3. THE UTILISATION OF GP SERVICES

Anne Nolan

Brian Nolan

The Economic and Social Research Institute, Dublin

3.1 Introduction

Chapters 1 and 2 outlined how GP services in Ireland are financed and delivered, and how the interaction between the public and private systems impacts on the behaviour of both doctors and patients. In this chapter, we move on to detail patterns of GP visiting across the population. In Section 3.2 we describe the data-sets used in this analysis, and in the analyses in the following chapter, namely the 1995-2001 Living in Ireland Surveys, the 2001 Quarterly National Household Survey and the 2004 EU-Statistics on Income and Living Conditions. In Section 3.3, we begin the analysis of GP visiting patterns by firstly describing how GP visiting patterns vary according to various individual and household socio-economic characteristics. We relate GP visiting by the individual to his or her 'need' for health care (as proxied by their age, gender and health status), 'non-need' factors such as education level, labour force status, household location etc. and finally, the financial incentives facing both the individual and the doctor (i.e., eligibility for free care and household income). While variation in GP visiting patterns across the population due to 'need' factors such as age and health status is to be expected, examining the variation, if any, in visiting rates due to 'non-need' factors is useful for highlighting possible horizontal inequities in GP visiting rates across different population groups (see Morris *et al.*, 2005).

However, many of these individual and household characteristics are highly correlated with each other (for example, medical card eligibility is highly correlated with health status). In Section 3.4, we therefore move on to use multivariate regression techniques, which help in gaining a better understanding of the independent effects of each of the different variables on the utilisation of GP services. Section 3.5 analyses new data on GP visiting in the 2004 EU-SILC. Section 3.6 presents some international comparisons, including a brief comparison of GP visiting in Northern Ireland and the Republic of Ireland (an issue dealt with more fully in Chapter 5). Section 3.7 summarises and concludes.

**3.2
Data Sources**

3.2.1 LIVING IN IRELAND SURVEYS (LIIS)

The LIIS constitutes the Irish component of the European Community Household Panel (ECHP), which began in 1994 and ended in 2001. The ECHP involved an annual survey of a representative sample of private households and individuals aged 16 years and over in most of the then EU-15 member states, and was based on a standardised questionnaire. Where possible, the same households were followed through time. Each adult (16+ years) completed a personal questionnaire, which collected a wide range of information on individual socio-economic characteristics, including various aspects of health status (both physical and psychological) and health services utilisation. A household questionnaire was also completed, containing information on housing, income and financial situation and household size and composition.

For the purposes of this study, we use data from the 1995 to 2001 surveys (as GP, dentist and optician visits are not separately identified in 1994). While the rate of sample attrition in the LIIS is quite high with only 37.5 per cent of those interviewed in 1995 still participating in the survey in 2001, the 2000 survey added a substantial new random sample which comprised about half the households interviewed. To further reduce bias due to selective attrition, the sample for analysis was re-weighted to ensure representativeness in terms of a variety of demographic and socio-economic characteristics (see Russell *et al.*, 2004 for further details). In 1995, the sample size was approximately 8,500 individuals, and this had fallen to just under 5,400 individuals by 2001. For the presentation of GP visiting patterns and multivariate estimation results in this chapter, we concentrate on data from 1995 and 2001 only, but in Section 4.2.2 of Chapter 4 we use the full longitudinal data-set (i.e., 1995-2001 inclusive).

3.2.2 QUARTERLY NATIONAL HOUSEHOLD SURVEY (QNHS)

The QNHS is carried out each quarter with the primary purpose of gathering information on participation in the labour force, and approximately 40,000 adults (18+ years) are surveyed each quarter. Each survey also contains an add-on survey relating to special social topics of interest, and in the third quarter of 2001 (June-August), over 40,000 individuals provided information on various aspects of their health status and use of health services, as well as their labour force characteristics. While the sample of individuals is much larger than for the LIIS, the range of socio-economic characteristics collected in the QNHS is much smaller, and much of the information is often not directly comparable with that from the LIIS (e.g., whereas GP utilisation is collected in terms of the number of visits in the previous year in the LIIS, it is collected in terms of whether or not the individual had at least one visit in the last two weeks in the QNHS).

3.2.3 EU STATISTICS ON INCOME AND LIVING CONDITIONS (EU-SILC)

EU-SILC is the successor to the ECHP, and the first such survey in Ireland was carried out by the Central Statistics Office (CSO) in the second half of 2003, making Ireland only one of six member states to participate in the pilot survey (see Maitre *et al.*, 2006). The second round of EU-SILC in 2004 included thirteen of the old EU-15 and most of the new member states, as well as Iceland. In 2005, EU-SILC reached its full scale with the involvement of all EU member states plus Iceland and Norway. Like the LIIS, EU-SILC collects a wide range of information on the socio-economic characteristics of both individuals (16+ years) and households, with the health information following closely that collected in the LIIS. However, information on the utilisation of GP services is only asked of those with medical cards, and in addition, the reference period is different again, referring to the number of free GP visits in the previous four weeks. On the other hand, EU-SILC does contain limited information on foregone visits to doctors and dentists, and the reasons (including cost) underlying this decision. We use the first complete wave of data (i.e., for 2004), which contains approximately 10,500 individual observations. Appendix I provides exact descriptions for each of the health and socio-economic variables used in this study for all three data sources.

3.3 GP Visiting in the 1995 and 2001 Living in Ireland Surveys

3.3.1 DESCRIPTIVE STATISTICS ON GP VISITING PATTERNS

Tables 3.1-3.12 present GP visiting patterns from the 1995 and 2001 LIIS by age, sex and various indicators of health status (i.e., so-called 'need' variables) and then by level of education; employment status; marital status; household location; household income and medical card eligibility (i.e., so-called 'non-need' variables). All data are weighted to ensure that statistics are representative of the national population, and observations with GP visits in excess of 104 per annum are excluded from the analyses.

From Table 3.1 we can see that the average number of GP visits per annum was 3.5 in 1995 and 3.3 in 2001. Just over 70 per cent of the adult population had at least one GP visit in the previous year in 1995, and this proportion had risen to nearly 74 per cent in 2001. Of those visiting at least once, the average number of GP visits was 5.0 in 1995 and 4.7 in 2001, which suggests that while more individuals are visiting their GP at least once, they visit less frequently now than in earlier years.

Table 3.1: Aggregate GP Visiting Patterns

	1995	2001
Average number of GP visits	3.5	3.3
Proportion with at least one GP visit in previous twelve months	70.4	73.8
Average for those with at least one GP visit	5.0	4.7

Table 3.2 presents GP visiting patterns by age and sex. Overall, GP visiting is an increasing function of age, with those aged 75 years having over three times as many GP visits as those aged 16-24 years. The proportion visiting their GP at least once a year also increases with age, with nearly 95 per cent of those aged 75+ visiting their GP at least once a year, in comparison with approximately 60 per cent of those aged 16-24 years. Females have both a higher average number of GP visits per annum, and also visit their GP at least once a year in higher proportions than males. However, the age gradient is steeper for males than for females, possibly due to GP visits as a result of pregnancy and childbirth for younger females. For example, men aged 75+ have approximately four times as many GP visits as men aged 16-24 years, while the corresponding figure for women is approximately three times as many GP visits.

Table 3.2: GP Visiting Patterns by Age and Sex

	Average Number of GP Visits		Proportion Visiting at Least Once	
	1995	2001	1995	2001
Males				
16-24	1.6	1.4	51.0	52.5
25-34	1.7	2.1	59.4	60.0
35-44	2.4	1.7	60.1	61.5
45-54	2.8	2.5	61.7	66.9
55-64	4.2	3.5	72.6	77.3
65-74	5.0	5.1	82.1	92.1
75+	6.6	6.3	93.8	94.2
Total	2.8	2.6	63.1	66.5
Females				
16-24	2.8	3.0	67.4	73.4
25-34	4.2	3.4	76.4	82.6
35-44	3.7	3.3	74.5	74.0
45-54	3.7	4.1	77.5	79.8
55-64	4.9	4.1	80.9	82.5
65-74	6.3	6.0	89.5	92.7
75+	8.3	7.4	95.2	96.2
Total	4.3	4.0	77.6	80.9
All				
16-24	2.1	2.2	58.7	62.9
25-34	3.0	2.7	68.1	71.0
35-44	3.1	2.5	67.3	67.9
45-54	3.2	3.3	69.4	73.3
55-64	4.5	3.8	76.8	79.9
65-74	5.7	5.6	86.1	92.4
75+	7.6	7.0	94.7	95.4
Total	3.5	3.3	70.4	73.8

In Tables 3.3 to 3.6 we present GP visiting patterns by various indicators of physical and psychological health status, namely, the individual's self-assessment of their own health status, whether the individual has a chronic condition, the individual's perception of the severity of this condition and levels of psychological distress. There is a clearly increasing relationship between the average number of GP visits per annum and worsening levels of self-assessed health status, with those in very bad health reporting 6.8 times more GP visits than those aged 16-24 years in 1995; by 2001, this differential had increased to 8.9 times more visits (Table 3.3). Similarly, nearly all

of those in very bad health have a least one GP visit per annum, in comparison with approximately 60 per cent of those in very good health. The patterns by chronic illness tell a similar story; those who report that they suffer from "a chronic physical or mental health problem, illness or disability" have a higher total number of GP visits per annum and visit their GP in greater proportions than those without such conditions in both years (Table 3.4). Focusing on those who report a chronic illness, Table 3.5 presents GP visiting patterns by the individual's self-assessment of the severity of their condition. Those who report that they are severely limited in their daily activities have approximately twice as many GP visits per annum as those who are not hampered in their daily activities, although there is less variation in the proportions visiting their GP at least once as the severity of the illness increases (suggesting that the frequency of visits for those who visit at least once is much higher for those who are slightly or severely hampered in their daily activities). From Table 3.6, we can see that those who are deemed to be in psychological distress[1] have over twice as many GP visits as those who are not regarded as psychologically distressed, and nearly 90 per cent of such individuals visit their GP at least once a year, in comparison with approximately 70 per cent of individuals who are not classified as psychologically distressed.

Table 3.3: Visiting Patterns by Self-Assessed Health Status

	Average Number of GP Visits		Proportion Visiting at Least Once	
	1995	**2001**	**1995**	**2001**
Very good	1.8	1.7	58.8	63.5
Good	3.1	3.0	73.2	76.0
Fair	7.5	7.6	92.6	95.8
Bad	12.7	10.5	93.5	99.8
Very bad	12.3	15.2	97.8	98.7
All	3.5	3.5	70.4	73.8

Table 3.4: GP Visiting Patterns by Chronic Illness

	Average Number of GP Visits		Proportion Visiting at Least Once	
	1995	**2001**	**1995**	**2001**
No chronic illness	2.2	2.2	65.1	67.8
Chronic illness	8.8	7.4	92.3	95.6
All	3.5	3.5	70.4	73.8

[1] Scores from the General Health Questionnaire (GHQ) are used to construct a variable indicating psychological health status. The GHQ contains twelve questions relating to psychological health status. For the six positive statements, a person scores one if they answer "less than usual" or "much less than usual" while for the six negative statements, a person scores one if they answer "more than usual" or "much more than usual". An example of a positive statement is "have you recently been able to concentrate on whatever you're doing?" while an example of a negative statement is "have you recently lost much sleep over worry?" These scores are added up and constitute an ordinal variable indicating the degree of psychological distress; anyone scoring above the conventional threshold of two is considered to be in psychological distress (see also Nolan, 1993a).

Table 3.5: GP Visiting Patterns by Severity of Chronic Illness (for those Reporting a Chronic Illness)

	Average Number of GP Visits		Proportion Visiting at Least Once	
	1995	2001	1995	2001
Not Hampered	5.9	5.0	85.9	92.3
Slightly Hampered	8.5	7.0	94.0	96.1
Severely Hampered	11.6	11.2	92.3	98.0
All	8.8	7.4	92.2	95.5

Table 3.6: GP Visiting Patterns by Psychological Health Status

	Average Number of GP Visits		Proportion Visiting at Least Once	
	1995	2001	1995	2001
No psychological stress	2.9	2.9	69.3	72.3
Psychological stress	6.9	6.7	84.8	87.2
All	3.6	3.4	72.0	74.5

Note: The measure of psychological health status is not available for questionnaires completed by proxy (which account for 13.9 per cent of observations in 1995 and 14.5 per cent of observations in 2001).

We now move on to detail GP visiting patterns by so-called 'non-need' factors, i.e., factors other than age, sex and health status. While differences in GP visiting rates due to need factors such as age and health status is to be expected, examining the variation, if any, in GP visiting rates due to 'non-need' factors such as household location, income or medical card eligibility may highlight possible horizontal inequities in GP visiting across different population groups. Of course, some 'non-need' factors may be highly correlated with 'need' factors (e.g., medical card eligibility is highly correlated with age and health status), and therefore a multivariate analysis of GP visiting is necessary to determine whether GP visiting still varies significantly by such 'non-need' factors, even after controlling for age, sex and health status (see Section 3.3.2). Table 3.7 shows that while the average number of GP visits per annum declines as the level of education increases, the proportions visiting their GP at least once are highest for those with a primary education, followed by those with a third level education, and lowest for those with lower or upper secondary levels of education. This would suggest that while those with a third level education visit their GP in high proportions, they do not visit very frequently (unlike their counterparts with a primary level of education only). GP visiting also shows distinct patterns by individual marital status, with single individuals having both the lowest proportion visiting their GP at least once and average number of GP visits per annum, and widowed persons the highest (Table 3.8).[2] Table 3.9 confirms the expectation that time costs are an important determinant of GP visiting, with those that are employed having a smaller average number of GP visits and visiting their GPs in smaller proportions, than those that are either

---

[2] GP visiting refers to personal visits only (i.e., visits accompanying children are not included).

unemployed or economically inactive. Examining GP visiting patterns by household location in Table 3.10 suggests that while there was no difference in the average number of GP visits per annum for urban and rural residents in 1995, by 2001, rural residents had a higher average number of GP visits per annum, despite the fact that urban residents visit their GP in greater proportions in both years. When we look in more detail at GP visiting patterns by household location, there is no clear pattern across different areas of the country in GP visiting, except that Galway city has the lowest proportion visiting their GP and the lowest number of GP visits in both years.

Table 3.7: GP Visiting Patterns by Highest Level of Education Completed

	Average Number of GP Visits		Proportion Visiting at Least Once	
	1995	2001	1995	2001
Primary	5.3	5.4	78.0	83.5
Lower Secondary	2.6	3.0	64.3	70.3
Upper Secondary	2.7	2.5	66.5	69.6
Third Level	2.2	2.3	69.2	71.6
All	3.5	3.3	70.4	73.8

Table 3.8: GP Visiting Patterns by Marital Status

	Average Number of GP Visits		Proportion Visiting at Least Once	
	1995	2001	1995	2001
Never married	2.7	2.7	62.8	68.6
Married	3.5	3.4	72.0	75.1
Separated/divorced	3.6	4.1	80.9	78.2
Widowed	7.7	6.0	92.4	91.5
All	3.5	3.3	70.4	73.8

Table 3.9: GP Visiting Patterns by Labour Force Status

	Average Number of GP Visits		Proportion Visiting at Least Once	
	1995	2001	1995	2001
Employed	2.1	2.1	63.5	67.4
Unemployed	2.8	4.1	63.1	72.7
Inactive	5.1	4.9	78.9	82.8
All	3.5	3.3	70.4	73.8

Table 3.10: GP Visiting Patterns by Household Location

	Average Number of GP Visits		Proportion Visiting at Least Once	
	1995	2001	1995	2001
Rural	3.5	3.6	67.6	70.2
Urban	3.5	3.2	72.3	76.3
Open Country	3.4	3.4	66.8	68.5
Village (200-1,499)	4.0	4.6	71.3	78.7
Town (1,500-2,999)	4.4	4.6	69.6	82.8
Town (3,000-4,999)	4.6	4.2	78.6	72.5
Town (5,000-9,999)	3.7	4.8	67.4	78.4
Town (10,000 or more)	3.9	3.5	75.8	74.3
Waterford City	2.5	4.3	59.0	80.4
Galway City	2.2	1.4	63.8	64.6
Limerick City	4.2	3.8	77.6	72.2
Cork City	3.8	3.7	76.4	75.3

Finally, we examine how GP visiting patterns vary by household income and medical card eligibility. Given the unusual system of eligibility for free GP care in Ireland (see Chapters 1 and 2), particular attention in this, and the subsequent chapter, will be devoted to examining how GP visiting varies by income and medical card eligibility. From Table 3.11, we can see that the average number of GP visits per annum declines with increasing income (although the relationship is not linear, with the highest average number of GP visits per annum observed for those in the third income decile in 1995 and second in 2001). GP visiting rates fall sharply after the second/third income decile, reflecting the sharp decline in medical card coverage as we move up the income distribution. In terms of the proportion of the sample in each decile who visit their GP at least once a year, for 1995, there is evidence of a clear U-shaped pattern in the proportion with at least one GP visit per annum; by 2001 however, while the proportions visiting their GP at least once a year does increase for the ninth and tenth (highest) income deciles, the proportions do not reach the levels of those in the bottom three deciles.

Table 3.11: GP Visiting Patterns by Household Income

	Average Number of GP Visits		Proportion Visiting at Least Once	
	1995	2001	1995	2001
Decile 1 (lowest)	3.9	5.6	71.1	80.2
Decile 2	4.7	5.8	74.5	84.1
Decile 3	5.2	3.7	76.1	76.6
Decile 4	4.2	3.2	68.4	67.9
Decile 5	3.5	3.1	67.1	71.8
Decile 6	3.2	2.6	70.6	71.4
Decile 7	2.9	2.0	65.8	67.7
Decile 8	2.8	2.7	69.3	68.4
Decile 9	2.7	2.2	71.4	76.1
Decile 10 (highest)	2.3	2.3	70.1	73.9
All	3.5	3.3	70.4	73.8

Household income is the primary criterion by which eligibility for a medical card is assessed, and therefore much of the variation in GP visiting between those in the bottom deciles and those at the top

could simply reflect a medical card availability effect. In addition, the widening gap between the top and bottom of the income distribution in GP visiting patterns over the period 1995-2001 is not surprising, given the fall in the proportion of the population eligible for a medical card over the period, and the consequent concentration of medical card patients among the poorer sections of the population. Table 3.12 confirms that GP visiting patterns differ considerably by medical card eligibility status, with those holding a medical card having approximately 2.5 times more GP visits per annum and visiting their GPs in greater proportions than those without a medical card.

Table 3.12: GP Visiting Patterns by Medical Card Eligibility

	Average Number of GP Visits		Proportion Visiting at Least Once	
	1995	**2001**	**1995**	**2001**
No Medical Card	2.3	2.3	65.1	67.7
Medical Card	5.7	6.0	80.1	86.9
All	3.5	3.5	70.4	73.8

3.3.2 MULTIVARIATE ANALYSIS OF GP VISITING

While the above tables suggest that GP visiting patterns vary considerably across different sections of the population, many household and individual characteristics are highly correlated with each other. For example, while there is a clear relationship between medical card eligibility and GP visiting, much of the variation in GP visiting across the two groups could simply be due to the fact that medical card patients are, on average, older, on lower incomes and in poorer health than those without medical cards (e.g., while 40.7 per cent of medical card patients report a chronic illness, only 11.5 per cent of non-medical card patients do). We need, therefore, to construct multivariate models that will indicate whether such differences remain when all other possible influences on GP visiting have been controlled for. This necessitates the use of multivariate regression techniques in order to untangle the independent effects of each of the different variables.

As detailed in Appendix I to this chapter, we estimate two separate models of GP visiting; the one-step model examines the determinants of the total number of GP visits per annum, while the two-step model examines the determinants of the contact (the decision to visit the GP) and frequency (the subsequent number of GP visits) decisions separately. In the literature on the utilisation of health services, two-step approaches, which are motivated in terms of a principal-agent view of the decision-making process, are increasingly common. It is a useful approach in that different variables may affect the decision to visit a GP and second, the decision about the number of visits. In addition, the same variables may affect the two stages of the decision in different ways. For example, Hurd and McGarry (1997) find that while income has a positive and significant effect on the contact decision, it is insignificant in determining the frequency of GP visits. They

interpret this effect as consistent with a principal-agent view of the decision-making structure with the GP determining the frequency of GP visits at the second stage. Unfortunately, our data do not allow us to include variables describing the characteristics and incentives of the GP, which are often argued to be important in determining the frequency of GP visits (see Pohlmeier and Ulrich, 1995 and Jimenez-Martin *et al.*, 2001).

Table 3.13 presents estimation results for the one-step model of GP visiting, using LIIS data for 1995 and 2001. The results are presented in terms of marginal effects (i.e., the predicted extra number of GP visits per annum). As expected, health status emerges as the strongest predictor of GP visiting rates in both years. For example, in comparison with those in very good health, those who

Table 3.13: Marginal Effects from One-Step Model of GP Visiting

	1995	2001
Age 25-34 years	0.19	0.28 *
Age 35-44 years	-0.09	-0.29 *
Age 45-54 years	-0.54 ***	-0.14
Age 55-64 years	-0.35 **	-0.10
Age 65-74 years	-0.15	0.20
Age 75+ years	0.38 *	0.21
Female	0.82 ***	1.00 ***
Good	1.02 ***	0.98 ***
Fair	2.85 ***	2.79 ***
Bad or very bad	4.49 ***	4.95 ***
Chronic illness	2.23 ***	1.81 ***
Stress	0.82 ***	0.67 ***
Lower secondary	-0.24 **	-0.21 *
Upper secondary	-0.28 ***	-0.30 **
Third level	-0.09	-0.25 *
Married	0.51 ***	0.52 ***
Separated/divorced	0.69 **	0.67 **
Widowed	0.60 ***	0.49 **
Employed	-0.30 ***	-0.30 ***
Unemployed	-0.43 ***	-0.42 *
Rural	-0.12 *	-0.02
Income 3	0.30 **	-0.18
Income 4	-0.00	-0.25 *
Income 5	0.14	0.59 ***
Income 6	0.56 ***	-0.06
Income 7	0.39 **	-0.36 **
Income 8	0.50 ***	0.15
Income 9	0.62 ***	-0.16
Income 10 (highest)	0.71 ***	0.22
Medical Card	1.20 ***	1.06 ***
N	7,218	5,309
Log-Likelihood	-15,337.3	-11,512.8

*** significant at 1 per cent; ** significant at 5 per cent; * significant at 10 per cent.

assess their own health as bad or very bad had nearly five extra GP visits per annum in 2001. Those with a chronic illness and in psychological distress also have a significantly higher number of GP visits per annum. Age is largely insignificant in 2001, and while those aged 75+ years have significantly more GP visits than those aged 16-24 years in 1995, the effects are surprisingly negative for some of the middle age groups. Females visit significantly more often than males.

Examining the remainder of the socio-economic characteristics, the results indicate that the number of GP visits per annum is significantly lower for those with higher levels of education (although there is little significant difference between those with primary level education and those with a third level qualification in both years). In comparison with being single, being married, separated, divorced or widowed increases significantly the average number of GP visits per annum. In comparison with those that are economically inactive, those that are employed or unemployed have significantly fewer GP visits per annum, a pattern consistent with the descriptive statistics presented in Table 3.9. Household location is largely insignificant.

The number of GP visits is an increasing function of income in 1995, although there is little consistent pattern in 2001, except that those in the highest income decile have significantly more GP visits per annum than those in the lower income deciles. As expected, medical card patients have a significantly higher number of GP visits per annum than private patients, even when income and health status have been taken into account. While we have tried to control as comprehensively as possible for differences in health status between those with and without medical cards, some differences in need may not be fully captured by our need variables, and may indeed be correlated with medical card eligibility or other factors that we are labelling 'non-need'. For example, if medical card patients differ from private patients in aspects of health status not captured by our range of health status variables, then medical card eligibility may to some extent reflect a difference in the need for a GP visit. However, the relatively large size of the effect (between 1.0 and 1.2 extra GP visits per annum) and its significance suggest that the effect would not entirely disappear, even with enhanced measures of health status (see Section 4.2.1 of Chapter 4 for further analysis of this issue). We also tested the addition of an interaction term between a continuous form of the income variable and medical card eligibility, as we might expect the income effect to be more pronounced for those without medical cards. However, the interaction term is insignificant in both 1995 and 2001.

Moving on to the two-step model, Table 3.14 presents the results for the contact decision (i.e., examining the probability of visiting a GP at least once in the previous year), and Table 3.15 presents the results for the frequency decision (i.e., examining the number of GP visits for those visiting at least once per annum). Age is significant in explaining the decision to contact a GP, particularly at the older ages. The remaining need factors (gender and the various measures of health status) are all highly significant in explaining the probability of

visiting a GP, with the exception of psychological distress in 2001. While education and employment status are largely insignificant in determining the probability of visiting a GP in both years, marital status has an effect in the direction expected (but only for 1995). Rural residents are significantly less likely to contact their GP in both years. Income exerts a positive and significant effect, as does medical card eligibility.

Table 3.14: Marginal Effects from Contact Decision of Two-Step Model of GP Visiting

	1995	2001
Age 25-34 years	-0.02	0.01
Age 35-44 years	-0.07 ***	-0.01
Age 45-54 years	-0.08 ***	0.00
Age 55-64 years	-0.06 **	0.05 *
Age 65-74 years	0.02	0.11 ***
Age 75+ years	0.12 ***	0.15 ***
Female	0.11 ***	0.11 ***
Good	0.09 ***	0.07 ***
Fair	0.19 ***	0.17 ***
Bad or very bad	0.21 ***	0.19 ***
Chronic illness	0.16 ***	0.15 ***
Stress	0.07 ***	0.03
Lower secondary	-0.01	0.02
Upper secondary	0.00	0.02
Third level	0.05 **	-0.00
Married	0.11 ***	0.02
Separated/divorced	0.12 ***	0.03
Widowed	0.08 **	0.06 *
Employed	0.00	-0.01
Unemployed	-0.03	-0.03
Rural	-0.04 ***	-0.04 ***
Income 3	0.03	0.02
Income 4	-0.02	-0.01
Income 5	0.02	0.06 **
Income 6	0.07 ***	0.01
Income 7	0.05 **	0.05 *
Income 8	0.08 ***	0.05 *
Income 9	0.10 ***	0.07 ***
Income 10 (highest)	0.10 ***	0.07 ***
Medical Card	0.13 ***	0.07 ***
N	7,218	5,309
Log-Likelihood	-3,871.5	-2,616.4

*** significant at 1 per cent; ** significant at 5 per cent; * significant at 10 per cent.

Table 3.15: Marginal Effects from Frequency Decision of Two-Step Model of GP Visiting

	1995	2001
Age 25-34 years	0.42 **	0.42 *
Age 35-44 years	0.15	-0.41 *
Age 45-54 years	-0.58 ***	-0.32
Age 55-64 years	-0.41 *	-0.48 *
Age 65-74 years	-0.43 *	-0.32
Age 75+ years	0.07	-0.39
Female	0.69 ***	0.89 ***
Good	1.04 ***	1.02 ***
Fair	2.89 ***	2.73 ***
Bad or very bad	4.99 ***	5.00 ***
Chronic illness	2.33 ***	1.86 ***
Stress	0.93 ***	0.81 ***
Lower secondary	-0.35 **	-0.35 **
Upper secondary	-0.45 ***	-0.51 ***
Third level	-0.46 **	-0.30
Married	0.23	0.68 ***
Separated/divorced	0.27	0.83 **
Widowed	0.48**	0.62 **
Employed	-0.50 ***	-0.38 ***
Unemployed	-0.57 ***	-0.53 *
Rural	0.04	0.25 **
Income 3	0.39 **	-0.32 *
Income 4	0.15	-0.31 *
Income 5	0.15	0.58 **
Income 6	0.38 *	-0.07
Income 7	0.27	-0.83 ***
Income 8	0.24	-0.02
Income 9	0.24	-0.74 ***
Income 10 (highest)	0.41 *	-0.14
Medical Card	1.09***	1.17 ***
N	5,033	3,930
Log-Likelihood	-11,365.2	-8,805.0

*** significant at 1 per cent; ** significant at 5 per cent; * significant at 10 per cent.

Examining the frequency decision (see Table 3.15), age is only marginally significant, with gender and health status being the main 'need' determinants of the frequency of GP visits. Rising levels of education are associated with fewer GP visits (although the relationship is not as clear-cut in 2001), being married, separated, divorced or widowed are associated with more GP visits and in comparison with being economically inactive, being in the labour force (i.e., either employed or unemployed) is associated with fewer GP visits per annum. Household location is only significant in 2001, and indicates that rural residents visit significantly more frequently than urban residents. The results from the two-step model for 2001 therefore suggest that while rural residents are significantly less likely to visit their GP, they visit significantly more frequently when they do. The income results for 1995 suggest that while income is

significant in determining the probability of visiting a GP, it is insignificant in determining the number of GP visits once that decision has been made. This is consistent with a principal-agent view of the decision-making process underlying GP visiting, whereby the patient decides to make the initial contact with the GP, and the GP (and his characteristics) are more important in determining the frequency of treatment. Medical card eligibility is once again positive and highly significant.

3.4 GP Visiting in the 2001 Quarterly National Household Survey

3.4.1 DESCRIPTIVE STATISTICS ON GP VISITING PATTERNS

Tables 3.16 to 3.22 present descriptive statistics on GP visiting (the proportion of the sample with at least one GP visit in the previous two weeks) using data from the 2001 QNHS. Unfortunately, the data do not record the actual number of visits in the previous two weeks, but even with the different reference period, the patterns are largely consistent with those using LIIS data. Table 3.16 shows that 19.1 per cent of the adult (18 years and older) population had at least one GP visit in the previous two weeks. As found in the LIIS, GP visiting is an increasing function of age, with nearly three times as many of those aged 65+ years having at least one GP visit in the previous two weeks compared to those aged 18-24 years. Once again, the proportion of those visiting at least once in the last two weeks is higher for females than for males, and females at all age groups visit their GP in greater proportions than males, and the differential is larger for the younger age groups. While the categories for the self-assessed health variable are different to those in the LIIS, Table 3.17 illustrates that GP visiting is, once again, an increasing function of worsening self-assessed health status with just under 9 per cent of those reporting excellent self-assessed health having at least one GP visit in the previous two weeks, in comparison with nearly 63 per cent of those with poor self-assessed health. For those who report that they suffer, or have suffered, from one or more of the eighteen specified health conditions (e.g., angina, heart attack etc.), 37.3 per cent had at least one GP visit in the previous two weeks, in comparison with only 11.1 per cent of those without any of the conditions who had visited their GP (Table 3.18).

Table 3.16: GP Visiting Patterns by Age and Sex (Proportion Visiting a GP in Last Two Weeks)

	Male	Female	All
18-24 years	8.0	16.2	12.1
25-34 years	8.4	22.4	15.4
35-44 years	11.5	21.3	16.5
45-54 years	14.8	19.4	17.1
55-64 years	20.7	24.2	22.4
65+ years	32.0	36.8	34.7
All	14.6	23.4	19.1

Table 3.17: GP Visiting Patterns by Self-Assessed Health Status

	Proportion Visiting GP in Last Two Weeks
Excellent	8.9
Very good	13.9
Good	24.0
Fair	47.9
Poor	62.6
All	19.1

Table 3.18: GP Visiting Patterns by Chronic Illness

	Proportion Visiting GP in Last Two Weeks
No health conditions	11.1
One or more health conditions	37.3
All	19.1

Examining variation in GP visiting patterns by 'non-need' factors, the QNHS has no information on highest level of education completed or household income. The patterns of GP visiting by employment status found in the QNHS are similar to those reported for the LIIS, with the economically inactive visiting a GP in higher proportions than either the employed or unemployed (Table 3.19). While the recall period is different, the patterns by marital status are also similar to those for the LIIS, where widowed and separated/divorced individuals have more contact with their GPs than married individuals, or in particular, single individuals (Table 3.20). The categories for household location are different to those recorded in the LIIS, and as in the LIIS, are a level that is too aggregated to say anything about the regional distribution of GP services, and indeed, the patterns in Table 3.21 indicate that there was little variation in GP visiting rates across the country, ranging from a low of 17.9 per cent of the population with at least one GP visit in the previous two weeks in Dublin to 21.7 per cent of the population in the Mid-West. The substantial difference in GP visiting behaviour between medical card patients and private patients is evident from Table 3.22, where only 13.2 per cent of those without a medical card had visited their GP in the previous two weeks, in comparison with over 34 per cent of those with a medical card.

Table 3.19: GP Visiting Patterns by Employment Status

	Proportion Visiting GP in Last Two Weeks
Employed	12.6
Unemployed	17.1
Inactive	29.9
All	19.1

Table 3.20: GP Visiting Patterns by Marital Status

	Proportion Visiting GP in Last Two Weeks
Single	14.7
Married	19.6
Separated/Divorced	25.3
Widowed	34.2
All	19.1

Table 3.21: GP Visiting Patterns by Location

	Proportion Visiting GP in Last Two Weeks
Border	19.5
Midlands	19.8
West	18.5
Dublin	17.9
Mid-East	19.1
Mid-West	21.7
South-East	18.9
South-West	19.8
All	19.1

Table 3.22: GP Visiting Patterns by Medical Card Eligibility

	Proportion Visiting GP in Last Two Weeks
No Medical Card	13.2
Medical Card	34.1
All	19.1

3.4.2 MULTIVARIATE ANALYSIS OF GP VISITING

As our dependent variable is the proportion visiting a GP at least once in the previous two weeks, the marginal effects in Table 3.23 refer to the change in the predicted probability of contacting a GP. While the reference period is different, and information on income is missing, the results are very similar to those for contact decision for the LIIS presented in Table 3.15. However, age is negative and significant at the higher ages, suggesting that the probability of having at least one GP visit in the previous two weeks declines as individuals age (in direct contrast to the aggregate GP visiting patterns by age presented in Table 3.16). The remainder of the health status and socio-economic characteristic variables have results that are in line with expectations and with the results in Table 3.15. However, there is little systematic pattern in GP visiting across different regions of the country, with those living in the Mid-East and Mid-West being significantly more likely to visit their GP than residents of Dublin, and those living in the West significantly less likely.

Table 3.23: Marginal Effects from Model of Contact Decision of GP Visiting

	2001
Age 25-34 years	0.03 ***
Age 35-44 years	0.00
Age 45-54 years	-0.05 ***
Age 55-64 years	-0.05 ***
Age 65+ years	-0.04 ***
Female	0.06 ***
Very good	0.05 ***
Good	0.10 ***
Fair	0.26 ***
Poor	0.39 ***
At least one health condition	0.15 ***
Married	0.04 ***
Separated/divorced	0.05 ***
Widowed	0.02 ***
Employed	-0.03 ***
Unemployed	-0.02 *
Medical card	0.09 ***
Border	-0.01
Midlands	0.01
West	-0.02 ***
Mid-East	0.01 **
Mid-West	0.04 ***
South-East	-0.01
South-West	0.01
N	44,844
Log-likelihood	-19,767.9

*** significant at 1 per cent; ** significant at 5 per cent; * significant at 10 per cent.

3.5 GP Visiting in the 2004 EU-SILC

3.5.1 DESCRIPTIVE STATISTICS ON GP VISITING

As mentioned in Section 3.2.3, the data in EU-SILC on GP visiting are more limited than those available in either the LIIS or QNHS, as the number of GP visits is only asked of those with medical card eligibility. In addition, the reference period is different again, referring to the last four weeks. The absence of comparable information on private patients, as well as the different reference period for GP visits, means that we are unable to make any comparison between the following descriptive statistics and those for either the QNHS or LIIS. Nonetheless, Table 3.24 shows that the average number of *free* GP visits in the previous four weeks was 0.82, with this figure generally increasing with age. Male medical card patients tend to have fewer GP visits than female medical card patients, and the differential between the youngest and oldest age groups is again wider for males than for females. Even though these patterns are for those with *free* GP visits, GP visiting for medical card patients shows a clear relationship with health status (Tables 3.25, 3.26 and 3.27), with those in very bad health having over four times

as many GP visits in the last month as those with very good self-assessed health status. Examining utilisation by household location in Table 3.28 reveals little systematic pattern in GP visiting across the broad regional areas defined.

Table 3.24: GP Visiting Patterns by Age and Gender (Average Number of GP Visits in Last Four Weeks for Medical Card Patients Only)

	Male	Female	All
Age 18-24 years	0.43	0.54	0.50
Age 25-34 years	0.67	0.92	0.82
Age 35-44 years	0.70	0.90	0.82
Age 45-54 years	0.85	0.73	0.78
Age 55-64 years	0.77	0.90	0.84
Age 65-74 years	0.75	0.90	0.83
Age 75+ years	1.01	1.03	1.02
All	0.76	0.86	0.82

Table 3.25: GP Visiting Patterns by Chronic Illness

	Average Number of GP Visits in Last Four Weeks
No chronic illness	1.14
Chronic illness	0.56
All	0.82

Table 3.26: GP Visiting Patterns by Self-Assessed Health Status

	Average Number of GP Visits in Last Four Weeks
Very good	0.45
Good	0.62
Fair	1.11
Bad	1.49
Very bad	2.20
All	0.82

Table 3.27: GP Visiting Patterns by Severity of Limiting Activity

	Average Number of GP Visits in Last Four Weeks
Severe limitation	1.52
Some limitation	0.96
No limitation	0.55
All	0.82

Table 3.28: GP Visiting Patterns by Household Location

	Average Number of GP Visits in Last Four Weeks
Border	0.71
Midlands	0.96
West	0.80
Dublin	0.80
Mid-East	0.84
Mid-West	0.97
South-East	0.73
South-West	0.88
All	0.82

3.5.2 MULTIVARIATE ANALYSIS OF GP VISITING

Table 3.29 presents the marginal effects from a simple one-step model of GP visiting, for the sample of medical card patients (i.e., those entitled to *free* GP visits). As expected, health status is the most important determinant of differences in the number of GP visits in the previous four weeks among medical card patients, with those who assess their own health status as bad or very bad having approximately 1.2 extra GP visits per month than those who assess heir own health as very good. The remainder of the socio-economic variables are insignificant, and this is consistent with the fact that

Table 3.29: Marginal Effects for One-Step Model of GP Visiting (Medical Card Patients Only)

	2004
Age 25-34 years	0.29 ***
Age 35-44 years	0.09
Age 45-54 years	-0.03
Age 55-64 years	-0.04
Age 65-74 years	0.03
Age 75+ years	0.11
Female	0.11 ***
Good	0.21 ***
Fair	0.61 ***
Bad or very bad	1.24 ***
Chronic illness	0.26
Lower secondary	-0.01
Upper secondary	0.02
Third level	-0.07
Married	0.04
Separated/divorced	0.10
Widowed	0.05
Employed	-0.05
Unemployed	-0.13 **
Border	0.05
Midlands	0.12
West	-0.04
Mid-east	0.03
Mid-west	0.16 **
South-east	-0.03
South-west	0.06
Income 3	0.09
Income 4	-0.06
Income 5	-0.11 **
Income 6	-0.02
Income 7	-0.08
Income 8	-0.09
Income 9	-0.01
Income 10	-0.14 **
N	4,012
Log-likelihood	-4,784.6

*** significant at 1 per cent; ** significant at 5 per cent; * significant at 10 per cent.

medical card patients are a particularly vulnerable group of the population and are, therefore, concentrated in certain population sub-groups such as the old and unemployed. However, there is some evidence to suggest that medical card patients on higher incomes have a significantly lower number of GP visits per month than medical card patients on lower incomes, although this is likely picking up a further effect of 'need', given the strong empirical correlation between socio-economic status and health status.

3.6 International Comparisons

3.6.1 DESCRIPTIVE STATISTICS ON GP VISITING PATTERNS

We use EHCP data (see Section 3.2.1) to compare GP visiting rates across 11 of the old EU-15 countries in 2001 (see also Nolan and Nolan, 2004). Table 3.30 illustrates that the average number of GP visits per annum ranged from a low of 1.9 GP visits per annum in Greece to a high of 4.9 GP visits per annum in Belgium, while the Irish level of GP visiting is in the middle of the range for the 11 countries examined.

Table 3.30: Average Number of GP Visits Per Annum, 2001

	2001
Austria	4.7
Belgium	4.9
Denmark	2.9
Finland	2.1
Greece	1.9
Ireland	*3.6*
Italy	4.9
Netherlands	2.8
Portugal	3.1
Spain	3.9

Data are unavailable for France, Germany, Luxembourg, Sweden and UK.
See Nolan and Nolan (2004).

Given the existence of universal eligibility for free GP care in most European countries, it is useful to examine how GP visiting rates vary across the income distribution across Europe. From Table 3.31, we can see that in almost all countries the average number of GP visits per annum is higher towards the bottom of the income distribution and lower towards the top (Finland being the exception with a very flat pattern across the income deciles). However, the gap between the top and bottom of the income distribution varies a great deal. In Ireland, the average number of GP visits per annum is about twice as high in the lower income deciles compared with the higher deciles, whereas in most of the other countries the ratio is lower, at approximately 1.5 times greater towards the bottom. The striking feature of the Irish patterns however, is the very sharp fall in the GP visiting rate as we move from the second to the third income decile, where the average number of GP visits per annum falls from 6.6 to

3.6.[3] No other country sees such a sharp decline; the obvious question to ask is whether this reflects the impact of medical card eligibility on the cost of GP visits, given the concentration of medical card patients in the lower income deciles.

Table 3.31: GP Visiting Rates by Household Income Decile, 2001

	1	2	3	4	5	6	7	8	9	10	All
Austria	5.8	6.4	5.1	4.8	5.0	4.7	3.7	4.1	4.3	3.8	4.7
Belgium	7.6	6.9	6.2	4.8	5.0	4.7	3.8	3.5	3.5	3.6	4.9
Denmark	3.4	3.6	3.6	4.1	2.8	2.7	2.1	2.0	2.3	2.0	2.9
Finland	1.8	2.6	2.4	2.4	2.0	1.9	2.0	1.9	2.3	1.8	2.1
Greece	2.5	2.4	2.1	1.9	2.1	1.8	1.6	1.4	1.6	1.2	1.9
Ireland	*4.8*	*6.6*	*3.6*	*3.0*	*3.1*	*4.1*	*3.7*	*2.3*	*2.6*	*2.4*	*3.6*
Italy	5.0	5.7	5.0	5.6	5.8	4.9	4.3	4.3	4.3	3.9	4.9
Netherlands	3.4	3.2	3.2	3.1	2.8	2.9	2.6	2.3	2.4	2.4	2.8
Portugal	3.8	3.6	4.1	2.8	3.0	3.0	3.0	2.6	2.5	2.6	3.1
Spain	4.5	5.6	4.2	4.4	4.3	3.6	4.0	3.5	3.0	1.9	3.9

Note: 1 refers to the bottom 10 per cent of the income distribution, and 10 to the top 10 per cent.
See Nolan and Nolan (2004).

3.6.2 EMPIRICAL EVIDENCE

Van Doorslaer *et al.* (2000) undertook a large-scale comparative analysis of inequities in the delivery of health services in ten European countries and the US, using a variety of micro-data sources (including the ECHP). Examining GP visits (as well as visits to medical specialists and in-patient days in hospital), they find little evidence for significant differences in the utilisation of GP services across the income distribution (except in Belgium and Ireland where the distribution of GP visits is pro-poor, i.e., after controlling for 'need', those towards the bottom of the income distribution consume significantly more GP services than suggested by their 'need').[4] On the other hand, the distribution of specialist visits was significantly pro-rich in most countries examined, and there was no clear pattern across countries with a similar organisation of health services (in terms of GP gatekeeper role, universal coverage for health care expenses etc.).

The above analysis was later extended to include fourteen OECD countries (twelve EU member states, Canada and the USA), and once again, the objective was to examine the extent to which the distribution of GP and specialist visits in inequitable after controlling for 'need' (Van Doorslaer *et al.*, 2002). Using data from 1996 (including the ECHP), the authors find that Ireland is once again an exception, with a significant pro-poor distribution of GP visits, which is explained by preferential treatment of low income groups via the medical card. In most of the other countries examined, there

---

[3] The GP visiting rate in the Irish case also increases again in the sixth decile and falls again in the eighth, but the gap between the second and third decile is considerably wider.

[4] See Layte and Nolan (2004) and Chapter 8 for a fuller discussion of the methodology underlying this research.

is no significant difference in the distribution of GP visits across the income distribution. The analysis was further extended in 2004 to 21 OECD countries (14 EU members, Australia, Canada, Hungary, Mexico, Norway, Switzerland and the USA), using data for 2000 (Van Doorslaer and Masseria, 2004). The results confirm the earlier findings that GP visits are distributed equitably across the income distribution in most countries examined, although once again, the distribution of GP visits in Ireland is significantly pro-poor.

Jimenez-Martin *et al.* (2004) undertake a similar analysis using ECHP data for twelve European countries for the period 1994-1996. They find that between a third and a half of the variability in the demand for health services (GP and specialist visits) across EU countries can be explained by differences in the effect of age, income and the role of GPs (e.g., gatekeeper role, reimbursement method), with income particularly important for Ireland (where the effect is significantly negative). Finally, Layte *et al.* (2005), while primarily concerned with the differential effect of age on the use of GP services and hospital nights across the EU, also examined patterns of utilisation according to other socio-economic characteristics and found that age and health status were consistently most important in determining differences in utilisation, with income in general insignificant once 'need' had been controlled for.

3.6.3 COMPARISON OF GP VISITING IN NORTHERN IRELAND AND THE REPUBLIC OF IRELAND

The discussion in Section 3.6.1 confirms that while the overall number of GP visits in Ireland is comparable with GP visiting rates in other European countries, the extent to which Irish GP visiting rates vary across the income distribution is unusual in a European context. In this regard, it is particularly useful to compare GP visiting in Northern Ireland and the Republic of Ireland, two jurisdictions with very similar population health characteristics and a similar institutional structure in terms of the GP service, but with one crucial difference: while all residents of Northern Ireland are entitled to free GP visits, only the 30 per cent of the population in the Republic on lower incomes are entitled to free GP visits. This allows us to investigate the effect of charges on the utilisation of GP services.

Chapter 5 presents a fuller comparison of the utilisation of health services in Northern Ireland and the Republic of Ireland (see also McGregor *et al.*, 2006), but to put Irish GP visiting rates in context, we present here some descriptive statistics on GP visiting rates in 2001 for Northern Ireland and the Republic of Ireland. From Table 3.32 we can see that the average number of GP visits per annum was 3.8 in Northern Ireland, in comparison with 3.2 in the Republic of Ireland. Examining the descriptive patterns by age; gender; education level; employment status; marital status and household income reveals that there is much less variation across the different values of each characteristic in Northern Ireland than there is in the Republic. For example, those aged 65+ years have 1.7 times more GP visits per annum than those aged 16-24 years in Northern Ireland; the

corresponding figure for the Republic of Ireland is three times more GP visits among the over 65s. Most importantly however, the descriptive patterns reveal that while GP visiting rates do fall as we move up the income distribution in Northern Ireland, the fall is not as dramatic as that which occurs in the Republic, and where the most dramatic fall-off in GP visiting rates occurs at the lower part of the income distribution (rather than at the higher end for Northern Ireland). Once again, as medical card eligibility falls sharply as we move up the income distribution in the Republic, this would suggest that charging for GP services has a substantial impact on GP visiting rates, and a further examination of this issue will be carried out in Chapter 5.

Table 3.32: Average Number of GP Visits by Various Socio-Economic Characteristics, 2001

	Northern Ireland	Republic of Ireland
Age 16-24 years	2.9	1.9
Age 25-34 years	3.5	2.5
Age 35-44 years	3.3	2.5
Age 45-54 years	3.8	2.9
Age 55-64 years	4.5	3.6
Age 65+	4.8	5.7
Male	3.3	2.7
Female	4.1	3.7
Primary	4.6	4.8
Lower secondary	3.6	2.8
Upper secondary	3.4	2.4
Third level	2.7	2.3
Employed	2.6	2.1
Unemployed	3.9	3.1
Economically inactive	5.0	4.5
Never married	3.2	2.4
Married	3.7	3.3
Separated/divorced	4.9	4.2
Widowed	4.9	6.0
Income 1 (lowest)	4.2	5.0
Income 2	4.4	3.4
Income 3	4.1	2.9
Income 4	3.6	2.4
Income 5 (highest)	2.6	2.3
Medical card		5.3
Private		2.2
All	3.8	3.2

See McGregor *et al.* (2006).

3.7 Summary and Conclusions

The purpose of this chapter was to detail patterns of GP visiting across the Irish population, and to examine how they vary by various individual and household socio-economic characteristics. Using micro-data from a variety of sources, the descriptive patterns described how GP visiting rates vary by 'need' factors such as age, sex and health status, but also by 'non-need' factors such as

education level, employment status, marital status and household location. In the context of the discussion in Chapter 2 on the importance of financial incentives in influencing doctor and patient behaviour, this chapter also examined the role of income and medical card eligibility on patterns of GP visiting. As many of these 'need' and 'non-need' characteristics are highly correlated with each other, multivariate analyses were also undertaken and confirmed that 'need' factors such as age and health status, as well as medical card eligibility were found to be consistently most important in determining differences in GP visiting rates across the population.

This chapter also described Irish GP visiting rates in a European context, and found that while the overall average number of GP visits is comparable with many other European countries, the variation across the income distribution (reflecting largely a medical card effect) is unusual in a European context. Similarly, a comparison of GP visiting rates in Northern Ireland and the Republic of Ireland confirmed the greater variation in GP visiting rates across the income distribution in the Republic, and the subsequent chapter will further examine this issue. Given the consistent importance of medical card eligibility in determining differences in GP visiting rates across the population, the following chapter concentrates on the role of income and medical card eligibility in influencing GP utilisation decisions in Ireland.

APPENDIX 1: VARIABLE DEFINITIONS

	LIIS	QNHS	EU-SILC
GP visits	Number of GP visits in the previous twelve months	=1 if visited a GP at least once in the previous two weeks, =0 otherwise	Number of *free* GP visits in the previous four weeks
Dentist visits	Number of dentist visits in the previous twelve months		Number of *free or subsidised* dental, ophthalmic or aural treatments in the previous twelve months
Optician visits	Number of optician visits in the previous twelve months		
Age	Seven categories (16-24, 25-34, 35-44, 45-54, 55-64, 65-74 and 75+ years)	Six categories (18-24, 25-34, 35-44, 45-54, 55-64 and 65+ years)	Six categories (18-24, 25-34, 35-44, 45-54, 55-64 and 65+ years)
Gender*	=1 if female, =0 otherwise		
Chronic illness	=1 if suffers from any physical or mental health problem, illness or disability, =0 otherwise	=1 if suffers, or has suffered, from one or more of eighteen specified health conditions (e.g., angina, asthma etc.,), =0 otherwise	=1 if suffers from any chronic (long-standing) illness or condition (health problem), =0 otherwise
Self-assessed health	Five categories (very good, good, fair, bad and very bad)	Five categories (excellent, very good, good, fair and poor)	Five categories (very good, good, fair, bad and very bad)
Stress	=1 if in psychological distress (i.e., scoring 3 or more on GHQ), =0 otherwise		
Smoker	=1 if the individual is a daily smoker, =0 otherwise (2001 only)		

* Indicates variables with the same definition across all three data sources.

VARIABLE DEFINITIONS (Continued)

	LIIS	QNHS	EU-SILC
Body mass index	Four categories (obese, overweight, ideal weight and underweight) (2001 only)		
Marital status*	Four categories (never married, married, separated/divorced and widowed)		
Employment status*	Three categories (employed, unemployed and economically inactive)		
Highest education level*	Four categories (primary, upper secondary, lower secondary, third level)		
Household income	Ten categories representing decile of equivalised weekly household income		Ten categories representing decile of equivalised annual household income
Medical card*	=1 if has a medical card, =0 otherwise		
Household location	Eleven categories (open country or village (200-1,499 inhabitants), town (1,500-2,999 inhabitants), town (3,000-4,999 inhabitants), town (5,000-9,999 inhabitants), town (10,000 or more inhabitants), Waterford, Galway, Limerick and Cork cities, Dublin city and Dublin county)	Eight categories (Border, Midlands, West, Dublin, Mid-east, Mid-west, South-east and South-west)	
Disadvantage	=1 if score 2 or more on index of disadvantage, =0 otherwise		

* Indicates variables with the same definition across all three data sources.

APPENDIX II: ECONOMETRIC METHODOLOGIES

1995 AND 2001 LIVING IN IRELAND SURVEYS

We begin by specifying a very simple one-step model of GP visiting, which relates the number of GP visits in the previous year to various individual and household socio-economic characteristics as follows:

$$y_i = \beta_0 + X_i' \beta_1 + \varepsilon_i \tag{1}$$

where y_i is the dependent variable (number of GP visits in the previous year), X_i is the vector of independent variables (e.g. age, gender, education level etc.), β are the estimated coefficients and ε_i is the error term. In this case, the dependent variable (the number of visits to a GP in the previous twelve months) is a variable that can only take on non-negative integer values. The distribution of GP visits is also highly skewed with a large proportion of observations clustered at zero and only a small proportion of individuals recording frequent visits. Count data models, which assume a skewed, discrete distribution and restrict predicted values to non-negative values, are necessary. For the one-step model (1), we therefore use a negative binomial methodology (further details are available in Madden *et al.*, 2005).

We also estimate a two-step model of GP visiting, which consists of a first part that estimates the probability that the individual had at least one GP visit in the previous year, and a second part that models the frequency of GP visits for those with at least one GP visit in the previous year, i.e.,

$$Pr(y_i > 0) = \beta_0 + X_i' \beta_1 + \varepsilon_i \tag{2}$$

and

$$y_i = \beta_0 + X_i' \beta_1 + \varepsilon_i, \text{ for } y_i > 0 \tag{3}$$

Many argue that such an approach is more appropriate in describing the nature of the decision-making process underlying the decision to visit a GP, whereby the patient initiates the visit to their GP but the GP decides on the frequency of treatment. Such a model

can accommodate the fact that different variables may affect the decision to visit a GP (contact decision) and second, the decision about the number of visits (frequency decision), as well as the fact that the same variables may affect the two decisions in different ways. For the first part of the two-step model (2), we use a binary probit methodology and for the second part (3), we use a truncated (i.e., including only positive observations) negative binomial methodology. Again, further details on these techniques are presented in Madden *et al.* (2005).

2001 QNHS

For the analysis using QNHS data, the dependent variable is a binary variable indicating whether or not the individual visited their GP in the previous two weeks, and so we use the binary probit methodology to estimate a model similar to that specified in (2) above.

2004 EU-SILC

For the analysis using EU-SILC data, the dependent variable is a continuous variable indicating the number of free GP visits in the previous four weeks, and so we use the one-step negative binomial methodology to estimate a model similar to that specified in (1) above.