as the positive HI coefficient shows, the adjusted expenditure is less negative than C^{ill} using the limiting illness measure, suggesting that health care utilisation among higher income groups still exceeds what we would expect given their need (HI=0.074).

Is this finding the result of the measure of 'need' that we use? If we look at the results for the SAH measure, which was far more skewed in its distribution toward the poor, we can see that the adjusted expenditure distribution is relatively similar to that using limiting illness, although the share of the lowest quintile increases. This distribution leads to an estimate of C^{exp} of –0.102, slightly more negative than that for limiting illness, showing once again that spending is skewed to the lower end of the income distribution. Comparing the standardised C^{exp} to C^{ill} the HI coefficient is again positive, suggesting again that those with the same level of need receive less healthcare if they have less income.

It would be useful to decompose these standardised measures of total expenditure on health care into its components, so that we can evaluate whether this pattern of inequity is common across all the elements, or more pronounced among some than others. Rather than give standardised distributions for all elements for both the need measures, here we concentrate on those elements which together represent over 90% of all expenditure: nights in hospital, GP visits, out- patient visits and prescriptions. We saw in Table 2 that each of these elements were used more by those at the lower end of the income distribution, but here we standardise by age, sex and location as well as the two measures of health need that we are using (as well as equivalising income). Table 9 shows that the standardised CIs for these four services tend to be slightly less unequally distributed than when using the unstandardised CIs, although the CI for inpatient nights and out-patient usage standardised by the SAH measure is marginally more unequal.

Table 9: Distribution of Standardised Imputed Health Care Expenditure on Specific Services by Equivalent Income Quintile Controlling for Age, Sex, location and 'Need'

Income Quintile	In Patient Nights		Doctor Visits		Out Patient Visits		Prescriptions	
	Limiting Health	SAH	Limiting Health	SAH	Limiting Health	SAH	Limiting Health	SAH
Lowest	25.8	28.1	28.4	29.8	22.1	23.5	35.6	36.9
2	24.6	24.8	21.7	21.6	20.5	20.6	23.6	23.5
3	18.1	17.1	17.7	17.2	15.7	15.3	16.6	16.1
4	13.5	12.6	16.9	16.4	20.4	19.4	13.1	12.6
Highest	18.0	17.5	15.3	15.0	21.4	21.2	11.2	10.9
CI	-0.112*	-0.143*	-0.120**	-0.138**	-0.010	-0.032	-0.229**	-0.245**
HI	0.042	0.11	0.034	0.115	0.144	0.221	-0.075	0.008

If we use these coefficients to derive the index of health inequality (HI), we see that all of the coefficients other than that for prescriptions standardised with limiting illness are positive, suggesting that service use is greater for higher income groups relative to their need. The inequity is largest for out-patient visits relative to the SAH measure, where the HI coefficient is almost twice as large as that for hospital nights and visits to the GP. Only for prescription using the less skewed chronic illness measure do we see a negative coefficient for HI suggesting inequity in favour of the less well off, with the SAH measure again being negative.

9. Summary and Conclusions

In this paper we have examined the distribution of health care service utilisation in Ireland, and attempted to evaluate whether that utilisation was equitable across income groups. This is an important question which has generated a great deal of debate in media and policy circles, but which has not been examined systematically using recent empirical evidence. The analyses performed here were based on the Living in Ireland Survey for 2000, a nationally representative sample of individuals and households.

By deriving measures of utilisation from the LIS data and using data on expenditure on health care from a number of different sources including official publications and the Household Budget Survey for 1999/2000, we estimated the unit cost for different health care services that could be used to impute overall cost per person as a measure of their overall utilisation. We then compared that utilisation among individuals ranked by their income with levels of health need in the form of a measure of chronic illness.

The results showed that a relatively high share of imputed expenditure went to lower income quintiles, but this was still substantially less than the proportion within these quintiles who were experiencing a chronic illness or were limited by their health, and a great deal less than the proportion stating that their health was bad. By using the methodology developed by Wagstaff *et al* (1991) we were able to derive an index to describe this inequality, and the results showed that levels of utilisation/imputed expenditure favoured the better off. Adjusting income for household size and composition led to an increase in the coefficient of inequity.

However, those analyses did not standardise for socio-demographic characteristics and a number of other factors that may confound the relationship. In the final part of the paper a direct standardisation method was employed for this purpose. This led to still suggested that more affluent groups in Irish society use significantly more health care services than would be expected given their level of need, relative to the less well off.

The two health measures marked the two extremes of the skewed distribution of health need across income groups. However, we should also beware that the measures of 'need' that we have used are limited and based solely on the self-reports of respondents. It would be valuable in the future to carry out the same type of analyses using internationally standardised measures of health such as the SF-36 or 12. It should also be born in mind that our results assumed that there are no differences in quality between public and private care, which would also benefit from further investigation.

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