The Spatial and Temporal Organisation of Primary Health Care Services in Rural Areas: A Case Study of Wales

Sean D. White

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ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

Summary

This thesis has the key aim of analysing changes in the spatial and temporal organisation of primary healthcare services in Wales over the period 1996-2004, with a particular focus on the pharmacy sector in the case study area of Gwynedd. Within this broad aim, key determinants of the organisation of such services are analysed, specifically, rurality and the importance of accessibility, reorganisation and policy developments within the healthcare sector in Wales, and the impact of restructuring processes in rural society as a whole and within particular healthcare organisations. A theoretical context based on restructuring theses, particularly regulation theory, and theories of the firm, is employed to provide a framework for the subsequent empirical and qualitative analysis undertaken. A Geographical Information Systems approach is adopted to construct databases of primary healthcare services in Wales for two time periods 1996 and 2004. Indicators of accessibility are then constructed to analyse changes in access in the sector across Wales. Key findings are that primary healthcare services have remained fairly stable over the time period but that there are many areas of rural Wales with poor accessibility to these services, particularly in areas with small populations. The importance of theories of the firm is highlighted through the case of pharmacies in Gwynedd where vertical integration in a pharmacy firm has resulted in a near monopolistic market model emerging in the sector. Finally, the role of the state emerges as crucial in ensuring an equitable delivery of primary healthcare services and emerging developments in the sector, for example new contracts for GPs and pharmacies, suggests that this role will continue to grow in importance in the coming years.

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Chapter One - Introduction

1.1 Introduction

The last ten years have seen major changes in the organisation and delivery of primary healthcare services in England and Wales and this has had considerable implications for consumers of these services in rural parts of the country. Among the most important changes that have taken place in the sector over this last decade are; the re-organisation of the NHS in the UK in 1997 and 2003, which varies slightly between England and Wales but maintains a basic principle of 'making healthcare more locally accountable and responsive' and moving away from the competitive culture in healthcare of the previous conservative government. The latest re-organisation in 2003 shifted this emphasis further towards devolved delivery of primary healthcare through the setting up of Primary Care Trusts in England and Local Health Boards in Wales with commissioning of healthcare services powers (NAW, 2002). This thesis seeks to explore the effects of these structural changes in the delivery mechanisms of primary healthcare services in relation to rural areas of Wales within a context of concomitant restructuring of rural society (Marsden and Murdoch, 1990, Gilg, 1992, Goodwin et al 1995) and restructuring and re-organisation of service delivery in the health sector which draws on 'theories of the firm' literature, for example the development of vertical integration of various primary healthcare services.

A key element of primary healthcare service delivery in a rural context is related to the levels of accessibility to such services experienced by the individuals, or 'consumers' of healthcare. This differential accessibility to services experienced by rural residents is clearly an important issue in the health sector in terms of individuals being able to access appropriate levels of service, whether diagnostic, treatment or follow-up care, where and when they need it. There has been a considerable amount of research undertaken into how accessible healthcare services are to residents in rural (or urban) areas, based on potential

accessibility or revealed accessibility measures (see for example, Joseph and Bantock, 1984, Lovett et al, 2000, Higgs , 2000). Less research has been undertaken on temporal variations in access to particular healthcare services, in terms of differentiated availability of services at times of the day or week (Moseley 1979). Change in access to healthcare services over a long period of time is also relatively under-researched, particularly within a context of changing structural characteristics of a healthcare system. This thesis seeks to explore both the spatial changes in the provision of primary healthcare services in Wales over the last decade, and, in relation to a case study area, how those changes are manifest at the local level in terms of variations in particular services – both spatially and temporally, where data constraints allow, in terms of what services are offered and how frequently these are available. Although primary healthcare services are considered in some detail throughout the thesis, incorporating GP services, dental services and pharmacy services, a particular emphasis is given to pharmacy services within the thesis. There are a number of reasons for this focus on the pharmacy sector, among them its status as a semi-regulated sector (as oppose to the heavily regulated GP sector, and un-regulated dental sector), and the often highly monopolised nature of the market structure of the sector in many rural areas – in particular the relationship between multiple and independent pharmacies and how competition operates between them. Over the last decade the proportion of pharmacies owned by chains of more than five outlets has risen by 25% to more than 40%. In addition, new in-store supermarket pharmacies have developed quickly and now represent a significant market force in the sector (Williams et al, 2002).

One can explore spatial and temporal changes in healthcare service delivery from a number of different perspectives, for example; through a positivist approach to the patterns of healthcare delivery identified, through a social interactionist approach to the experience of varying levels of healthcare 'service', through a structuralist approach to healthcare delivery focusing on the economic relations and structures influencing access to healthcare, through a structurationist approach to access to healthcare based, primarily, on time-space (or geography) theories that influence consumption of such services, or, finally,

through a post-structuralist approach which is concerned with how knowledge and experience are constructed in the context of power relations, with particular reference on public health and what it means to be a 'healthy citizen' (Gatrell, 2002). This thesis adopts a largely positivist approach to the analysis of spatial and temporal patterns of healthcare delivery in Wales over the last decade, although echoes of the structuralist approach emerge in relation to particular aspects of the analysis. In operationalising this theoretical context a Geographical Information Systems approach is employed to visualise and analyse the spatial organisation and temporal variation of primary healthcare delivery across rural Wales through a longitudinal study of primary healthcare services in Wales 1996 and 2004. Depth is added to this national level analysis of rural Wales by developing a case study of one Unitary Authority in rural Wales, Gwynedd, which acts as focus for more in-depth analysis of the spatial and temporal changes in rural primary healthcare over the study period.

1.2 The Research Questions

The thesis is constructed around a number of key research objectives and resulting research questions, which are outlined below;

Objectives:

1. To examine and explain the recent spatial organisation of primary healthcare services in rural areas with particular reference to the pharmacy sector.

2. To assess the contribution of different factors influencing the static and dynamic spatial characteristics of rural health care services with specific reference to pharmacies.

3. To explore the role of GIS-based approaches in the study of static and dynamic organisation of demand for and supply of rural health services.

4. To illustrate the practical aspects of the above with a case study of Welsh rural areas.

5. To explore the role of the state in supporting rural primary healthcare services.

Research questions:

1. What are the determinants of the spatial and temporal organisation of primary healthcare services and the distribution of access over social groups?

2. How have the spatial characteristics of rural primary care services developed over the last decade and what factors have been responsible for this change?

3. What implications have the restructuring processes for access to primary healthcare for local communities and different social groups?

4. What role can GIS play in analysing and visualising differential accessibility to key health care facilities in rural areas?

5. What role has the state played and should play to support rural primary healthcare?

In broad terms the thesis is attempting to analyse a broad topic 'the spatial and temporal organisation of primary healthcare in rural areas' using Wales as a 'test bed' and the Gwynedd Local Health Board as a more detailed case study

locality. The broad objectives outlined above are now considered in more detail in terms of the approach taken.

1. What are the determinants of the spatial and temporal organisation of primary healthcare services and the distribution of access over social groups?

This first objective necessitates the use of a Geographical Information System approach to mapping primary healthcare services in rural areas of Wales. Data is presented on the location of GP practices, Dental Practices and Pharmacies throughout Wales at two time periods – 1996 and 2004. The aim here is to comment on the spatial organisation of healthcare services in relation to the underlying characteristics of the populations served – employing 1991 and 2001 UK census data to inform how the demand patterns have changed over the period studied. On the supply side, attribute information is presented, where available, for the primary healthcare services analysed, and in detail for the case study area of Gwynedd and Anglesey. Particular reference is made to the pharmacy sector within this assessment as it forms one of the focal points of this thesis as outlined above; of particular interest are ownership issues within the pharmacies of Gwynedd and Anglesey and the types of services offered by these pharmacies. There are likely to be, of course, a number of possible determinants of the spatial and temporal organisation of healthcare services. Of particular importance are likely to be the structural changes in the sector over the last decade which are considered in detail in the review of literature in chapter two. Also of importance will be local factors, for example recruitment initiatives, that have shaped the supply of healthcare facilities in the case study area, or across Wales as a whole during the period of analysis. This shall be considered through the analysis of spatial patterns of healthcare services supply and returned to at the end of the thesis when considering realistic models of primary healthcare supply.

These data are employed to undertake an analysis of potential accessibility to healthcare services at the two time periods, using 1991 UK Census population data to represent the demand data for the 1996 service facility data and the same for the 2004 service facility data for reasons covered during the analysis. The analysis is performed using Arc/Info GIS software and employing road network data from 1996 (Bartholomews data). A potential physical accessibility model is performed on primary healthcare data at the all Wales level for 1996 and 2004. This modelled accessibility data are then weighted in terms of population levels or social characteristics for 1996 and 2004 (using 1991 and 2001 UK census data) and presented on a common boundary base – 2001 UK Census Ward boundaries for Wales. More detailed analysis of accessibility levels is carried out for the case study area of Gwynedd, particularly in respect to the situation in 2004 taking into account variations in temporal supply of key services as well as the spatial dimension of access.

2. How have the spatial characteristics of rural primary care services developed over the last decade and what factors have been responsible for this change?

Changes in the provision of primary healthcare services in rural Wales are analysed at two levels through this thesis. The primary method is through a statistical comparison of provision levels in 1996 and 2004 drawing on point level facility data held in the GIS and resulting potential accessibility measures for each type of primary healthcare service outlined above. This will allow for an appraisal of changing levels of access to services over the eight year period 1996-2004, and the underlying factors responsible for these changes are postulated and analysed – structural, social or demographic changes could all play a part in explaining these changes. The second key source of data relating to change in the supply of primary healthcare comes from aggregate level surveys of rural Welsh Community Councils carried out by the author, with a colleague in 1995 (Higgs and White, 2000), and updated in 2004 as part of a Welsh Assembly Government funded research initiative (White and Hughes,

1995). These two surveys provide information at the Community Council level in Wales about the levels of healthcare service provision in rural areas and also provide qualitative information on what services have closed or opened in the five years prior to the survey and whether or not service levels are adequate in terms of primary healthcare. Although much of the data can only be considered in aggregate form (as detailed within the analysis sections), the two surveys do provide an invaluable source of contextual data for the research conducted for this thesis.

3. What implications have the restructuring processes for access to primary healthcare for local communities and different social groups?

A central theoretical perspective of the thesis is built around constructs of restructuring theses and how they can assist in our understanding of differentiated social relations in rural areas. Various theories of restructuring are explored, including regulation theory which may lend themselves to a deeper understanding of changes in rural society that are taking place over the study period.

The restructuring of organisations is also considered in relation to theories of the firm and market models in healthcare services. This is particularly pertinent in relation to rural pharmacies given the oligopolistic, or monopolistic structure of the markets that are emerging in this sector and the influence of vertical integration that is promoting market dominance amongst a small number of suppliers.

4. What role can GIS play in analysing and visualising differential accessibility to key health care facilities in rural areas?

The utility of GIS for presenting and analysing spatial and temporal variations in primary healthcare services provision is a key methodological focus of the thesis. This is of particular interest in respect to analysis of the differential access of particular groups in rural communities to key primary healthcare facilities. Alternative methods of analysing access to services through GIS techniques are explored through the development of, for example, potential physical accessibility models and isolation indices

Visualisation of these various techniques for analysing differential accessibility to services is of considerable importance, particularly if the results of such analysis are to be employed in a policy context. Alternative methods of visualising such analyses are outlined which include utilising existing underlying administrative boundaries, for example electoral wards, which has the advantage of presenting the analysis to policy makers in recognisable spatial units that can be combined with other data sources of interest available at the ward or community level (e.g. Higgs and White, 2000). This technique has become fairly standard in recent years, particularly where such accessibility measures are combined with other ward-based indicators to form area-based deprivation measures (NAW, 2000, DETR, 2000). An alternative approach is to use a raster (or grid) based data format in the GIS and producing continuous accessibility 'surface' models of differential access to services, based on travel time or distance constraints. Such methods have the advantage of being both visually appealing and reflecting accessibility levels across a large spatial area without being constrained by administrative boundaries. This can pose problems in itself for policy makers, however, as this type of visualisation does not allow for easy comparison of levels of accessibility between one administrative area (ward or local authority) and another, aside from an intuitive visual assessment of which areas appear more accessible than others. A final visualisation technique that may be employed is to map travel time isochrones away from particular service facilities, which may be performed fairly easily in the GIS using both vector and raster file formats.

5. What role has the state played and should play to support rural primary healthcare?

The state obviously has an important role to play in supporting rural primary healthcare and it has already been mentioned that re-organisation has recently taken place in the healthcare sector in Wales (April, 2003) accompanied by new initiatives and contractual arrangements in the delivery of such services. A key aim of the thesis is to explore the extent of previous intervention in the primary healthcare sector and determine what the future shape of intervention is likely to be. This is carried out through an analysis of policy initiatives that have been introduced during the study period and through a series of interviews with professionals in the field (at a Local Health Board level and at the national level) and, in the case of pharmacies in Gwynedd, through interviews with service providers themselves to ascertain their views on the effect of re-organisation and what they see as the threats and opportunities facing the sector over the coming years.

1.3 The Structure of the Thesis

The thesis is structured around the key research objectives highlighted above with analysis or review of material undertaken to provide answers to the research questions posed.

Chapter Two presents the review of existing literature and assesses the literature relating to the various factors that may influence the spatial

distribution of primary healthcare facilities in rural areas and how these have developed over time, with a particular focus on the pharmacy sector. A theoretical framework is developed which attempts to describe and explain the organisation of services in space and how these change over time. The role of demographic and economic forces impacting on rural areas is considered as are institutional forces (both firm and governmental) that have resulted in changes in distribution of primary healthcare services in a rural setting. Distributional factors relating spatial organisation of services and differential access for particular social groups are also explored. Finally, the use of GIS and accessibility models in analysing and visualising the changing spatial organisation of primary healthcare in a rural setting is highlighted.

Chapter Three seeks to illustrate the methods employed during the research process and to highlight the methodological approach in terms of the role of theory in the research and the epistemological and ontological orientation of the work. The research design is considered in detail as are survey techniques and sampling procedures, before a detailed consideration of the role of quantitative data analysis techniques employed and the Geographic Information Systems approach adopted.

Chapter Four describes the case study area examined during the course of the research and builds on the justification of the area of study developed in chapter three. The chapter is also concerned with describing the development of the primary healthcare system in Wales in terms of how it is organised and how it functions. Although the focus is on rural Wales, broadly speaking, more detailed analysis of primary healthcare characteristics for a particular region of Wales, the Gwynedd Local Health Board, are presented throughout the analysis. Therefore, within this chapter particular features of the healthcare delivery within the Gwynedd area are presented.

Chapter Five provides a baseline analysis of primary healthcare services throughout Wales and particularly in the case study area of Gwynedd. Part of this analysis focuses on the findings of a research project which developed measures of accessibility to particular service facilities in a GIS environment. The research was funded by the Economic and Social Research Council (ESRC) and conducted in the Department of City and Regional Planning, University of Wales, Cardiff during 1996 and 1997. The full results of this work are documented elsewhere (Higgs and White, 2000), but this chapter draws on new analysis of the survey and data collection work undertaken by the author as part of the ESRC-funded project, with a particular focus here on primary healthcare facilities in rural areas.

Chapter Six outlines the analysis undertaken of health services in Wales as a whole for the year 2004 and, more specifically, a detailed analysis of the primary healthcare services in the case study area of Gwynedd in north Wales, a largely rural area as detailed in chapter four of this thesis. The analysis covers, where possible, a similar scope to the analysis undertaken for the baseline analysis carried out in chapter five for the year 1996. Specifically, an analysis of the census characteristics for Wales from the recently released 2001 census is undertaken before considering the results of an updated survey of Welsh Rural Services in Community and Town Councils carried out in 2004. The analysis then considers new analysis of accessibility levels to key health services in Wales using 2004 point level data before looking at the case study area in detail and assessing the characteristics of primary healthcare services in Gwynedd, with a particular focus on the pharmacy sector.

Chapter Seven builds on the analysis of primary health care service levels presented in Chapters Five and Six by undertaking a positivist, or empirical, analysis of changes in service provision within the sector that have taken place over the period 1996 – 2004. One of the key aims of the chapter is to try and explore the utility and role of GIS-based methods in examining the dynamic processes behind the changing spatial organisation of demand for and supply of

health services in rural areas. It is recognised that the spatial distribution of primary health care services is not likely to be subject to significant and widespread changes in facility location in a rural setting over this relatively short period of time. It is, however, true that this distribution of services in rural Wales, and focusing on the case study area of Gwynedd, is an evolving one with noticeable changes in the spatial, temporal and organisational characteristics of the primary health care facilities occurring between 1996 and 2004.

Chapter Eight attempts to draw together the wealth of data and analysis presented in chapters four, five and six and start to make connections with the theoretical debates surrounding rural restructuring and theories of the firm relating to healthcare services discussed in chapter two of this thesis. The chapter also assesses the role that the state plays in influencing the spatial distribution of primary healthcare services in rural areas. Allied to this discussion of the role of the state and organisations in influencing primary healthcare characteristics is an analysis of survey results from interviews with pharmacists and Local Health Board officials in the Gwynedd area, together with information from interviews with other health professionals across Wales.

Chapter Nine concludes the thesis and summarises the main findings in light of the initial research questions set out in chapter one. Limitations of the research and areas for further analysis are also outlined here.

Chapter Two - Review of the Literature

2.1 INTRODUCTION

This chapter reviews the literature relating to the various factors that may influence the spatial distribution or primary healthcare facilities in rural areas and how these have developed over time, with a particular focus on the pharmacy sector. A theoretical framework is developed which attempts to describe and explain the organisation of services in space and how these change over time. The role of demographic and economic forces impacting on rural areas is considered as are institutional forces (both firm and governmental) that have resulted in changes in distribution of primary healthcare services in a rural setting. Distributional factors relating spatial organisation of services and differential access for particular social groups are also explored. Finally, the use of GIS and accessibility models in analysing and visualising the changing spatial organisation of primary healthcare in a rural setting is highlighted.

2.2 Determinants of spatial and temporal organisation of primary healthcare services in rural areas.

This section is concerned with the major determinants of the spatial and temporal organisation of primary healthcare facilities in a rural setting. The focus is to try and illustrate what makes the delivery of primary healthcare in rural areas different to their urban or industrial counter-parts, in other words what factors affect the organisation of such services in rural areas that may not be important determinants of spatial organisation in an urban setting. The determinants highlighted here include: the importance of rurality itself, how accessibility to services impacts on rural residents, institutional forces (firm and governmental), and the role of the state in relation to primary healthcare delivery in rural areas.

2.2.1 The Importance of Rurality

Traditionally, it has been argued, rurality has not been a major issue in UK-based debates over inequalities in health and equity of healthcare provision. This has been due to a number of factors including; (mis)conceptions of the rural idyll, an assumption that the NHS has prevented the emergence of social and geographical inequalities seen in other healthcare systems, and that distances travelled to healthcare even in rural areas of the UK are much smaller than in other systems, e.g. in the USA or Australia (Rousseau et al, 1994, Deaville, 2001). An important element to consider is obviously how we define what rurality actually means – how do we define it? For practical purposes rurality can be defined in a number of ways: as an index, by socio-economic clusters, on the basis of population density, according to user perception, or in a way relating to the needs of a particular study. Also important is the scale at which the definition is applied. Rural areas are arguably more heterogeneous than urban, and so working at large scales such as government districts may cause an unacceptable reduction in variation. In terms of health, because rural areas are in many ways more diverse than urban areas, it could be argued that health varies more between rural areas across the country than between inner city areas (Rousseau et al, 1994, Williams et al, 2000). The definitions of rural areas employed in Wales and adopted in this study are considered in more detail in Chapter 4 but broadly speaking relate to a Unitary Authority (UA) classification adopted by the Welsh Assembly Government of 9 rural Unitary Authorities, 3 urban Unitary Authorities, 7 'valley' UAs and 3 'other' UAs (a mixture of urban and rural). This has been supplemented recently by a new urban-rural definition based on 2001 Census data that divides Census Wards into categories relating to how accessible or remote they are – again returned to in chapter 4.

In recent years there has been a growing acceptance of the importance of rurality in terms of its impact on the equitable delivery of healthcare in such areas (Higgs, 1999, Sherwood and Lewis, 2000). This has led to attempts by

researchers to define rurality within the perspectives of primary healthcare delivery characteristics or urban-rural health differentials. In relation to primary care, for example, Rousseau and McColl (1997) defined levels of sparsity from the Rural Practice Payments Scheme, where the degree of remoteness is calculated in relation to the travel times from GP practices to the nearest hospital (Rousseau and McColl, 1997). Distinctions between the characteristics of urban and rural delivery of primary care were explored by the Institute of Rural Health (1998) using Delphi techniques. Four main themes were identified by a panel of experts asked to distinguish rural from urban General Practice, these were,

- Increased emergency/minor casualty work
- Difficulties associated with distance and travel
- Specific rural illnesses - e.g. zoonoses
- Difficulties in obtaining cover for absence and 'out of hours'

Other factors were also identified by the panel of experts as being important in distinguishing between rural and urban general practice, these included:

- A wider range of clinical skills used in rural areas.
- Smaller list size and larger geographical areas.
- Personal/family implications - lack of privacy/anonymity.
- Recruitment problems.
- Relative professional isolation (IRH, 1998).

Clearly the expert panel used in the IRH study regarded organisational factors, such as list sizes or recruitment problems, and service provision issues, in terms of types and availability of services offered, as important defining characteristics of rural practice. Also important is the physical accessibility constraint on delivering services in a rural area, in terms of time and distance.

Accessibility to services (medical or otherwise) in rural contexts has been extensively researched in the last few decades particularly with advances in computer systems such as Geographical Information Systems (GIS). Health-related accessibility studies are examined in the next section before considering other determinants of spatial organisation of healthcare services.

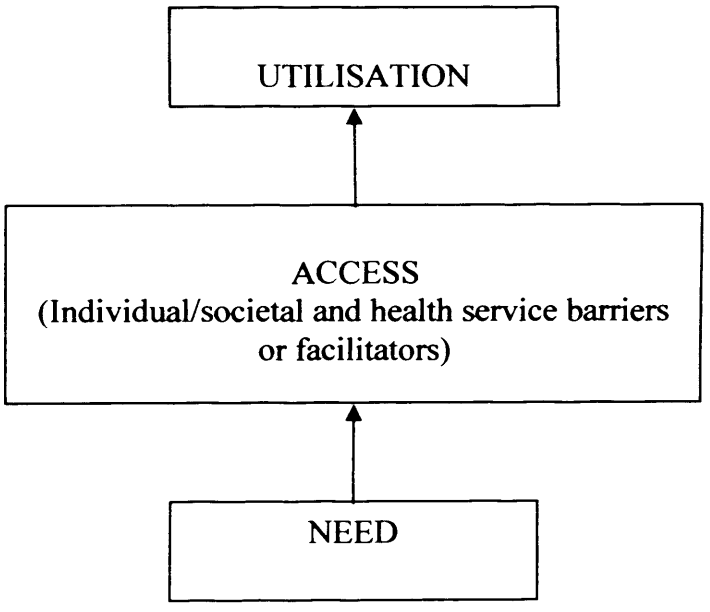
2.2.2 *Access to Primary Healthcare*

One of the key objectives of the recent National Assembly for Wales policy document on the future operation of the NHS in Wales, *Improving Health in Wales* (NAW, 2001), was "to offer an extended range of services in locally accessible primary care settings" (NAW 2001, p10). This objective encompasses two aspects of access to primary healthcare that are represented in the policy and academic literature. The first aspect is the whole question of equity in providing primary health services to the population, for example in addressing variations in the types of services available in primary care facilities in different localities. An important factor here is the relationship between utilisation of, and need for, primary healthcare services. The second aspect is the importance of distance (or travel time) in accessing primary healthcare, particularly for certain groups in the population - this 'physical accessibility' concern clearly takes on greater significance in a rural context and it has a direct impact on utilisation and need (Deaville, 2001). The basic tenets of the 'Improving Health in Wales' agenda have carried through to recent reports on the management of primary care in Wales, in particular the 'Future of Primary Care Action Plan' (WAG, 2002). The plan recognises the wider UK government and NHS focus on improving local delivery and access to primary healthcare and, in particular, focuses on the need to improve access in terms of core primary services and out-of hours care (WAG, 2002). This has recently been developed further through a 'Review of Health and Social Care in Wales' in 2003 (sometimes referred to as the Wanless Report after its author) which stresses the need for organisational change and a move to locally focused service delivery in line with emerging developments in the GP and pharmacy contract system (WAG, 2003). These points are dealt with in detail in Chapter 4. There is, therefore, a growing recognition of the importance of equity in access

to primary care from a public policy viewpoint but it is worthwhile at this point to outline the development of theories of access, utilisation and need in terms of primary healthcare services.

The most commonly employed definition of equity in service delivery in the health sector is based on the principal of equal access (or treatment) for equal need (Rousseau et al. 1997). This definition may be termed horizontal equity, an alternative to this is vertical equity defined as measuring the extent to which individuals with unequal needs receive appropriately different levels of care (Waters, 2000). With the focus here on rural areas, the importance of access in explaining the relationship between need and utilisation is clear. As Deaville (2001) asserts, "Access is the facilitator or barrier between need and utilisation" (Deaville, 2001 p.7). This is expressed linearly in the following table:

Table 2.1 The relationship between Access, Utilisation and Need



(Source: Deaville, 2001)

There have been attempts made to define and measure all three elements of the above model and, of these, utilisation is probably the simplest to delimit given the multifarious nature of need and access (Deaville, 2001). Benzeval and Judge

(1996), for example, attempted to assess the level of equity in the provision of GPs in England by trying to develop models of need for GP services through analysis of area characteristics and observed utilisation rates. Through this analysis the researchers could compare actual utilisation rates with potential need in England FHSAs to demonstrate levels of inequity in provision (Benzeval and Judge, 1997). In considering measures of 'need', of course, there is a degree of subjectivity in choosing population characteristic data or socio-economic variables used to portray need alongside observed utilisation rates. Many of these factors will be independent of geography and therefore not unique to the rural situation, for example age-sex characteristics (Cabinet Office, 2000).

A key element, therefore is the levels of accessibility experienced by groups in rural communities to rural services and opportunities, referred to by Shaw (1979) as mobility, or opportunity, deprivation. Much has been written on the concept of accessibility and many formulations have been conceived that pertain to measure differential experience of accessibility in a host of different settings and applications. A principal aim of this section is to highlight previous techniques and methods that have emerged, within various academic fields, to aid the measurement of accessibility, particularly in a rural context. An outline of previous studies is therefore implied, but the aim is to provide a critique of techniques applied to the problem rather than a précis of former research. Following this critique, ideas and techniques advocated to address the issue of rural accessibility in the context of the current study of rural primary healthcare are developed.

a) Rural Studies of Accessibility

Studies relating to the problems faced by rural communities with particular reference to poor accessibility levels or 'mobility deprivation' have received increasing attention from researchers over the last two decades. A major contribution to this debate was provided in the late 1970s by research into

accessibility levels in rural Norfolk by a team of researchers at the University of East Anglia (UEA) (Moseley et al. 1977, Moseley, 1979). Moseley (1979) stresses the importance for geographers, faced with measuring accessibility, of incorporating some social element in those measurements before delimiting the spatial dimensions of accessibility, as it is the different experiences of people within the places that influence accessibility in that place, not the place itself (Moseley, 1979). The UEA team adopted techniques from the Swedish school of 'Time-Geography' to aid in the measurement of accessibility levels (see Hagerstrand, 1970, 1973 and 1974, and latterly Nutley, 1985). The research identified five social groups which were assessed in terms of their accessibility to various activities, for example post office services. Access to the activities is measured against the characteristics of the social groups and the frequencies and times when the local activities could be accessed, accounting for the influence of public transport services. The time-geography methodology and study framework adopted by UEA allowed for the evaluation of accessibility levels at three distinct levels; by spatial units (the villages/settlements), by social group, and by the activities present at the destinations (Moseley et al. 1977).

The time-geography, or time-space, techniques adopted in the UEA study were developed further by research undertaken into rural accessibility levels and transport policies in rural Wales during the early 1980's (Nutley, 1980, 1981, 1983). Nutley (1983) defines three elements that combine dynamically to constitute accessibility; population, transport, and functions, and through analysis of these various elements set in a time-geography methodology sought to measure access levels in rural Wales. Whereas the UEA research was limited to definition of access levels and subsequent forecasting of future levels based on estimated public transport costs and policy scenarios, Nutley's work in Wales was more explicit in policy appraisal terms with the aim of assessing individual policy inputs through cost-benefit analysis techniques (Nutley, 1983). Nutley identifies a methodology which may be applied to the analysis of accessibility in rural areas that allows for subsequent planning of improvements to the system, this methodology is,

> "..first able to evaluate the social benefits of any policy such that a cost-benefit relationship can be expressed, second allows objectives and achievements to be measured in a consistent normative manner, and, third, presents a clear statement to decision makers of choices and consequences."
>
> (Nutley, S. 1985. p.38)

The research in rural Wales devised some 40 planning options in the study area which could then be appraised on the basis of additional access incurred, the cost, the cost-benefit ratio and other criteria, such as the way in which benefits are distributed (Nutley, 1985).

Time-space techniques, as used in the above studies, offer an effective means of assessing the differential patterns of accessibility in rural areas but the technique is often data intensive, in terms of the detailed level of information relating to trip patterns, and has, therefore, been utilised primarily in case study research rather than at a regional or macro level. The research outlined above is useful in informing the current study in that it highlights the need to consider the social aspects of differential accessibility and to incorporate some indication of the socio-demographic profile of localities in any accessibility measure.

Nutley extends his analysis of rural mobility and accessibility further in a later study in rural Ulster in the early 1990's (Nutley and Thomas, 1992). The research in Ireland is based on a more simplified format than that undertaken by Nutley in Wales, with questionnaire approaches forming the basis of the research. Here the emphasis was placed on the importance of personal mobility and the availability of private transport at the household and intra-household scale and, specifically, within certain social groups. The problems faced by those without access to private transport are compounded by dwindling public transport services and poor local services provision (Nutley and Thomas, 1992). By including questions in the survey on private and public transport provision and regular travel patterns the study was able to calculate travel distances or trip patterns to a range of basic services cross-referenced against mobility

characteristics in the areas surveyed. The research highlights a growing divide in rural areas between those with and without the regular use of private transport and that this divide is felt most keenly in households with no wage earners, by the elderly, and by those living alone (Nutley and Thomas, 1992).

Askew (1983) utilises location allocation methods to generate alternative strategies to apply to the problem of locating service facilities in rural areas. Askew then combines this methodology with the time geography approach to measure the accessibility of the facilities for each strategy, whilst taking personal mobility into account (Askew, 1983). The measurement of accessibility is introduced as a means of evaluation of the alternative locational strategies devised through location allocation models. Askew argues that demand is conceptualised within the location allocation model in terms of constraints on opportunities to consume, which reflects constraints on accessibility. This being the case, then by considering the constraints imposed by time budgets and distance, and their interaction, time-geography is deemed to be the most suitable approach for developing accessibility measures. For each village, or social group, access to facilities, subject to a given transportation system, is established and this access is then measured on an appropriate scale. Concordance analysis is used to rank the accessibility of villages under a number of different criteria, based largely on the accessibility criteria put forward by Moseley et al, 1977, in this way an aggregated index of accessibility could be established.

Accessibility criteria proposed by Moseley et al. 1977;

- Frequency of access desired by consumer
- Opening hours of the facility
- Acceptable time at the facility
- Acceptable walking distance to local facility
- Journey duration

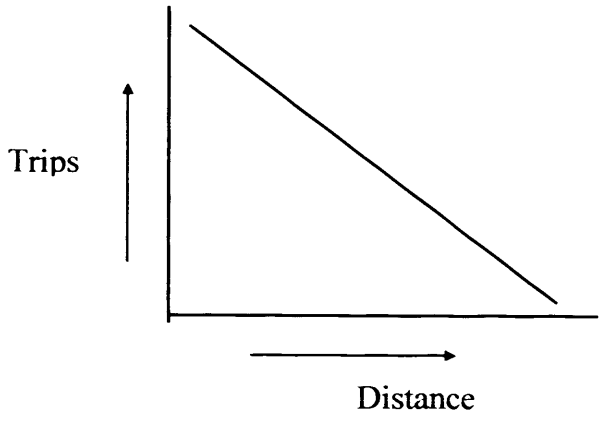
- Start and finish times for use of service

The various accessibility criteria are weighted within the concordance analysis using multidimensional scaling (MDS) methodology. MDS is a procedure in which the alternative criteria are represented geometrically as points in a multi-dimensional space, the relative positions of the points indicating the relationships between the alternatives (Askew, 1983).

Askew develops the methodology in a case study of alternative location strategies for General Practitioner surgeries in rural South East Devon. It is argued that this model for quantifying accessibility to services is particularly applicable to the rural situation as accessibility in the model is defined as the inter-relationship between location and mobility, an inter-relationship at the heart of the problem of rural services provision (Askew, 1983).

b) Approaches to the measurement of accessibility.

Much of the technical expertise in measuring differential access to service facilities has emerged over the years from the optimal facility location literature. The measurement of differential accessibility forms an important part of wider locational models encompassing equity and efficiency goals in the planning of optimal public service location. A comprehensive review of the techniques and applications developed within the optimal location field is provided by Leonardi (1981a, 1981b). The focus of Leonardi's work is inevitably to identify optimal facility location allocation through a systems methodological framework but within this framework the important element of accessibility evaluation, in terms of demand, plays a crucial role and is pertinent in informing the current debate. A range of allocation models are described, mostly based on the gravity or spatial allocation assumptions whereby the number of trips to facilities is proportional to a decreasing function of distance or travel cost (Leonardi, 1981a).



Leonardi (1981a) considers in detail the behaviour of users in the optimal allocation model with reference to their trip-making patterns and facility choosing behaviour. An attempt is made to find a unifying framework for facility location problems and within this, as far as users behaviour is concerned, three main issues or problems are highlighted. Specifically; the problem of relating users' choices to some optimising behaviour, secondly, and of particular relevance here, the problem of defining a suitable general form for an accessibility sensitive demand mechanism, and finally, the problem of defining a suitable form for a congestion sensitive demand mechanism. The steps towards the solution of these problems lead in turn to the ultimate goal of a unifying framework of study (Leonardi 1981a). In dealing with the problem of defining a suitable form for an accessibility sensitive demand mechanism, Leonardi identifies the need to incorporate, initially, some specific measure of accessibility and highlights three alternative means to this end. The first possibility is to measure accessibility by either taking the nearest facility travel cost or the mean of travel costs to all facilities, both options are straightforward to calculate but the assumption is made that all consumers evaluate distances according to the minimum, an assumption at odds with general spatial interaction model behaviour. The second possible measure takes into account spatial interaction behaviour and is explicitly a measure of users' benefit. Accessibility is measured by taking the sum of the capacity of all service facilities taking into account a distance decreasing discount factor applied to the facilities by the users. The measure takes the general form;

$$A = \sum_j f(Cj)Wj \qquad [1]$$

Where:

A = measure of accessibility to the service from a demand location

Wj = weight measuring attractiveness of a facility in j

Cj = cost of travelling from the demand location to the facility in j

$f(-)$ = space discount function

The final method of measuring accessibility is to take an 'average' travel cost where the averaging operator is consistent with spatial interaction behaviour. The average travel cost is obtained by applying the inverse of a space discount function to accessibility (the space discount function being the means by which users perceive distance in spatial interaction behaviour), whereby;

$$\overline{C} = f^{-1}(A) \qquad [2]$$

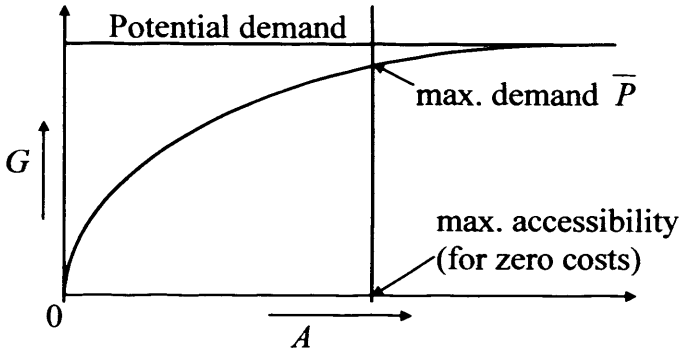
Where :

$\overline{C}$ is the average travel cost from a given demand location having accessibility A defined by equation [1] and,

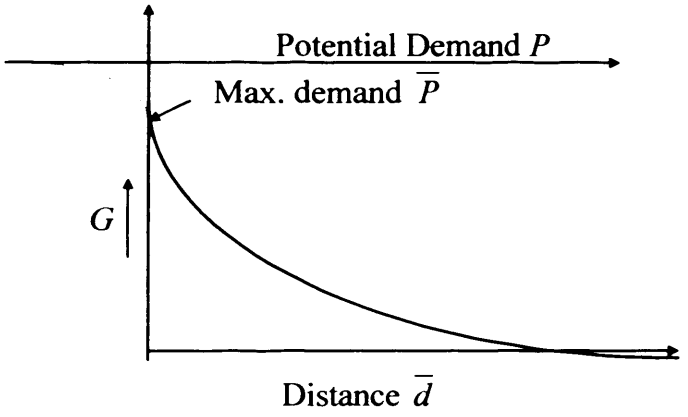
$f^{-1}(-)$ is the inverse function of $f(-)$ (Leonardi 1981a)

This method of calculating average travel cost is the only possible average ensuring consistency in problems of aggregating and disaggregating spatial choice models. Leonardi proceeds to identify two forms of accessibility sensitive demand generation model based on whether an actual accessibility index is used, as in equation [1], or a measure of 'average' cost is employed to measure accessibility (equation [2]). The first form, an accessibility-increasing demand curve, assumes that in general demand G will increase up to a measure $\overline{P}$, corresponding to the maximum value of A, which is reached when all travel

costs are zero (i.e. space disappears). Generated demand G is bounded by a maximum potential demand P which is always finite if the total population living in the demand location is finite.



The second form, an average cost decreasing demand curve, assumes that G will reach its maximum $\overline{P}$ for zero cost and then decrease as travel cost increases (Leonardi, 1986a).



($\overline{d}$ can be average distance or nearest facility distance)

The review of optimal location methodology and techniques provided by Leonardi and outlined here is of use in the current context as it provides a view of how the complex problem of measuring accessibility may be approached.

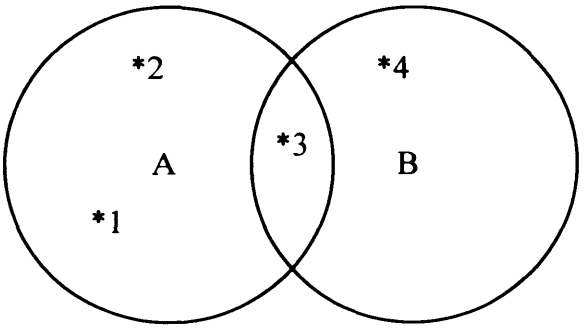
An example of the type of accessibility modelling procedures outlined above is provided by Pacione (1989) in a study of access to secondary education in an urban context. Pacione employs a modified version of a traditional gravity model to provide a numerical index of relative accessibility of urban residents in 104 sub areas in the case study city (Glasgow, Scotland) to secondary education establishments. Pacione takes the traditional gravity model but modifies it to take into account the influence of differential mobility of residents. In this context access to private transport is seen as crucial in delimiting differential accessibility, therefore the index of accessibility from the gravity model is weighted according to rates of car ownership, incorporating measures based on travel speeds by car and public transport (Pacione, 1989). The model is then further modified to taking account of the distinction between personal accessibility and place accessibility (in effect by weighting the accessibility index according to the number of people in each neighbourhood). The final index provides a ratio of the supply (facilities) and demand (population) components of the urban education system, and thus provides a sound measure of the relative accessibility of secondary schools to people in different neighbourhoods (Pacione, 1989). Pacione applies the methodology to building up accessibility surfaces to secondary education in Glasgow, charting the effects of proposed school closures on the relative accessibility to services. In conclusion, Pacione stresses the need to address both the social and spatial dimensions of accessibility highlighting the socio-political processes that act upon and constrain the equitable distribution of urban services (Pacione, 1989).

Further work on access to urban services undertaken at Cardiff University has resulted in a methodologically innovative approach to measuring differential accessibility to services (Webster, 1996, Webster and White, 1998, for a detailed description of the model). The general form of the model is as follows:

$$\frac{(ACCESSIBLESERVICES / POPULATION)^{small}}{(ACCESSIBLESERVICES / POPULATION)^{large}} \qquad [3]$$

The measure is termed a standardised accessible service ratio and was devised in an attempt to address a situation where facilities or services may be accessible to more than one population zone. Not accounting for this would mean that the level of service supply measured for a zone will be over stated since shared facilities between zones will be double counted (Webster, 1996). The solution to the problem of what may be termed overlapping catchment areas was to distribute shared facilities to sharing populations based on respective population sizes and populations' access to other facilities. In Figure 2.2 therefore, if the populations in A and B were equal, it would be reasonable to assume that the use or demand from B would be greater than from A since A has a choice of two other facilities while B has only one other (Webster, 1996).

Figure 2.2 Accessibility buffer around the centroids of two population zones showing shared and unique facilities



A and B = population centres
* = facilities offering services

An algorithm was employed to calculate [3] above whilst taking into account the overlapping catchment area problem in Figure 2.2 (see Webster and White, 1997). The standardised accessible services ratio was developed initially to aid

analysis of access to child-care in urban areas but the model is flexible enough to be adapted to a number of different types of service sector and localities.

c) Measures of Potential Accessibility to services

A number of research studies, particularly in rural areas, have used measures that are focused on the potential physical (or geographical) accessibility. These types of measures assess the nature and pattern over space of physical access to service facilities and permit the manipulation of supply and demand data, through reference to utilization behaviour, to provide measures of regional accessibility (Joseph and Phillips, 1984).

A measure of potential physical accessibility to rural health care services could be adapted from work undertaken by Joseph and Bantock (1982) (and more recently, Higgs and White, 2000) into potential accessibility to general practitioners in rural areas of Canada. The measure adopts the term *'potential'* accessibility because no actual interaction between the two sides of the demand-supply equation is implied (Joseph and Phillips, 1984). The measure assumes that 'given a maximum range for the service being offered at a facility and assuming that every member of the population is a potential user of the service, the pattern of physical accessibility will depend only on the relative location of the population and the service facilities'(Joseph and Bantock, 1982). This could be represented as travel time, road or map distance. If we assume a continuous and progressive impact of distance from the facility on utilisation rates then a simple measure of nodal accessibility would be.

$$A_i = \sum_j F_j / d_{ij}^b \qquad [1]$$

where:

A_i = potential physical accessibility of area i to services

F_j = Service facility at j within the range of area i

d_{ij} = distance between i and j

b = exponent on distance

(adapted from Joseph and Bantock, 1982)

A feature of this nodal accessibility measure is that a limit is set on the distance within which a service is accessible to a population and a power function rather than a negative exponential function is used to represent the distance decay effect. There should also, however, be some method of taking account of the differential availability of services, for example services with a densely populated catchment area are likely to be less available than those within sparsely populated areas (this is especially true of specialist services such as doctors and dentists). The differential availability of services can then be estimated through the following equation.

$$D_j = \sum_i P_i / d_{ji}^b \qquad [2]$$

Therefore, the potential demand for a service at j, D_j, is a function of the magnitude of the population within the range of the service offered, modified by their distance away. By combining the two equations, [1] and [2], we arrive at a measure of potential physical accessibility to services, A_i^* that combines a realistic assumption of utilisation behaviour with a weighted estimate of service availability (Joseph and Bantock, 1982).

$$A_i^* = \sum_j \left[F_j / \left(\sum_i P_i / d_{ji}^b \right) \right] / d_{ij}^b \qquad [3]$$

Joseph and Bantock (1982) applied these equations to the distribution of GPs in Southern Ontario using centroids of census tracts and the exponent on distance, *b*, set equal to 2. A series of ranges at 5, 10 and 15 miles were used in order to illustrate that although residents in some rural parts of the region had further to travel to access a GP, the potentially lower population served by such GPs, meant that they were likely to be more available to them. At the same time, gaps in potential spatial accessibility could be identified and, if time series data were available, temporal trends in accessibility could be commented upon.

d) Measures of Revealed Accessibility

"The proof of access [to services] is use of the service, not simply the presence of a facility. Access can, accordingly, be measured by the level of use in relation to 'need' (Donabedian, 1973, p. 211)

Joseph and Phillips (1984) argue that this view of access to services can lead to an association between utilization rates and accessibility which may be termed 'revealed accessibility. Donabedian's (1973) argument does, however, mask two important weaknesses with this approach. First, 'need' for a particular service, e.g. healthcare, is difficult to define, with Bradshaw (1972) highlighting four potential definitions of need: 'normative need', 'felt need', 'expressed need', and 'comparative need' (Bradshaw, 1973). Accordingly, Joseph and Phillips (1984) assert that unless need can be measured in some way by extensive household surveys then we must rely on professional judgement to operationalise the concept, either at the individual level (normative need) or the group level (comparative need). The objectivity of such a revealed accessibility measure would therefore rest upon that of the professional judgement of need (Joseph and Phillips, 1984, p.59). The second key weakness in assessing revealed accessibility is the existence of a multiplicity of factors that may intervene in the translation of need for a particular service into the *use* of particular facilities. Even if the pattern of need (however defined) is known, examination of utilisation patterns does not usually permit the identification of the relative importance of the various geographical, socio-economic, and

organisational factors interposed between the need and the utilisation (Fiedler 1981 in Joseph and Phillips, 1984). There now follows a discussion of various methods and examples of measures of revealed accessibility before an attempt is made to operationalise an alternative approach in the current study.

Social scientists have long been concerned with trying to assess the effects of aspatial factors in influencing utilisation rates for particular services, for example medical services. This section will detail some of the attempts to specify variables that may influence utilisation (particularly aspatial, social and economic) and will also look at those spatial influences that will also have some degree of influence on utilisation (e.g. distance from a facility).

Joseph and Phillips (1984) highlight five key studies that seek to model the key features of population characteristics, service characteristics, and other variables in an attempt to explain or predict utilisation behaviour, in this case to health services.

1. 1959-1960 The Rosenstock Model : psychological-motivational determinants of health service utilisation
2. 1964-1966 The Schuman Model : socio-cultural and environmental determinants
3. 1968 The Anderson Model : family life-cycle determinants
4. 1972 The Gross Model : behavioural components
5. 1974 The Aday and Anderson Model

The Rosenstock model is interesting in that it was one of the first to suggest that distance may act as a barrier to the receipt of care. Schuman's model emphasised the influence of social groupings and linkages on utilisation. Therefore, the levels of health knowledge of kin and contacts will be important in influencing utilisation – and this may vary between different social and cultural groups (Joseph and Phillips, 1984). Anderson (1968) proposed a model

explaining utilisation behaviour in terms of the sequence of conditions which tend to regulate the volume of service used – sometimes referred to as a life-cycle determinants model. These can be summarised as the factors that may predispose towards utilisation (family composition, social structure, health beliefs), and those that enable utilisation (sufficient family resources, available facilities). This model does not explicitly include accessibility as a factor influencing utilisation – perhaps a key weakness (Joseph and Phillips, 1984). Gross (1972) proposes a regression model operating within a 'behavioural framework' which includes accessibility variables as well as predisposing, enabling and need components highlighted by Anderson (1968).

The equation:

$$U = f[E; P; A; H; X] + e \qquad [1]$$

Seeks to explain the utilisation (U) of various services by an individual

E = Enabling factors such as family size, occupation, income

P = Predisposing factors such as attitudes of the individual towards healthcare, health services and physicians, health behaviour

A = Accessibility factors such as distance and/or time of individual from a facility

H = perceived health level of individual or family

X = individual and area-wide exogenous variables (age, sex, family size etc.)

e = residual error term

The model does include many recognised and potential influences on utilisation but perhaps one weakness is the problem of multicollinearity, reverse causality and data gathering which is common in models of this type (Joseph and Phillips, 1984).

Aday and Anderson (1974) provide a useful 'systems' approach to the problem and provide a framework examining health systems of different types and variations in utilisation. The model is valuable in that it recognises that access involves more than the mere existence of a service but also takes into account the impact of distance decay in such models (Joseph and Phillips, 1984).

These models provide a valuable contextual fabric for the geographically orientated access models outlined above. They indicate to researchers the potential variables which need to be considered when analysing the utilisation of any given health service in any given health care system (Joseph and Phillips, 1984).

e) GIS and Access to Health Services

As Gatrell and Senior (1999) assert, Geographic Information Systems are effectively tools for analysing spatially referenced data and it is, therefore, no surprise that they have been embraced by those approaching the geography of health from a 'spatial analysis' tradition (that is, the quantitative analysis of health-related phenomena in a spatial setting) (Gatrell and Senior, 1999). One of the principle applications of GIS in terms of geography of health research has been concerned with the delivery of, and access to, healthcare services. GIS has been used in this area of research to help answer some broad questions of healthcare delivery, as summarised by Gatrell and Senior (1999),

> "Clearly, health care resources have to be located somewhere. But what are the population 'needs' for healthcare, how should resources be allocated over space, and how accessible are such resources to the populations that they are designed to serve?"
>
> (Gatrell and Senior, 1999, p926)

Gatrell and Senior go on to describe four main areas where GIS has been used in the health care planning area of research, at the interface between population

'needs' and service delivery raising a number of issues of accessibility and utilisation (considered in more detail later in this chapter)(Gatrell and Senior, 1999). The four main areas are: locality planning and needs assessment, locational planning of health services, spatial decision support for health care planning, and access to health services. Access to health services is the main focus of the use of GIS in this thesis but it is useful to highlight the main focus of applications of the technology in the alternative areas of research, before returning to GIS and access to health services.

In locality planning and needs assessment GIS has been employed to define localities for particular health service catchments or neighbourhood units, before undertaking a health needs assessment. An example of this technique is provided by Bullen et al, (1996) who defined localities, or neighbourhoods, for 500 residents in West Sussex. This involved: digitising and then rasterising the perceived neighbourhoods of residents to identify common community areas; defining theoretical school catchments using Thiessen polygons; linking patient postcodes to census areas and doctors' locations; and isolating the dominant patient-doctor linkages (Bullen et al, 1996 cited in Gatrell and Senior, 1999). GIS can also assist in the process of planning supply of health care services. In particular, modern GIS such as ArcInfo are now capable of solving 'location allocation' problems which have been of interest to geographers for many years. Hodgson (1988) applies such a model in an exploratory way to locate primary health care facilities among settlements of varying size in a rural area of Goa, India (Hodgson, 1988 cited in Gatrell and Senior, 1999). It is not the intention of this thesis to employ such location allocation techniques to the situation in rural Wales as here we are interested in changes in access to services within the local population, as apposed to optimum locations for primary care facilities. GIS is also employed to provide spatial decision support for health care planning with a focus on measuring health needs accurately and dealing with them in ways that are both clinically effective and cost effective (Gatrell and Senior, 1999). Birkin et al, (1996) argue for an intelligent GIS for healthcare which includes the ability to perform spatial interaction models for patient registrations with doctors (see Martin and Williams, 1992) and for doctor

referrals of patients to hospitals by specialism. Efforts to link the visualisation capabilities of GIS with spatial interaction modelling and location-allocation analysis will continue to attract attention but it is worth noting that concerns have been raised about issues of error that arise in such applications (Gatrell and Senior, 1999).

Some of the examples cited above in relation to optimal location of facilities planning draw on potential accessibility of the population as the key indicator of optimum locations for new facilities and it is to the question of potential access to services that we now turn.

Penchansky and Thomas (1981) identify five important dimensions of access;

- Availability – defines the supply of services in relation to needs – are the capacity and types of services adequate to meet needs?
- Accessibility – describes geographical barriers, including distance, transportation, travel time, and cost. It highlights the geographical location of services in relation to population.
- Accommodation – identifies the degree to which services are organised to meet clients' needs, including hours of operation, application procedures and waiting times
- Affordability – refers to the price of services in regard to people's ability to pay. Income levels are obviously crucial to this element.
- Acceptability – clients views on particular services and how service providers interact with clients

In terms of GIS, the emphasis is necessarily on accessibility – the explicitly geographical dimension of access. People's access to services is rooted in their daily activity patterns in time and space (Cromley and McLafferty, 2002). Time-space constraints will clearly have a central role in shaping access to

services, for example health care. Utilisation is often based on alternatives that best satisfy perceived service needs within the time-space constraints of daily life. When aggregated together, these individual choices form spatial patterns of health care utilisation (for example) – the flows of people over space to health services.

The influence of physical accessibility on the need-utilisation continuum is one that has attracted considerable attention in recent years, particularly with the advent of GIS technology. This has allowed researchers to model differential accessibility levels to healthcare services within localities based on distance travelled or the time taken to travel to services. Early applications of GIS in the health field focused on epidemiological issues (e.g. Dunn, 1992, Glass et al, 1992) such as the distribution and determinants of health and disease in groups. More recently GIS has been applied to the planning and management of health care services, including applications ranging from the creation of health profiles (e.g. Bloemberg et al, 1992) to the location of service centres, route planning and access or utilisation studies (Parker and Campbell, 1998). A number of studies have considered the potential impacts of the quantity and spatial location of medical services for health outcomes, for example by exploring the significance of distance as a barrier to care in rural areas (Haynes and Bentham, 1982; Joseph and Bantock, 1982), or by examining the implications of poor access to health services on health status (Bentham and Haynes, 1985). GIS-based studies using network modelling techniques have allowed refinement of such analysis by taking into account patient distribution, hospital or GP characteristics, and transport/network information to measure accessibility and model the implications of changes in the healthcare delivery system (Higgs, 2000, p215). These techniques have also illuminated the debate on theoretical concerns within the rural health sector, such as the 'inverse care law', for example Lovett et al (2000) in a study of access to primary care services in East Anglia found that rural populations with the poorest accessibility were also more deprived and showed evidence of higher levels of health need than other populations (Lovett et al., 2000). What has been less evident in 'accessibility-based' studies of healthcare provision in rural areas has been the analysis of the

impacts of variable quality of primary care provision (Higgs, 2000). The current study attempts, in a limited sense, to introduce some element of the quality and characteristics of services provided in rural areas and relate this back to the question of access.

A key aspect of health care utilisation patterns is distance decay, or the tendency for interaction with facilities to decrease with increasing distance (see Joseph and Bantock, 1984, Cromley and McLafferty, 2002 for examples). Distance decay is a function of the added time, cost, and effort of travelling long distances. As an individual's costs increase their willingness to travel decreases. People's knowledge of, or familiarity with, service opportunities also decline with distance, exacerbating the pattern of distance decay (Cromley and McLafferty, 2002).

The role of geographical accessibility in service utilisation also depends on population characteristics. People differ in their ability to overcome distance and in how locational constraints affect their service use. Characteristics such as age, income, occupation and gender will affect accessibility to services and those whose mobility is restricted (e.g. through low income or poor access to transportation) are more sensitive to distance, and thus more likely to use the nearest service provider (Cromley and McLafferty, 2002).

In terms of GIS and health, many health organisations in the UK and USA are now employing GIS techniques to capture and map information on service locations and health needs, although this is by no means universal and problems still exist in the UK in terms of collecting information in digital format and employing common spatial scales or boundaries for analyses across regions (see, for example, Higgs and Gould (2001), for an analysis of the use of GIS in the NHS in the UK).

f) *GIS and Potential Accessibility Measures*

Most efforts to implement policies to improve service availability focus on 'potential accessibility', the geographical matching between people and essential services. At its core, the concept refers to the separation between services and population and the dynamic relationship and influencing factors between the two. As we have seen there are a number of ways of measuring potential access as highlighted above and most can be easily implemented in GIS.

Regardless of how it is measured, potential accessibility to health services is distributed unevenly over space. This reflects the way most health services are provided: at fixed sites, serving a dispersed population – particularly the case in rural areas. GIS can provide a tool for viewing geographical variation in accessibility and seeing if differences in accessibility stem from obvious gaps in service coverage or are structured along social or demographic variations (Cromley and McLafferty, 2002). A GIS may be employed to 'visualise fairness' in service distribution patterns (Talen, 1998). Such a system may incorporate a variety of accessibility measures, including average travel distance and population coverage. The GIS could produce maps of accessibility that can be viewed individually and also related to maps that show the distributions of population groups, housing values, and environmental features (e.g. relief). Maps and statistics would then reveal the differential patterning of accessibility (Talen, 1998).

g) GIS and Revealed Accessibility

GIS are also a valuable tool for analysing 'revealed accessibility' to services, that is, patterns of health care utilisation. These patterns are often the result of choices about when and where to use services, the geographical configuration of health care opportunities, and the mediating effects of medical referrals and

regulations (Cromley and McLafferty, 2002). GIS can be used in this area to help address a number of key questions:

- What is the market area for a health care facility?
- How will changes in health care delivery, for example the closing of a surgery, affect market areas and utilisation?
- Are services and procedures over or under-utilised in particular areas?

Market areas, or service areas, for particular services are possible to map in a GIS based on postcoded point locations of patients. This could, however, also give outliers who live far from the actual facility. Although these maps of service areas are useful descriptive tools, they do not address the determinants of service utilisation patterns, and thus have limited value for forecasting and planning. Spatial Interaction Models (SIMs) provide a useful tool for examining the question 'what are the effects of distance, facility size and service level on utilisation (Cromley and McLafferty, 2002)? SIMs describe and explain the movements or interactions between places as a function of distance and other factors. A particular form of SIM – the destination-constrained model- has been widely used in the UK where healthcare is centrally planned and financed, and health authorities often dictate the capacities of health care facilities (Mayhew et al, 1986). This model assumes that the total capacity of each facility is fixed, so each facility can only serve a pre-defined number of clients. Given this constraint the model describes the flows of patients to facilities (Cromley and McLafferty, 2002). GIS can clearly have an important role in terms of data processing and management, and displaying the results of such models across space so that differential patterns of utilisation or revealed accessibility can be identified.

2.3 What are the implications of restructuring processes for access to local communities and different social groups?

This section outlines theoretical perspectives on restructuring processes that may affect rural communities in terms of accessing essential services such as primary health care. It is argued that restructuring processes in the countryside will have an impact on localities in terms of their social make-up and ability to support key services and facilities. At the same time restructuring processes are in force within organisations that deliver such services and here the debate turns to economic theories of the firm and economic models in health that attempt to explain how these impacts could be felt in particular health care organisations – this discussion is particularly relevant to the case of the rural pharmacy as shall be apparent as the analysis of rural primary health care in Wales, that forms the basis of this thesis, shall testify.

2.3.1 Restructuring Processes in the Countryside

The restructuring thesis (Newby, 1986, Marsden and Murdoch, 1990) assumes the decreased significance of spatial categories (particularly the urban-rural dichotomy) and is replaced by an emphasis on the ways in which capital accumulation processes seek out exploitable spaces largely associated with the relative quality and costs of human labour (Marsden and Murdoch, 1990). An understanding of social change in rural localities in terms of spatial restructuring remains an appropriate means of analysis of processes which have particular local effects. However, localities should not become objects of study to be investigated for their own sake, but rather should be laboratories for the investigation of particular theoretical and empirical issues (Newby, 1986). Newby argues that the restructuring thesis should take account of the 'distributional struggles' over scarce resources used to determine life-chances within the localities studies (whether in an urban or rural setting)(Newby, 1986).

The term 'restructuring' is derived from three main bodies of work. First, is the 'regulationist' school which stresses the globalisation of capital and modes of

regulation (e.g. the need in a mass production society for a mass market of consumers). This work is preoccupied with the crisis of Fordism and the move towards a post-Fordist regime of accumulation. Second, is the 'disorganised capital' school which stresses the post-Fordist flexible specialisation of production, the destruction of traditional hierarchies of control and the breakdown of the post war systems of social and political power. Third there is the 'spatial divisions of labour' approach which highlights the new industrial geography of capitalism and the changing roles of regions and localities (Marsden and Murdoch, 1990).

By way of an example of how such restructuring theses may be applied to rural change in particular localities the work of Goodwin et al (1995) which describes locality based studies of 'Lifestyles in Rural Wales', relates the changes identified in rural communities in rural Wales to one strand of the restructuring thesis: regulation theory. Goodwin et al (1995) argue that regulation theory is a continuous, if highly variable, process, and in practice there are a variety of institutional structures, political practices, regulatory mechanisms, and social norms, as well as different strategies of production, within any regime of accumulation. Therefore we should not look to specify the ways in which rural areas are implicated in any move away or towards Fordism, but instead allow for a much more complex situation (Goodwin et al, 1995). Rural change, therefore, becomes part of a whole series of socially constructed and contested processes, with the outcome hard to determine in advance. Rural change will not be pre-determined by inevitable technical developments towards flexibility either in the economy or in society, but will be shaped by continuing attempts to regulate the contradictions and crises of capitalism – but its specific path in any locality can only be traced through theoretically informed research into specific cases (Goodwin et al, 1995). The 'lifestyles' research in rural areas of Wales found wide-ranging problems of poverty, low income, agricultural decline, low paid employment, and housing and transport difficulties. These transitional forces or restructuring forces, it is argued, can be viewed using the notion of a mode of regulation which allows for an appraisal of this complex situation where rural changes are the result of particular combinations of contested

political, economic, social and cultural relations. These operate at different spatial scales, around different sets of institutions, and are promoted and challenged by different sets of social groupings (Goodwin et al, 1995). Rural change is, therefore, not uniform but is instead socially constructed and sometimes a fairly localised process. Peripheral areas such as rural Wales are likely to be hit hard by deepening problems of uneven development and regulation theory can be used to address to the existence of these problems (Goodwin et al. 1995).

If we consider rural Wales to be a peripheral locality, based on geographical and economic constructs then we might also assess a number of economic perspectives on how such peripherality may be explained in economic theory terms. In economic research, peripherality has tended to be linked to concepts of economic development, and to competitiveness and comparative advantage. It is less clear that peripherality in these senses has an inherent spatial component. Broadly three different schools of thought may be distinguished.

The *neo-classical* explanation emphasises the role of competitive markets, with changing patterns of demand and supply altering the balance of development between areas, with some experiencing growth while others decline. The substitution of capital for labour in primary activities like agriculture would thus lead to employment decline and low wages in some rural areas. Neo-classicists would argue that the market itself will redress rural decline, as labour, land and capital in these areas become cheaper, with the price-signals of the market acting as a self-correcting process through the mobility of labour and capital. From this perspective, the role of policy is to remove market imperfections, such as nationally negotiated wage-rates, monopoly power, and rigidities in housing markets, in order to allow the market to regain equilibrium.

The *cumulative causation* school, deriving from Myrdal (1956, 1957), would argue that, far from evening out, spatial imbalances will accumulate and become accentuated as prosperity breeds further growth, and declining areas spiral

further downwards. A decline in agricultural employment will thus have two separate negative effects. On the one hand the decline promotes emigration, which leads to a reduced rate of natural increase because of a disturbance to the age/sex structure of the population, and hence to a further drop in population. At the same time, the initial fall in population also brings a reduced demand for services and hence further reductions in employment opportunities. Through the interaction of these two sets of factors the process of decline continues. Again, the market is regarded as the causal mechanism, though from this standpoint there is no self-correcting mechanism and the cycle can only be halted through government intervention to regenerate declining rural areas.

A third explanation, from a *Marxist* standpoint, sees the emphasis upon markets as misplaced and instead sees uneven spatial development as integral to the workings of capitalism. Spatial inequality is something that is produced and used by industrial and other capital in the search for profitable investment. As the nature of the national and international economy changes (global restructuring), so too does the role played by different rural areas. The pattern of inequality shifts continuously through time, with each new pattern creating the pre-conditions for a subsequent pattern of uneven development. Thus, the tendency toward agricultural surplus production in the developed world has eroded the post-war certainties of many agricultural economies, most notably through the demise of productivist policies and associated structures. This has opened the way to an increasingly differentiated countryside whose future trajectories derive from a much more complex array of economic, social, cultural and political elements. In particular, rural areas may be becoming areas predominantly of consumption, whether for residence or leisure, rather than of production. Distance then becomes an issue less in terms of its impact on the costs of production, but more in terms of whether the locality is within commuting distance of a major employment centre, or is accessible to mass tourism and/or recreation through an airport or motorway. That is, distance becomes important in relation to the costs of consumption, rather than of production.

2.3.2 Restructuring Processes within Organisations – The Theory of the Firm

This section provides a brief overview of the development of the theory of the firm which is essential if this area of economic theory can be applied to the case of pharmacies and other primary healthcare providers. Other important elements of the theory of the firm, of interest in this context, are covered here, in particular the importance of vertical integration, before assessing some of the issues raised in terms of its application in a primary healthcare setting.

Historical development of the theory of the firm

Any discussion of the development of the theory of the firm has to begin with the contribution of Alfred Marshall to the field (O'Brien, 1984). The overriding themes of Marshall's treatment of the firm are technical progress, knowledge and decision-taking, in which connection he pays considerable attention both to the role of the entrepreneur and to the form of the organisation. This focus was coupled with attention to competitive structures and size of the firm (O'Brien, 1984). There are three essential tenets to Marshall's position:

- General propositions in regard to either competition or monopoly are 'full of snares' – simple models in a world where there are many different influences on any one individual case should be treated with distrust.
- Marshall had a firm sense of historical perspective (drawing particularly on the work of Babbage and John Stuart Mill).
- Allocation takes place within a continuously evolving framework of possibilities, leading to new techniques, new processes, new products, and new profit opportunities.

The characteristics of Marshall's development of a theory of the firm as summarised above can be discussed under a number of key headings: knowledge, decision-taking, organisation, technical change, costs, pricing, and competitive structure.

Knowledge

There is a key role for knowledge in Marshall's position in that resources are not allocated in a world of costless omniscience but that there needs to be knowledge of the internal situation of the firm and of the external market in which it operates (O'Brien, 1986). The internal knowledge of the firm stems from the managers' awareness of processes and resource use within the firm, and also through the ability to recognise managerial talent among employees. This internal knowledge will not be static over time and will improve through joint consultation and search procedures which may operate under the stimulus of competitive pressure. External knowledge will emerge from an awareness of market conditions and larger firms will tend to have a comparative advantage as the wider range of commercial contacts of a large firm give it a comparative advantage in the acquisition of such knowledge (O'Brien, 1986).

Decision Taking

There is often imperfect availability of both internal and external knowledge and, therefore, the role of the entrepreneur in being able to take decisions is a key factor in the development of the firm. The entrepreneur needs to be able to forecast the movements of production and consumption, to see where there is an opportunity to supply a new commodity that will meet a need, or to improve the production of an old commodity. The entrepreneur should be risk-taker and a 'leader of men' to implement the decisions taken (Marshall, 1920 in O'Brien, 1986).

Organisation

Decision taking was, in Marshall's view, influenced not only by the quality of the decision takers, but also by the form of the organisation within which the decision was taken. Marshall studied the weakness of companies, particularly related to the separation of risk-bearing and knowledge, and the weakening of incentives while their bureaucratic form was inimical to the generation of knowledge on which the vital technical progress depended (O'Brien, 1986).

Technical Change

The most important single factor in relation to knowledge and organisation was the generation and utilization of technical advance. As technological change takes time, the time element assumes a central role in Marshall's theory of the firm. Increasing returns develop over time with diffusion of technical knowledge. The downward sloping supply curve which results is not reversible; therefore cost curves had a time as well as a quantity axis. Product development was important and required not only time but finance giving larger firms a comparative advantage in innovation (O'Brien, 1986).

Costs

Marshall was concerned with cost relationships as these really existed, rather than what was analytically convenient. Secondly, he did not accept the simple analysis of marginal cost which has subsequently become popular. Marginal cost was, for him, not the first derivative of a continually differentiable cost curve but the cost of a process. The cost of producing single items could not be isolated; there was a fundamental information problem concerning the allocation of joint costs. More generally, internal information on marginal cost was lacking, and average cost provided a useful source of information. In addition, costs were incessantly changing and cost curves were not smooth but involved step changes (O'Brien, 1986).

Pricing

Considerations affecting the price associated with particular costs included the desire to induce consumers to learn more about a product and also to invest in equipment to use the output. Monopolists did not pursue simple profit maximisation but might be affected both by some consideration of consumer interests and, particularly, by the threat of potential competition. More generally, price policy was also affected by considerations of oligopolistic interdependence especially where there were high fixed costs (O'Brien, 1986).

Competitive Structure

The size of firms is clearly a major influence on competitiveness and this was not lost on Marshall, who linked firm size to the 'life-cycle' of the firm – this element of the theory of the firm was to develop further through the work of Penrose on the growth of the firm (Penrose, 1959). Competitive structure was also influenced by the existence of barriers to entry, for example the preservation of excess capacity in existing firms. Such barriers could be strengthened by vertical integration which will be reflected in later analysis of rural pharmacies presented later in this thesis. Marshall also focused on the dominance of trusts and cartels and the forces encouraging their creation, which included the existence of large capital investments and of similar costs for different producers. Trusts and cartels possessed both countervailing power and retaliatory power against entrants, and were found to be over a wide range of economic activity, including retailing (O'Brien, 1986). They were generally highly effective, and this led to pressure for public regulation. Unfortunately, public regulation encountered the crucial problem of knowledge on the part of the regulators, including the problem of knowing the necessary level of capital equipment if rate regulation with an eye to the rate of return were contemplated. Moreover regulation itself encouraged concerted action and concentration (O'Brien, 1986).

The work of Marshall cannot be under-estimated in terms of setting out a framework for subsequent refinements of the 'theory of the firm'. As O'Brien asserts, however, Marshall was often criticised, perhaps unfairly, for assuming

'perfect competition' in his theoretical construct – unfairly because data limitations led to these conditions being presumed in the discussion. Two further key contributions to the development of the theory of the firm are detailed here, namely the work of Coase in 1952 and the contribution of economists of the 1970s that led to a modern 'theory of the firm'.

Coase's (1952) contribution is to note that the firm, like the price mechanism, is essentially a coordinating device, a device which allocates resources within itself. Coase points out that while the firm is concerned with allocating resources, unlike the price mechanism it does not have market and exchange transactions. Coase's paper is concerned mainly with answering the question of why another coordinating device, in addition to the price mechanism, should exist. In short, he is concerned with the questions of why the firm is needed, and why this 'suppression of the price mechanism' takes place (Crew, 1975). His answer is that "the main reason why it is profitable to establish a firm would seem to be that there is a cost of using the price mechanism" (Coase, 1952, p.336). The main cost of using the price mechanism is the cost of negotiating and concluding a separate contract for each transaction. The firm, on the other hand, greatly reduces the number of contracts that take place by performing functions internally instead of using the market. Thus the firm, instead of executing a series of contracts in the market to provide the activities performed by an employee, makes one contract (of employment) with the employee (Crew, 1975).

Another reason for the existence of the firm is that it may be desired to make a long-term contract to supply goods, in which case the costs of making one contract within the firm, rather than several shorter ones within the market, are lower. It should be emphasised that the market puts an upper limit on the firm's costs. Thus the firm has to transact its activities at a lower cost than the market because it is always possible to revert to the market if it fails to do this. The firm exists then, only because it can organise services internally which would otherwise cost more if channelled through markets (Crew, 1975).

In the 1970's economists, such as Alchian and Demsetz (1972) extended the scope of Coase's work (and Marshall before him), principally by the introduction of two concepts termed 'team production' and 'metering' (Alchian and Demsetz, 1972). Team production takes place where;

- Several types of resources are used,
- The product is not the sum of separable outputs of each resource used by the team, and,
- Not all the resources used by the team belong to one person – the 'team organisational problem'

These features of team production create a metering problem, that is, a measurement and apportionment problem. Problems of an economic organisation include the metering of input productivity and the metering of rewards. Thus if rewards were random and not associated with productive effort then there would be no incentive toward productive effort. If rewards were negatively correlated with productivity then the organisation would be subject to sabotage (Crew, 1975).

Alchian and Demsetz's (1972) analysis, by developing the notion of team production, is an extension and clarification of earlier work in economics, including that of Coase. The firm emerges because of the fact that extra output is provided by team production, and that, however, success depends on being able to 'manage' the team so that metering problems and the attendant 'shirking' are overcome. The firm in economics is seen as being able to estimate marginal productivities of inputs, and able to organise and direct them so as to obtain the benefits of team production. Alchian and Demsetz therefore propose two necessary conditions for the emergence of the firm;

- The fact that productivity can be increased by team production – a technique for which it is costly directly to measure the marginal outputs of the cooperating inputs,

- It is economical to estimate marginal productivity by observing or specifying input behaviour (Alchian and Demsetz, 1972 in Crew, 1975).

Vertical integration

Vertical integration is the process whereby different aspects of a business, 'upstream' and 'downstream', ranging from sourcing raw materials and production to marketing, are brought together. In the oil business a company which is primarily engaged in the production of crude petroleum may decide to engage in vertical integration by acquiring downstream refineries and distribution networks. Similarly, a company strong in its downstream operations may try to engage in vertical integration by investing more in exploration and development and acquiring a greater stake in the production process. Vertical integration may also occur when complementary companies make long term contracts with one another or joint ventures, or if they decide to merge (Penrose, 1995).

The degree to which a firm owns its upstream suppliers and its downstream buyers is referred to as vertical integration. Because it can have a significant impact on a business unit's position in its industry with respect to cost, differentiation, and other strategic issues, the vertical scope of the firm is an important consideration in corporate strategy. Expansion of activities downstream is referred to as *forward integration*, and expansion upstream is referred to as *backward integration*.

Two issues that should be considered when deciding whether to vertically integrate are cost and control. The cost aspect depends on the cost of market transactions between firms versus the cost of administering the same activities internally within a single firm. The second issue is the impact of asset control, which can impact barriers to entry and which can assure cooperation of key value-adding players (www.quickmba.com accessed 10/11/04).

The following benefits and drawbacks of vertical integration are now highlighted.

Benefits of Vertical Integration

Vertical integration potentially offers the following advantages:

- Reduce transportation costs if common ownership results in closer geographic proximity.
- Improve supply chain coordination.
- Provide more opportunities to differentiate by means of increased control over inputs.
- Capture upstream or downstream profit margins.
- Increase entry barriers to potential competitors, for example, if the firm can gain sole access to a scarce resource.
- Gain access to downstream distribution channels that otherwise would be inaccessible.
- Facilitate investment in highly specialized assets in which upstream or downstream players may be reluctant to invest.
- Lead to expansion of core competencies (www.quickmba.com accessed 10/11/04).

Drawbacks of Vertical Integration

While some of the benefits of vertical integration can be quite attractive to the firm, the drawbacks may negate any potential gains. Vertical integration potentially has the following disadvantages:

- Capacity balancing issues. For example, the firm may need to build excess upstream capacity to ensure that its downstream operations have sufficient supply under all demand conditions.
- Potentially higher costs due to low efficiencies resulting from lack of supplier competition.
- Decreased flexibility due to previous upstream or downstream investments.
- Decreased ability to increase product variety if significant in-house development is required.
- Developing new core competencies may compromise existing competencies.
- Increased bureaucratic costs (www.quickmba.com accessed 10/11/04).

Factors Favouring Vertical Integration

The following situational factors tend to favour vertical integration:

- Taxes and regulations on market transactions
- Obstacles to the formulation and monitoring of contracts.
- Strategic similarity between the vertically-related activities.
- Sufficiently large production quantities so that the firm can benefit from economies of scale.
- Reluctance of other firms to make investments specific to the transaction.

Factors acting against Vertical Integration.

The following situational factors tend to make vertical integration less attractive:

- The quantity required from a supplier is much less than the minimum efficient scale for producing the product.
- The product is a widely available commodity and its production cost decreases significantly as cumulative quantity increases.
- The core competencies between the activities are very different.
- The vertically adjacent activities are in very different types of industries. For example, manufacturing is very different from retailing.
- The addition of the new activity places the firm in competition with another player with which it needs to cooperate. The firm then may be viewed as a competitor rather than a partner (www.quickmba.com accessed 10/11/04).

Vertical integration should not be confused with horizontal integration, or movements toward greater oligopoly or monopoly within an industry. However, vertical integration may encourage tendencies toward oligopoly by offering the integrated companies a competitive edge against their less integrated rivals. The study of vertical integration has presented difficulties both at theoretical and policy levels of analysis. Policy interest in vertical integration has been concerned mainly with the possibility that integration can be used strategically to achieve anticompetitive effects (Williamson, 1971). Vertical integration, as a public policy matter, is typically regarded as having 'antisocial' properties with technological interdependencies or observational economies constituting the principle exceptions (Williamson, 1971).

The central notion underlying integration in primary care is the health care value chain which describes the flow of inputs and outputs underlying the production of a particular good or service (Porter, 1980). Vertical integration in the health care sector can be defined as "a governance structure designed to enhance co-ordination and control of health care services that are at different stages of the

health care value chain and to facilitate inter-organisational collaboration and communication between health care providers that are involved in the delivery of those services" (Simoens and Scott, 1999). Vertical integration in primary care can take the form of shifts in the provision of health care between primary and secondary care and of formal/informal contractual or co-operative arrangements between primary and secondary care providers. This is true at the governmental level but it is also true that in quasi-private organisations such as pharmacies this vertical integration may take on a more standard economics definition with firms controlling manufacturing and wholesaling operations as well as the 'point of sale' business.

Horizontal integration in the health care sector can be defined as "a governance structure designed to enhance co-ordination and control of health care services that are at the same stage of the health care value chain and to facilitate inter-organisational collaboration and communication between health care providers that are involved in the delivery of those services" (Simoens and Scott, 1999). Horizontal integration in primary care can take the form of co-operative arrangements between services and professionals within primary care.

Application to health and health economics

Health economics is concerned with how we can improve survival, quality of life and fairness in access to services. Economists are normally concerned with allocation of resources between competing demands. Within this, demands are assumed to be infinite as there is no end to consumption aspirations. Resources are assumed to be always finite, thus scarcity of resources becomes the fundamental problem to which economists address themselves (in the sense of resource availability relative to demand) (McPake, et al 2002).

Health economics has two branches, firstly, a **positive** branch which describes and explains how choices of resource allocation are made and, secondly, the

normative branch which is concerned with judging which choices should be made.

In the normative perspective it is necessary to establish criteria according to which the situation can be judged, for example, if equity of access to health services is one criterion and ability to pay a dominant explanation of non-coverage the situation may be judged bad and alternatives determined (McPake, et al 2002).

There are two main choices in resource allocation, first to let the market decide which will involve letting demand, supply and prices determine allocation, or, secondly, to plan, whereby the government collects resources from the population, allocating those to defined production activities and distributing the produced services among the population (McPake, et al 2002).

The Market-led approach involves understanding demand (willingness to pay), supply (conditions in input markets, cost, and how provision is organised (one firm or many)) and their interactions. This is essentially a positive activity but can be normative if it is decided that a particular effect is desirable. Such analysis can be used to evaluate whether or not a change should be introduced (McPake, et al 2002).

The theory of demand for health care is normally built up in two stages,

1. To look at patterns of preference or indifference between different goods or services. Such preferences are complicated and the best way to think of it is 'Which would I choose?' This lead to a consideration of combinations of preference for different services or products. If it is not possible to choose between them then this is said to be *indifferent*. It is possible to construct indifference curves, or L shaped curves, which indicate that the more we have of a particular service then the less we value additional elements of that service (McPake, et al, 2002).

2. To try to maximise utility, in other words to be on the highest possible indifference curve. What limits this is personal income. It is important to consider various combinations of choices or preferences and choose the one that provides the highest utility (McPake, et al 2002).

The theory of demand assumes that keeping all other factors constant we can show that the effects on the choices made change as we vary the price of one good, or vary income.

This produces a demand curve. In this model of demand, the quantity chosen is a function of the price [1]:

$$Q=f(P) \qquad [1]$$

Determinants of Demand

There are a number of determinants of demand for a service. The first is individual tastes and preferences. A preference function contains a number of components [2]:

$$U = f(X, Y, L, H) \qquad [2]$$

Where U is utility, X and Y are goods, L is leisure and H is health. Each individual's preference function is considered unique.

Second, the price of the goods will influence the amount chosen. Third, demand will be affected by price of other goods, both substitutes and complements. A fall in the price of substitutes causes demand for the service to fall and a fall in the price of complements for it to rise. Fourth the income of individuals is a determinant of demand, expressed as [3]:

$$D=f(P,Ps,Pc,Y,T) \qquad [3]$$

P=price, Ps = price of substitute, Pc= price of complement good, Y=income, T=taste

Therefore, demand falls with price, increases with the price of substitutes, decreases with the price of complements, increases with income and as tastes and preferences increase. The decision to spend money shows a willingness to pay and an ability to pay (taste and income). Demand curves produced are based on the individual but we just add together these for a demand for the community. (McPake et al, 2002).

Downward sloping demand curves are expected in health markets, for example, where prices for health services are charged or are implicit (distance or waiting times), we expect less health services to be demanded the higher they are. We also normally expect suppliers of health care to supply more as the price increases *ceteris paribus*.

> "If demands for dental services are increasing, *ceteris paribus*, prices of dental services are likely to increase." (McPake, et al 2002, p.39)

The Perfect Market Model

Demand curves are powerful tools for telling us about how individuals value the goods they purchase, and indicate the aggregate marginal value or marginal utility of goods within that market. No perfect market exists though there are some markets which come close, but we need to consider more the demand and supply side curves in this instance (McPake, et al 2002).

On the supply side the following represent the assumptions of the perfect competition model:

1. U-shaped or upward sloping marginal cost curves in the short-run (and also in the long run)
2. profit maximising firms

3. no barriers to entry or exit from the market
4. perfect mobility of factors of production
5. the product being sold must be homogeneous across suppliers
6. large numbers of buyers and sellers
7. perfect knowledge of market conditions on the parts of buyers and sellers
8. no government intervention (McPake, et al 2002).

In this sort of market all inefficient firms are driven out of the market and only efficient ones can remain earning only normal profit. In this type of market a number of conditions for efficiency have been met:

1. Allocative efficiency – productive activity allocated to those products which consumers value in excess of their cost
2. Technical efficiency
3. Economic efficiency
4. Scale efficiency – production is divided between firms in such a way that each produces that proportion of total output consistent with operation at the minimum point of a short run average cost curve (McPake, et al 2002).

The Monopolistic Market Model

At the opposite extreme to perfect competition is monopoly characterised by only one seller and price setting. Under monopoly the firm's demand curve and market demand curve are the same. Under monopoly there is no supply curve because the supplier dictates price and sets price and output together. There is also no distinction between firm and market because the firm is the market. If all units of the good are sold at the same price (an assumption of monopoly) price equals average revenue (McPake, et al 2002). Marginal revenue can be derived from the demand curve but is always less than average revenue because in order to sell one more unit of the good the monopolist must reduce the price

charged for all the units sold. The monopolist output can be deemed inefficient but this will not be catastrophic for the monopolist.

From Models to Policy

In the health sector the market for surgery may be less perfect than the model for pharmacies. Pharmacies involve many buyers and small firms competing with each other whereas much surgery takes place only in hospitals which are sometimes monopolies at the local level. It is easier, therefore, to become a pharmacist than a surgeon and pharmaceutical products are more homogeneous than surgical operations

We need the theory of the second best to get past these complexities because once there is a single imperfection in the market, the introduction of a second imperfection may increase rather than reduce efficiency (McPake, et al 2002).

Imperfect competition

Between the two extremes of perfect competition and pure monopoly there are a range of market forms which can be analysed by combining the features of the perfect competition and monopoly models. Imperfect competition covers a range of market structures from many to a few firms and relies on each firm facing a downward-sloping demand curve. It is a result of relaxation of one of two perfect competition assumptions: homogeneous product or perfect information. Therefore differentiation in product will persuade some to pay higher prices than similar products, alternatively if information is imperfect, consumers will pay a higher price rather than search the market (search costs) (McPake, et al 2002).

Imperfect competition is also known as monopolistic competition, and oligopoly, a market characterised by a small number of firms, covers the range of cases at relatively demand-inelastic points on the range between perfect competition and monopoly (McPake, et al 2002).

The key feature of oligopoly is the interdependence between firms – firms only decide on their best strategy in light of what they know about other firms. Many different possible models exist to illuminate the processes of oligopoly, for example the 'kinked demand curve' model where firms assume that if they raise their prices other firms will not follow but seek to gain market share. However price reductions will be imitated as other firms seek to avoid losing market share (McPake, et al 2002).

Quality Competition

This model suggests that providers respond to lower concentration (more competition) not by dropping price but by increasing quality. If 'per unit of expenditure', quality elasticity of demand is higher than price elasticity of demand it will be more profitable for the provider to increase quality than to reduce price.

- this relationship between quality and price may be particularly likely in the health sector because consumers are not so sensitive to price because quality dominates their utility functions
- quality competition often associated with higher investment in hi-tech equipment and hotel aspects of care (McPake, et al 2002). .

Increasing Monopoly Model

Pauly and Satterthwaite (1981) argue healthcare is a reputation good meaning 1) sellers' products are differentiated and 2) consumers' search among sellers is conducted by asking friends and relatives for recommendations. The model is thought to be mainly relevant to primary care. Primary care services are frequently used, and Pauly and Satterwaite (1981) imply that reputation is a more important factor than for more rarely used services. Patients are in a better position to judge the service provided than for higher services (Pauly and Satterwaite, 1981).

The argument is as follows;

1. If the number of health care providers within a community increases, the available consumer information about each decreases. Therefore consumers find it hard to collect information about a new provider
2. If the search for information becomes more difficult, consumers become less price sensitive (McPake, et al 2002).

Therefore an increase in supply of health care providers makes the consumers' search more difficult and may cause the equilibrium fee to rise.

Monopoly, Oligopoly and Contestability

It has been suggested that monopolistic and oligopolistic profits may be eroded by the threat of competition even if it remains a threat and no entry in fact takes place. This is often referred to as contestability. Perfect contestability requires only one of the conditions for perfect competition – entry is absolutely free and exit is absolutely costless. This implies that;

1. No entrant can make a profit, at the market price
2. if the incumbent producer price above average cost even for a very short period it is vulnerable to 'hit and run' entry
3. Technical efficiency offers the same opportunity to a potential entrant. Production must be technically efficient.
4. Price must equal marginal cost, since other choices represent profitable opportunities to potential entrants (McPake, et al 2002).

The aim of regulation is to correct market failure on the understanding that if one market distortion exists, introducing another can lead to efficiency improvement. Regulation may also arise to correct inequity, for example, lack of access to care for part of the population (McPake, et al 2002).

Regulation may be thought to occur when a state or government exerts control over the activities of individuals and firms. The exact action is described as the regulatory intervention or regulatory mechanism. Interventions can be categorised as:

1. Legal restrictions or controls where participants must conform to legislated requirements.
2. Incentives to which participants change their behaviour and lead to changes in the target variable. This could take monetary and non-monetary forms
3. Incentive regulation is a further extension of the use of incentives which can be thought of as rules which regulate the relationship of verifiable outcomes such as price (McPake, et al 2002).

Regulation in the Health Sector

The key roles that regulation can play within the health sector are:

1. Control of market entry and exit,
2. Control of competitive practices
3. Control of market organisations
4. Control of remuneration
5. Control of standards/quality
6. Ensuring safety (McPake, et al 2002).

2.4 How have the spatial characteristics (static and dynamic) of rural primary healthcare developed over the last decade?

The aim of this section is to try and draw out through a review of relevant literature some of the key characteristics, or features, of primary healthcare facilities in rural areas, and particularly within rural Wales (where evidence

exists). This will provide context to the subsequent analysis of primary care facilities in the case study of Gwynedd.

2.4.1 Rural GP Services

Rural GP Services have probably received most attention in the academic and policy literature and this chapter has already considered the implications of rurality for General Practice. In Scotland, the problems of providing GP services in remote rural areas is recognised, in a tangible sense, by the recent review of the resource allocation system by NHS Scotland (SEHD, 1999). This proposes the introduction of an adjustment of the expenditure formula for General Medical Services (GMS) to reflect the unavoidable excess costs of delivering healthcare in rural and remote areas (based on population and settlement density) (Deaville, 2001). Clearly, the Scottish situation is characterised by greater distances and a higher degree of remoteness or peripherality than experienced in Wales, but this may be viewed as a positive step that, at the very least, highlights (and compensates for) the pressures that rural GPs work under.

All independent contractors are, to differing degrees, dependent on the number of patients or customers which they can attract and retain. However, major differences exist between the extent to which remuneration for different primary health care contractors is dependent on

- the quantity and composition of the potential demand or need
- payments related to the quantity and quality of the services provided
- the amount of non-NHS work undertaken (Williams et al, 2000).

In the case of doctors the first finds expression through patient lists, and remuneration is on the basis of both the size and composition of patient lists and the uptake and quality of services provided (Williams et al, 2000).

Although there is no 'rural premium' as such in the remuneration payment scheme for GPs in England and Wales there are additional payments that can be accessed by rural GPs to compensate for the higher costs and lower incomes associated with running small practices in remote areas. The first is the rural practice payments scheme which compensates rural GPs for smaller list sizes and travel costs from 'distance payments'. These payments are essentially a mileage fund which is paid to a GP or partnership if at least 20% of their patients live a minimum of 3 miles from the main surgery by a main route. As Deaville (2001) explains,

"Rural Practice Units are calculated per patient and depend on the distance from the main surgery. Patients attract units for the following items:

- Distance
- Walking
- Blocked Route
- Residence in a special district

Units are added for each mile over the 3 mile eligibility criteria that must be travelled, and for each quarter of a mile journey that must be walked...The calculations and payments are made quarterly"

(Deaville, 2001, p.73)

There has been precious little research into the impact of this scheme apart from a study of GP perceptions of the scheme in Northumberland and Cumbria by Rousseau and McColl (1997). They found that many GPs were unhappy about the inconsistencies in the calculation of payments, the levels of compensation and the eligibility of some urban practices for the payments (Rousseau and McColl, 1997). Rural GPs can also supplement their income by receiving payments for providing services such as minor surgery, obstetrics and immunisations - this issue is returned to in detail later in this chapter.

In the UK and Ireland, rural GPs are also able to supplement their income by prescribing and dispensing drugs on their premises. Authorisation to dispense is given when patients live within a controlled locality, at a distance of more than one mile from any pharmacy (Baker, 1999). The dispensing GP is therefore largely a rural phenomenon and is often the only logical place for patients in remote areas to obtain their prescriptions. Although the payments arrangements for dispensing GPs are complex and subject to review, the basic formula is summarised below (Williams et al, 2000).

Payments are received for:

- Reimbursement of the basic price of the drug according to the Drug Tariff (less a deduction to reflect the discount that practices receive from the suppliers)
- A 10.5% on-cost of the net ingredient cost of the dispensed drug
- A 3.8p "container allowance" per prescription
- A "dispensing fee" ranging from 82.5p to £1.05 depending on the number of prescriptions prescribed
- Reimbursement of VAT

(Source: Baker, 1999)

There are both positive and negative aspects of dispensing in rural general practice - it undoubtedly acts as an important support mechanism for rural GPs but there are also concerns about potential misuse of the system by GPs in an attempt to raise income and conflict with local pharmacies. It is an important issue in rural primary healthcare and one that is returned to later in the chapter.

2.4.2 Rural Dental Services

As dental practitioners are unrestricted and subject to market forces in their locational choice then it is not surprising that, in aggregate, some intervention has been necessary to produce a satisfactory spatial coverage of the service.

This has taken the form of two important national initiatives in the 1990s (Williams et al, 2000).

Those parts of Wales which suffer from a shortage of NHS dental provision can be split into areas of unmet demand and areas of unmet need, which are not necessarily coterminous. Some areas of Wales have been traditionally "short" of NHS dental provision because the population is too sparse to support a viable GDS practice. In these areas the departure of a long established dentist through retirement or death or, as is now more likely the decision of a dentist to "go private" in whole or selective part, can be problematic in terms of service provision (Williams et al, 2002).

Areas of unmet need are defined as being those where children have a high rate of dental decay which is usually in urban areas where there has been little or no complaint from the public on the shortage of dentists. These are also the areas where the culture and tradition of looking after one's oral health is not so established. As the pattern for oral health is not established there is limited opportunity for viable practices to take root. There are plenty of potential customers around but they simply won't attend a surgery unless in pain (Williams et al, 2000).

In 1995 a £3million dental initiative was launched in response to complaints from MPs and patients in rural areas who found themselves being unable to obtain NHS dental treatment as a result of the dispute, combined with the monopoly situation which the rural GDPs had. The community dental service was unable to cope with the local surges in patient demand. The most affected areas were North West Wales (Gwynedd/Anglesey) and Mid West Wales (Dyfed/Powys) with Clwyd and Gwent also being affected. The west and mid Glamorgan areas were not affected to the same degree (Williams et al, 2000).

The 1995 initiative established priority areas in Wales defining eligibility and extent of grant support (Welsh Office, 1995). The following series of bandings were defined and identified in a map:

- Band 1: no serious problems in obtaining NHS treatment - no financial assistance;
- Band 2: areas of high demand or high need or both, which covered much of rural Wales, the South Wales Valleys area and parts of Cardiff, Swansea, and several small towns - incentive grants up to £25,000;
- Band 3: covered relatively few areas of exceptionally high demand, most notably the Llyn peninsula, Anglesey, and areas around Bala, Newtown, Cardigan and Pembroke Dock - incentive grants up to £50,000.

In all, over 60 grants were awarded for new practices, for existing practices to expand and for additional posts in the Community Dental Service. Authorities took advantage of the scheme to differing degrees and problem areas either remained, especially in the rural areas of mid Wales, or recurred from time to time (Williams et al, 2000).

The second stage of the initiative was launched in July 1998 and was more flexible in that it took into account the requirements of rural dentists and the difficulties in opening branch surgeries. (Welsh Office, 1998). This was successful in bringing some relief to mid and west Wales. This stage provided a further £0.5m for new grant offers in recognition that there were still areas in which difficulty was experienced in registering for a NHS dentist, especially if their regular dentist decided to reduce their commitment to the NHS in favour of private practice (Williams et al, 2000).

Two particular areal classes were identified in the new map of assistance. These were **Qualifying Areas** and **Special Areas**. For the former, areas which had already been grant aided were excluded, except for a few areas "where there is still significant, identified, unmet demand for dental services which cannot be met without a further increase in provision" (Welsh Office, 1998 cited in Williams et al, 2000). A few areas were also included for the first time for the same reason, and in some of the very large areas in mid-Wales, specific towns/villages were targeted. Special areas covered localities within the qualifying areas where there was identified unmet demand but where there were likely to be too few regular patients to support a full time practice, as well as areas of special difficulty where there might be sufficient unmet demand which would support a full time practice but where the availability of a £25,000 grant was not sufficient to attract a new dentist for a new practice or an associate for an existing practice to expand. For the latter, grants in excess of £25,000 were considered (Williams et al, 2000).

Between them the area and local targeting measures of the Stage 1 and 2 initiatives were particularly successful in attracting dentists to many parts of rural Wales, especially Gwynedd and Anglesey.

2.4.3 Rural Pharmacies

The pharmacy sector is one of particular interest in primary healthcare in that pharmacies are privately owned companies or owned by large retail organisations and therefore has to concentrate on profitability. At the same time they have an important role to play in the local community as providers of medicine and advice to the local population. Community Pharmacies (CPs) (also known as retail pharmacies or chemists) play a primary role in the UK's healthcare system. They form an extensive network of outlets that allow the great majority of people to have their prescriptions dispensed conveniently. In addition, they provide other essential services to the community including retailing of non-prescription medicines and healthcare products, providing

professional advice on safe and responsible use of medicines and basic medical testing. Retail pharmacies are central to their neighbourhoods as research conducted by the National Pharmaceutical Association revealed:

". . .[there are] very strong levels of customer loyalty and usage for independent pharmacies: an astonishing 53 per cent of respondents have been regular customers of their local pharmacy for more than ten years. A total of 80 per cent regard their local pharmacy as the most convenient place to buy medicines, a "short walk away" for two-thirds of patients. This is most vital to the mothers of under-fives, of whom 56 per cent walk to their local pharmacy and other, less socially advantaged and less physically mobile segments of the community . . . Moreover, independent pharmacies are perceived by seven out of ten adults as having caring, friendly staff. ICM research demonstrated that the aging and the D/E social classes were especially likely to see their pharmacist as being "at the heart of their local community" in a valued and trusted role as "a family friend" (NPA press release, 2003, p. 1).

The most important service CPs provide is the dispensing of NHS prescriptions. In order to dispense NHS prescriptions, a pharmacy must have a contract with its local Primary Care Trust (PCT). In 1987 regulations were introduced in the UK that placed restrictions on the award of NHS dispensing contracts and hence entry to the market (OFT, 2003). These regulations are commonly referred to as the 'control of entry regulations'. The regulations determine that local Primary Care Trusts (or Health Boards or Local Health Groups in Wales) should consider applications for new pharmacy contracts on the basis of whether the proposed pharmacy is 'necessary or desirable' in order to ensure an adequate provision of pharmaceutical services in the 'neighbourhood'. Therefore, the choice of whether to open and where to locate an NHS dispensing pharmacy and where to locate it is not simply a commercial decision left to the discretion of the pharmacy owner (OFT, 2003).

Recent deregulation measures in relation to all aspects of the service's marketing mix, namely products, price, place, promotion, physical evidence,

people and processes, have made for a dynamic competitive climate with increasing pressures on the livelihood of small- to medium-sized enterprises (SMEs) (Schmidt and Pioch, 2004). The traditional core "product" of pharmacies is a combination of the sale of goods – namely the dispensing of National Health Service (NHS) prescription and retailing of over-the-counter (OTC) medicines and related merchandise – and the provision of services, both to patients and other healthcare providers. Community pharmacists predominantly rely on prescription incomes to safeguard their livelihood. This role of the pharmacist is being strengthened as they are empowered to become supplementary prescribers of products where an initial diagnosis has previously been made by a General Practitioner (GP), with the intention to step up to full independent prescribing (NHS, 2000).

CPs in the UK typically provide a range of professional and retail services that includes selling over-the-counter medicines (OTCs), toiletries, skin care and hair care products, perfumes, cosmetics and baby care products. They also provide professional advice on medicines. The most important stream of income for CPs is derived from dispensing NHS prescriptions. For a typical CP, dispensing NHS prescriptions provides 80 per cent of its revenue – a proportion that has risen over time (OFT, 2003).

The pharmaceutical products commonly sold or dispensed in community pharmacies are regulated under The Medicines Act 1968. They are split into three broad categories:

- prescription only medicines (POM)
- pharmacy only medicines (P)
- general sales list medicines (GSL).

- Prescription only medicines (POMs) are listed in The Prescription-Only Medicines(Human Use) Order 1997. For pharmacy dispensing, only those with a contract with their local Primary Care Trust (or Health Board) can dispense NHS prescriptions and this must be done under the supervision of a registered pharmacist. In 2002 the UK the market for NHS prescribed medicines was worth £6.8 billion. There is also a small but growing private prescriptions market worth around £300m annually.

- Pharmacy only – or P medicines – do not require a prescription but a pharmacist must supervise their sale. This can be because of the active ingredient involved, the strength of the drug, the instructions for use or its pack size. For example, Nurofen tablets (200 mg) are classified as 'P' in a pack of 24 but in a pack of 12 are available as a GSL medicine. Other P medicines include many of the stronger cold and flu medicines. There is, however, no statutory list of pharmacy medicines as such. Instead, any medicine that is not listed as POM or GSL is, by default, a P medicine.

- GSL medicines are medicines that do not need to be sold in pharmacies but do need to be sold in a lockable shop. They are commonly found in supermarkets, convenience stores and petrol stations. GSLs are listed on 'The Medicines (Products other than Veterinary Drugs) (General Sale List) Order 1984' and include such medicaments as cough mixtures and paracetamols. Around 50 per cent of GSLs are sold in pharmacies (OFT, 2003).

Together P medicines and GSLs are known as over-the-counter medicines (OTCs). Until recently, branded OTCs were subject by law to a minimum retail price, fixed by manufacturers or suppliers (the system was known as resale price maintenance or RPM). RPM was removed in May 2001. In 2001, OTCs had a market value of £1.83 billion – split evenly between P medicines and GSLs.

There has been a substantial change in the structure of the market over the past decade. In this time, the proportion of pharmacies in chains of 5 or more has risen from a third to a half. Superdrug Ltd, for example, has built up its number of NHS contractor pharmacies from nothing ten years ago to around 230 today. Another significant change in the market structure since 1990 has been the opening of some 450 supermarket pharmacies. There is one supermarket pharmacy in Northern Ireland.

There are relatively few legal barriers to opening a CP without an NHS dispensing contract, but in reality this rarely happens. Only one in a hundred pharmacies operates without such a contract (approximately 130 pharmacies in all). With 94 non-contract pharmacies, Boots owns more than anyone else (OFT, 2003).

Independent vs. Multiple Chain Pharmacies

Much growth in the UK market has been related to a trend towards self-medication. The total spend on OTC drugs, with their excellent average margin of 33.3 per cent, increased 25 per cent between 1996 and 2000, and a further 18 per cent from 2001 to 2002. The switch of drugs from prescription to OTC when patents expire further enhances this trend, as exemplified by the rapidly growing market for hay fever and allergy medication (Creyer et al., 2001). Unfortunately, community pharmacies largely fail to benefit as "[m]ost independent pharmacies in the UK derive 60 per cent of their turnover from National Health Service Prescriptions and a mere 20 per cent from higher margin OTC medicines" (Euromonitor, 2003, p. 11).

From 2000 onward severe discounting followed in the wake of the lifting of resale price maintenance (RPM) on OTC products. Supermarkets in particular benefited; economies of scale and buying power meant that their prices could be set at 20 per cent below even those of the large chemist multiples. This allowed them to make further inroads into the retail pharmacy sector (e.g. Asda's pharmacy business showed sales growth of 100 per cent year on year in 2002)

(Schmidt and Pioch, 2004). Small independents were left unable to compete on price. As with other self-medication products, the niche market for complementary medicines has increased by 45 per cent since 1997. With homeopathic products carrying a 40-50 per cent margin, this is a potentially attractive prospect for product range diversification. However, most NHS primary care trusts do not yet fund complementary medicine, and in contrast to their large-scale competitors, Boots, Moss and Lloyd, who have all developed wellbeing formats, small pharmacists are reluctant to step outside the NHS umbrella. The introduction of new European Union (EU) rules governing complementary medicines may be perceived as a further barrier by independent pharmacists. Further opportunities to supplement income through product range diversification into high margin areas (such as photo processing or premium priced healthy sandwiches) are utilized a lot more efficiently by the large multiples and supermarkets who are experts of the use of own label branding as well.

Community pharmacists see themselves as "therapeutic experts" first and retailers second. As a result, the retail aspect of the business is often underdeveloped (Schmidt and Pioch, 2004). Thus research conducted by Unichem found that around 40 per cent of product lines carried by typical independent pharmacy are dead stock, and their subsequent marketing initiative succeeded in increasing sales of non-prescription medicines by more than 10 per cent and for other health care products by 16 per cent (The Pharmaceutical Journal, 2003).

From an NHS planning point of view, clearly a shift in the role of the pharmacist from the dispensary to the management of professional services is intended, leaving a trained dispenser in charge of the dispensary (NHS, 2000). New equipment designed for automatic dispensing, which can handle up to 85 per cent of patient packs dispensed per day, complemented by home delivery services, may aid this development. This means a change in the balance of the

core "product" of SME pharmacies, with greater emphasis on the service element.

The process element of community pharmacies' offering is also challenged by increasing demands for IT competence. The NHS plan's commitment to electronic prescribing requires virtual partnerships between GPs and pharmacists, where shared patient records can enhance service and cut down on administrative errors and work loads. Arguably the use of email preordering, electronic and repeat prescribing and touch screen provision of health information could be precisely the tools which would enable the community pharmacist to manage time much more flexibly and be able to provide advice services rather than being tied to the dispensary because of queues (Schmidt and Pioch, 2004). This would be one way of matching the supermarket, where patients can drop off prescriptions and collect on their way out, allowing the pharmacist more flexible use of time.

The challenge for community pharmacists is to develop a unique selling proposition tailored to the particular needs of the pharmacy's current and potential customer base. Creativity and innovation are key to a truly entrepreneurial response to environmental change. NHS (2000) states:

"A good community pharmacy is one where the patient comes first. Where medicines are available conveniently when patients want them. Where pharmacists make themselves available to respond to requests for advice and take the initiative in offering help where appropriate. Where patients can discuss personal matters in privacy if they wish, and with the absolute confidence that their pharmacist is equipped with up-to-date expertise and skills". (NHS, 2000)

Commentators have focused on the need for community pharmacists to consider the unique contribution made by their pharmacy in terms of long-term personal relationships with loyal core customers, and that this rests on three core elements: vision, location and a commitment to superior service (Schmidt, 2004; Pioch and Schmidt, 2003). However, unless this is balanced by a

matching commitment to commercial development, a combined lack of strategic direction, a somewhat inward looking approach and mere re-activeness to competitive threats can become a danger to the business's very survival (Schmidt and Pioch, 2004).

Monopoly and Competition

In order to achieve a monopoly, or at least a licensure, a profession must have a special relationship with the state. Cooper et al (1988) call it 'the regulative bargain'. This bargain is strongly conditioned by the 'political culture' and the political power network which must be seen as an ever present feature of the world in which the profession has its being (Morgall and Amarsdottir, 1999). In the UK this translates into the current system of regulation that exists within the pharmacy sector, although this is now somewhat under threat as has been shown. Although control of entry regulations in the UK have an impact on numbers of pharmacies in particular areas (or at least attempt to ensure a minimum level of service in a geographical sense), what is interesting in the UK (as will be shown in the case study analysis in chapter seven) is the spatial determination of pharmacy location and the emergence of local monopolies. This normally takes the form of multiple chain pharmacies (whether national chains or localized chains) taking hold of the pharmacy sector in particular areas and dominating the delivery of this service. This could, presumably, have a number of implications for smaller independent community pharmacies in particular regions.

What emerges therefore is a monopolistic trend or pattern of pharmacy supply and the implications of this trend are a major concern of this thesis.

Dispensing doctors

In England and Wales, GPs have long-standing rights to dispense medicines. Under the National Health Service (Pharmaceutical Services) Regulations 1992, some areas are deemed rural in character and are classified as 'controlled'

areas'. Within these areas, GPs may apply to provide NHS dispensing services to patients who live more than one mile away from their nearest pharmacy. Dispensing doctors thus play an important role in ensuring access to NHS dispensing services in rural areas. Dispensing doctors do not, however, engage in the sale of non-prescription (OTC) pharmaceuticals. In relation to pharmacy applications in controlled areas, pharmacies which are not on the pharmaceutical list must pass the 'prejudice test' as well as the 'necessary' or 'desirable' test. Those pharmacies already on the pharmaceutical list need only satisfy the 'necessary' or 'desirable' test (except in minor relocation applications) (OFT, 2003).

The essential small pharmacy scheme

Besides standard remuneration and reimbursement payments, 340 community pharmacies in the UK currently receive additional payments under the Essential Small Pharmacy Scheme (ESPS). ESPS payments provide financial assistance to pharmacies that are not economically viable because of their location but are considered vital to the provision of pharmaceutical services to their local community. The scheme, therefore, aims to ensure the proper provision of pharmaceutical services in areas that would otherwise have difficulty in attracting them. Payments are drawn from the Global Sum and in 2001-02, a little over £4 million in England and Wales and around £380,000 in Scotland (or less than 0.5 per cent of the Global Sum in both countries) (OFT, 2003).

Around 90 per cent of pharmacies claiming payments in the UK under the ESPS are independents. Although the majority of ESPS pharmacies are located in rural areas, 33 ESPS pharmacies were located in London and another 40 were located in other metropolitan areas (OFT, 2003).

To be eligible for the scheme today, the pharmacy must:

- dispense fewer than 23,040 prescriptions per year, and

• be located more than one kilometre (by the nearest practicable route to the public on foot) from the next nearest pharmacy.

While these criteria are relatively straight forward, circumstances may change so that a once eligible pharmacy no longer meets the requirements. What happens depends on which of the two requirements are not met. If the first requirement is no longer met while a pharmacy is receiving ESPS payments (i.e. it dispenses more than 23,040 prescriptions), any ESPS payments already made will be recovered. This will be done by clawing back the payments already made from the remuneration due to the pharmacy in the 3 months immediately following the month in which prescriptions went over the 23,040 limit (OFT, 2003).

If, however, it is the second requirement that is no longer met (i.e. a second pharmacy with a NHS contract opens within one kilometre of the first pharmacy), ESPS payments to the first pharmacy will not immediately stop. Instead, they will be phased out. Payments will be made at the full rate for the remainder of the current year and at half the full rate for the following year before ceasing.

Currently, ESPS payments are calculated as "the difference between one twelfth of the target payment (£40,350) and the remuneration due". In this calculation, ESPS payments are cumulative so that previous months' ESPS payments are taken into account when calculating the gap (i.e. at a constant prescription level the gap decreases). For example, in month 1 the ESPS payment is the difference between 1/12th of 40,350 and the remuneration due. In month two, the ESPS is the difference between 2/12th of 40,350 and the sum of the remuneration due and the previous month's ESPS payment. If the pharmacy is open for less than 30 hours per week, ESPS payments are adjusted accordingly on a pro rata basis (using the average number of hours that the pharmacy is open) (OFT, 2003).

2.5 Summary

This chapter has covered a wide range of material from accessibility analysis techniques to theoretical debates on the restructuring of rural areas and organisations, through to an appraisal of the characteristics of the supply of rural primary healthcare services. The following chapter presents the research methodology proposed for the study of these concepts and outlines some of the analytical approaches taken to the study of the spatial and temporal changes in primary healthcare over the study period.

Chapter Three - Methodology

3.1. Introduction.

This chapter seeks to illustrate the methods employed during the research process and to highlight the methodological approach in terms of the role of theory in the research and the epistemological and ontological orientation of the work. The research design is considered in detail as are survey techniques and sampling procedures, before a detailed consideration of the role of quantitative data analysis techniques employed and the Geographic Information Systems approach adopted.

3.2 The Research Strategy

In broad terms the research strategy adopted during the study has been quantitative in nature as opposed to qualitative, but this broad strategy needs clarification in terms of the role of theory in the study and the epistemological orientation of the research – it is the case that qualitative methods of data collection have been employed at some stages of the research but this does not preclude an overall quantitative research strategy guiding the research process. Bryman (2001) states that,

> "Research data achieve significance [in the social sciences] when viewed in relation to theoretical concerns".
>
> (Bryman, 2001, p.5)

This raises the question of how we view the relationship between theory and research, and this question may be sub-divided into two main concerns. The first involves deciding on what form of theory is the central focus of the research and, the second involves determining if the data that is collected and analysed

serves the purpose of testing or constructing theories. The form of the theoretical under-pinning of the research really refers to the level of abstraction of theory itself ranging from the 'Grand Theories' which operate at a more abstract and general level, to the 'theories of the middle range' which are "intermediate to general theories of social systems which are too remote from particular classes of social behaviour, organisation and change to account for what is observed" (Merton, 1967, p.39 quoted in Bryman, 2001, p.6). Middle range theories, therefore, tend to guide and be the focus of empirical enquiry. We may view the restructuring theories and theories of the firm from Chapter Two of this thesis within these terms – as guiding theories for further empirical enquiry. This implies that the theoretical context outlined in Chapter Two provides a 'start point' from which empirical enquiry and analysis can proceed, in other words a deductive approach to the research that tests the theoretical constructs laid out in Chapter Two. The alternative approach to the use of theory in research would be an inductive one focusing on the collection of observations and analysis to generate new theories. The alternative uses of theory in social science research are highlighted in Table 3.1. When conducting a deductive study the researcher must first devise a series of testable propositions (or hypotheses) that will then be subject to empirical scrutiny (or testing). Babbie (2002), in fact, extends this basic description of the process to six stages;

1. Specify the theory to be tested
2. Derive a set of conceptual propositions
3. Restate conceptual propositions as testable propositions
4. Collect relevant data
5. Analyse data
6. Assess the theory (Babbie, 2002, p.14)

Therefore, if we consider the case of restructuring of rural primary healthcare services and influences of theories of the firm within this, particularly in the case of pharmacy services, then we might propose a number of testable propositions based around the key research questions:

Research questions:

1. What are the determinants of the spatial and temporal organisation of primary healthcare services and the distribution of access over social groups?

2. How have the spatial characteristics of rural primary care services developed over the last decade and what factors have been responsible for this change?

3. What implications have the restructuring processes for access to primary healthcare for local communities and different social groups?

4. What role can GIS play in analysing and visualising differential accessibility to key health care facilities in rural areas?

5. What role has the state played and should play to support rural primary healthcare?

Testable Propositions:

1. Primary healthcare services have declined in the study area over the study period 1996-2004,

2. Accessibility levels have reduced over the same period in the study area,

3. Restructuring processes have resulted in a decline in service levels for selected primary care services in the study area,

4. The role of the state has had a negative influence on rural primary care in the study period.

Table 3.1 Quantitative and Qualitative Research Strategies

	Quantitative	**Qualitative**
Principle orientation to the role of theory in research	Deductive testing of theory	Inductive generation of theory
Epistemological orientation	Natural Science model - positivism	Interpretivism
Ontological Orientation	Objectivism	Constructionism

(Bryman, 2001)

Following the identification of a general research strategy and its relationship with theory, a quantitative deductive approach in this case, it is useful to highlight a general epistemological and ontological orientation to the research. As Bryman (2001) notes, it is often difficult to 'drive a wedge' between the two approaches and in epistemology terms it may well be that a deductive approach can also employ normative statements (what should, should not or ought to be) to illuminate a particular theory in more detail (if not to directly *test* it). This would differ from the positivist position which relies on positive statements (or scientific statements) which rely on measurable facts (Table 3.2) (Bryman, 2001).

Following Bryman's division between quantitative and qualitative research strategies (Table 3.1), the ontological orientation of the research can be considered in terms of objectivism or constructionism. Objectivism is an ontological position that asserts that social phenomena and their meanings have an existence that is independent of social actors (Bryman, 2001, p.17).

Table 3.2 Positive vs. normative statements

- A positive statement = what is, was or will be
- A normative statement = what should, should not or ought to be

Positive assumptions	Positive assumptions	Normative assumptions
Normative statements	Positive statements	Normative statements

Alternatively, constructionism asserts that social phenomena and their meanings are continually being accomplished by social actors – in other words social objects and categories are socially constructed (Bryman, 2001). The ontological position of objectivism allows for the examination of primary healthcare services as facilities for a local population (however defined), and analysis of features of that delivery of service, without consideration of how those services of interest may have been socially constructed - although the impact of change in service delivery on society is considered in detail.

A summary of the key differences between quantitative and qualitative research strategies are highlighted in Table 3.3.

Table 3.3 Research Strategies Summarised

Quantitative:

- Involves a deductive approach : accent on the testing of theories
- Positivist in nature – i.e. Asks factual or 'positivist' questions - what was, is, will be etc.
- View of social reality as an external, objective reality (Objectivism)
- a research discipline that emphasises quantification in the collection and analysis of data

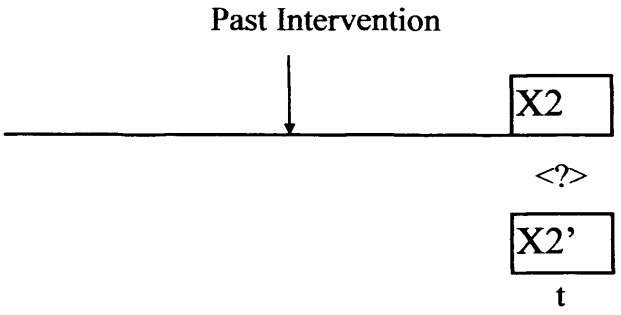
Qualitative:

- a research discipline that emphasises words rather than quantification in the collection and analysis of data;
- An inductive approach - focuses on the generation of theory
- Rejects positivism and instead emphasises the ways in which individuals interpret their (social) world (Interpretivism)
- Takes a view of social reality as a constantly shifting emergent property of individuals' creation (Constructionism)

3.3 Research Design

The research design adopted during the research is essentially a cross-sectional one. This normally assumes analysis of a group of cases at one point of time, what we have here however is an analysis of two sets of cases (healthcare services in 1996 and services in 2004) which allows comparison between the two dates, as there is no control group within the design, however, we cannot be sure that difference between the two groups of cases is due to some identifiable intervention (e.g. health re-organisation). In this sense we may term the research design a longitudinal study based on cross-sectional research design at two points in time (Bryman, 2000). Table 3.4 illustrates in graphical form the cross-sectional design.

Table 3.4 : Cross-sectional designs



Notes:

- X2 and X2' might be house prices for two groups of properties: those within and those not in a conservation area
- intervention = conservation area
- Can we attribute any difference (X2-X2') to the policy?. Maybe, if houses in the two groups are well matched on other variables. No, if groups are not matched.
- Can hold other variables constant statistically using multivariate analysis
- Retrospective designs are cross-sectional designs with *memory* questions
- We measure the absence or presence of (or degree of) intervention by creating a variable. In this example it would be a binary variable, say Z (=1 if property is in a conservation area, =0 otherwise),

The use of a longitudinal approach will allow for comparison of the spatial organisation of primary healthcare services within the case study area of rural Wales and, particularly, Gwynedd. This will facilitate an empirical analysis of rates of change in service provision levels, variations in their spatial organisation and temporal (or quality) variations within the service facilities. Essentially the research has adopted a classic longitudinal research design whereby a sample (the primary health care services in Wales) has been surveyed at one point at time (1996) and the process then repeated for another point in time (2004). The aim is then to identify changes between the two samples and

suggest causal factors for these changes, for example rural or organisational restructuring.

The research design is important in that it must be appropriate for identifying responses, or answers, to the research questions guiding the research programme, highlighted above. Having decided on a longitudinal design which takes cross sections of the primary healthcare services at two points in time in a particular location, it is now appropriate to turn attention to the specification of the actual research process that was undertaken. These are described in terms of sampling procedures (which in effect describes the choice of area and features to study), measurement techniques adopted which includes information on data collection methods (quantitative and qualitative), and concluding with an assessment of the GIS methodology adopted to undertake the analysis.

3.4 Sampling procedures

Rural Wales is taken as the area of study for the research and this is a useful test-bed for the analysis of rural primary health care for a number of reasons. Firstly, Wales has undergone a process of healthcare re-organisation within the time-scale of the research moving from a two-tier system of Health Authorities and Local Health Groups to a more devolved system of primary healthcare delivery based on Local Health Boards which are co-terminous with Unitary Authority boundaries. Secondly, Wales has undergone a devolution process during the research period with the National Assembly for Wales (now known as the Welsh Assembly Government) formed on the 1st July 1999. This has given new powers to Wales to influence the direction of policies on issues such as health and this has culminated in a reform of the NHS in Wales through the 'Improving Health in Wales' policy initiative (NAW, 2001). Other key developments in healthcare in Wales are returned to in chapter four of this thesis.

A third of the population in Wales live in rural areas and many of these areas are among the most sparsely populated in England and Wales. The focus on a study of rural primary healthcare organisation and distribution has been developed in chapter two and the choice of Wales as a case study area is certainly an apt one give the socio-demographic and environmental profiles of its rural areas. These are expanded on in depth in chapter four and in the analysis chapters of the thesis. How we define rural areas in Wales is also covered in chapter four. Within the rural areas of Wales, it has been necessary to limit some analysis of changing service levels in particular primary care services to one particular case study. The area chosen for this more detailed analysis is the Unitary Authority area of Gwynedd in north west Wales. A background to this case study area is provided in chapter four but in broad terms it represents an effective case study locality as it contains within its border a range of area types from 'deep rural' localities in and around the Snowdonia National Park, coastal regions heavily reliant on tourism trade, urbanised areas around Gwynedd and Bangor, and former industrial areas (the former slate mining communities) in the north of the Authority. Gwynedd, therefore, shares many characteristics of other rural areas of Wales but also presents some quite unique features; physical, economic, and cultural (Gwynedd is one of the 'heartlands' of the Welsh language).

Selection of primary healthcare services to study was a relatively straightforward task as the author already held information on GP surgeries and dental surgeries from 1996 (Higgs and White, 2000) so these could be employed in the study and new data collected for these services in 2004 for comparison purposes. It was also felt that the pharmacy sector would be of particular interest to study because of potential recent developments affecting their operation (OFT, 2002), outlined in chapter two. This presented a problem as although data for pharmacies was collected for 2004 no historic data existed of the situation in 1996. The analysis of change in this sector is therefore limited to the county of Gwynedd where information was provided by the Local Health Board on the situation in 1996 within the Authority.

Qualitative analysis of the primary healthcare sector was also undertaken which consisted of face to face interviews with three Local Health Board officials in Gwynedd, pharmacy officials in the Welsh Assembly Government and with the Institute of Rural Health based in mid Wales. More detailed surveying of pharmacies in Gwynedd was also undertaken which involved interviews with twelve pharmacists (including three independent pharmacies) to shed further light on the research questions of the study. A copy of an interview schedule for the pharmacies interviews is included in ***Appendix Ch.3***.

3.5 Measurement techniques and data collection

Measurement techniques have been based largely around Geographical Information Systems techniques detailed in the next section. However, a range of statistical procedures have also been employed during the analysis phases to shed further light on relationships apparent in data analysed for 1991 and 2001, chief among these are correlation techniques to determine the strength and direction of relationships between various census variables and computed accessibility to services scores.

One innovation has been to re-aggregate 1991 Enumeration Districts to 2001 wards to allow comparison of data collected and analysed at the two time periods of the research at the same spatial scale. It is possible to view 1991 census information on the 2001 Census ward boundaries by employing GIS techniques in ArcInfo GIS which apportion 1991 Enumeration District boundaries to the new 2001 ward boundaries. This apportionment of the EDs allows for 1991 census data to be re-calculated to the new boundaries by multiplying the ED scores with the proportion of the 1991 ED boundary contained within the new 2001 boundary areas.

Data has also been collected on rural primary healthcare through aggregate level surveys of rural Welsh Community Councils carried out by the author, with a colleague in 1995 (Higgs and White, 2000), and updated in 2004 as part of a Welsh Assembly Government funded research initiative (White and Hughes, 2005). These two surveys provide information at the Community Council level in Wales about the levels of healthcare service provision in rural areas and also provide qualitative information on what services have closed or opened in the five years prior to the survey and whether or not service levels are adequate in terms of primary healthcare. Although much of the data can only be considered in aggregate form (as detailed within the analysis sections), the two surveys do provide an invaluable source of contextual data for the research conducted for this thesis.

3.6 GIS and Health Analysis

There is now a large and growing literature on the application of Geographical Information Systems (GIS) in health-related studies. This reflects the recognition that geographically referenced health databases are of considerable value, whether these refer to patterns of need, demand or supply of services. Their use in health service studies for data capture, analysis and display of information is now extensive. Essentially, GIS is used as an analytical tool during this research to provide spatially based analysis of the developments in rural primary healthcare over the last decade. Chapter two has considered GIS applications in health in some detail and a range of such studies and reviews can be found in, for example, Dunn (1992), Bloemberg et al (1992), Hirschfield (1994), Hirschfield et al (1995), Loytonen (1998), Gatrell and Senior (1999), Higgs (2000), Lovett et al. (2000).

As described in chapter two of this report, a number of potential indicators of potential accessibility could be employed in a GIS setting to examine changing levels of access to primary healthcare services. Three such methods are outlined below in terms of the techniques employed.

Indices of Isolation

In order to examine processes of demand and differential access to such services in rural areas a series of datasets need to be assembled using a GIS relating to service demand and supply throughout Wales.

Service demand data can be derived at the disaggregate point level from the 1991 UK Census population weighted Enumeration District (ED) centroids. Ideally demand data would exist at the individual household level - in particular by assessing the status of individual households in relation to the road network. Such household level data could also be classified according to a range of socio-economic profile data, for instance, those with and without cars and, for the latter group, related to the existence (and frequency) of public transport opportunities. In the absence of data at such disaggregate scales 'demand' locations based on population weighted centroids at the smallest spatial district scale, the ED, are often used as the best available alternative. Such demand points do have limitations in that the accessibility of individuals within different settlements that are located within the boundary of the same spatial unit are assumed capable of being represented by the same zone centroid. Assumptions are also made with respect to the *potential* of individuals to avail themselves of transport opportunities, private or public. In such circumstances, it is extremely unlikely, given differing socio-economic circumstances of individuals, that each will have the same ability to pay for a particular mode of transport; but in the face of absence of data at the household level, researchers need to resort to such aggregate measures of demand.

In order to effectively analyse accessibility to services within rural areas then it is essential to identify service facilities in the study area at the most detailed level possible, ideally at the disaggregate point level. Specifically, the point level datasets utilised in the accessibility analysis should relate to six key rural services, identified in previous research, namely; doctor's surgeries, post offices, dental surgeries, petrol stations, banks, and primary schools. The databases need to be completed for the whole of Wales and those English local

authorities that border Wales, for the purpose of accounting for cross-border flows. Having assembled the point level service supply data and the population demand data with the GIS then a range of accessibility based measures is possible to be derived employing road network data for the whole of Wales and the bordering areas in England.

One possible set of methods that could be used to examine accessibility levels in rural areas are those that establish the distance that is needed to be travelled in order to access particular services. The first set of such measures, termed Isolation Indices (Higgs and White, 2000), attempts to ascertain the minimum distance that the population of Welsh communities need to travel to access essential services A measure of (in)accessibility to the key services held at point level in the databases can be calculated at the aggregate community level for the whole of Wales, adopting a network modelling technique available within a commercially available GIS (Arc/Info GIS). To perform the accessibility analysis demand and supply points have to be identified on the network, this is achieved by finding the nearest node on the network to the demand points (the ED Centroids) and the supply points (the service facilities) and measuring the distance to the node. Having located the demand and supply points on the network then the distance from the demand location to the nearest of the services in question could be calculated across the road network. This basic network distance between every ED centroid and every service facility can then be aggregated to the community level by calculating the average network distance of EDs to each service for every ED in a community. This gives an average network distance to each of the services for every community in Wales. This measure can be further enhanced by weighting the network distance to each of the services by the population at the ED, thereby re-orientating the measure to an estimate of the average distance of people to services rather than ED centroids to services. The end result is population weighted network distance measures for each community in Wales based on the networked distance to each of the primary healthcare services. The final scores for each service at the community level in Wales can then standardised in order to

construct a single index of access to services using Z-score and chi-square techniques.

Index of Potential Physical Accessibility

An alternative to the isolation measures outlined above are measures that are focused on the potential physical (or geographical) accessibility. These types of measures assess the nature and pattern over space of physical access to service facilities and permit the manipulation of supply and demand data, through reference to utilization behaviour, to provide measures of regional accessibility - in this case at the community scale for Wales (Joseph and Phillips, 1984). A measure of potential physical accessibility to the services held at the point level in Wales could be adapted from work undertaken by Joseph and Bantock (1982) (and more recently, Higgs and White, 2000) into potential accessibility to general practitioners in rural areas of Canada. This work has already been described in Chapter Two of this thesis and essentially involves the calculation of potential physical accessibility scores for the primary healthcare services at two separate service ranges, 5km and 10km. The service ranges can be viewed as the maximum range of walking distance (5km) and a driving distance range (10km). Services across the border in England should be included in the calculation of the scores in order to account for cross-border flows. The scores relating to the potential accessibility from the population at each ED to the nearest service were then aggregated to the community level by taking the average score across all EDs within a community. Therefore a range of data could be produced at the community level for the whole of Wales based on the different healthcare services covered and the two service ranges used; 5km and 10km

Index of Public Transport Dependency

In studies of the influence of public transport on rural accessibility it is important to determine a series of demand indicators for public transport and supply indicators based on the availability characteristics of local public transport networks. Demand indicators may be defined as identifying the spatial variation in demand for transport services in a locality. In this respect, Nutley (1980) refers to the importance of the spatial variation in access to private transport as an indicator of potential *mobility*. Developing this theme further, Nutley attempts to identify the actual population that do *not* have access to private transport in a locality in order to devise indices of dependence on, and hence demand for, public transport (Nutley, 1980). Two indices of public transport dependence may be formulated; firstly, an Index of Total Dependence expressed as the number of people in 'non-car' households as a percent of total population, and, secondly, an Index of Partial Dependence based on the number of people in 'one-car' households, less the number of such households as a percent of the total population. This may represent the probability that the family car is used by one person most of the time, thus leaving the rest of the household at least partially dependent on other modes of transport. A further demand indicator may be devised by combining the Partial and Total public transport indices into a 'composite' index of dependence simply by weighting each by 0.5. Communities that then score highly on this index may be regarded as most in need of public transport alternatives due to relatively lower car availability levels (all three demand indicators may be derived from the UK Census of Population Small Area Statistics). These three indices of public transport dependency were developed by Nutley (1980) at the parish level for rural Wales using 1971 Census data.

These various measures or indices are outlined in chapter five in relation to the situation in 1996 and in chapter six, applied to rural primary healthcare services in 2004. The next chapter provides an introduction to the study area.

Chapter Four - The Case Study Area

4.1 Introduction

This chapter describes the case study area examined during the course of the research and builds on the justification of the area of study developed in chapter three. The chapter is also concerned with describing the development of the primary healthcare system in Wales in terms of how it is organised and how it functions. Although the focus is on rural Wales, broadly speaking, more detailed analysis of primary healthcare characteristics for a particular region of Wales, the Gwynedd Local Health Board, are presented throughout the analysis. Therefore, it is important to also highlight particular features of healthcare delivery within the Gwynedd area here.

4.2 Rural Wales – the focus of the research.

As highlighted in chapter two, it is important to define what we mean by rurality when undertaking a study of rural areas. Within Wales a number of definitions of urban and rural areas are employed. The most common approach is to determine an area classification based on Unitary Authorities. This can be visualised in Map 4.1 in ***Appendix Ch.4*** and shows that UAs are broken into four categories; urban, rural valley and 'other' (a mix of rural and urban). Recently an alternative classification of urban and rural areas has been put forward by the ODPM in conjunction with the Welsh Assembly Government which divides 2001 census wards into 'accessible' or 'remote' categories based on settlement types and how these are accessible to other areas within the locality. This new definition is shown in Map 4.2, and a simplified version in Map 4.3 showing the rural and urban classes combined, both in ***Appendix Ch.4***.

The nature of the rural population of Wales is of key importance when assessing the various maps included in this report. The relative population density of the unitary authorities in Wales is important to note and will obviously have implications for the ward-based map analysis – in rural areas wards will have lower populations and hence fewer people are affected in terms of the various variables examined. This is controlled for in one sense by the use of proportions or percentages but it is worthwhile at this stage to assess the relative share of the population in various categories of Unitary Authorities in Wales. For the purposes of ease of analysis UAs in Wales can be characterised as Rural (9 authorities), Other (a mixture of rural and urban – 4 authorities), Valleys (6 authorities), and Urban (3 authorities). Table 1.1 displays the distribution of the Welsh population in Unitary Authorities based on population density within those authorities (sparse, medium and dense) and shows that 44% of the population in rural authorities are in sparse localities. Indeed, most of the rural authorities are characterised by large proportions of their population in sparsely population density or medium population density localities.

Table 4.1 : Distribution of Population by Density (Alphabetical by UA Category)

		Persons	Share of population by density group			Persons per sq km
		(=100%)	Sparse	Medium	Dense	
Carmarthenshire	R	173,000	43%	43%	14%	70
Ceredigion	R	75,000	59%	26%	15%	40
Conwy	R	110,000	15%	58%	28%	100
Denbighshire	R	93,000	26%	32%	42%	110
Gwynedd	R	117,000	54%	33%	13%	50
Isle of Anglesey	R	67,000	52%	35%	13%	90
Monmouthshire	R	85,000	32%	39%	29%	100
Pembrokeshire	R	114,000	47%	39%	14%	70
Powys	R	126,000	69%	29%	3%	20
Blaenau Gwent	V	70,000	-	93%	7%	640
Bridgend	V	129,000	3%	60%	37%	510
Caerphilly	V	170,000	2%	67%	31%	610
Merthyr Tydfil	V	56,000	6%	68%	26%	500
Neath Port Talbot	V	134,000	16%	53%	31%	300
Rhondda Cynon Taff	V	232,000	1%	89%	10%	550
Cardiff	U	305,000	-	9%	91%	2,180
Newport	U	137,000	8%	28%	63%	720
Swansea	U	223,000	2%	42%	56%	590
Flintshire	X	149,000	12%	64%	24%	340
Torfaen	X	91,000	-	58%	42%	720
Vale of Glamorgan	X	119,000	19%	27%	54%	360
Wrexham	X	128,000	17%	42%	42%	260
Wales		**2,903,000**	**18%**	**46%**	**36%**	**140**
Rural	R	959,000	44%	38%	18%	60
Valleys	V	791,000	4%	72%	23%	490
Urban	U	666,000	2%	24%	73%	940
Others	X	487,000	13%	48%	39%	350

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Density groups defined at the electoral division level

Sparse: less than 150 persons per sq km

Medium: between 150 and 1500 persons per sq km

Dense: more than 1500 persons per sq km

Source : Statistical Directorate, Welsh Assembly Government (July 2003)

Rural areas of Wales are very diverse not just in terms of population density but also in terms of their socio-economic make up and chapter five and six of this report returns to this point with a detailed Census-based analysis of rural communities in Wales.

4.3 The Organisation of Healthcare Services in Wales

A policy context for the study of healthcare services in Wales has developed over the last decade in Wales. One of the key policy aims has been to improve the quality of local health services. *The New NHS: Modern and Dependable* (DoH, 1997) and *Putting Patients First* (Welsh Office, 1998a) shifted the policy focus from competition to collaboration while maintaining the separation of commissioning and provision of services. Two ideals underpinned this policy shift:

Equity of access to services across the UK

Equity of standards of services across the UK (Williams et al, 2000).

Whereas previous government policies aimed to raise quality by stimulating local diversity, the current policy is more centrally led. Specific new bodies have been created to develop common standards, for example the National Institute for Health and Clinical Excellence (NICE) and then to monitor the extent of local compliance with these standards, for example the Commission for Health Improvement (CHI). At the same time, however, political decision making is being devolved outwards from the centre to regions, at least as far as the Celtic countries are concerned. As a result the National Assembly for Wales is transforming the way in which decisions are taken in the health care arena (Williams et al, 2002).

Within this changing context, *Improving Health in Wales* (NAW, 2001a) sets out a strategic plan for improving the health experience, and health services, of people across Wales. Improving health and well-being is one of the five key action areas highlighted. Values of fairness, effectiveness and efficiency are espoused, driving the stated determination to tackle health inequalities at their roots, rather than symptomatically (Williams et al, 2002).

The National Assembly for Wales is seeking to strengthen its approach to tackling inequalities in health care service provision. Local Health Groups (LHGs), based on Unitary Authority boundaries were set up in Wales in 1999 specifically to improve the fit between local health needs and local health service provision (Welsh Office, 1998b).

One of the key objectives of the recent National Assembly for Wales policy document on the future operation of the NHS in Wales, *Improving Health in Wales* (NAW, 2001a), was "to offer an extended range of services in locally accessible primary care settings" (NAW 2001a, p10). It proposed that Health Authorities should be abolished by April 2003 and that LHGs be further strengthened and given wider responsibilities for the provision of primary care at the local level, together with a change of name from Local Health Groups to Local Health Boards which are shown in Map 4.4 in ***Appendix Ch.4*** (Williams et al, 2002).

Recent developments in the organisation of primary healthcare in Wales include the production of a strategy plan for improving primary care in Wales (NAW, 2002). This was supplemented by separate strategy documents on dental services and pharmacy services in Wales. The plan for primary care sought to inject funding into the system citing relative under-funding over the previous 20 years in Wales. The plan stressed that primary care needs to build on its traditional role at the front end of the system, focussing on its core principles and needs to be better positioned to manage and co-ordinate care for patients on a whole system basis to suit the individual needs of patients for support and care

across the range. In part, this will be discharged by the development of Local Health Groups (latterly Local Health Boards) which will be both commissioners and providers of services (NAW, 2002). The main aim of the new 'vision' for primary care is outlined as follows,

> "The aim of this vision of primary care is that by 2010 the public and health professionals will report greater satisfaction with the primary care experience. Long term careers in primary care will be seen as the first choice for clinicians and managers. A new integrated primary care sector will have equal status with other parts of the NHS and real improvements in population health will have been delivered. We will have moved forward to create health and social care systems that are fully engaged and operating within a radically modernised framework of top quality public sector services." (NAW, 2002, p.14)

The plan for primary healthcare in Wales identifies a number of potential challenges that need to be overcome if an improved system is to be put into place (NAW, 2002);

- **Pressures on primary care**. The health of primary care nationally is variable: at the extreme, poor premises, large list size, recruitment difficulties, too few community nurses and an increasingly complex workload lead to low morale amongst professionals. The professionals are aware that they cannot achieve the best for their patients amid the mounting pressures and this places them in intolerable ethical and moral positions.
- **Changes in clinical practice** are in some cases reducing the need for hospital beds and bringing about changes in the way hospital care is organised. At the same time, however, overall demand is rising, placing pressure on the whole system including primary care. Rapid technical turnover of patients does not always meet their needs for personal care, nor does it provide adequate attention to the complex health problems that have become common clinical currency in an ageing society.

- **The new policy environment**. Primary care is charged, in *Improving Health in Wales*, with playing a significant role in shaping local health services. This will require a more balanced approach to the development of primary, community and secondary health care services. *Better Health: Better Wales* also recognises that factors that affect people's health are not always within the direct control of individuals. The strategy for health improvement is one of joined-up working between the NHS, local government, the voluntary sector and other bodies interested in the well being of communities and the provision of universally accessible primary care services.

- **The human geography of Wales** presents particular challenges. The population is more concentrated in the south-east. There are large rural areas with limited road and rail communication and a regional distinctiveness north and south. This is a highly diverse country with many specific local needs.

- **The social and economic history of Wales** has resulted in poor levels of health, high levels of morbidity and high demand. The health service has underlying financial deficits and significant use of cross border services for populations in North, Mid and South-East Wales.

- **Imbalances in general practice and primary care**. There exist considerable imbalances within Wales in the distribution of general medical practice. This makes it difficult to make sure that everyone has an equal chance of access to high quality primary care. The same can be said for dentistry.

- **Changes in the population** where new groups within the population present high levels of need, but have difficulty in accessing and using primary care services effectively. There are considerable reported variations in gaining access to GPs (NAW, 2002).

One of the main tools for delivering a new system of primary healthcare in Wales is the introduction of a new GMS contract for GPs and Pharmacies that seeks to address some of the challenges outlined above.

4.3.1 The New Contracts for GPs and Pharmacists

In June 2003, the NHS confederation, on behalf of the four health departments across the UK, negotiated a new GMS (General Medical Services) contract with the GPC of the British Medical Association. On 28th February 2004, the Health and Social Care (Community Health and Standards) Act 2003 was enacted in Wales and established the primary legal framework for the GMS contract (Audit Commission in Wales, 2004). The new contract came into force on the 1st April 2004 with the expressed aim of improving the quality of local health across the UK – in Wales the contract operates between GP practices and their Local Health Boards.

Almost concomitantly, a new contract for community pharmacists has been agreed, confirmed in August 2004 in England and imminent in Wales at the time of writing. The new contracts have considerable implications for the delivery of primary care services both at national level and, importantly, at the local scale with implications for local GP and pharmacy services delivery in rural localities. This section of the thesis considers the important changes that will be introduced as a result of the new contract organisation, in relation to both GP services and community pharmacies.

The New GMS contract for GPs

The new GP contract is aimed at improving the care patients receive from the NHS whilst at the same time recognising and rewarding GPs for providing high quality care. The new contract, therefore, provides financial incentives for GP practices to deliver a wider range of services in the community and improve the standard of patient services (Audit Commission in Wales, 2004). The UK Government has allocated an additional £1.9 billion on primary healthcare from 2003/2003 to 2005/2006 to meet the demands of the new contract (a rise from

£6.1 billion to £8 billion over that period). In Wales expenditure is expected to increase from £302 million to £402 million over the same period, a 33% increase in the funding of GP services (Audit Commission in Wales, 2004). The focus of the new contract is to improve local health services and, in order to achieve this, the parties to the new contract are GP practices and Local Health Boards in Wales (the previous contract was between the Welsh Assembly Government and GP practices).

In terms of the funding of the new contract at the local scale in Wales, LHBs are responsible for managing local GMS budgets and to allocate resources to practices in three main ways:

- The Global Sum – to cover practice running costs;
- The Qualities and Outcome Framework (QOF) – to reward practices according to the quality standards they achieve; and
- Enhanced Services Payments – available to practices to expand the range of services they provide.

Additional funding streams are also available to practices to cover investment in IM&T and premises, and to reward long-serving GPs through seniority pay (Audit Commission in Wales, 2004).

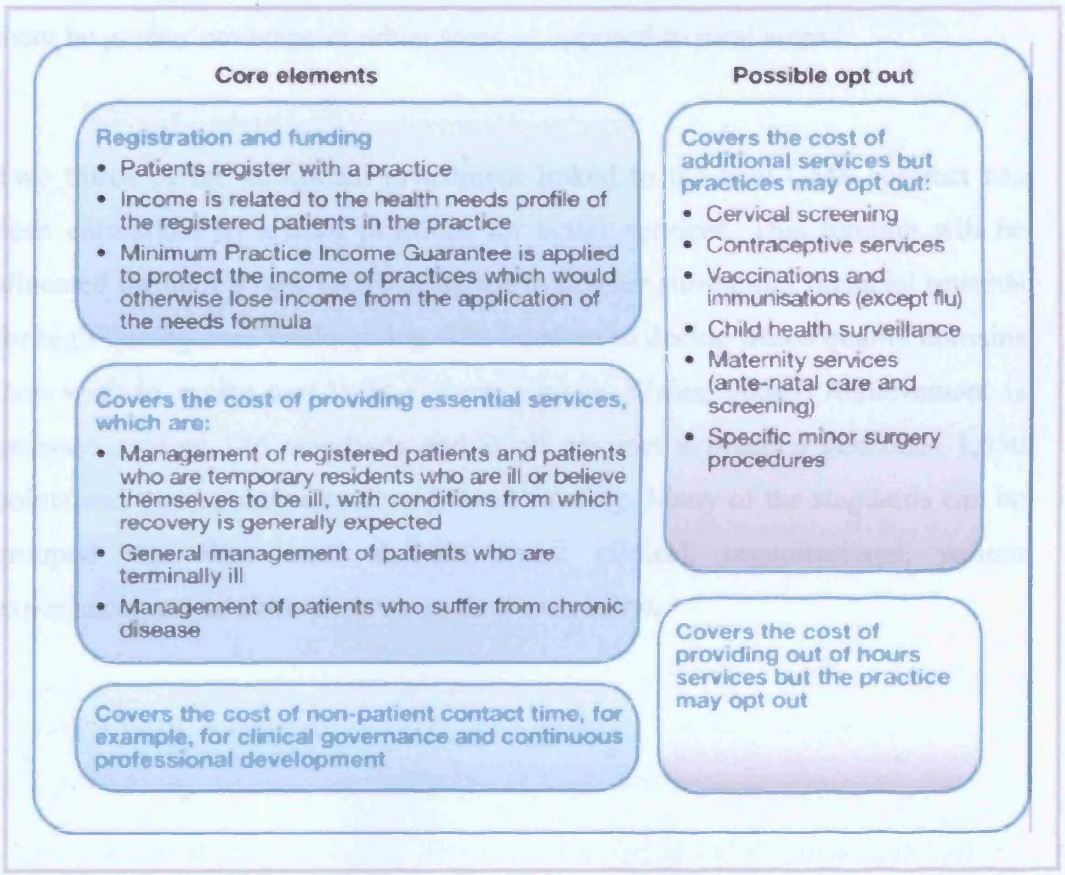
The Global Sum is paid to practices for the provision of 'essential' and 'additional' services and for paying staff, reimbursing locums and protecting time in order to maximise opportunities for GPs to develop their careers. The Global Sum is calculated using the Carr-Hill formula which is composed of adjustments for:

- The age and sex structure of the population, including patients in nursing and residential homes,

- The additional needs of the population, relating to morbidity and mortality,
- List turnover to take account of the fact that newly registered patients generate around 40% more workload in the first year than average,
- The costs of rurality, to take account of population density and dispersion, and
- Higher costs of living, in the form of a market forces factor applied to all practice staff.

(Audit Commission in Wales, 2004).

Table 4.2 Key elements of the Global sum (Audit Commission, 2004)



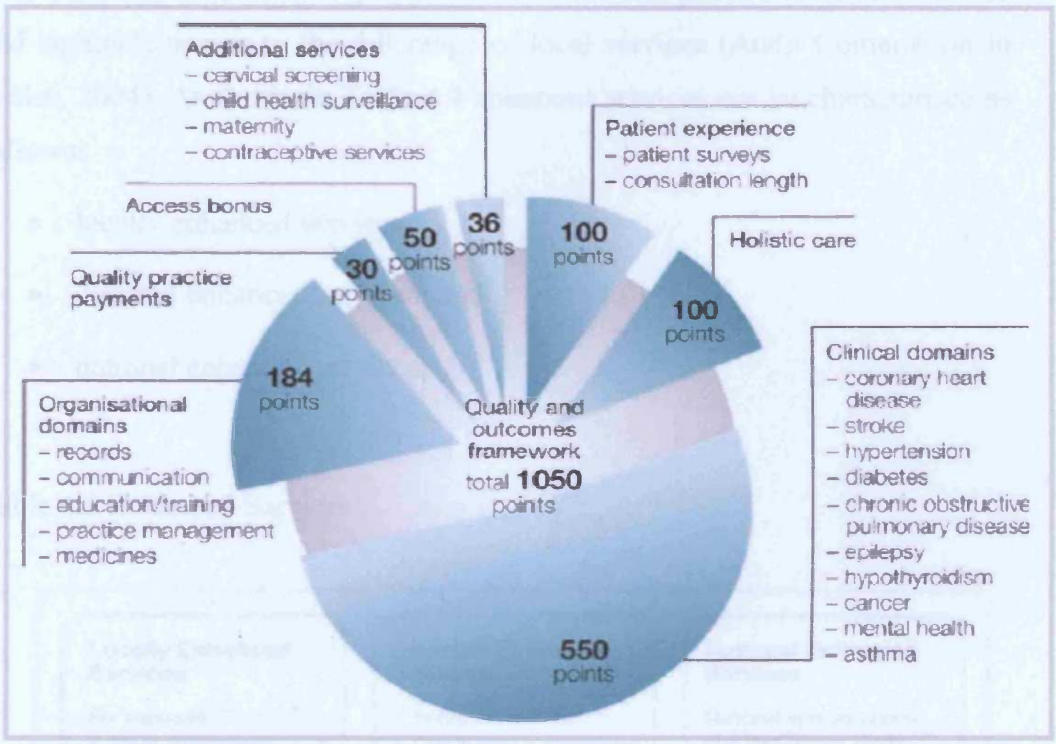
Source: 'Transforming Primary Care'; Audit Commission National Report, 2004

This allocation formula is currently under review within Wales to ensure that each factor is drawing on the most rigorous data available.

Out-of-hours care is one of the most contentious developments affecting GP service provision under the new contract and one that will be returned to in relation to community pharmacy services. Under the new contract all GP practices in Wales have the choice to opt out of providing out-of-hours care by 31st December 2004. The vast majority of practices are expected to do so and LHBs will, in future, be expected to provide these services, probably through third party providers (WAG, 2004). There are suggestions, however, that around 30-50% of GPs in Wales would be interested in continuing to work out-of-hours on a contract basis for third party providers, although at the time of writing there is no indication of whether there will be a spatial bias to this, in other words will there be greater coverage in urban areas as opposed to rural areas?

Two thirds of the additional investment linked to the new GMS contract has been earmarked to reward practices for better services. This funding will be allocated through a new QOF, designed to deliver substantial financial rewards for high-quality care while giving GPs freedom to decide which quality domains they wish to aspire to (Audit Commission in Wales, 2004). Achievement is assessed against 146 standards and if all are met a practice generates 1,050 points and these points attract additional funding. Many of the standards can be grouped into four main domain areas: clinical, organisational, patient experience, and additional services, as shown below.

Table 4.3 key elements of QOF



Source: 'Transforming primary care'; Audit Commission National Report, 2004

LHBs will be responsible for performance monitoring of the QOF framework and will visit practices on an annual basis.

Enhanced Services

The third funding stream related to the new GMS contract is for the provision of enhanced services which are defined as services that are:

- 'essential' or 'additional' services delivered to a higher standard; and
- extra, specialised services, such as drug and alcohol misuse clinics or minor injury services.

LHBs are responsible for the commissioning of enhanced services, either from local practices or alternative providers, to ensure that patients have more choice and equitable access to the full range of local services (Audit Commission in Wales, 2004). As shown in Table 4.4 enhanced services can be characterised as follows:

- locally enhanced services;
- directed enhanced services; and
- national enhanced services.

Table 4.4 Enhanced Services

Note: * Must be available to GMS practices;
** Must be available within the LHB;
*** Can be altered by local agreement

Source: Transforming Primary Care, Audit Commission 2004

All LHBs must spend a minimum on locally enhanced services, the amount of which will be specified annually in LHB allocations.

The new contract provides additional resources for developing human resources and modernising practice infrastructure. It introduces a number of key provisions for:

- improving premises,

- developing IM&T; and
- developing people, improving working conditions and recognising the valuable contribution made by all practice healthcare professionals.

(Audit Commission in Wales, 2004).

Opportunities and Barriers

The new GMS can be seen as offering a real opportunity for LHBs and practices to improve healthcare in Wales by reshaping primary care provision and enhancing the range and quality of general medical services available to patients. The new local contracting arrangements and the associated local review mechanisms will fundamentally change the relationship between LHBs and practices, enabling them to develop genuine healthcare partnerships (Audit Commission in Wales, 2004). The new contract provides LHBs with the opportunity to think strategically about how healthcare is delivered locally, in a way that improves convenience and choice for their populations. By managing their enhanced services budget effectively, LHBs should be in a position to:

- improve patient care for all patients, including specific vulnerable groups:
- allow practices to develop additional services for their practice populations:
- improve patient choice; and
- allocate resources more effectively between secondary care to primary care.

One key concern is whether the changes to provision of an out-of-hours service is likely to have a detrimental impact on levels of care provided to patients, although LHBs and the NHS insist that this should not occur even if all GPs opt out of providing out-of-hours services. Clearly the reasoning behind the change

in out-of-hours service provision is a recognised need to make general practice a more attractive place to work and it is hoped that this well help solve a long-standing recruitment problem that has tended to affect rural areas, or old industrial areas, more than urban areas. this is particularly true in Wales.

The new contract is first and foremost a strategic tool, to be used by LHBs to improve the quality and range of services for patients, increase primary care capacity to meet local needs, and to revitalise general practice by making it a more rewarding and family friendly place to work (Audit Commission in Wales, 2004). There may be barriers, however, to the successful implementation of the new contract and key among these is the need for effective management of the implementation of the contract and robust review procedures of how it is being operated across Wales. This review of how the contract is being implemented will need to include monitoring of the financial management of the contract by LHBs, particularly in areas such as quality achievement payments which could be higher than budgeted for in the early years of the contract. Similarly, some practices may fall below expected quality framework scores leading to a lower-than-expected practice income and LHBs will need to work closely with such practices to manage this risk and support improvements (Audit Commission in Wales, 2004). LHBs will also need to develop a clear strategy regarding the range of services they need to commission. This is crucial both because practices will be able to opt out of some services and LHBs are required to spend a specified element of their budgets on locally enhanced services. A key concern in the commissioning area is the need to ensure that patients have a fair and equitable access to services. In rural areas this is particularly where patients have to travel larger distances to access particular services that were previously provided by a local GP but have now, perhaps, been re-located to an alternative GP practice. Where GPs opt out of out-of-hours services, LHBs will need to ensure that alternative services are commissioned which are affordable, maintain continuous service provision and do not have an adverse impact on other NHS services such as A&E (Audit Commission in Wales, 2004).

4.3.2 The New Community Pharmacy Contract in England and Wales.

Early in 2005, community pharmacists in England and Wales will have a new NHS contract for the first time since 1987, which should be implemented sometime in January in Wales. Whilst the old contract focused on the 'throughput' of large volumes of prescriptions, the new contract has different aims, which include rewarding high quality services, harnessing the skills of pharmacists and pharmacy staff, and providing minimum standards for pharmacy (Bellingham, 2004a). The new contract is formed of three tiers: essential services, advanced services and enhanced services. All contractors will be expected to offer essential services, but advanced services will require accreditation of the pharmacist, the pharmacy premises or both. These two tiers will form the basis of the national pharmacy contract. The third tier of enhanced services will be commissioned locally in Wales by the Local Health Boards (LHBs), although a service specification and value will be agreed nationally for each enhanced service.

Essential Services

There are seven essential services that must be provided by all community pharmacy contractors and are not open to local negotiation (Bellingham, 2004a). First of the essential services is dispensing which covers the supply of medicines and appliances, and the provision of advice about the medicines dispensed. The aims of the dispensing service are that both a safe supply is made and the patient knows how to use the dispensed item. The second essential service is repeat dispensing which will be a new service for the majority of community pharmacists. The repeat dispensing service will allow patients to collect regular repeat prescription medicines and appliances direct from the pharmacy for a certain length of time agreed with the prescriber (Bellingham, 2004b). The aims of this service are to increase patient choice and convenience, to reduce workload at GPs' surgeries and to minimise wastage. Before undertaking this service all pharmacists will be required to complete training

and will have to provide advice services to patients about the repeat dispensing service and how it will operate.

The third essential service relates to clinical governance and contractors will be expected to ensure that standard operating procedures are used, that adverse incidents are reported to the National Patient Safety Agency, that continuing professional development is undertaken by pharmacists, that services are audited, that patient satisfaction questionnaires are carried out and that interventions are monitored (Bellingham, 2004a). The new contract contains three principles of clinical governance:

- Clinical governance should be built into all professional services
- Clinical governance is driven by a genuine desire to improve the service delivered to patients
- The development of clinical governance in community pharmacy is supported and encouraged by primary care organisations

Clinical governance will be assessed around seven components: patient and public involvement, clinical audit, risk management, clinical effectiveness, staff management, training and development, and use of information (Bellingham, 2004c).

A fourth essential service is in public health awareness which comprises of two components: first, the provision of opportunistic advice to patients obtaining prescriptions from the pharmacy and, second, involvement in public health campaigns. The aim of the service is to increase public awareness and knowledge about key healthy lifestyle messages, for example smoking cessation, CHD risk factors, and dietary and obesity advice (Bellingham, 2004d). If the pharmacist is unable to provide the support, advice or treatment that is required, the pharmacy staff will refer the person to a health or social care provider, or another appropriate organisation – this process is referred to as 'Signposting' and is the fifth essential service. One of the pharmacists' key roles

is to provide patients with advice and support to enable self-care. This service has been formalised as the sixth essential service under the new contract. Through this service, pharmacy staff will provide advice to patients and carers who request help with the self-treatment of minor illness and chronic conditions (Bellingham, 2004d).

The final essential service is medicines waste disposal and the aim of this service is to ensure that the public can easily and safely dispose of unwanted medicines. This should reduce risk for a number of reasons. First, if people keep large stocks of medicines at home, there is an increased risk of accidental poisoning and of diversion of medicines to someone not authorised to possess them. Second, if people try to dispose of the medicines themselves they could choose a non-secure method that results in other people being exposed to the unwanted medicine. Finally, if someone uses an inappropriate method of disposal it could lead to environmental damage (Bellingham, 2004e).

Advanced Services

The second tier of the contract is advanced services and in order to provide them the pharmacists will have to be accredited or the premises will have to meet certain requirements. Although part of the national contractual framework it is not expected that all contractors will provide these services from the outset because of the investment needed to meet the additional requirements (particularly with regard to premises). It is hoped, however, that eventually all contractors will provide these services (Bellingham, 2004a). There are two advanced services: medicines use review and a prescription intervention service. Both services consist of the same medicines review, the only difference is the way in which they are initiated: medicines use reviews are planned but the prescription intervention is a response to a problematic prescription.

The medicines use review aims to improve patient knowledge, concordance and use of medicines through:

- Establishing the patient's actual use, understanding about, and experience of, taking his or her medicines
- Identifying, discussing and resolving poor or ineffective use of medicines
- Identifying side effects and drug interactions that may affect compliance
- Improving the clinical and cost-effectiveness of prescribed medicines
- Reducing medicine wastage

To carry out this process both the pharmacy premises and the pharmacist have to be accredited. The premises must have a designated private consultation area where the pharmacist and patient can sit down and talk without being overheard by anyone else in the pharmacy. This has major expenditure implications for many pharmacies – particularly those independent pharmacies who cannot draw on the capital investment available to larger multiple pharmacy chains. Pharmacists themselves will also have to pass an accreditation based on nationally agreed competencies. The medicines use review will take place normally on an annual basis and would usually target patients taking multiple medicines on a long term basis. The overall aim is that pharmacists can start playing a role in the management of long-term conditions which will be the first time pharmacists have had a nationally recognised and remunerated clinical service (Bellingham, 2004f). The prescriptions intervention service is similar to the medicines use review but it is initiated differently. Instead of a planned review, the prescription intervention service will be a review triggered by a pharmacist identifying a significant issue with a patients prescription.

Enhanced Services

Enhanced services will be commissioned locally by Local Health Boards in Wales. A service specification and value – either in pounds or, like the new GP contract, in points – will be agreed nationally but LHBs will be able to vary these according to local needs (Bellingham, 2004a). Because enhanced services are commissioned, but many of them a particular pharmacy provides will be determined by local needs so a definitive list of all the enhanced services pharmacists could offer is impossible to determine. However, some examples of enhanced services that are expected to be commonplace are:

- Minor ailments management
- Diabetes screening
- Substance misuse services
- Coronary heart disease screening
- Disease-specific medicines management
- Palliative care services
- Emergency hormonal contraception
- Full clinical medication review (i.e. 'Room for Review' level three)
- Concordance services
- Out-of-hours services
- Care home and intermediate care services
- Prescriber support services
- Domiciliary assessments
- Head lice management
- Smoking cessation service
- Gluten-free food supply service

4.4 : Primary healthcare in Gwynedd

The study area consists of the Local Health Board of Gwynedd in North West Wales. The area is recognised as a peripheral region, with associated problems of isolation and inaccessibility (White et. al, 2000). The historic settlement pattern in the region is one of scattered key towns and dispersed rural villages and hamlets, this pattern holds true throughout the region but it is important to note the importance of the slate quarry valleys areas in the Snowdonia National Park where major local centres grew up around this particular industry, including Llanberis, Bethesda and Blaenau Ffestiniog (Slate Valleys Partnership, 1998). Clearly there is a very dispersed settlement pattern in the case study area with the exceptions being linear coastal development on the northern coast (and following the main A55 expressway), the clustering of settlements in Gwynedd around the slate industry, and the main centres of Bangor, Caernarfon and Holyhead. These centres perform both service and administrative functions for the area with other local centres supporting the rural hinterland (Mid and West Wales Strategic Planning Forum, 1998).

There are important cultural issues in the region which are relevant in this context, chief among them the high concentration of Welsh speakers in the region, up to 80% of the population in the area were Welsh speakers at the time of the 1991 Census (White and Higgs, 1997). This can have implications for the delivery of primary healthcare services in the region as shown later in this thesis.

Gwynedd Local Health Board was established on April 1st 2003 and employs 38 people. The health status of the LHB population is generally poor on a range of measures when compared to other rural counties of Wales and particularly so for certain diseases. Coronary heart disease rates are much higher in Gwynedd than in other rural counties, for example CHD mortality in females is 42% higher than in Ceredigion (Gwynedd County Council, 2003).

One of the principal roles of the Gwynedd LHB is to use its resources efficiently and effectively to develop appropriate primary care services for the county. In addition the LHB commissions or purchases acute and community health services from a range of providers.

Outlined below are some of the key documented policy statements which are likely to influence the shape of health service provision in Gwynedd over the coming years, taken from the Gwynedd Health Alliance Health and Social Care Strategy:

- Services should be provided which are safe and effective as locally as possible, not local services as safely as possible. This highlights the fact that, for some services, local provision is not always possible and inevitably some services will be provided based on a much larger catchment population.
- The need to further reduce the division in service planning and delivery between different sectors and settings for care, ensuring that a whole systems approach is taken. This may include the further development of managed clinical networks
- The continued development of clinical care pathways, mapping the patients journey through the sectors and services, to ensure efficiency and appropriateness.
- Patients accepting responsibility for their own health
- A greater proportion of service delivery occurring in primary and community settings
- The need to review the role of community hospitals in light of the WAG principle that community hospitals cannot provide a sustainable service with less than 30 beds.
- The need to integrate hospital based emergency care and other forms of un-scheduled care (Gwynedd County Council, 2003).

In dealing with these challenges a number of priorities have been established by the Gwynedd Local Health Alliance:

- Older people
- Children, young people and young parents
- Circulatory diseases
- Cancer
- Injuries
- Other key population groups: carers, homeless, learning difficulties, disabled, ethnic minorities and unemployed

In addition, four cross-cutting themes run alongside the six key priorities:

- Mental health, in particular emotional and psychological well-being
- The unacceptable inequalities in health
- The social determinants of health
- Access to health services (Gwynedd County Council, 2003).

4.5 Summary

This chapter has provided an introduction to the case study area and outlined key developments in primary healthcare policy in Wales over recent years. Of particular importance here are the re-organisation processes that have occurred and the recent developments in contractual arrangements for GPs and Pharmacies which are returned to later in this thesis.

Chapter Five - Baseline Analysis of Primary Healthcare Services in Rural Wales

5.1 INTRODUCTION

A number of studies (Shucksmith et al., 1996) have drawn attention to the nature and extent of rural deprivation in the UK and highlighted the types of socio-economic processes that have, and will continue to, influence deprivation levels in rural areas. Factors such as inaccessibility and social isolation, lower than average activity rates and underemployment, income levels below the national average, scarce local services, low levels of affordable housing, greater dependency on private car ownership, and declining levels of public transport which necessitate continuing support, characterise many rural areas of the UK. Furthermore, there appears to be a commonality with regard to the types of factors influencing poverty levels in rural areas which is independent of geographical setting (Cloke et al., 1994, 1995a; Pacione, 1995; Payne et al., 1996; Welch, 1996) and which are different to those prevailing in urban settings. In particular, the fact that rural disadvantage is more dispersed and less visible has led researchers to suggest that 'whilst the spatial factor is a central part of rural deprivation, it merely characterises the distribution of urban deprivation but is not a central dimension of it' (Midwinter et al., 1988; p. 46).

Previous studies by researchers such as Shaw (1979) and Moseley (1979) have been largely concerned with investigating the types of factors determining levels of service provision in rural areas and the relative physical (in)accessibility of social groups to such facilities. Shaw (1979) distinguished between 3 components of deprivation; namely household, opportunity and mobility deprivation. Household deprivation stemmed from income / housing inequalities. The latter two components, however, were largely concerned with the loss of job / service opportunities and the inability of some groups within

rural areas to gain access to jobs, services and facilities. Although this definition of rural deprivation has been criticised in some quarters due to the perceived over-emphasis on service provision (Bradley et al., 1986), service rationalisation and centralisation during the previous two decades led to a number of studies in the late 1970s' and early 1980s' which focused on the relationships between mobility and accessibility in relation to declining public services. These explored the implications of deteriorating levels of, for example, transport, retail, health and leisure opportunities both at the community (e.g. Nutley, 1980) and household (e.g. Nutley and Thomas, 1992) scales. By primarily focusing on case study approaches examining detailed travel patterns of population sub-groups to a variety of facilities, such research highlighted the problems faced by those sections of the community who do not have access to private transport (Nutley, 1992; 1996). These factors are likely to differentially impinge on social groups with the greatest impacts likely to be for elderly, young and unemployed sections of rural communities. Many of these findings re-surfaced in the Rural Lifestyles research in England (Cloke et al., 1994) and Wales (Cloke et al., 1995b) which focused on the nature of disadvantage in rural areas through ethnographic approaches. These studies, together with the higher profile given to rural issues with recent developments such as the 'BSE Crisis' and 'Foot and Mouth' and the highly publicised public protests by farmers and rural dwellers, have re-focused attention on issues such as disadvantage and employment creation in rural areas (Higgs and White, 2000).

5.2 CHAPTER AIMS AND OBJECTIVES

This chapter provides a baseline analysis of primary healthcare services throughout Wales and particularly in the case study area of Gwynedd. Part of this analysis focuses on the findings of a research project which developed measures of accessibility to particular service facilities in a GIS environment. The research was funded by the Economic and Social Research Council (ESRC) and conducted in the Department of City and Regional Planning, University of Wales, Cardiff during 1996 and 1997. The full results of this work are

documented elsewhere (Higgs and White, 2000), but this chapter draws on new analysis of the survey and data collection work undertaken by the author as part of the ESRC-funded project, with a particular focus on primary healthcare facilities in rural areas.

Declining levels of service provision and differential accessibility to services within rural communities were highlighted in the Rural Lifestyles projects as forming an important element of disadvantage in rural areas (Cloke et al, 1994). However, there were important spatial and temporal variations with rural residents perceiving a mixture of deterioration in some services (for example, in transport opportunities, shops and post offices) and an improvement in others (for example, education and health services). Clearly, there has been a long history of service rationalisation in both public and private sector services in some rural areas. Low levels of public service provision when combined with poor accessibility to services such as shops, doctors and schools will differentially impact on residents within rural areas. This has more recently been alluded to in attempts to add a 'rural dimension' to standard measures of disadvantage in both Wales and England (NAW, 2001, DETR 2000).

The afore-mentioned project referred to here had a number of key aims:

- to investigate the range of existing indicators of deprivation used by public service providers in Wales in relation to area-based measures or census indicators

- to assemble information on each indicator including the base statistics from which it is derived, the formula used to derive it, the units of area to which it is applied, the categories of services in which it has been used, references, case history dates and locations and to apply and review the use of such indicators in rural areas of Wales;

- to clarify which, if any, of the available base statistics are the most appropriate to assess levels of rural deprivation and to determine whether some of the currently used techniques such as the Z- and Chi-score methodologies are fundamentally unsuitable for indicators of deprivation across areas of extremely different size or population. Each measure was calculated at the community level of Wales and a range of statistical techniques used to examine the performance of different indicators. Differences in rankings of communities on these measures were used to examine the levels of association between policy-relevant indicators. Finally, this was complemented by comparing the degree of overlap for those communities ranked as the most deprived on each of the measures.

- to create a database which provides a detailed breakdown of services at the community level supplemented by point level databases relating to, for example, doctors, dentists, hospitals, primary schools and post offices - the first ever baseline survey of facilities in rural areas of Wales. This permitted the development of measures based on existing levels of service provision in Wales and to identify gaps in provision in these key services;

- to use a combination of spatial analytical techniques in conjunction with GIS software to derive indicators of rural disadvantage using this database based on availability of, and access to, services and to compare the performance of these indicators with those in use in Unitary Authorities in Wales at the time (Higgs and White, 2000).

The project involved widespread reviews of data sources available to Unitary Authorities. Concern has often been expressed by those authorities with large rural populations that, due to the spatial heterogeneity of deprivation, standard indicators of disadvantage do not represent the adverse circumstances under

which a significant minority of such residents are presently living (RDC, 1998a).

This chapter provides a baseline analysis of primary healthcare facilities in rural areas of Wales for 1996. The chapter draws on information and data collected by the author during the ESRC project mentioned above. The chapter sets out new analysis of this data focussing on the primary healthcare sector and introduces GIS techniques for highlighting differential access to various services developed by the author during the course of the ESRC project and more recently. It is argued that inadequate service provision in rural areas can be viewed as an important component of social exclusion but that the majority of studies have focused on the socio-economic status of rural areas rather than on spatial inequalities in access to services *per se*. This shortcoming has started to be addressed more recently with research undertaken by the Countryside Agency and various government agencies starting to assess the importance of accessibility issues in rural areas (CA, 2001, NAW 2001, DETR, 2000). In such instances it is the differential access to services for social groups within rural areas that are worthy of consideration and targeting those within rural communities that are most at risk from the centralisation and rationalisation of services, for example healthcare services, may be more effective than targeting specific locations. In the past, the unavailability of nationally consistent databases has hindered the development of such indices. This has been addressed to some extent here through the creation of unique databases of services within rural Wales for 1996. The two datasets were created by the author as part of the ESRC project: one at the community (area) level relating to the numbers of services and one at a disaggregate (point) level relating to the geographical location of each service. Together they can be used to explore the development of alternative measures of disadvantage, in relation to access to healthcare in a rural context.

5.3 A Baseline Analysis of Primary Healthcare Services in rural areas of Wales, 1996.

Introduction

This section describes the technical processes involved in creating various indicators of accessibility and service provision at the community scale in Wales, drawing on a range of supply data relating to services and demand data relating to population and household characteristics at the community level and below. Four separate types of indicator are presented in this section, each one based on service provision and/or demand; the four types of indicators are:

- Indicators of Service Provision
- Indicators of Isolation
- Indicators of Potential Physical Accessibility
- Public Transport Dependency Indicators

As highlighted in the previous section these indicators are not meant to be viewed individually as independent indicators of rural disadvantage *per se*, it is more appropriate that they be viewed as separate indices that may be used in combination with other measures to provide a more accurate reflection of the problems faced by rural communities. In the following description and analysis of the various indicators the intention is to highlight the various methodological processes in their creation and to describe the patterns produced by the various indicators when applied at the community level throughout Wales. Whilst the indicators developed during the research are felt to be effective in reflecting different aspects of rural disadvantage and methodologically robust and innovative, it is acknowledged, in the final part of this section, that there are some limitations in their application largely as a result of data availability.

5.4 CREATING INDICATORS BASED ON MEASURES OF SERVICE PROVISION IN RURAL WALES

Previous attempts at creating poverty / disadvantage measures in rural areas have largely been concerned with using census-derived data which have a more rural focus or with using alternative methodologies to those used to calculate current policy relevant indicators.

Two major data sets are employed here; namely a database of public services collated for all rural communities in Wales by the author and held at the area level in the GIS, and a disaggregate (point-level) database of selected services. These were previously assembled during the course of a two year research project, sponsored by the Higher Education Funding Council for Wales (HEFCW), which was concerned with creating the first comprehensive database of public facilities in Wales (Higgs and White, 1996). Using these data sources, four main sets of indicators have been developed. The four sets of indicators relate to; service level indices from the survey of Welsh rural communities, 'Isolation Indices' based on access to services, potential physical accessibility indicators, and public transport based indicators. The examination of each set of indicators now follows in relation to their formulation and preliminary analysis of the patterns that they highlight with reference to the primary healthcare sector; this is preceded by a brief description of the main findings of the Survey of Welsh Rural Communities 1996.

Preliminary Analysis of Survey of Welsh Communities

A questionnaire survey was sent to the Community Clerks in each of the surveyed communities in November 1995 with questions relating to the availability of a range of publicly and privately provided services. The survey was similar in scope and methodology to the Village Services Surveys carried out at the parish level in England by the Rural Development Commission (RDC, 1991, 1995, 1997 and Countryside Agency, 2001). In the next chapter of this

thesis an updated version of the Survey carried out in 2004 by the author is described.

Of the 864 communities in Wales 615 were surveyed and a response rate of 82% was achieved. The 615 'rural' communities were defined as those with a population sparsity index of less than 4 residents per hectare, i.e. those communities considered to be sparsely or 'super-sparsely' populated (the sparsity index is based on the UK governments own guidelines for use in local government spending assessments and is calculated by taking the resident population of those wards within the authority per hectare divided by the total resident population of the authority; those communities with a sparsity index of less than 0.5 residents per hectare are considered to be 'super sparsely populated' those with an index between 0.5 and 4 are termed 'sparsely populated', all other communities are categorised as urban in nature). The sparsity index was employed in the survey as a measure, or index, of rurality, it was felt that the sparsity index was of most use in categorising the large numbers of communities in that it was an area based measure capable of standardising the diverse range of communities, in terms of area and population. Other studies of facilities in rural areas have tended to focus on areas or settlements within certain pre-defined population thresholds, in this case, however, it was felt that this would not be an indicator of whether a community was essentially urban or rural in character. The surveyed communities were fairly evenly distributed across rural Wales with good coverage in most parts of the country, although there are a number of 'pockets' of non-response particularly in parts of Anglesey, parts of north-east Wales and a small part of Pembrokeshire in south-west Wales. No attempt has been made in this thesis to interpolate the levels of services existing in communities where there was no survey return and the maps that follow therefore include areas where we have no data (see Howes et al. 1993) for methods of deriving service levels for non-response parishes in England).

Analysis of the survey results involved a preliminary analysis of the general patterns of service provision across the responding communities before developing more sophisticated measures of service provision based on the survey results. Whilst a relatively small proportion of communities were found to be without the most basic of services such as a post office (20.5%), a public house (10.3%), and a primary school (19.9%), it is the more specialist services such as a GP surgery (65.2%), a bank or building society (87.7%), and a dental surgery (89.7%) where provision is acutely poor in the responding communities. Also of great significance are the relatively high proportion of rural communities without access to a shop (any type) (40%), and a petrol station (44.5%). This compares to the findings from the Rural Development Commission's Survey of Rural Parishes taken around the same time in England (RDC, 1997) namely that;

- 42% of parishes had no permanent shop of any kind
- 43% had no post office
- 29% had no public house
- 50% had no primary school

Index of Service Provision

The initial analysis of the survey data outlined in the previous section may be viewed as an exploratory, descriptive review of the nature of the information yielded by the questionnaire survey. The data relates to the situation that exists within the communities themselves and is therefore inherently spatial. In response to this, the second stage of analysis of the survey data is concerned with the spatial patterns of rural service provision in Wales. The raw data from the questionnaire analysis, once applied to the spatial boundaries of the community councils within a GIS, may be examined in relation to the other data sources held within the information system, for example, social and economic characteristics of the resident population available through official statistics

particularly the decennial UK Census of Population (data from which is available at the community level in Wales).

An ultimate aim of the survey was to comment on overall levels of service provision in numerous service sectors across rural Wales; a major step towards this aim is the formulation of service provision indices based on the findings of the survey. Service level indices have been employed in previous studies to good effect, for example, a recent study in Scotland reported on service provision in rural Scotland by way of a weighted score applied to each parish based on the presence or absence of available services, the number of service facilities and a system of weighted values for different service functions based on perceived importance (Scottish Consumer Council, 1989). Three separate indicators of service supply were constructed in the Scottish Consumer Council study; an outlets, or facility, index, a service function index, and an overall, combined index. The facility index is based on the number of service facilities in each service category, for example shops. Therefore, an area with two shops will have a score on this index double that of an area with only one shop. The function index varies from the facility index in that it only takes account of whether an area has a particular service, for example a retail service, and disregards duplication of the actual service facilities. Finally, the overall service index is a combination of these two indexes, calculated from the arithmetic mean (Scottish Consumer Council, 1989).

The methodology adopted by the Scottish Consumer Council study was employed to construct service provision indices based on the Welsh Survey of Rural Communities, based on a number of service sectors identified as important in previous studies of rural service provision. The first service provision index is based on six services identified in the Rural Development Commission's Survey of Rural Services (RDC, 1992) and 'considered to be required for the conduct of normal daily life in villages'. The six services are;

- permanent shop
- post office

- public house
- school
- village hall
- bus service

A second index of service provision was calculated based on five 'basic' services identified by Grampian Regional Council as crucial to rural life, namely;

- primary school
- post office
- permanent shop
- petrol outlet
- doctor's surgery

(Bochel and Chapman, (1995).

Information from the survey of Welsh rural communities was compiled for each of the service types identified by the RDC and Grampian Regional Council and for each service two separate indices were formulated based on the Scottish Consumer Council methodology, namely; a facility index, and a function index. Finally, two overall service indices were calculated for both the 'RDC key services' and 'Grampian's basic services', based on the summation of the facility and function scores for all services before taking an arithmetic mean of the total facility and function scores to give an overall index. In general terms, the spatial pattern of service provision in the responding communities is similar based on these two separate indices. There are relatively high levels of service provision in a number of rural areas of Wales, particularly in parts of north-west Wales especially Gwynedd, in parts of west Wales (Ceredigion), and in rural areas fringing urban areas, particularly around Swansea in the south and Wrexham in the north-east. The main areas where service provision levels are

low in comparison with other responding rural communities are large parts of Powys across mid-Wales and large parts of Pembrokeshire in south-west Wales. Taken separately, the 'Basic Services Index' tends to identify fairly homogenous 'pockets' of communities with similar service levels than the 'Key Services Index' where the 'pockets' of service characteristics appear to be more fragmented.

To examine the service level indices in the responding communities in further detail, a series of correlation analyses were undertaken with Census-based socio-economic profile data a number of standard indicators of disadvantage, or deprivation, including the Department of Environment's Index of Local Conditions, and the Welsh Office Index of Socio-Economic Conditions (all based on 1991 UK Census data). Clearly, the relationships illustrated in Table 5.1 are fairly weak but a number of observations can be made. Firstly both service indexes correlate positively with the % of Households with No Car variable (+.5), indicating that lower levels of car ownership are associated with higher levels of service provision; conversely in remote areas where car ownership levels are very high, due to the necessity for private transport, service provision levels are also lower. Although there are weak relationships between the service provision indices and the various deprivation indicators, the general trend is positive indicating that the more deprived communities tend to have higher levels of service provision.

Table 5.1 : Correlation Coefficients - Service Provision Indicators and Socio-economic Indicators.

	1	2	3	4	5	6	7	8	9	10
1.Basic Index	1.000									
2.Key Index	.972	1.000								
3.SMR	.116	.121	1.00							
4.Unemployed	.227	.255	.213	1.000						
5.No Car	.500	.552	.283	.576	1.00					
6.SOCDEP	.406	.454	.233	.767	.817	1.00				
7.ILC	.168	.156	.153	.586	.390	.479	1.00			
8.BREAD	.356	.389	.306	.569	.833	.720	.472	1.00		
9.Carstairs	.306	.331	.249	.704	.704	.670	.626	.750	1.00	
10.Welsh Office	.204	.212	.497	.488	.462	.379	.535	.697	.697	1.00

Notes:

1. Basic Index - Basic Services Index from the survey of Welsh rural communities
2. Key Index - RDC Key Services Index from the survey of Welsh rural communities
3. SMR - Standard Mortality Ratio
4. Unemployed - Percentage Unemployed (1991 Census)
5. No Car - Percentage of Households with No Car (1991 Census)
6. SOCDEP - Social Deprivation Index (Forrest and Gordan, 1993)
7. ILC - Department of Environments' Index of Local Conditions
8. BREAD - Breadline Britain Deprivation Indicator
9. Carstairs - Carstairs Deprivation Index
10. Welsh Office - Welsh Office Index of Socio-Economic Conditions

A further analysis of the survey data undertaken in the GIS was to determine population bands for the responding communities. This allows for a descriptive analysis of the proportions of communities who have, or do not have, a particular primary healthcare facility within their boundary. Table 5.2 displays the results of this analysis for the GP surgery or practice. Clearly the presence or otherwise of such a service is largely dependent on the population size of the community. Relatively small proportions have this type of service in the 0-600 population size bands (below 20%). This figure rises to 41% in the 1000-2000 band and above 70% in the 2000 and above population categories. Of course, this analysis does not consider whether or not an alternative facility might be available in a neighbouring community for those who do not have their own. This analysis is returned to in Chapter Seven with an appraisal of changes in service provision from this survey from 1996 and an updated survey from 2004.

Table 5.2 : Proportion of Community Councils with or without a GP Surgery. 1996

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no GP	81.5	86.0	85.4	75.8	70.7	58.7	29.6	11.5
One or more GP surgery present	18.5	14.0	14.6	24.2	29.3	41.3	70.4	88.5

Table 5.3 highlights the proportion of communities with or without a dental surgery in 1996 and, clearly, there is little or no provision of this service below the 1000 population band. As alluded to previously in this thesis dental services are unique in the healthcare sector in terms of their un-regulated locational characteristics. This would suggest that dental surgeries are likely to locate in areas of higher populations, or customer base, and this would appear to be confirmed from Table 5.3.

Table 5.3 : Proportion of Community Councils with or without a Dental Surgery. 1996

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no dentist	100	98.2	100	100	100	90.5	70.4	19.2
One or more dentist present	0	1.8	0	0	0	9.5	29.6	80.8

Table 5.4 displays the proportion of communities with or without a pharmacy service in 1996 and again the provision of this service is strongly correlated with the population size of communities. Below the 1000 population band less than 10% of responding communities had a pharmacy service. This rises to 23% in the 1000-2000 population band, 61% in the 2000-4000 band, and 77% in the 4000+ population band.

Table 5.4 : Proportion of Community Councils with or without a pharmacy. 1996

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no pharmacy	98.6	98.2	91.7	90.9	96.3	77.0	38.9	23.1
One or more pharmacy present	1.4	1.8	8.3	9.1	3.7	23.0	61.1	76.9

The survey results for GP practices, dental surgeries and pharmacies can also be assessed in map form in ***Appendix Ch.5***. In all maps the white areas denote non-response and the grey areas are un-surveyed communities. Map 5.1 displays the number of pharmacies in the responding communities and clearly large areas of rural Wales are without this service facility based on the survey response. The pattern for GP practices is slightly better – Map 5.2 but this service is still lacking in large parts of rural mid and west Wales. The situation for dentists is relatively poor in large parts of the country, with wide gaps in provision for this service (Maps 5.3 and 5.4)

Clearly, analysis of the survey of rural communities in spatial terms has a number of limitations, not least of which is the problem caused by 'gaps' in our understanding of the spatial patterns of service provision in rural communities in Wales due to non-response. The measures devised from the survey are essentially concerned with service availability, they do not measure geographical accessibility because any measure of distance between dispersed demand points (population) and the facilities is not possible from the survey results. Indexes of service provision are concerned with analysing the total supply of public services and in this section have been used to identify trends in the spatial distribution of services at the community level in Wales. The weaknesses of such measures have been alluded to, particularly with regard to the simplistic assumption of low levels of interaction between supply and demand located in different communities. This work can, however, be taken further by developing measures relating to the distribution of services in relation

to the location of population (Joseph and Phillips, 1984). Two such measures have been developed, namely an index of isolation and a measure of potential accessibility. In both instances, the disaggregated (point-level) database of public services held within a GIS in order to provide measures of the dispersion of services in relation to potential clients. These are described in more detail in subsequent sections.

Index of Isolation

Whilst the survey of Welsh rural communities examined in the previous section is extremely effective in illustrating trends in service supply in rural areas, it does have limitations in terms of assessing demand and differential access to such services in rural areas. In order to examine such processes a series of datasets were assembled using a GIS relating to service demand and supply throughout Wales.

Service demand data was derived at the disaggregate point level from the 1991 UK Census population weighted Enumeration District (ED) centroids. Ideally demand data would exist at the individual household level - in particular by assessing the status of individual households in relation to the road network. Such household level data could also be classified according to a range of socio-economic profile data, for instance, those with and without cars and, for the latter group, related to the existence (and frequency) of public transport opportunities. In the absence of data at such disaggregate scales 'demand' locations based on population weighted centroids at the smallest spatial district scale, the ED, are often used as the best available alternative. Such demand points do have limitations in that the accessibility of individuals within different settlements that are located within the boundary of the same spatial unit is assumed capable of being represented by the same zone centroid. Assumptions are also made with respect to the *potential* of individuals to avail themselves of transport opportunities, private or public. In such circumstances, it is extremely unlikely, given differing socio-economic circumstances of individuals, that each

will have the same ability to pay for a particular mode of transport; but in the face of absence of data at the household level, researchers need to resort to such aggregate measures of demand.

In order to effectively analyse accessibility to services within rural areas then it is essential to identify service facilities in the study area at the most detailed level possible, ideally at the disaggregate point level. Supply data of this nature was available from previous research, sponsored by HEFCW, conducted by the research team into devising a GIS-based database of public services for Wales. Specifically, the point level datasets utilised in the accessibility analysis relate to six key rural services, identified in previous research as shown in previous sections, namely; doctor's surgeries, post offices, dental surgeries, petrol stations, banks, and primary schools. All services are stored as point features within the GIS and were entered into database during the course of 1996, most derived from post-coded lists provided by Local Authorities and other organisations. The databases are complete for the whole of Wales and those English local authorities that border Wales, for the purpose of accounting for cross-border flows. Having assembled the point level service supply data and the population demand data with the GIS then a range of accessibility based measures could be derived employing road network data for the whole of Wales and the bordering areas in England.

One possible set of methods that could be used to examine accessibility levels in rural areas are those that establish the distance that is needed to be travelled in order to access particular services. The first set of such measures, termed Isolation Indices, attempts to ascertain the minimum distance that the population of Welsh communities need to travel to access essential services A measure of (in)accessibility to the key services held at point level in the database was calculated at the aggregate community level for the whole of Wales, adopting a network modelling technique available within a commercially available GIS (Arc/Info GIS). To perform the accessibility analysis demand and supply points have to be identified on the network, this is achieved by finding the nearest node

on the network to the demand points (the ED Centroids) and the supply points (the service facilities) and measuring the distance to the node. Having located the demand and supply points on the network then the distance from the demand location to the nearest of the six services (banks, petrol stations, post offices, dentists, doctors and primary schools) could be calculated across the road network. This basic network distance between every ED centroid and every service facility was then aggregated to the community level by calculating the average network distance of EDs to each service for every ED in a community. This gave an average network distance to each of the six services for every community in Wales. This measure was then further enhanced by weighting the network distance to each of the services by the population at the ED, thereby re-orientating the measure to an estimate of the average distance of people to services rather than ED centroids to services. The end result is six population weighted network distance measures for each community in Wales based on the networked distance to each of the six services listed above. The final six scores for each service at the community level in Wales were then standardised in order to construct a single index of access to services using Z-score and chi-square techniques. The measures for each service were standardised using these methods and summed to form a final index based on each form of standardisation, no form of weighting was employed for either type of index as the aim was to give a general indication of access levels to all types of service rather than identifying particular service types as more important in rural areas than others.

Map 5.5 in ***Appendix Ch.5*** displays the Isolation Index based on a Z score standardisation, clearly the areas identified as most isolated (high scores) tend to be in the largely rural areas of mid and west Wales, although the pattern is by no means uniform and 'pockets' of isolation are identified in the industrial and urban areas of south-east and north-east Wales. Map 5.6 is the same index based on a chi-square standardisation method and again a similar pattern emerges. Map 5.7 and Map 5.8 in Appendix Ch.5 display the Z score Isolation Indices calculated individually for the two services – GP Practices and Dental surgeries. From the maps it is clear that levels of accessibility to these two services in rural

areas of Wales are quite poor with many rural communities in the top two quintiles on this index. The situation is marginally worse for dentists than for doctors with wide areas suffering high levels of inaccessibility to this service.

Index of Potential Physical Accessibility

An alternative to the isolation measures outlined above are measures that are focused on the potential physical (or geographical) accessibility. These types of measures assess the nature and pattern over space of physical access to service facilities and permit the manipulation of supply and demand data, through reference to utilization behaviour, to provide measures of regional accessibility - in this case at the community scale for Wales (Joseph and Phillips, 1984).

A measure of potential physical accessibility to the services held at the point level in Wales has been adapted from work undertaken by Joseph and Bantock (1982) into potential accessibility to general practitioners in rural areas of Canada. The measure adopts the term *'potential'* accessibility because no actual interaction between the two sides of the demand-supply equation is implied (Joseph and Phillips, 1984). The measure assumes that 'given a maximum range for the service being offered at a facility and assuming that every member of the population is a potential user of the service, the pattern of physical accessibility will depend only on the relative location of the population and the service facilities'(Joseph and Bantock, 1982). This could be represented as travel time, road or map distance. If we assume a continuous and progressive impact of distance from the facility on utilisation rates then a simple measure of nodal accessibility would be,

$$A_i = \sum_j F_j / d_{ij}^b \qquad [1]$$

where:

A_i = potential physical accessibility of area i to services

F_j = Service facility at j within the range of area i

d_{ij} = distance between i and j

b = exponent on distance

(adapted from Joseph and Bantock, 1982)

A feature of this nodal accessibility measure is that a limit is set on the distance within which a service is accessible to a population and a power function rather than a negative exponential function is used to represent the distance decay effect. There should also, however, be some method of taking account of the differential availability of services, for example services with a densely populated catchment area are likely to be less available than those within sparsely populated areas (this is especially true of specialist services such as doctors and dentists). The differential availability of services can then be estimated through the following equation,

$$D_j = \sum_i P_i / d_{ji}^b \qquad [2]$$

Therefore, the potential demand for a service at j, D_j, is a function of the magnitude of the population within the range of the service offered, modified by their distance away. The total population of each zone (i) is represented by P_i in the equation. By combining the two equations, [1] and [2], we arrive at a measure of potential physical accessibility to services, A_i^* that combines a realistic assumption of utilisation behaviour with a weighted estimate of service availability (Joseph and Bantock, 1982).

$$A_i^* = \sum_j \left[F_j / \left(\sum_i P_i / d_{ji}^b \right) \right] / d_{ij}^b \qquad [3]$$

Joseph and Bantock (1982) applied these equations to the distribution of GPs in Southern Ontario using centroids of census tracts and the exponent on distance, *b*, set equal to 2. A series of ranges at 5, 10 and 15 miles were used in order to illustrate that although residents in some rural parts of the region had further to travel to access a GP, the potentially lower population served by such GPs, meant that they were likely to be more available to them. At the same time, gaps in potential spatial accessibility could be identified and, if time series data were available, temporal trends in accessibility could be commented upon.

The potential physical accessibility scores were calculated for GP surgeries and dental surgeries at two separate service ranges, 5km and 10km. The service ranges can be viewed as the maximum range of walking distance (5km) and a driving distance range (10km). Services across the border in England were included in the calculation of the scores in order to account for cross-border flows. The scores relating to the potential accessibility from the population at each ED to the nearest service were then aggregated to the community level by taking the average score across all EDs within a community. Therefore a range of data was produced at the community level for the whole of Wales based on the six different services covered and the two service ranges used; 5km and 10km. The patterns of potential physical accessibility created using these techniques are presented in Maps 5.9 to Map 5.12, which show the accessibility scores at 5km and 10km for the primary healthcare services, dentists and GP surgeries. At the 5km service range, or walking distance, the maps clearly indicate that large parts of rural Wales have very poor access to the services examined. Large numbers of rural communities in mid-Wales and south and north-west Wales have no access to such services at the 5km range (denoted by a score of zero in the maps). At the 10km service range, which denotes a need for some sort of method of transport, potential accessibility levels improve but GP surgeries, and, particularly, dental surgeries, are again inaccessible to large

numbers of communities even at a radius of 10km from demand points. In the case of dentists large clusters of communities in mid Wales, covering a wide area, are without access to such services.

Index of Public Transport Dependency

In studies of the influence of public transport on rural accessibility it is important to determine a series of demand indicators for public transport and supply indicators based on the availability characteristics of local public transport networks. Demand indicators may be defined as identifying the spatial variation in demand for transport services in a locality. In this respect, Nutley (1980) refers to the importance of the spatial variation in access to private transport as an indicator of potential *mobility*. Developing this theme further, Nutley attempts to identify the actual population that do *not* have access to private transport in a locality in order to devise indices of dependence on, and hence demand for, public transport (Nutley, 1980). Two indices of public transport dependence may be formulated; firstly, an Index of Total Dependence expressed as the number of people in 'non-car' households as a percent of total population, and, secondly, an Index of Partial Dependence based on the number of people in 'one-car' households, less the number of such households as a percent of the total population. This may represent the probability that the family car is used by one person most of the time, thus leaving the rest of the household at least partially dependent on other modes of transport. A further demand indicator may be devised by combining the Partial and Total public transport indices into a 'composite' index of dependence simply by weighting each by 0.5. Communities that then score highly on this index may be regarded as most in need of public transport alternatives due to relatively lower car availability levels (all three demand indicators may be derived from the UK Census of Population Small Area Statistics). These three indices of pubic transport dependency were developed by Nutley (1980) at the parish level for rural Wales using 1971 Census data. They have been replicated here at the community level for the whole of Wales using 1991 Census data.

Comparison with Nutley's (1980) work in Welsh parishes is problematic due to boundary changes in the interim period but there are a number of general trends that may be highlighted. In terms of the demand indicators highlighted above the proportion of the population in rural parts of Wales that are dependent on public transport has obviously fallen overall given the increase in car ownership between the 1971 and 1991 censuses. Map 5.13 in ***Appendix Ch.5*** displays the population totally dependent on public transport in Welsh communities in 1991 and clearly shows that rural parts of Wales (large areas of mid and west Wales) have very small proportions of the population (less than 10%) totally dependent on public transport. This contrasts with the situation recorded by Nutley whereby the same areas had public transport dependence levels up to 20%, or even 30% in some areas of mid and west Wales - a figure only reached by the urban areas of Wales in 1991. The proportion of the population partially dependent on public transport, shown in Map 5.14 reveals a higher incidence of this group within rural areas, with many communities in mid and west Wales falling within the top quintile of partial public transport dependency (more than 30%). This suggests that in rural areas where levels of car ownership are very high there is still a potentially high demand for public transport services, and points to poor mobility levels at the intra-household level. Nutley's study identifies a similar pattern but, again, with much higher levels of dependence; in large areas of rural mid and west Wales partial public transport dependency levels were commonly higher than 40% and in some parishes over 50% (Nutley, 1980). A composite index of public transport dependence, shown in Map 5.15, indicates that on average public transport dependency in rural parts of Wales ranges from 10-20% with some 'pockets' of communities reaching as high as 25% or above. Clearly this raises doubts over claims that rural dwellers have high levels of private mobility and indicates that large proportions of the population are, at least at times, dependent on public transport services.

There are problems with any area based assessment of transport provision - as Jordan and Nutley (1993) stress, the fact that there can be wide variations in bus services within larger communities or wards suggests that it may be more profitable to look at accessibility at the settlement / village level. This involves matching settlement locations against bus routes and, in their study in Northern Ireland, permitted scores to be allocated to villages using an arbitrary weighting system based on absence/presence and frequency of services. A composite index can be calculated from these individual component scores in order to ascertain overall accessibility for each village. This is then averaged for villages within wards to give an overall ward score. This accessibility 'index' can then be compared to measures of private transport availability in order to identify those wards which are highly dependent on public transport in the face of a lack of such services. One way in which this research could be taken forward could be repeat this analysis at the settlement level taking population size as a selection criterion (Higgs and White, 2000).

Further analysis of the public transport based indicators (particularly the demand indicators) is outlined in the next section in relation to the accessibility and isolation indicators outlined previously and in relation to measures of disadvantage and deprivation.

5.5 COMPARISON OF SERVICE-BASED INDICATORS AND STANDARD DEPRIVATION INDICES

The next stage of the analysis could involve a comparison of the current distribution of services, and the spatial variation in the accessibility and isolation indicators, with need based on population and deprivation measures. Further work is needed to establish if the communities of highest disadvantage on standard indicators are also those losing services. Previous research in Cheshire seems to suggest that deprived enumeration districts were actually well served (Cheshire County Council, 1994) but more research is needed to see how

replicable these findings are in other rural areas. In this section we compare the different indicators relating to isolation, accessibility to services, and deprivation in Wales by statistically and graphically analysing the degree of overlap between these different measures. The aim is to assess, using statistical techniques, how these indices relate to one another and also to compare them with deprivation indicators to determine how the indicators that identify rural problems relate to indicators that purport to identify *deprived* communities throughout Wales.

The various indicators outlined above relating to accessibility to services, isolation and public transport dependency were correlated with deprivation indicators and other Census variables to determine general relationships between them. Firstly, the raw values for the different indicators were correlated and the results of this analysis are presented in Table 5.5. A pattern that emerges is of a negative correlation between the two isolation indices A5 and A6 and the other indicators which include potential physical accessibility indices, deprivation indicators and public transport dependency indicators. This negative relationship is fairly strong (around -.5 and -.6) with some of the deprivation indices and the public transport dependency indicators (which tend to highlight urban communities) suggesting that isolated communities are not being highlighted by standard indicators of disadvantage. There is a fairly weak positive relationship (around .2 - .4) between the potential physical accessibility indicators and the deprivation indicators suggesting that communities with lower levels of accessibility are also scoring low on standard deprivation indicators.

Table 5.5 Correlation coefficients between different indices (raw values)

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
A1	1.00											
A2	.938	1.00										
A3	.851	.831	1.00									
A4	.756	.834	.923	1.00								
A5	-.356	-.386	-.352	-.372	1.00							
A6	-.307	-.347	-.312	-.341	.885	1.00						
A7	.295	.333	.253	.298	-.366	-.317	1.00					
A8	.436	.458	.396	.419	-.625	-.541	.726	1.00				
A9	.279	.305	.215	.253	-.436	-.399	.854	.464	1.00			
A10	.367	.406	.316	.258	-.646	-.548	.952	.714	.835	1.00		
A11	.217	.230	.147	.181	-.137	-.118	.654	.243	.748	.599	1.00	
A12	.276	.316	.239	.289	-.501	-.445	.919	.484	.913	.895	.663	1.00

Key :

A1 : Pot. Accessibility to doctors (5Km band)

A2 : Pot. Accessibility to post offices (5Km band)

A3 : Pot. Accessibility to doctors (10Km band)

A4 : Pot. Accessibility to post offices (10Km band)

A5 : Chi Square Isolation Index

A6 : Z Score Isolation Index

A7 : Welsh Office Index

A8 : Total Pub. Trans. Depend.

A9 : Townsend Index

A10 : Composite Dependency

A11 : Index of Local Conditions

A12 : Breadline Britain Index

This basic correlation analysis can be enhanced by calculating the rank of each of the communities in Wales based on each of the measures described above and comparing the performance of each community on all the indicators. The results of the correlation analysis carried out on these rankings is presented in Table 5.6. The patterns and trends identified by correlating the raw values of these indices (Table 5.5) are accentuated by the ranking exercise and there is a striking negative relationship highlighted between the accessibility / isolation indices (R1-R6) and the deprivation indicators and public transport dependency indicators (R7-R12). This negative relationship is particularly strong between the isolation indices and the Breadline Britain and Townsend deprivation

indicators and the composite public transport dependency index. Strong positive relationships are identified between the different isolation and accessibility indices suggesting that these measures are identifying broadly the same communities as having poor accessibility levels.

Table 5.6 Correlation coefficients between different ranks of indexes

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12
R1	1.00											
R2	.830	1.00										
R3	.891	.751	1.00									
R4	.709	.777	.796	1.00								
R5	.480	.574	.568	.722	1.00							
R6	.481	.572	.569	.722	.994	1.00						
R7	-.365	-.455	-.385	-.508	-.738	-.738	1.00					
R8	-.177	-.272	-.155	-.266	-.778	-.777	.793	1.00				
R9	-.089	-.125	-.016	-.064	-.141	-.142	.504	.298	1.00			
R10	-.312	-.357	-.285	-.312	-.473	-.476	.679	.488	.601	1.00		
R11	-.304	-.362	-.313	-.399	-.600	-.602	.874	.591	.563	.694	1.00	
R12	-.251	-.314	-.244	-.329	-.516	-.516	.812	.551	.702	.776	.887	1.00

Key :

R1 : Pot. Accessibility to post offices (10Km band)
R2 : Pot. Accessibility to post offices (5Km band)
R3 : Pot. Accessibility to doctors (10Km band)
R4 : Pot. Accessibility to doctors (5Km band)
R5 : Chi Square Isolation Index
R6 : Z Score Isolation Index
R7 : Composite Dependency
R8 : Tot. Public Trans. Depend.
R9 : Index of Local Conditions
R10 : Welsh Office Index
R11 : Breadline Britain Index
R12 : Townsend Index

5.6 ADVANTAGES AND LIMITATIONS OF DERIVED INDICATORS

The measures outlined in section 4 have largely developed from the use of the survey information. We have been concerned with the use of GIS techniques to generate measures of geographical accessibility to services in rural Wales. As Love and Lindquist (1995; p. 629) suggest 'detailed accessibility measures permitted by geographic information system technology call into question the continued use of crude empirical accessibility measures'. In particular, the advanced spatial analytical capability offered by GIS, in tandem with the types of disaggregate data of public services collated in this study, presents opportunities to refine existing measures. In the present study, a measure of accessibility to key services is calculated at the aggregate level of the community for the whole of Wales, adopting a network modelling exercise within a Geographic Information System (GIS) to ascertain the minimum distance that the population of Welsh communities need to travel to essential services. We have calculated the average distance needed to be travelled from a demand point to services for the whole of Wales and then used this to calculate the z score for each service (in order to standardise the score), summed the unweighted z-scores and plotted maps of these values. We have also compared these maps to maps of the chi-square index using the observed and expected distances to services from the demand points.

These indices are, of course, not without limitations; for example, rather simplistically, in the absence of detailed network data such as road speeds, actual distances across the network are the main criterion, as opposed to time of travel. It should be possible, however, to use the GIS to substitute physical distance by travel times given detailed information on maximum road speeds. Assumptions are also made with respect to the *potential* of individuals to avail themselves of transport opportunities, private or public. The indicators currently take no account of the differential mobility of residents. In such instances, the mode of transport will be of particular significance and indicators could be

weighted according to rates of car ownership and should ideally incorporate measures based on travel speeds by car and public transport. Another factor is that different social groups are likely to have differential access to services and, in such circumstances, it is extremely unlikely, given differing socio-economic circumstances of individuals, that each will have the same ability to pay for a particular mode of transport. It is also assumed that people will avail themselves of the facility / service that is closest to their home location. Again, this may be too simplistic where there is a greater choice of such facilities but, in the absence of detailed individual household behaviour data, would appear to be realistic given generally low service provision levels in rural areas. In addition, by using the centroid of the community, the analysis is not taking into account the dispersal of people within the communities. To improve on the methodology it is necessary to know something about the residential patterns within each community. In theory, however, the indicators could be based on as disaggregate a scale as possible so that it is possible to aggregate to user-defined units. The indicators developed also take no account of the quality of provision and this would ideally require information regarding, for example, the opening times of facilities in order to tailor these measures to local circumstances (Higgs and White, 2000).

To summarise, the indicators developed during the course of the project are largely measures of physical accessibility, and have not been concerned with measures of socio-economic accessibility - for example, no attempt has been made to model people's ability to pay for a service. In this regard, in the absence of detailed information, no attempt is made to gauge levels of utilisation of services or to take on board the quality of service provision (Higgs and White, 2000). The latter, in particular, is an important component of any comprehensive study of accessibility levels. Such an approach would need to examine detailed patterns of utilisation (or revealed accessibility) of services and characterises much of the work of Moseley (1979) and Nutley (1981). This would require information, for example, on the opening hours of facilities, data on whether or not the service provided is affordable to individuals and also whether the person's time-space budget would permit access to the service.

Clearly, working at the all-Wales level, this has not been possible within the cost and timescale budgets of the project but the development of indicators of this nature does suggest communities that are worthy of further study.

5.7 DISCUSSION

Deprivation in rural contexts is clearly a multi-faceted concept; in such circumstances, it is extremely unlikely that one indicator is capable of describing the experiences of individuals and households within rural areas. This re-iterates much of the research findings from the accessibility studies reviewed in chapter two in that deprivation can be sub-divided into separate components - each of which contribute to the overall levels of poverty experienced by individuals and are capable of being modelled. Clearly a major assumption in any exercise of this nature is that, given the heterogeneous nature of disadvantage in rural settlements and the dispersed populations, such measures are able to capture deprivation levels at a sufficiently fine scale. In an ideal world, we need data at the individual or household levels which reflect the utilisation of services and data on the quality of service provision in relation to the nature of interaction by all sectors of the community. However, the lack of temporally and spatially consistent data sets of this nature has led to the types of approach adopted in this study.

The aim has not been to distinguish specifically between rural and urban aspects of deprivation. As a report by the RDC (1998b; p. 71) has suggested 'rural disadvantage is not, on the whole, distinctive in any significant way from disadvantage in an urban area'. There are obviously communities suffering deep-seated deprivation within urban areas of Wales. At the same time, rural areas have been shown to be experiencing important demographic and social changes which have had major implications for changes in facilities and local transport provision but which tend to be less visible in many rural communities given the geographical dispersion of the population. A recent project which examined central government resource allocation mechanisms for local authority services (through the Standard Spending Assessment methodology),

including: health, housing, and for Training and Enterprise Councils (TECs), found that the urban bias of the indicators used in the formulae had detrimental impacts on the level of funding for rural areas (Rita Hale and Associates, 1996). This study followed on from research, much of which has been unpublished, by those local authorities in England and Wales with large rural populations, in which failure to take into account factors such as the relative isolation and sparsity of such communities and the higher costs of service provision were found to have significant impacts on resource allocation and worked to the disadvantage of rural areas (Higgs and White, 2000).

This research was concerned with developing indicators which measure facets of deprivation which have been deemed to be important distinguishing features of rural areas (lack of accessibility, poor levels of transport provision, lack of services). As Jordan and Nutley (1993) suggest, changes in the provision of services in one sector are not necessarily duplicated in another although many of the factors determining such trends may be related (e.g. problems of servicing areas of dispersed low populations). Similarly, many of these trends are common to some urban areas (e.g. peripheral estates) and these indicators could have been developed in relation to these kinds of areas (Higgs and White, 2000).

Chapter Six – Primary Healthcare Services in Wales in 2004.

6.1 INTRODUCTION

This chapter outlines the analysis undertaken of health services in Wales as a whole for the year 2004 and, more specifically detailed analysis of the primary healthcare services in the case study area of Gwynedd in north Wales – a largely rural area as detailed in chapter four of this thesis. The analysis covers, where possible, a similar scope to the analysis undertaken for the baseline analysis carried out in chapter five for the year 1996. Specifically, an analysis of the census characteristics for Wales from the recently released 2001 census is undertaken before considering the results of an updated survey of Welsh Rural Services in Community and Town Councils carried out in 2004. The analysis then considers new analysis of accessibility levels to key health services in Wales using 2004 point level data before looking at the case study area in detail and assessing the characteristics of primary healthcare services in Gwynedd, with a particular focus on the pharmacy sector. The chapter helps shed light, to some extent, on three of the five research questions highlighted in Chapter One of this thesis, namely;

2. To assess the contribution of different factors influencing the static and dynamic spatial characteristics of rural health care services with specific reference to pharmacies

3. To explore the role of GIS-based approaches in the study of static and dynamic organisation of demand for and supply of rural health services

4. To illustrate the practical aspects of the above with a case study of Welsh rural areas.

6.2 CENSUS ANALYSIS

This section highlights the socio-economic characteristics of wards in Wales taken from the 2001 Census. This is initially undertaken through a map analysis of all wards in Wales drawing on a range of indicators, many relating to health issues, and these maps can be located in '***Appendix Ch.6***' at the end of this thesis. Correlation analysis is undertaken on the census variables to determine the extent of relationships between different variables before the analysis of census data focuses on the rural authority of Gwynedd with detailed comparison between this area and other rural, urban or valley areas of Wales.

Map 6.1 to Map 6.3 in ***Appendix Ch.6*** display age profile data for Welsh wards from the 2001 Census. These maps clearly display the 'ageing population' profile of rural Wales that has been alluded to elsewhere (e.g. WAG, 2001), with large percentages of the population over 50 years old (Maps 6.2 and 6.3) present in rural areas of Wales, particularly in Powys, Ceredigion and parts of Gwynedd, Carmarthenshire, Monmouthshire and Pembrokeshire (for the Unitary Authority map of Wales see ***Appendix Ch.4***). The three maps show that the situation in Gwynedd is quite complex with some wards having quite large proportions of young people (in the top quintile) as well as a large proportion of wards with high percentages of elderly people.

Map 6.4 displays the proportion of non-Welsh people who were at a different address outside Wales one year previous to the Census as a proportion of all moved and shows that the majority of these in-migrants are locating in rural areas of Wales particularly along the border areas of Powys and Monmouthshire and in parts of Ceredigion and Gwynedd, with other concentrations in coastal regions. In Gwynedd this pattern is again not uniform with the rural southern

areas of the county and the Llyn Peninsular experiencing higher proportions of in-movers compared to more urban/industrial areas around Caernarfon and Bangor and the northern coast.

Maps 6.5 to 6.7 display the results of 2001 Census data on self-reported health in Welsh Wards and show a clear urban-valley-rural differential. Map 6.6 displays the proportion of those who report that their health was good and this is clearly concentrated in rural areas of Wales, and north Wales in particular. The valley areas and parts of West Wales (particularly Ceredigion) have much lower percentages of people who consider their health to be good. The reverse is true when looking at Map 6.7 which displays those who consider their health to be Not Good. Here the valley areas of South Wales, parts of the urban areas of Swansea, Newport, Wrexham and Cardiff, and the northern coastal areas have high proportions of people who consider their health 'not good'. It should be remembered when assessing these indicators that we are dealing with self-reporting of well-being which is clearly subjective, open to interpretation and may vary due to socio-cultural characteristics of localities.

Perhaps a more accurate picture of health levels in Welsh Wards is provided by Map 6.8 in ***Appendix Ch.6*** which displays the proportion of the population experiencing Limiting Long Term Illness (LLTI) from the 2001 Census. Here the pattern mirrors somewhat self-reported evidence of ill-health but as well as the valley and urban areas of Wales having high proportions of the population with LLTI, there are pockets of high incidence of LLTI throughout rural areas of Wales and, in particular, relatively high levels of the indicator across large parts of Gwynedd.

Maps 6.9 and 6.10 provide a visualisation of car ownership levels in Welsh Wards in 2001. Map 6.9 displays the proportion of households with no car or van which has often been used as a proxy indicator for income but is less useful in a rural setting where car ownership is more of a necessity than in an urban setting (Nutley and Thomas, 1992). This is borne out by Map 6.9 which

displays high levels of car ownership in rural areas of Wales with only pockets of low car ownership in the major rural settlements of Wales and, interestingly, in parts of Gwynedd (which has a number of wards in the third or fourth quintiles on this indicator). Map 6.10 shows that in rural areas it is often necessary to have 2 cars in a household as personal mobility will be greatly reduced for those without access to the household, or family, car during working hours. Many rural areas of Wales have between 40 and 65% of households with 2 or more cars. Map 6.11 in ***Appendix Ch.6*** is interesting in that it highlights the distance that needs to be travelled by individuals to their place of work with 70-80% of people travelling more than 10km to work in large parts of rural Wales, particularly in rural north Wales including Gwynedd.

Map 6.12 displays the Townsend Deprivation Index calculated for 2001 Wards. The index has been widely used in the UK as a standard indicator of social deprivation (Townsend, 1987). The index is said to have something of an urban 'bias' and clearly parts of urban areas and the valley areas of Wales do score highly on this Index. However, there are pockets of deprivation identifiable from the Townsend Index in rural parts of the country and, in particular in the Gwynedd and Anglesey areas suggesting that there are real underlying social problems in this area of rural Wales.

Maps 6.13 and 6.14 in ***Appendix Ch.6*** examine socio-economic characteristics in more detail, namely the percentage of the population with no qualifications and the percentage unemployed in Welsh wards. The largest concentrations of those with no qualifications are located in the valley and urban areas of the country, in rural areas, however, there are concentrations of this particular indicator (in terms of those in the fourth and fifth quintile) in parts of Powys, Gwynedd, Anglesey and Ceredigion. Map 6.14 displays the percentage of unemployed people from the 2001 Census and whilst high levels are to be expected in the valley areas of Wales and some parts of the urban centres, there are clear concentrations of unemployment in pockets across rural Wales but especially so in Gwynedd and Anglesey which have a large proportion of wards

in the top two quintiles – similar in profile to the South Wales Valleys. Finally Map 6.15 displays the percentage of people who speak, read and write Welsh and here the familiar pattern of the Welsh speaking heartlands of South and North West Wales emerge with up to 80% of the population Welsh speaking.

The following analysis relates to a more detailed tabular breakdown by Unitary Authority in Wales of some of the 2001 Census variables covered in the map analysis above, as well as a number of additional Census variables. Here the Unitary Authorities have been categorised according to their Urban, Valley, Rural or 'other' status (other=mix of urban and rural). The analysis has been further categorised within the table analysis in terms of sparse, medium and dense population densities (sparse = less than 150 people per sq. km., medium = 150-1500 people per sq. km, dense = more than 1500 people per sq. km.). The tables referred to below can be found in ***Appendix Ch.6***.

Table 6.1 displays the distribution of population by population density in Unitary Authorities of Wales. A third of the population in Wales live in the nine rural Unitary Authorities, but only 18% of the population live in sparsely populated areas. The share within sparse Electoral Divisions is obviously much higher in rural authorities, however, with the highest proportions being Powys with 69% in sparse electoral divisions, Ceredigion with 59%, and Gwynedd with 54%.

Table 6.2 displays the percentage of Vacant Dwellings from the 2001 Census (ranked by the average share for all Electoral Divisions), and visualised in terms of sparse, medium and dense population densities. This is a problem that particularly affects the valley and rural authorities with higher proportions of vacant dwellings at all population densities for these categories of authorities. It is a particular problem in Gwynedd, Anglesey and Pembrokeshire.

Table 6.3 displays the percentage of Second Homes or Holiday Dwellings from the 2001 Census. This is an issue that is most prevalent in the rural authorities of Anglesey, Pembrokeshire and, particularly, Gwynedd with 7.8% of its dwelling stock second or holiday accommodation.

Table 6.4 displays the percentage of Households rented privately from the 2001 Census. This is a feature of the housing market in rural areas of Wales and is most prevalent in the rural authorities of Conwy, Denbighshire, Anglesey, Pembrokeshire, Powys, and Gwynedd with around 15% of the share of occupied households in this tenure group in these areas.

Table 6.5 displays the percentage of households without access to a private car, again visualised in terms of sparse, medium and dense population densities. As in the map analysis above this is not such an issue for rural areas of the country but it has long been recognised that this is a poor indicator of social exclusion in rural areas as ownership of a car is often a necessity in order to access employment or key services.

Table 6.6 displays the percentage of unemployed persons aged 16-74. Apart from the valley authorities, rural authorities have the highest incidence of unemployment (although this is marginal) and Gwynedd and Anglesey have the highest proportions of all rural authorities, indeed higher than all authorities in the case of Anglesey with only Blaenau Gwent having higher levels of unemployment than Gwynedd.

Table 6.7 displays the percentage of unemployed persons aged 16-24. Rural areas have a relatively low share of this indicator across the various population density categories and the valley communities suffer most from young unemployment.

Table 6.8 displays the percentage of persons with no recognised qualification. Rural areas have a relatively low share of this indicator across the various population density categories, although higher than the share for urban authorities.

Table 6.9 displays the percentage of persons aged over 64. All rural authorities, apart from Monmouth, score highly in terms of their share of this population group with Powys, Denbighshire and Conwy having the highest percentage share. In Gwynedd, 19% of the population fall within this population age category.

Table 6.10 displays the percentage of persons with limiting long term illness from the 2001 Census. Apart from the valley authorities, rural areas have a relatively large share of this particular indicator, with Carmarthenshire the highest out of the rural authorities. The figure for Gwynedd is below average with around 20% of the population there affected by LLTI.

Table 6.11 displays the percentage of households with dependent children from the 2001 Census. Rural areas have the lowest share of household with dependent children – reinforcing the evidence of an ageing population in rural Wales identified previously in the map analysis.

Table 6.12 displays the proportion of people who reported that their health was 'not good' in the 2001 Census. Gwynedd along with Monmouthshire have the lowest levels of this particular indicator as noted previously in the analysis of Map 6.7.

Table 6.13 and Table 6.14 in ***Appendix Ch.6*** display correlation co-efficients for the Census variables employed in the preceding map analysis. Table 6.13 is

a Pearson Product Moment Correlation analysis and Table 6.14 a Spearman Rank Correlation (to allow for a more effective analysis of the Z score index of the Townsend variable). Examining Table 6.14 in more detail we can take two variables – Limiting Long Term Illness and % Unemployment as comparators and assess the relationships with the other variables in the analysis based on these standard health and economic status indicators. Taking LLTI, Table 6.14 displays a number of significant relationships at the all-Wales level. It is strongly positively correlated with self reported ill health (notgood - .942) although as we have seen in the map analysis there are significant spatial variations in this correlation. It is also positively correlated with nocar% (.636), noqual% (.729), unemp% (.529), and TOWN (.531). Taking the unemployment variable (unemp%) from the same table we can see significant positive relationships with households with no car (.651), the Townsend Index (.767), and routine occupations (.603).

If we take the wards of Gwynedd separately and perform the same Pearsons and Spearman correlation we can look at the same variables in more detail for this area – Tables 6.15 and 6.16 in ***Appendix Ch.6***. Taking LLTI first, and using the Spearman rank correlation in Table 6.16, we can identify a number of significant relationships with the other census variables but these are weaker than for the all-Wales analysis. Positive correlations can be identified between LLTI and nocar%(.330), health not good (notgood -.785), noqual (.585), and TOWN (.303). Taking % unemployment again the correlations are weaker than the all-Wales level with households with no car (.567), the Townsend Index (.625), and routine occupations (.583).

This analysis of census data has provided a broad picture of the socio-demographic profile of rural Wales vis-à-vis other parts of Wales and highlighted the county of Gwynedd in some detail. In broad terms Gwynedd displays many of the characteristics of other rural areas of Wales with an ageing population, high levels of self-reported good health, high levels of households with two or more cars, and a high proportion of private rented households and

second/holiday homes. Gwynedd also has a number of socio-economic problems often associated with 'valley' areas of Wales, however, with high percentages of unemployed people and relatively high levels of deprivation in parts of the UA measured on the Townsend score.

6.3 Survey of Rural Welsh Services 2004

This section outlines results from a survey of rural services undertaken by the author in 2004 for the Welsh Assembly Government as part of the WAG's Wales Rural Observatory research initiative. This survey represents the first attempt to survey levels of service provision in rural Wales since the 1996 survey which was described in chapter five of this thesis (Higgs and White, 2000). The survey, in keeping with the Higgs and White study, took the Community Council (or Town Council) as the unit of analysis with questionnaires being sent to all Community/Town Clerks in rural areas of Wales. The survey achieved a response rate of nearly 70% and a summary of the key findings from the questionnaire relating to primary healthcare services are presented here (White and Hughes, 2005).

A first step in carrying out the Survey of Rural Services was to identify those rural Community Councils to be included in the study. Following discussions with the Welsh Assembly Government it was decided to employ the standard Unitary Authority definition of urban and rural areas used in Wales; the 9 Rural Unitary Authorities plus parts of 3 others – Flintshire, Vale of Glamorgan and Wrexham. Unitary Authorities classed as 'Valleys' or 'Urban' were excluded from the study. Community and Town Councils were then identified in the rural areas of Wales and a mailing list drawn up of Community and Town Council Clerks.

A questionnaire was compiled drawing together elements of the Countryside Agency surveys and the previous study undertaken in Wales by Higgs and White in 1996 (Higgs and White, 2000). This would allow for comparison with the situation in England at the time of the last Countryside Agency survey (CA, 2000), and an analysis of changing service levels in Wales since 1996. The questionnaire primarily asked for numbers of particular service facilities within a Community Council or, in some cases whether or not a service was present or not. Where it differs from the Countryside Agency surveys is in terms of requests for additional views on whether service levels are adequate and where they might be improved – this qualitative element to the survey is important in giving context to the raw figures on supply. The questionnaire also requested information on whether or not there have been service closures or openings over the five years prior to the survey. It is important to add a caveat at this point, the survey relied on the local knowledge of the respondent and while one would expect this to be very accurate in most cases it is possible that errors are made in determining the numbers of a particular service in a Community Council, particularly where a facility lies close to the Council boundary.

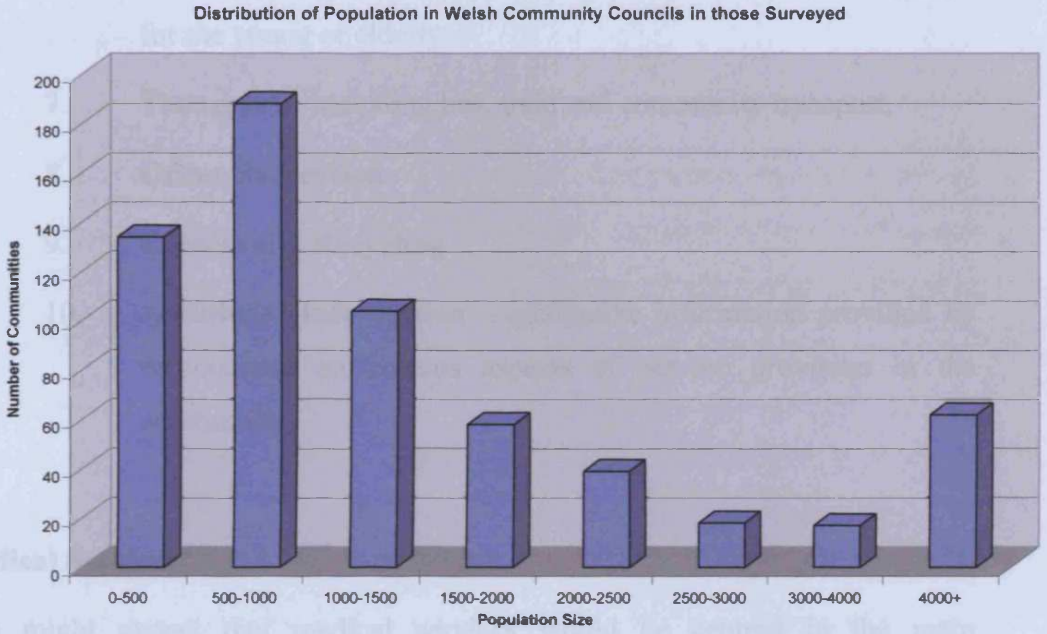
Following a period of piloting the survey it was felt that the questionnaire would prove difficult to complete for the larger Town Councils. Therefore an alternative questionnaire was devised for those councils with a population over 4,000 which covered the same key services but could be completed with relative ease through the use of categorical questions for numbers of a particular service, for example, less than 5, 5-10, 10-15, more than 15 etc. This allowed for a good response from some of the larger settlements in rural Wales which are of key importance in terms of the delivery of services to rural residents.

At the time of writing the response rate stands at 69% which compares favourably with the survey response to the Countryside Agency surveys in England. Map 6.16 in Appendix Two displays the response rate together with those communities not surveyed and it is clear from Map 6.16 that the response

is fairly uniform, in spatial terms, with no obvious concentrations of gaps in response across rural Wales.

The question of population distribution in the Town & Community Councils surveyed is an important one as it will often be the case that particular services are more likely to be present in areas with higher population concentrations. Figure 6.1 displays the number of Town & Community Councils within particular population bands in the surveyed communities. Clearly a large proportion of those Town & Community Councils surveyed have populations below 500 and between 500-1000 people. In these Community Council areas we might expect relatively low levels of service provision beyond the most basic service facilities (shop, pub, post office, primary school). The population distribution in surveyed Communities is also shown in spatial terms in Map 6.17 in ***Appendix Ch.6***. This clearly shows the high concentration of Town & Community Councils below 1000 population across rural mid and west Wales.

Figure 6.1 : Pop. Distribution of Surveyed Welsh Town & Community Councils.



The findings from the Survey of Rural Services in Wales included data on a wide range of services as listed below but this section of the report will only include information on medical services from the survey results.

1. **Shops and Other Services** – this section includes permanent shops, post offices, farmers markets, food outlets, petrol stations, banks and buildings societies, and public houses,
2. **Medical Services** – this section includes GP surgeries, dental surgeries, pharmacies and branch services,
3. **Education and Day Care** – this section includes pre-school facilities, schools, and day-care services for the elderly or disabled,
4. **Places of worship**
5. **Information and Welfare** – including libraries, internet facilities, affordable housing information, support services for vulnerable groups and advice services,

6. **Recreation Facilities and Community Activities** – including meeting places, play areas, sports facilities and clubs or groups for the young or elderly

7. **Transport** – including bus, train and community transport,

8. **Crime Prevention**

9. **Community Recycling**

10. **Additional Information** – qualitative information provided by respondents on various aspects of service provision in the community.

Medical Services

One might expect that medical services would be centred in the main settlements in rural areas of Wales. For particular types of primary medical service – the GP surgery or dentist, a population base is essential to provide the adequate customer base, or 'list size'. This section highlights the provision or otherwise of GP surgeries, health centres, dental surgeries and pharmacies from the 2004 Survey of Rural Services. General levels of provision based on all responding Councils are as follows; 68% of Councils have no GP Practice, 84% have no dental practice, and 75% of responding Town and Community Councils have no pharmacy service. The following analysis considers in more detail variation in provision based on population size of responding Councils.

Table 6.17 shows Town & Community Councils with or without a GP surgery. As expected in population bands below 1000 people, less than 15% of communities have a GP surgery (as low as 2.7% in the 400-500 band). In the 1000-2000 population band (32.3% have a surgery) and the 2000-4000 band (66.7% have a surgery) there are still a significant proportion of the communities with no GP surgery. Again provision of health centres are strongly correlated with population with only the highest population bands with significant levels of provision of health centres (Table 6.18).

A number of respondents mentioned that their communities possess branch or satellite surgeries; some suggested, however, that whilst this type of facility had been available it has subsequently closed:

> *"Two GP surgeries have closed over the last six months; this [service] has been greatly missed to the community, especially those who do not have transport, or are not fit enough to travel 10 miles on a bus to get to the nearest surgery"* (pop. 0-400).

Dental surgeries are clearly customer dependent and are un-regulated (i.e. the dentists can locate where they wish). This is reflected in Table 6.19 which clearly shows that there are only dental surgeries located in communities with over 1000 people – and only significant levels in the 4000+ category. The provision of pharmacy services again follows that of GP and dental services, tending to concentrate in the higher population bands (Table 6.20).

A large proportion of respondents suggested that there was a need for the provision of local dental surgeries and particularly those operating within the National Health Service (NHS):

> *"Need a dentist in the area"* (pop. 2000-4000)

> *"Dental service at the local town has left [the] NHS and gone private"* (pop. 400-500)

Whilst a pharmacy may not be physically located in the community, several respondents highlighted the provision of a mobile / delivery prescription service serving the area. Similar to the comments made in relation to the provision of shops and other services, a large number of respondents suggested that there was adequate provision in nearby towns:

"This rural community adjoins a market town where good medical and dental facilities exist" (pop. 2000-4000)

"Doctors, dentist and pharmacies available 5 miles away" (pop. 700-1000)

Again, it was implied that being located outside of the community, had ramifications on those people who do not have access to a car or public transport. Other comments made related to demographic issues; for example, one community respondent implied that their '*community is increasing but facilities are decreasing*' (pop. 2000-4000), another pointed to the impacts of an ageing population on doctor's waiting lists:

"Expanding elderly population causes long waiting times" (pop. 1000-2000)

Map 6.18 in ***Appendix Ch.6*** displays the numbers of GP surgeries within responding communities and clearly there are large numbers of Councils who are lacking this service facility in parts of mid and west rural Wales. Concentration of this service does tend to be in the Councils with larger populations (refer to Map 6.17 for the population distribution across rural Wales). The red shaded areas signify respondents who were unable to accurately answer this particular question.

Map 6.19 in ***Appendix Ch.6*** displays the number of dental surgeries in responding Town & Community Councils and clearly reflects the trends identified in Table 6.19. The majority of rural Councils who responded to the survey are lacking this medical service. The red shaded areas signify respondents who were unable to accurately answer this particular question.

Map 6.20 Again show large proportions of Town & Community Councils with no pharmacy provision within their boundary – this is particularly the case

across rural mid-Wales. The red shaded areas again signify respondents who were unable to accurately answer this particular question.

Table 6.17 : Proportion of Town & Community Councils with or without a GP Surgery.

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no GP	94.2	97.3	96.3	95.7	85.7	67.7	33.3	9.9
One or more GP surgery present	5.8	2.7	3.7	4.3	14.3	32.3	66.7	90.1

Table 6.18 : Proportion of Town & Community Councils with or without a Health Centre.

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no health centre	97.1	100	100	95.7	96.7	88.4	77.8	38.6
One or more health centre present	2.9	0	0	4.3	3.3	11.6	28.2	61.4

Table 6.19 : Proportion of Town & Community Councils with or without a Dental Surgery.

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no dentist	100	100	100	100	100	89.6	60.5	25.0
One or more dentist present	0	0	0	0	0	10.4	39.5	75.0

Table 6.20 : Proportion of Town & Community Councils with or without a Pharmacy.

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no pharmacy	100	97.2	96.3	95.7	91.9	79.3	35.0	9.1
One or more pharmacy present	0	2.8	3.7	4.3	8.1	20.7	65.0	90.9

The Surveys of Rural Services undertaken in Wales by the author in 1996 and 2004 are returned to again in chapter seven when analysis of the changes that have occurred during that timescale are analysed in more detail.

6.4 Accessibility Analysis of Primary Healthcare Services 2004

In order to replicate the accessibility analysis of primary healthcare services for 1996 carried out in chapter five of this thesis it was first necessary to collect information on healthcare services for Wales in 2004. This was undertaken by contacting the NHS in Wales and the Welsh Assembly Government to secure lists of postcoded facility information for GP surgeries, dental surgeries and (unique to the 2004 analysis) pharmacy services. This data was collected for all Wales and also for all English Authorities bordering Wales, in order to avoid a 'border effect' along the England-Wales border during the analysis. This would then allow for the analysis of accessibility levels to be reproduced for the situation in 2004. One major challenge was to try and ensure that the change in accessibility levels could be analysed between the two dates. A decision had to be made therefore about the population centroids to be used, the road network to be used and the final aggregate level of analysis. There were two options here: first, to use 2001 Output Area population centroids and a current road network, or; secondly to use the 1991 Enumeration Centroids as population centres in the accessibility analysis and the existing road network. If taking the second option this would mean having to re-aggregate the 1996 network distance scores to

2001 ward boundaries to allow comparison with the situation in 2004. This second option was chosen because it does allow for comparison of the two time periods as the same population centres and network have been use so any change identified is a change in levels of services in localities studied. There is obviously a problem here in using population centroids from one period for both the 1996 and 2004 services (and this problem works both ways whether 1991 or 2001 centroids are used), the aim has been to try and analyse change in accessibility levels of key services rather than present two snap-shots which could not then be compared effectively, hence the compromise. If one was to analyse the 2004 data independently then it would be preferable to use 2001 Output Area centroids and the latest network data. This change in access is examined in detail in chapter seven of this thesis. The following section therefore concentrates on the creation of accessibility indices for Wales based on 2004 primary health care services – GP surgeries, dental surgeries, and pharmacies. The process followed within the analysis was as follows:

1. Collection of primary health care services data (postcoded) and data entry to ArcInfo GIS
2. Construction of 1991 Enumeration District Population Weighted Centroids and Bartholomew's road network in the GIS,
3. Assignment of population centroids and service facilities (for 1996 and 2004) to the nearest node on the network (distances from node to service/centroid calculated)
4. Calculation of the network distance between the population centroids and service facilities based on their nearest nodes on the network
5. Aggregation of the distance measures from each centroid/service to the network node and the road network distance,
6. Calculation of the minimum distance from each ED centroid to each service,
7. This basic network distance between every ED centroid and every service facility was then aggregated to the community level by

calculating the average network distance of EDs to each service for every ED in a ward (2001 wards)

8. This measure was then further enhanced by weighting the network distance to each of the services by the population at the ward using 1991 Census population data for the 1996 data on services and 2001 Census population data for the 2004 service data thereby re-orientating the measure to an estimate of the average distance of people to services rather than ED centroids to services.

This process leads to the calculation of the first set of accessibility measures, termed Isolation Indices, which attempts to ascertain the minimum distance that the population need to travel to access primary health care services This measure of (in)accessibility to the key services held at point level in the database was calculated at the aggregate ward level for the whole of Wales, giving population weighted accessibility scores for GP surgeries, dental surgeries and pharmacies for the 2004 data and a re-calculated set of indices for the 1996 data at the 2001 Census Ward unit. The re-calculation of the 1996 accessibility at the 2001 ward level was made possible by constructing a 'look-up' table of 1991 Enumeration Districts to 2001 Wards and calculating the proportion of EDs within wards which allows that apportionment to be applied to the population of EDs in 1991 and therefore allowing 1991 Census data (e.g. population levels) to be presented and used in analysis at the 2001 Ward Level.

Maps 6.21 to map 6.23 in ***Appendix Ch.6*** display the unstandardised population weighted average network distance to services scores (or Isolation Indices as termed by Higgs and White, 2000) for the GP surgeries, dental surgeries and pharmacies across Welsh Wards in 2004. For Dental Surgeries (Map 6.21) there are clearly large parts of the rural areas of Wales that have poor access to this type of service facility with areas of Powys, Ceredigion, Pembrokeshire, Gwynedd and Anglesey most affected (note that the measure used here should not be read strictly as a distance measure as the average distance to a service has been weighted by the population). This is not a uniform pattern of good

accessibility in urban areas and poor in rural areas, however, as there are pockets of fairly good accessibility levels (the lighter shading) in rural parts of Wales (and also poor accessibility in valley or urban localities). This is an advantage of using network distance over straight-line distance as variations of this sort are highlighted in the modelled access measures.

In Map 6.22 in Appendix Ch.6 the population weighted average distance to GP surgeries in 2004 is displayed for 2001 Census Wards. Again a similar pattern emerges as that shown for dental surgeries in map 6.21 with large parts of the rural areas of Wales experiencing poor levels of accessibility with pockets of improved accessibility in some parts. Map 6.23 shows the same analysis for pharmacies in Wales in 2004 and although there are still major parts of rural areas with poor levels of accessibility there are larger areas of rural areas with improved levels of access to pharmacies compared to other primary health care services.

6.5 Characteristics of Primary Healthcare Services in Gwynedd, 2004

6.5.1 GP Services in Gwynedd

The single village doctor is now something of a rarity in many rural areas as GPs join together to exploit economies of scale and scope. Surgeries in outlying villages have increasingly been closed or downgraded, to be replaced by single surgeries serving what was the territory of several practices, and a system of branch practices at best. This is very much a feature of the Gwynedd area.

At a broad spatial scale there is a fairly even coverage of GP services, as shown in Map 6.24 in Appendix Ch.6, with the main practices clustered around the main centres of Caernarfon and Bangor in the north of Gwynedd. Apart from these areas, main practices are found in coastal settlements and the former industrial centres in the central area of Gwynedd, e.g. Blaenau Ffestiniog. There

are a number of single-handed practices around Porthmadog and on the northern coast. A concern of the local health professionals is that several single-handed GPs are approaching retirement and the anticipated difficulties of attracting replacement GPs to take on fairly small practices in this remote rural area[1]. A major deterrent in attracting new GPs into rural areas is the need to provide 'out of hours' cover (this has also been identified as a major problem by Powys Local Health Board). New GPs, in particular are tending to target placements where 'out of hours' work is light and this has led to new initiatives from LHBs in rural areas to try and reduce the 'out of hours' loads for new recruits. Powys LHB, for instance, has tried to promote the 'clubbing together' of GP practices to cover 'out of hours' workloads and this has been successful in reducing workloads and addressing this recruitment problem. For GP practices in very remote localities, however, this may not be a viable option.

A further feature of Map 6.24 is the distribution of branch surgeries within the locality and these form an essential component of the primary healthcare delivery mechanism in the region - far more so than in the urban areas analysed previously. Branch surgeries are particularly important in the middle and southern parts of Gwynedd and on the Llyn peninsular and are a significant resource for remote populations in these areas. The Health Board is trying to maintain the levels of service in these remote areas against the pressures to consolidate services at larger centres. The branch surgery system is also of great importance in other rural areas of Wales. In Powys, for instance, LHB professionals are committed to maintaining the branch system and support such services through funding of running costs and through provision of additional resource allocations to practices that maintain branch services. Where there is pressure to consolidate services, decisions are taken on a case by case basis taking rental and staffing costs into consideration and the potential impacts on patients in the locality.

[1] A number of initiatives are being tried to address the recruitment problems in the remote rural areas. In Anglesey, for example, these consist of Assembly funded grant incentives, and 'grass roots' initiatives such as funding of college bursaries aimed at attracting young local people into the profession.

Map 6.25 and Map 6.26 in ***Appendix Ch.6*** illustrates the variation in opening times that exist at these branch surgeries (by hours a week and days a week). The maps indicate immediately that a large proportion of the branch surgeries in the remote rural areas of south Gwynedd and the Llyn Peninsular are only open for one or two days a week and for less than five hours per week. Typically such services are located in local community facilities like church halls or village halls and operate for one or two hours on a couple of days a week. Some exceptions are apparent with a few large and well organised branch surgeries in Gwynedd that are open five days a week and for up to 25 hours and offer a large range of services including specialist clinics. Powys Health Group also have a number of branch surgeries with restricted opening times - these are termed 'occasional' services and they tend to pick up particular activities such as dispensing in remote areas. The Powys LHB is trying to promote full-time, or nearly full-time branch services although this is dependent on appropriate premises being available and staffing availability from local GP surgeries.

A further indication of the importance of such branch surgeries can be revealed by the accessibility (spatial proximity) maps shown in Maps 6.27 to 6.29. These are established by determining the distance from each enumeration district centroid to the nearest facility or service centre with the required characteristic. The distance is then banded, as shown, to portray differences in proximity, from good (light shading) to poor (dark shading) access. Map 6.27 gives the distribution of proximity to main surgeries, which shows that large areas of the south of Gwynedd and parts of Anglesey and the Llyn Peninsular have poor physical access. Distances between 10 and 15 km to access such facilities are experienced by some population groups (shaded black), although these are not large in numerical terms. Clearly, such "crow-fly distances" do not reflect the additional difficulties for those who have to rely on the inevitably infrequent public transport services.

The pattern of poor access to GP services is ameliorated, particularly in the south and on the Llyn Peninsula, when the presence of branch surgeries is

introduced (Map 6.28). However, this in turn must be amended to take into account the restricted opening hours at the branches. Map 6.29 includes main practices and those branches which are open more than two days per week. This intermediate pattern of access shows that there are still quite large parts of the region – essentially the deep rural areas - for which GP surgeries are located in excess of ten kilometres from population groups (shaded black).

The future of branch surgeries continues to command a lot of attention of health professionals charged with the organisation and delivery of primary care services in rural areas. The Gwynedd Local Health Alliance, along with the LHB, is, at present, addressing the traditional problem of balancing the efficiency of centralising services into large well-organised practices that are able to offer a full range of services while delivering an accessible and equitable service to the community. It is recognised that this may involve co-ordinating public transport improvements in those areas that may lose branch services.

We have already noted the predominance of Welsh speakers among the population in this part of Wales. Many people, for whom Welsh is their first or only language, would be reluctant to discuss their health issues with a non-Welsh speaking doctor. Indeed, where no Welsh speaking doctors are present, it has been known for Welsh speaking reception staff to act as translators during private consultations with the GP. The availability of Welsh speaking doctors is therefore an important factor in delivering a high quality of service provision. Map 6.30 in ***Appendix Ch.6*** illustrates for each practice the number of GPs that speak Welsh. It identifies some gaps in this important attribute. For example, there are two surgeries serving a wide area in the south of Gwynedd with no Welsh speaking doctors.

The level of take-up of specific services in rural areas and the lack of organisational or clinical support may not justify the provision of specialist clinics. Maps 6.31 to 6.34 in ***Appendix Ch.6*** display the distribution of GP practices which offer specialist clinics for minor surgery, asthma, diabetes and

child health surveillance in the main and branch surgeries. We have already stressed that such maps should be interpreted with care as they reflect specific organisational features and not necessarily the absence of, or inferior quality in the provision of a particular service which may be treated more opportunistically. One of the most striking features is the map of minor surgery clinics which shows a clear concentration of provision in practices around the Menai Straits area (North Gwynedd).

The other services shown in Maps 6.31-6.34 display a similar distribution with specialist clinics offered in the larger practices in the main settlements along the coast with large areas of south Gwynedd lacking clinic-based monitoring and treatment for the above conditions.

6.5.2 General Dental Services in Gwynedd

The location and size distributions of general dental practices in Gwynedd are shown in Map 6.35 in ***Appendix Ch.6***. The general pattern of provision in the region is one of small practices consisting of one or two dentists. Large areas of south Gwynedd and the Llyn Peninsular are served by single dentist practices.

As noted earlier, the availability of dentists in deeper rural areas has significantly improved over the last five years as a result of the dental initiatives see Chapter Two. These have been especially significant for the rural areas of the North Wales Health Authority. Health professionals within the area are now concerned, however, that as the number of eligible areas for funding in Gwynedd has fallen it will now be difficult to replace dentists that move away from the area or retire. Given the high level of single-dentist practices, identified in Map 6.35, it is felt that this could be a major problem in future years.

Maps 6.36 and 6.37 in ***Appendix Ch.6*** displays those dental practices which, in mid-2000, were accepting new Adult and Child NHS patients in Gwynedd. The measurement and display of this feature is subject to strong caveats as dental

practices in the region may change their policy on accepting NHS patients almost on a monthly basis. Map 6.36 reveals a pattern of adult access to NHS provision in Gwynedd which is considerably less widely available than that for children. For the former there are particularly problematic areas in the south and some of the deprived deeper rural communities. Where NHS provision can be identified this may involve very long journey distances.

The above finding for access to NHS dentistry for Gwynedd are found in many other communities of rural Wales and particularly in Powys. Press reports earlier in 2001 suggested that

> "(receiving NHS treatment is...) very difficult, particularly if you do not have a car. A call to the health authority ...confirmed that there are two practices in mid-Powys taking new patients (waiting list of one month) but nothing in the north of the county. One has not accepted new (NHS) patients for the last two years". (Guardian, March 3rd, 2001, p3).

The above situation has been confirmed by contact with the Dyfed-Powys Health Authority, officers stressing that, as with Gwynedd, the provision of NHS services is relatively 'elastic' and can change month by month, or even week to week.

6.5.3 Pharmacies in Gwynedd

Map 6.38 in ***Appendix Ch.6*** shows the distribution of pharmacies in the two LHB areas together with dispensing GP practices. Some such practices and pharmacies are in close proximity and there are instances of pharmacies and dispensing practices being less than a mile apart – an arrangement which predates the 1992 'one mile rule'. The coverage by pharmacies is fairly even both generally and with respect to the different areas of deprivation. Map 6.39 displays the distribution of multiples together with details of ownership. This

reveals a fairly concentrated market structure, almost oligopolistic in form, with the Rowland chain dominant. This market concentration is a relatively recent phenomenon, occurring over the decade. There is no discernable clustering of pharmacies.

Maps 6.40 and 6.41 shows the distribution of needle exchange and oxygen services in the Gwynedd pharmacies. These provide contrasting patterns with oxygen provision largely confined to the larger settlements whereas needle syringe exchange services (Map 6.41) are showing a much more even distribution. In general terms, oxygen services tend to be located in some of the larger settlements, for example, Bangor, Caernarfon, and Blaenau Ffestiniog, with relatively poor provision of these services in the more rural parts of southern Gwynedd. Discussion with the Local Health Board professionals reveals that this situation is improving and that the needle syringe exchange service operating within the LHB areas has, by contrast been widely adopted[2], there are few gaps in provision identified in Map 6.40.

[2] The wide availability of the Needle Syringe Exchange Scheme is largely a historical legacy given that the scheme was introduced in the North Wales Health Authority (in the Conwy Health Group) and there was active encouragement of its introduction throughout the area.

Chapter Seven - Changes in Primary Healthcare Services from 1996-2004

7.1 INTRODUCTION

This chapter builds on the analysis of primary health care service levels presented in Chapters Five and Six by undertaking a positivist, or empirical, analysis of changes in service provision within the sector that have taken place over the period 1996 – 2004. This analysis proceeds along a series of separate but inter-linked key areas:

- An appraisal of changing population levels in Wales and in the case study area of Gwynedd,
- An appraisal of changing levels of service provision in the primary healthcare sector that have emerged from the 1996 and 2004 Surveys of Rural Services in Wales,
- An analysis of changing levels of accessibility to key primary healthcare services across Wales drawing on the analysis presented in Chapters Five and Six,
- Analysis of changes in primary health care service provision within the case study area of Gwynedd with a particular focus on the pharmacy sector in Gwynedd and how this has changed radically over the period 1996-2004, particularly in terms of organisational factors.

One of the key aims of the chapter is to try and explore the utility and role of GIS-based methods in examining the dynamic processes behind the changing spatial organisation of demand for and supply for health services in rural areas. It is recognised that the spatial distribution of primary health care services is not likely to be subject to significant and widespread changes in facility location in a rural setting over this relatively short period of time. It is, however, true that this distribution of services in rural Wales, and focusing on the case study area

of Gwynedd, is an evolving one with noticeable changes in the spatial, temporal and organisational characteristics of the primary health care facilities occurring between 1996 and 2004. It is the forces responsible for this evolutionary change that are of interest in Chapter Eight of this thesis but here the focus is on highlighting the changes that have taken place during this period.

7.2 Changes in the demographic characteristics of the study area

One of the features of the census analysis studied in chapters Five and Six is the fact that socio-economic problems highlighted by particular census variables from the 1991 and 2001 Censuses are not constrained to the valley or urban areas of Wales. It is quite apparent from this analysis that many rural areas of Wales, particularly in the north west of the country in Gwynedd and Anglesey, have particularly high levels of particular indicators of disadvantage such as the percentage unemployed or the Townsend Index of Deprivation. It is possible to view 1991 census information on the 2001 Census ward boundaries by employing GIS techniques in ArcInfo GIS which apportion 1991 Enumeration District boundaries to the new 2001 ward boundaries. This apportionment of the EDs allows for 1991 census data to be re-calculated to the new boundaries by multiplying the ED scores with the proportion of the 1991 ED boundary contained within the new 2001 boundary areas.

This process has been performed for the 1991 Enumeration Districts and this allowed the accessibility analysis outlined in chapter five to be re-analysed on the 2001 boundaries. These re-calculated measures will be described in the next section of this chapter and compared with accessibility measures calculated for the 2004 primary health care services data. It is also useful to examine change in census variables between the two census periods at the same spatial scale. Perhaps most illuminating in terms of the changes that have taken place in Wales over the period 1991-2001 is an appraisal of population change during this period.

Map 7.1 in ***Appendix Ch.7*** displays change in population from 1991 – 2001 at the Unitary Authority level in Wales. At the UA level it is clear that population change in Wales has definite spatial concentrations in terms of positive and negative change. Those areas losing population are the valley areas and the Isle of Anglesey – the highest loss occurring in Merthyr Tydfil with a population decline of over 6%. Interestingly rural areas have gained population, or remained stable, during this 10 year period with Powys and Ceredigion experiencing the highest population increases. Powys has seen a 5% increase in population from 1991-2001 while Ceredigion has experienced a significant population increase of 12.8% with much of this increase attributed to high in-migration to the area often from outside Wales (see Chapter Six and WAG, 2004). Population change in Gwynedd has remained fairly stable at just below 1% increase between 1991 and 2001.

Analysing population change at the ward level in Wales using re-aggregated ED data from the 1991 Census on 2001 Ward boundaries does help in examining the broad changes highlighted in Map 7.1 in more detail. Map 7.2 in Appendix Ch.7 displays the population change from 1991 – 2001 at the Ward level in Wales. Clearly the aggregate patterns at Unitary Authority are much more complex when considered at the Ward level. The population increase in Ceredigion is very much apparent but in Powys the pattern is less homogeneous with significant areas of population loss within the county. Perhaps most striking, when considering rural areas, is the high levels of population loss in the rural areas of southern Gwynedd and the Llyn Peninsular. This is offset at the UA level with population increases in some of the urban areas of north Gwynedd but it is fair to say that many of the rural parts of Gwynedd have lost population at a significant rate over the 1991-2001 period.

7.3 Analysis of Change in Service Provision based on the Surveys of Rural Services

As highlighted in chapter Five of this thesis a survey of Welsh Town and Community Councils was carried out in 1996 that followed a similar methodology to the Survey of Rural Services carried out in 2004 by the author as part of Welsh Assembly Government funded research (Higgs and White, 2000, White and Hughes, forthcoming). A questionnaire survey was sent to the Community Clerks in each of the surveyed communities in November 1995 with questions relating to the availability of a range of publicly and privately provided services. The survey was similar in scope and methodology to the Village Services Surveys carried out at the parish level in England by the Rural Development Commission (RDC, 1991, 1995, 1997 and Countryside Agency, 2001).

Of the 864 communities in Wales in 1995, 615 were surveyed and a response rate of 82% was achieved. The 615 'rural' communities were defined as those with a population sparsity index of less than 4 residents per hectare, i.e. those communities considered to be sparsely or 'super-sparsely' populated, as described previously in the thesis. The surveyed communities were fairly evenly distributed across rural Wales with good coverage in most parts of the country, although there were a number of 'pockets' of non-response particularly in parts of Anglesey, parts of north-east Wales and a small part of Pembrokeshire in south-west Wales (Higgs and White, 2000).

At the basic descriptive level percentages of responding communities that were without a number of key services were calculated for the 1996 data. Whilst a relatively small proportion were without the most basic of services such as a post office (20.5%), a public house (10.3%), and a primary school (19.9%), it is the more specialist services such as a GP surgery (65.2%), a bank or building society (87.7%), and a dental surgery (89.7%) where provision was acutely poor in the responding communities. Also of great significance are the relatively high

proportion of rural communities without access to a shop (any type) (40%), and a petrol station (44.5%).

A further analysis of the 1996 survey data undertaken in the GIS for the purposes of this thesis was to determine population bands for the responding communities. This allows for a descriptive analysis of the proportions of communities who have, or do not have, a particular service facility within their boundary. This analysis can then be compared with data from the Survey of Rural Services in Wales 2004. This has not been conducted for every service facility covered by both surveys but has been performed for a selection of key services that are relevant here, namely;

- GP practices
- Dental Practices
- Pharmacies

Table 7.1 displays the results of this analysis for the GP surgery in 1996. Clearly the presence or otherwise of such a service is largely dependent on the population size of the community. Relatively small proportions have this type of service in the 0-600 population size bands (below 20%). This figure rises to 41% in the 1000-2000 band and above 70% in the 2000 and above population categories. Of course, this analysis does not consider whether or not an alternative facility might be available in a neighbouring community for those who do not have their own. In 2004 (Table 7.2) it is clear that levels of GP practice provision have fallen significantly in the population bands below 1000 population based on the results of the survey.

Table 7.1 : Proportion of Community Councils with or without a GP Surgery. (1996 Survey)

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no GP	81.5	86.0	85.4	75.8	70.7	58.7	29.6	11.5
One or more GP surgery present	18.5	14.0	14.6	24.2	29.3	41.3	70.4	88.5

Table 7.2 : Proportion of Town & Community Councils with or without a GP Surgery. (2004 Survey)

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no GP	94.2	97.3	96.3	95.7	85.7	67.7	33.3	9.9
One or more GP surgery present	5.8	2.7	3.7	4.3	14.3	32.3	66.7	90.1

Table 7.3 highlights the proportion of communities with or without a dental surgery in 1996 and, clearly, there is little or no provision of this service below the 1000 population band. Dental services are unique in the healthcare sector in terms of their un-regulated locational characteristics. This would suggest that dental surgeries are likely to locate in areas of higher populations, or customer base, and this would appear to be confirmed from Table 7.3. The trend identified in Table 7.3 is mirrored in Table 7.4 with little or no provision of this service in Councils below 1000 population in the 2004 Survey.

Table 7.3 : Proportion of Community Councils with or without a Dental Surgery. (1996 Survey)

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no dentist	100	98.2	100	100	100	90.5	70.4	19.2
One or more dentist present	0	1.8	0	0	0	9.5	29.6	80.8

Table 7.4: Proportion of Town & Community Councils with or without a Dental Surgery. (2004 Survey)

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no dentist	100	100	100	100	100	89.6	60.5	25.0
One or more dentist present	0	0	0	0	0	10.4	39.5	75.0

Table 7.5 displays the proportion of communities with or without a pharmacy service in 1996 and again the provision of this service is strongly correlated with the population size of communities. Below the 1000 population band less than 10% of responding communities had a pharmacy service. This rises to 23% in the 1000-2000 population band, 61% in the 2000-4000 band, and 77% in the 4000+ population band. The results are broadly comparable with those gained from the 2004 survey (Table 7.6). The slightly higher rate of provision in the 4000+ population band could be a result of more larger Town Councils being surveyed in 2004.

Table 7.5 : Proportion of Community Councils with or without a Pharmacy. (1996 Survey)

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no pharmacy	98.6	98.2	91.7	90.9	96.3	77.0	38.9	23.1
One or more pharmacy present	1.4	1.8	8.3	9.1	3.7	23.0	61.1	76.9

Table 7.6 : Proportion of Town & Community Councils with or without a Pharmacy. (2004 Survey)

Community Population Size	0-400	400-500	500-600	600-700	700-1000	1000-2000	2000-4000	4000 +
	%	%	%	%	%	%	%	%
Proportion with no pharmacy	100	97.2	96.3	95.7	91.9	79.3	35.0	9.1
One or more pharmacy present	0	2.8	3.7	4.3	8.1	20.7	65.0	90.9

In general terms it does seem that levels of provision across a range of key services have fallen in rural areas between the two surveys 1996-2004. This is particularly evident in the Town and Community Councils in the lowest population bands (below 1000 population).

7.4 Analysis of Changing Accessibility Levels to Primary Healthcare 1996 - 2004

The re-aggregation of Enumeration District Centroid accessibility scores has allowed for the mapping of the Isolation Indices highlighted in Chapter Five to be re-calculated for 2001 Ward boundaries. These can then be compared with Isolation Indices for primary healthcare services calculated for 2006. The only difference between the two sets of indicators for the two time periods (apart from changes in the spatial distribution of the services that will have an impact on the accessibility scores over the network) is the weighting of the average population weighted ED-service distance measure by the population in the ward within which that ED falls. This population weighting is performed using 1991 Census population data for the 1996 Service facility data and 2001 Census population data for the 2004 service facility data. Accessibility scores (or Isolation Indices) for dental surgeries and GP surgeries, previously calculated at the community level in Wales (as in Chapter Five) have now been mapped on a common base – the 2001 Ward base and these will be analysed in this section. Information on the location of pharmacies in 1996 was not available for the

research but it was possible to obtain this information for the Authority of Gwynedd following discussions with LHB officials. In actual fact, there have been no changes in the distribution of pharmacies in the period 1996-2004 in Gwynedd but it is still possible to weight the average ED-pharmacy distance measures by the 1991 and 2001 population to determine if changing population in that period has impacted on the accessibility levels to services.

Map 7.3 and 7.4 in ***Appendix Ch.7*** display the population weighted accessibility measures to dentists in 1996 and 2004. The maps display some reduction in the distance measures between the two dates particularly in parts of Gwynedd and this may be the result of an improved dental service in the area resulting from the input of funding resulting from the Welsh Office Dental Initiatives that were promoted in the area during the 1990s and from which Gwynedd was relatively successful in securing new dental practices (see Chapter Two section 2.4.2). Clearly the effect of the population weighting process will also have some impact on the accessibility measures in Maps 7.3 and 7.4 but it is also true that many rural areas did see some increase in service as a result of the afore-mentioned dental initiative (between 1996 and 2000 the number of dental principals in Wales rose from 834 to 928 across the country – NAW, 2002).

Map 7.5 and 7.6 in ***Appendix Ch.7*** display the population weighted accessibility measures to GP Practices in Wales for 1996 and 2004. Here a fairly even pattern emerges with relatively little change in accessibility levels identifiable across the ranges for 1996 and 2004. Again, there are slight improvements in accessibility in Gwynedd but GP practice provision has remained relatively constant in rural areas over the 1996-2004 period with little dramatic change in this service (between 1996 and 2000 the number of GP partnerships fell from 532 to 522 across the whole country – NAW, 2002).

Maps 7.7 and 7.8 in ***Appendix Ch.7*** display the change in access to pharmacies in Gwynedd and although there have been small changes as a result of the weighting by 1991 and 2001 ward populations, the actual supply side has

remained stable during this time – indeed throughout Wales as a whole pharmacy services have remained stable throughout the 1990s with 714 pharmacies in Wales in 1996 and 711 in 2000 (NAW, 2002). These figures do mask a certain level of re-location within the sector and, particularly, changes in ownership with significant rises in the ownership of pharmacies by multiple chains occurring as shall be highlighted in the next section of this chapter.

In order to visualise the changes in the population weighted accessibility measures a little more easily percentage changes between 1996 and 2004 were calculated for each primary healthcare service. Map 7.9 in ***Appendix Ch.7*** displays this percentage change between 1996 and 2004 for the GP practices in Wales. It is clear from Map 7.9 that although GP practice location in Gwynedd and Ceredigion have remained fairly stable over this time period the impact of the population weighting on the accessibility measures is having a marked affect with increases in the population weighted distance in Gwynedd and decreases in Ceredigion. This pattern is mirrored somewhat by the population change map at ward level (Map 7.2 in Appendix Ch.7) which displays population decline in Gwynedd and population increase in Ceredigion between 1991 and 2001. The effect of this on the population weighted measures is a reduction in the denominator population data for Gwynedd and an increase in Ceredigion resulting in higher measures for Gwynedd and lower measures for Ceredigion, hence the pattern produced in map 7.9. This effect is not noticeable in the standard population weighted accessibility maps but is emphasised somewhat when assessing percentage change.

Map 7.10 in ***Appendix Ch.7*** displays the percentage change in population weighted accessibility between 1996 and 2004 for dental practices in Wales. A similar pattern emerges as for map 7.9 relating to doctors – the effect of the population denominator is prompting increased levels of inaccessibility in areas such as Gwynedd and parts of Anglesey and Pembrokeshire as these areas are losing population between the Censuses thereby leading to the services being accessible to a smaller amount of people than was the case in 1991 and therefore

increasing the population weighted network distance between the two cohorts of services (1996 and 2004). This is offset to some extent for the dental maps due to increases in this service in rural areas over the interim period.

Map 7.11 displays this population effect quite clearly in terms of pharmacies in Gwynedd which have seen no distributional changes from 1996 to 2004 but, nevertheless are seeing positive or negative changes in the population weighted distances depending on the population change in the wards.

Tables 7.7 and 7.8 in ***Appendix Ch.7*** display Spearman Rank Correlation analysis for the services in 1996 and 2004 against various 2001 Census variables described previously in chapter six. Table 7.7 examines dental services and there is clearly a very strong positive relationship between the two population weighted accessibility scores, as one might expect (.954). Relationships with census variables are not particularly strong but a number of variables are significant. For the 1996 dentist accessibility measure (dentw95) there are positive relationships with travelling 10km or more to place of work (travel10km%, .434), households with 2 or more cars (2carsplus%, .571), and speak read or write Welsh (srw_welsh, .383). Negative relationships are apparent with households with no car (nocar%, -.599), LLTI (-.306), and the Townsend score (-.365). For the 2004 dentist accessibility measure (dentw01) there are similar positive relationships with travelling 10km or more to place of work (travel10km%, .426), households with 2 or more cars (2carsplus%, .547), and speak read or write Welsh (srw_welsh, .380).). Negative relationships are also apparent with households with no car (nocar%, -.575), LLTI (-.273), and the Townsend score (-.346). Change in the population weighted access to dentists score (dentchange) shows an inverse pattern with positive relationships with the Townsend score, LLTI, unemployment, households with no car, and poor health (notgood%), and negative relationships with households with 2 cars and good health (good%).

Table 7.8 displays Spearman Rank Correlations for the GP practices population weighted accessibility measures for 1996 and 2004, as well as % change in this score, and the pharmacy population weighted access measure for 2004. For the 1996 doctor accessibility measure (doctw95) there are positive relationships with travelling 10km or more to place of work (travel10km%, .395), households with 2 or more cars (2carsplus%, .582), and speak read or write Welsh (srw_welsh, .400). Negative relationships are apparent with households with no car (nocar%, -.599), LLTI (-.306), and the Townsend score (-.365). There is also a very strong positive relationship between the two population weighted accessibility scores for GP practices, as one might expect (.981).). Negative relationships exist between doctw95 and households with no car (nocar%, -.614), LLTI (-.354), and the Townsend score (-.397). As with the dentist analysis these correlations are rather weak but do suggest a broad positive relationship with indicators of high car ownership and good health and a negative relationship between the accessibility measures and Census measures of deprivation or social problems for Wales. A very similar set of correlations emerges for the population weighted access measure for doctors in 2004 in table 7.8.

Table 7.8 also displays Spearman Rank Correlations for the 2004 pharmacy population weighted accessibility measure. Again a broadly similar set of relationships emerges and there are strong positive correlations with the GP accessibility measures (doctw95, .959) (doctw01, .968).

7.5 Changes in primary health care service provision within the case study area of Gwynedd

This section details the changes that have occurred in rural primary healthcare services within the case study area of Gwynedd over the period 1996 – 2004. The interest here is in the spatial organisation of services in this period, in other words changes in spatial supply that have occurred. As already stated, however, in the pharmacy sector there has been no change in the spatial organisation of

services but there has been considerable change in terms of how this sector is organised and this starts to draw out parallels with the theoretical material on the theory of the firm highlighted in chapter two of this thesis. In particular, the influence of vertical restructuring and the move to an oligopolistic pattern of supply of pharmacies starts to emerge. These themes are returned to chapter eight of this thesis. The remainder of this chapter details in map form the changes that have occurred in Gwynedd during the period 1996-2004.

Maps 7.12 to 7.14 in ***Appendix Ch.7*** display changes in primary healthcare service provision in Gwynedd over the period 1996-2004. Map 7.12 displays dental surgeries in Gwynedd in 1996 and 2004. It is clear that there have been a number of dental surgery openings during this time period (a net gain of four surgeries in Gwynedd) and these have been in the remoter rural parts of Gwynedd, particularly along the Llyn Peninsular and in the south of the Authority. Much of this dental surgery expansion can be attributed to the Welsh Office Dental Initiative of 1995. The 1995 initiative established priority areas in Wales defining eligibility and extent of grant support (Welsh Office, 1995). The following series of bandings were defined and identified in a map:

- Band 1: no serious problems in obtaining NHS treatment - no financial assistance;
- Band 2: areas of high demand or high need or both, which covered much of rural Wales, the South Wales Valleys area and parts of Cardiff, Swansea, and several small towns - incentive grants up to £25,000;
- Band 3: covered relatively few areas of exceptionally high demand, most notably the Llyn peninsula, Anglesey, and areas around Bala, Newtown, Cardigan and Pembroke Dock - incentive grants up to £50,000.

In all, over 60 grants were awarded for new practices, for existing practices to expand and for additional posts in the Community Dental Service (Williams et al, 2002). The large incentive grants available during this period in the Llyn Peninsular region of Gwynedd are a major explanation for the increased service that we see in this area in Map 7.12.

Map 7.13 displays changes in the spatial distribution of GP practices in Gwynedd and shows that there has been some loss of service over the 1996-2004 period with two GP practices closing during this time one in the north of the Authority and the other on the western coast of Gwynedd near Harlech. All other services have remained in place during this period. Unfortunately it as not possible to gain information on branch services in 1996 and this might have proved interesting as discussions with LHB officials have revealed that many branch services are under threat particularly where they are open for short periods of the week.

Map 7.14 in ***Appendix Ch.7*** displays the distribution of independent and multiple chain pharmacies in Gwynedd in 1996 (the spatial distribution of services has remained the same in this period). Also included in Appendix Ch.7 is the current pharmacy ownership arrangements in Gwynedd (Map 7.15), which highlights the proliferation of the L Rowlands national pharmacy chain in the Authority. Clearly there has been significant targeting of the Gwynedd area (and in fact most of north Wales) during the interim period and many independent pharmacies have been taken over by the Rowlands chain during this period.

These significant changes in primary healthcare in rural Gwynedd, particularly in the dental and pharmacy sectors highlight various governmental, organisational and economic forces that can influence the spatial distribution of services on the ground in a locality. These themes are returned to in chapter eight with an assessment of the role of the state and organisations in influencing

primary healthcare as well as a summary of the views of primary healthcare officials and pharmacy providers on the future direction of primary care in Gwynedd.

Chapter Eight - Appraising the spatial organisation and changes over time of the primary healthcare sector in rural Wales

8.1 Introduction

This chapter of the thesis attempts to draw together the wealth of data and analysis presented in chapters four, five and six and start to make connections with the theoretical debates surrounding rural restructuring and theories of the firm relating to healthcare services discussed in chapter two of this thesis. The chapter also assesses the role that the state plays in influencing the spatial distribution of primary healthcare services in rural areas. Allied to this discussion of the role of the state and organisations in influencing primary healthcare characteristics is an analysis of survey results from interviews with pharmacists and Local Health Board officials in the Gwynedd area, together with information from interviews with other health professionals across Wales.

8.2 Changes in demand factors and organisation

8.2.1 Changes in demand side factors

It was argued in chapter two of the thesis that restructuring theories of rural change could be applied to studies of socio-demographic characteristics in such areas, as with the application of regulation theory to studies of lifestyles in rural Wales undertaken by Goodwin et al (1995). Such studies of social change in particular localities lend themselves to application in the current study in terms of the analysis of changing socio-economic and demographic profiles undertaken in chapters five and six. The analysis of Census information for 1991 and 2001 has revealed that it is indeed difficult to delimit 'urban' from

'rural' purely on these terms. Increasingly, it appears, rural areas are experiencing social disadvantage problems at scales similar to, or greater than, their urban counterparts, for example unemployment levels in Gwynedd and Anglesey. The extent to which this is attributable to theoretical concepts such as regulation or the restructuring thesis is, of course, up for debate but this theoretical context does allow emerging patterns of uneven development in rural areas to be addressed and explained.

This research, however, unlike the rural lifestyles research, relies on aggregate levels of analysis, employing Census data and other sources to represent the 'demand' side of primary healthcare utilisation. One area for further research would certainly be to expand the demand side further to examine socio-demographic profiles of individuals in rural settings. This could also be extended in terms of the accessibility analysis undertaken to incorporate models of revealed accessibility into such models.

A particular feature of the changing patterns of development in rural areas lies in the area of population change and migration which has been identified in chapters six and seven as having a particular, and differentiated, influence on rural Wales. The emerging dichotomy of population decline in Gwynedd while Ceredigion has experienced the highest population increase in Wales between 1991 and 2001 is one that is bound up in patterns of in-migration, often from outside the region, and concomitant out-migration of rural residents, particularly in the younger age groups. Clearly this out-migration has implications for the socio-cultural make up of such areas if the indigenous population continues to move elsewhere for jobs or opportunities.

8.2.2 Changes in the Organisational Behaviour

One of the interesting trends to emerge from the analysis of change in service levels in Gwynedd in chapter seven of the thesis was the emergence of a near-

monopolistic market situation in the pharmacy sector in Gwynedd with a majority of pharmacies in the LHB being owned by the L Rowland chain. One of the main advantages that this multiple chain has is that it is vertically integrated in that the production and wholesale business is controlled by its parent company Phoenix Healthcare. As we shall see later in the chapter, one of the methods used by the Phoenix group to secure so many pharmacies in Gwynedd in such a short time was the use of secured loans to independent pharmacy service providers and in return these 'customers' must place 70% of their business with Phoenix for the duration of the loan, this loan scheme is now being advertised nationally,

> "Pharmacists nationwide can now take advantage of a Phoenix loan guarantee, following an extension of the earlier individual guarantee scheme. Under the new terms, Phoenix can guarantee loans of up to 1.25 per cent above the base rate, for a minimum of £25,000 and running for between one and ten years. In return customers must place 70 per cent of their business with Phoenix for the period of the loan". (www.dotpharmacy, June 21, 2003)

The degree to which a firm owns its upstream suppliers and its downstream buyers is referred to as vertical integration. Because it can have a significant impact on a business unit's position in its industry with respect to cost, differentiation, and other strategic issues, the vertical scope of the firm is an important consideration in corporate strategy. L Rowlands and the Phoenix group certainly have achieved a level of vertical integration that allows them to expand into market areas and form a near monopoly position as they have done so in Gwynedd. There is a degree of historical attachment with L Rowlands and Gwynedd as the firm's headquarters used to be in north Wales (in Wrexham) and they provided a wholesale service for chemists as well as developing their own retail business. Now that they have been subsumed by Phoenix they have re-located and moved into markets across the country. The influence of L Rowlands in Gwynedd is returned to later in this chapter when detailing the results of survey interviews with LHB officials and local pharmacists in Gwynedd.

8.3 Changes in the role of the state

Changes in the role that the state has played in the delivery of primary healthcare in rural areas have been detailed throughout the thesis, including during the analysis of primary healthcare services in the case study area in chapter six and seven. The aim is not to re-state that material but it is worth stressing the key impact of the 2003 re-organisation of the healthcare delivery system in Wales and the implications that this is having for the future delivery of primary care, particularly through the commissioning of services and through the emerging contractual arrangements for primary care. It remains to be seen what impact these developments will have but this appears to be a more holistic approach to the healthcare system based on local identification of need rather than former methods of top down assistance programmes such as the Dental Initiative of the 1990s, which although welcome and relatively successful has been accused of being rather temporary in nature and is unlikely to safeguard services on a long-term basis.

These various issues of state re-organisation and intervention in the healthcare sector are returned to now with an account of interviews carried out with healthcare professionals and service providers in the study area of Gwynedd and beyond.

8.3.1 Evidence from Health Professionals

A number of interviews were undertaken with health professionals in the case study area of Gwynedd and elsewhere in Wales, for example the Institute of Rural Health and the WAG. In all three primary healthcare officials were interviewed in Gwynedd including a primary healthcare manager and pharmacy officer. Three officials from the Welsh assembly Government were interviewed including senior official from the pharmacy and primary healthcare divisions,

and two policy officers from the Institute of Rural Health. All interviewees were assured of anonymous response so the following covers broad topics raised without attributing quotes to individuals. These are outlined here before examining evidence gained from interviews with local health care providers – pharmacists in Gwynedd.

Comments from local health professionals

In terms of recent trends in primary healthcare delivery in Gwynedd there is a feeling that healthcare provision will be better linked to local need through studies into needs assessment being put into place at the moment. This is still in the early stages and has only been underway for a year. This is carried out not so much through technical reports at the moment but more through consultation with local GPs to find out where they believe the areas of greatest need are. There is also great reliance on the Health and Social Care Strategy for Gwynedd (Gwynedd County Council, 2003). There is also praise for the new working arrangements with outside agencies with a definite shift to working more with local government,

> "The whole point of LHBs is to work more in conjunction with Local Authorities and take into account local factors of need in provision of services. In terms of pharmacy this has taken the form of more consultation with LA social services for provision of pharmacy services to local care homes". (Gwynedd LHB officer)

When asked about the likely effects of the new GMS contract for GPs and pharmacies in rural areas of Gwynedd there was a mixed response. Initially, it was felt that levels of service will decline, for example, in relation to out of hours rota issues which are being set up on a locality basis, there is currently a special team working on this with a number of different options. However, in

rural areas the previous out of hours working regime was just too onerous and was a barrier to recruitment, under the new contract it should be easier now to recruit in rural areas, but whether Gwynedd will have a comparative advantage in this respect over other LHBs is debatable. It will probably be easier in other areas too but it should be one barrier less to recruitment.

The way that commissioning is taking place is through the new GMS contract. In North Wales the six LHBs have come together and agreed what the new GMS contract arrangements should be.

"How can this be a local needs assessment if it is over six LHB areas – can we assume that this is a homogenous area and all the needs are the same?" (Gwynedd LHB official)

Commissioning is 'worked out' through the level of take up of particular services, for example, anti-coagulation services were being provided already by most GPs in Gwynedd but they were not always being paid for it, now GPs in Gwynedd will be paid a lot more for these services. Branch services are also likely to be affected under the new 20 hour minimum opening rule.

The new pharmacy contract will also impact in terms of out of hours work – the new contract stipulates that pharmacies have to remain open for 40 hours per week but,

"There is nothing to stop them opening 5 days a week and not opening on Saturday." (Gwynedd LHB official)

This is a challenge for the LHB as this will reduce access for some although this will depend on the locality. Some of the multiples have said that they will use the Saturday to do administrative tasks and stocktaking but also maintain their dispensing and other services. The interviewees were fearful of the effect that the new contract will have on the independent pharmacists,

"If they don't open on Saturday then this is another example of them falling down and not taking advantage of the new contract arrangements." (Gwynedd LHB official)

Who decides on what services are priorities? This is worked out by the LHB in conjunction with the advice of GPs. "There isn't really a spatial focus to all of this", services won't necessarily be targeted at certain areas, rather certain practices may provide a service out of a group of GP surgeries with the focus on providing some service across the LHB rather than focusing particular services in certain parts of the LHB. For example, recently a new salaried GP post was advertised and this is not targeted at a locality of need but rather all GP surgeries are invited to apply for the post to be allocated to them.

An important element of the new contract is the suitability of premises to take on enhanced services. A recent survey of GP premises has taken place which has the purpose of determining whether all facilities in the practice are used to their full potential and whether the premises are suitable to take on enhanced services. This issue is likely to become more important in terms of implementing the new contract arrangements.

"The services may not be in all practices but they should be in most of them." (Gwynedd LHB official)

Branch services may well suffer in this respect because they do not meet minimum standards in terms of facilities. Branch services in village halls and meeting rooms, for example, will be under threat because they are not fit for the purpose.

When asked how far national policy initiatives are impacting on assessing local needs or influencing local delivery of healthcare there was a mixed response.

The LHB is considering the setting up primary care resource centres, one of which could be in Penygroes where 4 doctors could combine. This type of arrangement could also be conceived as a possibility in Bangor and Caernarfon.

"You need the centre of population to support them though." (Gwynedd LHB official)

In spatial terms there are no real gaps in GP provision but one problem might arise when a high percentage of current GPs will be due for retirement in 2012-2015.

In terms of pharmacies there is some evidence of a status quo situation particularly since the rejection of the OFT recommendations on de-regulation. The views of the LHB officials surveyed were that the independents would have suffered as a result of any de-regulation process, for example the independent pharmacy located in Criccieth. Current regulations are effective but there should be some element of competition because this encourages the independents to try and adopt new working practices and move with the times. In terms of services provided it is perhaps not accurate to say that the multiples services are 'better' but perhaps the independents are less able to implement new innovations in the way that they operate.

"The independents provide a great service but they are reluctant to get on board with the new NHS guidelines. The LHB does work to support them through the pharmacist intervention scheme which pays them to do things differently but they won't do it." (Gwynedd LHB official)

The background on the L Rowlands move towards a monopoly situation in Gwynedd was discussed and it was commented that the L Rowlands group was previously the main wholesaler in north Wales and based in Wrexham. L Rowlands then offered incentives to GPs to prescribe their drugs. Following this initiative L Rowlands offered secured loans to independent pharmacists in

return for selling their products, but it emerged that they could then 'pull the rug' from them and move in and take over the pharmacy. The L Rowlands group were taken over by Phoenix healthcare in the mid 1990s and this saw a major expansion period. In Gwynedd the impact of this expansion saw the take over of five or more pharmacies 'almost overnight', but, importantly, for local visibility Phoenix retained the recognisable L Rowlands brand name for their 'point of sale' pharmacies.

"This is the advantage of the vertically integrated firm with wholesaling and point of sale services combined. Some of their pharmacies operate at a loss but they are big enough to cope with it." (Gwynedd LHB official)

A further problem for pharmacy services in Gwynedd (both multiple and independent) are the presence of fifteen dispensing practices in Gwynedd. This means that a lot of patients will receive dispensed medicines by the GP and may not require any access to dispensary services from a pharmacist.

"This is a major problem for pharmacy access in Gwynedd" (Gwynedd LHB official)

In terms of the spatial distribution of pharmacies (as we have seen previously) the situation is stable. Pharmacy has been 'outside the circle' in terms of its place in rural primary healthcare but is now coming back into the fold because of the new contract arrangement (as detailed in chapter four) providing the pharmacists vote for it and accept it. This illustrates the semi-regulated position of pharmacy services within primary healthcare, often separated from policy initiatives on improving primary healthcare delivery and the fact that the new contract arrangements attempt to forge a new role for pharmacists in the future priorities for primary healthcare.

"Its exciting times for pharmacy at the moment – if everyone gets on board with it, it will be good for pharmacy. At the moment if you think about pharmacy all they really do is dispense and other services are done on the initiative of the pharmacist. The new contract will mean that pharmacists have to provide eight core services but the second part of the contract is Medicine Use Review and a third stage is services commissioned by the LHB – this [the success of the contract] will depend on whether the pharmacies themselves want to get on board. If they don't want to then they will see their profits fall and fall and this will prompt them to do something." (Gwynedd LHB official)

According to the health care professionals in the LHB, the independents have a great deal of reluctance to invest in their operations in readiness for the new contract. This has prompted concerns within the LHB about the six independents in Gwynedd as to whether they can survive when the new regime emerges. The multiple pharmacies are ready for the new contact, L Rowlands for instance have people in the Head Office thinking about the new contract and preparing their pharmacies for it, a good example of this is the provision of private consultancy areas in pharmacies which L Rowlands have already invested in. This new 'enhanced service' under the new contract has massive implications for the independents as it requires major capital investment (7-8000 pounds). The large multiples, such as Boots and L Rowlands are able to absorb these costs.

"If everyone gets on board with the new contract then it will be great for Gwynedd, if not we could see loss of services." (Gwynedd LHB official)

Is recruitment of doctors, dentists and pharmacists in rural areas a problem? What steps have been taken to remedy this?

Recruitment is viewed as a very problematic issue, although not so much for pharmacy services, as the independents and multiples are fairly constant in the

area. Locum pharmacists are a bit more problematic and will be more so under the new pharmacy contract. LHB official are worried about the recruitment of GPs because of the rurality of the area which results in reluctance on the part of many GPs to come and work in the rural areas of Gwynedd, for example South Meirionydd. The LHB had problems prior to the 1st of April 2004 when GPs had to apply for additional partners under the Medical Vacancies Committee which has since disbanded. Some have lost partners since then and are not seeking to replace partners immediately but are taking a longer term view. Welsh speaking amongst new recruits is a further issue in the region, LHB officials commented that it does help if GPs can speak the Welsh and there are a number of initiatives within the LHB to try and encourage new GPs to learn the language.

As for dentists this is regarded a nationwide issue in terms of recruitment. Gwynedd was quite well served in the 1990s with additional funding for dentists under the Welsh Dental Initiative, highlighted previously, but dentists recruited as a result of the initiative are only required to stay contracted to the LHB for five years and then they can go private or to denplan.

What are the main causes for concern or optimism for rural primary healthcare in rural areas over the coming years?

The new GMS contract was cited as a cause for optimism for GPs but there was a perceived need to make sure there is enough funding to for the new services envisaged and to make sure that the estates are ready to provide certain services. There is the assumption that having gone through all the changes the funding will follow, but experience had shown that this is not always the case. It is clear that there is extra money to fund the changes but there was concern amongst officials that there would be enough funding at the outset to put all these changes into practice. The other concern is the control the LHB has over the process in particular in grappling with some of the procedural requirements of the contract which are felt to be 'quite cumbersome'.

As for dental services there as concern expressed by LHB officials in terms of the future of the service within the NHS, perhaps reflected nationally,

"Dentists could go their own way they are disillusioned with the NHS." (Gwynedd LHB official)

The provision of pharmacy services in the LHB was felt to be an area where there was cause for optimism. The new pharmacy contract, if accepted, should improve pharmacy services for the people of Gwynedd.

Comments from national health professionals

What are the challenges facing rural healthcare?

Officials from the Institute of Rural Health commented that the concentration on *rural* health delivery and problems is sometimes sporadic in the LHBs of Wales (even in some which are predominantly rural). There was a perceived need to move away from a 'meeting targets' mentality to one more focused on the particular problems faced by rural residents in accessing healthcare and where services are delivered and how people can access them is key to this.

More specific challenges are the new GP contract and particularly its impact on out of hours care, which will have an immediate impact on levels of care but maybe advantageous in the long term if it results in increased recruitment in rural areas. New primary care centres may also have both negative and positive impacts in rural areas with the key issue probably being where are these to be situated and will rural residents be able to access them.

What are the forces driving change in the healthcare sector?

The rural population will become more demanding in terms of what healthcare services it wants delivered and how and this is related to the growing elderly population who move in to rural areas from an urban background. Expectations on the rural healthcare providers are, therefore, increased within that context.

There is also a growing 'litigation culture' as rural populations become more aware and expectations increase. This is important in terms of creating more pressure to tighten 'professional competences' and delivery targets in rural areas. There may also be more demand for services delivered in an accessible way to rural residents as the elderly population grows in these areas.

One of the biggest concerns in the sector in relation to rural residents is the location and possible centralisation of services. If this does occur, for example through primary care centres then what will this mean in terms of how far patients have to travel for diagnostic treatment?

ICT could play an important role in delivering diagnostic services to rural areas and could provide better links between primary and secondary care especially in terms of diagnostic and post-treatment advice and information.

The political climate could change in the next 10 years drastically and this would have a big impact on delivery of healthcare. If a new ideology on healthcare delivery came into play then there may be a bigger role for the private sector or a move back to regional health boards. It is difficult to say what might happen in this instance.

There is a need for more cooperation between different government departments to tackle a range of issues related to the delivery of health care in rural areas, these include; ensuring that effective transport links are in place and that healthcare delivery is integrated with existing public transport networks (e.g. appointment times corresponding with available bus services etc.), and ensuring

that the poverty and social exclusion agenda takes on board rural issues, including poor access to healthcare services. A more cohesive approach is needed.

Comments on rural pharmacy issues

Overall numbers of pharmacies have remained static over the last five years with very few closures. They may be sold to multiples but they still remain pharmacies for the local population

The impact on dispensing practices in rural areas is very significant and a major threat to small rural pharmacies. Very little can be done about it in reality however, one option may be to extend the limit to 10km away from an existing pharmacy.

The key threat to the small rural pharmacy is how they can adapt to the new contract regulations coming in, particularly in terms of providing necessary improvements to chemists and providing flexible working hours for the rural population. Multiples will take this on board and adapt to the changes.

8.3.2 Evidence from Local Providers

An interview survey was undertaken with pharmacies in Gwynedd in autumn 2004 and the results from that survey work are presented here. The interview schedule employed is to be found in Appendix Ch.3. In all 12 interviews were completed including 3 from the independent pharmacies in Gwynedd, this was an acceptable response given that only 31 pharmacies are present in Gwynedd and those in rural areas were specifically targeted, as such none of the responses

presented here are from pharmacies in the major towns of Caernarfon, Bangor, or along the northern coastal 'strip' of Gwynedd.

1. *How long has the pharmacy been present in this location?*

All pharmacies surveyed had been in the same location for some time, for more than 10 years in all cases and up to 100 years in one instance. This demonstrates the stability in the sector within Gwynedd

2. *Has it always been under the same ownership? If no please give details of change in ownership (when this took place and details of who was the previous owner).*

Of the nine multiple pharmacies surveyed all but two were independents up to ten years ago. The change of ownership was, in most cases, initiated by L Rowlands and in two instances by Boots Chemists.

3. *How would you describe the pharmacy in ownership terms – small independent, part of a small multiple chain, part of a national multiple chain?*

Of the twelve responses nine were part of a large multiple chain and three were independent

4. *How many hours is the pharmacy open a week?*

For the multiple pharmacies who responded the range of opening hours was from 37.5 hours a week to 56 hours a week, with most operating at more than 50 hours per week. The Independents surveyed all worked 53-54 hours per week.

5. *Is the pharmacy part of a rota scheme for out of hours service? Please explain how the rota system operates in this locality and expand on any positive or negative views you may have on the system.*

Many of the multiple pharmacies are open between 5.30 and 6.30 everyday and two work on alternate Sundays. A number are also on rota call on Bank holidays. Two of the three independent pharmacists interviewed indicated that although they did participate in evening out of hours services from 5.30 to 6pm every day, they did not open on Saturdays or bank holidays

Positive views on providing out of hours service, especially from those who worked on weekends and Bank Holidays, were few and far between. Those that did respond with positive views on out of hours services saw them as a public good that provided an invaluable service to the local community, as one respondent put it,

"All patients know we are open so we can supply a service to a huge area."(multiple pharmacist)

Other positive views expressed about out of hours services included;

"It is useful on Sundays to have a contact point for health services." (independent pharmacist)

"The pharmacy is in a rural location, with the closest alternative pharmacy around seven miles away and, therefore, a rota could not easily be viable for the local community. Having said that, the pharmacy does take part in the Gwynedd LHB rota for Sunday opening (from 11-12pm)." (independent pharmacist)

"Ease of out of hours access to professional healthcare for the community (also important on Saturday as local surgeries no longer open on a Saturday or Sunday." (independent pharmacist)

Negative views on rota schemes for out of hours services were concentrated on the frustrations of remaining open with very little custom to justify the inconvenience,

"It is probably unnecessary to open after 6pm as the surgery is closed then." (independent pharmacist)

"It is a waste of time and ruins the weekend. I can't go anywhere and it costs more than it brings in." (multiple pharmacist)

"We often have nothing to dispense on weeknights after 5.30pm. Payments for rota don't cover costs so not worth staying open financially! It's very frustrating and is only really worth doing in the summer season, and the same applies to Sundays." (multiple pharmacist)

6. *Are there any dispensing GP surgeries in the vicinity of this pharmacy? Does this have any impact on your operation within this locality?*

Opinion among the pharmacists about the impacts of dispensing GPs on their business was fairly split within the survey. Some respondents saw dispensing GPs as a major threat to business, while others were happy to co-exist.

"One dispensing doctor has a branch surgery in village twice weekly, but the impact on our business is minimal." (multiple pharmacist)

"Yes, it definitely has a huge impact and I think that the person prescribing should be different from the person dispensing." (multiple pharmacist)

"Both Local doctors dispense, therefore there is not enough business to go around. Doctors seem to think that we are paid for rota services so that they can send their dispensers home at 6pm." (multiple pharmacist)

7. *Have you introduced additional services in an attempt to maintain or enhance your customer base (e.g. oxygen supply, home delivery, needle syringe)? Please detail these additional measures and how effective they have been.*

Only a small minority of those surveyed did not provide any additional services, examples of services provided are given below,

"Oxygen supply, home delivery, needle exchange, collection of prescription from surgery." (multiple pharmacist)

"Oxygen supply, which has been quite successful, we also offer a monitoring dosage system for nursing homes which has been very successful and we could expand in this area if given investment." (multiple pharmacist)

"Oxygen supply and 'day after pill' services are provided. They don't have a huge impact on business but do provide a necessary service for patients." (multiple pharmacist)

"Oxygen supply, delivery to rural villages on specific days of the week (which is regarded as a valued service), prescription collection and prescriptions sent directly to the pharmacy, methadone supply to help local drug problems." (independent pharmacist)

8. *How do you view your relationship with smaller independent pharmacies (or other multiples) in the area (same question in reverse for independents)? Is there an element of competition for custom or 'enough trade to go around'?*

"We have a very good relationship with the other pharmacy in town and there appears to be enough trade for both businesses." (multiple pharmacist)

"We have a monopoly in the town." (multiple pharmacist)

"The relationship is good but we still care more about patients than business, thank god." (multiple pharmacist)

"I do not think that multiples pose a threat to independent pharmacies, as the service that I and other independents provide is usually of a very high standard. This is essential if we are to keep our customer base and to attract new customers." (independent pharmacist)

9. *There is a degree of regulation in the pharmacy sector – do you feel that is warranted and what are the advantages/disadvantages of control of entry?*

"Regulation is warranted. If it wasn't there then vulnerable sections of the community (for example, mothers with small children, the elderly, and those without transport) would be unable to access services if small existing businesses were to close." (multiple pharmacist)

"It depends on the situation really. The advantages are that it stops supermarkets opening up pharmacies wherever they want and destroying smaller businesses. The disadvantages are that it tends to prevent expansion where there is a genuine opportunity." (multiple pharmacist)

"It is difficult for a young independent to start in the area because of the monopoly situation that exists with L Rowlands." (multiple pharmacist)

"It is a positive thing, the main advantage is that the NHS has got control over the pharmacist services and this is positive. The main disadvantage is that some locations would do it better with more pharmacies around." (multiple pharmacist)

"Yes, regulation is essential if we are to have a rational distribution of pharmacy services. If there was de-regulation in my opinion all pharmacies would be in large towns which would mean that rural residents would have to travel some distance to access pharmacy services." (independent pharmacist)

10. *Last year the OFT recommended that 'control of entry regulations' be lifted in the pharmacy sector. What would be the impacts on this for your local area and Gwynedd as a whole?*

"This would have a devastating impact; it would lead to reduced revenue, less re-investment in the business and adversely affect services. We would have concentrated pockets of pharmacies in larger towns." (independent pharmacist)

"This would have a minimal effect locally as there are no large supermarkets nearby. On the other hand it will have a positive effect for local healthcare." (multiple pharmacist)
"It would have few impacts because it is a quiet village. On a wider scale more pharmacies may equal better service and could also increase competence at the LHB level." (multiple pharmacist)

11. *What is your relationship with the Local Health Board in Gwynedd? Has the recent re-organisation of healthcare delivery been a positive one in your view?*

"All at Head Office level (Rowlands) no contact between LHB and branches. We will have to wait and see what the impact of re-organisation will be. Surgeries closing on Saturdays may have a large impact in increased workload and we, as yet, don't know how the new contract will impact." (independent pharmacist)

"We have a very good relationship with all tiers of health authorities and the recent re-organisation has been very positive." (multiple pharmacist)
"The relationship is poor, they are a bunch of idiots who don't look at whole picture and are purely interested in money." (multiple pharmacist)

12. *What do you see as the main threats facing the pharmacy sector in this locality over the next five years?*

Most pharmacists mentioned the new pharmacy contract as a major area of concern, when prompted. At the time of the research some were unaware of its precise format but were still quite concerned at its long term implications.
"Unsuccessful implementation of the new pharmacy contract by contractors or LHBs is the major threat to the pharmacy sector in Gwynedd." (independent pharmacist)

"The new out of hours arrangements may affect us. There may also be delays in setting up IT links for electronic prescribing. Finally, recruitment of qualified staff for extended services will cause problems." (multiple pharmacist)

"Continual under investment, the rise in numbers of dispensing doctors, and a fall in doctors hours resulting in more pressure on pharmacies are our main concerns for the future."(multiple pharmacist)

"The new contract is my major concern. Will my business and local doctors be able to co-operate? I will need to participate in 'additional services' in order to maintain business and I shall have to re-train in some areas." (multiple pharmacist)

8.3.3 Qualitative Analysis of the Survey Results

This section undertakes a qualitative analysis of the interview surveys targeted at the LHB officials, national health officials in Wales and the local pharmacy providers in Gwynedd that have been detailed in the preceding sections of this chapter. The purpose of this section of the chapter is to summarise the findings of the survey in relation to some of the key issues concerning the role of the state in delivering primary healthcare in rural Wales, for example, health service re-organisation or new contractual arrangements, and draw a number of conclusions on attitudes to these important developments in primary healthcare that have emerged through the survey research. This section is organised around the evaluation of a number of key issues related to the role of the state in delivering primary healthcare, specifically:

- The importance of re-organisation with the healthcare sector within Wales in 2003, particularly related to the setting up devolved Local Health Boards with commissioning responsibilities for primary healthcare,
- The problems of recruitment of primary healthcare providers in rural areas of Wales,

- The importance of the new GMS contract for GPs and pharmacies recently introduced in Wales,
- The impacts of large organisations on the pharmacy sector in Gwynedd, and the relationships between independent and multiple pharmacy providers,
- The prospects, or threats, facing the future delivery of primary healthcare in Gwynedd.

The recent re-organisation of primary healthcare services in Wales prompted substantial discussion across all interview groups, from the national level officials through to local service providers (the pharmacists). At the national level, there was concern expressed by some respondents (particularly from the Institute of Rural Health) that the new Local Health Boards (LHBs) need to move away from a 'meeting targets' culture in terms of commissioning primary healthcare services and, instead, take more account of local needs when allocating services. This is particularly the case in rural areas where issues of rurality and poor access to services need to be taken into account when delivering services to the local population. In contrast, LHB officials stressed the improvements in the delivery of primary healthcare services under the organisational framework. In particular, the advantages of partnership arrangements with other parties concerned with healthcare services, for example local authorities, were highlighted as an important move forward. The development of needs assessment reports by LHBs is a further advantage of the new organisational structure mentioned by respondents, again helping to better target the delivery of primary healthcare services which is an on-going process in Gwynedd LHB. Contradicting this positive picture of the LHB arrangement in Wales and the targeting of resources to local need, is the fact the LHB officials revealed that there was no consideration of spatial variation in need when allocating resources. In the case of GP services, for example, priorities for services provided are agreed between local GPs and the LHB and then allocated to various practices, but there is no spatial element to this allocation. This could mean that patients have to travel large distances to access specialist services in

GP surgeries. The issue of health service re-organisation was further considered during the survey of pharmacies in Gwynedd. The response to a question on the relationship between the pharmacies and the LHB drew a mixed response. Many had few dealings with the LHB, particularly in the larger multiple chains, indicating that their head office would deal directly with the LHB. Elsewhere there was a mixed picture emerging with some pharmacies enjoying a good working relationship with the LHB and others quite scathing about their relationship with the LHB.

Issues of recruitment in the primary healthcare sector in Wales, across the three main primary healthcare sectors, was an issue raised by many interviewees. This was particularly evident in the interviews with LHB officials who indicated that recruitment of GPs and dentist, in particular had been a major issue in Gwynedd over the last decade or more. The recruitment of new doctors in Gwynedd is a particular area of concern, and has been for many years. The main source of this problem is the rural and peripheral nature of many parts of Gwynedd which many doctors are reluctant to move to. The LHB would, ideally, like to recruit Welsh speaking doctors to the area but this limits the recruitment 'pool' further and therefore a Welsh language training scheme has been put in place to tackle this problem following the recruitment process. The recruitment of dentists in rural areas is a national problem in the UK and this is mirrored in the case of Gwynedd. Although the area was fairly successful in attracting new dentists under the Welsh Dental Initiative (Welsh Office, 1998), this recruitment package necessitated a five year commitment of the part of dentists. Since this five year period has now lapsed, many of the dentists recruited are either 'going private' or planning to leave the area altogether. Pharmacy provision, however, has remained fairly stable as we have seen in chapter seven although there may be emerging problems in adequate provision of locum pharmacists in the Gwynedd LHB area. The regulations on entry to the pharmacy sector clearly have an influence on the emergence of new pharmacies in particular localities. The evidence from the pharmacist survey in Gwynedd suggests that, although most pharmacies are in favour of regulation to mediate the impacts of supermarket expansion in the sector, there is also recognition that regulation

does impose barriers to entry for young independent pharmacies trying to enter the sector. Regulation serves an important purpose in providing a rational distribution of services across localities, particularly important in a rural context, but can impose barriers to entry to the sector in certain areas where greater competition in the sector would not be negative, for example larger rural towns.

The changes that are emerging in primary healthcare delivery as a result of the emergence of the new GMS contracts for GPs and pharmacies in Wales was clearly one of the key areas of concern, or interest, for those interviewed. At the national level, officials from the Institute of Rural Health indicated that the new GMS contract for GPs would have an immediate impact on healthcare provision as the majority of GPs were likely to opt out of out of hours working. Whilst this shortfall is likely to be addressed by LHBs in the long term this is likely to take time to implement successfully. The advantage of the new contract for GPs was cited as being the positive impact it is likely to have on GP recruitment in rural areas of Wales. The new GMS contracts for GPs and pharmacies tended to dominate interviews with LHB officials in Gwynedd as the respondents were faced with implementing the new contracts at the time of the interview. It was, therefore, very illuminating to conduct the interviews at a time when a major new initiative impacting on primary healthcare was being initiated. Again there was rather a mixed response to the new GMS contract, particularly for GPs. As with the national policy officials, it was felt that the new contract would have a detrimental impact on service provision due to the impact of new arrangements for out of hours working. Once new arrangements to cover out of hours work are put into place, however, it was felt that the new contract would definitely encourage recruitment but it was also noted that other rural LHBs in Wales would be in the same position so competition in the new recruitment market would be intense. Another major problem for the LHB under the new contract is that commissioning of services is being enacted on a 'north Wales' basis, in other words the six LHBs that make up the former North Wales Health Authority are consulting on which services should go where. This does tend to go against the perceived advantages of the re-organisation to LHBs in Wales

and in a sense displays a reluctance to abandon former organisational arrangements in the region. This emerges as an important issue, as one official commented how can the LHB aims of meeting local needs be met if commissioning arrangements are being worked out at a north Wales level?

The new contract for pharmacy services met with a much more positive response from LHB officials. There was obvious enthusiasm for the new contract, especially in terms of defining a new and enhanced role for pharmacies with the primary healthcare system in Gwynedd and elsewhere. Whilst this enhanced role for pharmacies was welcomed, it was recognised that the requirements of the contract on pharmacies if they wish to provide advanced services under the new contract could be problematic for smaller independent pharmacies in Gwynedd. An example of this is the need to provide private consultation spaces within the pharmacy premises, something that requires major capital investment. This has not been a problem for larger multiple pharmacy chains but there is concern that smaller independent pharmacies may not be able to cope with the demands of the new contract. Despite these fears, there did not appear to be any initiative within the LHB to help independent pharmacies prepare for the new contract, for example training initiatives, or funding assistance. This appears to be an area where the LHB could take a lead in assisting smaller pharmacies, which are often located in the most remote or rural parts of Gwynedd. The survey of pharmacies revealed that many pharmacists interviewed were not fully aware of the precise nature of the new contract (at the time of the survey the new contact had not been agreed). A number of respondents did raise concerns about the new contract, however, particularly in the areas of: re-training to provide advanced services (or recruiting new qualified staff), the successful implementation of the contract by the LHB, the levels of investment required, and the impact that the reduction of out of hours working by GPs was likely to have on pharmacies.

The survey of pharmacies in rural areas of Gwynedd provided significant background material on the relationships between multiple chain and

independent pharmacies and differences in their opinion of key developments in the primary healthcare sector detailed above. There did not appear to be any animosity between independent pharmacist and multiple pharmacists and all cited a good working relationship where both types of pharmacy co-existed in a particular location. It was felt that there was enough business 'to go around' where both types of pharmacy co-existed, but it should be remembered that in many localities of Gwynedd there are, at present, only L Rowlands pharmacists and no independents which is a very different situation to that which existed ten years ago (as shown by the analysis in Chapter Seven), indicating that independent pharmacists should not feel 'too comfortable' in terms of maintaining their market position. One independent pharmacist did highlight the need to provide as good a service as possible, providing many additional services such as home delivery, in order to preserve their place in the market. As for views on other issues such as the new GMS contract or the impact of re-organisation of the health service there was little clear distinction between the views of multiple chain pharmacists and independents. Concerns were raised, however, by independent pharmacists regarding the extra monetary burden that the new GMS contract would place on pharmacies in order to provide advanced services. Many of these costs would be met by the parent company in the case of multiple pharmacies such as L Rowlands. Overall, however, a variation in views on these issues tended to be identified on an individual basis rather than a distinction between the two types of pharmacy.

The survey analysis does provide contextual evidence to support a link between the analysis of organisational change in the pharmacy sector, provided in Chapter Seven, and the theoretical framework for this analysis set out in Chapter Two, drawing on theories of the firm. Maps 7.14 and 7.15 in ***Appendix Ch.7*** highlight the changes that have taken place in the pharmacy sector over the study period in Gwynedd. Spatially the distribution of these services has remained fairly stable but this is not the case in terms of organisational issues where many pharmacies in rural parts of Gwynedd have changed from an independent pharmacy to a L Rowlands pharmacy. Important elements of this development of the organisation of pharmacy firms in Gwynedd may be traced

back to Marshall's early theory of the firm (Marshall, 1919 cited in O'Brien, 1986). In particular, the importance of technical change or innovation, knowledge, and competitive structure in Marshall's theory are relevant here. Evidence from the surveys suggests that the larger multiple pharmacies, particularly L Rowlands, are able to adapt to new arrangements for the delivery of the service, for example through the new GMS contract. Here, additional costs associated with providing advanced services are easily assimilated within the larger firm structure and there is greater knowledge of the technical changes that need to be put in place. This is a result of the competitive structure of the firm with a head office function attuned to developments in the sector. We have seen in the survey of pharmacies that multiples like L Rowlands have little contact with the LHB as this process is carried out by the head office. Therefore, the importance of the size of the firm, as stated by Marshall, is important in respect to the pharmacy sector in Gwynedd in terms of responding quickly to emerging innovations and managing the operation of the firm and individual suppliers through a head office function. The advantages of the larger firm over independent suppliers is taken on by Coase (1952), and is relevant here in that it cites the importance of the firm in lowering costs through improved internal organisation that would otherwise be channelled through market processes, as highlighted in Chapter Two (Coase, 1952). Alchian and Demsetz (1972) contribution to the theory of the firm concentrates on the role of team production in assigning different tasks of the firm to different resources and deriving separate outputs that are clearly identifiable and do not necessarily combine to form one output (Alchian and Demsetz, 1972). The key to team production is seen as being able to manage the team particularly in terms of measuring outputs and apportioning tasks (the metering problem). It is possible to draw on this theoretical context once more in relation to the situation in the pharmacy sector highlighted through the preceding survey analysis. Clearly a large firm like L Rowlands has major advantages in terms of managing tasks and apportioning particular roles to certain aspects of the firm. The parent company, Phoenix Healthcare Distribution Ltd., has an important role in providing a wholesaling service to its pharmacies and its pharmacy division manages the interests of its contract pharmacists under the L Rowlands umbrella. It has been shown previously in this chapter that Phoenix also play an

important role in the appropriation of new pharmacy providers through its guaranteed loan scheme which necessitates clients placing 70% of their business with Phoenix for the duration of the loan period. Therefore, through a wide network of services provided under the Phoenix organisation, including wholesaling, medical products, pharmacy services, and management through the head office function based in Runcorn, it is possible to identify a form of team production with visible impacts identified in Gwynedd through the proliferation of the L Rowlands pharmacies. The further advantage that the Phoenix group has over other, independent, suppliers is a degree of vertical integration which has been commented upon by LHB officials during the course of the interview survey.

A number of factors that may favour the emergence of vertical integration in a firm were identified in Chapter Two. These included: regulatory controls on markets or controls on entry to markets by other providers, strategic similarity between vertically related activities, large production quantities that allow benefits of economies of scale, and the reluctance of other firms to make investments specific to the transactions (www.quickmba.com accessed 10/11/04). Many of the factors favouring vertical restructuring may be applied to the pharmacy sector in Gwynedd, and in particular the L Rowlands chain of pharmacies. Here, there are controls on entry to the market, there are clear links between the manufacture, wholesale and point of sale operations of the L Rowlands group (the pharmacy shops provide an outlet for wholesaled pharmaceutical goods, for example), there are obvious economies of scale involved in the L Rowlands operation process, and smaller chains or independents would be reluctant, or unable, to make substantial investments to increase market share. This reluctance or inability has been demonstrated in the results of the survey analysis presented in this chapter where independent pharmacists were unsure how investment costs to implement the new GMS contract for Pharmacists would be met.

A further important issue raised by the survey analysis and connecting with previous literature reviewed in the thesis is that of regulation within the pharmacy sector. We have seen previously in the review of health economics in Chapter Two that the aim of regulation is to correct market failure on the understanding that if one market distortion exists, introducing another can lead to efficiency improvement. Regulation may also arise to correct inequity in the delivery of primary healthcare services, for example a lack of access to healthcare services for part of the population (McPake et al, 2002). Recent debates, sparked by an Office of Fair Trading report, have called for regulatory controls on entry to the pharmacy sector to be lifted. The survey of pharmacists in Gwynedd revealed an overwhelming feeling that regulation was a positive element in the sector. Both multiple chain pharmacists and independent pharmacists felt that regulation was essential to maintain levels of service for all sectors of rural society. As one independent pharmacist commented,

"Regulation is essential if we are to have a rational distribution of pharmacy services. If there was de-regulation in my opinion all pharmacies would be in large towns which would mean that rural residents would have to travel some distance to access pharmacy services."

The impact on the less mobile, elderly and mothers with young children in rural areas was also a cause for concern if current regulatory controls are to be lifted. In terms of the OFT report recommendations to lift regulation in the pharmacy sector a similar pattern emerges with one independent pharmacist citing the "devastating impact" that this would have on small rural providers. The larger multiple pharmacists did indicate that their market position could be retained, however, under such an arrangement and could see some benefits for the sector of increased competition that may result.

Opinion on the future of the primary healthcare sector across Wales and within the case study area of Gwynedd was characterised by major differences in relation to certain sectors of the rural primary healthcare system: GP services, dental services, and pharmacies. At the national level, officials commented on possible detrimental impacts of centralisation of services across the sector in

primary care centres, particularly in relation to reducing access to key services. The new GMS contract for GPs was seen as a positive development in the long term but would need to be managed effectively. These concerns were shared by LHB officials who are optimistic about the new contract in terms of its role in securing existing service levels and providing for future expansion, but, at the same time, concerned over the short term impacts of reductions in service and securing funding for new enhanced services. Dental services are perceived as something of an 'outsider' in the NHS system and officials seem to be of the view that more are likely to become private, or part of Denplan, in due course. The pharmacy sector, on the other hand, is regarded as having a positive future due to the new GMS contract which enhances their role in the primary healthcare sector as we have already seen. There are threats identified, however, relating to the impacts of new arrangements for out of hours working, the continued threat of dispensing GP surgeries in rural areas, and the investment required, particularly within smaller independent pharmacies to successfully implement the new contract arrangements.

8.4 Summary

The analysis of the survey results and the interviews with healthcare professionals has served to illuminate many of the issues that have been the focus of attention throughout this research project. Primary healthcare officers and providers alike are concerned about levels of access and how these may be affected in the future by forthcoming policy initiatives or contractual arrangements. There is considerable concern expressed about how this will impact on the sector in general but also, perhaps more importantly, how these effects will be felt by the local population. It is also true to say that the impression is that this is an exciting time for primary healthcare and there seems to be some consensus that policy developments are heading in the right direction, especially in the pharmacy sector which will have an expanded role in rural healthcare under the new contract regime. How healthcare officers and

providers respond to the challenge will be crucial in determining the success and future direction of the pharmacy sector.

This chapter has further provided evidence on the efficacy of setting a review of changes in the primary healthcare market in Wales within a sound theoretical perspective that encompasses organisational change in relation to theories of the firm. It is has been shown that many of the developments within the pharmacy sector in Gwynedd, that have been highlighted empirically in Chapter Seven, can be traced back to recognised theories of firm as highlighted in the previous section of this chapter. The interview material, and further contextual material on the Phoenix group presented in section 8.2.2, has facilitated the establishment of a link between the operation of a large, vertically integrated, firm such as Phoenix Healthcare and its L Rowlands pharmacy chain, and the theories of the firm set out previously. The importance of regulation within the sector has also been highlighted with reference to the previous review of literature and response to the pharmacist survey.

Chapter Nine – Conclusions

9.1 Introduction

This thesis has attempted to analyse a broad topic 'the spatial and temporal organisation of primary healthcare in rural areas' using Wales as a 'test bed' and the Gwynedd Local Health Board as a more detailed case study locality. There has been a further attempt to narrow the focus of the research through affording particular attention to the pharmacy sector in Wales. The analysis presented on the spatial organisation of primary healthcare services and the changes that have occurred in the sector over the study period has been allied to an appraisal of the concomitant changes in the institutional setting, an on-going process of rural restructuring, and, where applicable, changing patterns of organisational aspects of the healthcare sector drawing on theories of the firm (particularly relevant in the case of the pharmacy sector). This concluding chapter attempts to critically evaluate the success of the thesis in addressing the five research questions set out in the introductory chapter (Chapter One) highlighting key findings to emerge from the analysis presented throughout the thesis. It is important that this evaluation further considers the value of the proffered theoretical context for examining spatial and temporal changes in the healthcare sector in a rural setting. An evaluation of the thesis in terms of its larger contribution to the area of research is then made. Finally, possible limitations to the study are presented before concluding with a number of thoughts for potential future research avenues in the rural primary healthcare sector that have emerged through this research.

9.2 Evaluating the Research Questions

In the Introduction to this thesis a number of research questions were set out to guide the progress of the research. The research questions have been addressed within the preceding chapters of the thesis and it is important now to approach these research questions anew evaluating where, and to what degree, the

analysis and reviews of relevant literature carried out in the thesis have provided responses to these questions. The five research questions are highlighted below once more for recollection purposes before each one is evaluated in turn in the remainder of this section of the conclusion.

The Research questions:

1. What are the determinants of the spatial and temporal organisation of primary healthcare services and the distribution of access over social groups?
2. How have the spatial characteristics of rural primary care services developed over the last decade and what factors have been responsible for this change?
3. What implications have the restructuring processes for access to primary healthcare for local communities and different social groups?
4. What role can GIS play in analysing and visualising differential accessibility to key health care facilities in rural areas?
5. What role has the state played and should play to support rural primary healthcare?

9.2.1 Research Question One

What are the determinants of the spatial and temporal organisation of primary healthcare services and the distribution of access over social groups?

In Chapter Two of this thesis an extensive review of existing literature was presented in an attempt to identify the factors that impact on the spatial distribution of primary healthcare services. From this discussion emerged a series of determinants of the spatial and temporal organisation of such services which included the influence of rurality and associated problems faced by rural residents on the spatial distribution of primary healthcare services in such localities. This inevitably led to a discussion of the importance of accessibility within a rural context, in relation to key services and how this could differentially impact on particular groups in society. Following the presentation

of a theoretical context for analysing access to primary healthcare services (considered in more detail in later sections of this conclusion), the role of the state and particular policy initiatives introduced in Wales in relation to primary healthcare delivery were introduced. These three key determinants of the spatial and temporal distribution; rurality, rural accessibility, and state initiatives, are now considered in detail in terms of how the research undertaken in the thesis has furthered our understanding of these processes.

The role of rurality in relation to primary healthcare has been highlighted previously in the thesis as impacting in a number of ways on primary healthcare services, which include a more dispersed patient population, poor accessibility, problems of recruitment and problems in securing 'out of hours' treatments (Rousseau and McColl, 1997). Further research by authors such as Deaville (2001) and Higgs (1999) has been considered previously which stresses the growing importance of issues of rurality in terms of the delivery of primary healthcare. This initial review of rurality issues led in Chapters Four and Five to a discussion and analysis of how we define rural areas in a practical sense, particularly within Wales, and, in a contextual fashion, examined the various concepts of rural disadvantage that impact on various groups in rural society and that may be applied to the study of rural primary healthcare. The initial result of this analysis was to identify the areas of Wales that we might consider rural based on a Unitary Authority or ward based definition as highlighted in Chapter Four.

The particular characteristics of these rural areas were subsequently returned to in Chapters Five and Six drawing on an analysis of UK Census of Population data from 1991 and 2001. In broad terms rural areas of Wales tend to exhibit a range of characteristics that include an ageing population, high levels of self-reported good health, high levels of households with two or more cars, and a high proportion of private rented households and second/holiday homes. This analysis has also highlighted, however, that there are certainly large areas of rural Wales that are experiencing structural problems based on measures of

certain socio-economic and demographic variables. This is particularly evident in the analysis of 2001 Census variables in Chapter Six (section 6.2) which highlights that the rural study area of Gwynedd, in particular, is experiencing high levels of disadvantage, measured on a range of census variables, that is often comparable to levels found in the South Wales Valleys communities, for example, with high percentages of unemployed people and relatively high levels of deprivation in parts of the UA measured on the Townsend score. Substantial 'pockets' of disadvantage are also found in other parts of rural Wales, for example Ceredigion and Carmarthenshire. Social groups within these rural areas that suffer from high levels of disadvantage may also be expected to experience problems of mobility (for example low levels of private transport ownership as recorded in the Townsend score) which will exacerbate problems of rurality that impact on accessing services.

The Census analysis is important when placed in the context of theoretical debates on rural deprivation or disadvantage highlighted in Chapter Five. This material has highlighted the importance of viewing rural problems or disadvantage in an alternative context to urban disadvantage and has been traced through the academic and policy literature in this thesis. The debate has moved through the important distinctions between household, opportunity and mobility deprivation stressed by Shaw (1979) before stressing an understanding of the importance of the spatial dimensions of rural disadvantage (for example, Midwinter et al, 1988). This debate highlights the important role of the characteristics of rural areas in informing our understanding of rural deprivation and in particular how space or distance impacts on the everyday lives of rural residents in terms of accessing services and employment. This accessibility issue is returned to below.

Clearly the thesis has sought to carefully limit the analysis and commentary to a focus on rural areas of Wales and the delivery of rural primary healthcare services within these areas, where analysis has yielded results for urban areas of Wales (for example the Census analysis and accessibility measures) this has

provided a useful comparative element but is not the focus of the study. The research has assisted, therefore, in developing our understanding of the importance of rurality when considering the spatial and temporal organisation of primary healthcare services and allowing further detailed analysis of the distribution of such services into a rigorous context. It is to that detailed analysis that this discussion now turns.

The issue of accessibility to services in rural areas has a clear bearing on the spatial distribution of various facilities across a wide range of sectors, not least in the primary healthcare sector. The importance of access in explaining the relationship between need and utilisation of healthcare services has been stressed previously in the thesis (for example Deauville, 2001). Access to primary healthcare services is clearly an area worthy of further consideration, therefore, and a number of alternative approaches to calculating accessibility in rural areas have been considered during the thesis. This included a detailed account in the review section of the thesis (Chapter Two) of previous approaches to measuring accessibility levels concentrating on two distinct areas of analysis; measures of revealed accessibility and measures of potential accessibility (for example, Joseph and Bantock, 1982).

The focus within this research has been to develop indicators of accessibility based on the potential of individuals to access primary healthcare services rather than any attempt to measure individuals actual (or revealed) accessibility experiences which often necessitate extensive survey analysis. A number of methods for measuring potential accessibility have been presented in the thesis and the analysis of access to primary healthcare services presented in Chapters Five and Six have concentrated on two such measures – the 'Isolation Index' developed by the author using GIS methods, an index of potential physical accessibility adapted from Joseph and Bantock, (1982), and measures of transport dependency developed by Nutley (1980) (Higgs and White 2000, Joseph and Bantock 1982, Nutley, 1980). The measure employed for both the 1996 and 2004 data is the Isolation Index. The utility of these measures lies in

the ability to aggregate accessibility scores based on both 1996 and 2001 data to a common unit which was the 2001 wards thereby allowing differences in accessibility levels to be attributed to changes in service facility provision or changes in the underlying population served by these facilities. The development of this indicator is a useful contribution to our understanding of the spatial and temporal organisation of primary healthcare services as it is relatively easy to understand in terms of the policy community and can be adapted to particular spatial units of choice which also allows for comparisons over time to be made, which is considered in more detail in section 9.2.2 below.

In summary, the employment of these techniques led to the following trends to be identified, drawing on evidence from Chapters Five and Six. The maps of the Indices of Isolation for the primary healthcare services in 1996 (GP Surgeries and Dental Surgeries only) in ***Appendix Ch.5*** show that the measure is quite rigorous in terms of not just showing a 'blanket' of poor accessibility levels to services in rural areas but that in fact some rural areas show fairly good levels of accessibility, particularly in the larger settlements. Conversely the reverse is true in some south Wales valley and urban communities where accessibility levels are quite low in certain localities. Similar trends appear in terms of the 2004 data in the maps presented in ***Appendix Ch.6*** where for Dental Surgeries (Map 6.21), for instance there are clearly large parts of the rural areas of Wales that have poor access to this type of service facility with areas of Powys, Ceredigion, Pembrokeshire, Gwynedd and Anglesey most affected. Again there is not a uniform pattern of good accessibility in urban areas and poor in rural areas, however, as there are pockets of fairly good accessibility levels in rural parts of Wales (and also poor accessibility in valley or urban localities). This is an advantage of using network distance over straight-line distance as variations of this sort are highlighted in the modelled access measures. The maps for GP Surgeries and Pharmacies (Maps 6.22 and 6.23 in ***Appendix Ch.6***) display a similar pattern as that shown for dental surgeries with large parts of the rural areas of Wales experiencing poor levels of accessibility with pockets of improved accessibility in some parts. The accessibility analysis for pharmacies in Wales in 2004 show that although there are still major parts of rural areas

with poor levels of accessibility there are larger areas of rural areas with improved levels of access to pharmacies compared to other primary health care services. The value of this analysis is evident, as there is not a universal picture of poor accessibility to primary healthcare services in rural Wales just as social and economic problems are not universal in their extent across this region. By employing sophisticated network-based accessibility models with the GIS a more accurate picture of differential accessibility across rural Wales is possible and the 'value added' utility of this approach is the possibility to examine changes in accessibility that have occurred across the study period, this is returned to in Section 9.2.2 below.

The role of the state is of key importance in assessing the determinants of spatial and temporal organisation of the primary healthcare sector and Chapters Two and Four, particularly, have outlined recent changes in the delivery of rural healthcare in Wales and, in particular focused on the importance of re-organisation in the sector and the development of new contractual arrangements for various aspects of primary healthcare delivery in Wales. A detailed consideration of the role of the state in promoting rural primary healthcare delivery is considered in Section 9.2.5 below but it is useful at this point to consider the role of the state in terms of how it has impacted on the spatial organisation of primary healthcare services that we see in rural Wales today and how this role has developed over time.

In the review of previous literature presented in Chapter Two of this thesis each primary healthcare sector (GP Surgeries, Dental Surgeries and Pharmacies) is analysed in terms of particular characteristics of delivery in a rural setting, particularly related to the situation in Wales. In terms of shaping the spatial and temporal organisation of primary healthcare services in rural Wales a number of key policy initiatives emerge from this review. The first key determinant is particular rural policy initiatives to promote primary care services. These are identified across the sector and include rural practice payments to GP practices, the dental Initiative of the Welsh Office in 1998 which was successful in

attracting many new dentists to parts of Gwynedd, Anglesey and Powys, and the essential small pharmacy scheme (ESPS) that provides financial assistance to pharmacies in England and Wales that are not viable because of their rural location. In Gwynedd, only two independent pharmacies are in receipt of ESPS payments. These initiatives provide a context for the ensuing analysis of the spatial characteristics of primary healthcare delivery particularly in relation to the case study region of Gwynedd presented in Chapter Six.

Of further importance in terms of affecting the delivery of primary healthcare services in Wales has been the recent re-organisation of the NHS in Wales in 2003, highlighted in the Introduction and Chapter Four of the thesis. This more devolved delivery of services has implications for the management of such services and should make delivery more locally sensitive or accountable; this point is returned to in Section 9.2.5. Finally recent developments in the formulation of new contracts for GP and pharmacy services in Wales are likely to have important implications for the spatial organisation of services as highlighted in the qualitative analysis of interviews carried out with service providers and healthcare officials. The thesis has fully engaged with the re-organisation processes that have emerged in Wales over the course of the study. This has included the developments in new contracts for GPs and pharmacies which were emerging at the time of writing. These are assessed in more detail in subsequent sections, but the thesis has found that these developments are likely to have profound impacts on primary healthcare services in the short and long term. This may be characterised by reductions in service levels through the new arrangements for out of hours work but this may be offset by improved recruitment levels in rural areas in the long term.

In summary the thesis has successfully considered relevant aspects of policy development and other determinants of the spatial distribution that have impacted on primary healthcare services over the study period and this was important in contextualising the analysis of accessibility levels to those services. Accessibility levels may be expected to be different across social groups and it

has been shown that variations in social and economic characteristics vary across rural Wales. The evidence further indicates that there are large parts of rural Wales with relatively poor access levels to key services, for example dental surgeries. Within these areas of low population further decline of primary healthcare services will necessitate larger distances to travel to access key services. This could pose significant problems for certain sectors of the rural community, for example the elderly, mothers with young children, the disabled, and those with low mobility levels, for example without access to private transport. If we consider the extent to which these determinants have impacted on the spatial distribution of services over the study period then a number of questions arise which are addressed through the next research question.

9.2.2 Research Question Two

How have the spatial characteristics of rural primary care services developed over the last decade and what factors have been responsible for this change?

This research question necessitated the need to analyse data relating to primary healthcare services across two time periods within the accessibility analysis framework set out and employing a GIS approach. Data for dental surgeries, GP practices, and pharmacies were assembled in the GIS for 1996 and 2004 (although in the case of pharmacies data was only available for the case study area of Gwynedd for the pharmacy services). The relationship to issues of demand or the characteristics of the population served by the services analysed was considered through analysis of Census data in relation to the indices of accessibility developed employing correlation techniques to determine the strength of any relationship. Chapter Seven of the thesis considered in detail changes in services provision across the study period drawing on analysis of percentage change of service levels between the two periods. An analysis of surveys of services in rural communities carried out for the period 1996 to 2004 in rural Wales by the author was also undertaken as part of this process. Finally detailed analysis of the situation in Gwynedd in terms of changes in primary

healthcare provision was carried out. In summary, the analysis of the changing characteristics of primary healthcare services over the study period encompassed a series of separate but inter-linked key areas:

- An appraisal of changing population levels in Wales and in the case study area of Gwynedd,
- An appraisal of changing levels of service provision in the primary healthcare sector that have emerged from the 1996 and 2004 Surveys of Rural Services in Wales,
- An analysis of changing levels of accessibility to key primary healthcare services across Wales drawing on the analysis presented in Chapters Five and Six,
- Analysis of changes in primary health care service provision within the case study area of Gwynedd with a particular focus on the pharmacy sector in Gwynedd and how this has changed radically over the period 1996-2004, particularly in terms of organisational factors.

An analysis of changing population levels in Wales from 1991-2001 was important in informing the influence of population change in the Isolation Indices developed during the study. This analysis of population change was facilitated by re-aggregating 1991 Census data to 2001 Ward boundaries and showed clearly that whilst Gwynedd and Anglesey had clearly lost population during the inter-census period, large parts of rural Wales, particularly parts of Powys and Ceredigion had seen significant population increase (see map 7.1 and 7.2 in ***Appendix Ch.7***).

The data from the Welsh Rural Communities Surveys undertaken by the author in 1996 and 2004 shows quite clearly that the provision of primary healthcare services in rural Wales is very much related to population levels in the communities surveyed. The survey results summarised in Chapter Seven show clearly that GP surgeries have significantly reduced in number in Community Councils with lower populations (below 1000 population), for example falling

from 24% of Community Councils having a GP Surgery in 1996 in the 700-1000 population band to 4% in 2004 (Tables 7.1 and 7.2 in Chapter Seven). In terms of Dental surgeries not a great deal of change in provision has been revealed in the two surveys with little or no provision of this service in Community Councils below 1000 population and concentration of provision in more populous areas of rural Wales with populations greater than 4000 (Tables 7.3 and 7.4 in Chapter Seven). Evidence of the presence or otherwise of pharmacies in rural Wales is also provided by the survey analysis presented in Chapter Seven. Here provision seems to have fallen in the Community Councils with the lowest populations (below 700 persons) but there are increases in provision in the most populous areas, those above 4000 population (Tables 7.5 and 7.6 in Chapter Seven). It does appear that levels of provision across a range of key services have fallen in rural areas between the two surveys 1996-2004. This is particularly evident in the Town and Community Councils in the lowest population bands (below 1000 population).

Changes in access to services are considered in detail in Chapter Seven based on the calculation of 'Isolation Indices' for each service (GP Surgery, Dental Surgery, and Pharmacy) for both time periods, 1996 and 2004, at a common spatial unit of the 2001 Ward boundary. The analysis of change in access to GP services revealed that a fairly even pattern of access is evident with relatively little change in accessibility levels identifiable across the ranges for 1996 and 2004 shown by maps 7.5 and 7.6 in ***Appendix Ch.7***. The maps produced for dentists show some reduction in the distance measures between the two dates particularly in parts of Gwynedd and this may be the result of an improved dental service in the area resulting from the input of funding resulting from the Welsh Office Dental Initiatives that were promoted in the area during the 1990's and from which Gwynedd was relatively successful in securing new dental practices (maps 7.3 and 7.4 in ***Appendix Ch.7***). As for pharmacy services, the analysis in Chapter Seven concentrated on the case study area of Gwynedd as data on pharmacy provision was not available across Wales for the 1996 period. This analysis reveals small changes in the accessibility measures resulting from the weighting process by 1991 and 2001 ward populations. The actual supply

side for pharmacy services in Gwynedd has remained stable during this time, however, indeed throughout Wales as a whole pharmacy services have remained stable throughout the 1990's with 714 pharmacies in Wales in 1996 and 711 in 2000 (NAW, 2002). These figures do mask changes in ownership with significant rises in the ownership of pharmacies by multiple chains occurring in the case study area.

Further analysis of point level data within the GIS in Chapter Seven revealed how services had changed over the study period in the case study area of Gwynedd. This change is characterised by a slight increase in dental services, a decline in GP practices and no change in pharmacy services. However, other developments in the pharmacy sector over the 1996-2004 period are just as noteworthy, based on changes in ownership that have occurred during that period, in particular the proliferation of the L Rowlands pharmacy chain in the Gwynedd LHB area which is returned to in the following section.

When evaluating the extensive analysis that has been undertaken on the changing spatial characteristics of primary healthcare services in Wales over the study period it is clear that a rather stable picture emerges in terms of the spatial coverage and access to such services. There are important trends identified in the surveys of Welsh Community Councils, however, which suggest that those communities with lower population levels are losing primary healthcare services. This could suggest some centralisation of services in larger settlements in rural areas. Therefore, the degree of rurality (in this case measured by population levels) may be contributing to a loss of service in rural areas of Wales. Conversely, the role of the state has had some impact in improving levels of particular primary healthcare services, for example the Welsh dental Initiative (Welsh Office, 1998) which was successful in attracting dentists to the north Wales region, particularly Gwynedd. This has been identified in the change in accessibility analysis and is further illustrated by Map 7.12 in ***Appendix Ch.7***.

9.2.3 Research Question Three

What implications have the restructuring processes for access to primary healthcare for local communities and different social groups?

In theoretical terms an attempt has been made to provide a context for examining spatial and temporal changes in primary healthcare services provision and changes in access to those services. The research has been framed within a theoretical context that describes the restructuring forces at work within the countryside or rural areas drawing on the example of regulation theory employed, for example, in the 'Lifestyles in Rural Wales' research undertaken by Goodwin et al (1995) (see also Cloke et al, 1995b). Regulation theory is used in this sense to underpin and explain some of the problems faced in rural communities of Wales as presented in Chapters Five and Six through an analysis of 1991 and 2001 UK Census data. The theoretical context developed was useful in providing a basis for understanding structural changes in rural areas of Wales, in particular changes in the demographic and social profiles of the areas studied as evidenced in the analysis of Census variables from 1991 to 2001. The importance of changes in population over the inter-census period is a significant factor in rural areas of Wales (highlighted in Chapter Seven of the thesis), linked as it is to changes in migration patterns over the 1991-2001 period.

The theoretical context presented in chapter two of the thesis is important from an additional sense in relation to restructuring processes in the primary healthcare sector in rural Wales. This relates to an assessment of the importance of organisational behaviour in terms of its helping to contextualise and explain the changing spatial and temporal organisation of primary healthcare services in rural Wales. The theoretical perspective developed has drawn on 'Theories of the Firm' literature to allow changes in particular primary healthcare services, particularly the pharmacy sector to be placed within a rigorous framework for analysis. It has been shown in Chapter Eight of the thesis how the examples of theories of the firm described previously in the thesis can be applied to the

particular situation of the pharmacy sector in Gwynedd. The empirical evidence on the way the pharmacy sector has developed in Gwynedd was presented in the GIS analysis in Chapter Seven which clearly showed how the L Rowlands chain had emerged as a near monopolistic force in the sector over the study period. This was viewed, within Chapter Eight within theories of the firm developed by Marshall, Coase, and Alchian and Demsetz (Marshall, 1919, Coase, 1952, Alchian and Demsetz, 1972). This analysis provided an explanatory framework for considering the temporal changes (in terms of ownership characteristics) that had been identified through the empirical analysis and, furthermore, provided a context for considering the qualitative evidence provided by interviewees on developments in the Gwynedd pharmacy sector. This is evidenced, for example, in Penrose' (1995) treatment of vertical integration within firms which is particularly relevant in explaining processes currently at work in the pharmacy sector in Gwynedd. Vertical integration in primary care is often seen as taking the form of shifts in the provision of health care between primary and secondary care and of formal/informal contractual or co-operative arrangements between primary and secondary care providers. This is true at the governmental level but it is also true that in quasi-private organisations such as pharmacies this vertical integration may take on a more standard economics definition with firms controlling manufacturing and wholesaling operations as well as the 'point of sale' business. Many of the factors favouring vertical restructuring may be applied to the pharmacy sector in Gwynedd, and in particular the L Rowlands chain of pharmacies. Here, there are controls on entry to the market, there are clear links between the manufacture, wholesale and point of sale operations of the L Rowlands group (the pharmacy shops provide an outlet for wholesaled pharmaceutical goods, for example), there are obvious economies of scale involved in the L Rowlands operation process and that of its parent company Phoenix Healthcare Ltd, and smaller chains or independents would be reluctant, or unable, to make substantial investments to increase market share. The thesis, therefore, has revealed a clear example of vertical integration in operation in the L Rowlands group in Gwynedd and the analysis of changes in primary healthcare services presented in Chapter Seven revealed very clearly how quickly this internal firm restructuring changed the ownership patterns of pharmacy outlets in Gwynedd over the study period 1996-2004.

This is allied to health economics literature which provides contextual information on alternative market models in the healthcare sector which are emerging in the pharmacy sector in north Wales. Although at the moment we can see that within the pharmacy sector in Gwynedd an oligopololistic market exists currently with a relatively small number of suppliers, it is evident that the restructuring within particular organisations has seen a gradual, if incomplete, move towards a monopoly situation in the pharmacy sector in Gwynedd through the dominance of one particular pharmacy provider: L Rowlands. An important barrier, or check, on the inefficiencies of a monopolistic market model is regulation and it has been shown that there is much opposition to the lifting of regulatory controls in the pharmacy sector in Gwynedd. The most important negative impact of such a move is seen as the detrimental impact on access to services by particular social groups in rural communities, and a reduction overall of smaller service providers in the most rural locations.

Restructuring was also identified in the healthcare sector itself through a re-orientation of the service to a more locally accountable and devolved delivery mechanism through the setting up of Local Health Boards in 2003. This has been considered previously in this concluding chapter in relation to the determinants of primary healthcare services spatial and temporal organisation and is returned to again in section 9.2.5 below. Whilst a new theory of healthcare service organisation may not have emerged in the course of the thesis, allying this previous theoretical work to the present study does place the technical development of measures of spatial and temporal organisation of these services into a robust framework for analysis.

9.2.4 Research Question Four

What role can GIS play in analysing and visualising differential accessibility to key health care facilities in rural areas?

A Geographic Information Systems (GIS) approach to the analysis of spatial and temporal variation in primary healthcare services in rural Wales has proved invaluable over the course of the research. The use of GIS has been a major methodological focus of the study and its utility in presenting and visualising complex concepts such as potential accessibility has been self-evident. The use of GIS in analysis of healthcare provision is not unique to this thesis, of course, and in Chapter Two a detailed review of previous healthcare studies adopting a GIS approach has been provided. It is not the intention here to revisit that review in any detail, but it is perhaps useful to highlight the primary areas of GIS use in the healthcare sector before assessing the contribution of GIS in relation to the present study.

One of the principal applications of GIS in terms of geography of health research has been concerned with the delivery of, and access to, healthcare services. We have seen previously, how GIS has been used in this area of research to help answer some broad questions of healthcare delivery (see, for example, Gatrell and Senior, 1999), Four main areas of GIS and health research were reviewed in chapter two which are, locality planning and needs assessment, locational planning of health services, spatial decision support for health care planning, and access to health services. Clearly the review in Chapter Two concentrated on the use of GIS in the access to health services research area and this is the context within which the current research may be viewed.

In practical terms the contribution of the study to the development of the use of GIS in the primary healthcare sector may be measured in terms of various key advantages. Firstly, the spatial extent of the study has been significant in that much of the analysis has been conducted at the national level in Wales which necessitated a major data collection exercise, particularly for the 2004 analysis. This was allied to a more detailed analysis of the primary healthcare sector in Gwynedd again using 2004 data but going much further in terms of examining the incidence of particular services that are available at the various service

facilities. This development of detailed attribute information for each of the service facilities in the case study locality was crucial in informing issues of spatial and temporal organisation of primary healthcare services, for example information on ownership details and services provided by pharmacy services, or temporal issues of GP opening times. The use of GIS is invaluable in constructing the complex datasets of both locational and attributes information, and the ability to visualise resulting spatial patterns and variations across time within the datasets has been a key resource for the research.

The visualisation techniques adopted in the thesis involved utilising existing underlying administrative boundaries, for example 2001 Census electoral wards, which has the advantage of presenting the analysis to policy makers in recognisable spatial units that can be combined with other data sources of interest available at the ward level or community level. This technique has become fairly standard in recent years, particularly where such accessibility measures are combined with other ward-based indicators to form area-based deprivation measures (NAW, 2000, DETR, 1999). The development of this technique does pre-date this acceptance of the method for use in disadvantage indicators (see White et al, 1997). An alternative approach is to use a raster (or grid) based data format in the GIS and producing continuous accessibility 'surface' models of differential access to services, based on travel time or distance constraints. An example of this type of approach is provided by Martin et al (2002) in a study of rural healthcare in South West England. Such methods have the advantage of being both visually appealing and reflecting accessibility levels across a large spatial area without being constrained by administrative boundaries. This can pose problems in itself, however, for policy makers as this type of visualisation does not allow for easy comparison of levels of accessibility between one administrative area (ward or local authority) and another, aside from an intuitive visual assessment of which areas appear more accessible than others, or through a re-aggregation of values to administrative areas in the GIS.

GIS has played a crucial role in the research allowing complex spatial analyses and visualisation of access levels across the two time periods. This involved a series of complex network based modelling techniques within the GIS. The use of GIS also allowed for an analysis of 1996 service accessibility levels for doctors and dentists at the 2001 ward level through a re-aggregation of 1991 Enumeration Districts to the 2001 boundary level. This then allowed for a comparative analysis of change at the all-Wales level at one common spatial unit. This analysis has found that although services had remained fairly stable over the study period there were identifiable variations in parts of rural Wales and the influence of a changing demographic profile of the area was also having implications for accessibility levels to services based on the population weighted measures adopted in the study. This detailed accessibility analysis and visualisation of changing level of access over time could not have been undertaken without the spatial analytical and mapping capability of the Arc/Info GIS used throughout the research. The role that GIS has played in the study is, therefore, a crucial one and it is probable that the spatial level of analysis undertaken across all sectors of primary healthcare could not have been adequately addresses without the use of GIS.

9.2.5 Research Question Five

What role has the state played and should play to support rural primary healthcare?

The importance of the state in impacting on spatial and temporal variations in the organisation of primary healthcare services has already been alluded to in this chapter. It has been shown that in rural areas of Wales several initiatives already exist that attempt to compensate for h problems of delivering such services in a rural setting. These include rural payments for GPs, the Essential Small Pharmacies Scheme, and the dental initiative in Wales in the early 1990s which targeted dentist recruitment in rural areas of the country. More recently, the re-organisation of delivery mechanisms for primary healthcare have been identified through the re-organisation of the National Health Service in Wales

where Local Health Boards (LHBs - based on Unitary Authority areas) are now responsible for commissioning of primary healthcare services and the former Health Authority administrative tier has been removed. These current or historic policy initiatives have obviously assumed an important role in shaping the organisation of primary healthcare in Wales in recent years but it is also true that emerging developments at the time of writing the thesis are likely to have major impacts on the future deliver of primary healthcare in Wales. These include the new GMS contracts for GPs and Pharmacies and the findings of the Office of Fair Trading Report into pharmacy services in England and Wales (OFT, 2003). Many of these developments have been covered through the thesis in terms of reviews of relevant policy or academic literature, but also through survey analysis of pharmacy providers and primary healthcare professionals (in Chapter Eight of the thesis).

The re-organisation of primary healthcare in Wales in 2003, detailed in Chapter Four of the thesis, re-orientate the delivery of services to more of a bottom up approach than was seen under the former Health Authorities in Wales. The plan that underpins the new arrangements for delivering primary healthcare at the local scale in Wales stresses the importance of taking account of, for instance; local variations in access to primary healthcare factors, changes in the local population served by primary healthcare services, and recognizing the pressures that primary healthcare professionals face in a rural setting. Whether or not healthcare officials in the LHBs recognize the importance of rurality and accessibility when determining the delivery of primary healthcare services is a disputed point as commented on in the survey analysis.

To take a specific example, within the Gwynedd Local Health Board primary healthcare officials were positive about the impacts of re-organisation, particularly in terms of improved working relationships with other actors, for example Unitary Authorities, and there are improvements in the assessment of local needs when allocating services. Clearly primary healthcare professionals work within the constraints of the organisational framework within which they

are located. Having talked to such professionals who had worked in the previous organisational framework it was evident that the new arrangements had enthused them and revealed opportunities to apply their local knowledge of the primary healthcare system in Gwynedd in a much more targeted fashion than under the former two-tiered organisational structure of Health Authorities and Local Health Groups.

One of the most important policy developments that primary healthcare officials and providers are concerned with at the present time is the introduction of new GMS contracts for GPs and pharmacists in Wales in 2004. The details of the new contracts have been covered in detail in Chapter Four of the thesis. For GPs three main there are three main strands, in terms of funding, the Global Sum (including standard and enhanced services), a Quality and Outcomes Framework (QOF), and an Enhanced Service payment scheme. One of the key aims of the new contract is to re-define the relationship between GP practices and Local Health Boards so that the latter can think strategically about the range of services needed and where these should be targeted appropriately, particularly through management of the enhanced services budgets now possible through the devolved LHB organisational structure. One key concern is that under the new contract GPs are able to opt out of providing an out-of-hours service. Many feel that this is likely to have a detrimental impact on levels of care provided to patients, although LHBs and the NHS insist that this should not occur even if all GPs opt out of providing out-of-hours services. Clearly the reasoning behind the change in out-of-hours service provision is a recognised need to make general practice a more attractive place to work and it is hoped that this well help solve a long-standing recruitment problem that has tended to affect rural areas and old industrial areas of Wales.

The new GMS contract for pharmacies is being agreed in Wales at the time of writing and, again, has a number of important implications for the future delivery of this primary healthcare service (the new contract is described in detail in Chapter Four). When asked about the new contract for GPs and

pharmacies, health care professionals in the case study areas of Gwynedd provided a mixed response with some negatives associated with the new GP contract and a relatively positive feeling about the new pharmacy contract. The new GP contract had perceived negative and positive impacts, as we have seen, but local primary healthcare officials were very enthusiastic about the new pharmacy contract. Despite the overall enthusiasm for the new contract there is a fear that smaller independent pharmacies may be 'left behind' under the more demanding elements of the new contract, particularly advanced services provision.

The survey of pharmacy providers in Gwynedd also offered a number of insights into the role of the state in influencing pharmacy services delivery and these have been considered in detail in Chapter Eight of this thesis. In summary, most pharmacists were concerned about possible lifting of regulatory controls (although its seems this is unlikely to emerge in Wales in the near future), there was a mixed response to new working arrangements with the LHB (most multiples seemed to be unaffected by LHB procedures), and nearly all pharmacists surveyed were concerned about the possible impacts of the new GMS contract, particularly in terms of the provision of advanced services,

The role of the state has, therefore, been assessed in detail throughout the research and this was supplemented by invaluable information provided by the healthcare officials and service providers in the study region. Many of their views mirrored and reinforced conclusions drawn from the analysis of the role of the state in delivering rural primary healthcare with issues of demand, supply and re-organisation chief among them. The survey of rural pharmacists was particularly illuminating in terms of the concerns that they have about providing out-of-hours services and the uncertainty surrounding forthcoming new contractual arrangements. In general terms it appears that the re-organisation of primary healthcare service delivery in Wales is a positive step forward. Healthcare officials and providers seem happy with the new organisational arrangements but the challenge now is clearly the successful implementation of

the new GMS contracts and it is important that primary healthcare officials find a way to ensure that all healthcare providers, particularly so in the case of independent pharmacies, benefit from the new contract and are not 'left behind' through a failure to meet pre-conditions enforced on the ability to provide particular services. The delivery of primary healthcare in Wales has moved a long way from top-down initiatives such as the Welsh Office dental initiative but it is important that the new devolved structure really does ensure that all healthcare providers locally are ready for new contractual arrangements, if this is not the case then levels of service provision may well fall over the coming years in certain sectors, for example small independent pharmacies.

9.3 The Wider Contribution of the Research

This section acts as a summary of the material presented thus far in this concluding chapter in terms of overall responses to the research questions. A further aim is to present wider or larger contributions to the field that the thesis has provided. These wider contributions are considered in relation to: contributions to theoretical debates on the provision of primary healthcare in a rural context, contributions to the field of GIS and healthcare, methodological contributions, and contributions to the policy debates in the primary healthcare field.

In assessing the contribution of the thesis to the theoretical debates on the provision of primary healthcare in rural areas, a number of observations can be put forward. Firstly, previous studies have tended to assess the spatial distribution of primary healthcare in terms of need or utilisation patterns, for example assessing the role of access to healthcare in terms of the 'Inverse Care Law' (see, for example Lovett et al, 2000). This thesis has followed this focus in assessing the relationships between the access to services measures and socio-economic indicators or measures of social disadvantage. Where a contribution has been made, in theoretical terms, is to look beyond the relationship of access to services and levels of demand or need and consider too the important role of

restructuring of organisations in shaping the spatial distribution of particular services. Through the study of the pharmacy sector, which is currently regulated but has recently received pressure to lift controls on entry to the sector (OFT, 2003), a theoretical context was provided drawing on theories of the firm and contextual material on health economics whereby any changes in the sector over the study period could be assessed. This has been evidenced through an analysis of the pharmacy sector in Gwynedd where empirical evidence has pointed to the emergence of a near monopolistic market model with the L Rowlands dominating in large areas of rural Gwynedd. Further information from qualitative interview material reinforced the assertion that an aggressive policy of infiltration into the pharmacy sector in Gwynedd had taken place over the study period by the L Rowlands pharmacy chain and its parent company Phoenix Healthcare Ltd. Whilst interesting in itself, the empirical and qualitative information on this process has been afforded clearer understanding through the theoretical context identified. This has allowed theoretical concepts highlighted in various theories of the firm, such as, team production, competitive structure and vertical integration to be assessed with regard to the situation in the pharmacy sector in Gwynedd. The thesis has also addressed the important role of regulation within the pharmacy sector with regard to health economics literature and survey analysis as detailed previously.

The analysis has been further contextualised through a consideration of restructuring processes at work in rural areas as a whole over the study period. This theoretical context has drawn on regulation theory to provide a robust setting for the analysis of socio-economic characteristics of rural areas of Wales that has been undertaken through the analysis of 1991 and 2001 UK census information.

The use of GIS in analysing access to primary healthcare, and changes in this access over the study period, may also be viewed an area of wider contribution to emerge from the thesis. GIS has been used to establish any variations in accessibility to primary healthcare services across the timescale of the study at

the national level in Wales. This temporal element to the analysis was facilitated through the use of GIS techniques that allowed both 1991 and 2001 population data to be considered within the accessibility analysis at a common spatial scale. This was invaluable in allowing the access over the timescale of the study to be addressed. Whilst information on the location of primary healthcare facilities is a requirement of studies of this nature, the analysis went a step further by incorporating an element of the quality of services provided. This was facilitated through the use of detailed attribute information on the primary healthcare facilities in Gwynedd that provided detailed insights into the characteristics of the facility and the type of service offered by the facility. This allowed, for example, analysis of accessibility to GP surgeries and branch facilities in the study area of Gwynedd taking into account opening times of the branch facilities. It also allowed information on various specialist services such as diabetes clinics in GP surgeries and needle exchange programmes in pharmacies to be mapped and commented upon (in Chapter Six). The GIS has been crucial in facilitating the ambitious aim of the thesis, to examine spatial and temporal variations in primary healthcare across Wales, and this would have been difficult to achieve without the GIS approach to the study.

One of the key methodological contributions of the thesis lies in the development of the Isolation Indices within the GIS. Whilst the measure may have some limitations, as highlighted in section 9.4 below, it has proved a robust measure of differential access to particular services. One key utility of the measure is to enable both network distance to service facilities and population levels in the areas of concern to be accounted for within the measure. This population weighting could be further developed by applying social characteristics to the measure, for example car ownership levels, as detailed elsewhere (Higgs and White, 2000). Furthermore, the measure can be aggregated to recognisable areal units, which is of key importance if it is to be understood by professionals working in the sector. The thesis has also applied a multi-method approach to the research by attempting to contextualise the empirical analysis through the use of interview surveys of key healthcare officials and primary healthcare providers. This qualitative analysis allowed

such complex areas as healthcare reorganisation, organisational factors affecting healthcare providers, and future developments in healthcare delivery to be considered in a more rounded fashion.

The thesis has made a contribution to wider policy debates about the future of primary healthcare services delivery. In particular, it has considered in detail the impacts of healthcare restructuring in Wales and drawn on evidence from survey material to suggest that the new devolved structure of primary healthcare delivery should be more locally accountable and targeted at local needs in a more efficient way. It is important, however, that the spatial distribution of services and their relationship to underlying populations is taken on board fully by healthcare professionals when allocating services, it was not always clear that this was the case from the evidence provided. Whilst primary healthcare services have remained fairly stable over the study period, it is important that problems of rurality and poor accessibility are fully considered when allocating new services. This thesis has gone some way in providing an evidence base from which judgements on these issues could be made. The thesis has also considered the impacts of new contract arrangements for GPs and Pharmacies and the conclusions drawn from this analysis (presented earlier in this chapter and in Chapter Eight) should highlight that there are potential problems that need to be addressed if these are to be implemented successfully, for example out of hours working arrangements for GPs and ensuring that independent pharmacies are fully prepared to implement the new contract.

9.4 Limitations of the Research and Areas for Future Research

This section of the conclusion details some of the limitations of the research and presents possible areas for future research in the field that have emerged through the research process. Inevitably in a research project of this nature based on quantitative data analysis, problems arise in terms of availability of data and in the choice of analysis undertaken. These limitations of the study outlined here

centre on the availability of data, the choice of accessibility analysis undertaken, the qualitative survey analysis, and the evolving policy framework in primary healthcare which saw a number of new important developments during the course of the research.

The first limitation of the research relates to data availability. As highlighted during the thesis data was compiled for two time periods, 1996 and 2004, relating to locations of primary healthcare facilities within Wales. Unfortunately, location data for 1996 for pharmacies was not available and data for this service could only be gained for 1996 in the case study area of Gwynedd, supplied by the Primary Care Officer in Gwynedd LHB. Fortunately this data was fairly detailed and also included ownership information which allowed for a detailed consideration of the emergence of the L Rowlands chain of pharmacies as the dominant supplier in the region. It would have been advantageous if a full set of pharmacy location data had been available for Wales, however, as this would have allowed for all-Wales accessibility indices to be calculated in the same way as for GP practices and dental surgeries.

The calculation of the accessibility analysis presented a problem due to the key aim of performing comparative analysis of accessibility levels between 1996 and 2004. This problem arose in deciding on a population 'centre' for the accessibility analysis. Ideally population centres would be defined at the most disaggregate level possible, for example the individual household level. This detailed data was not available to the author and the decision was made to employ 1991 population weighted Census Enumeration District centroids in the analysis. This had the advantage of employing a methodology that had been published previously (Higgs and White, 2000), and allowed the recalculation of accessibility for 2004 data (weighting the accessibility scores by 2001 population totals as detailed in Chapter Three). The disadvantage of using these centroids is the assumption made that the centroid accurately represents the location of the population within that zone which in some large rural Enumeration Districts is unlikely to be true. In the absence of a more accurate

population centre, however, the ED centroid was deemed the most appropriate choice for the analysis. A further area for research would be to attempt this type of accessibility analysis using a more refined population centroid, perhaps based on unit postcode data. Alternatively, areal photos could be used to identify centres of population within the GIS and those could then be employed within the accessibility analysis.

The role of public transport is clearly important in determining access levels to primary healthcare facilities and has been assessed previously by researchers in the field (for example, Lovett et al, 2000). This was not possible within the timescale of the research, particularly as this would have involved incorporating bus routes and train routes into the accessibility analysis at a national level in Wales. It would be interesting to pursue this area further, however, in future research utilising the facility data collected during the study and employing recently available on-line public transport information.

The qualitative analysis of service providers in the pharmacy sector and healthcare officials was important in illuminating many of the key areas of interest in the thesis, for example the present and future role of the state. This analysis, presented in Chapter Eight, successfully met its objectives but it is true that this qualitative survey analysis could have been expanded. In particular, the survey could have been expanded to include other healthcare providers for example GPs and dentists. This would have broadened the scope of the thesis considerably and a clear aim of the research was to explore the pharmacy sector in detail, particularly with a theoretical context that drew on theories of the firm. Expanding the research to take on board the views of the other primary healthcare service providers could be a valuable future area for research, however. A second area where qualitative techniques could have played a greater role would be to survey users of particular services, for example pharmacies, to determine the issues that influence levels of access and utilisation. A study of revealed accessibility to pharmacy services could, again, represent a useful future avenue for research and could supplement the measures

of potential accessibility developed here. A survey of this nature was outside the scope of this thesis and would not have been possible due to time and financial constraints.

Finally, the focus of the study has been firmly placed on rural Wales, with detailed analysis of one case study area, the Gwynedd LHB. Clearly the analysis has necessarily related to the situation in Wales and this includes consideration of policy frameworks and initiatives. Slightly different systems operate in other rural parts of the UK and characteristics of rural areas, in England especially, are rather different to those in Wales. A useful area for future research would, therefore, involve a comparative analysis of the situation in Wales with other case study areas in England, and possibly Scotland. Similarly, the analysis presented in this thesis could be enhanced through an additional case study perhaps in an urban or old industrial area of Wales to act as a comparator. This has been assessed to some extent through the national level analysis undertaken in the thesis but a further case study would help contextualise the results for the Gwynedd case study area. This was not possible in the present research due to constraints on the researcher but, again, could be an area for further research.

9.5 Summary

This concluding chapter has demonstrated how the research has addressed the key research questions posed by this thesis. Clearly, a wide range of information on the key focus of the research, the spatial and temporal organisation of primary health care services in rural areas in Wales has been produced through the development of the thesis and this has been evaluated with reference to the research questions posed in the introduction in Chapter One. In general terms, there are clearly a number of key determinants of the organisation of primary healthcare in rural areas including, the characteristics of the localities themselves (the influence of rurality), the differential levels of accessibility to services, and the role of state initiatives in shaping the spatial organisation of primary healthcare services over time. Changes in accessibility and service

provision have taken place at the local level but the primary healthcare market in rural Wales has remained fairly stable in Wales over the study period. Structural changes in organisations can have a major impact on the characteristics of the primary healthcare market as we have seen in the case of the pharmacy sector in Gwynedd. It is also true that restructuring processes in rural society as a whole, and changes in the characteristics (in socio-demographic terms) have important implications for the future, equitable, delivery of rural primary healthcare services in Wales. It has been demonstrated, furthermore, how effective a GIS approach to analysing variations in primary healthcare can be, both through the spatial analysis and visualisation of that analysis presented throughout the thesis and through reviewing previous applications of GIS in the healthcare sector. Finally the role of the state in influencing the delivery of primary healthcare services in rural Wales is likely to grow in importance, and the thesis has highlighted major developments that are taking place in the sector. It is important that healthcare officials, particularly in the LHBs, work closely with local service providers to ensure equity in provision of primary healthcare in rural areas of Wales, particularly given the range of problems faced in such communities in accessing particular services as demonstrated throughout this thesis.

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APPENDIX CH.3

Survey of Rural Pharmacists in Gwynedd

Sean White, Lecturer in GIS and Spatial Analysis
School of City and Regional Planning,
Glamorgan Building
Cardiff University
Cardiff
CF10 3WA
Tel : 02920 876015

PhD Research Survey

Survey of Pharmacy Services in Gwynedd

1. How long has the pharmacy been present in this location?

2. Has it always been under the same ownership? If no please give details of change in ownership (when this took place and details of who was the previous owner).

3. How would you describe the pharmacy in ownership terms – small independent, part of a small multiple chain, part of a national mutiple chain?

4. How many pharmacists and other staff work in the pharmacy? Please fill in details in the table below;

Job title	Full time / part time	Duration of employment (in years)

5. How many hours is the pharmacy open a week?

6. Is the pharmacy part of a rota scheme for out of hours service ? Please explain how the rota system operates in this locality and expand on any positive or negative views you may have on the system.

Positive Views

Negative Views

7. Are there any dispensing GP practices in the vicinity of this pharmacy? Does this have any impact on your operation within this locality?

8. Do you feel that the levels of pharmacy provision in this area are sufficient to serve the local population?

9. Is this pharmacy part of the Essential Small Pharmacies Scheme? What impact does that have on your business?

10. Have you introduced additional services in an attempt to maintain or enhance your customer base (e.g. oxygen supply, home delivery, needle syringe). Please detail these additional measures and how effective they have been.

11. Do multiple chain pharmacies pose a threat to the operation of this pharmacy, have there been any attempts to take over this pharmacy?

12. There is a degree of regulation in the pharmacy sector – do you feel that is warranted and what are the advantages/disadvantages of control of entry?

13. Last year the OFT recommended that 'control of entry regulations' be lifted in the pharmacy sector allowing any qualified pharmacist to locate wherever they wanted and allowing larger chains and supermarkets to open pharmacies anywhere. What impact would such de-regulation have on a) this pharmacy b) the local population c) pharmacy services in Gwynedd?

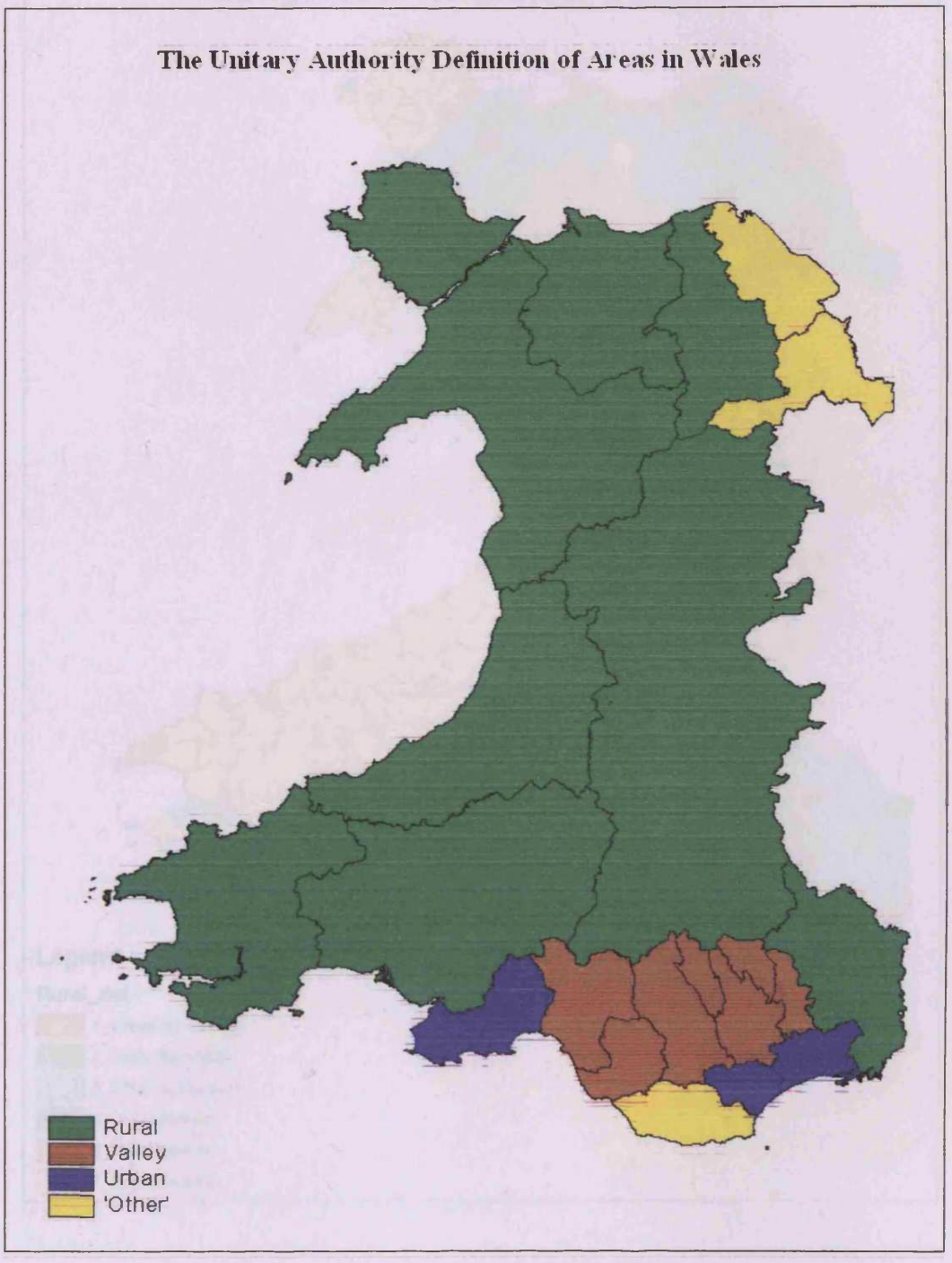
14. What is your relationship with the Local Health Board in Gwynedd ? Are there any controls placed on your operation from the LHB? Has the recent re-organisation of healthcare delivery been a positive one in your view?

15. What will be the impact do you feel of the soon to be announced new Pharmacy Contract on your business? Do you see it as a positive move?

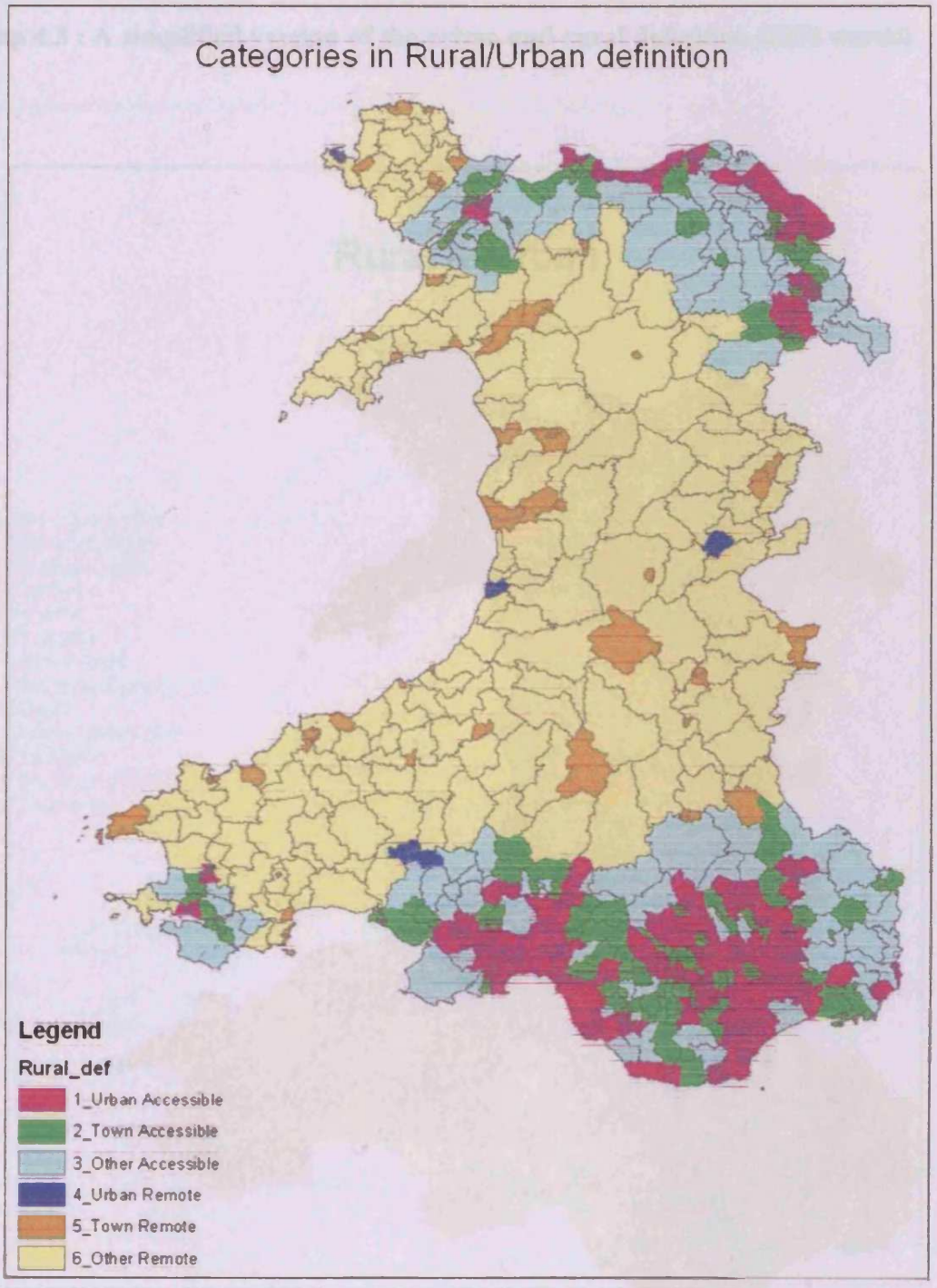
16. What do you see as the main threats facing the pharmacy sector in this locality over the next five years?

APPENDIX CH.4

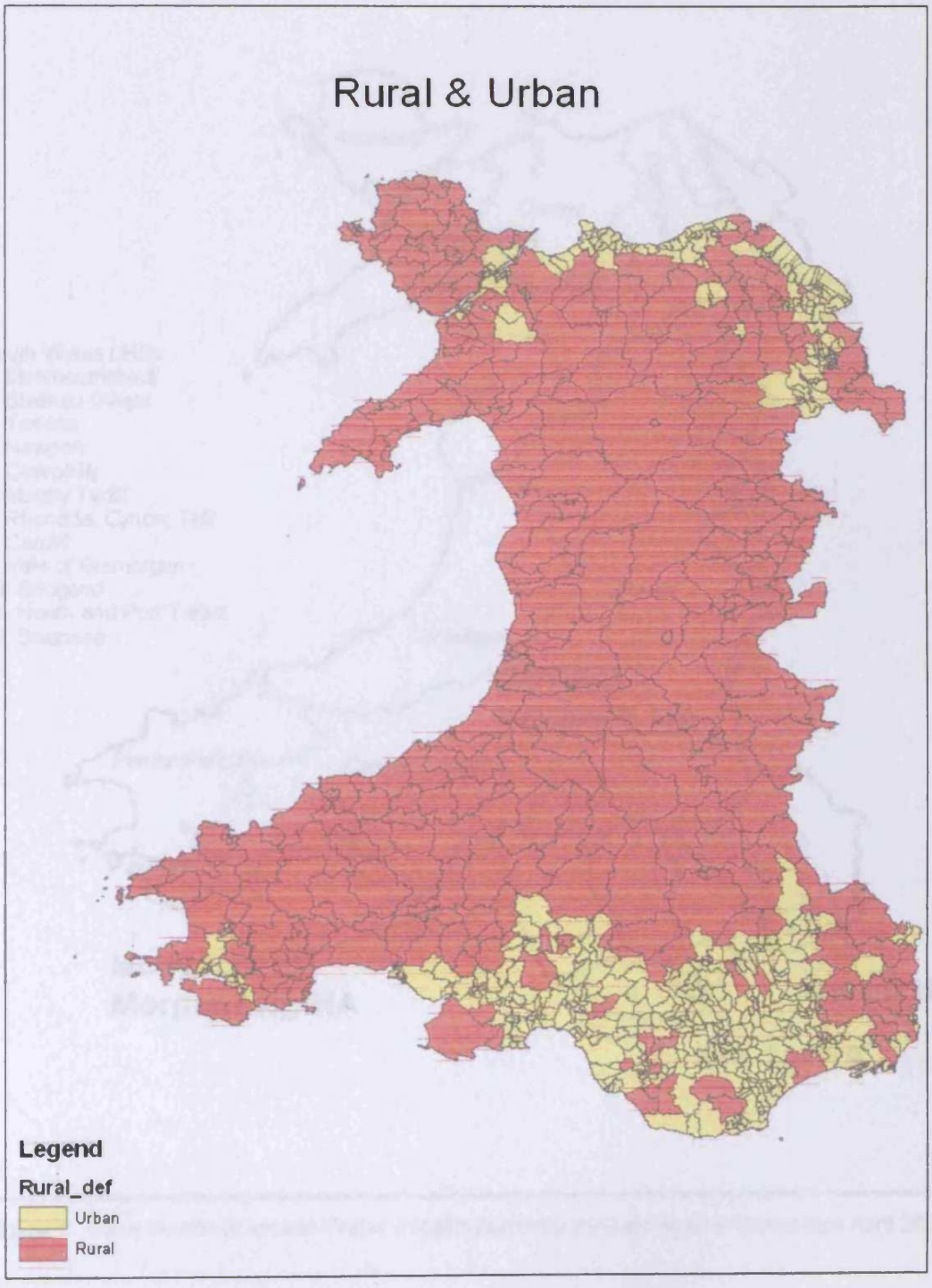
Map 4.1 : A Unitary Authority Definition of Areas in Wales



Map 4.2 : ODPM/WAG definition of rural/urban areas



Map 4.3 : A simplified version of the urban and rural definition (2001 wards)



Map 4.4 : Local Health Boards in Wales together with former Health Authority Areas

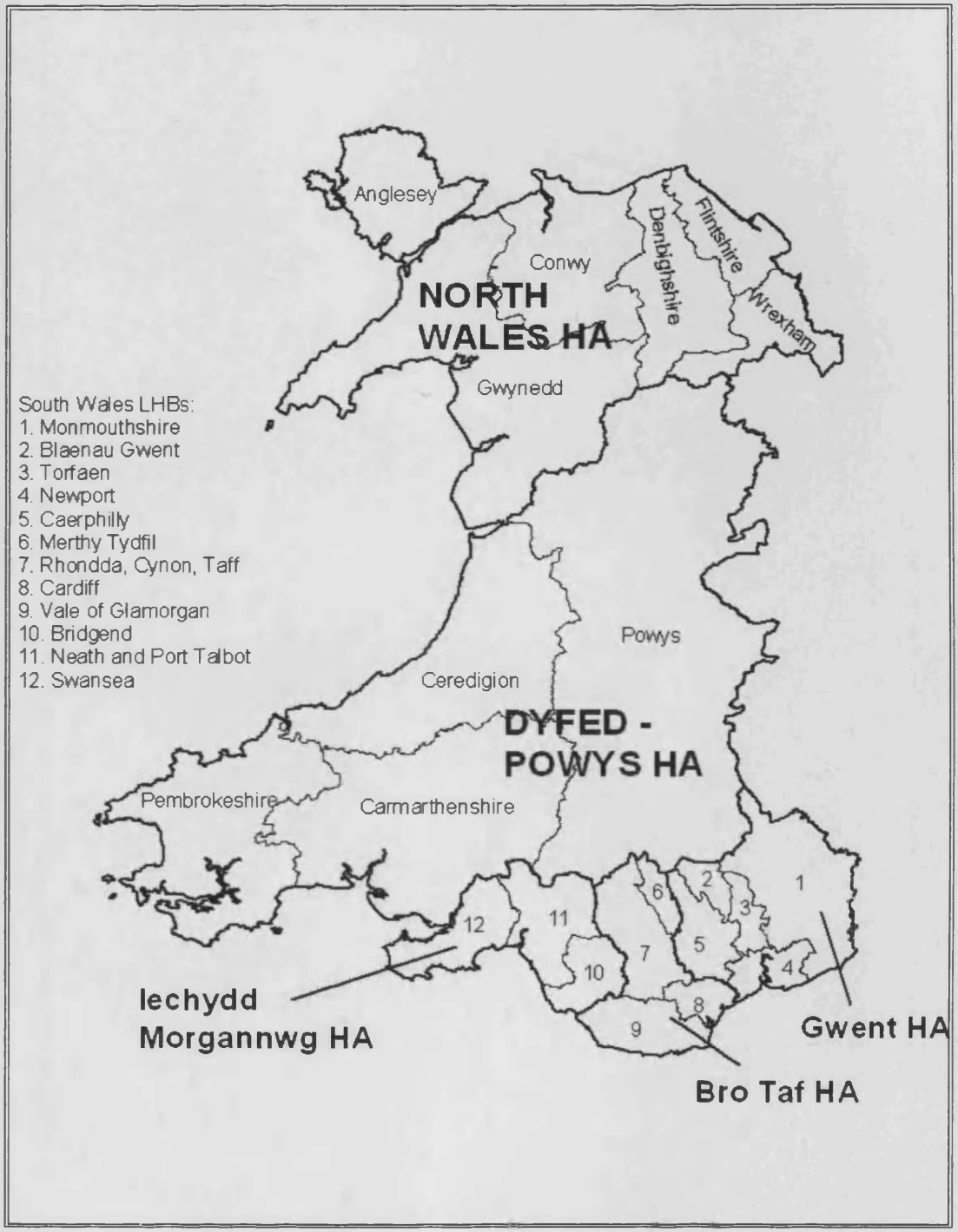
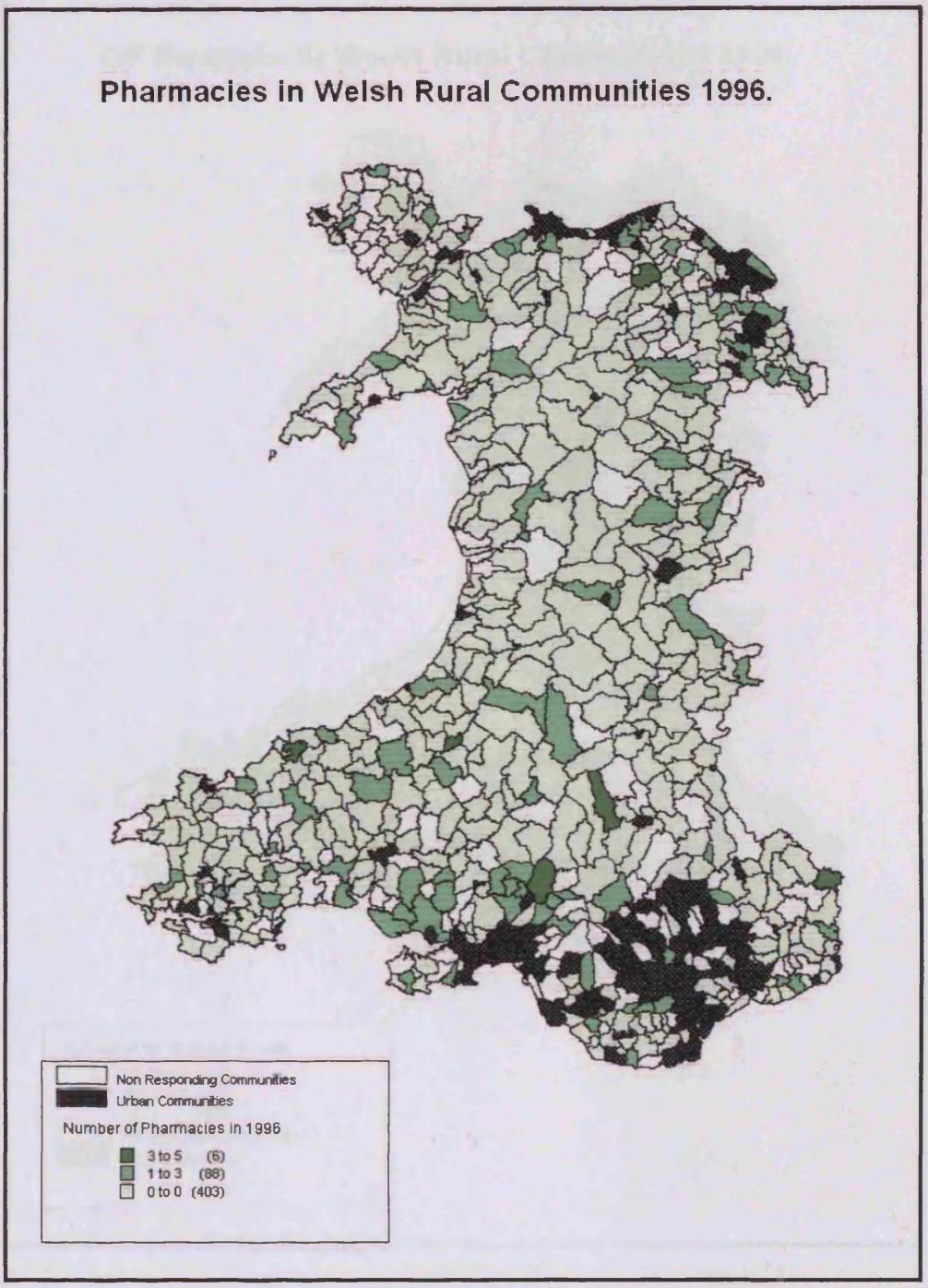


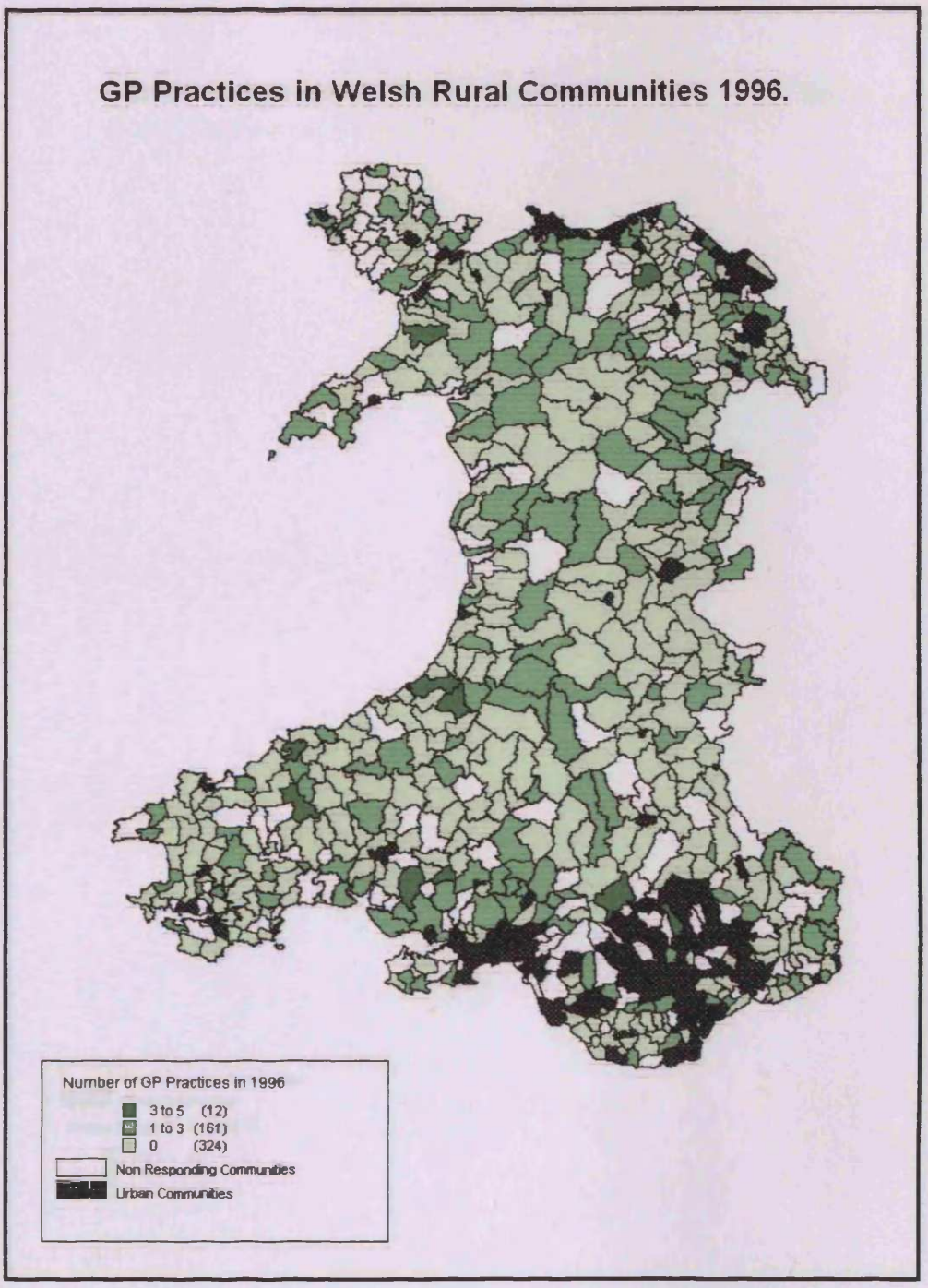
Figure 1 : Local Health Boards in Wales (Health Authority (HA) areas also shown (pre April 2003)

APPENDIX CH.5

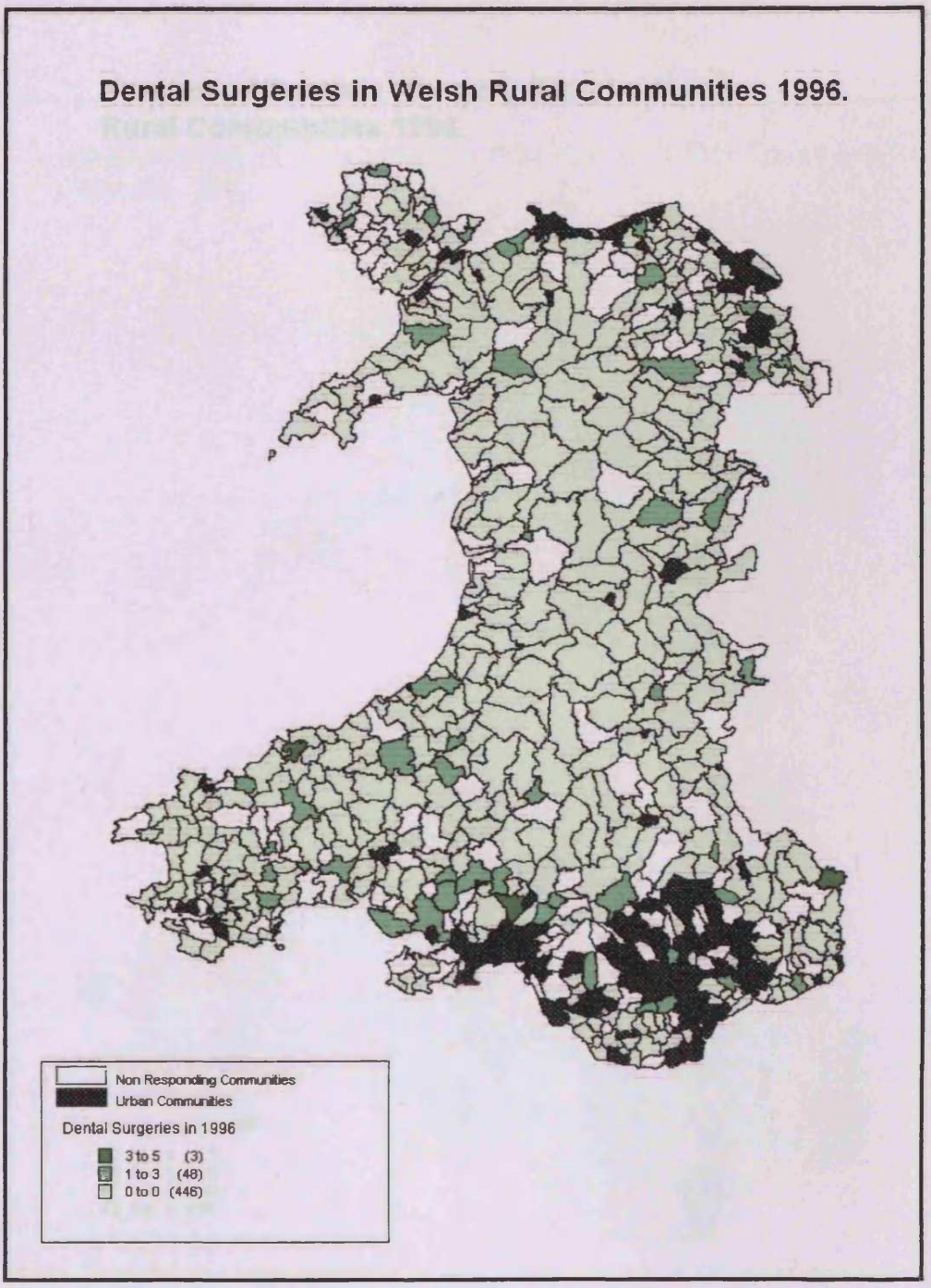
Map 5.1 Pharmacies in Welsh Rural Communities 1996



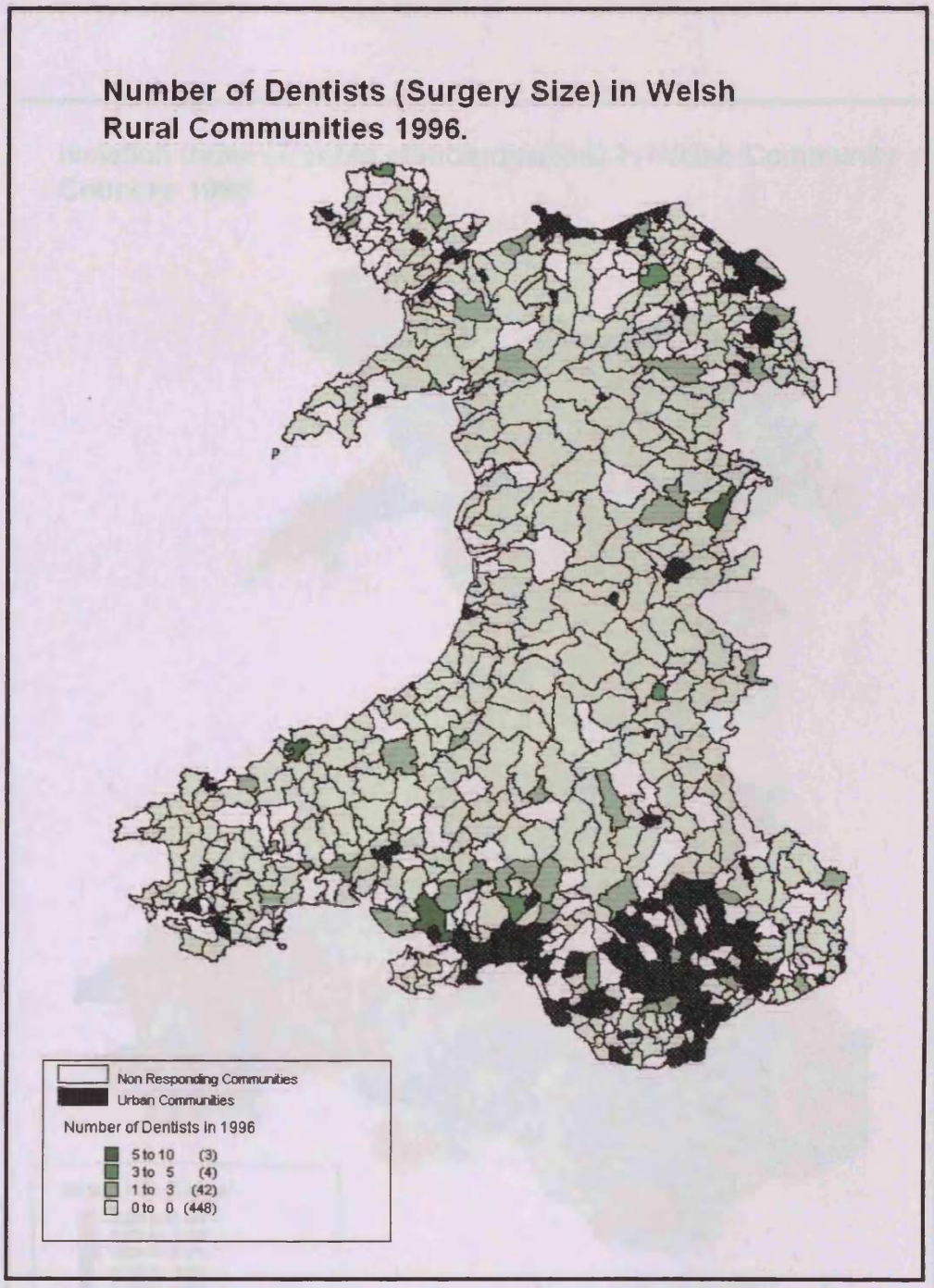
Map 5.2 : GP Practices in Welsh Rural Communities 1996



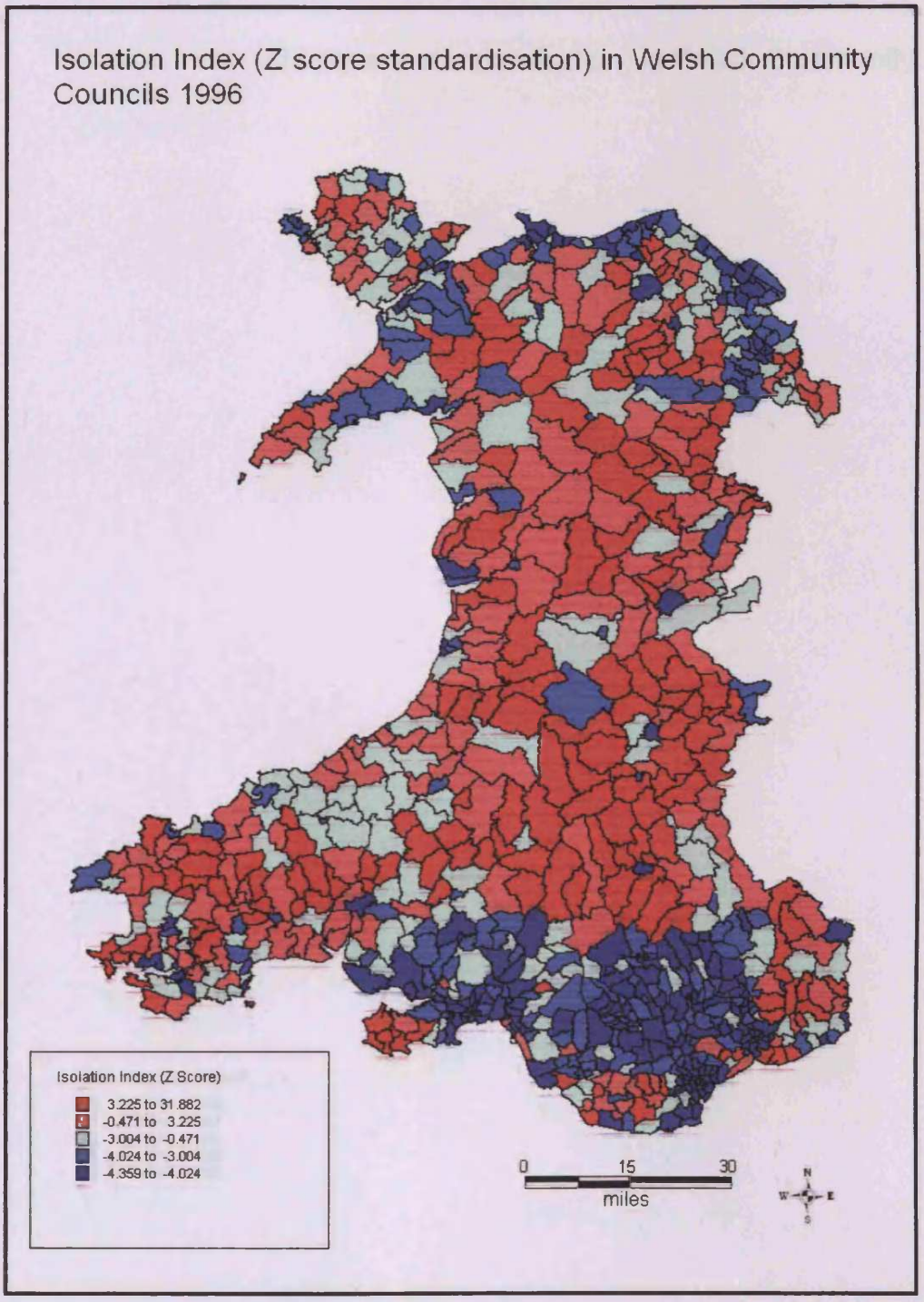
Map 5.3 Dental Surgeries in Welsh rural Communities 1996



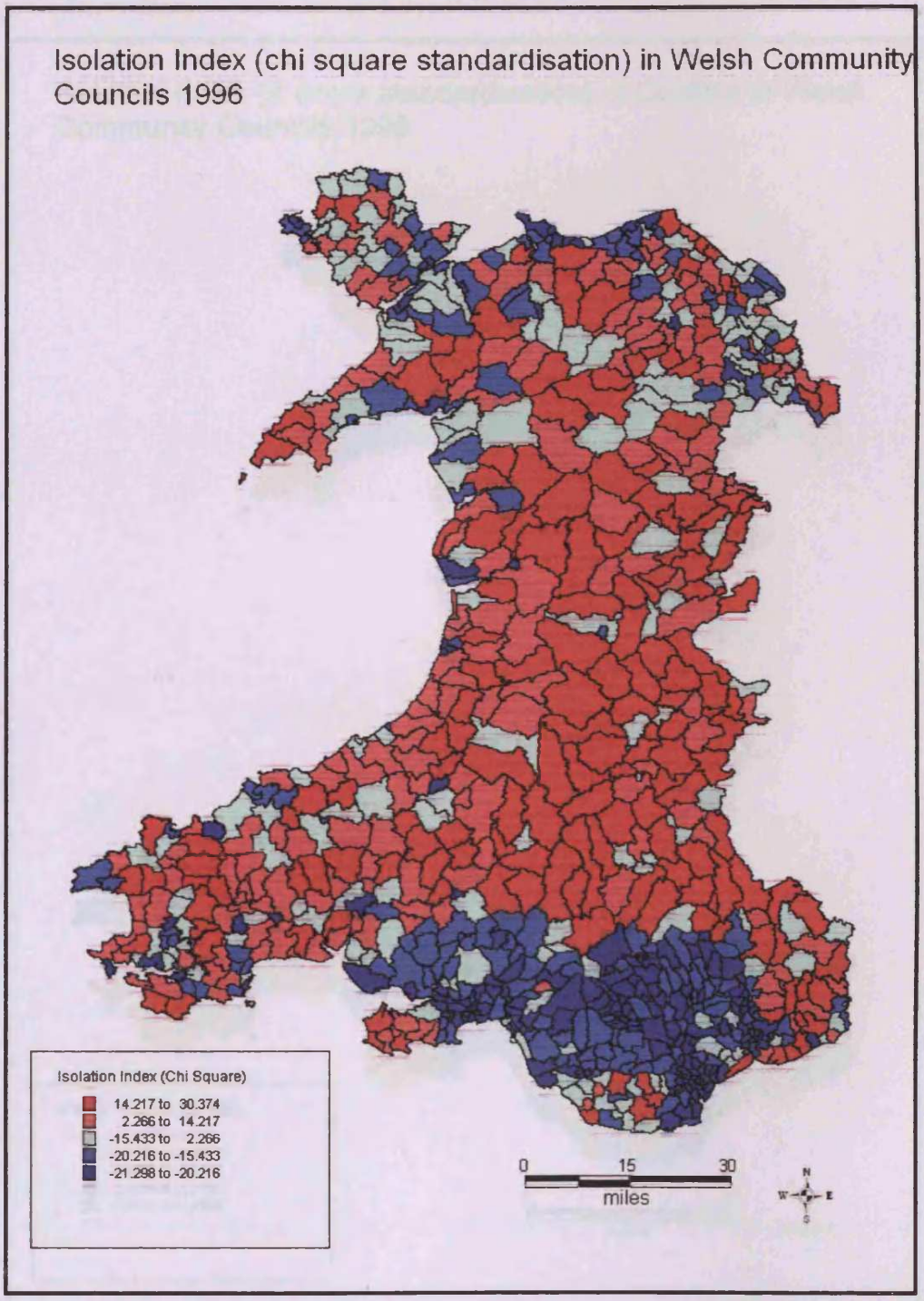
Map 5.4 : Number of Dentists (Surgery Size) in Welsh Rural Communities 1996



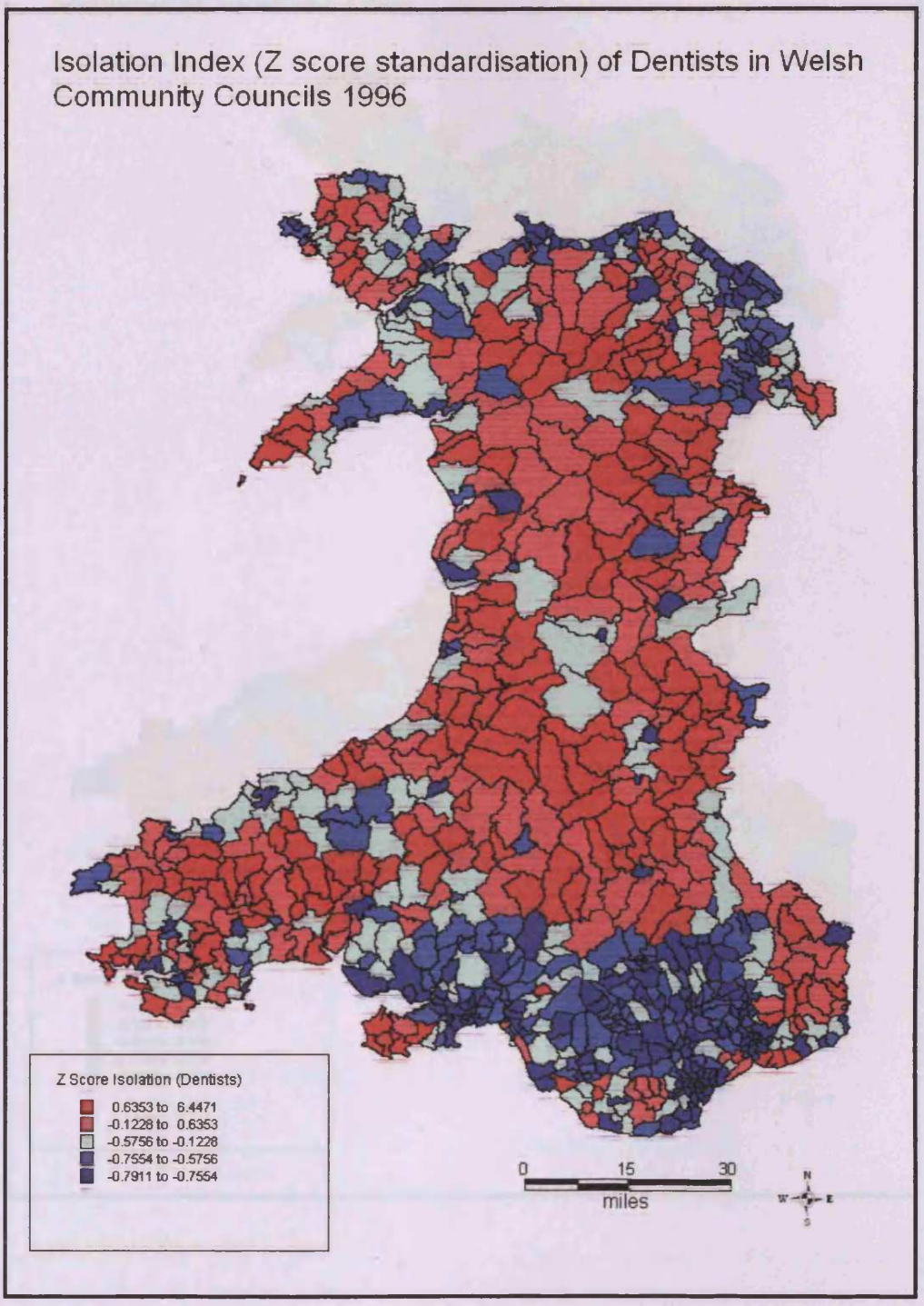
MAP 5.5 Isolation Index (Z Score) in Welsh Community Councils 1996



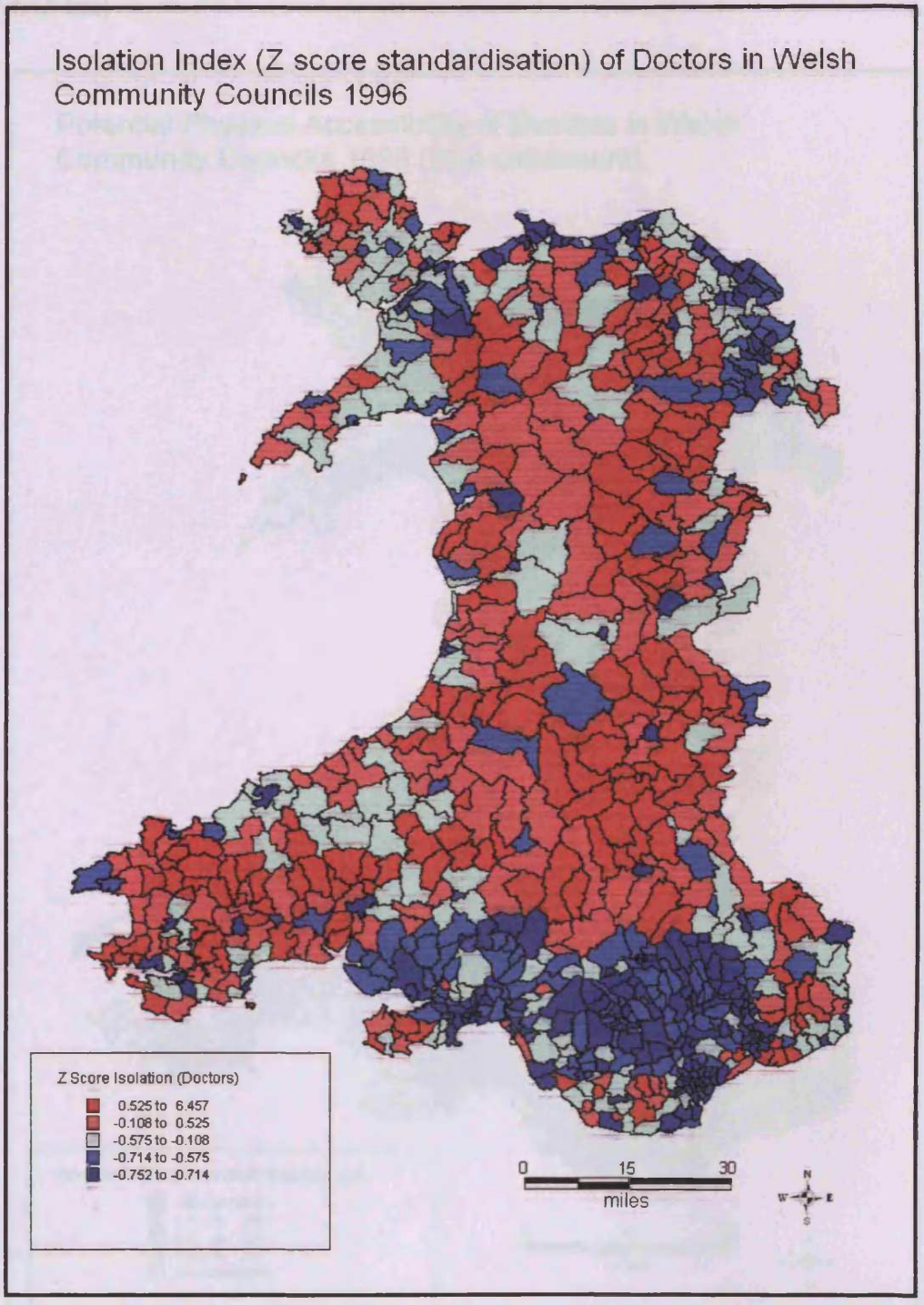
Map 5.6 Isolation Index (Chi Square) in Welsh Communities 1996



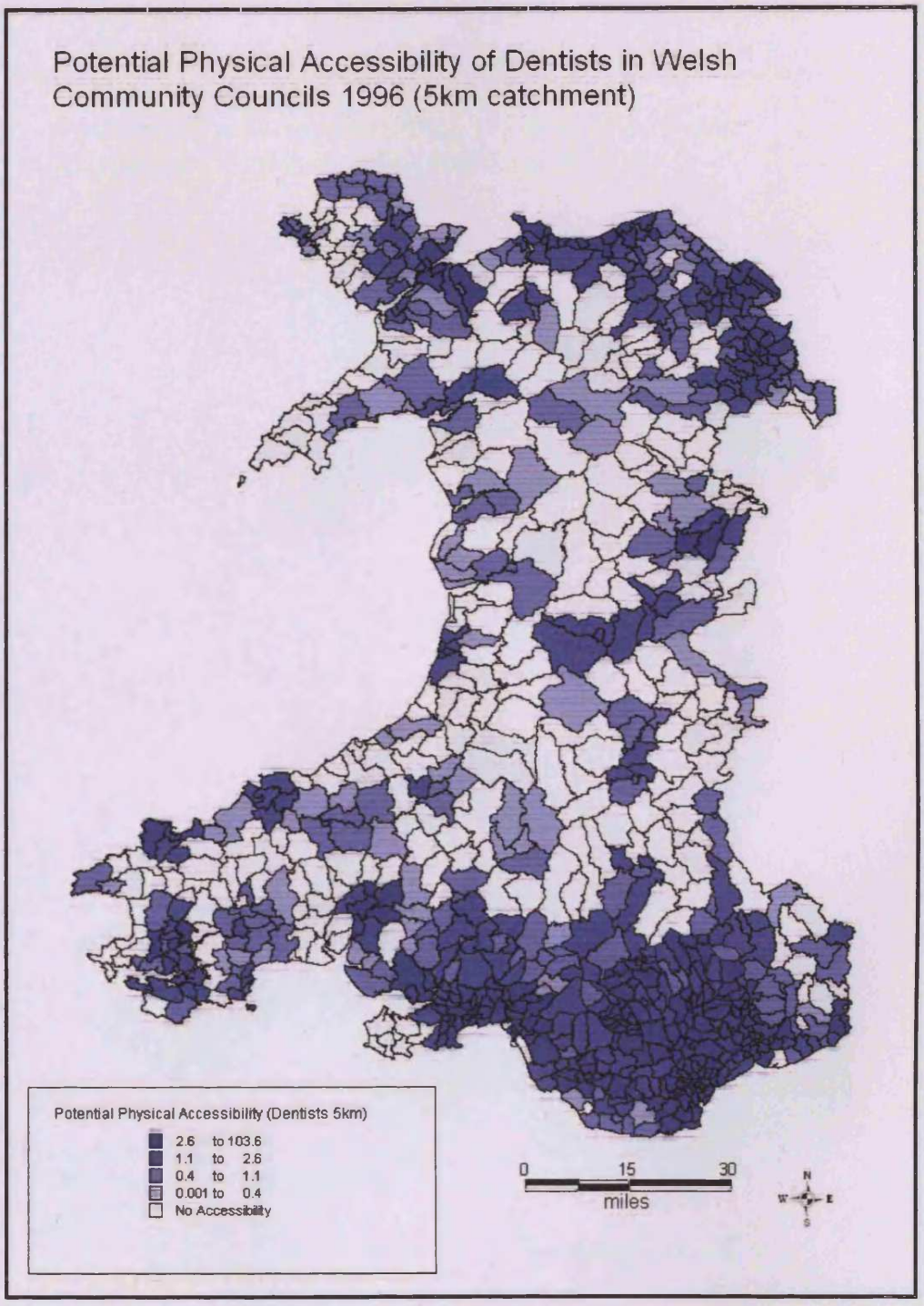
Map 5.7 : Isolation Index (Z Score) of Dentists in Welsh Community Councils



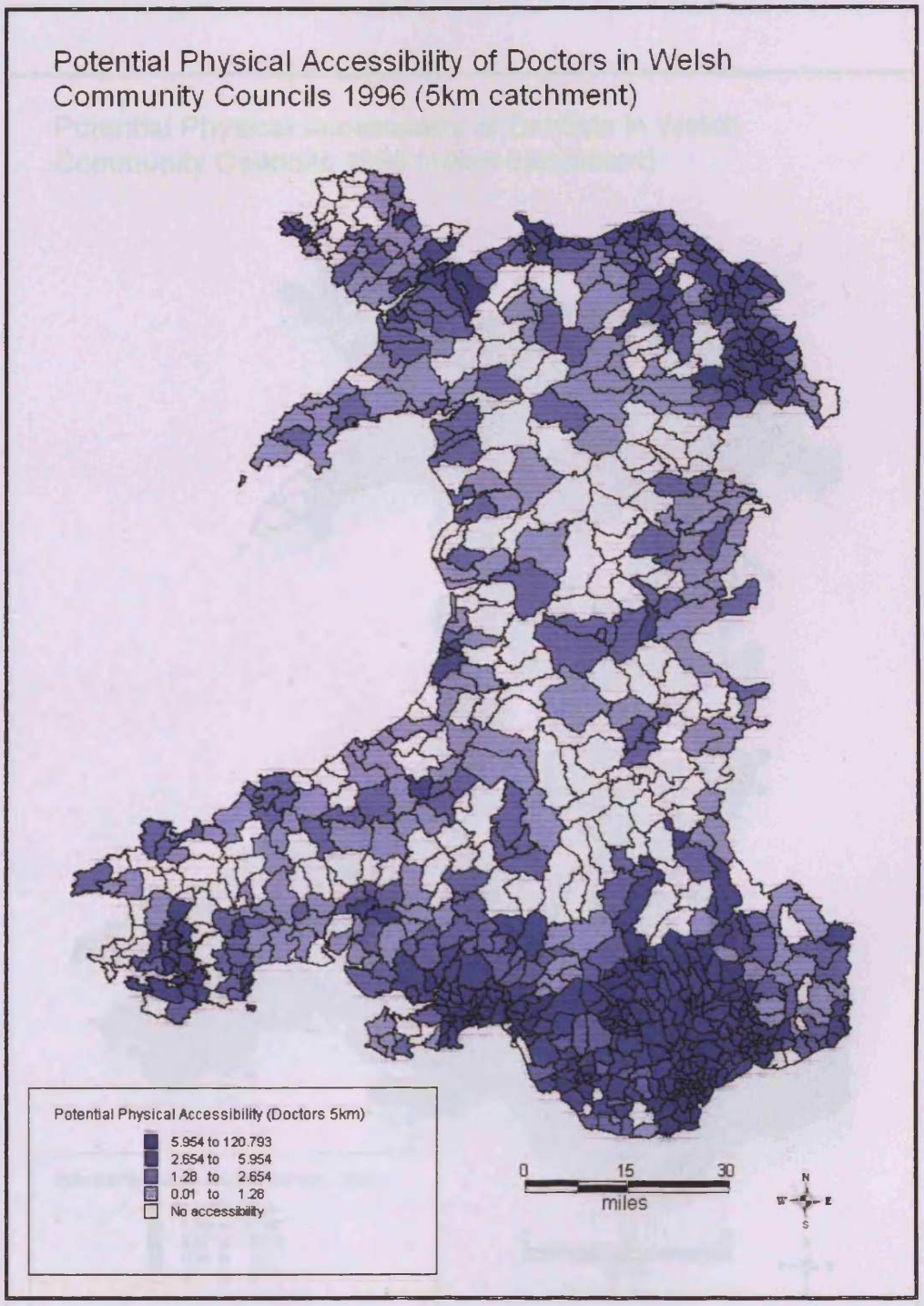
Map 5.8 : Isolation Index (Z Score) of Doctors in Welsh Community Councils



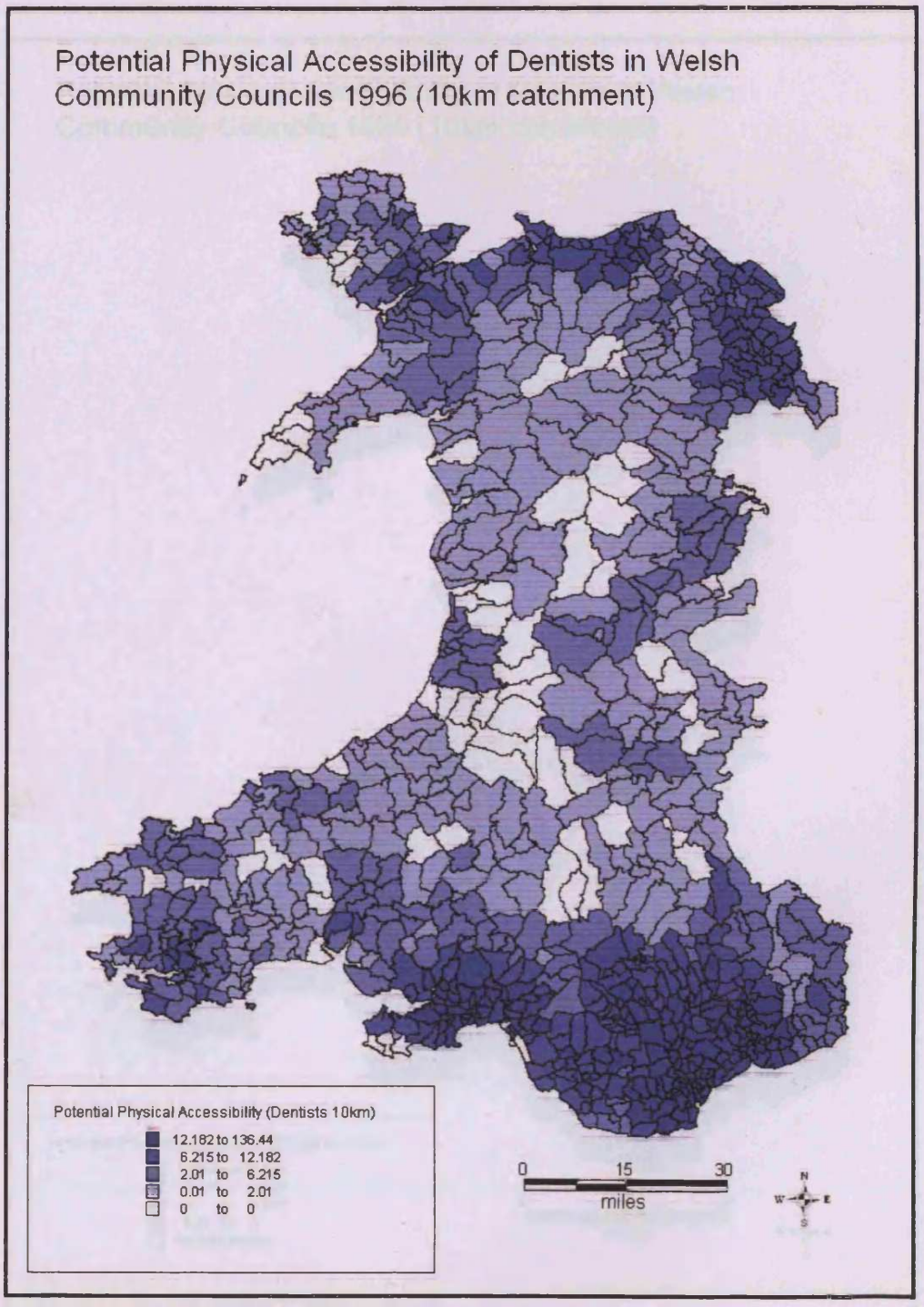
Map 5.9 : Potential Physical Accessibility of Dentists in Welsh Rural Communities 1996 (5 km)



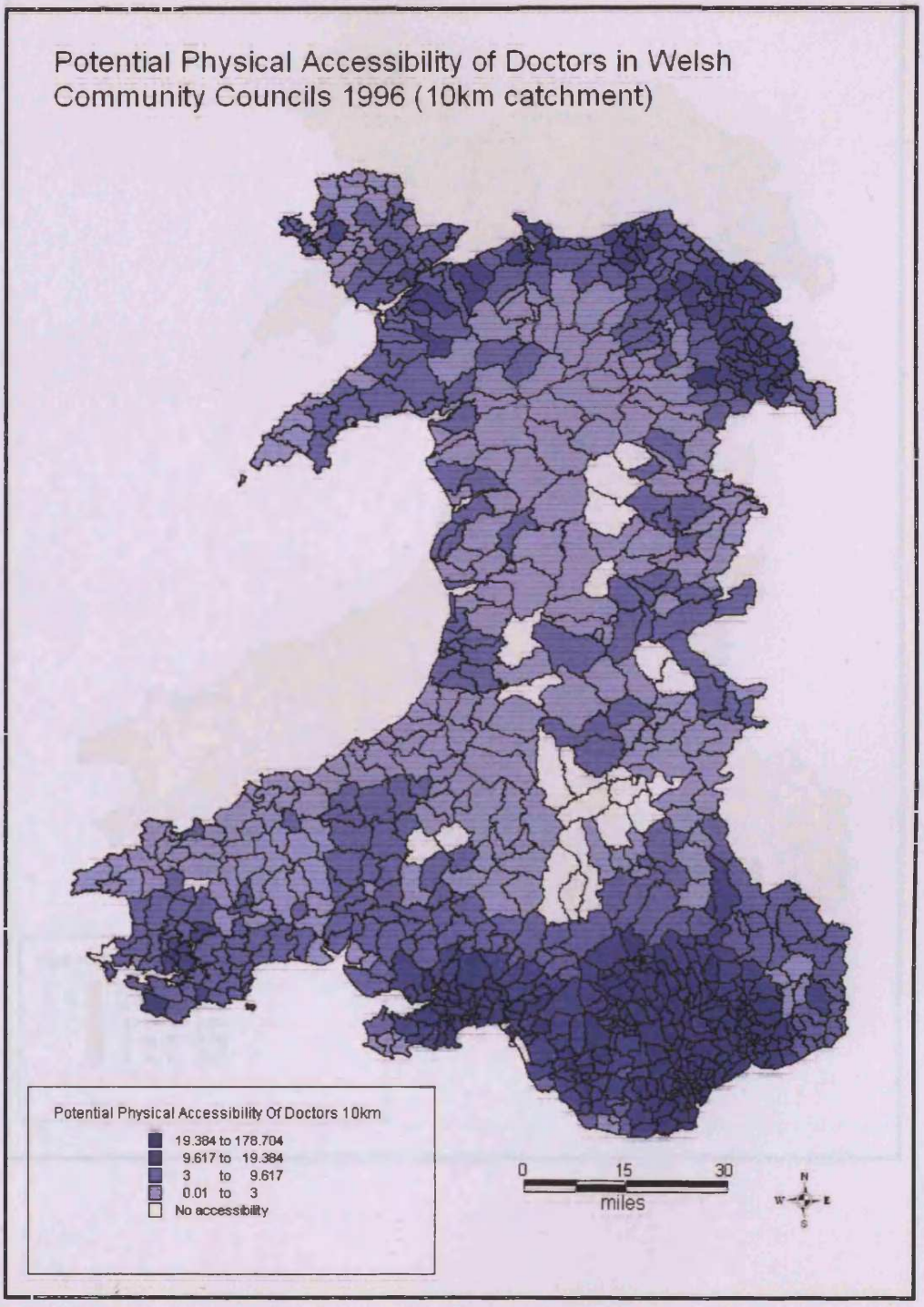
Map 5.10 : Potential Physical Accessibility of Doctors in Welsh Rural Communities 1996 (5 km)



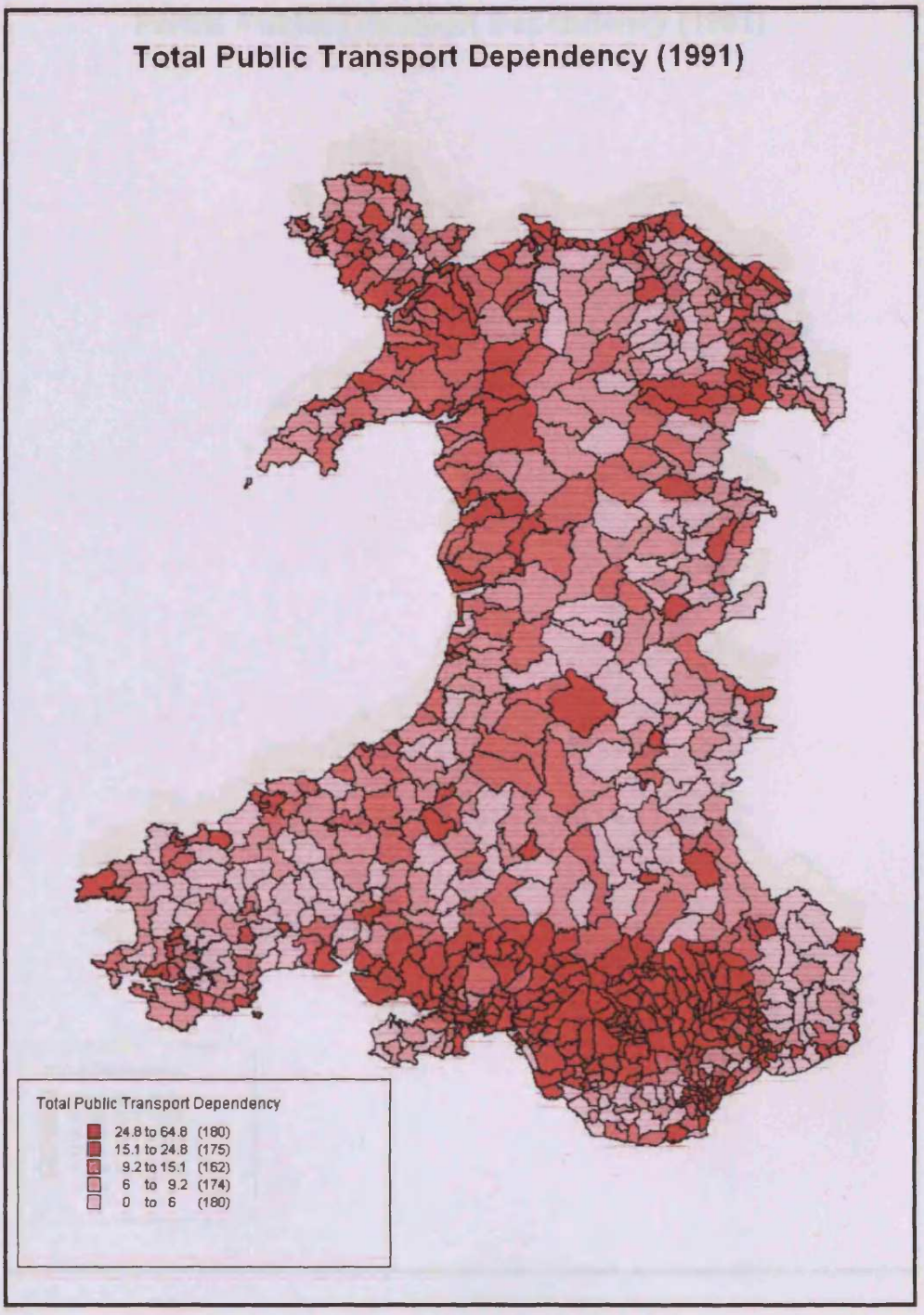
Map 5.11 : Potential Physical Accessibility of Dentists in Welsh Rural Communities 1996 (10 km)



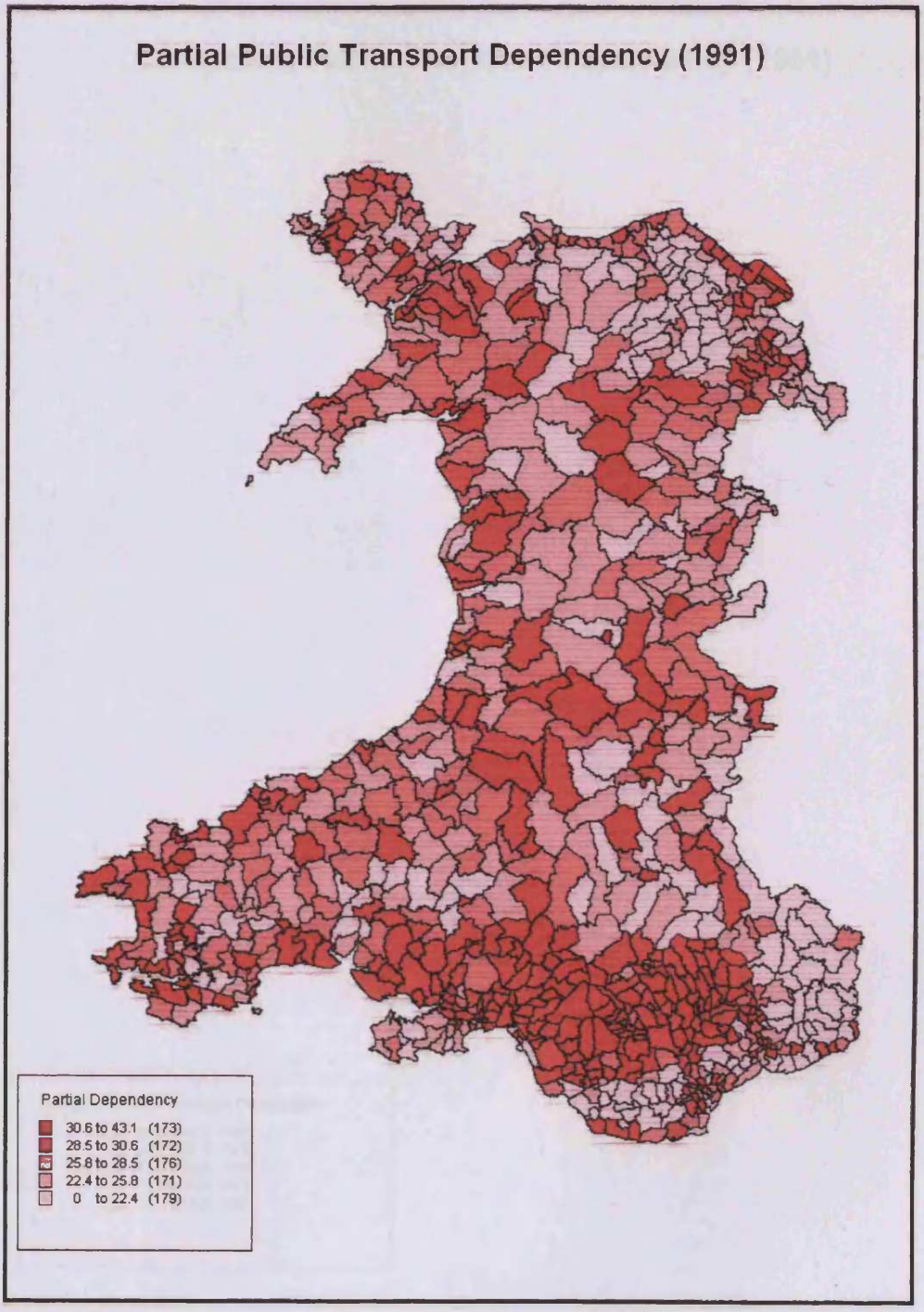
Map 5.12 : Potential Physical Accessibility of Doctors in Welsh Rural Communities 1996 (10 km)



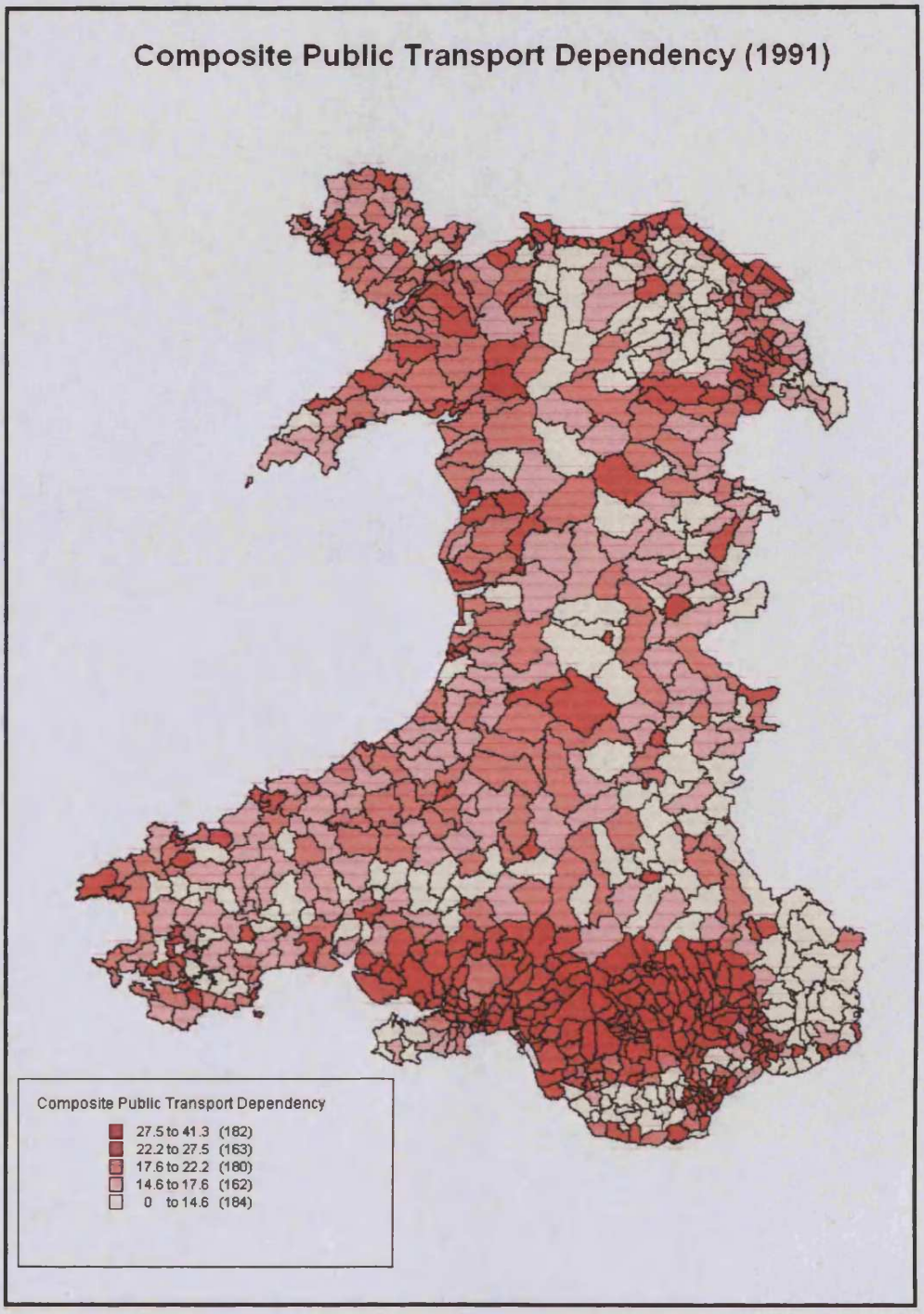
Map 5.13 : Total Public Transport Dependency (1991)



Map 5.14 Partial Public Transport Dependency (1991)



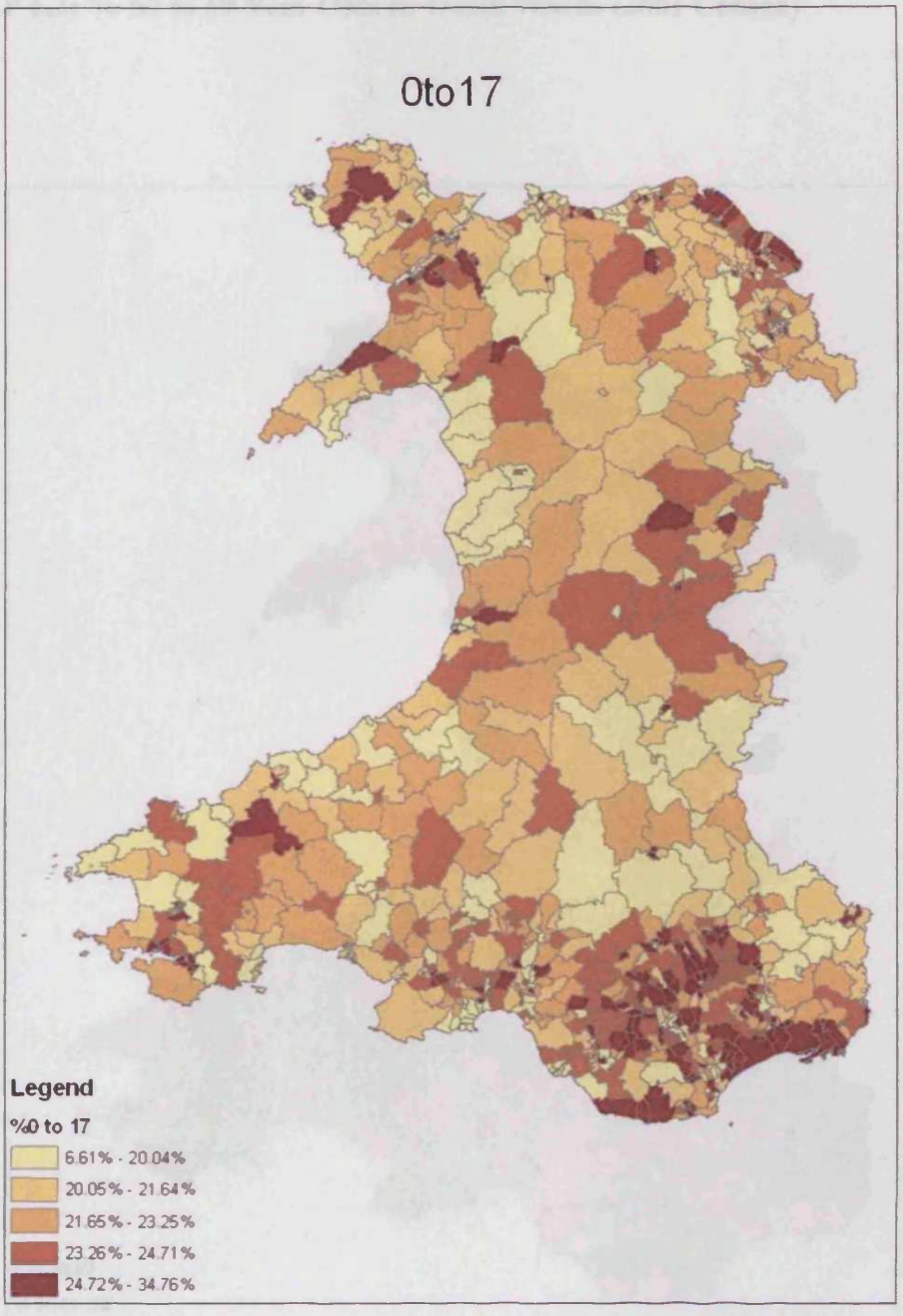
Map 5.15 : Composite Public Transport Dependency (1991)



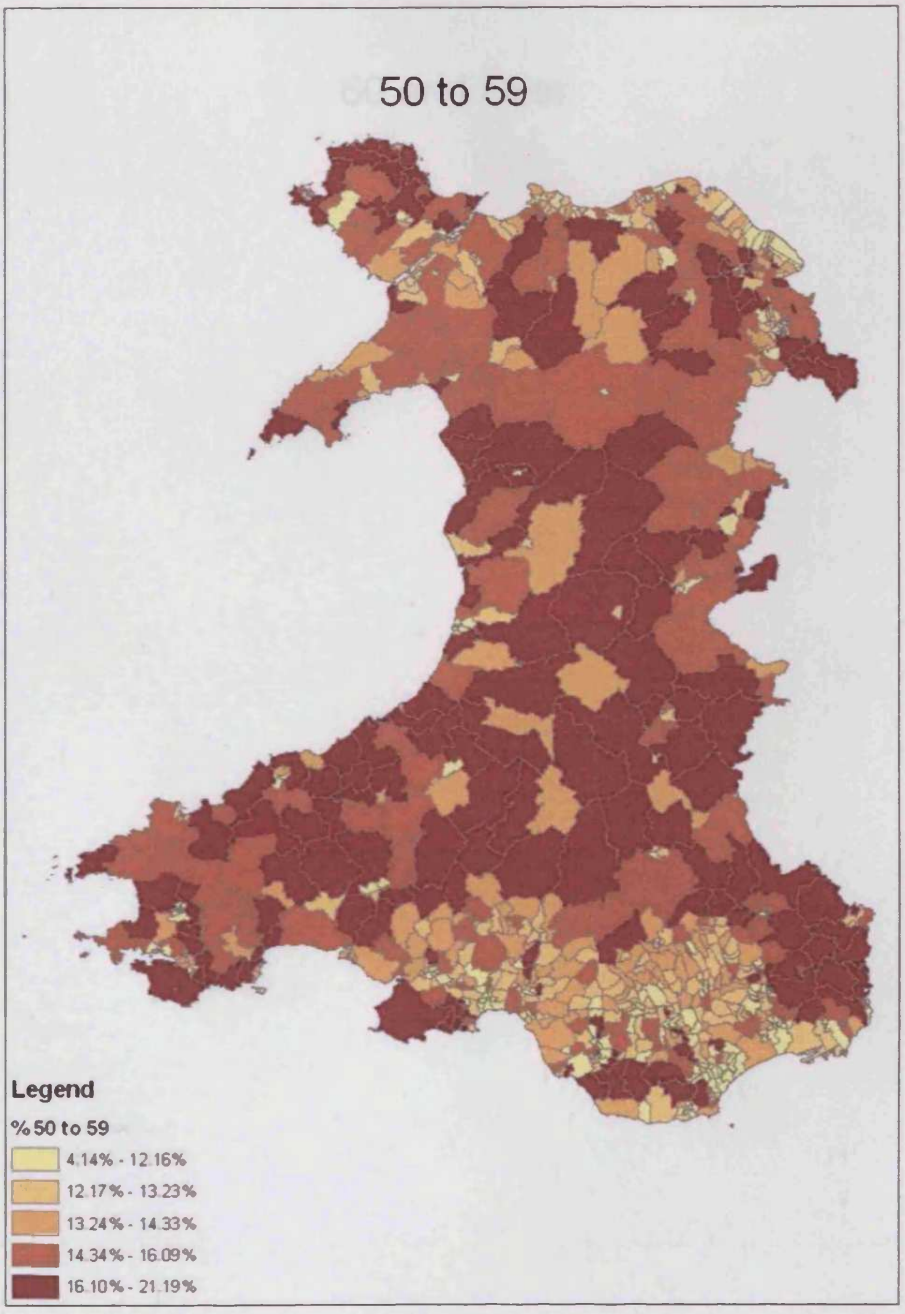
APPENDIX CH.6

- CENSUS MAP ANALYSIS
- CENSUS TABLE ANALYSIS
- 2004 SURVEY OF RURAL SERVICES IN WALES MAP ANALYSIS
- ACCESSIBILITY ANALYSIS
- MAPS OF 2004 PRIMARY HEALTHCARE SERVICES

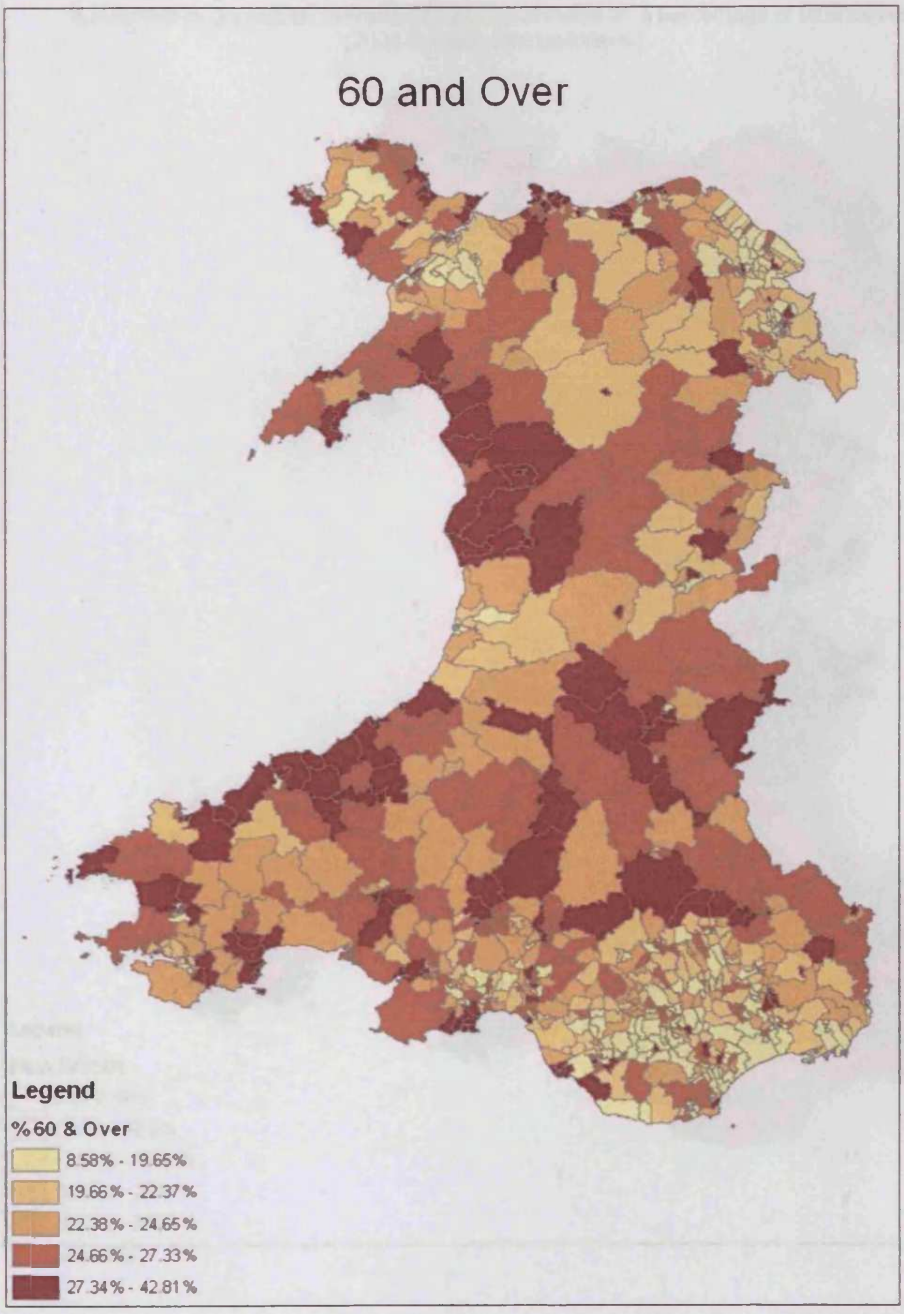
MAP 6.1 : % 0 to 17 Year Olds in Welsh Wards (2001 Census)



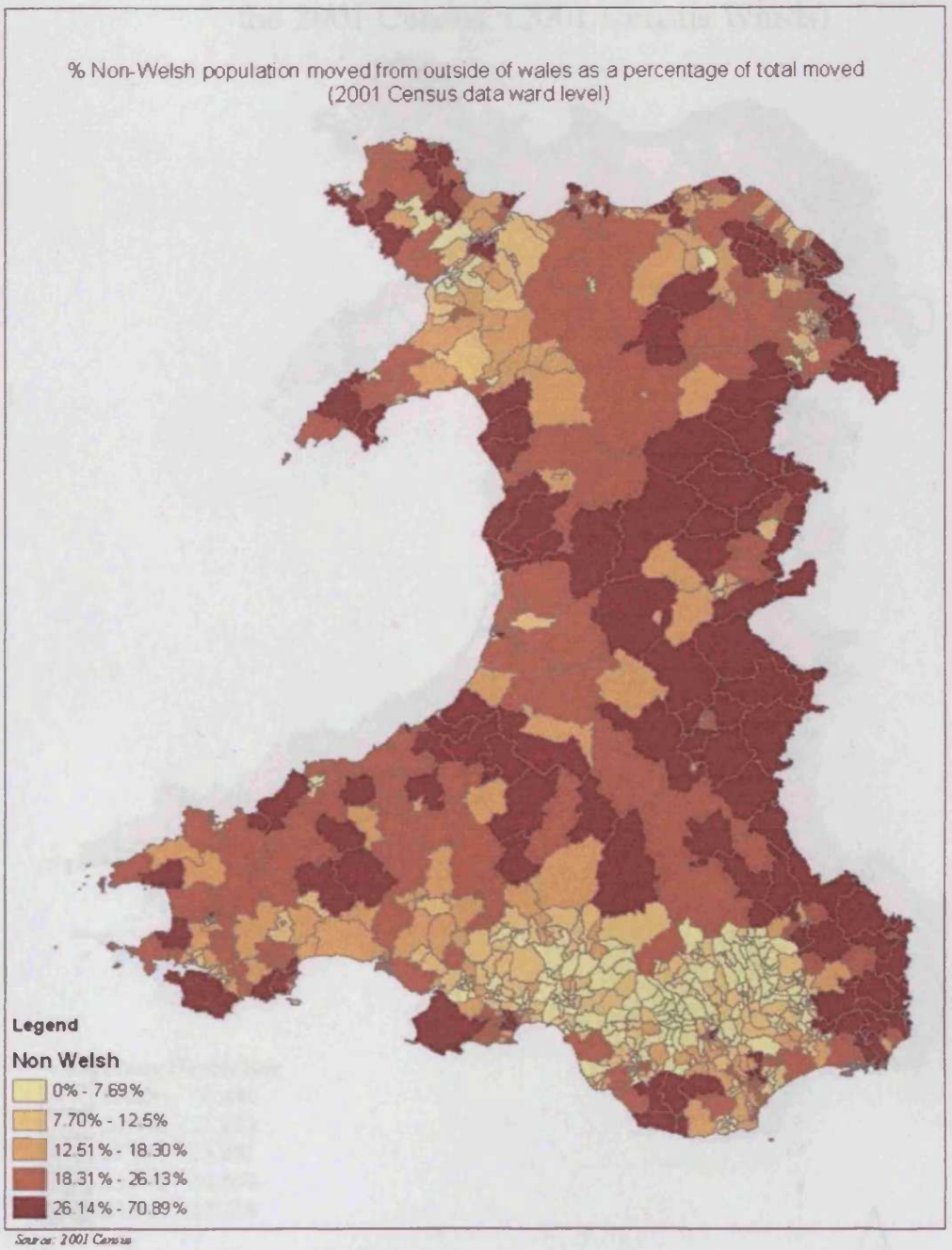
MAP 6.2: % 50 to 59 Year Olds in Welsh Wards (2001 Census)



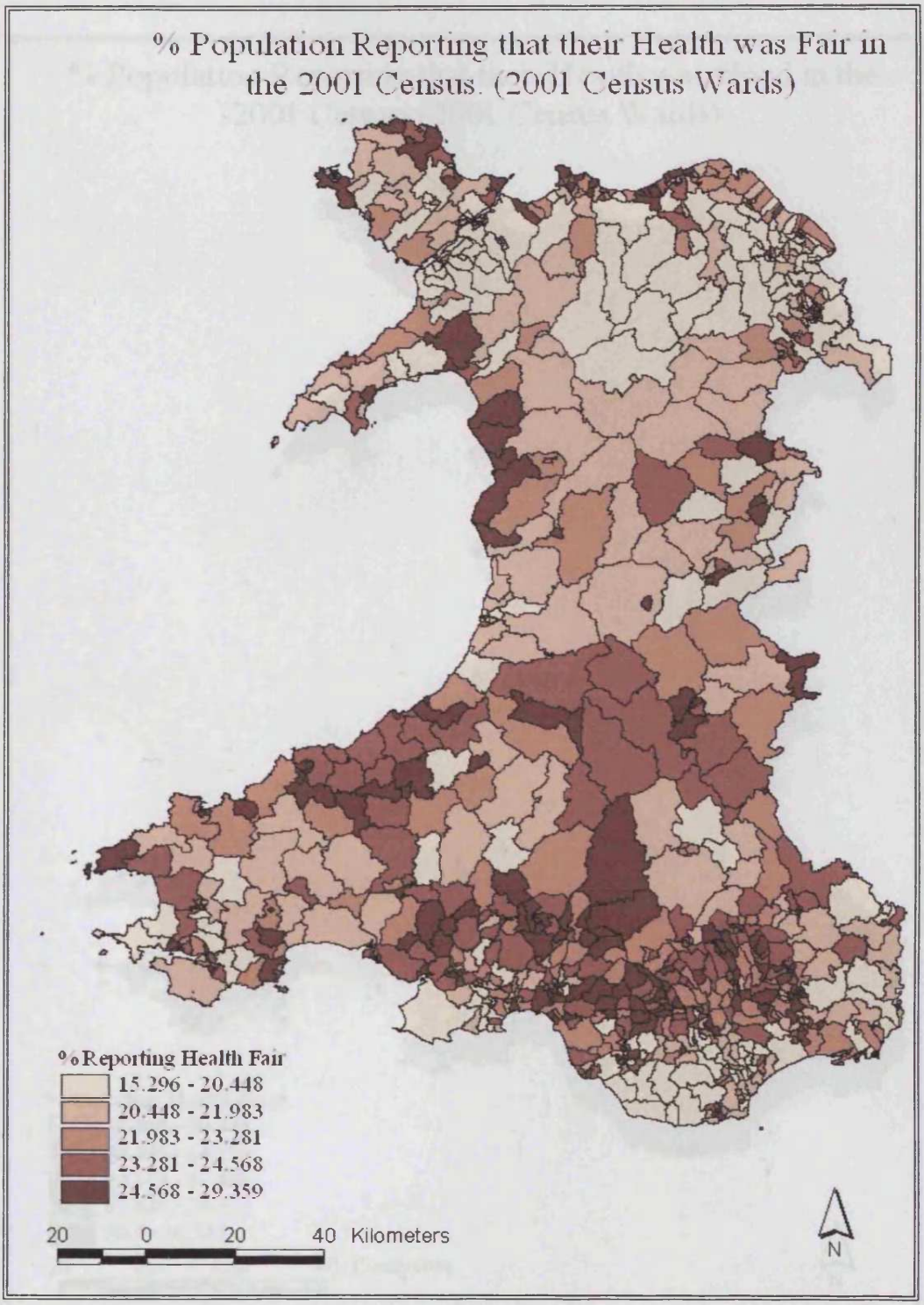
MAP 6.3 : % 60 and Over Year Olds in Welsh Wards (2001 Census)



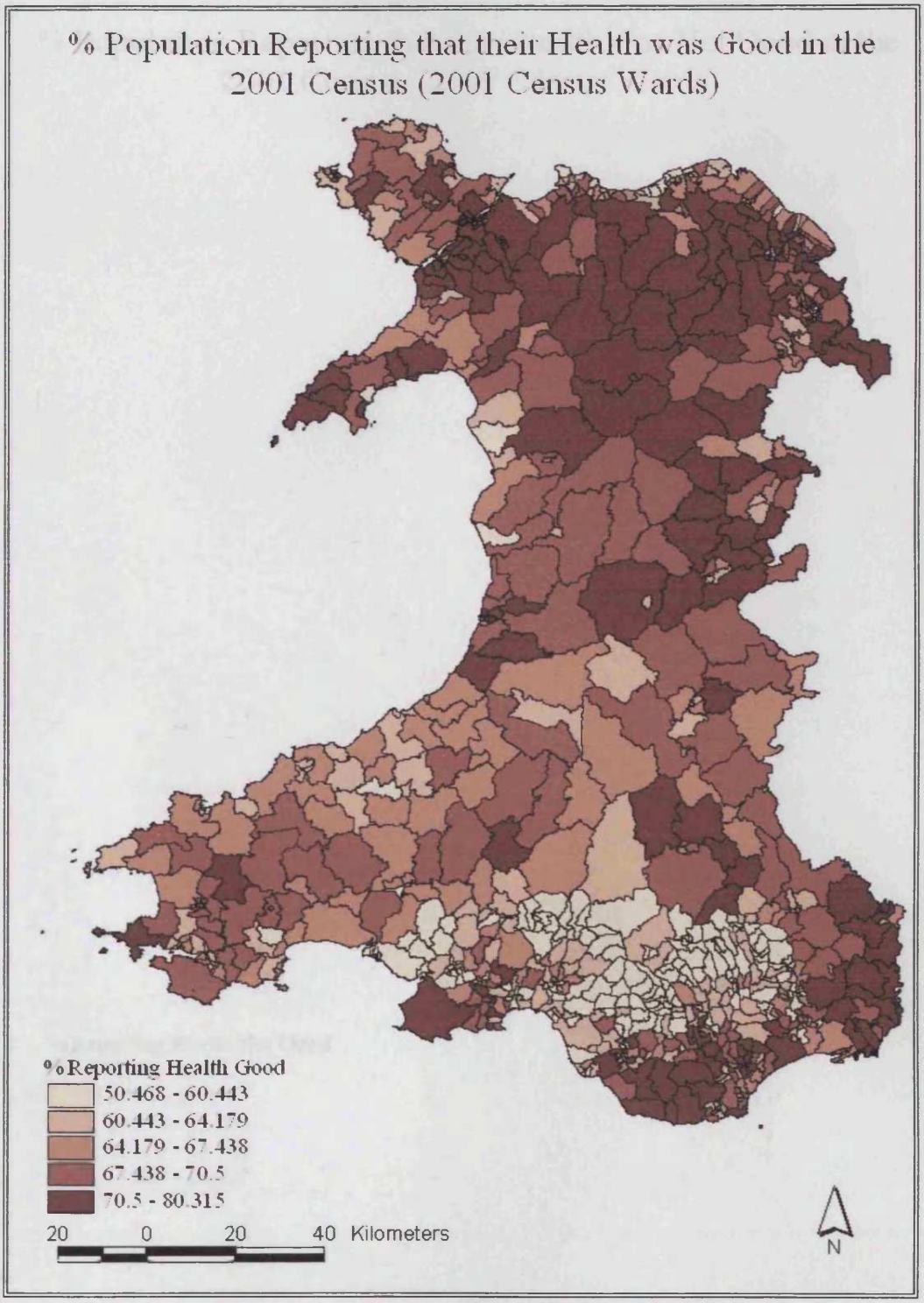
MAP 6.4 : Non- Welsh moved from outside Wales as a % of all moved



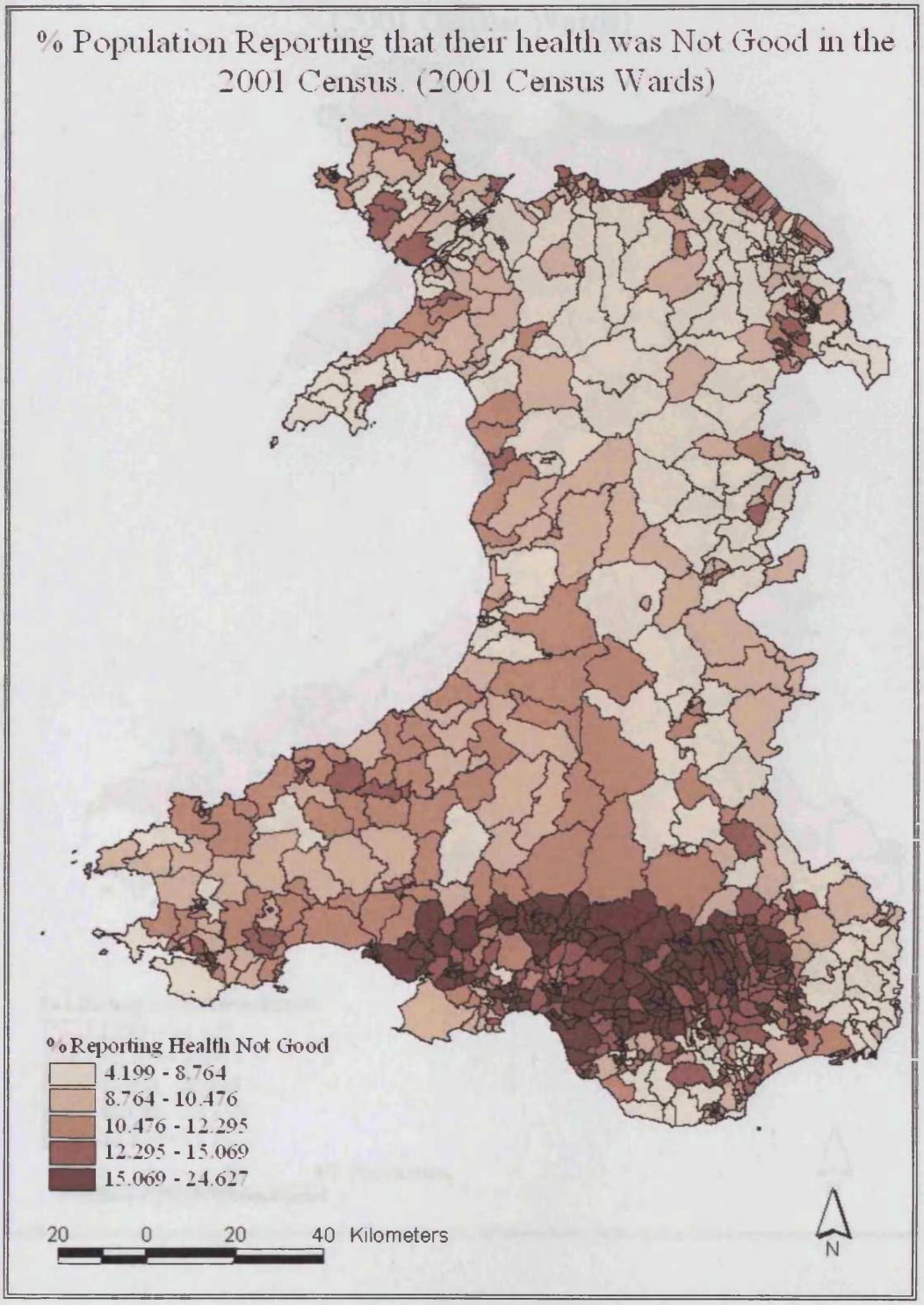
MAP 6.5 : % Population Reporting that their health was fair in the 2001 Census



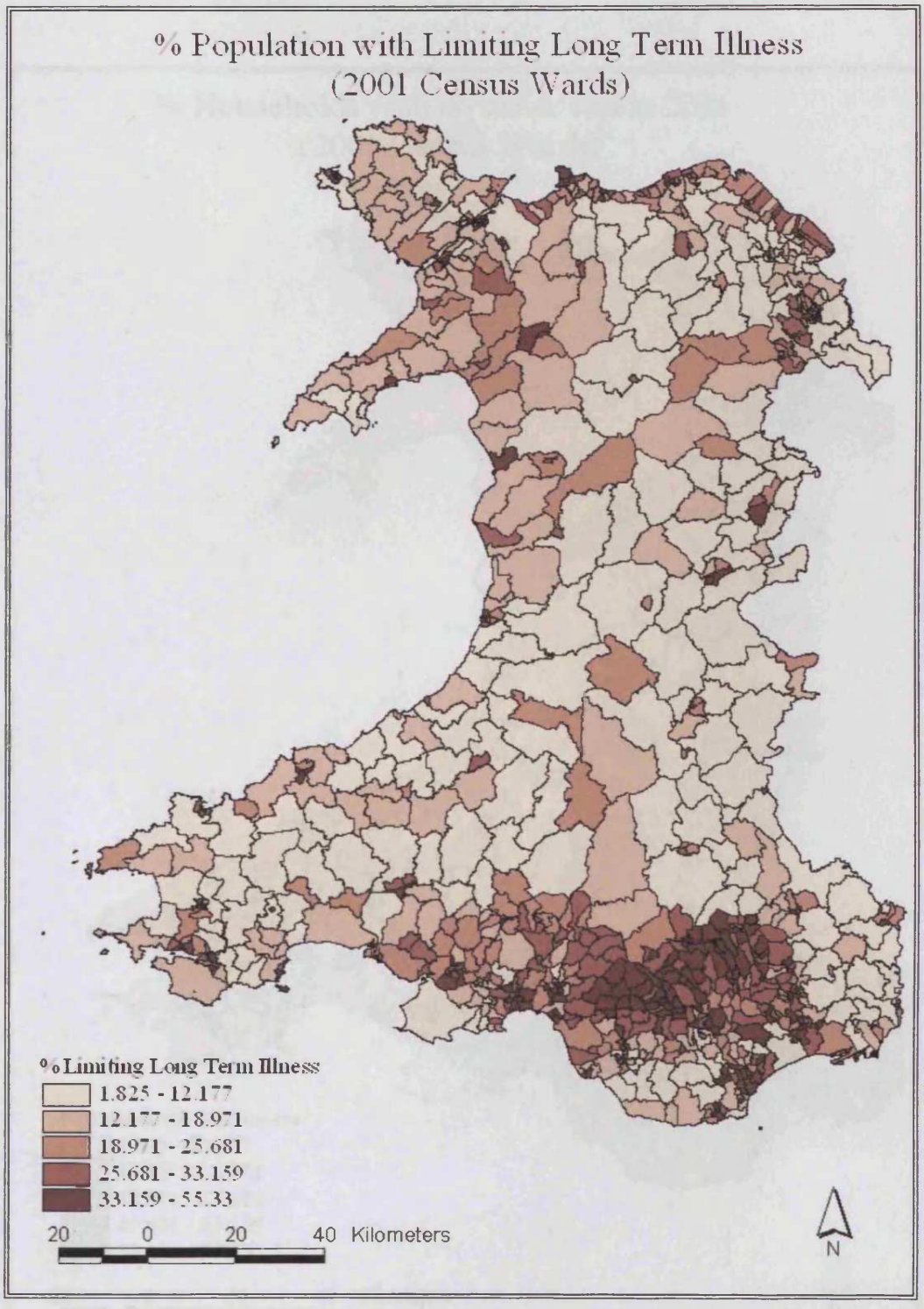
MAP 6.6 : % Population Reporting that health was good in the 2001 Census



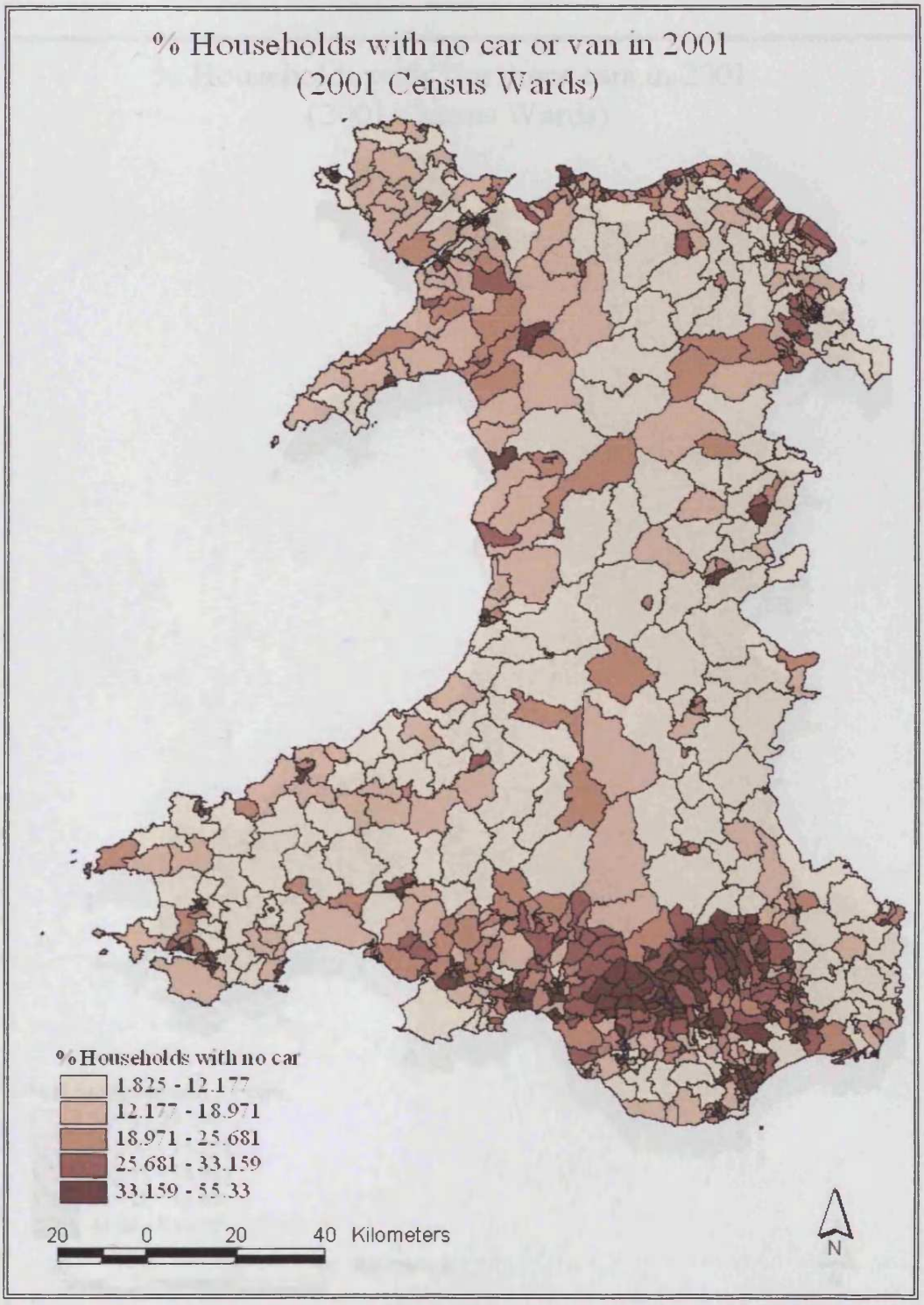
MAP 6.7 : % Population reporting that health was not good in the 2001 Census



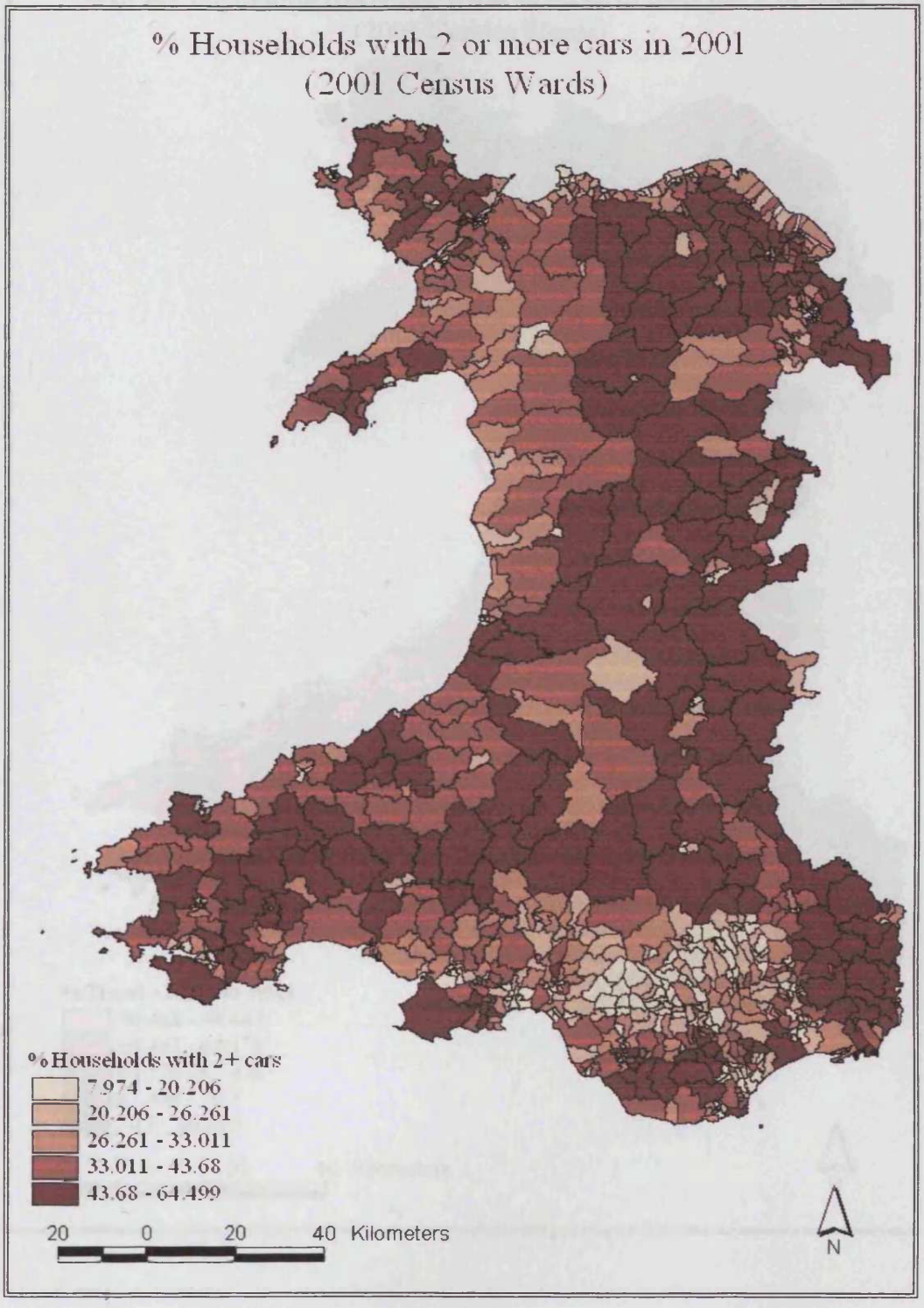
MAP 6.8 : % Population with Limiting Long Term Illness (2001 Census)



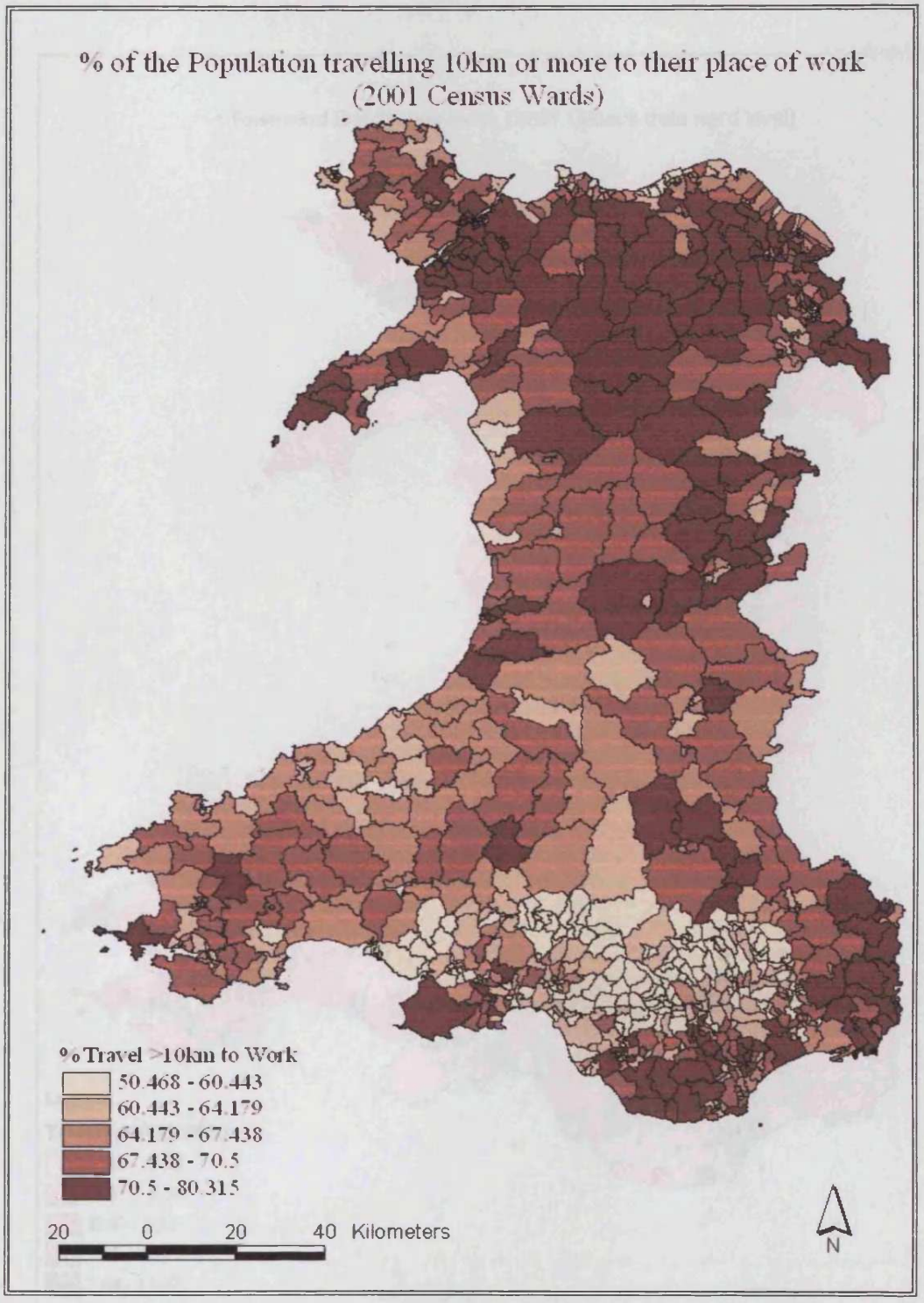
MAP 6.9 : % Households with no car or van (2001 Census)



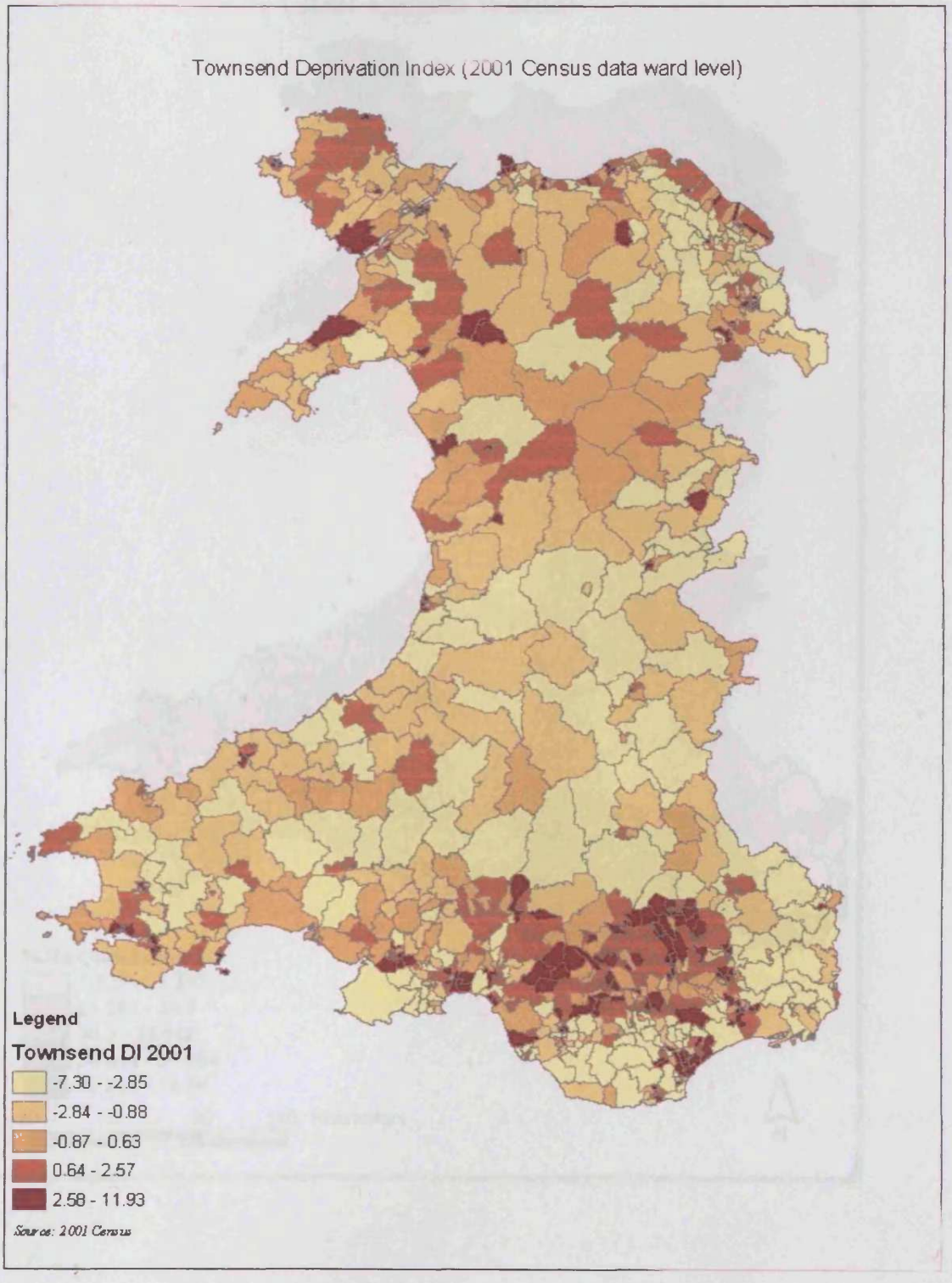
MAP 6.10 : % Households with 2 or more cars (2001 Census)



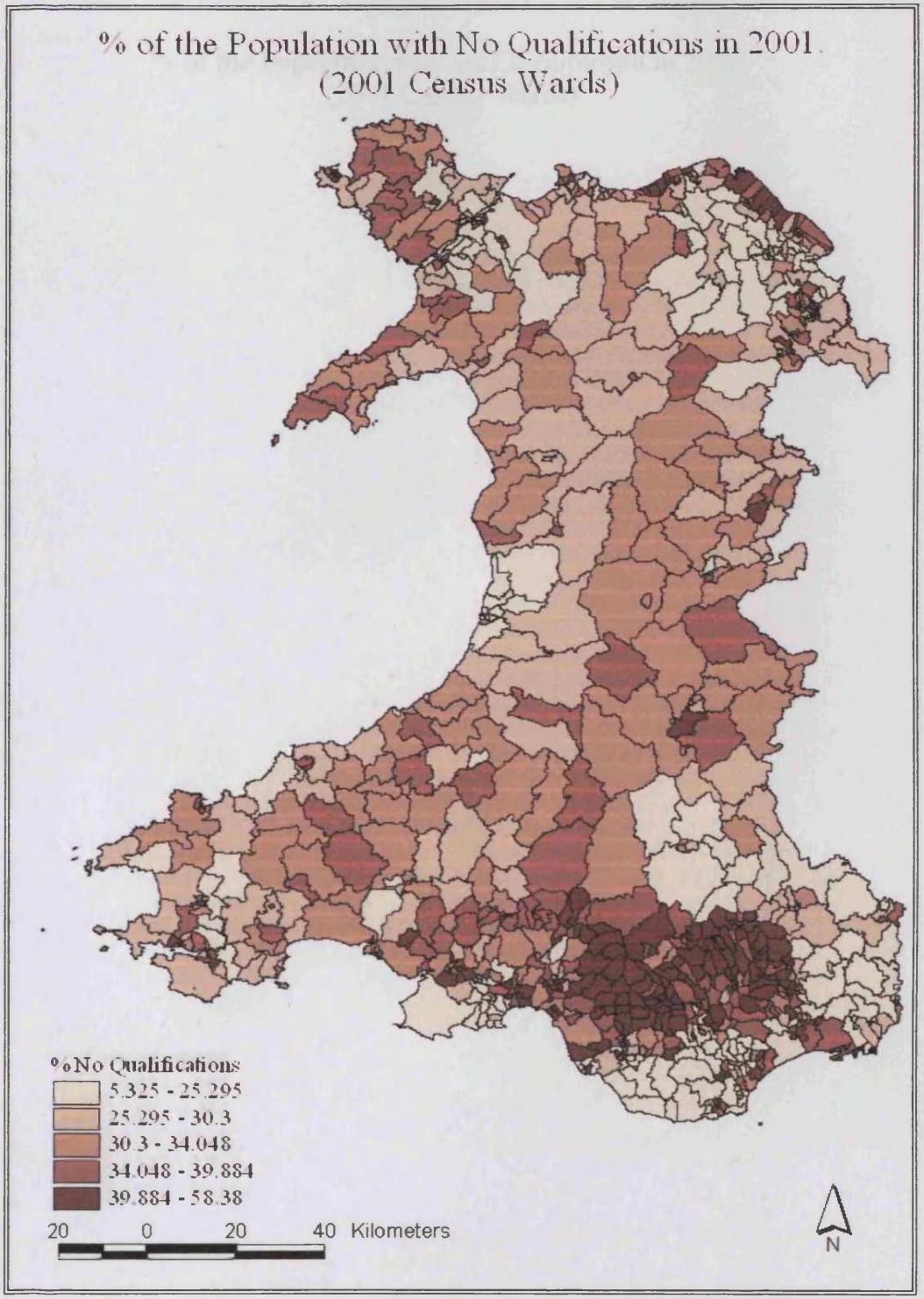
MAP 6.11 : % Travelling 10km or more to their place of work



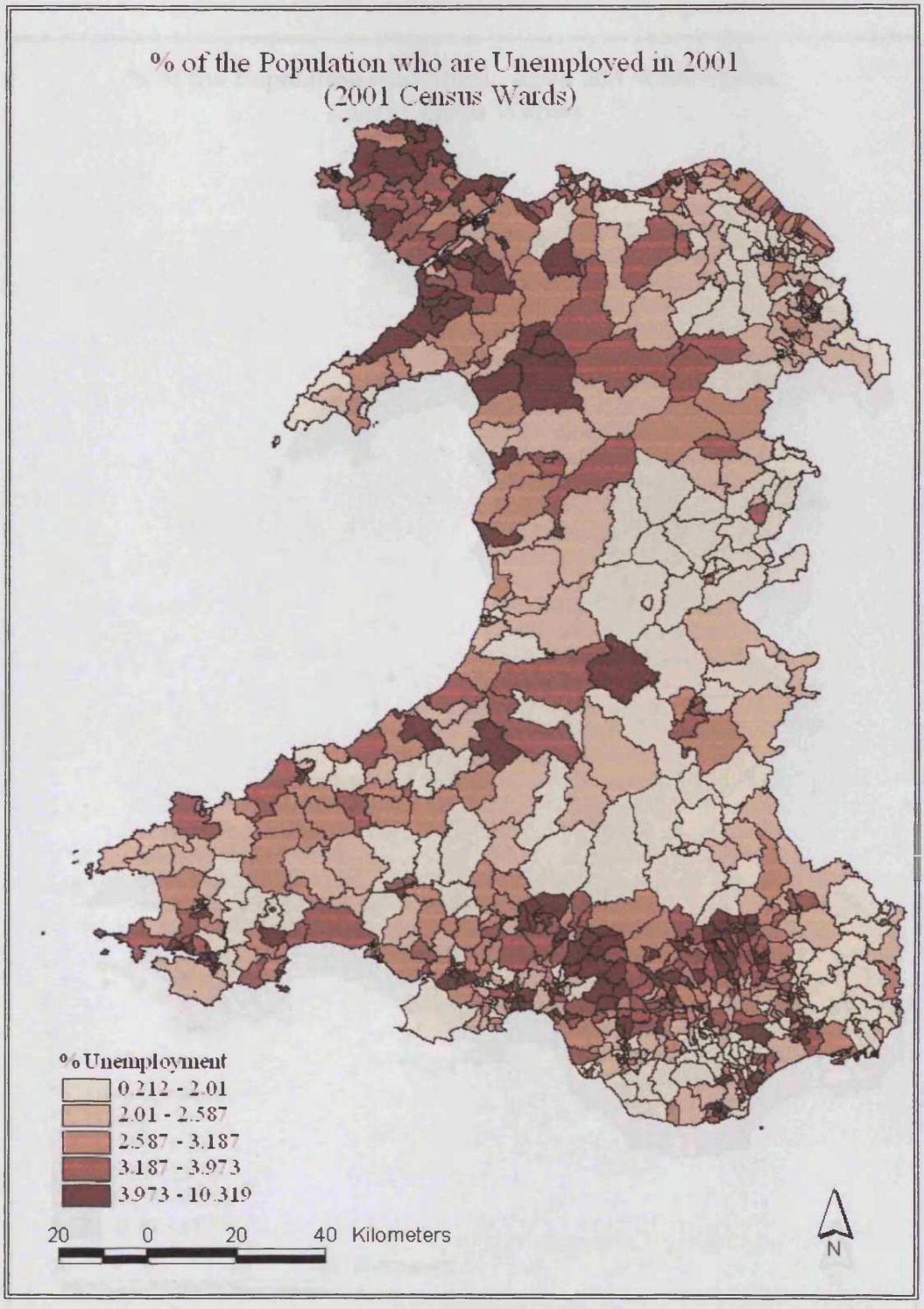
MAP 6.12 : Townsend Deprivation Index (2001 Wards)



MAP 6.13 : % of the population with no qualifications in 2001



MAP 6.14 : % of the population who were unemployed (2001 Census)



MAP 6.15 : % of the population who speak, read and write Welsh (2001 Census)

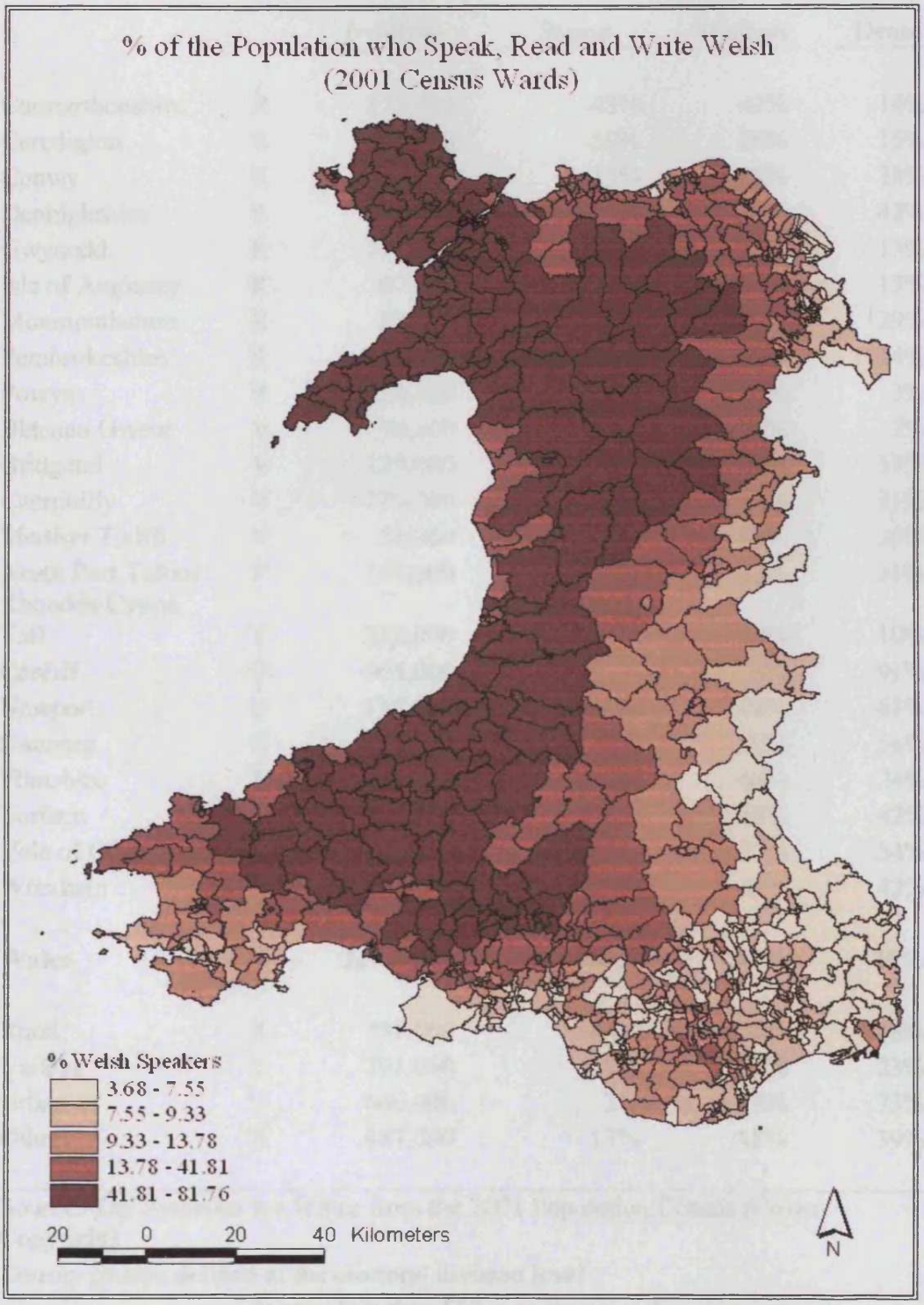


Table 6.1: Distribution of Population by Density (Alphabetical by UA Category)

		Persons	Share of population by density group			Persons per sq km
		(=100%)	Sparse	Medium	Dense	
Carmarthenshire	R	173,000	43%	43%	14%	70
Ceredigion	R	75,000	59%	26%	15%	40
Conwy	R	110,000	15%	58%	28%	100
Denbighshire	R	93,000	26%	32%	42%	110
Gwynedd	R	117,000	54%	33%	13%	50
Isle of Anglesey	R	67,000	52%	35%	13%	90
Monmouthshire	R	85,000	32%	39%	29%	100
Pembrokeshire	R	114,000	47%	39%	14%	70
Powys	R	126,000	69%	29%	3%	20
Blaenau Gwent	V	70,000	-	93%	7%	640
Bridgend	V	129,000	3%	60%	37%	510
Caerphilly	V	170,000	2%	67%	31%	610
Merthyr Tydfil	V	56,000	6%	68%	26%	500
Neath Port Talbot	V	134,000	16%	53%	31%	300
Rhondda Cynon Taff	V	232,000	1%	89%	10%	550
Cardiff	U	305,000	-	9%	91%	2,180
Newport	U	137,000	8%	28%	63%	720
Swansea	U	223,000	2%	42%	56%	590
Flintshire	X	149,000	12%	64%	24%	340
Torfaen	X	91,000	-	58%	42%	720
Vale of Glamorgan	X	119,000	19%	27%	54%	360
Wrexham	X	128,000	17%	42%	42%	260
Wales		**2,903,000**	**18%**	**46%**	**36%**	**140**
Rural	R	959,000	44%	38%	18%	60
Valleys	V	791,000	4%	72%	23%	490
Urban	U	666,000	2%	24%	73%	940
Others	X	487,000	13%	48%	39%	350

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Density groups defined at the electoral division level

Sparse: less than 150 persons per sq km

Medium: between 150 and 1500 persons per sq km

Dense: more than 1500 persons per sq km

Source : Statistical Directorate, Welsh Assembly Government (July 2003)

Table 6.2 : Vacant Households (Ranked by the average share for all Electoral Divisions)

			Share of all household spaces			
		Value	All	Sparse	Medium	Dense
Flintshire	X	2,000	2.8%	3.8%	2.7%	2.6%
Cardiff	U	4,000	2.8%	-	3.0%	2.8%
Torfaen	X	1,000	2.9%	-	3.2%	2.4%
Wrexham	X	2,000	3.1%	3.0%	2.8%	3.4%
Bridgend	V	2,000	3.3%	3.6%	3.6%	2.8%
Newport	U	2,000	3.4%	1.5%	3.1%	3.7%
Denbighshire	R	1,000	3.4%	3.9%	2.9%	3.5%
Ceredigion	R	1,000	3.5%	3.5%	3.3%	3.6%
Monmouthshire	R	1,000	3.6%	4.4%	3.6%	2.8%
Caerphilly	V	3,000	3.6%	3.1%	3.9%	3.1%
Powys	R	2,000	4.0%	3.9%	4.1%	2.4%
Vale of Glamorgan	X	2,000	4.1%	2.7%	4.6%	4.3%
Conwy	R	2,000	4.4%	4.7%	4.8%	3.5%
Swansea	U	4,000	4.5%	3.4%	3.4%	5.2%
Carmarthenshire	R	4,000	4.6%	4.6%	4.3%	5.4%
Rhondda Cynon Taff	V	5,000	4.6%	3.7%	4.7%	4.1%
Neath Port Talbot	V	3,000	4.8%	6.2%	4.6%	4.3%
Isle of Anglesey	R	2,000	4.9%	5.9%	3.9%	3.8%
Pembrokeshire	R	3,000	5.1%	4.8%	5.2%	6.1%
Gwynedd	R	3,000	5.5%	6.2%	5.1%	3.1%
Blaenau Gwent	V	2,000	5.6%	-	5.7%	4.6%
Merthyr Tydfil	V	1,000	5.7%	4.5%	6.1%	4.7%
Wales		**51,000**	**4.0%**	**4.5%**	**4.1%**	**3.6%**
Others	X	7,000	3.2%	3.1%	3.1%	3.4%
Urban	U	10,000	3.5%	2.1%	3.3%	3.6%
Valleys	V	15,000	4.4%	5.4%	4.6%	3.6%
Rural	R	19,000	4.4%	4.7%	4.3%	3.9%

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Table 6.3 : Second Homes or Holiday Accommodation (Ranked by the average share for all Electoral Divisions)

			Share of all household spaces			
		Value	All	Sparse	Medium	Dense
Caerphilly	V	-	0.1%	-	0.1%	0.1%
Torfaen	X	-	0.1%	-	0.1%	0.1%
Blaenau Gwent	V	-	0.1%	-	0.1%	-
Newport	U	-	0.1%	0.1%	0.2%	0.1%
Rhondda Cynon Taff	V	-	0.2%	-	0.2%	0.1%
Merthyr Tydfil	V	-	0.2%	0.5%	0.2%	0.1%
Neath Port Talbot	V	-	0.2%	0.4%	0.2%	0.1%
Flintshire	X	-	0.2%	0.6%	0.2%	0.1%
Cardiff	U	-	0.2%	-	0.3%	0.2%
Wrexham	X	-	0.2%	0.7%	0.2%	-
Bridgend	V	-	0.3%	0.2%	0.3%	0.2%
Vale of Glamorgan	X	-	0.4%	0.7%	0.2%	0.3%
Carmarthenshire	R	1,000	0.7%	1.3%	0.2%	0.2%
Swansea	U	1,000	0.7%	9.8%	0.5%	0.4%
Monmouthshire	R	-	0.8%	1.5%	0.5%	0.3%
Denbighshire	R	-	0.8%	2.0%	0.4%	0.5%
Powys	R	1,000	2.2%	2.9%	0.8%	0.4%
Conwy	R	1,000	2.2%	5.2%	2.1%	1.0%
Ceredigion	R	1,000	2.9%	3.2%	3.4%	0.5%
Isle of Anglesey	R	1,000	3.8%	4.8%	3.6%	0.1%
Pembrokeshire	R	3,000	6.1%	9.7%	3.7%	0.8%
Gwynedd	R	4,000	7.8%	9.9%	6.7%	0.3%
Wales		**16,000**	**1.2%**	**4.1%**	**0.8%**	**0.3%**
Valleys	V	1,000	0.2%	0.3%	0.2%	0.1%
Others	X	-	0.2%	0.7%	0.2%	0.2%
Urban	U	1,000	0.4%	3.6%	0.4%	0.3%
Rural	R	13,000	3.1%	4.8%	2.2%	0.5%

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Table 6.4 : Households rented from the private sector or other arrangements (Ranked by the average share for all Electoral Divisions)

			Share of all occupied households			
		Value	All	Sparse	Medium	Dense
Torfaen	X	2,000	5.4%	-	5.7%	4.9%
Caerphilly	V	4,000	6.0%	5.6%	6.1%	5.7%
Flintshire	X	5,000	7.6%	9.4%	7.8%	6.2%
Newport	U	4,000	7.8%	5.1%	7.1%	8.4%
Wrexham	X	4,000	8.3%	13.2%	7.3%	7.3%
Neath Port Talbot	V	5,000	8.4%	8.1%	7.7%	9.8%
Bridgend	V	5,000	8.5%	9.7%	8.0%	9.1%
Blaenau Gwent	V	3,000	8.5%	-	8.6%	6.7%
Monmouthshire	R	3,000	9.1%	11.7%	7.9%	8.0%
Vale of Glamorgan	X	5,000	9.3%	7.9%	9.5%	9.6%
Merthyr Tydfil	V	2,000	10.0%	9.2%	9.8%	10.9%
Rhondda Cynon Taff	V	10,000	10.1%	4.6%	10.3%	9.3%
Carmarthenshire	R	8,000	10.4%	11.2%	9.4%	11.3%
Swansea	U	10,000	11.1%	9.9%	8.1%	13.2%
Pembrokeshire	R	6,000	13.2%	12.4%	13.1%	15.8%
Cardiff	U	16,000	13.2%	-	8.6%	13.7%
Denbighshire	R	6,000	14.3%	15.5%	11.1%	15.9%
Conwy	R	7,000	14.7%	16.5%	15.8%	11.6%
Isle of Anglesey	R	4,000	15.0%	15.7%	13.1%	17.3%
Gwynedd	R	7,000	15.0%	14.0%	14.6%	21.0%
Powys	R	8,000	15.5%	15.7%	15.6%	7.5%
Ceredigion	R	6,000	18.0%	14.0%	20.0%	31.5%
Wales		**130,000**	**10.8%**	**12.8%**	**9.6%**	**11.2%**
Others	X	16,000	7.7%	10.2%	7.4%	7.4%
Valleys	V	28,000	8.5%	8.0%	8.6%	8.4%
Urban	U	31,000	11.4%	6.7%	8.0%	12.6%
Rural	R	55,000	13.6%	13.8%	13.0%	14.5%

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Table 6.5 : Households with no access to a private car (Ranked by the average share for all Electoral Divisions)

			Share of all occupied households			
		Value	All	Sparse	Medium	Dense
Powys	R	9,000	17.5%	13.0%	26.5%	28.6%
Monmouthshire	R	6,000	17.5%	9.2%	17.9%	25.2%
Flintshire	X	12,000	19.1%	13.7%	17.7%	25.4%
Ceredigion	R	6,000	19.5%	11.4%	27.4%	39.5%
Isle of Anglesey	R	6,000	20.9%	14.4%	21.5%	43.4%
Vale of Glamorgan	X	10,000	21.5%	9.8%	17.4%	27.4%
Pembrokeshire	R	10,000	21.7%	12.4%	27.8%	33.2%
Carmarthenshire	R	17,000	23.1%	16.3%	26.5%	32.9%
Denbighshire	R	9,000	23.7%	13.7%	21.0%	31.6%
Gwynedd	R	12,000	23.9%	17.9%	28.3%	38.6%
Conwy	R	12,000	24.2%	12.1%	24.5%	29.6%
Wrexham	X	13,000	24.7%	13.3%	24.5%	29.3%
Bridgend	V	14,000	25.6%	31.3%	25.3%	25.6%
Torfaen	X	10,000	27.2%	-	26.4%	28.2%
Swansea	U	27,000	28.5%	11.1%	22.8%	33.4%
Caerphilly	V	20,000	29.2%	33.8%	29.5%	28.3%
Cardiff	U	37,000	29.7%	-	15.7%	31.1%
Neath Port Talbot	V	17,000	30.2%	32.1%	25.1%	37.5%
Newport	U	17,000	30.5%	10.5%	26.2%	34.8%
Rhondda Cynon Taff	V	30,000	31.6%	20.7%	31.5%	32.9%
Blaenau Gwent	V	10,000	35.1%	-	34.9%	38.5%
Merthyr Tydfil	V	8,000	35.2%	29.1%	33.2%	41.8%
Wales		**314,000**	**26.0%**	**14.8%**	**26.2%**	**31.4%**
Rural	R	88,000	21.6%	14.0%	25.0%	32.2%
Others	X	45,000	22.7%	12.2%	21.2%	27.7%
Urban	U	81,000	29.5%	10.7%	22.4%	32.4%
Valleys	V	100,000	30.5%	31.3%	30.0%	31.7%

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Table 6.6 : Unemployed persons aged 16-74 (Ranked by the average share for all Electoral Divisions)

			Share of persons aged 16 to 74			
		Value	All	Sparse	Medium	Dense
Monmouthshire	R	2,000	2.6%	2.1%	2.6%	3.3%
Powys	R	2,000	2.7%	2.5%	3.0%	3.2%
Ceredigion	R	2,000	2.9%	2.8%	3.2%	2.7%
Flintshire	X	3,000	3.0%	2.3%	2.9%	3.6%
Cardiff	U	7,000	3.1%	-	2.4%	3.2%
Wrexham	X	3,000	3.3%	2.4%	3.3%	3.7%
Vale of Glamorgan	X	3,000	3.3%	2.0%	2.8%	4.0%
Carmarthenshire	R	4,000	3.4%	3.0%	3.5%	4.0%
Torfaen	X	2,000	3.4%	-	3.3%	3.5%
Denbighshire	R	2,000	3.4%	2.7%	2.7%	4.4%
Bridgend	V	3,000	3.5%	3.8%	3.4%	3.6%
Rhondda Cynon Taff	V	6,000	3.6%	3.5%	3.5%	3.9%
Caerphilly	V	4,000	3.6%	3.9%	3.5%	3.8%
Swansea	U	6,000	3.6%	2.5%	3.2%	4.0%
Conwy	R	3,000	3.7%	3.2%	3.8%	3.7%
Pembrokeshire	R	3,000	3.9%	2.9%	4.7%	4.9%
Neath Port Talbot	V	4,000	3.9%	4.5%	3.6%	4.1%
Newport	U	4,000	3.9%	2.5%	3.2%	4.5%
Merthyr Tydfil	V	2,000	4.0%	4.2%	3.9%	4.3%
Gwynedd	R	3,000	4.1%	3.6%	4.5%	5.1%
Blaenau Gwent	V	2,000	4.7%	-	4.6%	5.4%
Isle of Anglesey	R	2,000	4.7%	4.5%	4.1%	7.2%
Wales		**72,000**	**3.5%**	**3.0%**	**3.5%**	**3.8%**
Others	X	11,000	3.2%	2.2%	3.1%	3.8%
Urban	U	16,000	3.4%	2.5%	3.0%	3.6%
Rural	R	24,000	3.5%	3.0%	3.6%	4.2%
Valleys	V	21,000	3.7%	4.3%	3.7%	3.9%

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Table 6.7 : Unemployed persons 16-24 (Ranked by the average share for all Electoral Divisions)

			Share of unemployed persons aged 16 to 74			
		Value	All	Sparse	Medium	Dense
Isle of Anglesey	R	-	22.0%	21.9%	20.1%	25.2%
Powys	R	1,000	22.1%	20.6%	23.8%	37.5%
Conwy	R	1,000	23.0%	21.5%	23.3%	23.0%
Gwynedd	R	1,000	23.8%	21.7%	26.1%	25.1%
Ceredigion	R	-	25.3%	23.2%	28.6%	27.1%
Pembrokeshire	R	1,000	25.7%	23.1%	26.3%	29.2%
Cardiff	U	2,000	28.0%	-	27.5%	28.1%
Denbighshire	R	1,000	28.5%	24.7%	25.2%	31.6%
Swansea	U	2,000	28.8%	16.8%	29.9%	28.4%
Vale of Glamorgan	X	1,000	28.8%	23.9%	31.0%	28.9%
Carmarthenshire	R	1,000	29.0%	26.4%	32.1%	26.7%
Newport	U	1,000	29.6%	23.9%	27.5%	30.7%
Flintshire	X	1,000	29.9%	24.5%	29.4%	32.7%
Monmouthshire	R	-	30.2%	27.6%	28.5%	34.0%
Blaenau Gwent	V	1,000	31.3%	-	31.6%	28.0%
Torfaen	X	1,000	31.8%	-	32.3%	31.2%
Bridgend	V	1,000	32.0%	40.0%	32.9%	30.0%
Neath Port Talbot	V	1,000	32.7%	27.0%	32.1%	37.1%
Wrexham	X	1,000	33.1%	24.9%	32.5%	35.7%
Caerphilly	V	1,000	33.7%	38.0%	33.4%	34.2%
Rhondda Cynon Taff	V	2,000	34.7%	16.3%	34.4%	38.3%
Merthyr Tydfil	V	1,000	34.8%	24.8%	33.8%	39.3%
Wales		**21,000**	**29.3%**	**23.6%**	**30.5%**	**30.3%**
Rural	R	6,000	25.5%	23.1%	26.4%	28.2%
Urban	U	5,000	28.6%	21.6%	29.0%	28.7%
Others	X	3,000	30.9%	24.4%	31.1%	31.9%
Valleys	V	7,000	33.4%	28.3%	33.3%	34.6%

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Table 6.8 : Persons aged 16-74 with no recognised qualifications (Ranked by the average share for all Electoral Divisions)

			Share of persons aged 16 to 74			
		Value	All	Sparse	Medium	Dense
Ceredigion	R	14,000	25.0%	28.5%	23.4%	14.9%
Vale of Glamorgan	X	22,000	26.2%	20.4%	23.2%	29.9%
Monmouthshire	R	16,000	26.3%	23.3%	26.2%	30.1%
Cardiff	U	59,000	26.8%	-	17.7%	27.7%
Flintshire	X	32,000	29.3%	25.5%	29.0%	32.1%
Gwynedd	R	25,000	30.1%	29.8%	32.1%	26.2%
Swansea	U	49,000	30.5%	23.1%	30.4%	30.9%
Pembrokeshire	R	25,000	31.1%	28.6%	33.1%	34.0%
Denbighshire	R	20,000	31.4%	26.3%	28.0%	37.3%
Powys	R	28,000	31.4%	31.1%	31.6%	35.4%
Conwy	R	24,000	31.8%	28.2%	32.3%	32.9%
Isle of Anglesey	R	15,000	31.9%	30.8%	29.6%	42.5%
Wrexham	X	31,000	33.2%	26.9%	33.7%	35.3%
Newport	U	32,000	33.6%	26.5%	29.8%	36.3%
Carmarthenshire	R	42,000	34.0%	33.2%	34.4%	35.8%
Bridgend	V	34,000	36.4%	51.3%	37.8%	33.0%
Torfaen	X	24,000	36.7%	-	37.1%	36.0%
Neath Port Talbot	V	38,000	39.0%	44.2%	34.9%	43.4%
Caerphilly	V	48,000	39.8%	54.6%	39.9%	38.8%
Rhondda Cynon Taff	V	67,000	40.5%	41.3%	40.2%	42.9%
Merthyr Tydfil	V	17,000	43.9%	38.6%	42.9%	47.8%
Blaenau Gwent	V	22,000	45.0%	-	45.1%	44.5%
Wales		**685,000**	**33.0%**	**29.9%**	**34.5%**	**32.7%**
Urban	U	141,000	29.4%	25.4%	28.0%	30.0%
Rural	R	210,000	30.8%	29.8%	31.2%	32.5%
Others	X	108,000	31.0%	24.2%	31.1%	33.1%
Valleys	V	226,000	40.1%	45.0%	39.9%	39.7%

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Table 6.9 : Persons Aged over 64 (Ranked by the average share for all Electoral Divisions)

			Share of total population			
		Value	All	Sparse	Medium	Dense
Cardiff	U	45,000	14.6%	-	11.8%	14.9%
Flintshire	X	22,000	14.9%	15.0%	14.8%	15.3%
Caerphilly	V	26,000	15.2%	14.4%	16.0%	13.7%
Wrexham	X	21,000	16.0%	16.6%	15.3%	16.5%
Newport	U	22,000	16.1%	14.8%	15.7%	16.5%
Merthyr Tydfil	V	9,000	16.2%	18.0%	15.7%	17.0%
Rhondda Cynon Taff	V	38,000	16.3%	16.3%	16.3%	15.8%
Bridgend	V	21,000	16.6%	16.1%	16.9%	16.0%
Vale of Glamorgan	X	20,000	16.8%	17.7%	15.1%	17.3%
Torfaen	X	15,000	16.8%	-	17.0%	16.6%
Blaenau Gwent	V	12,000	16.9%	-	17.1%	14.6%
Monmouthshire	R	15,000	18.0%	17.5%	17.9%	18.6%
Swansea	U	41,000	18.3%	19.5%	17.9%	18.5%
Neath Port Talbot	V	25,000	18.3%	18.6%	17.6%	19.5%
Ceredigion	R	14,000	18.5%	18.7%	20.9%	13.6%
Isle of Anglesey	R	13,000	18.9%	18.3%	20.5%	16.5%
Gwynedd	R	22,000	19.0%	19.9%	19.7%	13.3%
Pembrokeshire	R	22,000	19.2%	19.9%	17.8%	20.6%
Carmarthenshire	R	34,000	19.5%	19.1%	19.2%	21.7%
Powys	R	25,000	19.9%	20.1%	20.4%	10.5%
Denbighshire	R	19,000	20.2%	18.9%	19.4%	21.7%
Conwy	R	25,000	23.1%	17.9%	23.1%	25.8%
Wales		**505,000**	**17.4%**	**18.8%**	**17.2%**	**16.9%**
Others	X	78,000	16.0%	16.5%	15.4%	16.6%
Urban	U	107,000	16.1%	16.3%	16.3%	16.1%
Valleys	V	130,000	16.5%	17.8%	16.5%	16.1%
Rural	R	189,000	19.7%	19.3%	20.0%	20.1%

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Table 6.10 : Persons of all ages with a limiting long term illness (Ranked by the average share for all Electoral Divisions)

			Share of total population			
		Value	All	Sparse	Medium	Dense
Cardiff	U	57,000	18.8%	-	14.8%	19.2%
Monmouthshire	R	16,000	19.1%	18.3%	18.6%	20.4%
Flintshire	X	29,000	19.2%	18.4%	18.9%	20.4%
Vale of Glamorgan	X	24,000	19.9%	18.0%	17.7%	21.6%
Powys	R	26,000	20.4%	20.2%	21.2%	18.8%
Gwynedd	R	24,000	20.6%	20.4%	21.6%	19.2%
Ceredigion	R	16,000	20.7%	21.4%	21.5%	16.8%
Wrexham	X	28,000	21.5%	18.2%	21.3%	22.9%
Newport	U	30,000	21.6%	17.7%	20.5%	22.6%
Pembrokeshire	R	25,000	22.3%	21.4%	22.4%	24.9%
Isle of Anglesey	R	15,000	22.4%	22.2%	21.6%	25.6%
Denbighshire	R	22,000	23.4%	19.0%	21.0%	27.9%
Conwy	R	26,000	23.5%	17.8%	24.1%	25.2%
Swansea	U	55,000	24.7%	21.7%	24.3%	25.2%
Torfaen	X	23,000	24.8%	-	25.2%	24.4%
Bridgend	V	32,000	25.0%	31.9%	25.5%	23.8%
Carmarthenshire	R	45,000	26.3%	23.9%	27.4%	30.2%
Caerphilly	V	45,000	26.3%	31.6%	26.6%	25.4%
Rhondda Cynon Taff	V	63,000	27.2%	28.1%	27.3%	26.0%
Blaenau Gwent	V	20,000	28.3%	-	28.3%	27.3%
Neath Port Talbot	V	39,000	29.4%	30.9%	27.8%	31.2%
Merthyr Tydfil	V	17,000	30.0%	29.4%	29.3%	32.2%
Wales		**676,000**	**23.3%**	**21.2%**	**24.3%**	**23.1%**
Others	X	102,000	21.0%	18.2%	20.7%	22.3%
Urban	U	142,000	21.4%	19.0%	21.7%	21.4%
Rural	R	215,000	22.4%	21.0%	23.0%	24.6%
Valleys	V	216,000	27.3%	30.7%	27.2%	26.9%

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Table 6.11 : Households with dependent children aged 0-4 years old (Ranked by the average share for all Electoral Divisions)

			Share of all occupied households			
		Value	All	Sparse	Medium	Dense
Ceredigion	R	3,000	8.6%	9.1%	8.2%	7.4%
Conwy	R	5,000	9.5%	9.9%	9.6%	9.2%
Powys	R	5,000	9.8%	9.5%	9.9%	16.3%
Isle of Anglesey	R	3,000	10.2%	10.0%	10.1%	11.0%
Denbighshire	R	4,000	10.2%	9.3%	10.7%	10.4%
Monmouthshire	R	4,000	10.3%	9.1%	10.9%	10.6%
Swansea	U	10,000	10.4%	9.8%	11.3%	9.8%
Neath Port Talbot	V	6,000	10.4%	10.4%	10.4%	10.3%
Carmarthenshire	R	8,000	10.4%	9.7%	10.8%	11.1%
Gwynedd	R	5,000	10.8%	10.6%	11.1%	11.0%
Pembrokeshire	R	5,000	11.0%	10.0%	12.6%	10.0%
Blaenau Gwent	V	3,000	11.2%	-	11.1%	11.8%
Wrexham	X	6,000	11.4%	10.4%	11.6%	11.5%
Torfaen	X	4,000	11.4%	-	11.4%	11.4%
Merthyr Tydfil	V	3,000	11.6%	10.5%	11.7%	11.7%
Bridgend	V	6,000	11.7%	11.9%	11.5%	12.0%
Flintshire	X	7,000	11.8%	10.0%	12.0%	12.3%
Rhondda Cynon Taff	V	11,000	12.1%	9.7%	12.1%	13.0%
Vale of Glamorgan	X	6,000	12.2%	10.1%	12.0%	12.9%
Cardiff	U	15,000	12.2%	-	13.4%	12.1%
Caerphilly	V	9,000	12.5%	13.2%	12.2%	13.2%
Newport	U	7,000	12.8%	11.9%	12.6%	13.0%
Wales		**135,000**	**11.2%**	**9.9%**	**11.4%**	**11.6%**
Rural	R	41,000	10.2%	9.7%	10.6%	10.3%
Others	X	23,000	11.7%	10.2%	11.7%	12.1%
Urban	U	32,000	11.7%	11.2%	12.0%	11.6%
Valleys	V	38,000	11.7%	10.8%	11.7%	12.0%

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Table 6.12 : Persons who report that generally their health is not good (Ranked by the average share for all Electoral Divisions)

			Share of total population			
		Value	All	Sparse	Medium	Dense
Monmouthshire	R	8,000	9.5%	8.7%	9.4%	10.5%
Gwynedd	R	11,000	9.5%	9.2%	10.0%	9.8%
Flintshire	X	15,000	9.8%	9.0%	9.6%	10.5%
Powys	R	13,000	10.1%	9.9%	10.7%	10.5%
Ceredigion	R	8,000	10.1%	10.4%	10.5%	8.5%
Cardiff	U	31,000	10.2%	-	7.7%	10.5%
Vale of Glamorgan	X	12,000	10.4%	9.1%	9.0%	11.6%
Isle of Anglesey	R	7,000	10.5%	10.3%	9.9%	12.9%
Pembrokeshire	R	13,000	11.2%	10.2%	11.7%	13.0%
Wrexham	X	14,000	11.3%	8.9%	11.1%	12.3%
Denbighshire	R	11,000	11.5%	8.2%	10.0%	14.8%
Conwy	R	13,000	11.6%	8.0%	12.1%	12.4%
Newport	U	16,000	12.0%	9.2%	11.1%	12.8%
Swansea	U	30,000	13.4%	10.5%	12.9%	13.8%
Bridgend	V	18,000	13.6%	18.4%	13.9%	12.8%
Torfaen	X	13,000	13.9%	-	14.1%	13.6%
Carmarthenshire	R	24,000	13.9%	12.2%	14.8%	16.8%
Caerphilly	V	25,000	15.0%	18.9%	15.1%	14.5%
Rhondda Cynon Taff	V	36,000	15.7%	16.9%	15.7%	15.1%
Neath Port Talbot	V	22,000	16.4%	17.9%	15.1%	17.8%
Blaenau Gwent	V	12,000	16.5%	-	16.6%	15.2%
Merthyr Tydfil	V	10,000	18.1%	16.8%	17.5%	20.0%
Wales		**361,000**	**12.5%**	**10.4%**	**13.1%**	**12.6%**
Others	X	54,000	11.1%	9.0%	10.9%	12.0%
Rural	R	107,000	11.1%	10.1%	11.6%	12.8%
Urban	U	77,000	11.6%	9.6%	11.6%	11.7%
Valleys	V	123,000	15.6%	17.9%	15.5%	15.3%

Source: Key Statistics for Wales from the 2001 Population Census (Crown Copyright)

Table 6.13: Pearson Correlation Analysis of 2001 Census Variables

		nocar%	2carsplus%	travel10km%	good%	fair%	notgood	LLTI	noqual%	%routine	unemp%	srw_welsh	TOWN
nocar%	Pearson Correlation	1	-.940(**)	-.367(**)	-.667(**)	.495(**)	.683(**)	.608(**)	.656(**)	.675(**)	.649(**)	-.236(**)	.883(**)
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2carsplus%	Pearson Correlation	-.940(**)	1	.397(**)	.690(**)	-.564(**)	-.671(**)	-.625(**)	-.646(**)	-.691(**)	-.622(**)	.188(**)	-.827(**)
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
travel10km%	Pearson Correlation	-.367(**)	.397(**)	1	.058	-.054	-.052	.006	-.062	-.118(**)	-.143(**)	.243(**)	-.301(**)
	Sig. (2-tailed)	.000	.000		.087	.112	.125	.861	.067	.000	.000	.000	.000
good%	Pearson Correlation	-.667(**)	.690(**)	.058	1	-.865(**)	-.940(**)	-.945(**)	-.782(**)	-.615(**)	-.476(**)	.242(**)	-.557(**)
	Sig. (2-tailed)	.000	.000	.087		.000	.000	.000	.000	.000	.000	.000	.000
fair%	Pearson Correlation	.495(**)	-.564(**)	-.054	-.865(**)	1	.643(**)	.731(**)	.589(**)	.456(**)	.371(**)	-.144(**)	.429(**)
	Sig. (2-tailed)	.000	.000	.112	.000		.000	.000	.000	.000	.000	.000	.000
notgood	Pearson Correlation	.683(**)	-.671(**)	-.052	-.940(**)	.643(**)	1	.947(**)	.795(**)	.630(**)	.475(**)	-.272(**)	.560(**)
	Sig. (2-tailed)	.000	.000	.125	.000	.000		.000	.000	.000	.000	.000	.000
LLTI	Pearson Correlation	.608(**)	-.625(**)	.006	-.945(**)	.731(**)	.947(**)	1	.751(**)	.555(**)	.462(**)	-.141(**)	.496(**)
	Sig. (2-tailed)	.000	.000	.861	.000	.000	.000		.000	.000	.000	.000	.000
noqual%	Pearson Correlation	.656(**)	-.646(**)	-.062	-.782(**)	.589(**)	.795(**)	.751(**)	1	.855(**)	.583(**)	-.139(**)	.662(**)
	Sig. (2-tailed)	.000	.000	.067	.000	.000	.000	.000		.000	.000	.000	.000
%routine	Pearson Correlation	.675(**)	-.691(**)	-.118(**)	-.615(**)	.456(**)	.630(**)	.555(**)	.855(**)	1	.560(**)	-.163(**)	.668(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000
unemp%	Pearson Correlation	.649(**)	-.622(**)	-.143(**)	-.476(**)	.371(**)	.475(**)	.462(**)	.583(**)	.560(**)	1	.127(**)	.762(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
srw_welsh	Pearson Correlation	-.236(**)	.188(**)	.243(**)	.242(**)	-.144(**)	-.272(**)	-.141(**)	-.139(**)	-.163(**)	.127(**)	1	-.052
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.127
TOWN	Pearson Correlation	.883(**)	-.827(**)	-.301(**)	-.557(**)	.429(**)	.560(**)	.496(**)	.662(**)	.668(**)	.762(**)	-.052	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.127	

** Correlation is significant at the 0.01 level (2-tailed).

Table 6.14 : Spearman's Rank Correlation Analysis of 2001 Census Variables.

		nocar%	2carsplus%	travel10km%	good%	fair%	notgood	LLTI	noqual%	%routine	unemp%	srw_welsh	TOWN
nocar%	Correlation Coefficient	1.000	-.968(**)	-.366(**)	-.684(**)	.522(**)	.702(**)	.636(**)	.683(**)	.709(**)	.651(**)	-.292(**)	.872(**)
	Sig. (2-tailed)	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2carsplus%	Correlation Coefficient	-.968(**)	1.000	.410(**)	.693(**)	-.562(**)	-.690(**)	-.632(**)	-.687(**)	-.708(**)	-.653(**)	.277(**)	-.855(**)
	Sig. (2-tailed)	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
travel10km%	Correlation Coefficient	-.366(**)	.410(**)	1.000	.074(*)	-.052	-.092(**)	-.020	-.081(*)	-.136(**)	-.144(**)	.234(**)	-.285(**)
	Sig. (2-tailed)	.000	.000	.	.029	.121	.006	.549	.016	.000	.000	.000	.000
good%	Correlation Coefficient	-.684(**)	.693(**)	.074(*)	1.000	-.880(**)	-.943(**)	-.940(**)	-.772(**)	-.616(**)	-.534(**)	.281(**)	-.576(**)
	Sig. (2-tailed)	.000	.000	.029	.	.000	.000	.000	.000	.000	.000	.000	.000
fair%	Correlation Coefficient	.522(**)	-.562(**)	-.052	-.880(**)	1.000	.686(**)	.754(**)	.608(**)	.465(**)	.427(**)	-.175(**)	.449(**)
	Sig. (2-tailed)	.000	.000	.121	.000	.	.000	.000	.000	.000	.000	.000	.000
notgood	Correlation Coefficient	.702(**)	-.690(**)	-.092(**)	-.943(**)	.686(**)	1.000	.942(**)	.776(**)	.635(**)	.543(**)	-.304(**)	.584(**)
	Sig. (2-tailed)	.000	.000	.006	.000	.000	.	.000	.000	.000	.000	.000	.000
LLTI	Correlation Coefficient	.636(**)	-.632(**)	-.020	-.940(**)	.754(**)	.942(**)	1.000	.729(**)	.557(**)	.529(**)	-.175(**)	.531(**)
	Sig. (2-tailed)	.000	.000	.549	.000	.000	.000	.	.000	.000	.000	.000	.000
noqual%	Correlation Coefficient	.683(**)	-.687(**)	-.081(*)	-.772(**)	.608(**)	.776(**)	.729(**)	1.000	.859(**)	.616(**)	-.218(**)	.695(**)
	Sig. (2-tailed)	.000	.000	.016	.000	.000	.000	.000	.	.000	.000	.000	.000
%routine	Correlation Coefficient	.709(**)	-.708(**)	-.136(**)	-.616(**)	.465(**)	.635(**)	.557(**)	.859(**)	1.000	.603(**)	-.233(**)	.699(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000
unemp%	Correlation Coefficient	.651(**)	-.653(**)	-.144(**)	-.534(**)	.427(**)	.543(**)	.529(**)	.616(**)	.603(**)	1.000	.005	.767(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.885	.000
srw_welsh	Correlation Coefficient	-.292(**)	.277(**)	.234(**)	.281(**)	-.175(**)	-.304(**)	-.175(**)	-.218(**)	-.233(**)	.005	1.000	-.136(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.885	.	.000
TOWN	Correlation Coefficient	.872(**)	-.855(**)	-.285(**)	-.576(**)	.449(**)	.584(**)	.531(**)	.695(**)	.699(**)	.767(**)	-.136(**)	1.000
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 6.15 : Pearson Correlation Analysis for Gwynedd (2001 Census Variables)

		nocar%	2carsplus%	travel10km%	good%	fair%	notgood	LLTI	noqual%	%routine	unemp%	srw_welsh	TOWN
nocar%	Pearson Correlation	1	-.941(**)	-.271(*)	-.303(*)	.165	.416(**)	.175	.204	.432(**)	.622(**)	-.233	.897(**)
	Sig. (2-tailed)		.000	.022	.010	.170	.000	.145	.088	.000	.000	.050	.000
2carsplus%	Pearson Correlation	-.941(**)	1	.303(*)	.418(**)	-.275(*)	-.504(**)	-.312(**)	-.240(*)	-.473(**)	-.564(**)	.270(*)	-.822(**)
	Sig. (2-tailed)	.000		.010	.000	.020	.000	.008	.044	.000	.000	.023	.000
travel10km%	Pearson Correlation	-.271(*)	.303(*)	1	-.042	.065	-.002	.113	.179	-.167	-.120	.207	-.184
	Sig. (2-tailed)	.022	.010		.726	.591	.984	.346	.135	.165	.320	.083	.124
good%	Pearson Correlation	-.303(*)	.418(**)	-.042	1	-.921(**)	-.827(**)	-.884(**)	-.509(**)	-.211	-.219	.355(**)	-.257(*)
	Sig. (2-tailed)	.010	.000	.726		.000	.000	.000	.000	.077	.066	.002	.031
fair%	Pearson Correlation	.165	-.275(*)	.065	-.921(**)	1	.541(**)	.729(**)	.363(**)	.058	.032	-.400(**)	.125
	Sig. (2-tailed)	.170	.020	.591	.000		.000	.000	.002	.628	.790	.001	.301
notgood	Pearson Correlation	.416(**)	-.504(**)	-.002	-.827(**)	.541(**)	1	.853(**)	.574(**)	.370(**)	.426(**)	-.188	.373(**)
	Sig. (2-tailed)	.000	.000	.984	.000	.000		.000	.000	.001	.000	.116	.001
LLTI	Pearson Correlation	.175	-.312(**)	.113	-.884(**)	.729(**)	.853(**)	1	.636(**)	.288(*)	.263(*)	-.084	.163
	Sig. (2-tailed)	.145	.008	.346	.000	.000	.000		.000	.015	.027	.488	.174
noqual%	Pearson Correlation	.204	-.240(*)	.179	-.509(**)	.363(**)	.574(**)	.636(**)	1	.708(**)	.501(**)	.380(**)	.342(**)
	Sig. (2-tailed)	.088	.044	.135	.000	.002	.000	.000		.000	.000	.001	.004
%routine	Pearson Correlation	.432(**)	-.473(**)	-.167	-.211	.058	.370(**)	.288(*)	.708(**)	1	.591(**)	.395(**)	.499(**)
	Sig. (2-tailed)	.000	.000	.165	.077	.628	.001	.015	.000		.000	.001	.000
unemp%	Pearson Correlation	.622(**)	-.564(**)	-.120	-.219	.032	.426(**)	.263(*)	.501(**)	.591(**)	1	.155	.703(**)
	Sig. (2-tailed)	.000	.000	.320	.066	.790	.000	.027	.000	.000		.197	.000
srw_welsh	Pearson Correlation	-.233	.270(*)	.207	.355(**)	-.400(**)	-.188	-.084	.380(**)	.395(**)	.155	1	-.199
	Sig. (2-tailed)	.050	.023	.083	.002	.001	.116	.488	.001	.001	.197		.097
TOWN	Pearson Correlation	.897(**)	-.822(**)	-.184	-.257(*)	.125	.373(**)	.163	.342(**)	.499(**)	.703(**)	-.199	1
	Sig. (2-tailed)	.000	.000	.124	.031	.301	.001	.174	.004	.000	.000	.097	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

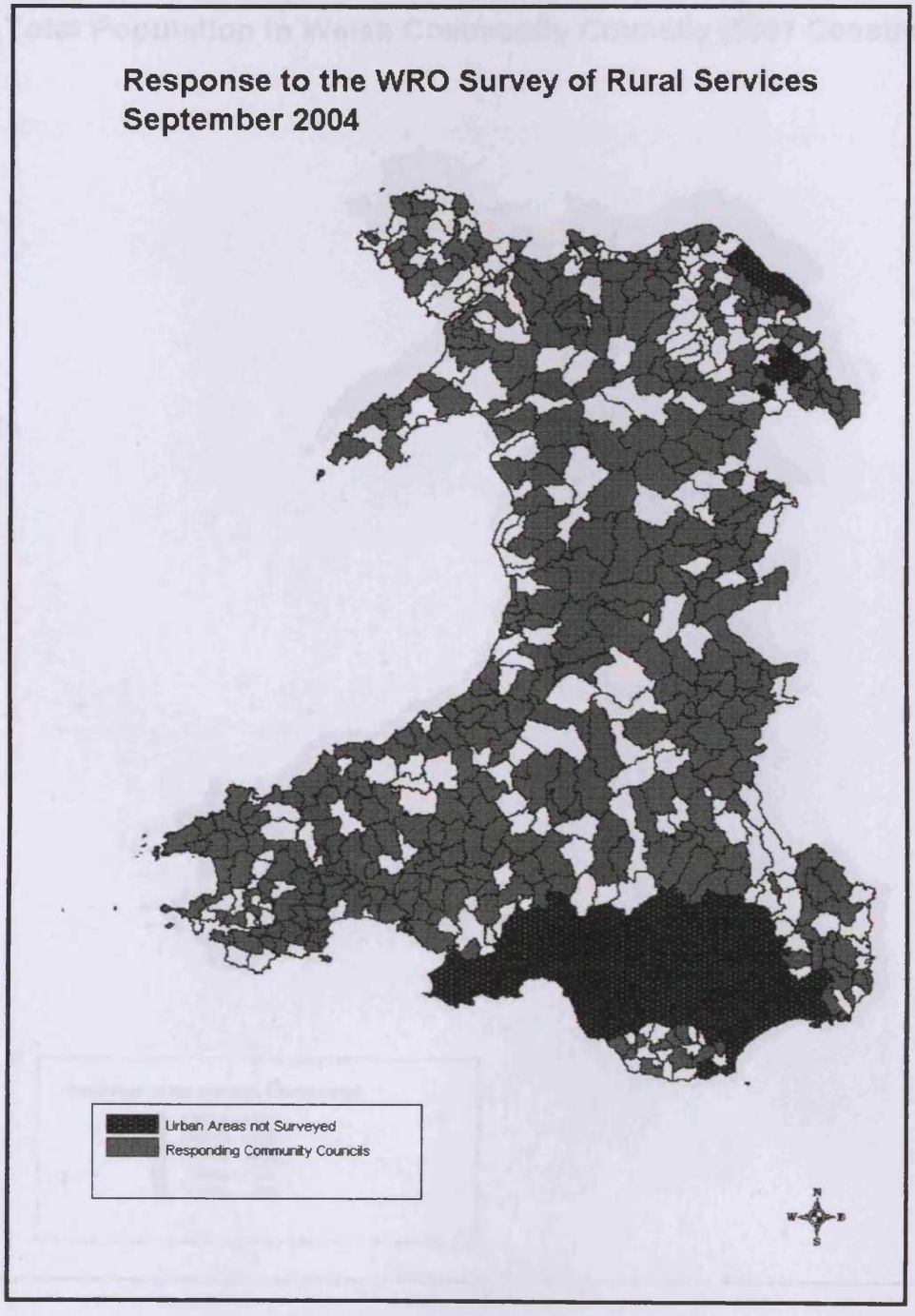
Table 6.16 : Spearman Rank Correlation Analysis for Gwynedd Wards (2001 Census data)

		nocar%	2carsplus%	travel10km%	good%	fair%	notgood	LLTI	noqual%	%routine	unemp%	srw_welsh	TOWN
nocar%	Correlation Coefficient	1.000	-.954(**)	-.220	-.402(**)	.236(*)	.492(**)	.330(**)	.341(**)	.502(**)	.567(**)	-.092	.878(**)
	Sig. (2-tailed)	.	.000	.065	.001	.048	.000	.005	.004	.000	.000	.448	.000
2carsplus%	Correlation Coefficient	-.954(**)	1.000	.279(*)	.478(**)	-.317(**)	-.533(**)	-.399(**)	-.349(**)	-.496(**)	-.511(**)	.170	-.841(**)
	Sig. (2-tailed)	.000	.	.018	.000	.007	.000	.001	.003	.000	.000	.156	.000
travel10km%	Correlation Coefficient	-.220	.279(*)	1.000	-.099	.143	-.013	.165	.257(*)	-.196	-.115	.183	-.129
	Sig. (2-tailed)	.065	.018	.	.411	.233	.913	.169	.031	.102	.342	.126	.285
good%	Correlation Coefficient	-.402(**)	.478(**)	-.099	1.000	-.911(**)	-.766(**)	-.880(**)	-.588(**)	-.255(*)	-.262(*)	.295(*)	-.351(**)
	Sig. (2-tailed)	.001	.000	.411	.	.000	.000	.000	.000	.032	.027	.013	.003
fair%	Correlation Coefficient	.236(*)	-.317(**)	.143	-.911(**)	1.000	.471(**)	.733(**)	.420(**)	.079	.080	-.348(**)	.195
	Sig. (2-tailed)	.048	.007	.233	.000	.	.000	.000	.000	.511	.505	.003	.104
notgood	Correlation Coefficient	.492(**)	-.533(**)	-.013	-.766(**)	.471(**)	1.000	.785(**)	.591(**)	.425(**)	.413(**)	-.133	.421(**)
	Sig. (2-tailed)	.000	.000	.913	.000	.000	.	.000	.000	.000	.000	.270	.000
LLTI	Correlation Coefficient	.330(**)	-.399(**)	.165	-.880(**)	.733(**)	.785(**)	1.000	.585(**)	.257(*)	.295(*)	-.142	.303(*)
	Sig. (2-tailed)	.005	.001	.169	.000	.000	.000	.	.000	.030	.012	.238	.010
noqual%	Correlation Coefficient	.341(**)	-.349(**)	.257(*)	-.588(**)	.420(**)	.591(**)	.585(**)	1.000	.644(**)	.409(**)	.282(*)	.448(**)
	Sig. (2-tailed)	.004	.003	.031	.000	.000	.000	.000	.	.000	.000	.017	.000
%routine	Correlation Coefficient	.502(**)	-.496(**)	-.196	-.255(*)	.079	.425(**)	.257(*)	.644(**)	1.000	.583(**)	.367(**)	.533(**)
	Sig. (2-tailed)	.000	.000	.102	.032	.511	.000	.030	.000	.	.000	.002	.000
unemp%	Correlation Coefficient	.567(**)	-.511(**)	-.115	-.262(*)	.080	.413(**)	.295(*)	.409(**)	.583(**)	1.000	.184	.625(**)
	Sig. (2-tailed)	.000	.000	.342	.027	.505	.000	.012	.000	.000	.	.125	.000
srw_welsh	Correlation Coefficient	-.092	.170	.183	.295(*)	-.348(**)	-.133	-.142	.282(*)	.367(**)	.184	1.000	-.063
	Sig. (2-tailed)	.448	.156	.126	.013	.003	.270	.238	.017	.002	.125	.	.603
TOWN	Correlation Coefficient	.878(**)	-.841(**)	-.129	-.351(**)	.195	.421(**)	.303(*)	.448(**)	.533(**)	.625(**)	-.063	1.000
	Sig. (2-tailed)	.000	.000	.285	.003	.104	.000	.010	.000	.000	.000	.603	.

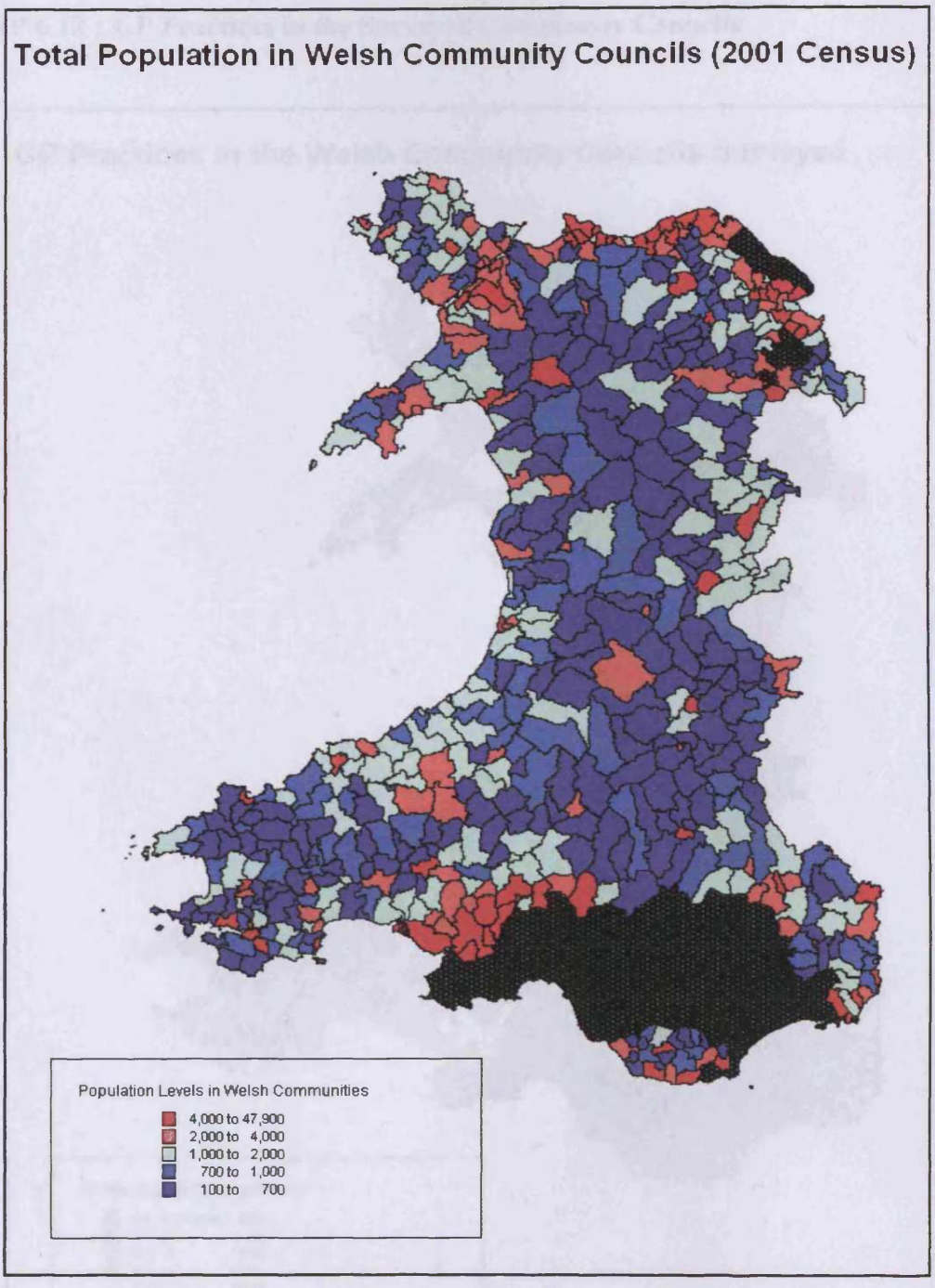
** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

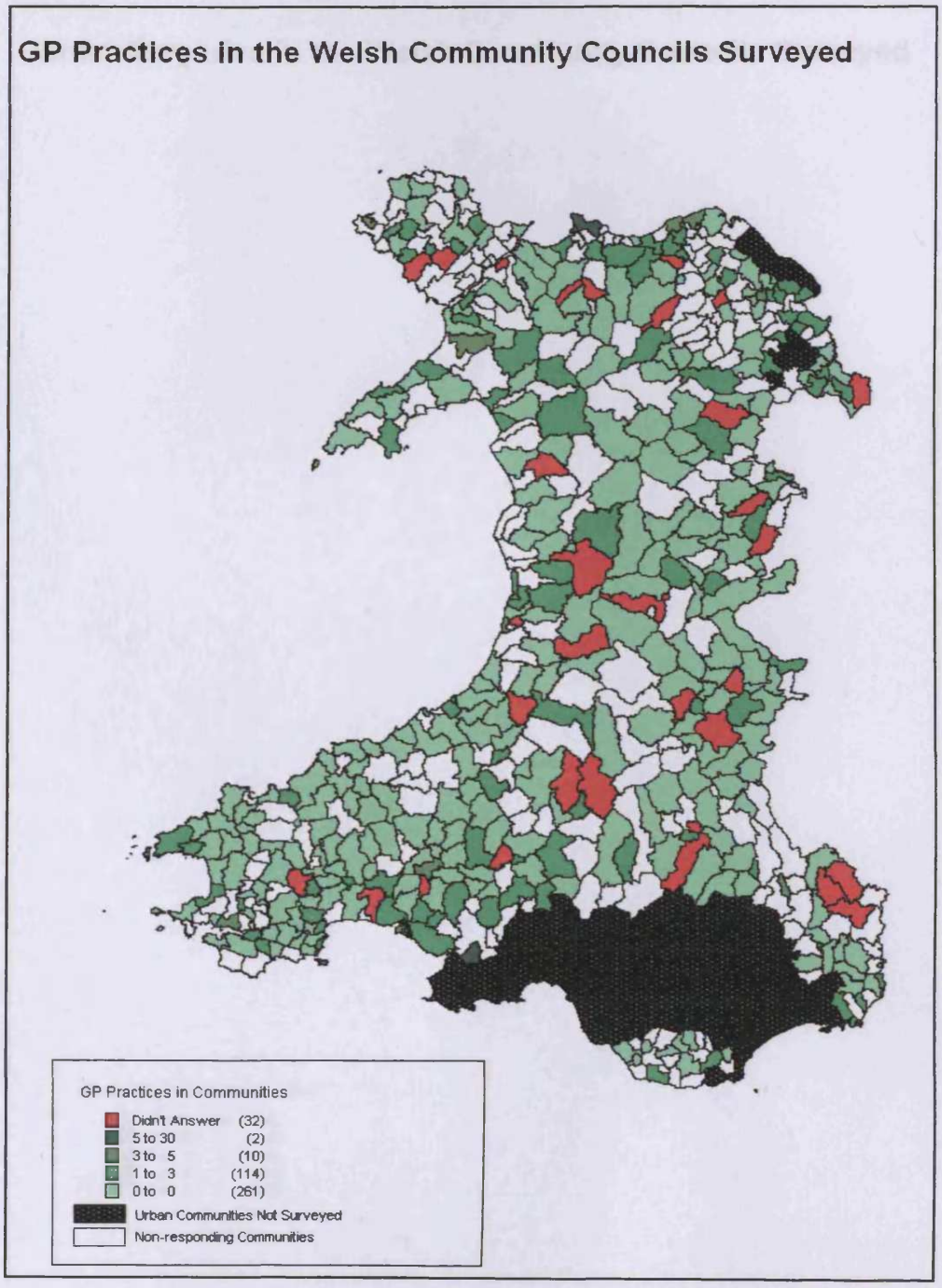
MAP 6.16 : Response to the WRO Survey of Rural Services. September 2004



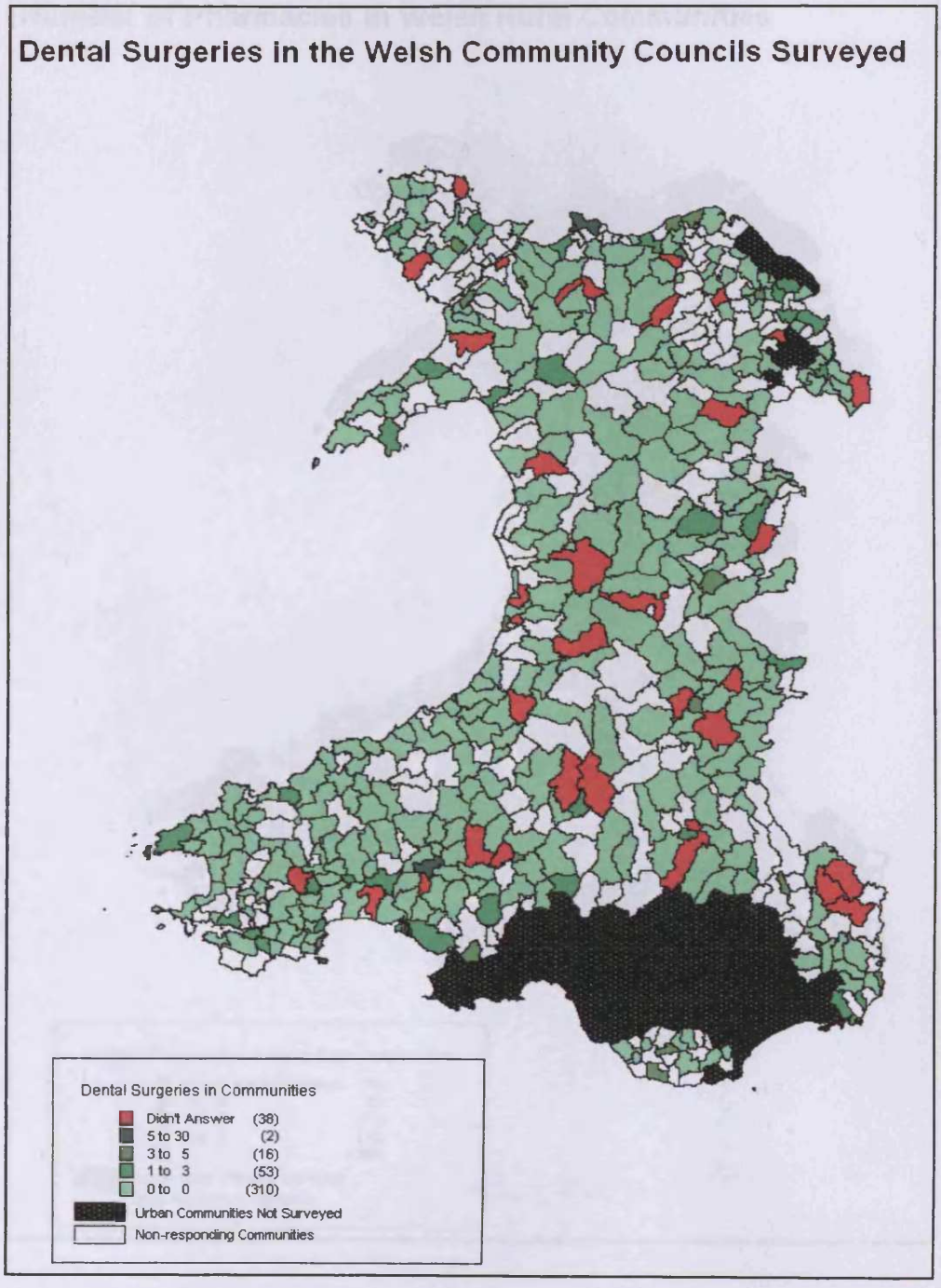
MAP 6.17 : Total Population in Welsh Community Councils (2001 Census)



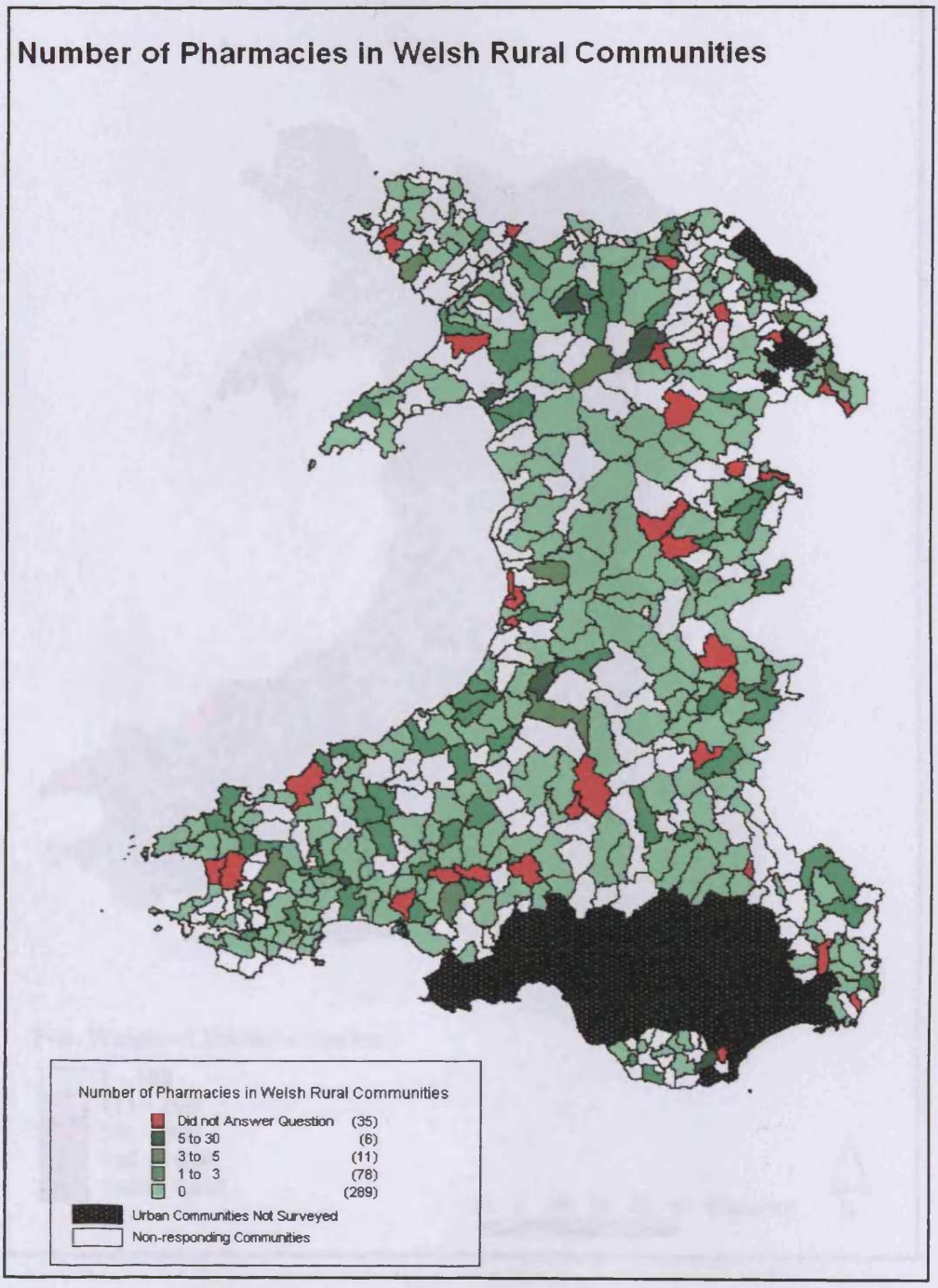
MAP 6.18 : GP Practices in the Surveyed Community Councils



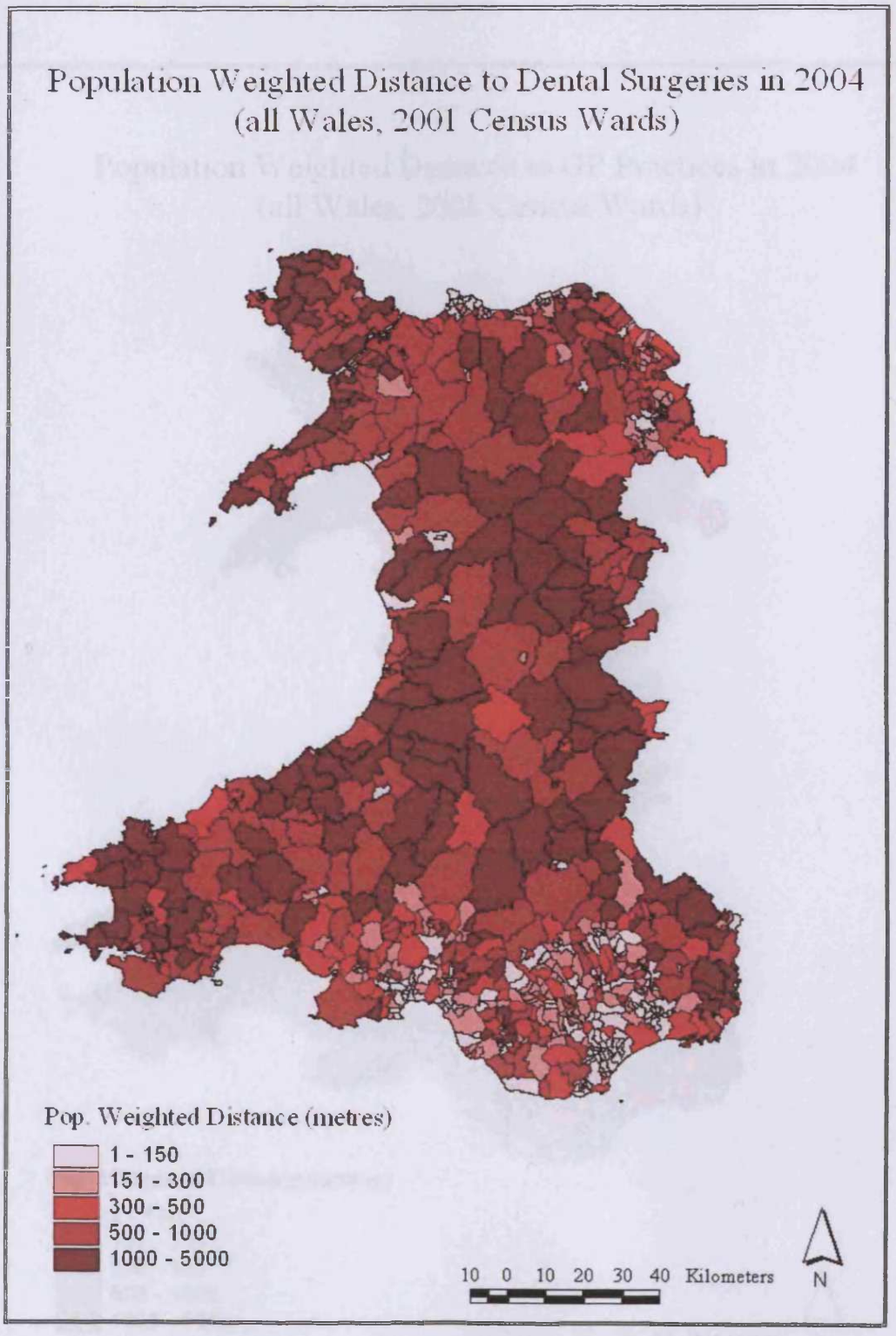
MAP 6.19 : Dental Practices in the Surveyed Welsh Community Councils



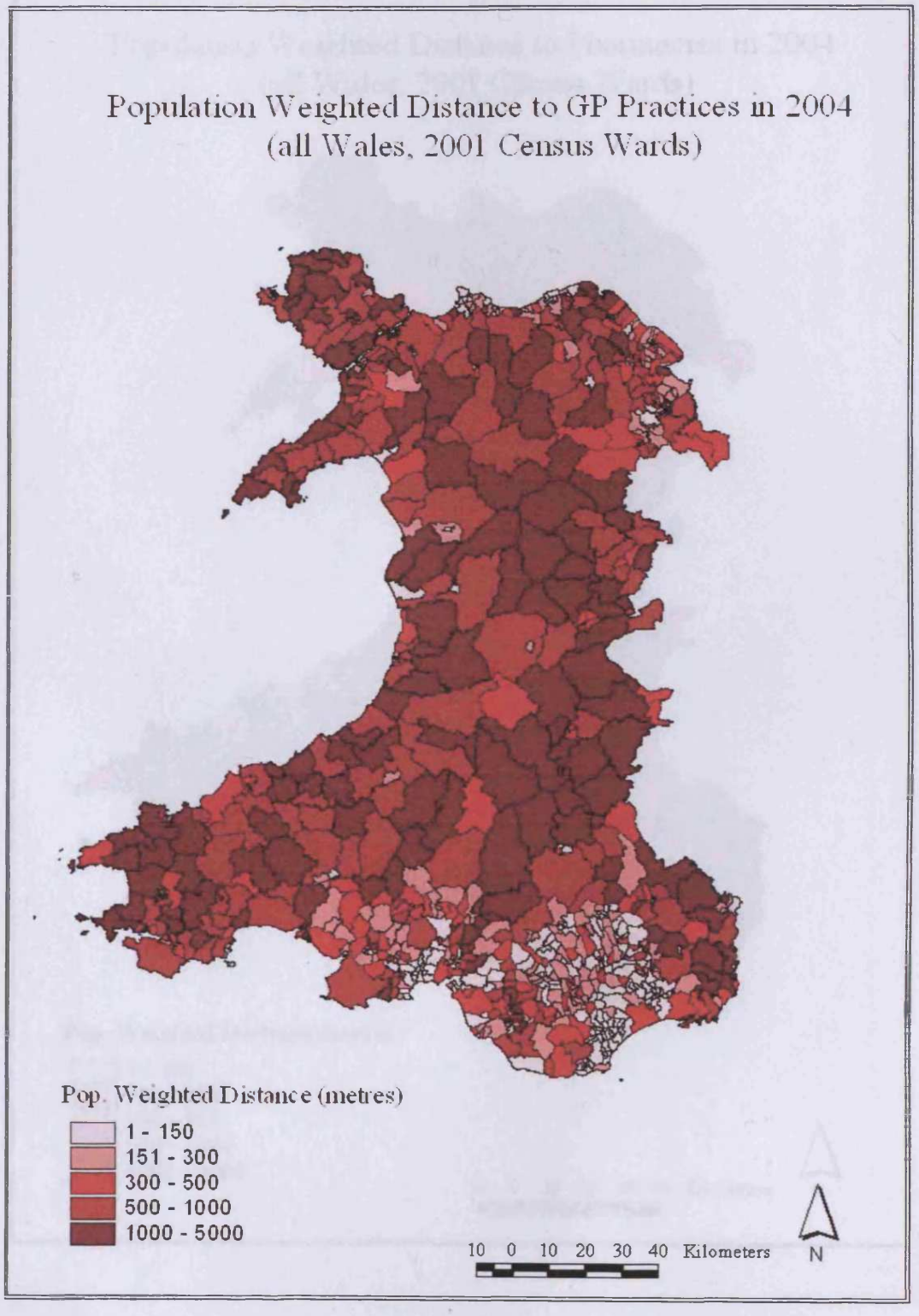
MAP 6.20 : Number of Pharmacies in the Surveyed Welsh Community Councils



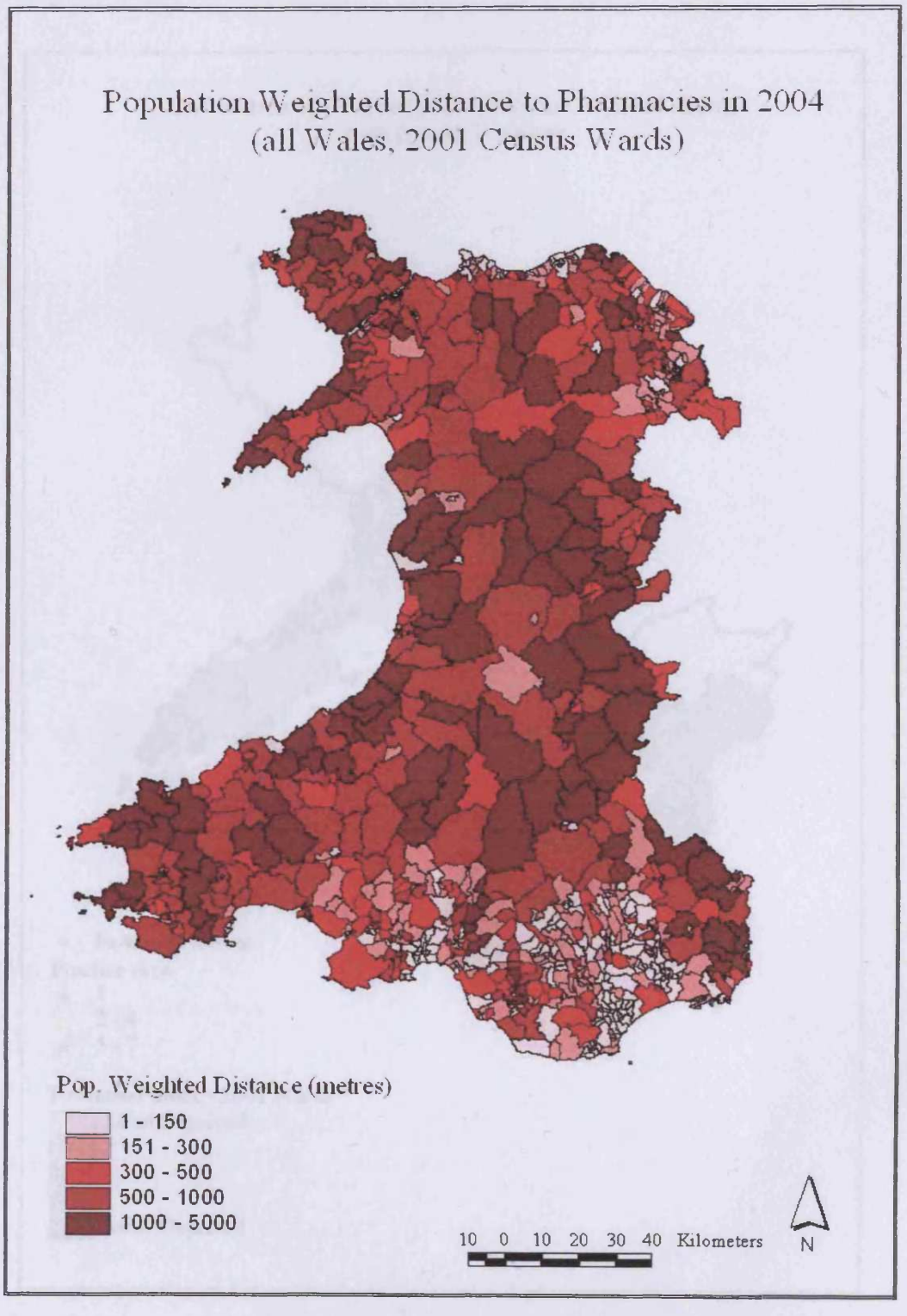
MAP 6.21 : Population Weighted Distance to Dental Surgeries in 2004



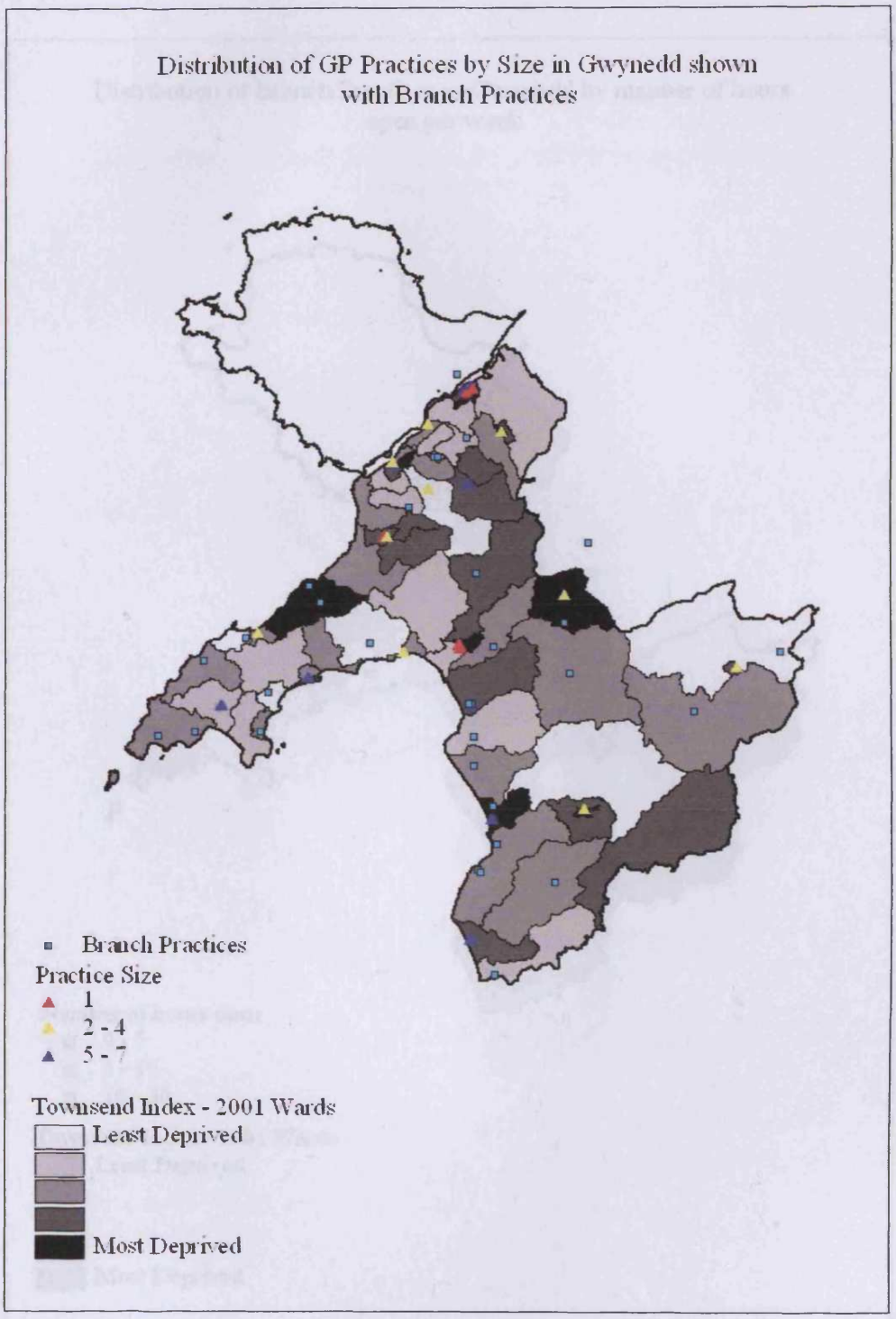
Map 6.22 : Population Weighted Distance to GP practices in 2004



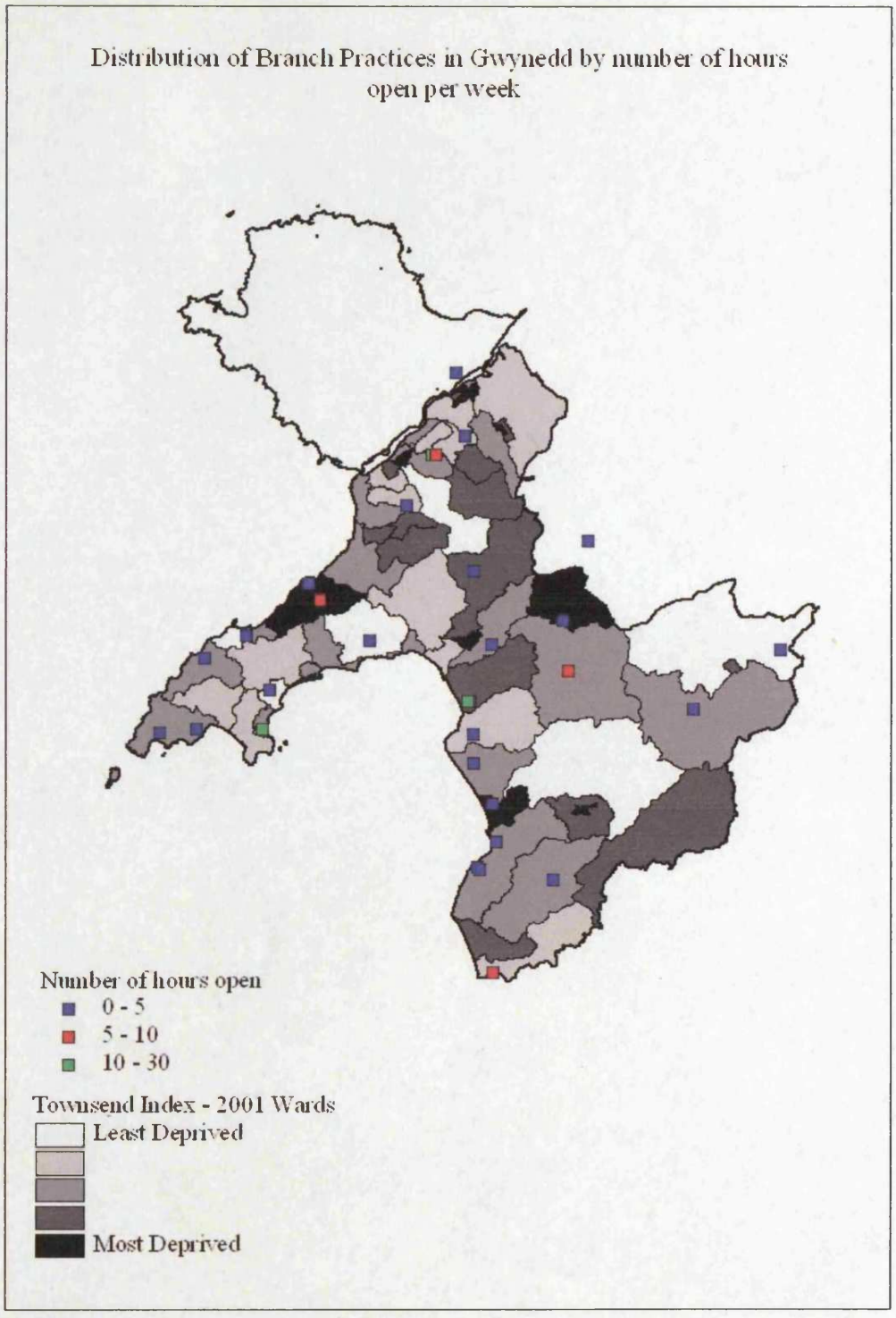
MAP 6.23 : Population Weighted Distance to Pharmacies in 2004



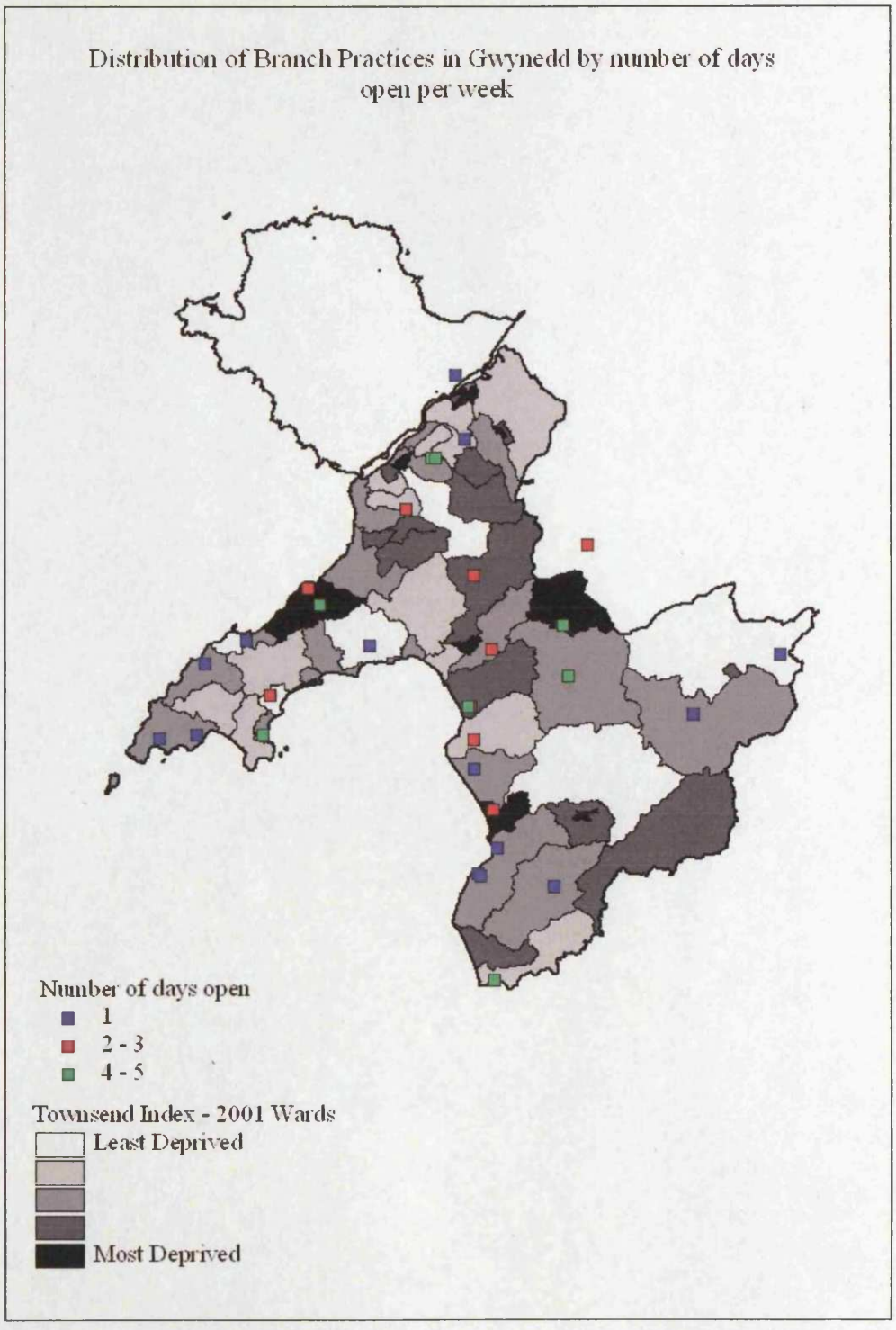
MAP 6.24 : Distribution of GP Practices by Size in Gwynedd Shown with Branch Practices



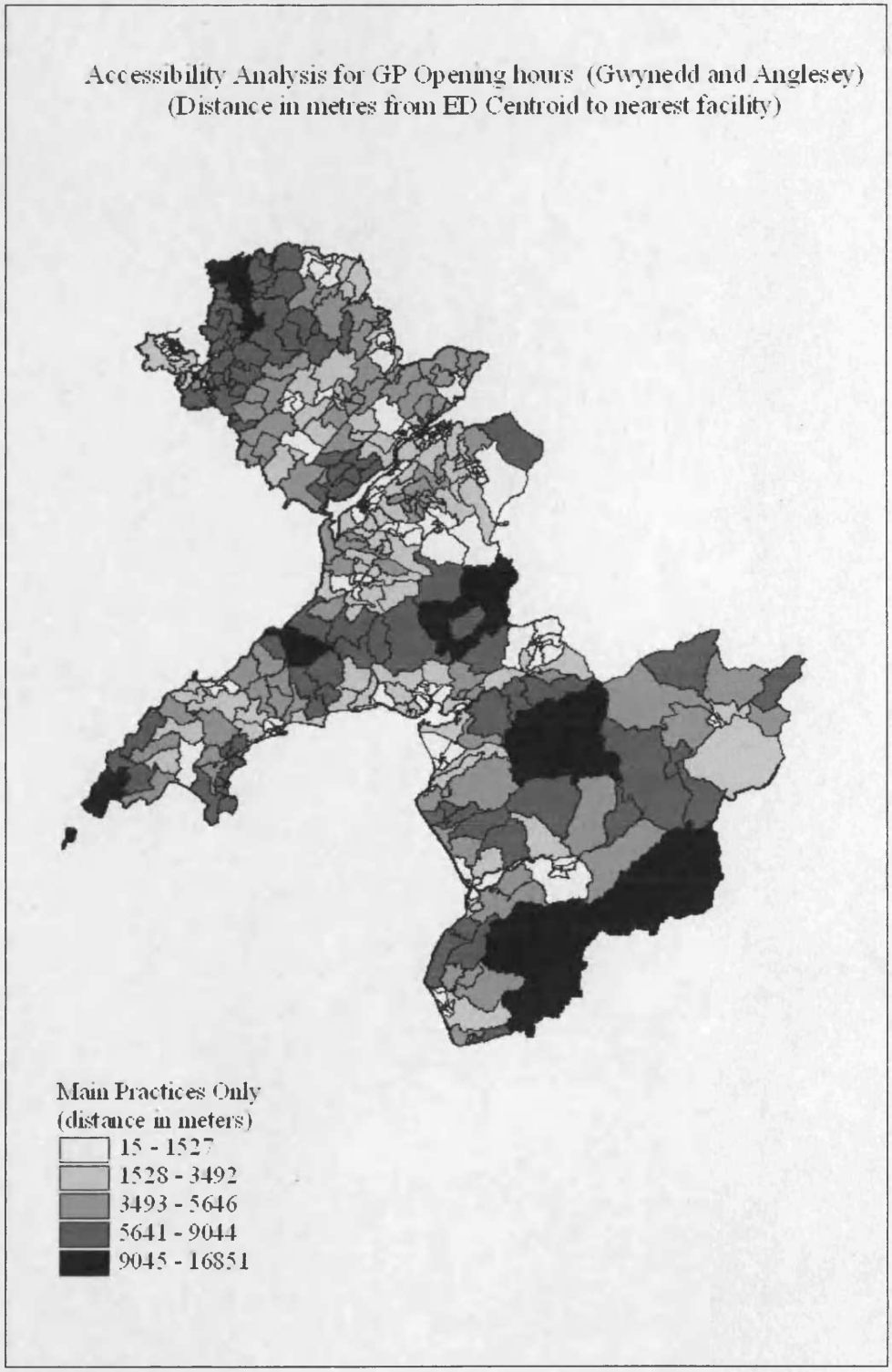
MAP 6.25 : Distribution of Branch Practices in Gwynedd by Number of Hours Open per Week



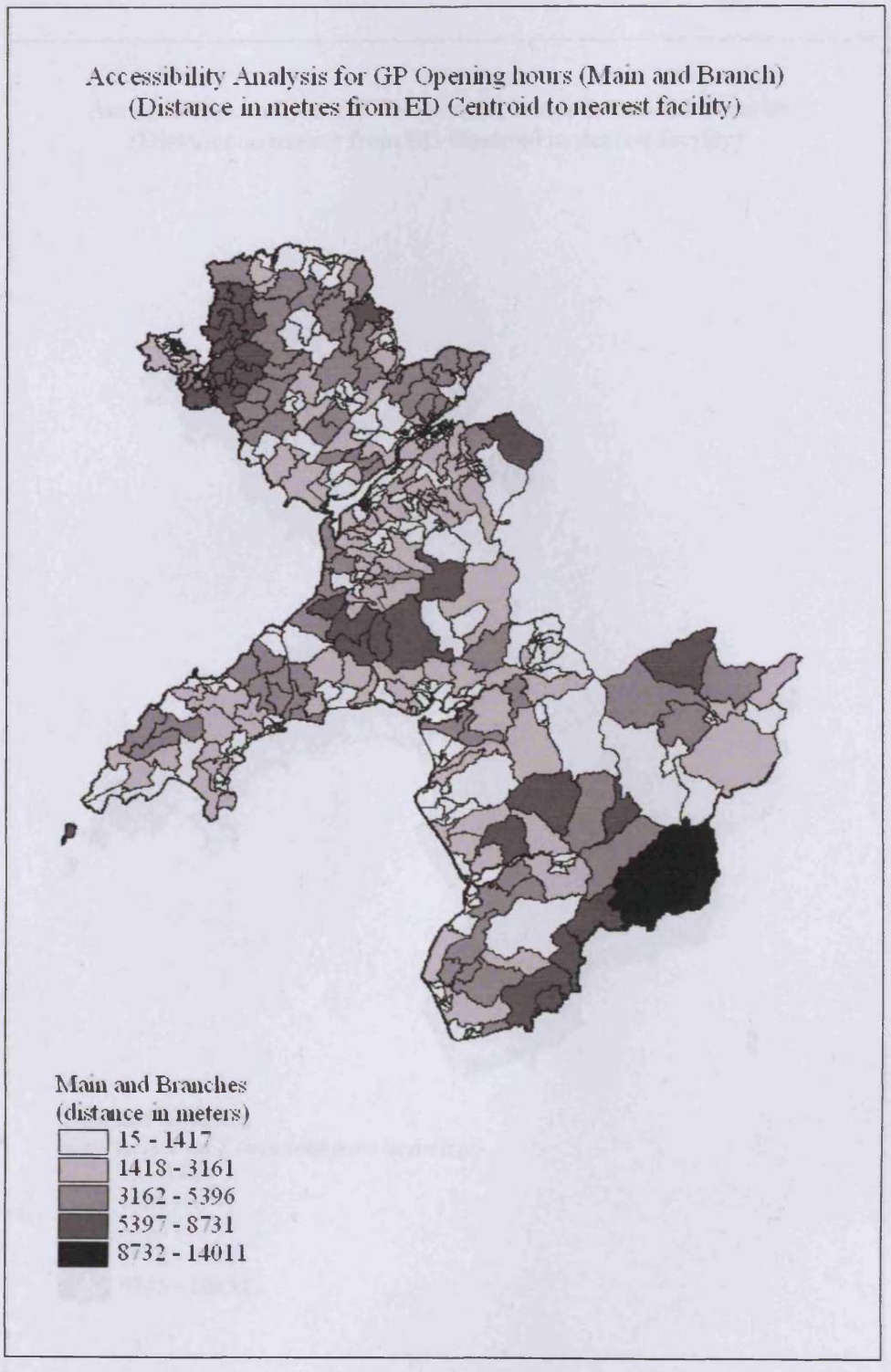
MAP 6.26 : Distribution of Branch Practices in Gwynedd by Number of Days Open per Week



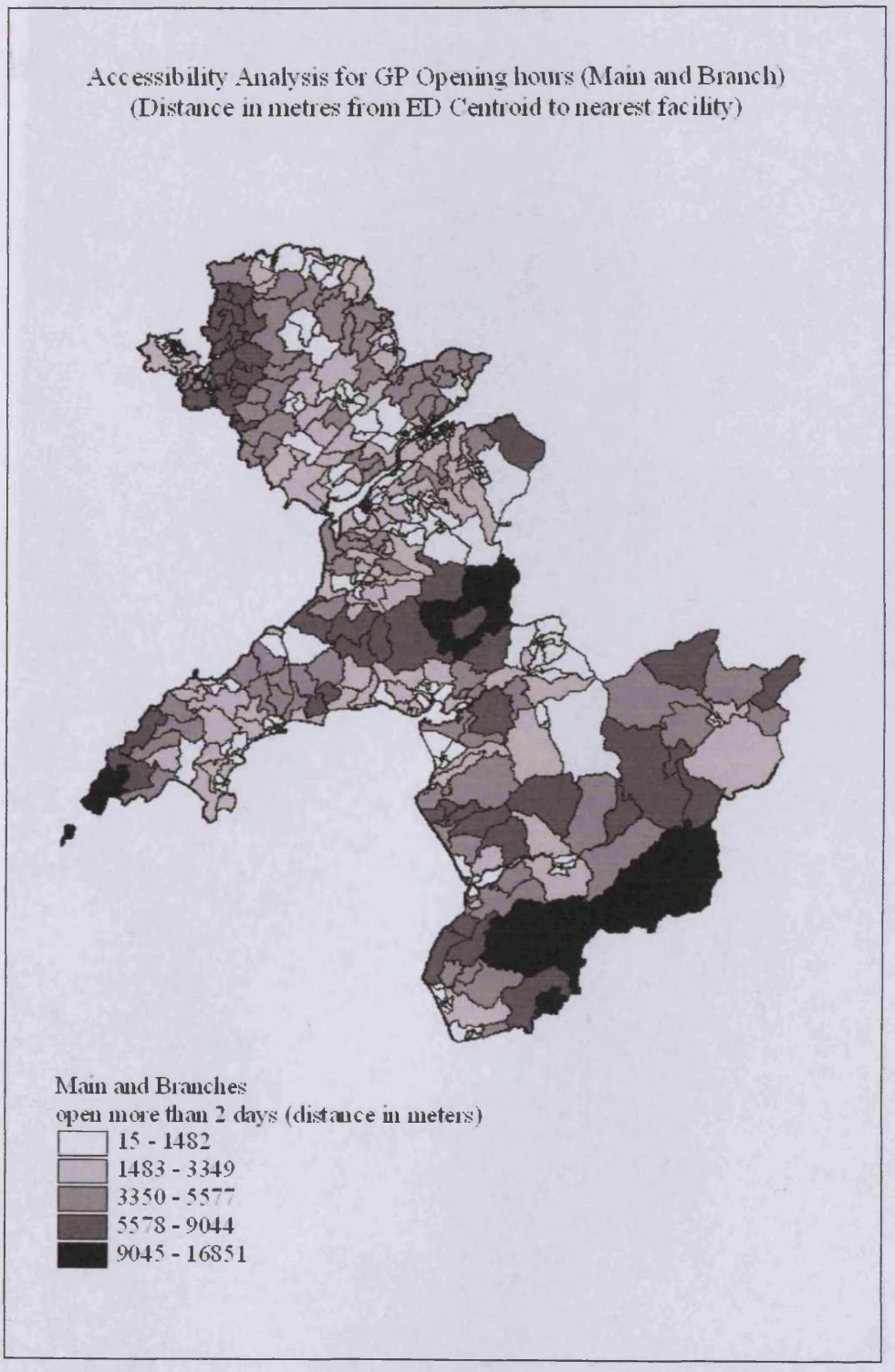
MAP 6.27 : Accessibility Analysis for GP opening hours – Main Practices only



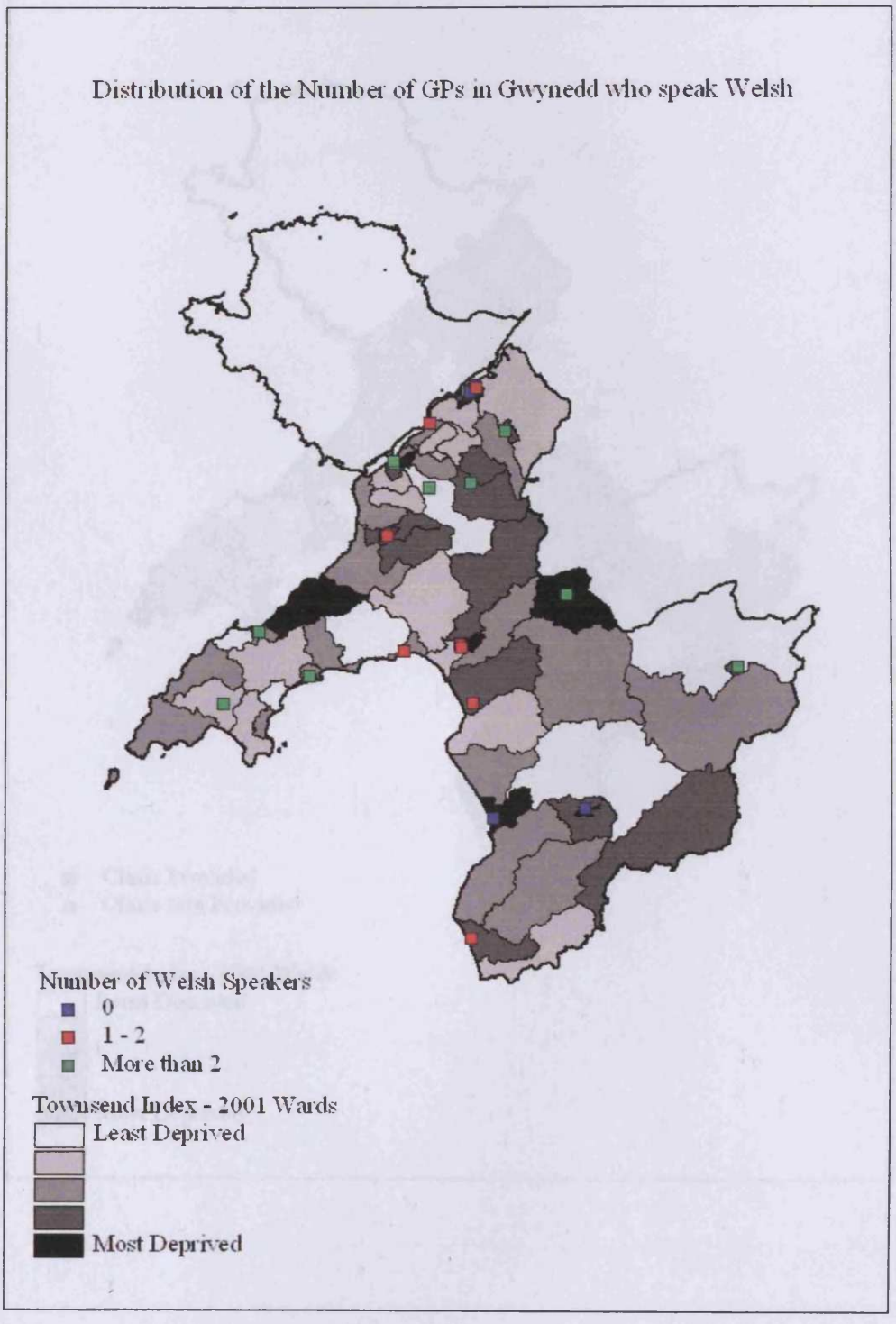
MAP 6.28 : Accessibility Analysis for GP Opening Hours (Main and Branch)



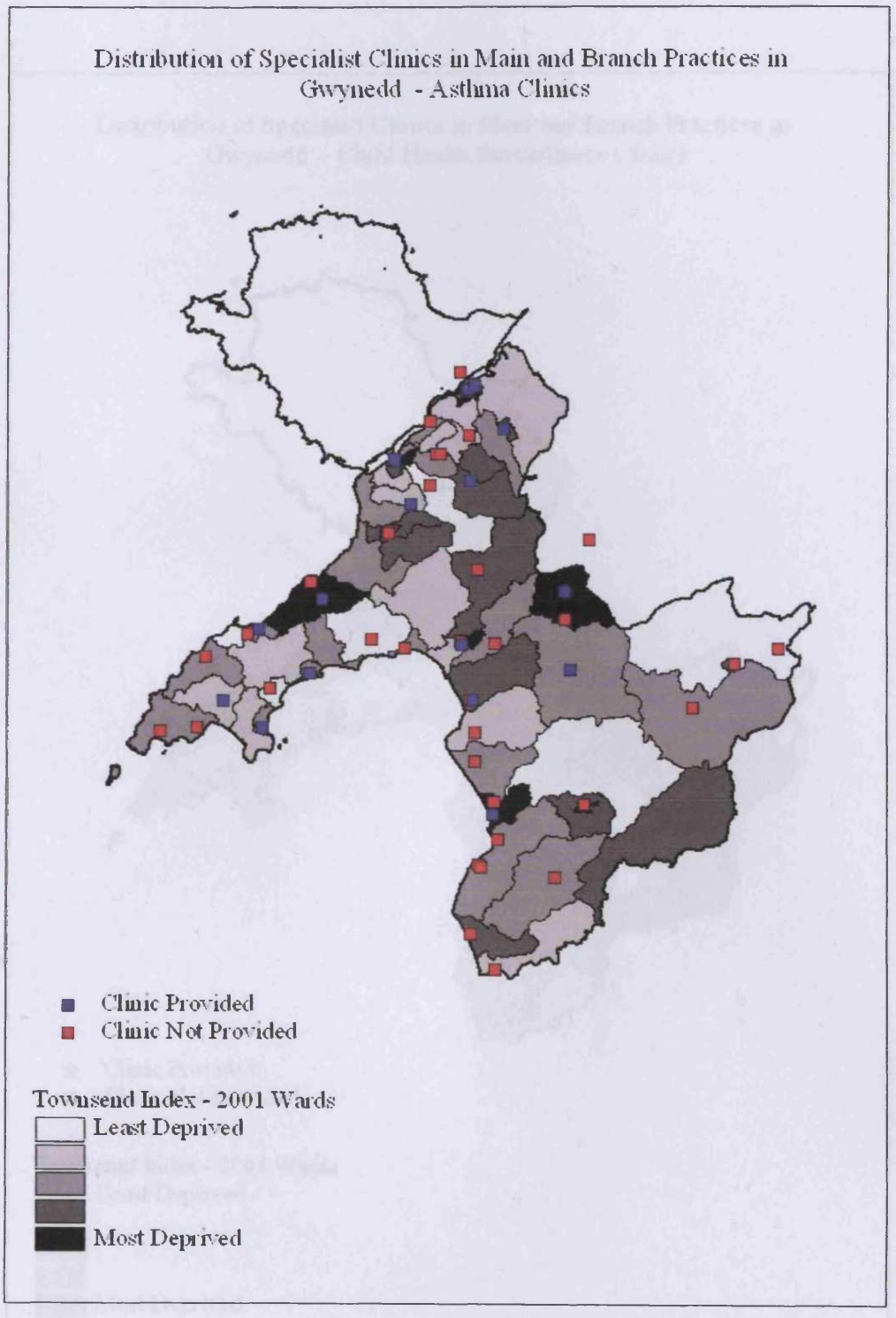
MAP 6.29 : Accessibility Analysis for GP Opening hours (main and branches open for more than 2 days per week)



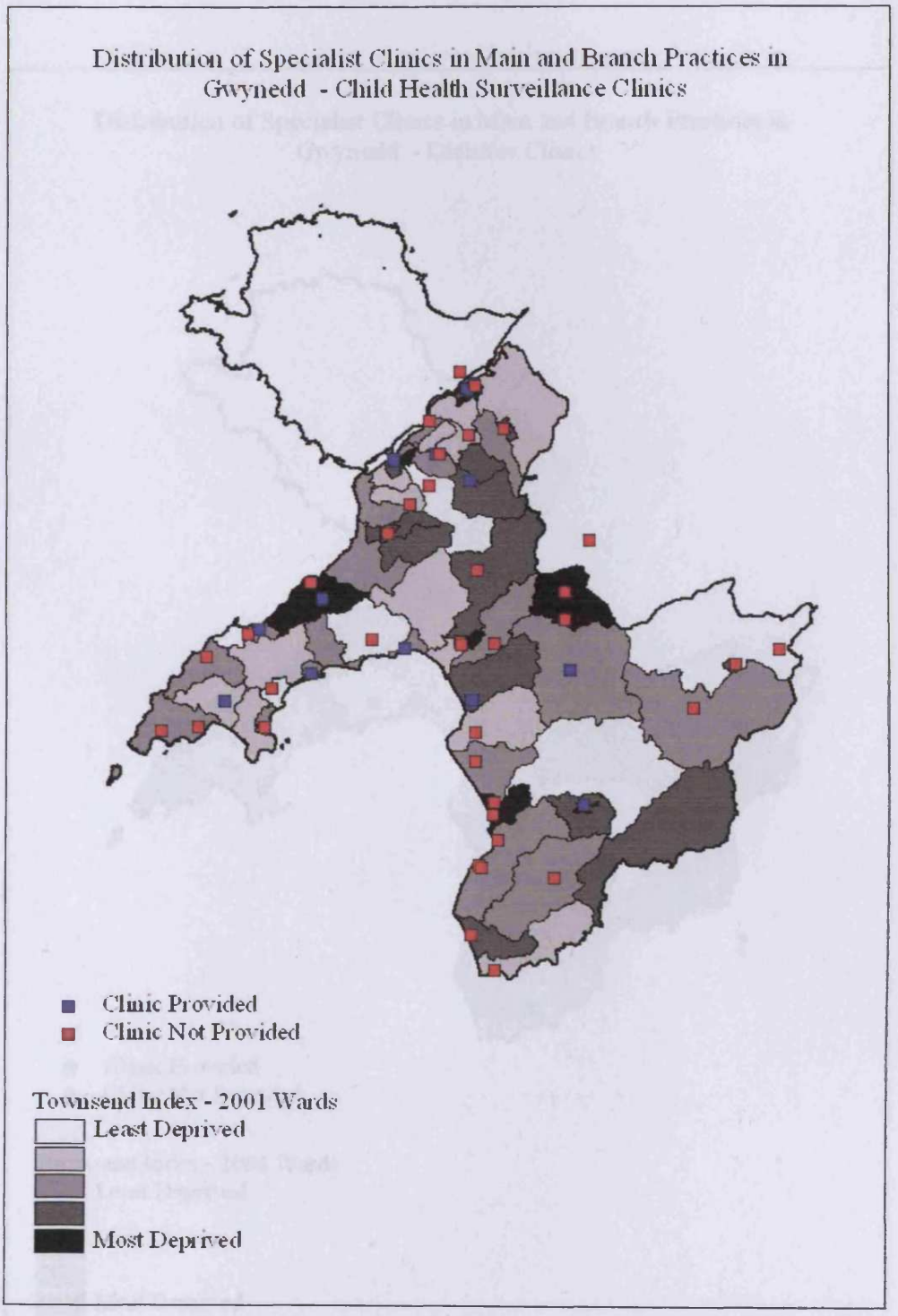
MAP 6.30 : Distribution of the Number of GPs in Gwynedd who speak Welsh



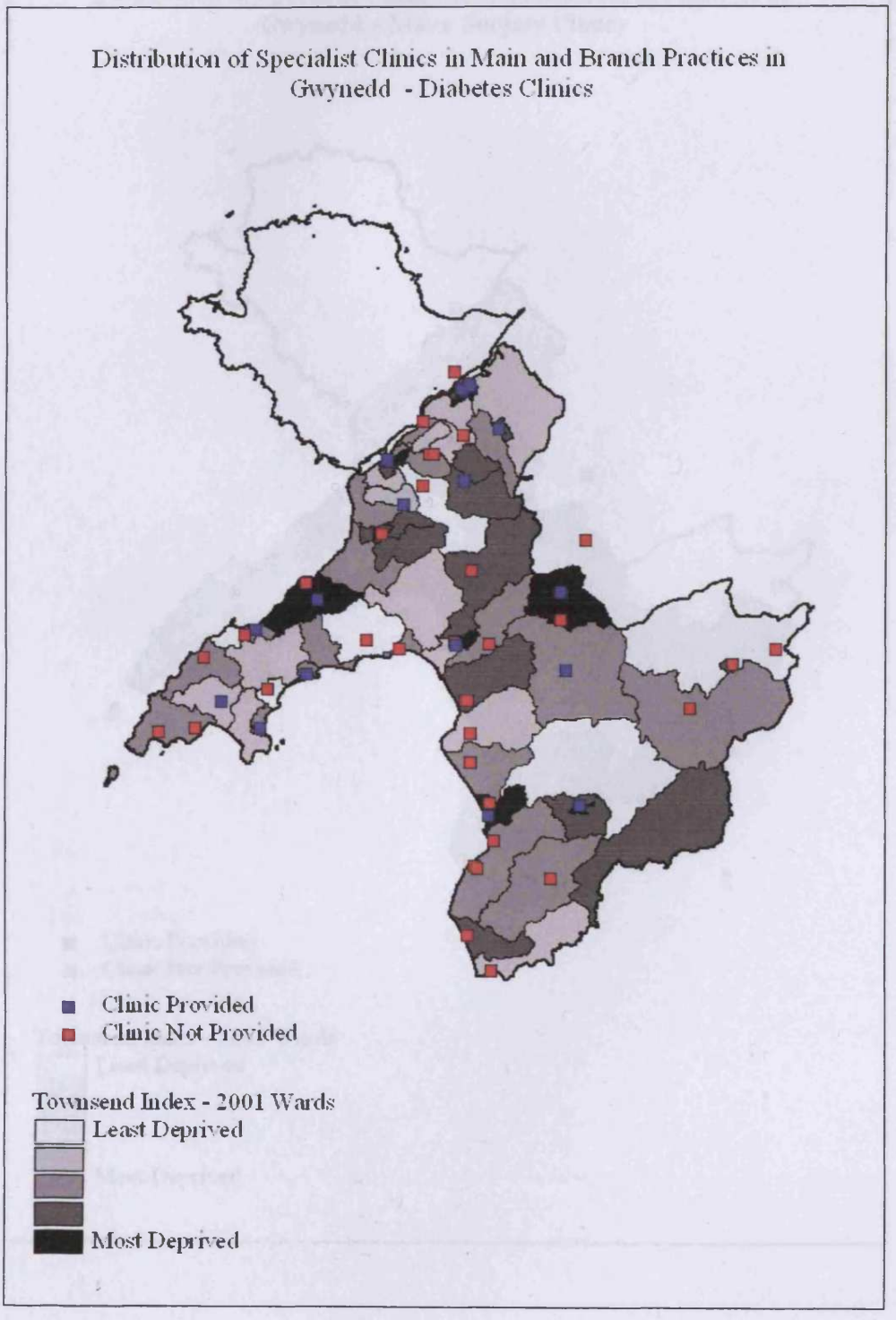
MAP 6.31 : Distribution of Specialist Clinics in Main and Branch Practices in Gwynedd - Asthma Clinics



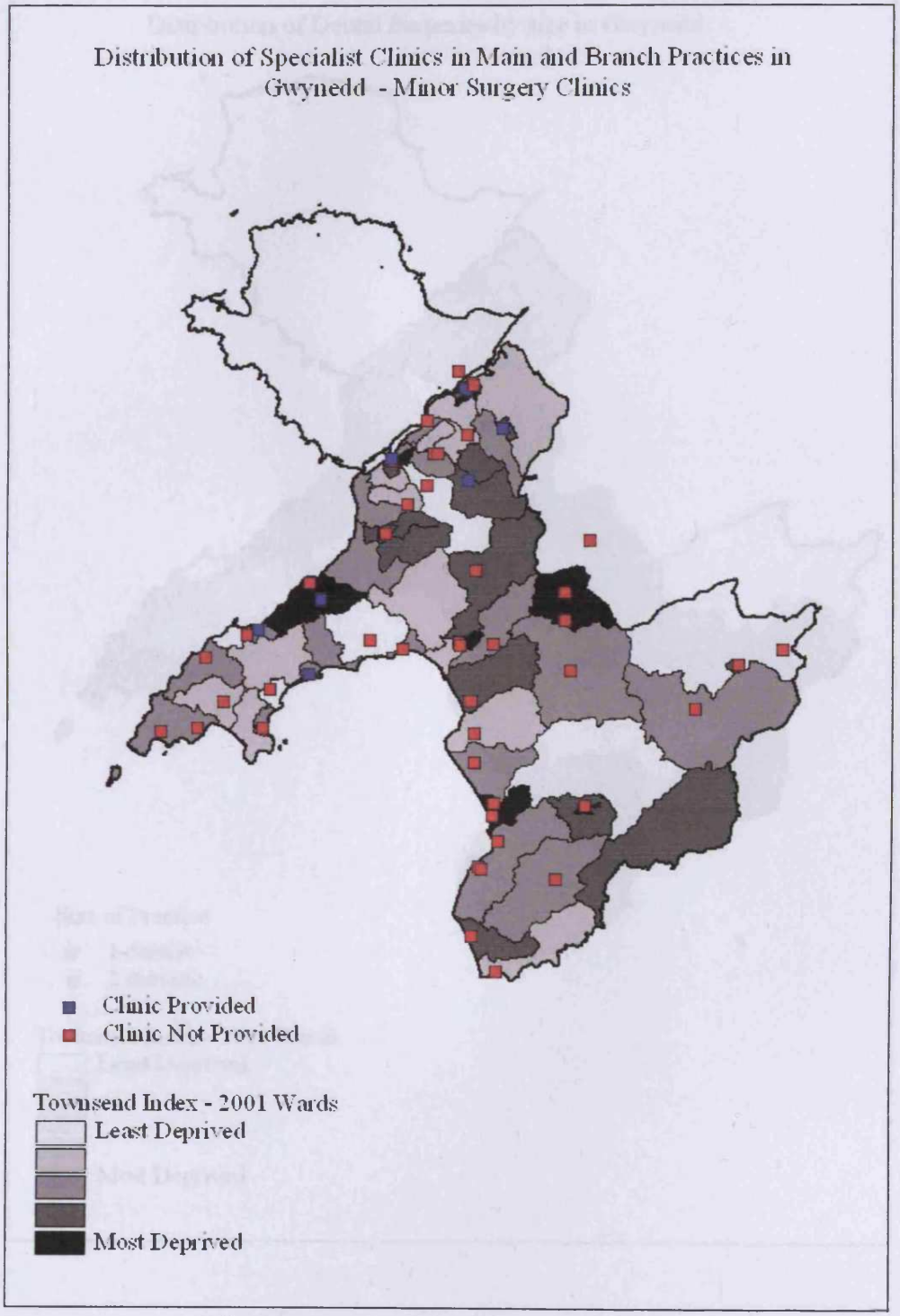
MAP 6.32 : Distribution of Specialist Clinics in Main and Branch Practices in Gwynedd - Child Health Surveillance Clinics



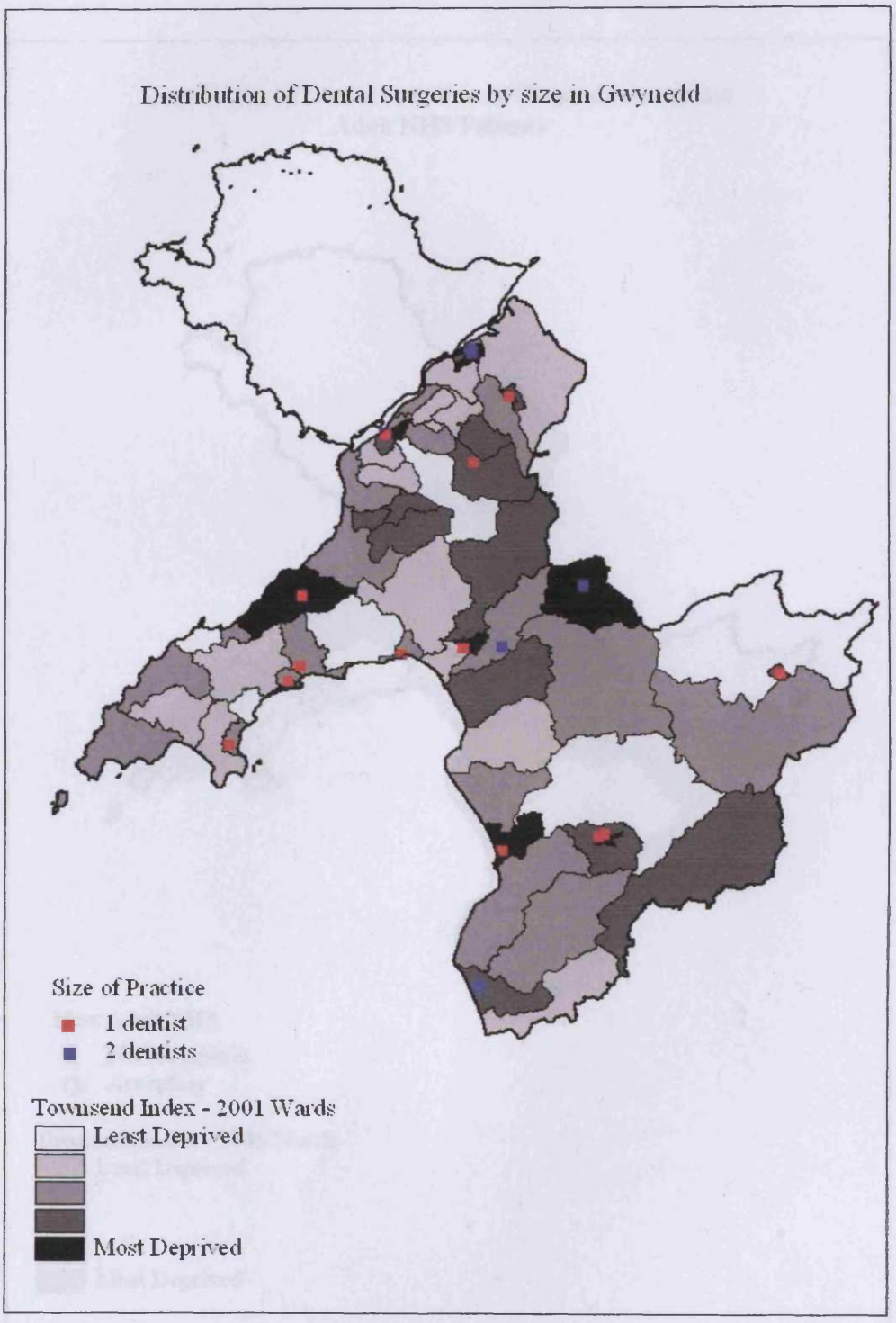
MAP 6.33 : Distribution of Specialist Clinics in Main and Branch Practices in Gwynedd - Diabetes Clinics



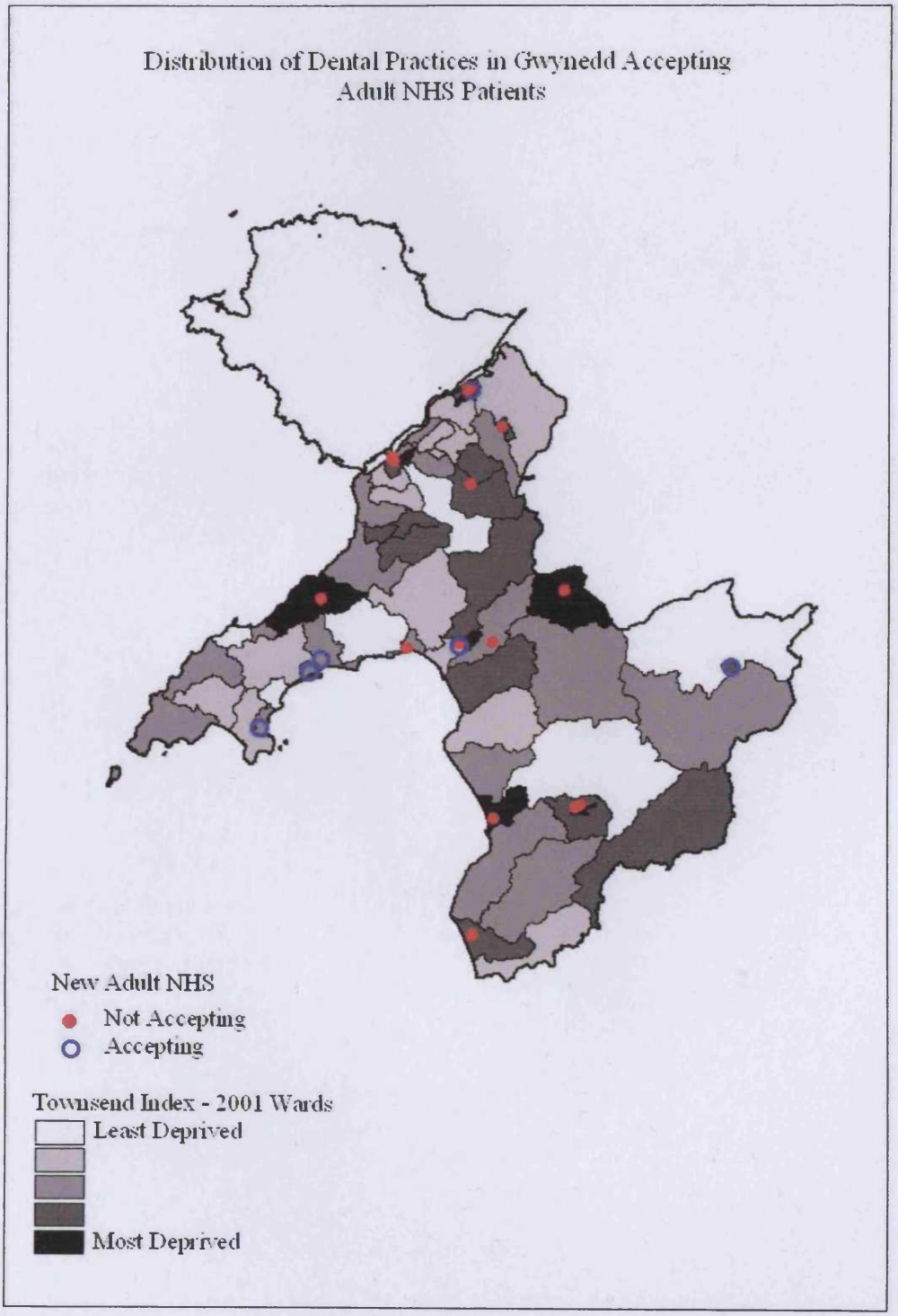
MAP 6.34 : Distribution of Specialist Clinics in Main and Branch Practices in Gwynedd - Minor Surgery Clinics



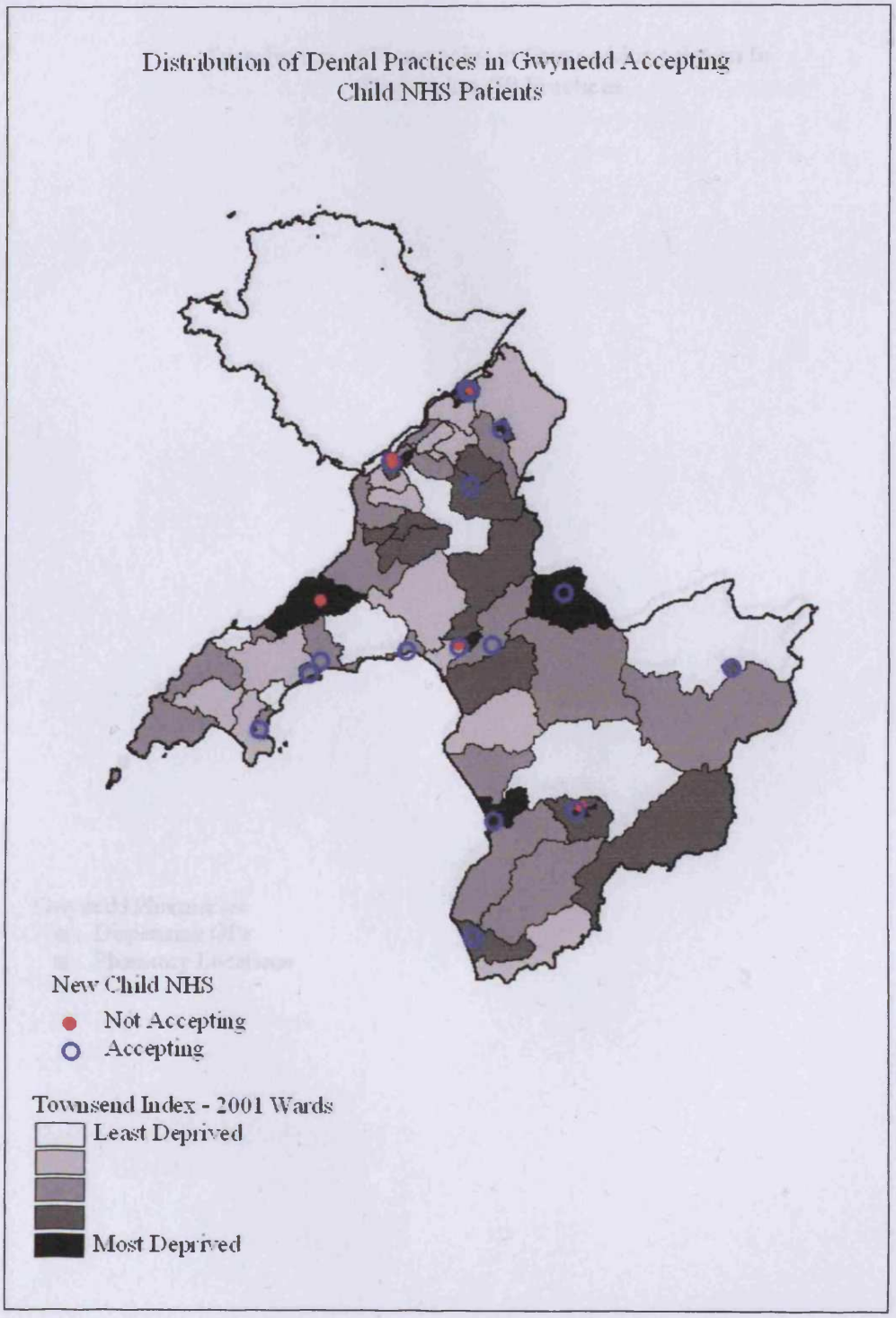
MAP 6.35 : Distribution of Dental Practices by Size in Gwynedd



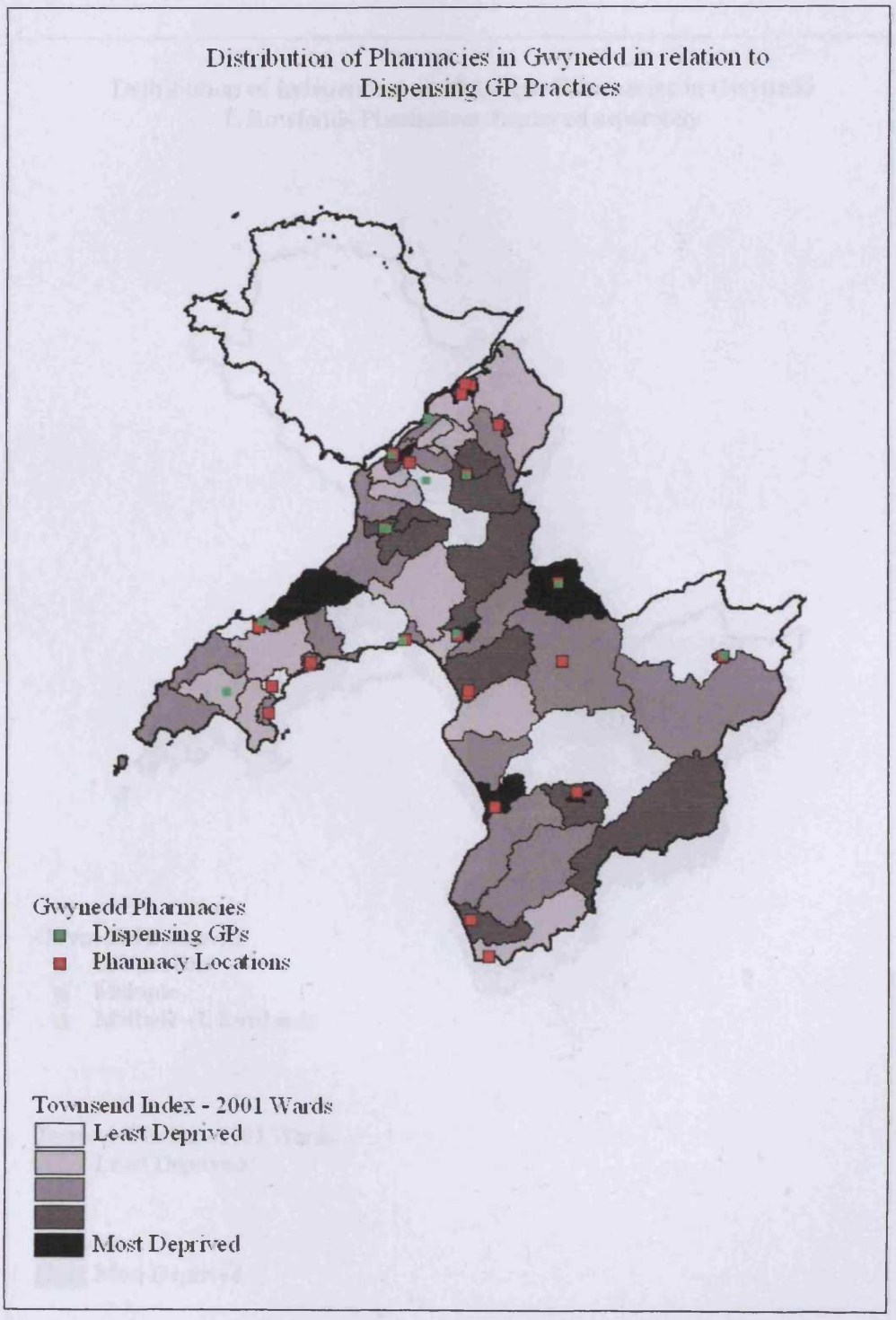
MAP 6.36 : Distribution of Dental Practices in Gwynedd Accepting Adult NHS Patients



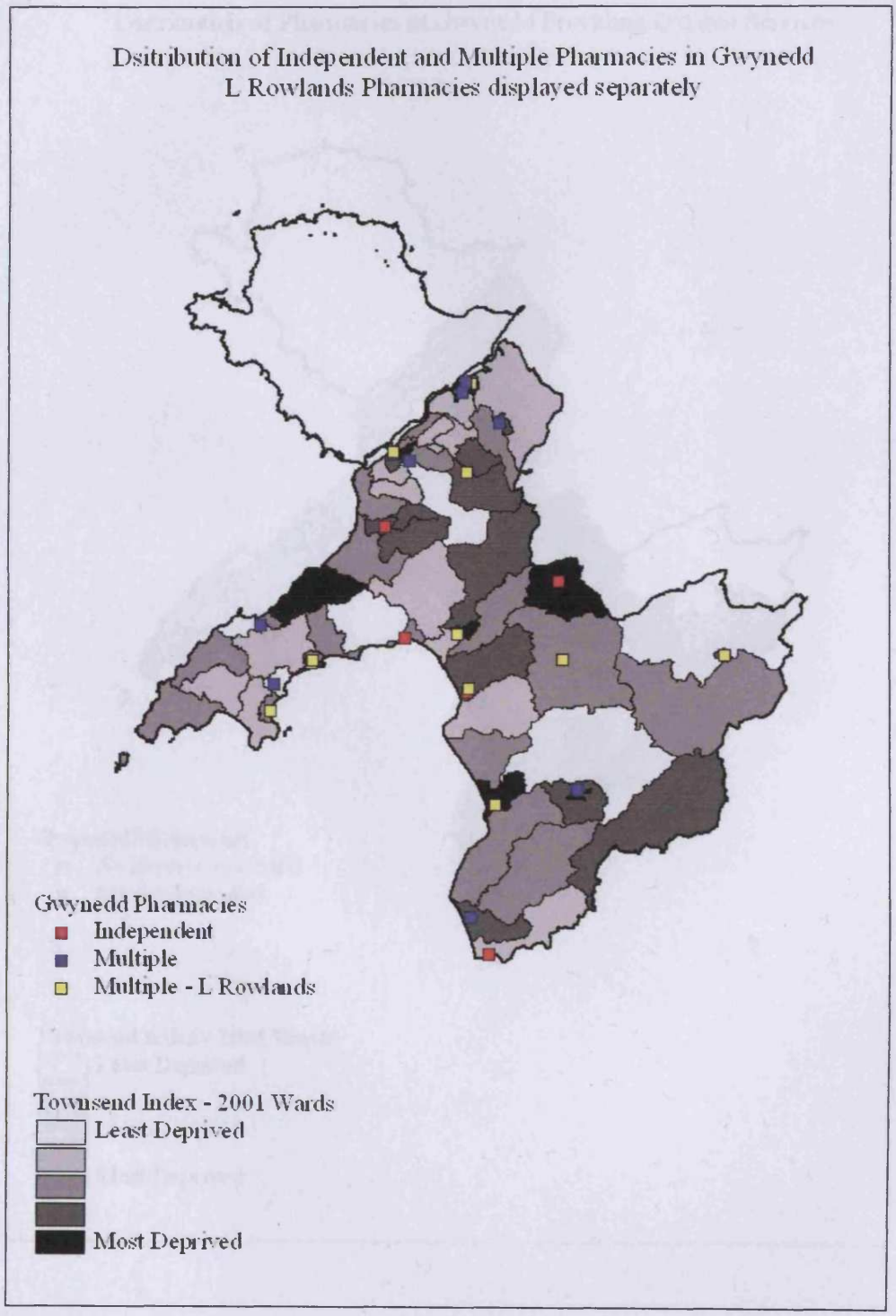
MAP 6.37 : Distribution of Dental Practices in Gwynedd Accepting Child NHS Patients



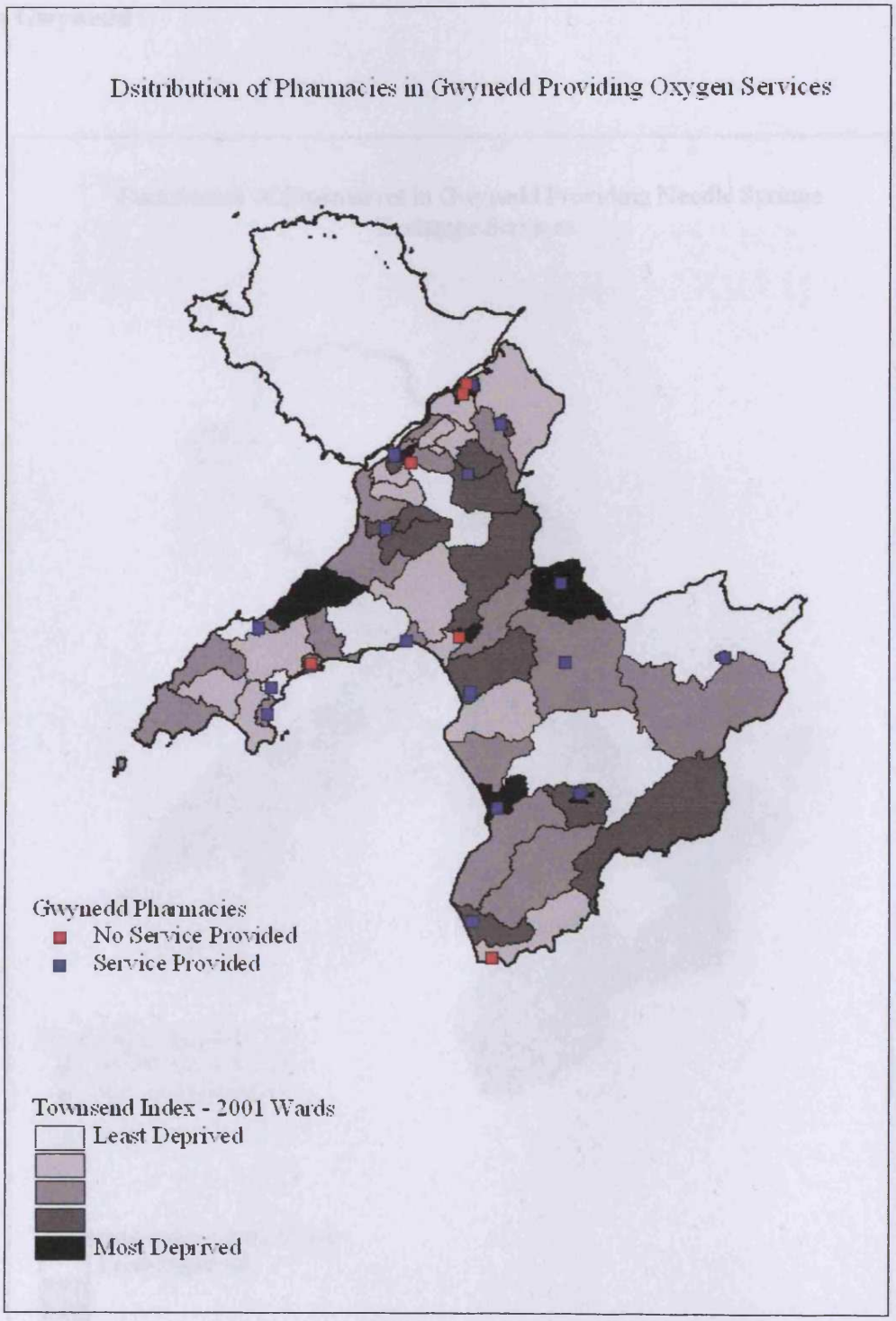
MAP 6.38 : Distribution of Pharmacies in Gwynedd in relation to Dispensing Practices



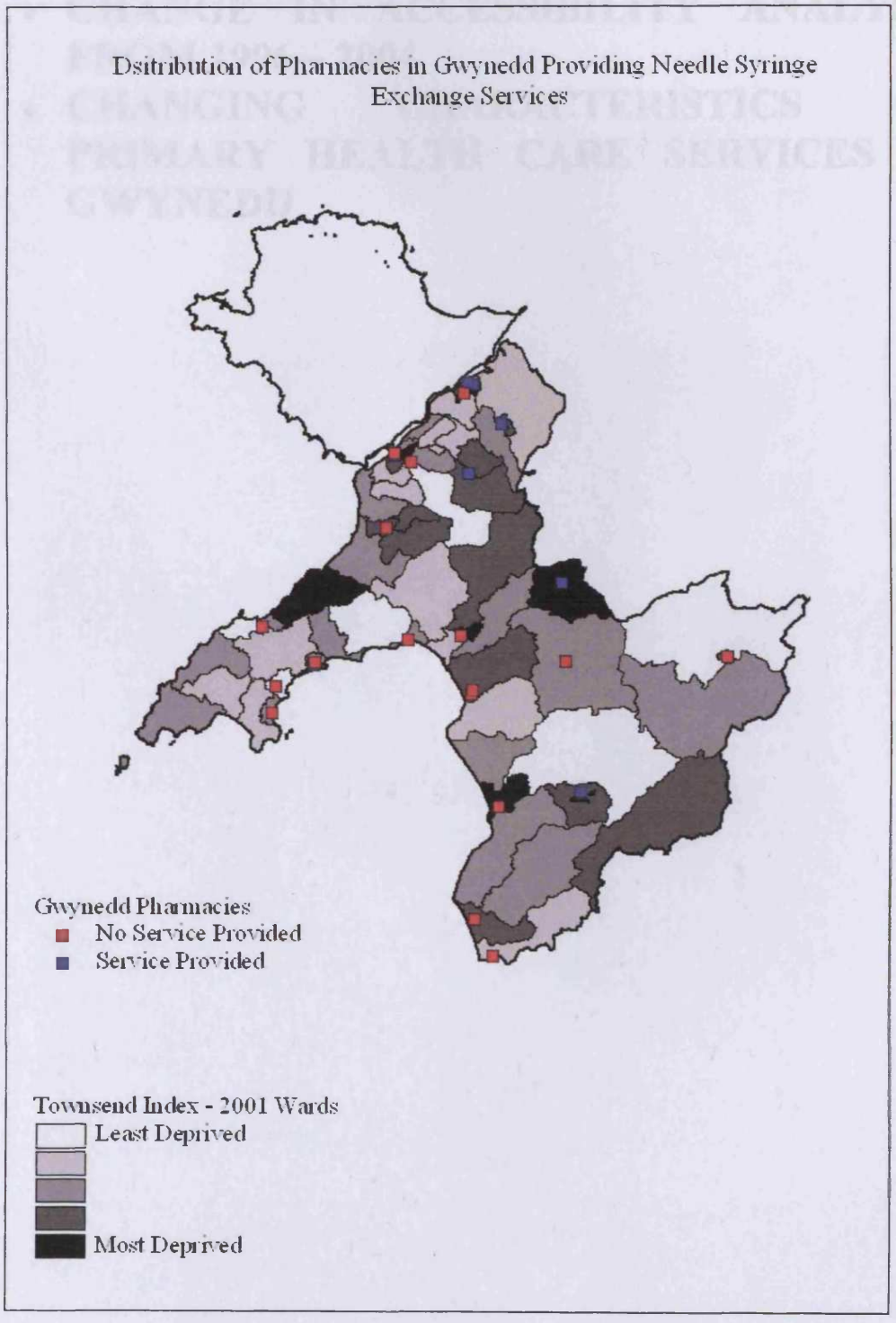
MAP 6.39 : Distribution of Independent and Multiple Pharmacies in Gwynedd L Rowlands Pharmacies Displayed Separately



MAP 6.40 : Distribution of Pharmacies in Gwynedd Providing Needle Syringe Exchange services



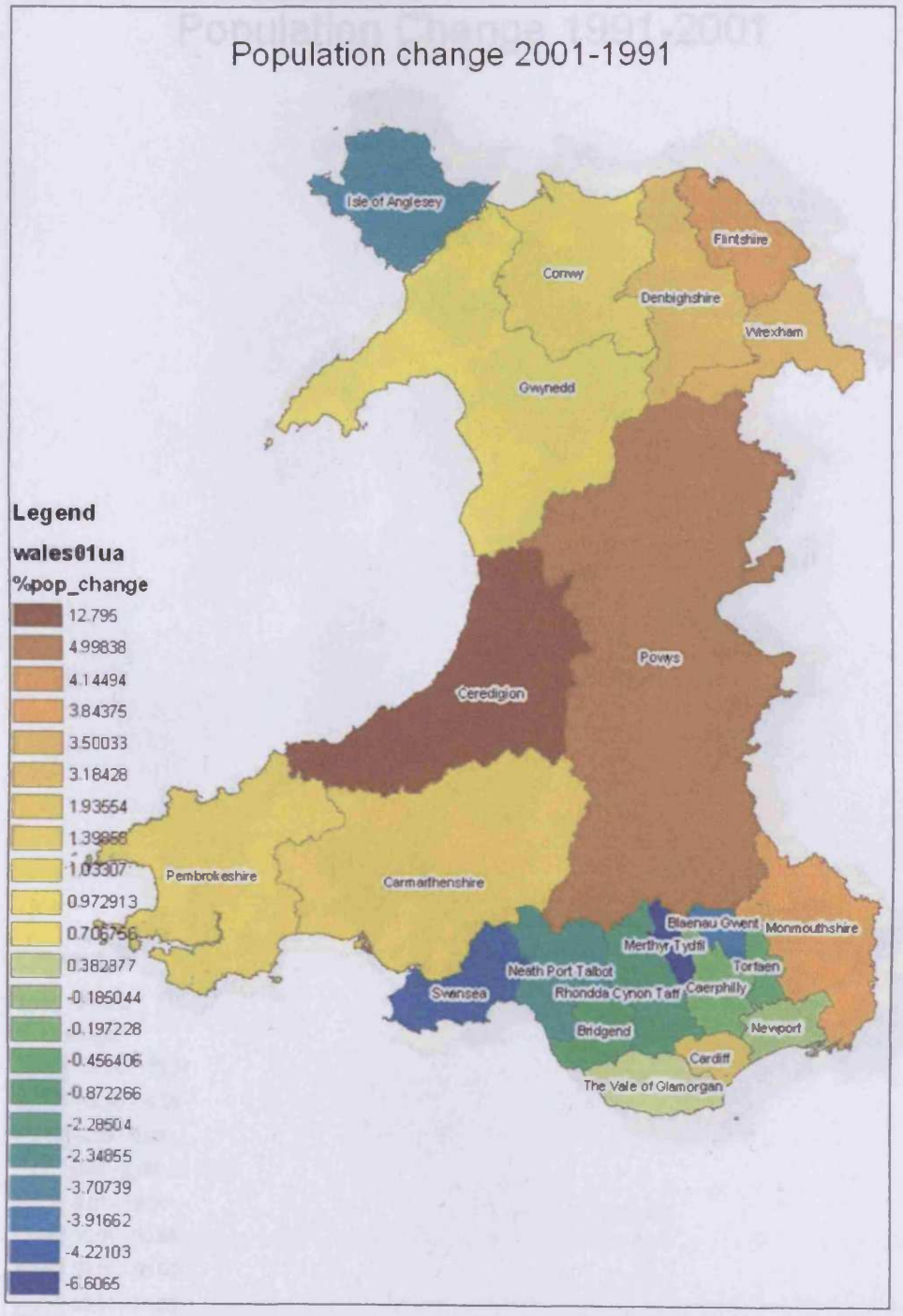
MAP 6.41 : Distribution of Pharmacies in Gwynedd Providing Oxygen Services in Gwynedd



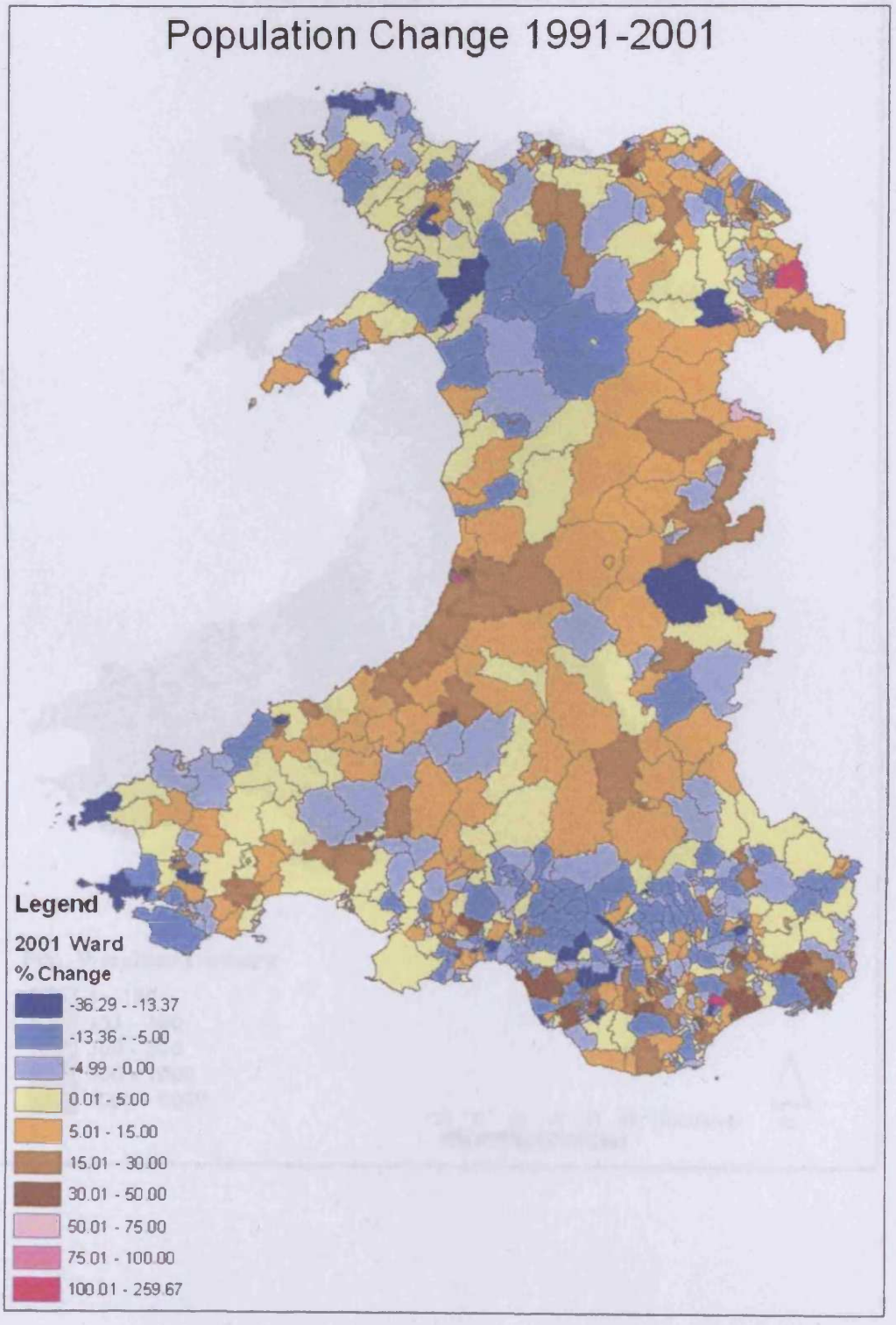
APPENDIX CH.7

- **CENSUS CHANGE ANALYSIS**
- **CHANGE IN ACCESSIBILITY ANALYSIS FROM 1996 – 2004**
- **CHANGING CHARACTERISTICS OF PRIMARY HEALTH CARE SERVICES IN GWYNEDD**

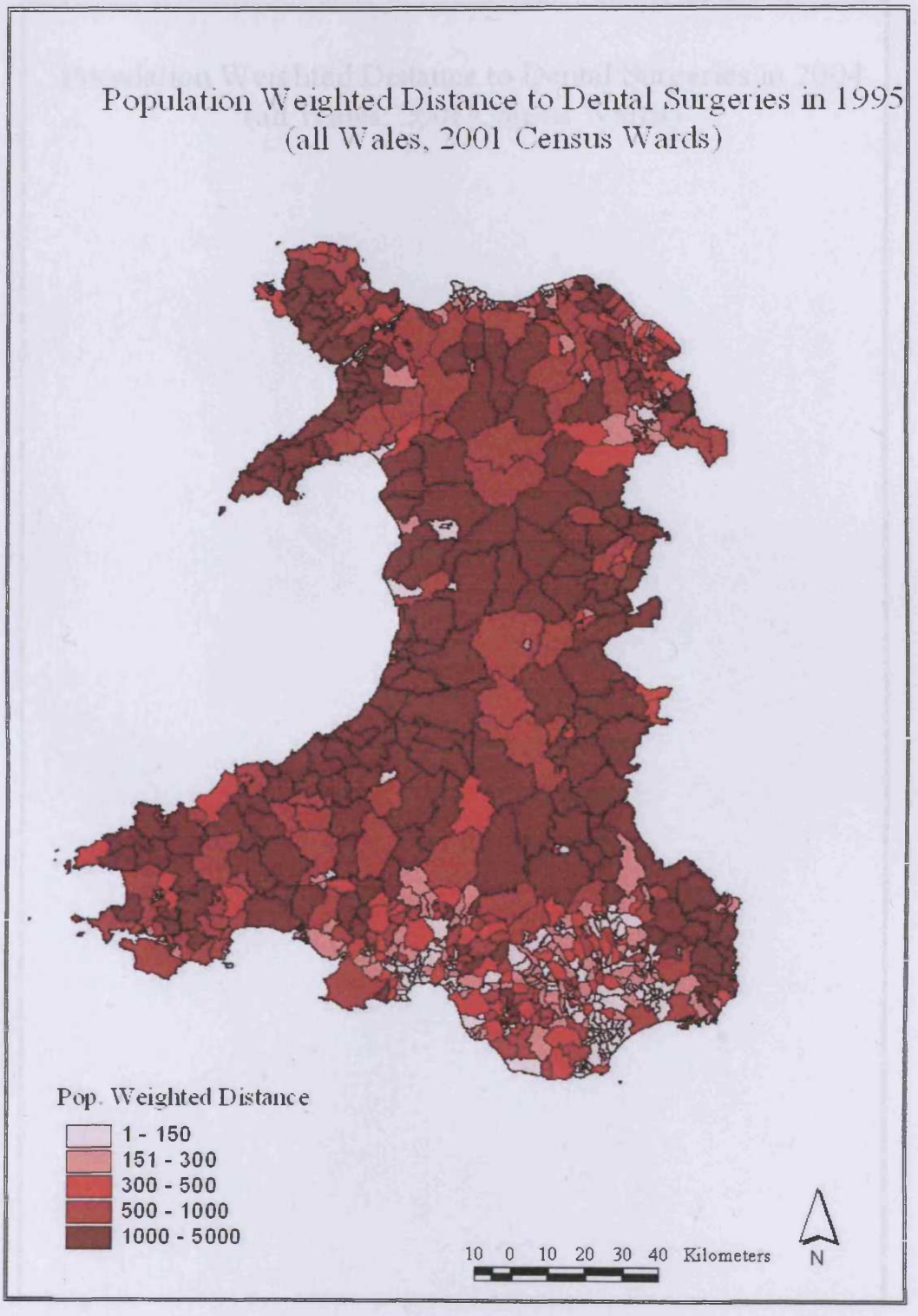
MAP 7.1 : Population Change at the Unitary Authority level 1991-2001



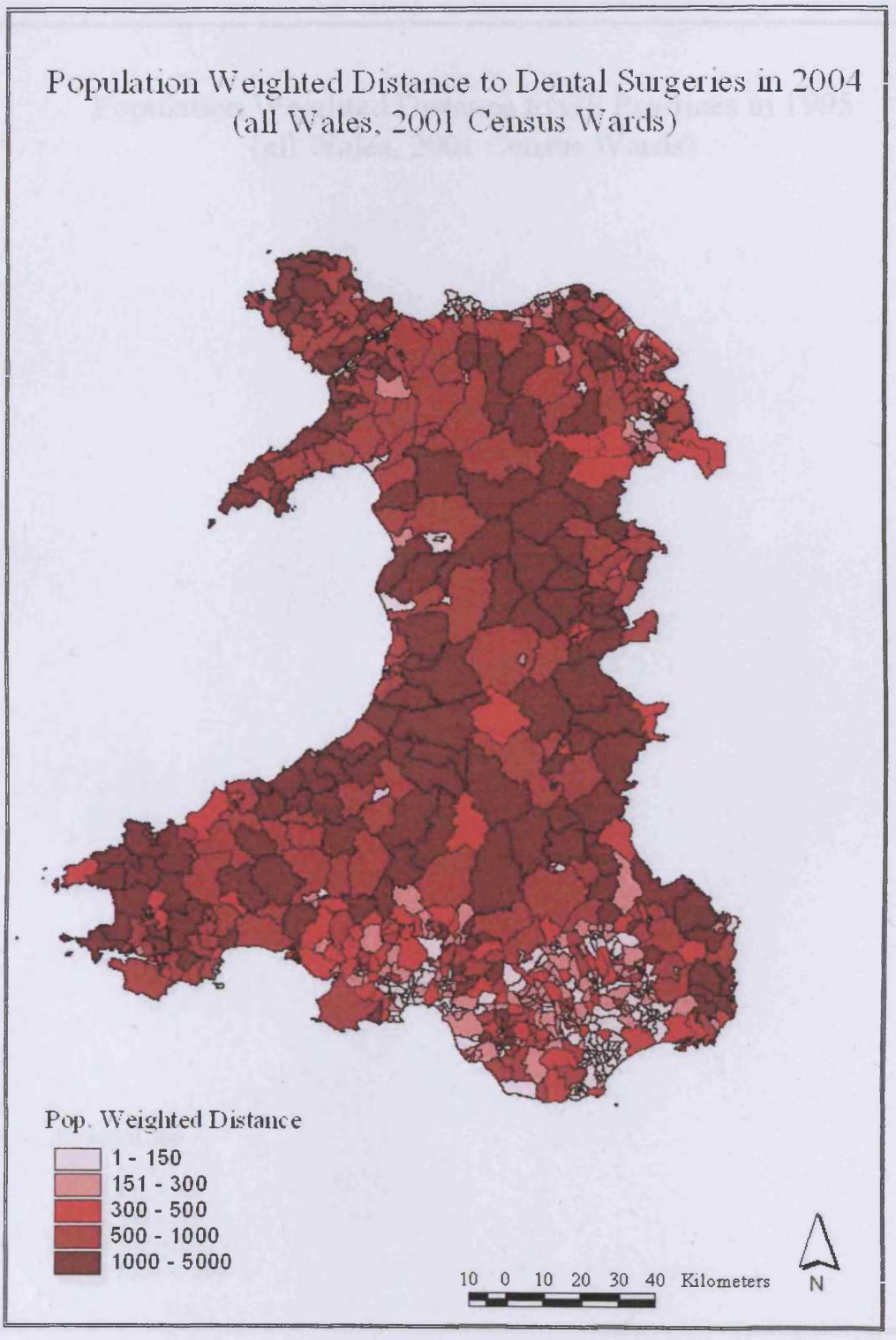
MAP 7.2 :Population Change at the Census Ward level 1991-2001



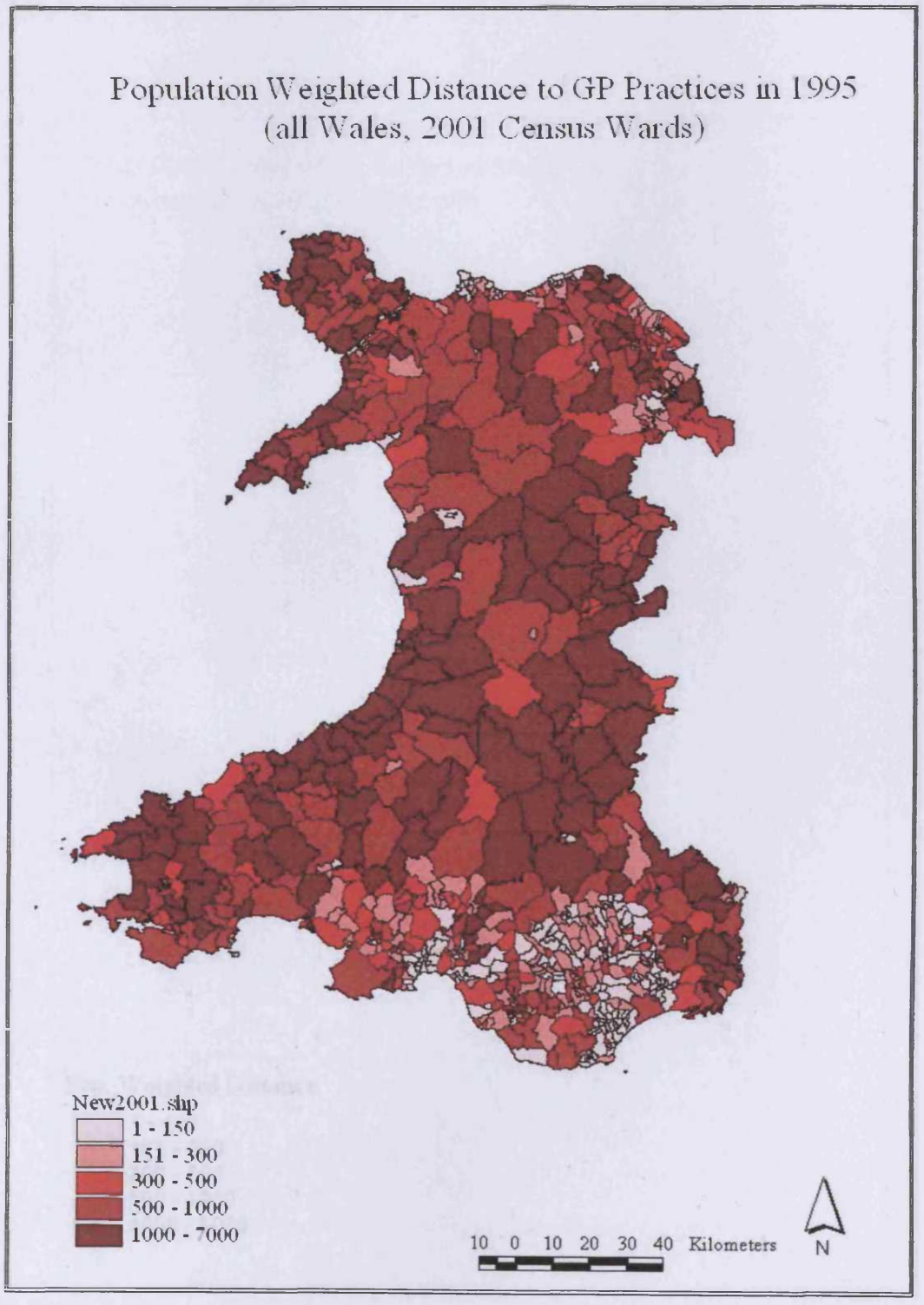
Map 7.3


Population Weighted Distance to Dental Surgeries in 1995
(all Wales, 2001 Census Wards)
Pop. Weighted Distance
1 - 150
151 - 300
300 - 500
500 - 1000
1000 - 5000
10 0 10 20 30 40 Kilometers
N

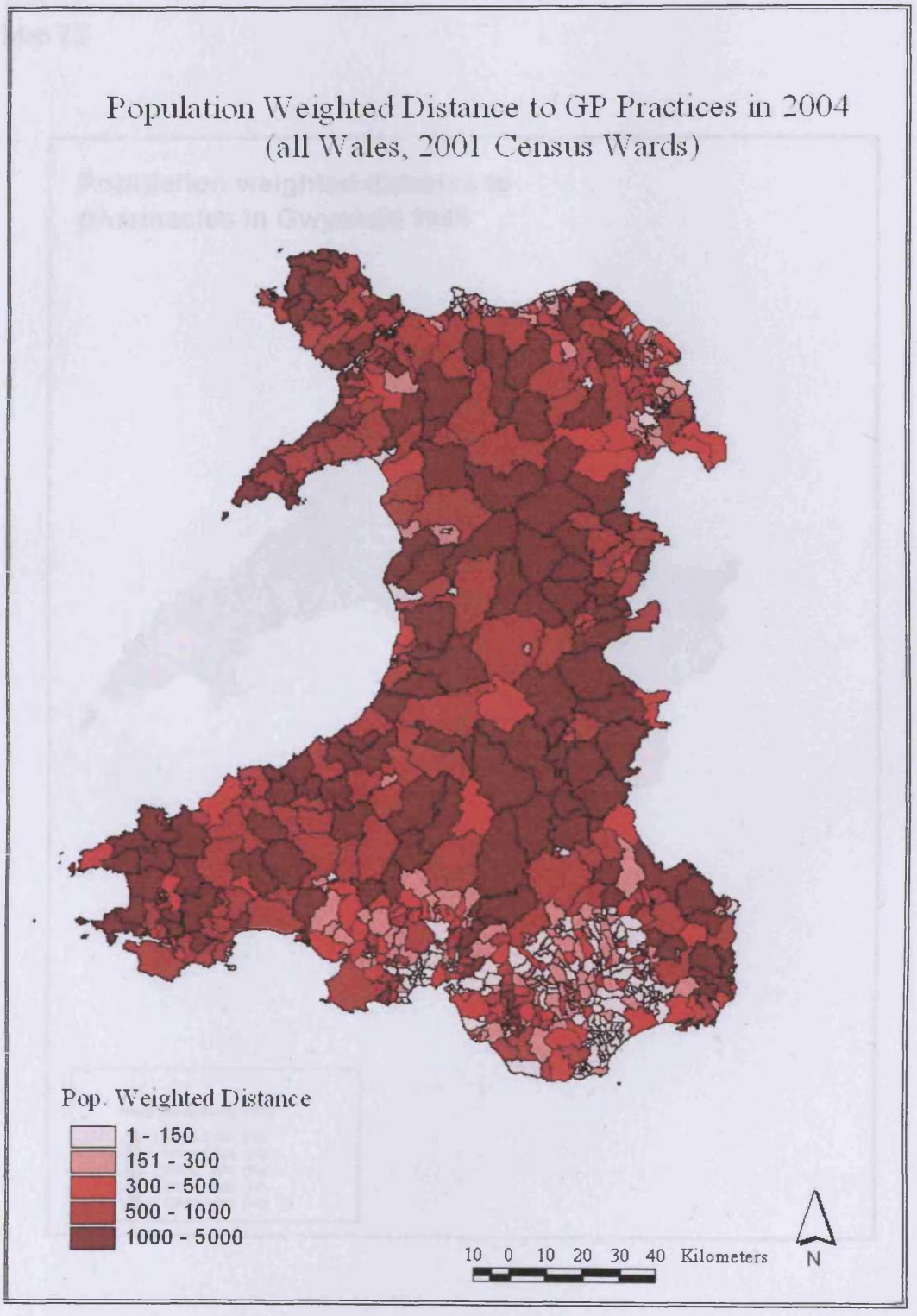
Map 7.4


Population Weighted Distance to Dental Surgeries in 2004
(all Wales, 2001 Census Wards)
Pop. Weighted Distance
1 - 150
151 - 300
300 - 500
500 - 1000
1000 - 5000
10 0 10 20 30 40 Kilometers
N

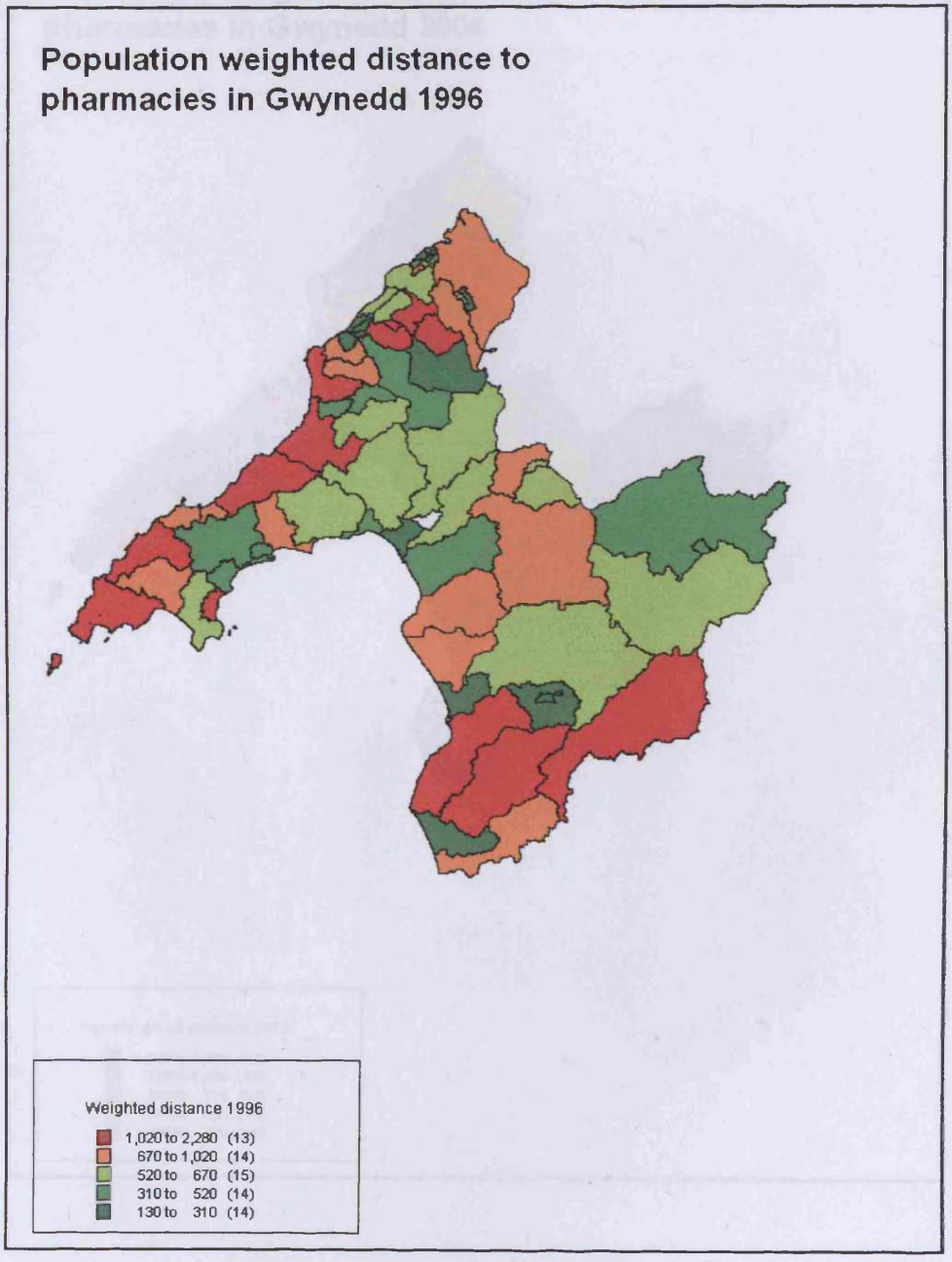
Map 7.5


Population Weighted Distance to GP Practices in 1995
(all Wales, 2001 Census Wards)
New2001.shp
1 - 150
151 - 300
300 - 500
500 - 1000
1000 - 7000
10 0 10 20 30 40 Kilometers
N

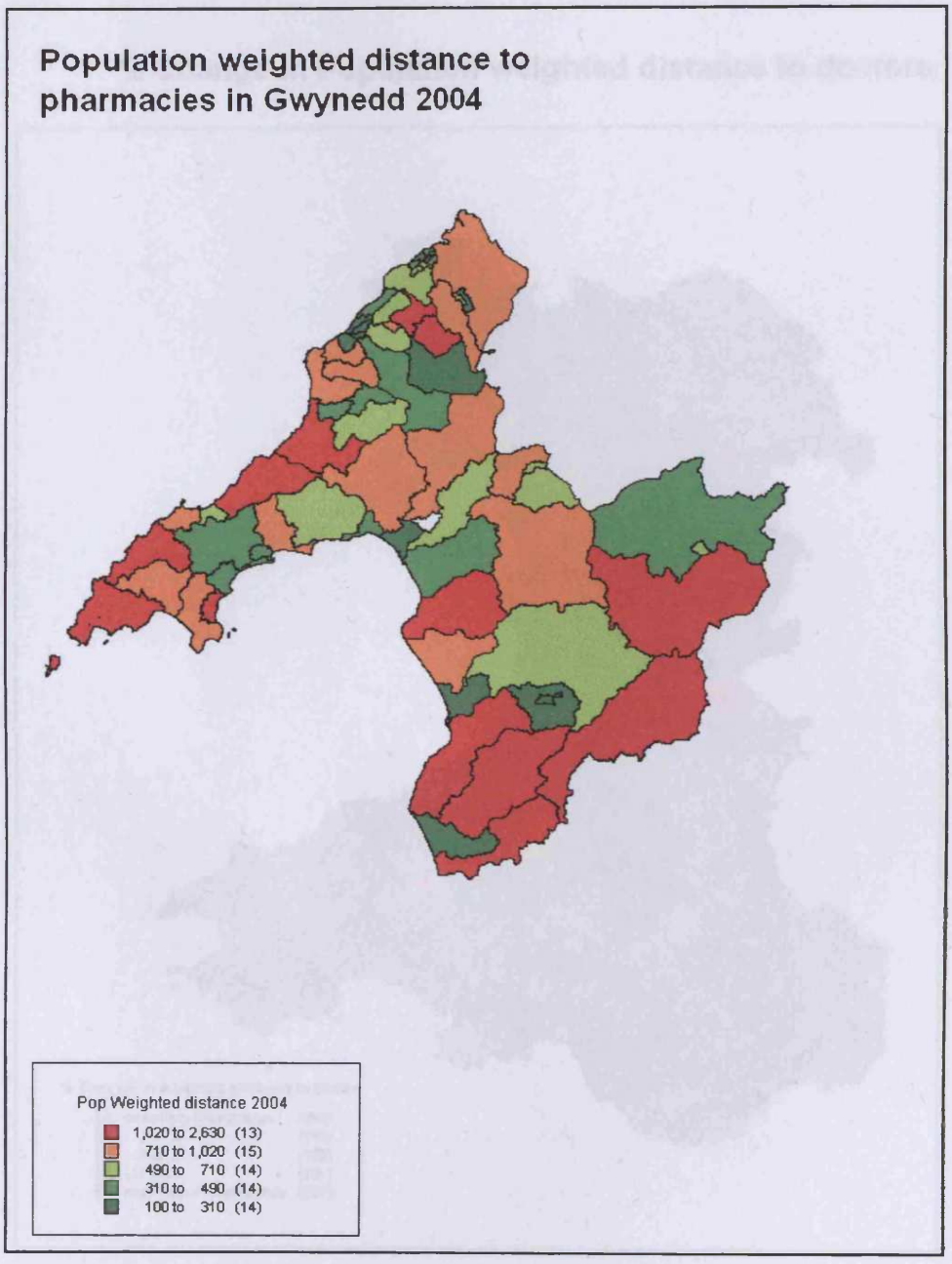
Map 7.6


Population Weighted Distance to GP Practices in 2004
(all Wales, 2001 Census Wards)
Pop. Weighted Distance
1 - 150
151 - 300
300 - 500
500 - 1000
1000 - 5000
10 0 10 20 30 40 Kilometers
N

Map 7.7

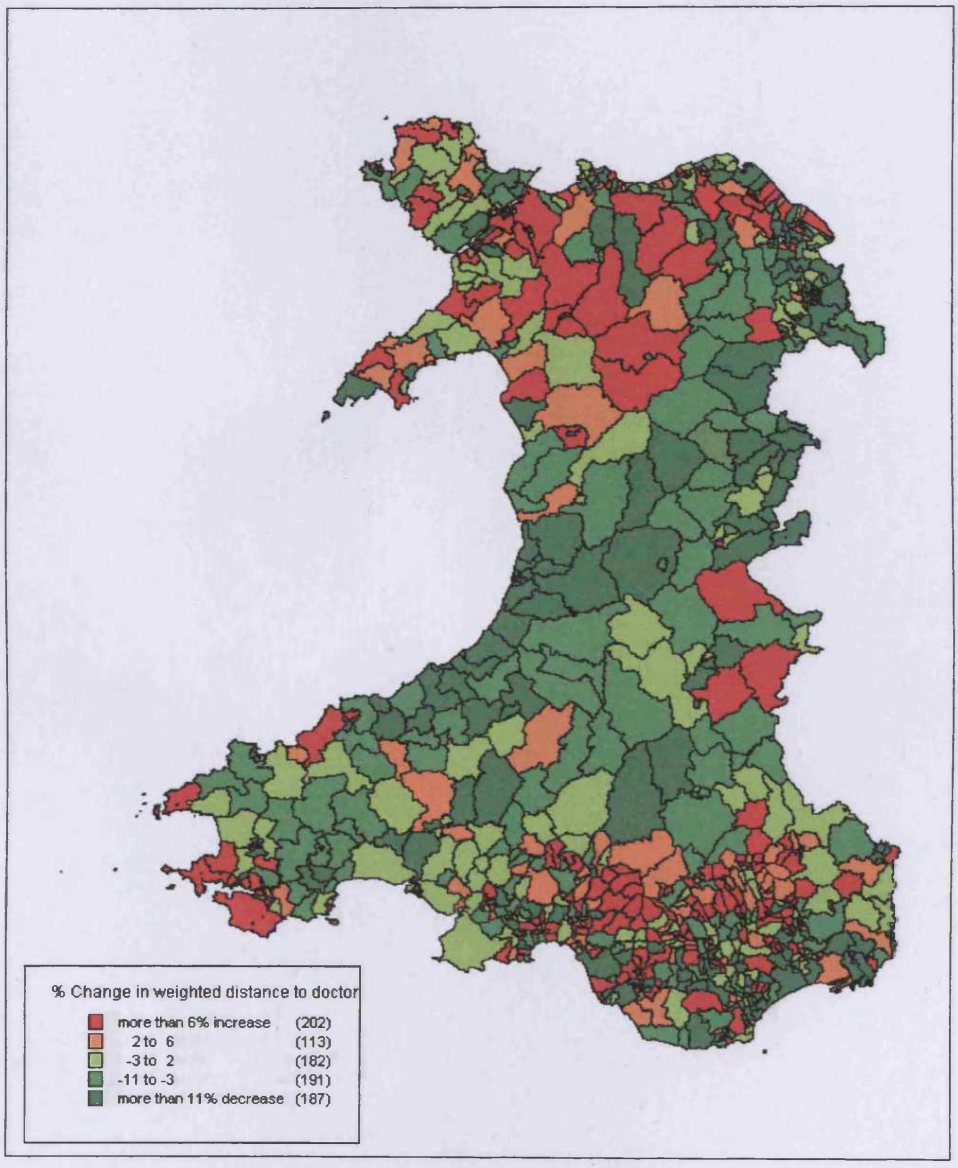

Population weighted distance to pharmacies in Gwynedd 1996
Weighted distance 1996
1,020 to 2,280 (13)
670 to 1,020 (14)
520 to 670 (15)
310 to 520 (14)
130 to 310 (14)

Map 7.8

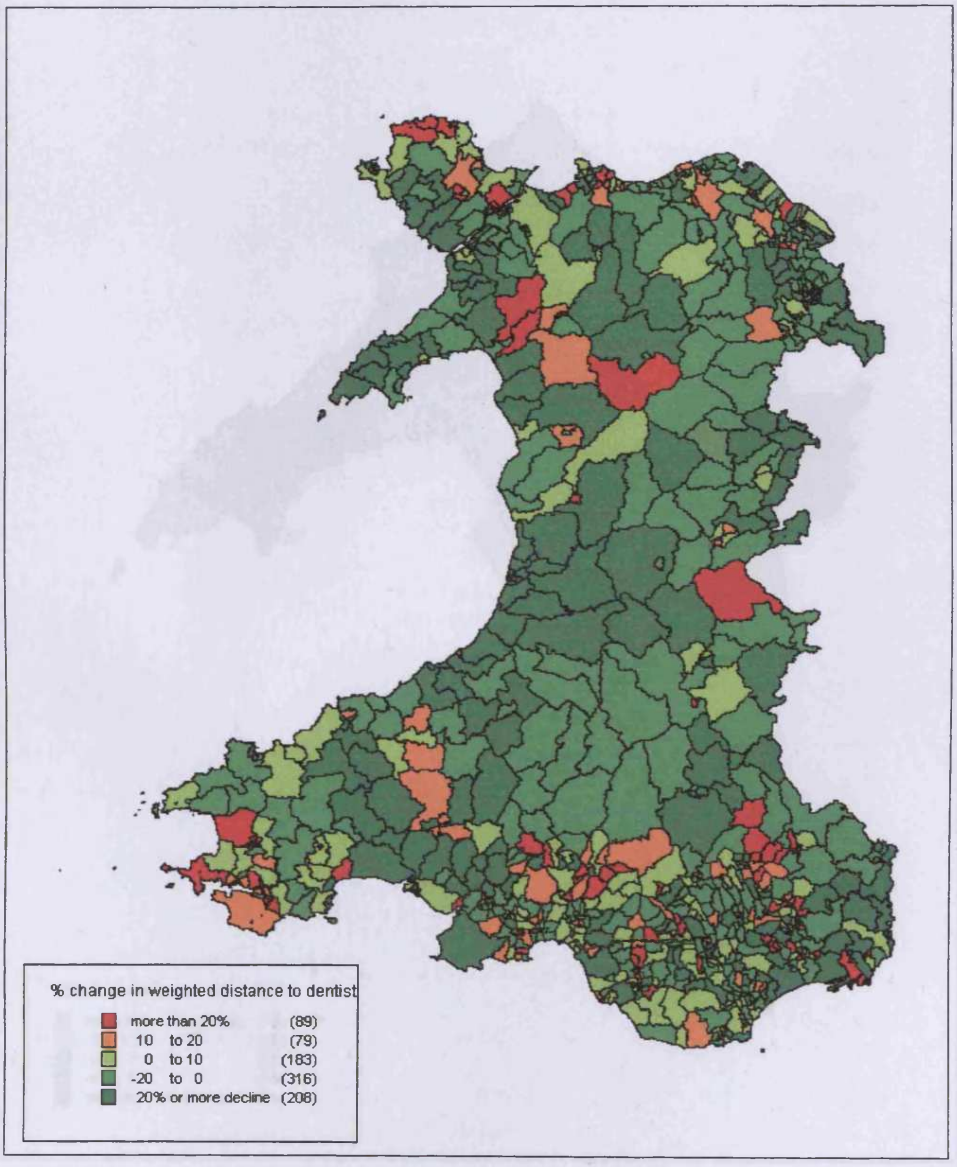

Population weighted distance to pharmacies in Gwynedd 2004
Pop Weighted distance 2004
1,020 to 2,630 (13)
710 to 1,020 (15)
490 to 710 (14)
310 to 490 (14)
100 to 310 (14)

Map 7.9

% Change in Population weighted distance to doctors



Map 7.10


% Change in Population weighted distance to dentists
% change in weighted distance to dentist
more than 20% (89)
10 to 20 (79)
0 to 10 (183)
-20 to 0 (316)
20% or more decline (208)

Map 7.11

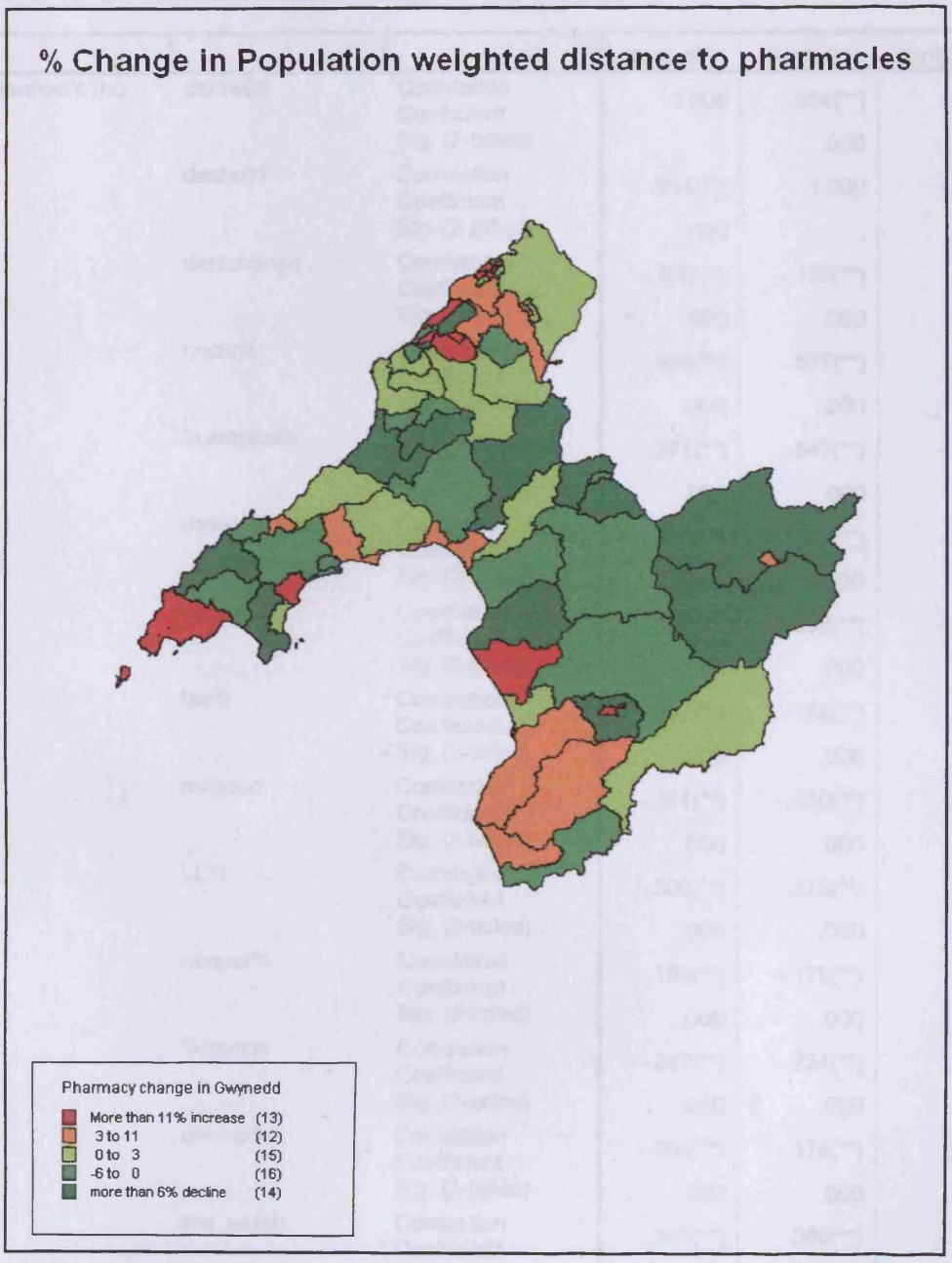

% Change in Population weighted distance to pharmacies
Pharmacy change in Gwynedd
More than 11% increase (13)
3 to 11 (12)
0 to 3 (15)
-6 to 0 (16)
more than 6% decline (14)

Table 7.7 Spearman Rank Correlation Analysis – Dental Surgeries

			dentw95	dentw01	dentchange
Spearman's rho	dentw95	Correlation Coefficient	1.000	.954(**)	-.370(**)
		Sig. (2-tailed)	.	.000	.000
	dentw01	Correlation Coefficient	.954(**)	1.000	-.126(**)
		Sig. (2-tailed)	.000	.	.000
	dentchange	Correlation Coefficient	-.370(**)	-.126(**)	1.000
		Sig. (2-tailed)	.000	.000	.
	nocar%	Correlation Coefficient	-.599(**)	-.575(**)	.273(**)
		Sig. (2-tailed)	.000	.000	.000
	2carsplus%	Correlation Coefficient	.571(**)	.547(**)	-.270(**)
		Sig. (2-tailed)	.000	.000	.000
	travel10km%	Correlation Coefficient	.434(**)	.426(**)	-.121(**)
		Sig. (2-tailed)	.000	.000	.000
	good%	Correlation Coefficient	.330(**)	.296(**)	-.289(**)
		Sig. (2-tailed)	.000	.000	.000
	fair%	Correlation Coefficient	-.197(**)	-.162(**)	.262(**)
		Sig. (2-tailed)	.000	.000	.000
	notgood	Correlation Coefficient	-.381(**)	-.350(**)	.279(**)
		Sig. (2-tailed)	.000	.000	.000
	LLTI	Correlation Coefficient	-.306(**)	-.273(**)	.276(**)
		Sig. (2-tailed)	.000	.000	.000
	noqual%	Correlation Coefficient	-.193(**)	-.175(**)	.172(**)
		Sig. (2-tailed)	.000	.000	.000
	%routine	Correlation Coefficient	-.247(**)	-.234(**)	.175(**)
		Sig. (2-tailed)	.000	.000	.000
	unemp%	Correlation Coefficient	-.203(**)	-.174(**)	.225(**)
		Sig. (2-tailed)	.000	.000	.000
	srw_welsh	Correlation Coefficient	.383(**)	.380(**)	-.134(**)
		Sig. (2-tailed)	.000	.000	.000
	TOWN	Correlation Coefficient	-.365(**)	-.346(**)	.200(**)
		Sig. (2-tailed)	.000	.000	.000

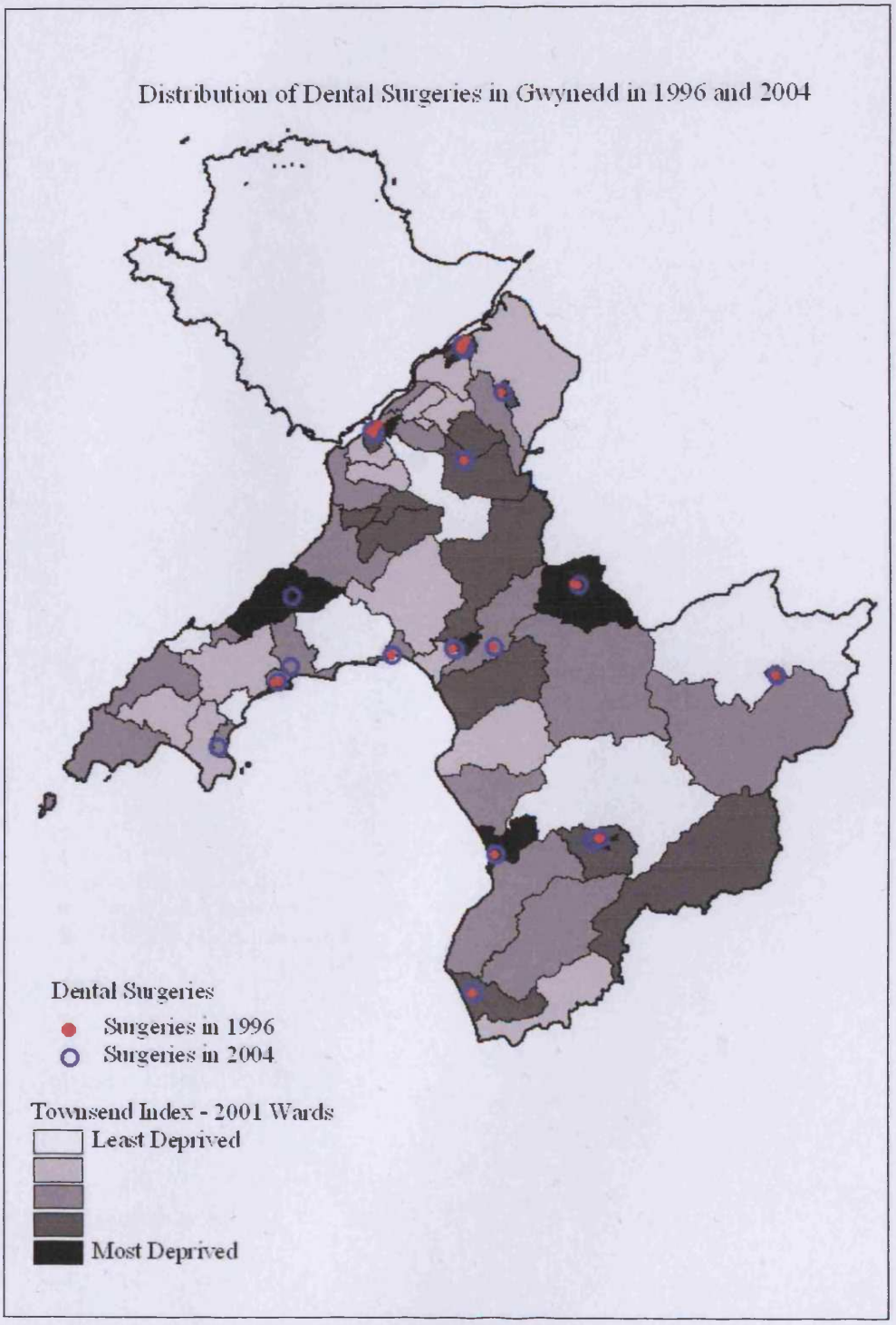
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 7.8 Spearman Rank Correlation – GP Surgeries and Pharmacies

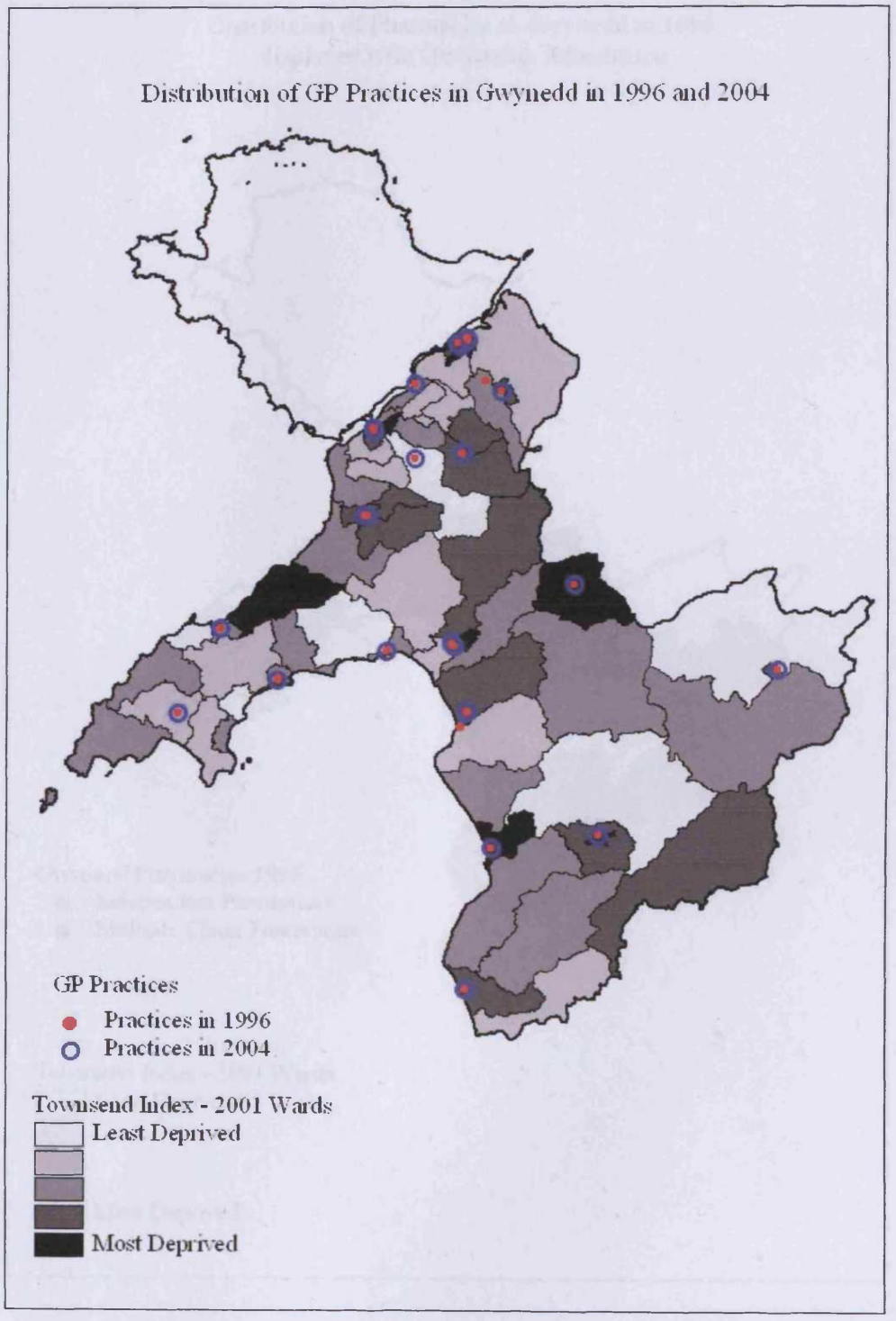
			doctw95	doctw01	doctchange	pharmw01
Spearman's rho	nocar%	Correlation Coefficient	-.614(**)	-.590(**)	.268(**)	-.583(**)
		Sig. (2-tailed)	.000	.000	.000	.000
	2carsplus%	Correlation Coefficient	.582(**)	.560(**)	-.255(**)	.555(**)
		Sig. (2-tailed)	.000	.000	.000	.000
	travel10km%	Correlation Coefficient	.395(**)	.401(**)	-.013	.387(**)
		Sig. (2-tailed)	.000	.000	.695	.000
	good%	Correlation Coefficient	.371(**)	.324(**)	-.338(**)	.343(**)
		Sig. (2-tailed)	.000	.000	.000	.000
	fair%	Correlation Coefficient	-.211(**)	-.172(**)	.257(**)	-.191(**)
		Sig. (2-tailed)	.000	.000	.000	.000
	notgood	Correlation Coefficient	-.431(**)	-.385(**)	.349(**)	-.401(**)
		Sig. (2-tailed)	.000	.000	.000	.000
	LLTI	Correlation Coefficient	-.354(**)	-.304(**)	.367(**)	-.323(**)
		Sig. (2-tailed)	.000	.000	.000	.000
	noqual%	Correlation Coefficient	-.268(**)	-.220(**)	.346(**)	-.228(**)
		Sig. (2-tailed)	.000	.000	.000	.000
	%routine	Correlation Coefficient	-.303(**)	-.269(**)	.288(**)	-.273(**)
		Sig. (2-tailed)	.000	.000	.000	.000
	unemp%	Correlation Coefficient	-.243(**)	-.204(**)	.331(**)	-.203(**)
		Sig. (2-tailed)	.000	.000	.000	.000
	srw_welsh	Correlation Coefficient	.400(**)	.395(**)	-.116(**)	.401(**)
		Sig. (2-tailed)	.000	.000	.001	.000
	TOWN	Correlation Coefficient	-.397(**)	-.370(**)	.251(**)	-.368(**)
		Sig. (2-tailed)	.000	.000	.000	.000
	doctw95	Correlation Coefficient	1.000	.981(**)	-.169(**)	.959(**)
		Sig. (2-tailed)	.	.000	.000	.000
	doctw01	Correlation Coefficient	.981(**)	1.000	-.020	.968(**)
		Sig. (2-tailed)	.000	.	.549	.000
	doctchange	Correlation Coefficient	-.169(**)	-.020	1.000	-.045
		Sig. (2-tailed)	.000	.549	.	.188
	pharmw01	Correlation Coefficient	.959(**)	.968(**)	-.045	1.000
		Sig. (2-tailed)	.000	.000	.188	.

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

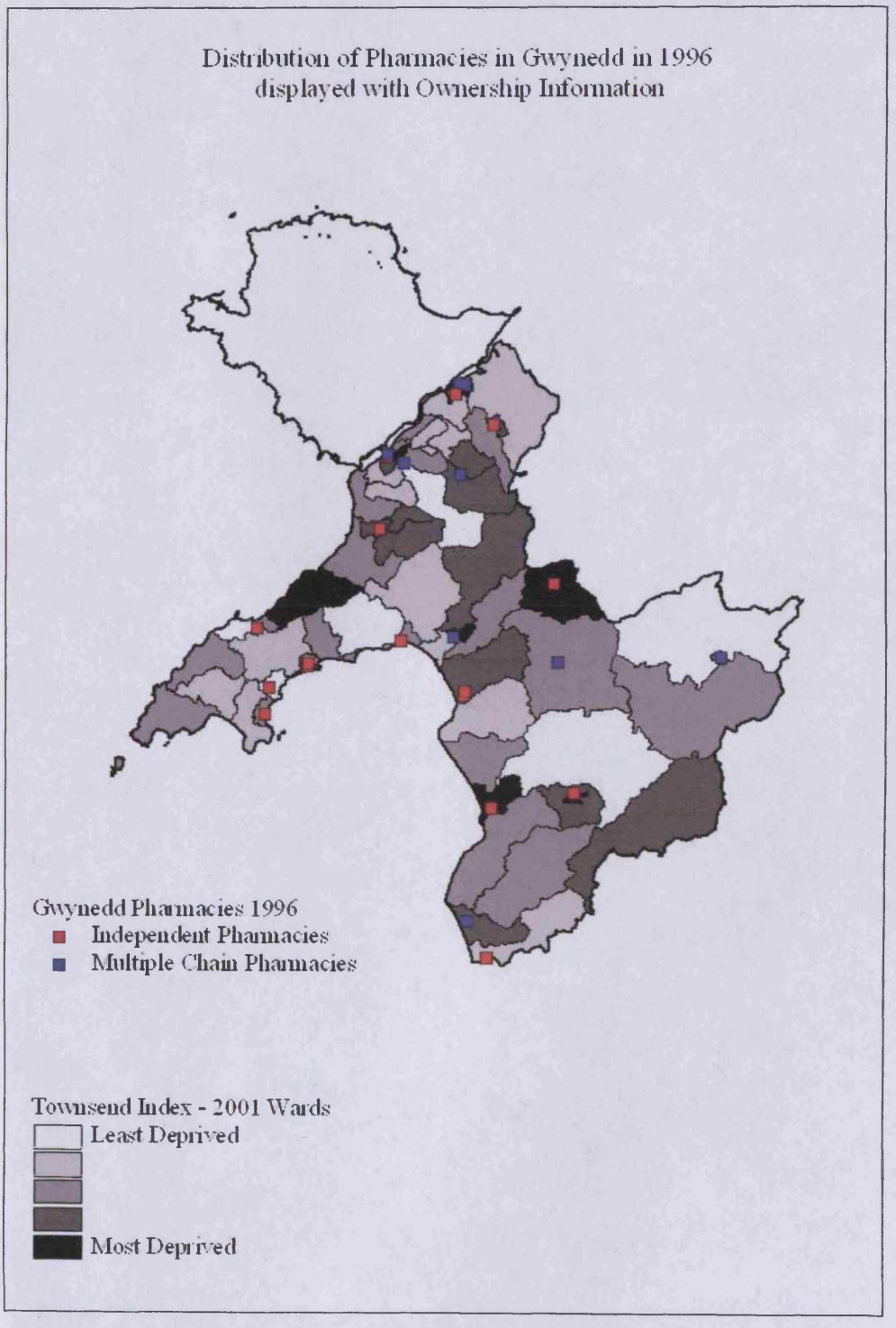
Map 7.12


Distribution of Dental Surgeries in Gwynedd in 1996 and 2004
Dental Surgeries
Surgeries in 1996
Surgeries in 2004
Townsend Index - 2001 Wards
Least Deprived
Most Deprived

Map 7.13


Distribution of GP Practices in Gwynedd in 1996 and 2004
GP Practices
Practices in 1996
Practices in 2004
Townsend Index - 2001 Wards
Least Deprived
Most Deprived

Map 7.14


Distribution of Pharmacies in Gwynedd in 1996
displayed with Ownership Information
Gwynedd Pharmacies 1996
Independent Pharmacies
Multiple Chain Pharmacies
Townsend Index - 2001 Wards
Least Deprived
Most Deprived

Map 7.15