

Rural Health Allocations Forum

Health Resource Allocation in England: What Case can be made for Rurality?

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FOREWORD

I am delighted to recommend to you this report on Rural Health Allocations. A conference was held in Stratford upon Avon in November 1999 bringing together representatives from most of the rural Health Authorities in England. There was a shared concern that the needs of rural populations were not adequately considered in the formulae used by the Department of Health to make funding allocations to the NHS. A small project team comprising representatives from rural Health Authorities was established. Representatives were chosen on a geographical basis so that all rural Health Authorities and Trusts had a link person from their geographical region.

The project team has met regularly since and with financial contributions from rural Health Authorities and Trusts commissioned the University of Plymouth to produce this report.

The report provides an evidence-based exploration of the needs of rural populations and some key issues relating to the cost of provision of services.

The project team was delighted to meet with Professor John Arbuthnott who had led work in Scotland to determine fair shares for rural areas and the Welsh assembly are also considering these issues. The Advisory Committee on Resources allocation provides advice to the Department of Health in England on Resource Allocation and there is an opportunity for this report to contribute to the discussions and considerations. The report is timely, particularly as a move to Primary Care Trust allocations is likely to magnify any inequities.

I do hope you find this report helpful and interesting.

Best wishes

Thelma Holland

Chief Executive Designate of the South West Peninsula Strategic Health Authority

Chair of the Rural Health Allocations Forum

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The report utilises 1991 Census data (Crown Copyright, ESRC purchase), postcode-to-ED lookup tables supplied by Manchester Information and Associated Services (MIMAS), and digital boundary data supplied by UKBorders with the support of the ESRC and JISC and based on data which is copyright of the Crown and the ED-LINE Consortium.

Executive Summary

The Rural Health Allocations Forum (RHAF) has commissioned this report, the aim of which is to explore the case for a major adjustment to the resource allocation formula in England to account for the impact of rurality.

The RHAF research remit was as follows:

- to update an earlier literature review commissioned by Cornwall and Isles of Scilly Health Authority (Brigham and Asthana, 1999);
- to review published and grey literature produced since 1999;
- to discuss the findings of reviews of resource allocation systems recently undertaken in Scotland, Northern Ireland and Wales; and
- to weigh up different options for examining the case for a rural premium in the English context, concluding with recommendations for future research.

Following an introduction (Section One), the report is structured around four main sections, reflecting our belief that a case can be made for a rural premium on four grounds:

- The English NHS formula introduces systematic biases in favour of urban areas in the way in which it expresses ‘need’ for health care
- Adjustments made for unavoidable costs in the provision of care also favour urban areas by using proxy measures that do not reflect actual variations in providers’ costs. At the same time, the formula does not adequately compensate for the additional costs of providing rural services.
- Because the resources allocated to rural areas do not adequately capture population needs or unavoidable additional costs, it is difficult to provide the same level of care as in urban areas. There is substantial evidence to suggest that the populations of rural areas exhibit lower levels of accessibility and utilization than their urban counterparts
- Finally, a case for a rural premium can be made on the basis of precedent. England is the only country in the UK that does not make a major adjustment for rurality in its NHS formula.

NHS Resource Allocation in England (Section Two)

NHS resources are distributed on the basis of population, weighted according to differences in the age structure, ‘additional’ need for health care and in the costs of providing services.

The importance of scale

With the reduction of the spatial scale at which resources are allocated (from the Health Authority to the Primary Care Organisation), greater variability in distance from target is likely to occur. If the current formula does not reflect the legitimate health care needs of all population groups, any systematic biases will become more pronounced at the PCO level.

Implications of using a utilisation-based model

The formula is likely to incorporate systematic bias because its measures of ‘need’ for health care have been derived from analyses of utilisation data.

- The age cost curves that are used in all three components of the weighted capitation formula rest on the assumption that existing patterns of use by different age groups are appropriate. Given widespread concerns about

ageism in access to health care, the per capita allocations for older age bands may be conservative, resulting in lower allocations (in relation to need) for areas serving demographically older populations. There is a strong rural-urban dimension to this bias as rural areas have older demographic profiles than their urban counterparts.

- The direction and impact of socio-economic biases in the utilization-based model are far more uncertain. If utilisation is subject to inverse care, then need, as revealed by use, in deprived areas will be underestimated. In fact, our empirical analysis suggests that the HCHS component of the formula allocates resources to deprived areas to a higher level than implied by morbidity alone, reflecting a pro-poor bias in rates of hospital use relative to need.
- Geographical biases in utilisation may be built into the system. For example, the formula for psychiatric services responds to the relatively high rates of utilisation in inner cities.

The use of nationally-standardised indicators in rural areas

The use of nationally standardised census indicators in the additional needs indices of the formula yields values that may misrepresent need in rural areas. Most of the commonly used indices of deprivation are better able to predict variations in morbidity and mortality in urban areas than in rural areas.

The construction of the weighted capitation formula

Although the additional need indices account for a far smaller proportion of the variation in health service use than age, equal weight is given to the age and additional need indices in the final calculation of the weighted capitation formulae. This is likely to overestimate the impact of socio-economic factors in determining overall need and underestimate the importance of age. This works to the disadvantage of rural areas, which have lower deprivation scores and older demographic profiles.

We have examined the impact of setting health care capitations on the basis of direct morbidity estimates and find that, compared to HCHS-based allocations, a morbidity-based methodology results in a significant shift of hospital resources away from deprived areas, towards areas with older demographic profiles and towards rural areas.

Adjustments for unavoidable geographical variations in the costs of providing services

The way in which the weighted capitation formula compensates for unavoidable geographical variations in the costs of providing services also discriminates against rural areas. The Market Forces Factor (MFF) is the largest adjustment in the resource allocation system as a whole, the Staff MFF alone covering about 57% of NHS expenditure. However, because most NHS staff are paid on a nationally agreed pay scale, NHS providers do not have to respond to wage levels in the general labour market to compete for staff. Indeed, base salaries are often lower in Central London (which receives the largest Staff MFF adjustments) than elsewhere.

With the exception of the small cost adjustments made for emergency ambulances services, the additional costs associated with the rural provision of HCHS have not met the criteria set for adjusting for unavoidable cost variations. Given growing evidence of the impact of economies of scale, peripherality etc., the reasons for this are unclear.

Service Costs in Rural Areas (Section Three)

Economies of Scale

Service providers in rural areas have less chance of achieving economies of scale than their urban counterparts. Regarding hospital provision, the following observations have been made:

- The need to provide services that are sufficiently accessible to resident populations often results in the duplication of facilities and staff at additional costs.
- Low numbers of specialist staff and/or specialist equipment can result in major disruption when something goes wrong.
- Community hospitals play a somewhat different role in different rural contexts. In mixed areas, where problems of low population thresholds and poor access are not so pronounced, they provide a mechanism for expanding levels of care and offering more choice in care packages. In very remote areas, where community hospitals may be expected to provide more core services, their limitations are more acutely felt.
- Because a critical mass of hospital beds is required, bed utilisation will inevitably be lower in rural areas. This should be compensated for in the allocation formula.
- The 'Fair Shares' review of resource allocation in Scotland found that island Health Boards required additional resources of almost 30% per capita to take account of the additional costs of providing hospital services in remote and rural areas. Mainland Boards with substantial rural populations required additional resources of between 7.5% and 10%.
- Average costs of providing inpatient care for mental illness ranged from £700-750 per week in the larger Scottish hospitals to more than £900 in the smallest hospitals.

Travel Costs

Many NHS professionals work in the community. In rural areas, this results in significantly higher travel costs.

- Community services provided by specialist staff can involve a high element of unproductive time.
- The shift of certain services from hospital outpatient departments to general practices has improved patient access but is associated with increased travel costs, particularly in rural areas.
- One way of balancing cost-effectiveness with access is to transfer costs associated with staff travel time to patients and their carers. However, there are growing expectations that the health sector assumes some responsibility for transporting patients. The cost implications of this should be acknowledged.

- Reviewing the costs of community services in Northern Ireland, rurality adjustments of between 22% and 30% were considered to be appropriate.
- Costs of providing domiciliary care in England have been modeled across the urban-rural continuum. Average travel-related costs per head were found to vary between £94 in Birmingham to £210 in North Yorkshire.

Unproductive Time

High travel times are associated with higher rates of unproductive staff time, a problem that itself confers costs.

- Studies of the provision of social services suggest that staff members may spend between 12% and 25% of their day travelling to and from clients.
- A study of the impact of sparsity on the provision of police services demonstrated that sparsity is not only associated with longer travel times, but results in rural areas having to maintain relatively higher levels of staff in order to respond to calls.

Other Costs

- Costs of telecommunications, training, consultancy and other support services tend to be higher in rural areas
- Networking is also more difficult in highly dispersed areas, a problem that has repercussions for the building of partnerships.

Service Access, Use and Quality in Rural Areas (Section Four)

Accessibility to services in rural areas

- There is strong evidence to suggest that geographical access to services has a profound effect on health care utilisation
- Conflating locational and socio-economic disadvantage into single measures of rural deprivation makes it difficult to distinguish the causes of service inaccessibility and to identify appropriate policy options to address problems of accessibility.
- In accessibility studies, travel time is generally superseding the use of straight line distance in the UK. Studies in Scotland, Wales and Norfolk find that similar percentages of the population have poor access to services.
- Access by public transport is particularly poor. Particular groups (the elderly, young people and many women) are likely to be disproportionately affected by this.
- Access measures still need to be refined if additional costs are to be adequately captured. Nearest neighbour analysis provides one promising method to this end.

Service quality in rural areas

- The recruitment of specialist staff can be difficult
- Rural patients can suffer from a lack of choice (e.g. of general practitioners)
- Ambulance response times in rural areas remain unsatisfactory

- Appeals for increased funding in rural areas should not hide organizational inefficiencies. However, initiatives such as the National Service Frameworks may provide a vehicle for making a robust case for increased investment in order to level up standards of care. At the same time, there should be recognition of urban-rural differences in the organisation of care. For example, rural general practitioners tend to carry out a number of functions (e.g. suturing) that, in an urban context, would take place in a secondary care environment.
- Service quality also rests on effective inter-agency working. However, there has also been under-investment in social services in rural areas, there are fewer voluntary organizations and self-help groups with which to work, and networking in order to build partnerships is more costly.

NHS Resource Allocation outside England (Section Five)

England is the only country within the United Kingdom that does not make a major adjustment for rurality in its NHS funding formula.

The Scottish 'Fair Shares' Model

- Before the 'Fair Shares for All' review, the sparsity index in Scotland was applied only to 30 of the costs of community nursing services. The review concluded that the excess costs associated with rurality and remoteness also applied to hospital, GP and other community services.
- The rurality adjustment in the Fair Shares Model resulted in a redistribution of 1.5% of total expenditure. Age/sex and morbidity/life circumstances adjustments redistributed 1.3% and 3.2% respectively.
- An explicit distinction is made between rural and remote areas with respect to additional costs of providing services.
- The impact of rurality on hospital costs was examined through the use of utilisation data. Although this captured the higher costs of providing hospital services in rural areas, the approach reflected historic rather than optimal provision.
- The ratio of costs for the very elderly compared with the lowest age cost group is significantly higher in Scotland than in England.

The Welsh Review of NHS Resource Allocation

- The Research Team appointed to undertake the major part of this review concluded that direct measures of health need should be used instead of utilisation data to allocate resources.
- The implications of applying the Scottish recommendations to Wales were considered. Given the different geographies of the two countries, it was concluded that a Welsh Formula should drawn upon Welsh data.

Northern Ireland

- This review focused on the costs of travel, including professional time, and on the generally longer distances to be travelled in rural areas.
- Subsequent research has also highlighted the need to consider distance from Belfast as an important component of rurality, due to the concentration of specialist services within the city.

Lessons for England

- The geographies of the different countries within the Union are very different and, in England, the problems faced by deprived urban communities are undoubtedly profound. Nevertheless, England also contains a number of peripheral areas that will suffer similar problems of economies of scale as mainland rural areas in Scotland and Wales.
- None of the reviews undertaken in Scotland, Northern Ireland or Wales could find evidence to support the Market Forces Factor.
- The recommendation made by the Welsh review to use direct measures of need would have significant implications for the funding of rural areas in England.

Conclusions concerning the report are made in Section Six.

Section One:

Introduction and Scope of the Report

As the first health care system to distribute the majority of its revenue resources between geographical areas in relation to population needs (Mays, 1995), the English NHS has received a good deal of attention. Indeed, the NHS has been called a 'world leader in pioneering scientific methods of equitable resource allocation' (Carr-Hill et al, 1997, p.69) and many other countries have turned to the use of 'capitations' as a basis for guiding the distribution of health care expenditure (Rice and Smith, 1999).

While a transparent, empirically-based approach to matching health spending to population need is generally viewed as an improvement upon allocation based on historical activity, the current system of NHS allocation in England is not without its critics. This report begins with a brief overview of the current weighted capitation system in England and a discussion of its perceived merits and limitations (Section Two). Drawing upon both published literature and our own empirical analysis, we find evidence that the English NHS formula introduces systematic biases in favour of urban areas in the way in which it compensates for variations in *both* needs and unavoidable costs.

The fact that major adjustments to the resource allocation formula are not made on the basis of rurality is at odds with a growing body of evidence that rurality is associated with higher service costs. We discuss this evidence in Section Three, in which we provide an update of a previous study commissioned by Cornwall and Isles of Scilly Health Authority (Brigham and Asthana, 1999). Following Woollett (1990), factors considered include economies of scale, travel-related costs, unproductive time, communication costs, costs of access to training, consultancy and other support services and the pace of development work.

If the English resource allocation system does not adequately capture rural health needs or compensate for the additional costs of providing health services in rural areas, questions naturally arise about the implications of urban-rural differences in funding for service accessibility, utilisation and quality. This is a difficult area to evaluate as, as Rice and Smith (2001) point out, it is unrealistic to expect that every citizen can be offered identical levels of access to identical models of health care, delivered at identical standards. Against this, the introduction of access standards suggests a desire to narrow the gap in standards of care between different areas. In Section Four of the report, we consider evidence of variations in the accessibility and quality of care and conclude that, if rural areas are to meet access standards set in initiatives such as National Service Frameworks, there will be a need for additional resources in rural areas.

We also propose that a case for a rural premium can be made on the basis of precedent. Rurality is a significant factor in many local government allocations (White, 2001). England is the only country within the United Kingdom that does not make a major adjustment for rurality in its NHS funding formula. The higher costs of health service provision in rural or remote areas are acknowledged in several systems outside the UK, including Australia, Canada, Finland and New Zealand (Rice and Smith, 1999). In Section Five, we review the approach taken in other systems to adjust for the impact of rurality and consider the relevance of such mechanisms to the English context.

Section Two:

NHS Resource Allocation in England

2.1. Introduction

As the first health care system to distribute the majority of its revenue resources between geographical areas in relation to population need (Mays, 1995), the English NHS has received international attention. The central aim of the resource allocation system is to allocate a budget to geographical areas in order to secure equal opportunity of access for those at equal risk. To this end, a sophisticated methodology for setting capitations has been developed that attempts to encapsulate variations in the need for health care as well as unavoidable variations in the costs of providing health services.

The purpose of this Section is to explore whether the current resource allocation system does allocate resources in a way that promotes equity of expenditure. To this end, we examine the composition of the weighted capitation formula and the empirical models on which they are based. Limitations of some of the fundamental assumptions that underpin the current system are discussed and empirical analysis presented that points to the existence of systematic biases in the way in which the current formula expresses need for health care. Problems are also identified with the approach taken to adjust for cost variations in the provision of services. We conclude that in the way in which it compensates for variations in *both* needs and unavoidable costs, the current system discriminates against rural areas.

2.2. A brief history of NHS resource allocation in England

The principle that health care expenditure should be geographically distributed in relation to population needs was established in response to the widespread perception that, when it was created, the NHS inherited gross inequalities in provision. Several commentators have proposed that the pre-NHS distribution of health care resources reflected 'past philanthropy, municipal pride and local affluence rather than a planned response to population needs' (Beech *et al*, 1990, p.44). This fuelled concerns that access to British health care services was not only unequal but also inequitable, areas with the greatest needs having the lowest service provision. Assertions about inequity date back to the beginnings of the NHS (Powell, 1997, p.34). However, until the 1970s, existing geographical inequalities were perpetuated by a system of incremental budgeting.

The most significant break from this system came with the appointment of the Resource Allocation Working Party (RAWP). In 1976, RAWP recommended that revenue resources for hospital and community services should be distributed on the basis of population, weighted according to differences in the age/sex structure, the need for health care and in the costs of providing services. The principle of a weighted capitation formula was thus introduced (Carr-Hill *et al*, 1997). This was used to calculate target budgets for each of the 14 English Regional Health Authorities (RHAs). Actual regional allocations were expected to move gradually towards their target through a process of differential funding. As the most 'overfunded' region was almost 15% above its revenue target and the most 'underfunded' 11% below, this implied a substantial redistribution of resources (Mays, 1995).

The RAWP formula, and a revised version introduced in 1990, continued to be used to allocate resources to RHAs until 1994. However, its use of standardized mortality ratios (SMRs) as a proxy for relative needs was criticized for failing to fully reflect the demand for health care resources produced by chronic disease and

deprivation. Thus, in 1995 a new weighted capitation formula was introduced. This is based on an empirical model (the York model) that identified its needs indicators as those census-derived health status and socio-economic variables that, having adjusted for the independent effects of supply, were most closely correlated with the national average pattern of hospital utilisation (Carr-Hill *et al*, 1994). Like the revised version of RAWP, the new formula targeted resources to areas of high rates of premature death. Unlike previous formulae, it acknowledged the social and economic factors (e.g. elderly people living alone) that influence levels of hospital use in a manner that is independent of health status variation. It was also applied to a smaller unit of analysis – the Health Authority.

The shift to a sub-regional system of resource allocation was in large part a consequence of the Conservative Government's NHS reforms. Following the introduction of the 1990 *NHS and Community Care Act*, District Health Authorities (DHAs) became purchasers of services for their resident populations. Under RAWP, however, RHAs determined the revenue base of DHAs and had discretion about the precise ways in which they allocated funding. Although some regions did draw upon RAWP principles, the factors used in sub-regional resource allocation varied (Mohan, 1995, p.98). For example, RHAs could choose to skew resources away from affluent areas towards deprived districts. Such active intervention sat uncomfortably with the Government's own vision of the internal market, the aim of which was to promote improvements in productive efficiency and responsiveness by making DHAs commission appropriate and economic packages of services from fixed budgets.

The election of the Labour Government in 1997 has resulted in less emphasis on competition and more on partnership. Nevertheless, the move initiated by the Conservatives towards a more devolved management structure has been maintained in the *New NHS* with the establishment of Primary Care Organizations (PCOs). When Strategic Health Authorities replace Health Authorities in April 2002, the PCO will be the spatial level at which the national resource allocation formula will be applied. To this end, the formula to determine levels of funding for hospital and community services has been combined with the funding stream for general medical services infrastructure (GMS) and an updated prescribing component to produce unified allocations (see Section 2.5.).

2.3. Resource allocation and the problem of scale

It is of course technically easy to apply the weighted capitation formulae to smaller units of analysis. All Health Authorities have received Attribution Data Sets (ADS) that comprise the demographic variables and synthetic ward-level census data that make up PCO budget allocations. However, the reduction of the scale at which NHS resources have been allocated does raise questions about the extent to which budget redistribution will be either appropriate or achievable.

Simply as a function of their smaller size, PCOs will be both more internally homogeneous and more socially and demographically diverse than Health Authorities. The range of values attached to individual PCOs using selected needs indicators will be wider than the range attached to health authorities and the sensitivity of different indices to different dimensions of need more pronounced at the PCO level.

It is therefore likely that, proportionately, distance from target allocations will be greater for PCOs than for health authorities. If the demographic and socio-economic weightings that make up the current weighted capitation formulae are adequate proxies for health service 'need', then the greater variability in distance between actual and expected resource use may well be appropriate. However, if the formulae do not reflect the legitimate health care needs of all population groups, any systematic biases against particular socio-economic or demographic groups will be most strongly played out where these characteristics are locally clustered.

The impact of scale of variability in distance from targets may be exacerbated by changes in the way in which the allocation of resources can be practically managed. In the past, large and heterogeneous health authorities could accommodate differences between localities in their use of health resources. With the introduction of a formulaic approach to allocating expenditure at the sub-health authority level, there is reduced scope for a flexible system of redistribution. The pace at which 'equity' can be achieved will thus largely depend on the overall level of central funding. Given a sufficient increase in NHS expenditure, convergence may be achieved by a process of differential growth: all areas receive increases in their budgets, but some receive more than others. Without revenue growth, a net transfer of resources will only be achieved by reducing the budgets of 'overfunded' areas.

2.4. Implications for equity

In the mid-1980s, the consequences of budget restrained redistribution were apparent in much publicized hospital bed closures and restrictions on non-emergency admissions, particularly within the 'overfunded' Thames RHAs (Mohan, 1995). The difficulties experienced by the London Authorities highlight the conflicts that can arise in seeking financial or spatial equity in the distribution of NHS resources.

Where populations have high levels of health service use relative to need, their 'fair share' of resources may not be enough to meet established demands. Compared to areas where the 'fair share' exceeds demand, equal treatment cannot be given for equal clinical need. Thus, the pursuit of financial equity can result in clinical inequity (Bevan, 1997).

Tensions between financial and clinical equity are perhaps an inevitable feature of any attempt to achieve a spatial redistribution of resources. However, as suggested above, such tensions will be drawn into sharper focus (a) with a reduction of the scale at which resources are allocation and (b) if the composition of resource allocation formulae fails to reflect the legitimate health demands of all population groups. In the following sections, we explore the key components of the current weighted capitation formula and consider whether there is evidence that the system builds in systematic biases that discriminate against rural areas.

2.5. Composition of the weighted capitation formulae

Since April 1999, Health Authorities have been funded through a single unified allocation comprising three components: hospital and community services (HCHS), general medical infrastructure (GMS) and prescribing. In 1999/2000, the proportions of national expenditure for each of these components were respectively 82%, 3% and 15% (NHS Executive, 1999).

In the absence of adequate morbidity data, need for health care is determined on the basis of (a) the demographic profile of resident populations, weighted for cost of care by age group and (b) 'additional need'.

Age cost curves for each component are derived from an analysis of utilisation data. For example, for the HCHS component, cost of care by age group is based on estimates of national average expenditure per head in eight age bands.

The 'additional needs' elements of each formula are intended to reflect the relative need for health care over and above that accounted for by age. The HCHS acute needs and psychiatric needs indices and the additional need adjustment to the prescribing component comprise those variables which, using regression analysis (Carr-Hill *et al*, 1994; Rice *et al*, 2000), best predicted national average utilisation after adjusting for supply.

The HCHS and GMS components of the unified formula also include a Market Forces Factor to take account of unavoidable geographical differences in the costs

of staff, land and buildings. Cash supplements have also been introduced to reflect additional costs associated with the health needs of rough sleepers and the need to provide interpretation, advocacy and translation services for ethnic minority populations. An emergency ambulance cost adjustment (EACA) was also introduced in 1998/99.

2.6. Limitations of the utilisation-based approach

The technical analyses that have informed the current system of NHS resource allocation in England are undoubtedly sophisticated. Indeed, the NHS has been called a 'world leader in pioneering scientific methods of equitable resource allocation' (Carr-Hill *et al*, 1997, p.69). For all its merits, however, the English formula and the empirically based models on which it is based have been criticised.

The most fundamental criticism of the approach relates to the use of utilisation-based models to assess need for health care. This implies that historical patterns of service uptake between different care groups (as revealed by utilisation) are appropriate, a problematic assumption given the concerns that are regularly expressed about ageism, sexism and socio-economic bias in access to health care.

The age cost curves that are used in all three components of the weighted capitation formula rest on the assumption that existing patterns of use by different age groups are appropriate. This is at odds with a growing body of evidence that suggests that the use of potentially life saving and life enhancing investigations and interventions decline as patients get older (Bowling, 1999). If, on the basis of clinical evidence, it is accepted that older patients can and should gain from more intensive treatment, then the per capita allocations for older age bands could be regarded as conservative.

Interpreting the appropriateness of weightings given to socio-economic status (a major component of the HCHS additional needs index) is more complex and contestable. Since Tudor-Hart first proposed that the availability of good medical care varies inversely with the need of the population served (Tudor-Hart, 1971), claims that the accessibility and use of NHS services are subject to the 'inverse care law' have become received wisdom. This would suggest that need, as revealed by use, in deprived areas will be underestimated.

In fact, evidence of inverse care is equivocal. Whilst some studies suggest that deprived populations have significantly lower rates of health service use according to need (Payne and Saul, 1997; Hippisley-Cox and Pringle, 2000), others find little difference between deprived and more affluent populations (Manson-Siddle and Robinson, 1998). Indeed, some research shows that the residents of more deprived areas experience higher rates of use relative to need (O'Donnell and Propper, 1991; Black *et al*, 1995; Gibson *et al*, 2002). Ten years on from when Julian Le Grand suggested that 'the jury is still out on the question as to whether the NHS provides equal treatment for equal need' (Le Grand, 1991), little is still known about inequalities in the use of NHS services.

On the basis of available research evidence, it is perhaps only safe to propose that there is a case for suggesting that the current weighted capitation formula systematically discriminates against areas serving demographically older populations in estimating need for health care. The direction and impact of socio-economic biases in the utilisation-based model are far more uncertain. We return to this issue in Section 2.9.

2.7. Limitations of the use of nationally standardised Indicators

The additional needs index of the HCHS formula comprises those variables that were found to be most closely associated with the national average pattern of hospital utilisation. Concerns have been expressed that the use of nationally standardised census indicators in a primarily urban country yields values that may

misrepresent disadvantage in rural areas (Cullingford & Openshaw, 1982; Payne *et al*, 1996; Haynes & Gale, 2000; Higgs, 1999).

For example, one of the acute need index variables is the proportion of economically active who are unemployed. Unemployment is generally regarded as a reliable indicator of deprivation. However, it may not capture relative need in rural areas where poverty is often the consequence of low pay, self-employment, part-time and seasonal work rather than long-term unemployment *per se*.

Different measures of social and economic status can therefore mean different things in different contexts. It is possible to explore this empirically by examining the association between different indices and phenomena that are known to be associated with disadvantage in different types of areas. Recent and as yet unpublished work (Barnett *et al*, forthcoming) has sought to examine how well three commonly used indices of deprivation predict ward-level variations in morbidity¹ and mortality² in three ONS-defined geographic contexts; namely rural areas, the rural fringe and urban areas³. The results show that all three indices are better able to predict variations in both morbidity and mortality in urban areas than they are in rural areas⁴. The authors conclude that, in contrast to their established effectiveness in urban areas, standard 'generic' deprivation indices are poor explanatory variables in rural locations. A number of possible explanations for this are offered, including the possibility that standard deprivation indices are simply not adequately detecting rural deprivation.

Our own elaboration of this analysis, in which we examine the relationship at ward-level between six deprivation indices and the standardized illness ratio for household residents under 75 (SIR<75)⁵ in each of the fourteen ONS geodemographic categories, supports this conclusion. As shown in Table 1 below, for all indices of deprivation except the DETR's Index of Multiple Deprivation 2000, relatively strong relationships in a variety of urban contexts contrast markedly with extremely poor (and sometimes even inverse!) relationships in rural areas and the rural fringe. A broadly similar pattern, albeit with generally lower correlation coefficients, emerges with respect to standardized mortality ratios (Table 2).

The implications of these results are that additional needs variables that predict national average patterns of use (and therefore need) may not be robust predictors of use in rural areas.

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- ¹ Morbidity data are derived from the Limiting Long Term Illness (LLTI) question in the 1991 Census. Health status is thus defined in terms of the proportion of people resident in households, under the age of 65, who report an LLTI in the census. The data are not age standardized.
 - ² Mortality data were obtained from the ONS for the number of deaths from all causes to those in the 0-74 age group in the period 1991-1996. These data are age-standardised.
 - ³ The Office for National Statistics (ONS) has generated a geodemographic Ward Classification that classifies all of the wards in England and Wales into one of fourteen categories. The categories 'Rural Fringe' and 'Rural Areas' are used, with the remaining twelve categories are aggregated to form the urban group.
 - ⁴ For instance, a strong relationship between LLTI and the Townsend deprivation index in urban areas ($p=0.72$) becomes a lot weaker in the rural fringe ($p=0.27$) and weaker still in rural areas ($p=0.18$). A similar pattern also emerges from the relationship between mortality and the Townsend index, with the strong relationship in urban areas ($p=0.61$) again becoming weaker in the fringe ($p=0.14$) and rural areas ($p=0.22$).
 - ⁵ The Standardised Illness Ratio (SIR) is derived from the Limiting Long Term Illness question on the 1991 census.

Table 1: Correlations (Pearson) of Standard Deprivation Indices and Standardized Illness Ratios at Ward-Level in Different Geographic Contexts (ONS Geodemographic Groups)

Description	N	Breadline Poverty Index	Carstairs' Index of Deprivation	DOE Index of Local Conditions, 1991	DETR Index of Deprivation 2000	Jarman's UPA Index	Townsend's Index of Material Deprivation
Suburbia	944	0.327 **	0.386 **	0.177 **	0.663 **	0.100 **	0.263 **
Rural Areas	736	-0.029	0.108 **	0.073 *	0.548 **	-0.084 *	0.127 **
Rural Fringe	979	-0.001	0.142 **	-0.017	0.566 **	-0.136 **	0.077 *
Industrial areas	630	0.288 **	0.260 **	-0.097 *	0.666 **	-0.184 **	0.199 **
Middling Britain	978	0.181 **	0.259 **	-0.001	0.664 **	-0.136 **	0.208 **
Prosperous areas	962	0.106 **	0.105 **	-0.091 **	0.470 **	-0.147 **	0.013
Inner City Estates	122	0.634 **	0.343 **	0.074	0.688 **	0.219 *	0.423 **
Established Owner-Occupier	1164	0.103 **	0.151 **	-0.034	0.616 **	-0.147 **	-0.003
Transient populations	98	0.329 **	0.273 **	0.211 *	0.488 **	0.231 *	0.222 *
Metropolitan Professionals	231	0.484 **	0.650 **	0.630 **	0.746 **	0.583 **	0.469 **
Deprived City Areas	230	0.776 **	0.721 **	0.678 **	0.743 **	0.671 **	0.742 **
Lower Status Owner Occupiers	481	0.486 **	0.473 **	0.286 **	0.702 **	0.225 **	0.447 **
Mature Populations	682	0.357 **	0.527 **	0.273 **	0.689 **	0.180 **	0.426 **
Deprived Industrial Areas	282	0.299 **	0.293 **	0.131 *	0.597 **	0.117 *	0.311 **
All	8519	0.766 **	0.793 **	0.647 **	0.878 **	0.647 **	0.744 **

** = significant at 0.01; * = significant at) 0.05

Table 2: Correlations (Pearson) of Standard Deprivation Indices and Standardized Mortality Ratios at Ward-Level in Different Geographic Contexts (ONS Geodemographic Groups)

Description	N	Breadline Poverty Index	Carstairs' Index of Deprivation	DOE Index of Local Conditions, 1991	DETR Index of Deprivation 2000	Jarman's UPA Index	Townsend's Index of Material Deprivation
Suburbia	944	0.235 **	0.226 **	0.120 **	0.344 **	0.103 **	0.198 **
Rural Areas	736	-0.016	-0.061	-0.199 **	0.155 **	-0.183 **	-0.040
Rural Fringe	979	0.018	0.045	-0.027	0.257 **	-0.089 **	0.052
Industrial areas	630	0.275 **	0.276 **	0.067	0.462 **	-0.001	0.252 **
Middling Britain	978	0.177 **	0.267 **	0.059	0.460 **	-0.001	0.213 **
Prosperous areas	962	0.106 **	0.103 **	-0.036	0.354 **	-0.080 *	0.069 *
Inner City Estates	122	0.661 **	0.270 **	0.025	0.466 **	0.188 *	0.441 **
Established Owner-Occupier	1164	0.121 **	0.116 **	-0.004	0.335 **	-0.030	0.092 **
Transient populations	98	0.291 **	0.213 *	0.143	0.268 **	0.175	0.244 *
Metropolitan Professionals	231	0.405 **	0.488 **	0.444 **	0.561 **	0.408 **	0.390 **
Deprived City Areas	230	0.562 **	0.411 **	0.357 **	0.337 **	0.427 **	0.516 **
Lower Status Owner Occupiers	481	0.400 **	0.330 **	0.291 **	0.472 **	0.254 **	0.388 **
Mature Populations	682	0.393 **	0.391 **	0.275 **	0.438 **	0.236 **	0.396 **
Deprived Industrial Areas	282	0.354 **	0.319 **	0.386 **	0.439 **	0.383 **	0.391 **
All	8519	0.694 **	0.707 **	0.596 **	0.736 **	0.611 **	0.685 **

** = significant at 0.01; * = significant at) 0.05

2.8. Implications of systematic bias in utilisation and variable selection for rural areas

There is a rural-urban dimension to the biases we have described in the previous sections. Geographical biases in utilisation may be directly built into a system that reads need from patterns of use. For example, evidence suggests that, due to isolation, stigma and low service expectations, rural residents may be less likely to seek help for mental health problems than their urban counterparts (Fearn, 1987; Gift and Zastowny, 1990). This is not acknowledged in the national resource allocation formula for psychiatric services which responds to the relatively high rates of utilisation in inner cities.

An indirect but more significant source of bias against rural areas lies in the weightings attached to different age bands and in the fact that in calculating the various weighted capitation indices, the Department of Health has chosen to accord equal weight to the age and additional needs indices. The latter captures the factors that predict relative use in health care over and above that accounted for by age. This accounts for a far smaller proportion of the variation in health service use than age. In the resultant formula, the importance of age in determining overall need for health care resources is therefore underestimated and the importance of socio-economic factors overestimated.

As the additional needs indices are strongly biased towards urban areas and as rural areas have older demographic profiles than their urban counterparts, the weightings attached to the capitation formula clearly discriminate against rural areas. According to 1998 population estimates, the proportion of the population at retirement age or over was 20% or more in all of the 'coast and country' rural health authorities. In Inner London, by contrast, this proportion was less than 16% (ONS, 2000).

If the commitment to eradicating ageism in the NHS is to be taken seriously, there will therefore be particular pressure on rural authorities to achieve service improvements. Within the current funding targets, this is likely to be difficult. Evidence suggests that rural health authorities are already completing more Finished Consultant Episodes (FCEs) than anticipated by their HCHS targets (White, 2001). There is a strong negative correlation between rates of general and acute FCEs and geometric mean population density, once age and additional need adjustments have been accounted for. White also identifies some urban outlier areas that complete significantly more FCEs than anticipated by the formula. The concentration of these areas in the North West Region again suggests that the weighted capitation formula incorporates geographical - in this case regional - biases.

The implication of these findings is that, because HCHS targets fall short of historical levels of activity in rural areas, rural health authorities will be hard pressed to bring about further improvements in the quantity and quality of services provided to older people. Of course, such improvements do not only demand changes to the current system of health and particularly hospital provision. The NSF for older people calls for closer collaboration between health and local government services in order to provide a seamless service for older people and their carers. However, there has been no consistency between resource allocation criteria between the different sectors (Judge and Mays, 1994). Indeed, as a recent survey of British local authorities found that rural authorities traditionally spent less on social care services and direct provision (Craig and Manthorpe, 2000), it is unlikely that investment from other sectors can compensate for urban bias in health care expenditure.

2.9. Empirical evidence of urban bias in the depiction of health need

Part of the rationale for using a utilisation-based model to determine target allocations was the lack of adequate data on direct health needs. However, concerns about the legitimacy of the utilisation-based approach have been

mounting and, in the recently released Report of the Welsh Assembly's National Steering Group on the Allocation of NHS Resources (NHS Wales Resource Allocation Review, 2001), a strong recommendation was made to adopt a needs-based budgeting approach.

The Welsh Assembly Report proposes the use of existing epidemiological evidence (in this case the Welsh Health Survey) to derive direct estimates of morbidity in different areas. As part of a research project funded by the Economic and Social Research Council's Health Variations Programme, we have developed a method of using age, sex and class-adjusted epidemiological estimates (based on the Health Survey for England) as a basis for setting target allocations for PCOs (Asthana *et al*, 2001).

We have examined the impact of using the morbidity-based capitation methodology to set clinical programme budgets for inpatient coronary heart disease services. Our study covers 34 PCOs in 7 Health Authorities in contrasting locations in England. These include three rural, one prospering, one maturing and two mining and industrial areas according to the ONS classification of health authority types and are located in four NHS regions.

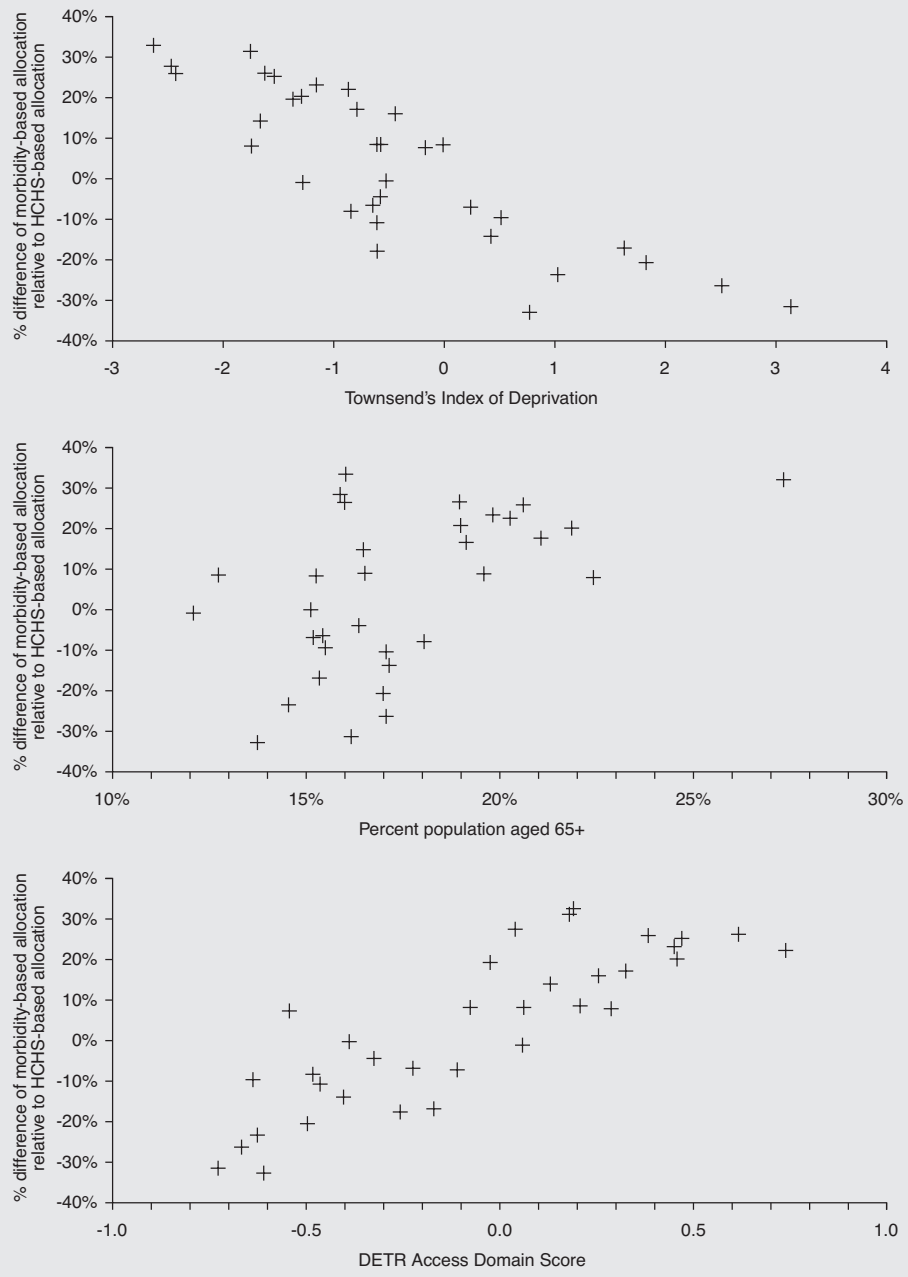
In the 3 years 1996/7 to 1998/9, registered patients within the study sample accounted for 71,426 inpatient episodes with main diagnosis angina or myocardial infarction (ICD10 I20-25). The total reference cost of these episodes was £90,264,143. The aim of the study was to compare how the morbidity-based capitation methodology and the HCHS component of the resource allocation formula would distribute this total reference cost.

The analysis revealed very significant variations. For sixteen PCOs in the sample the adoption of a morbidity-based approach would result in a drop in revenue relative to the HCHS-based allocation of between 0.49% to 32.8%. Eighteen PCOs would gain between 7.6% and 32.9%. £7,641,882 (or 8.5% of the total) would be reallocated if the CHD clinical programme budget was allocated on the basis of the morbidity-based methodology as opposed to the HCHS-based formula. With an overall average allocation of £31.22 per capita (aged 16+) between 1996/7 and 1998/9, the adoption of a morbidity-based approach would result in very significant per capita reallocations to PCOs of between £7.22 gain and £13.89 loss.

These direct health and utilisation-based allocations can be related to the demographic, socio-economic and geographic character of PCO populations. Figure 1 compares percentage differences between morbidity-based and HCHS-based allocations (relative to the latter) against a) Townsend's Material Deprivation scores ($r=-0.845$; $p<0.001$), b) the percentage of population aged 65+ ($r=0.529$; $p=0.001$), and c) the DETR's 'Access to Services' scores ($r=0.847$; $p<0.001$). The last variable provides a useful proxy for rurality. The higher the positive score on the y axes in Figure 1, the more a PCO would stand to gain from the introduction of a morbidity-based allocation. Negative scores indicate that the utilisation-based allocation is the larger. The figure clearly illustrates the extent to which a morbidity-based capitation methodology tends to result in a significant shift of hospital resources for CHD *away* from PCOs serving deprived areas; towards PCOs serving populations with older demographic profiles; and towards PCOs in rural areas.

The conclusions concerning deprivation are worthy of further comment. Because the model underpinning the HCHS component takes account, through the additional needs element, of the impact of deprivation on health service use, a close fit between HCHS resourcing and deprivation would be expected. However, we have used social class in the calculation of the prevalence estimates that underpin our model (see Gibson *et al*, 2002). Social class is a plausible surrogate for deprivation. Thus, the resource shift implied in the comparison of the two approaches reflects the relative weighting ascribed to deprivation in the two models. This is greater with respect to the utilisation-based formula than it is with reference to underlying morbidity.

Figure 1: Morbidity-based Resource Allocation for CHD Clinical Programme relative to HCHS allocation against Townsend, proportion population 65+ and DETR's Access Domain



It is possible that, due to factors such as co-morbidity and disease severity (Eachus *et al*, 1999), deprived groups have a greater need for hospital care than more affluent groups at a given level of morbidity. At a population level, however, we would expect the impact of this factor to be counterbalanced by the fact that utilisation rates are likely to be suppressed in areas with older demographic profiles.

The findings thus support the suggestion that the equal weighting that is accorded to the age and additional need indices in the calculation of HCHS targets (see Section 2.8.3) does indeed allocate resources to deprived areas to a higher level than implied by morbidity alone. This is because although the prevalence of conditions such as CHD is characterised by a strong social gradient, the demographic gradient is even stronger. This is not to deny the association between poverty and adverse health outcomes, or to reject the goal of reducing health inequalities. However, it is equally important to acknowledge that targeting more health care resources at areas that have higher *relative needs* (as expressed by indicators such as standardised mortality ratios and premature disease) will shift resources away from areas that have higher *overall rates* of morbidity when the latter have older demographic profiles.

In addition to effectively 'robbing Peter to pay Paul', the current weighted capitation approach rests on the assumption that variations in the *relative* health status of populations are directly proportional to variations in the need for health care. This suggests that variations in health status are amenable to health care intervention and ignores the factors that give rise to health inequalities that lie outside the control of the NHS.

2.10 Adjustments for Cost Variations in the Provision of Services

We have spent some time exploring the contention that the English NHS formula introduces systematic biases in favour of urban areas in the way in which it depicts needs for health care. In this section, we examine how the formula compensates for unavoidable geographical variations in the costs of providing services.

The recognition that cost variations should be taken into account when promoting 'equal opportunity of access for equal need' was explicitly made by RAWP in 1976. The RAWP report stated that 'the costs of exactly the same form of care may vary from place to place depending on local variations in market forces' (ACRA, 1998). Since RAWP established the principle for a Market Forces Factor (MFF) to take account of unavoidable geographical differences in the costs of inputs such as staff, land and buildings, the MFF has evolved to become the largest adjustment in the resource allocation system as a whole.

The Staff MFF alone covers about 57% of total NHS expenditure and a London Weighting given to medical and dental staff covers a further 9%. The land and buildings MFF applies to a relatively small proportion of total expenditure. Thus, the financial impact of the adjustments made to compensate for unavoidable variations in the costs of paying for or attracting labour is very considerable.

The rationale and development of the MFF have, however, been subject to criticism. The pay adjustments in the Staff MFF are not based on actual pay levels in the NHS but on wage levels in the general labour markets of local areas. This is to ensure that the NHS can compete with other employers for staff. However, as RAWP itself acknowledged, this argument only applies to groups of staff such as administrative, clerical and ancillary workers who are not paid on national NHS pay scales (ACRA, 1998). With the exception of very specific groups such as IT staff, more highly qualified staff tend to compete in the national rather than a local market. Consequently, the relevance of basing pay adjustments on local commercial salary rates is unclear.

The MFF adjustment is strongly biased towards London and the South East. In fact, base salaries are often lower in central London than elsewhere, in part because of higher staff turnover (White, 2001). Rural areas have a greater proportion of their nursing staff on the top of their pay scales due to longer service and the need to employ staff who are sufficiently qualified to work with flexibility and autonomy. There is also evidence that more qualified nurses prefer to work outside London and the South East, despite the payment of London allowances.

In light of the above, the whole basis of the MFF needs to be re-examined. Whilst higher levels of staff turnover in urban areas could result in extra costs due to training and recruitment, there is little evidence that the Staff MFF is being used to enable NHS providers to *compete* with other employers for staff. There is more rationale for using adjustments that *directly* compensate staff for variations in the cost of living. However, the association between the general labour market and the housing market (the most reliable measure of cost of living) is not straightforward. Thus, there are grounds for developing more direct cost-of-living allowances such as transport passes and schemes to help staff to purchase housing. In contrast to the significant adjustments that are made through the MFF, the emergency ambulance cost adjustment (EACA) applies to 2% of the HCHS budget. This is the only HCHS weighting that acknowledges that rural service provision results in unavoidable costs. Indeed, until the EACA was introduced in 1998/99, economies of scale were not considered to be an appropriate basis for making unavoidable cost adjustments to HCHS targets.

2.11. Conclusion

In this section we have presented evidence that suggests that the English NHS formula introduces systematic biases in favour of urban areas in the way in which it compensates for variations in both needs and costs. Against this background, it is hardly surprising that per capita allocations in rural areas tend to be significantly smaller than those in urban areas. Whilst some parts of Central London receive over £950 per person, some of the most rural areas receive less than £600 (White, 2001, p.16).

Much of this section has focused on systematic bias in the way in which *need* for health care is expressed in urban and rural areas. However, significant urban bias in the adjustments made for unavoidable cost variations has also been identified. The reasons why the additional costs associated with the rural provision of HCHS have not met the criteria set for adjusting for unavoidable cost variations are unclear. There is a precedent within the English system for compensating for rurality in the adjustment made to the formula for GP services. Rurality is a significant factor in most local government allocations. There is, moreover, a growing body of evidence that rurality is associated with higher service costs. We discuss this evidence in the next Section of the report.

Section Three: Service Costs in Rural Areas

3.1. Introduction

Many agencies find it hard to make formal distinctions between urban and rural areas in the way they organise and manage their services which means that the particular problems of rural service provision are often not recognised or tackled (Woollet, 1990).

In studies examining the cost implications of providing services in rural areas (Woollet, 1990; CCN, 1998), a number of common factors emerge. These include the lack of economies of scale; additional travel costs; the high level of unproductive time; additional telecommunications costs; poorer access to training, consultancy and other support services; difficulties of networking and the slow pace of development work. The lack of quality information about unmet needs and existing services in rural areas and the difficulty of measuring quality of rural service provision exacerbate these problems.

In this section, the impact of the above issues are explored, aided by survey results from a study we previously undertook for the Cornwall and Isles of Scilly Health Authority and the results of a recent literature search. Many aspects of rural service provision will fit into a number of the categories below. For example, the ambulance service in rural areas will suffer increased travel costs and lack of economies of scale. In the following discussion, however, the additional costs associated with specific sectors of service provision are generally explored under one heading.

Our survey for the Cornwall and Isles of Scilly Health Authority was undertaken in 1999. A telephone survey was undertaken with the Chief Executive of all but one of the mixed urban and rural and rural coast and country Health Authorities (RC&C), as defined by ONS. Among the questions asked were the above issues.

3.2. Economies of Scale

While many services do not run at their optimum level, there is no doubt that service providers in rural areas have less chance of achieving economies of scale than their urban counterparts (Hale, 1996). Consequently, health authorities and other service providers must either develop more numerous smaller units or sacrifice accessibility by tolerating large distances between service users and service centres. The latter approach incurs higher transport costs, even when a large proportion of these are borne by the user population, as staff also have to travel to distributed centres.

The effective delivery of services to rural areas frequently requires a very different approach to that which might be appropriate in urban areas. It is not simply a matter of a rural service being more expensive. The mechanics of delivery may need to be completely different. Options include the use of village halls, community centres, free phone services, part-time services, services provided on the back of others, sharing of premises, multi-purpose rather than specialist groups, and out-posted workers operating as satellites from their organisation's main base. Such relatively unconventional forms of delivery may exhibit high unit costs, particularly if special staff or vehicles are involved.

Some of the most overwhelming evidence of the lack of economies of scale in health service provision comes from the hospital sector. Below are the results of our own rural health authority survey, followed by the findings of the Arbutnott report.

3.2.1. Evidence of lack of economies of scale in rural hospital provision from our survey

Health authorities in the rural coast and country group (RC&C) identified more problems concerning economies of scale than the mixed urban and rural group (MU&R). Difficulties of access relating to the size of the health authority area and/or problems of rural transport were uniformly identified as a factor contributing to additional costs by the RC&C group. By contrast, less than half of the MU&R group raised this as an issue.

Both groups that identified access as a problem referred to the need to maintain more acute hospitals than would be the case if access were not an issue. This resulted in the duplication of facilities in hospitals relatively close to each other, the duplication of staff at multiple sites and/or time wasted in travel between sites, and problems of staff recruitment, training and retention. One coastal HA, where multiple sites were used rather than one central site, had two DGHs in its own patch, and was a heavy user of two other DGHs in differing adjoining HA areas. One Midlands HA maintained 3 acute trusts. In a northern coastal authority, two DGHs were located 45 miles apart, serving a population of 320k. There were not enough patients in paediatrics to justify highly experienced consultants in both hospitals. However, because of the time involved in travelling between the two hospitals, more paediatricians than would be expected at a single centre for the population threshold were required.

For the RC&C group, problems of access were compounded by a low population threshold. According to respondents, low population thresholds could have an impact upon service delivery and quality in a number of ways. For instance, the population supported may only require one consultant, but quality considerations may demand at least two. Low numbers of specialist staff and/or specialist equipment can result in more disruption for patients when something goes wrong. Relatively low staff numbers had implications for recruitment, training, skill retention and service quality. Quality issues were particularly raised over single-handed consultant posts. Finally, if one hospital department had to close due to scale or quality of training issues, other areas of hospital provision may in turn be threatened.

The necessarily small scale of operation was referred to by a number of respondents. For example, the acute hospitals in a HA near Wales were smaller than many of their urban counterparts. In a northern HA, attendance at an Accident and Emergency Department fell below the Audit Commission threshold of 50k patients each year. However, poor access to the next closest unit due to rurality meant that the department had to remain open. In a coastal northern HA, despite duplication of services at additional costs, problems arose with regard to providing a complete range of services and expertise in both District General Hospitals.

The fact that population thresholds pose a more significant problem for the RC&C group than the MU&R group authorities was reflected in the very different attitudes expressed about community hospitals. The MU&R group authorities hardly mentioned community hospitals, except in a positive sense of developing and expanding levels of care. By contrast, the RC&C group raised a number of problems. According to respondents, many community hospitals were limited in the services that they provide. This can be due to inadequate facilities at the hospital; problems with the Royal colleges over doctor training and minimum back-up requirements for patients when things go wrong; the inefficient use of consultants' time travelling out to remote areas for a limited number of patients; and difficulties in maintaining an efficient nursing rota. In addition, it was suggested that it was difficult to obtain a uniform quality of service in community hospitals; that hospitals in remote areas had a very high cost of access, but that despite additional costs, there remain many patients who do not have easy access to a community hospital.

In one South Western HA, the need to maintain efficiency at the DGH had led to services being taken away from the community hospitals, which had reduced their viability in terms of day case surgery. In another South Western HA, which had the highest number of community hospitals in an English HA, it was found that a number of GPs close to these community hospitals had a high cost for bed based care and conversely lower costs for nursing care.

In order to overcome problems of access and low population thresholds, a number of authorities have adopted hub and spoke arrangements in the provision of acute care. However, this option is not so viable for the peripheral authorities.

3.2.2. *Other work on the lack of economies of scale for hospital provision in rural areas.*

In urban areas there are often no community hospitals, as patients have ready access to a District General Hospital that offers equivalent services. However, as rurality increases it is necessary to have progressively more hospitals for patients to be able to access services. White (2001) shows that the most rural areas may have up to 6 hospitals per 100,000 people. He suggests that the need for additional local hospitals is particularly evident in rural areas that have a large number of small towns (e.g. Somerset, Devon, Cornwall and Dyfed Powys).

A frequent criticism of the smaller rural hospital unit is the lower utilisation of beds. Part of the reason for this difference is that in highly rural areas a critical mass of beds are required. White (2001) illustrates why this needs to be so by using the extreme case of the Isles of Scilly which has a population of about 2,000. Its links to mainland UK are by ship and a seasonal helicopter service. As a result the hospital for the Isles of Scilly has 14 beds with a daily average occupancy of 3.7. This number of beds is required because of the necessity to provide cover for serious health crises on the Islands. Unlike Scotland, there is no additional funding in the resource allocation formula to compensate English areas with highly remote populations.

White (2001) acknowledges that there is a significant opportunity to use the beds more efficiently in many rural areas, as the hospitals have to be staffed to meet the requirements of full occupancy. However, there can be difficulties with moving patients between facilities because of inadequate patient transport, differences in systems and protocols, poor communication and concerns over 'cost shifting'. Thus, such an increase in utilisation would necessitate an increase in funding to pay for transport for patients between hospitals, clinical supplies and increased catering costs.

3.2.3. *Recognition of lack of economies of scale in hospital service in Scotland.*

The Arbuthnott review of resource allocation in Scotland found that the island Health Boards required additional resources of almost 30% per head of population to take account of the particular problems they faced in delivering hospital services in remote and rural areas. Several of the mainland Boards with a substantial proportion of their population living in remote and rural areas (Borders, Dumfries and Galloway and Highland) required additional resources per head of population of between 7.5% and 10%. Grampian and Tayside Health Boards also have a significant proportion of their population living in remote and rural areas and require adjustments of 2- 3% to take account of the impact on their hospital costs.

The remoteness of the areas in which hospital services are provided varies widely between Health Boards in Scotland. Population density varies from 1,589 people per 100 hectares in Greater Glasgow Health Board to 8 people per 100 hectares in Highland Health Board. The island Health Boards (Orkney, Shetland and the Western Isles) have very low population density, and in Borders and Dumfries and Galloway the population density is also low compared with other mainland Health Boards. In most of the mainland Health Boards fewer than 10% of the population

live in small urban locations with a population of less than 1,000 people. However, in Borders, Dumfries and Galloway, and Highland this proportion rises to over 30%, and in the island Health Boards it averages over 50%.

This pattern of population settlement has significant implications for the costs of delivering hospital services, mainly because of the effects of economies of scale. The average size of hospital in Health Boards with low population density and with a significant proportion of their populations living in small communities is much smaller than in Health Boards providing hospital services in more densely populated urban areas.

The Arbuthnott technical team provided evidence on the economies of scale in the provision of hospital services, suggesting that the unit costs of providing services in small hospitals tend to be significantly higher than in large hospitals. For example, in the larger mental illness hospitals with more than 10,000 inpatient weeks the average cost of providing inpatient care in 1997-98 was around £700-£750 per week. This cost increases as the size of the hospital falls, and in the smallest hospitals with fewer than 10,000 inpatient weeks the average cost per week was more than £900. A similar pattern of costs was found in acute hospitals, maternity units and hospitals caring for the elderly. These estimates were based on the average costs with which services are provided in small hospitals compared with the average costs of providing services in large hospitals.

3.3. Higher Travel Costs.

Higher travel costs tend to be incurred in rural areas because service centres have larger catchment sizes and workers going out into the community cover a larger patch than their urban counterparts. Public service workers in rural areas therefore travel longer distances and spend more time travelling. In the absence of an adequate public transport system, travel is inevitably by car, which incurs both fixed and fuel costs. Empirical studies of travel costs confirm that significant differences exist between urban and rural areas. For example, the average mileage of urban occupational therapists in Dorset has been found to be 1,952 miles, compared to 4,880 for rural OTs (Galuschka, 1999).

3.3.1. Results from our survey on higher travel costs

High travel costs and high levels of unproductive time were almost uniformly raised as a concern by the RC&C group authorities. Many noted that countywide services involving specialist staff involved a high element of unproductive time.

Recent changes to primary care provision (such as the shift of services such as physiotherapy from outpatient departments to general practices) were also associated with increased costs, though it was recognised that such developments do improve patient access.

The extent to which district nurse travel costs were an issue varied between authorities depending on the degree to which community trusts charged blanket rates which cross-subsidised their rural areas or whether they made their travel costs to more remote areas more explicit.

Finally, several HAs had responded to declines in public transport availability by joint financing various community transport projects such as dial-a-ride which transports rural patients to outpatient departments. Transport does appear to be increasingly seen as a legitimate function of the health sector. Yet, the cost implications of this are rarely acknowledged.

The degree to which HAs could identify alternative policies to counter high travel costs varied according to the service provided and the rural context. Expensive specialist services such as consultant clinics may be more efficiently provided if patients travel to more centralised facilities and take on the burden of the travel and cost themselves. For other services, however, delivery within the home or community was an integral part of service quality.

Patient characteristics are also a factor in deciding whether to rationalise service delivery or not. For example, acutely ill patients may be motivated to travel further. By contrast, respondents suggested that local points of access should be kept open for patients who require regular monitoring (e.g. diabetics).

Finally, the socio-economic context of service delivery was an important factor. Several respondents pointed out that patients in isolated communities suffering from unemployment and deprivation are more likely to seek local care than to travel to a DGH, even if the latter provides the best medical solution.

Several HAs were reviewing travel costs with a view to reducing staff travel time and transferring costs to patients and carers. These HAs appeared to be acutely aware of the need to balance cost-effectiveness with quality and access.

3.3.2. Higher rural travel costs & the resource allocation in Northern Ireland

While it is intuitive that rural areas face higher travel costs in the provision of services, particularly community services, it is only relatively recently that the scale of the increased costs in relation to rurality have become explicit in a number of studies.

With regard to community services, in October 2000 the Department of Health, Social Services and Public Safety in Northern Ireland completed their report, *'Allocating Resources to Health and Social Services Boards: Proposed Changes to the Weighted Capitation Formula. A Third Report from the Capitation Formula Review Group'*. One of the aims of the review was to 'adjust for differential costs associated with the provision of services in rural areas. This largely related to the costs of travel, including professional time, and to take account of the generally longer distances to be travelled in rural areas'.

Ten specific services thought to have a significant rurality cost associated with travelling were used to develop weightings to reflect the impact of rurality. These weightings were extrapolated to similar services. Total demand across HSS Boards was based on the age and needs weighted population within each HSS Board area and the total travelling distances. Times produced by the model were then costed to produce a total 'rurality budget' for each modelled service along with each HSS Board's share of that budget. Each HSS Board's final 'Rurality Budget' for 2001/2002 varied from an addition of 22% to 30%.

3.3.3. English rural travel costs for domiciliary care

A study of the costs of providing domiciliary care in England using similar methods to those used in Northern Ireland and was undertaken for the English County Councils Network. Data from seven authorities across the urban rural continuum provided a service model for the key logistical elements of service provision, which was then extrapolated across all English authorities.

The results showed that travel related unit costs per head varied from £94 in Birmingham to £210 in North Yorkshire, a ratio of 2.2:1. If the model-derived travel costs were redistributed within the same overall funding level (rather than the current sparsity allowance) there would be significant changes in budget. The current mechanism for taking account of sparsity within the SSA only allows variation in funding levels at the margins and falls far short of adequately reflecting the true costs and true differential effects.

3.3.4. Rural travel costs for community workers in Scotland

The Arbuthnott review (SHED, 1999a, 1999b) of resource allocation in the Scottish NHS employed consultants NERA to develop a methodology for estimating the costs of providing district nursing and health visitor services. NERA's estimates of travel costs focused on two groups of patients, those within population clusters and those without, amongst other assumptions discussed elsewhere in this report.

These assumptions were used to generate a relative costs model with Scotland equal to 100, which showed that Health visiting and district nursing in Glasgow was 5.3% below the national average, while Argyll and Clyde was 3.3% above.

3.4. Unproductive Time

On top of the direct costs of transport, rurality tends to be associated with higher rates of unproductive staff time, a problem that itself confers costs. A database of home care clients and providers for 1997/98, held by the University of York, suggests that the travel component increases as population density decreases. Super-sparse wards have between 15% and 20% of provider time lost to travel, while sparse wards have between 13% and 15% of provider time lost to travel. Non-sparse wards have between 10% and 12% of provider time lost to travel.

O'Donnell, 1996 cites a number of studies from various sectors of social services in Cornwall where staff members spend between an eighth and a quarter of their day travelling to and from clients. This ranged from a case co-ordinator working in the urban area of St Austell who might spend 2% of their budget on travel, to a similar worker in the rural china clay mining area surrounding St Austell where travel costs amounted to up to 12% of budget. It is quite likely that more specialist (and higher paid) staff have to spend even more time travelling as their case load will be dispersed over a wider area.

As already shown, studies comparing travel time and costs between rural and urban areas suggest that rurality does indeed have negative consequences for transport costs and unproductive time. According to an analysis of elderly domiciliary care in 14 English counties, the proportion of time spent caring for the client (rather than travelling) was significantly higher in urban than rural areas. Not surprisingly, therefore, mileage costs accounted for a substantially higher proportion of total home care costs in sparse and super sparse areas (CCN, 1998).

In addition to incurring higher unit costs as a result of travel, lost time and the loss of economies of scale, sparsity has been associated with increased resource incurrence due to longer lengths of hospital stay. This reflects the difficulties of discharging patients to homes that are distant from health care centres and providing comprehensive home-based care (MHA, 1997; ORH, 1997).

3.4.1. *Unproductive time and efficiency in the emergency services*

Unproductive time and the resulting lower efficiency factor for rural service provision is most acutely felt with the emergency services. Following a study by MHA and ORH in 1997, the English resource allocation system gave an increase to certain rural health authorities for emergency ambulance provision. However, a review by ORH on the impact of population sparsity on the cost of provision of police services in April 1999 gave a valuable insight into the scale of difference between the most urban and the most rural of police forces (not necessarily shown by the scale of the award). The SSA for police services was adjusted for the 1996/97 financial year to compensate areas for the additional costs of providing police services in rural areas. The adjustment was 0.5% of overall funds and it was distributed on the basis of the enumeration district sparsity measure.

The study involved modelling the costs of 14 forces, the least sparse area being the Metropolitan Police area and the most sparse was Dyfed-Powys. Achieving the response time targets in the simulation resulted in utilisation rates of 87% in the least sparse areas and 30% in the most sparse area of Dyfed-Powys. The ratio of officers per call was 5.71 to 1 in Dyfed-Powys and 1.7 to 1 in the metropolitan police area. It was concluded that the low resource utilisation rate is the inevitable result of the requirement to respond to a high proportion of calls within the target time.

If national response time targets for the ambulance service (which operates much stricter response times than the police service) are going to be met, extra resources for ambulance services will be needed in rural areas.

3.4.2. Ambulance services in Scotland and Wales

Ambulance services were not directly changed by the Arbuthnott Report, and ambulance services in much of Scotland are run in different ways to England and Wales (key differences include the number of single manned and dual purpose vehicles, and retained ambulance persons on duty at home in Scotland).

In Wales the emergency ambulance service mirrors the English system, with the exception of how the rurality factor is calculated. In Wales the rurality factor is calculated by taking the road length per thousand population, added to the Wales average road length per thousand population. This factor is applied to a weighted sum of the inpatient and outpatient populations for each health authority. The weighting for this factor is five for outpatient services and one for inpatient services.

3.5. Higher communication Costs.

Rural organisations are likely to face higher costs for telecommunications services than urban organisations because of the structure of local telephone call areas and the greater use and dependence on the telephone in rural areas. While communication is getting easier and cheaper with email, fax and mobile phones, this should not replace face to face contact with many public service clients. However, due to poor transport infrastructure, communication with clients is more likely to rely on the phone.

Furthermore, because the head offices of many large organisations are either in large cities or the county town, providers contacting members of their own organisation often have to call outside the local area (O'Donnell, 1996). Problems of telecommunication costs have been recognised by rural agencies. For example, Cornwall County Council has developed a telephone network to allow clients to phone in at the cost of a local call.

3.6. Costs of Access to Training, Consultancy and Other Support Services.

Training requirements in the more remote areas are inevitably more costly to fulfil, either because staff must travel to training centres or because training needs to be imported. A Cornwall-based worker attending a conference in London would incur substantial travel costs and lost working time, and also a high probability of the expense and inconvenience of an overnight stay. Given the difficulties of producing viable numbers of training courses, providers are left with only two options: to pay more to send their staff to an urban centre, or to accept that their staff may be disadvantaged by lack of training. CCN (1998) concludes that in rural areas there is poorer access to training, consultancy, and other support services.

Rural providers also suffer from the lack of an existing infrastructure of supportive services. The voluntary sector tends to be under-resourced. This has implications not only for the costs of provision (as the role of the voluntary sector has shifted from that of political lobbying to direct provision). The low level of voluntary and other services also means that there may be no ready-made network with which to consult.

3.6.1. Survey results

The R&RC group was more likely to cite problems around issues of training, management time, and the pace of development change and networking. For example, a particular peripheral HA identified training as a major problem, particularly in the recruitment of junior doctors and practice nurse training. A more central rural HA also mentioned the problem of travel time involved for staff receiving training in its urban centres. GP practice staff training to maintain quality and networking was also identified by group two authorities as an issue for more rural practices, as was clinical governance.

Areas covering a wide geographical area found that much management time was taken up in arranging service configurations. Because there are no extra resources to deal with the staffing and infrastructure that needs to be maintained at diseconomies of scale to deal with management and development in very rural areas, management was cited as a very real problem by several in the R&RC group authorities. In some areas, the number of locality managers had to be reduced, with obvious implications for development work. Peripherality could also make guarded attitudes to change, making it difficult to implement new developments driven centrally by the Department of Health. Some health authorities, however, acknowledged that there was a slower pace of change, but suggested that the pay off for this was a better sense of ownership of policies at the local level.

In order to overcome some of the problems identified above, a number of HAs were experimenting with telemedicine. However, whilst such technologies were being developed for use in clinical and practice training, there was little evidence that technologies such as video conferencing are being brought into the management structures.

3.7. The Pace of Development Work.

Some workers argue that a characteristic of working with rural communities is the slow pace of change. There are often difficulties in bringing people together for meetings because of the time involved in travelling. The lack of supportive networks also affects development work, leading to a slow pace of change and a lack of innovation. The setting up of support networks in areas such as mental health is much more difficult in rural areas where the critical mass of interested people often do not exist.

As the DOH attempts to introduce a unified service standard across the country so the number of meetings that have to be convened has mushroomed. As an example, the introduction of the NSF for older people alone has required liaison between professional groups within and outside of the health service. This is much harder to achieve in rural areas where there are much greater distances to travel.

3.8. Conclusions

The cost implications of providing services in rural areas identified by Woollet in 1990 are still very relevant today. The lack of economies of scale is particularly significant for the costs of providing hospital services. The average size of hospital, and hence increased per patient cost in many rural areas is much smaller than in urban areas. In rural areas service centres tend to cover a larger patch than their urban counterparts, leading to higher travel costs. When aspects such as unproductive time are also taken into account then the need for higher inputs in rural areas becomes very apparent.

Specific sectors of rural service provision are likely to suffer from several of the aspects discussed above. These costs are largely unavoidable and it is difficult to justify their exclusion from the adjustments that are made in the English resource allocation system for geographical differences in the costs of providing care. One factor that appears to have influenced the decision not to take rurality into account when making major cost adjustment is the lack of sufficient evidence. We would propose that although data availability, costing systems and the methodological processes for capturing the increased costs of rural service provision are in their infancy, most of the factors we have discussed have the potential to be costed. As England is now the only country within the United Kingdom that does not make a major adjustment for rurality in its NHS funding formula (see Section Five), this decision, and its implications for rural-urban variations in the provision of care should at least be researched and reviewed.

Section Four: Service Access, Use and Quality in Rural Areas

4.1. Introduction

If, as the previous sections suggest, the English resource allocation system does not adequately capture rural health needs or compensate for the additional costs of providing health services in rural areas, questions naturally arise about the implications for urban-rural differences in funding for service accessibility, utilisation and quality. In this section, we explore the contention that under-funding in rural areas does threaten service access and quality and consider what available evidence means for the principle of geographical equity in the NHS.

4.2. Accessibility to Services in Rural Areas

There is strong evidence to suggest that geographical access to services has a profound effect on health care utilisation (Rice and Smith, 2001). This is demonstrated by the distance decay effect, where utilisation of healthcare drops as distance to a service increases. Rural communities tend to have to travel further in order to access services. Consequently, rural areas have been consistently found to exhibit lower levels of health service use than their urban counterparts (Haynes and Bentham, 1982; Bentham and Haynes, 1985; Watt *et al*, 1994; Jones *et al*, 1998; Gibson *et al*, 2002).

Despite such evidence, problems of rural access have attracted less attention amongst health policy makers than other forms of disadvantage (particularly socio-economic disadvantage). Perhaps frustrated by their attempts to get rural access issues directly onto the policy agenda, rural agencies have recently portrayed accessibility as one of a number of dimensions of 'rural deprivation' (Hodge *et al*, 2000; Noble *et al*, 1999). This approach is making a valid point - that access to basic services is important for quality of life and related health outcomes. However, there are also good grounds for making an explicit distinction between the geographical and socio-economic aspects of disadvantage.

4.2.1. Lessons from Australia

In work sponsored by the National Rural Health Association in order to devise the Accessibility/Remoteness Index of Australia (ARIA), problems that result from conflating locational and socio-economic disadvantage into a single measure were considered (NRHA, 1999).

The ARIA literature defines remoteness in terms of the physical distance separating the base spatial unit from nodes of activity. The major focus of interest here is on how distance restricts opportunities for interaction. Perceptual, behavioural and socio-economic characteristics also impinge upon service accessibility. However, as the ARIA research concluded, if geographical and socio-economic factors are incorporated into a single measure of remoteness, it is difficult to establish the extent to which an area is locationally disadvantaged and the extent to which it is socio-economically disadvantaged. For example, a single measure would fail to discriminate between areas on the fringe of a metropolitan area occupied by transport disadvantaged people and others in areas where inaccessibility is more attributable to sparsity of settlement and long distances to major urban centres. From a policy perspective, policy options to overcome or ameliorate the different types of disadvantage become confused.

There are many ambiguities in the current English resource allocation system. These include the association between socio-economic disadvantage and service uptake and the relationship between health inequalities and the distribution of

health care resources. Despite this, socio-economic disadvantage has been seen as a more legitimate target for resource allocation than locational disadvantage. If the concept of equal access is to be upheld as a guiding principle of resource allocation, geographical barriers to service access also deserve consideration. Making a more explicit distinction between geographical and socio-economic dimensions of service need and access could help to clarify the differing service needs of urban and rural areas and throw light on appropriate policy options for different contexts.

4.2.2. *Capturing variations in service access*

In Australia, research on locational disadvantage has tended to use distance decay as the main measure of remoteness. In a country the size of Australia, there is possibly no need for a second order measure, such as the dispersion of the population. In the UK second order measures may be more appropriate. Examples include nearest neighbour (Martin *et al* 2000), geometric population density (White, 2001) and distance from a settlement (SHED, 1999a, 1999b).

Although measures of physical distance and population distribution have indicated clear differences in geographical accessibility to services, travel time is generally superseding straight-line distance as an access measure. For example, Senior and Rigby (2001) superimposed methods used in the Arbuthnott report to compare access to GP practices and hospitals in Scotland and Wales. Census data were used to estimate the numbers of people resident in areas more than 30 minutes travel time from a hospital and 15 minutes travel time from a general practice. In Wales 57,944 people (2.05% of the total population) lived outside the access times, while in Scotland 120,518 people (2.45% of the total population) lived outside the access times to GPs.

A similar type of study in England was undertaken by Lovett *et al* (2000), where the project objectives were to develop new methods for measuring access to primary health care services (general practices, pharmacies and NHS dentists) in Norfolk. GP patient registration data were used to represent the spatial distribution of the population and patterns of service access by both private and public transport explored. The results suggest that a similar proportion of the population are 'under-served' in terms of access to GP surgeries as in Scotland and Wales. Only 2.5% of the population were outside 15 minutes car travel time; 8% lived more than 10 minutes derive from a surgery. Public transport access was considerably poorer. 13% of Norfolk's residents lived in areas with no return daytime services to GP, dental or pharmacy services. Some of these will, of course, live within a reasonable car travel time (though not all will have access to a car). The study estimated that 5% of the population lived more than 10 minutes car journey *and* had no useable bus service to a surgery.

4.2.3. *What is the threshold of reasonable access to primary care?*

It is interesting that using the same threshold of 15 minutes car drive time to a GP surgery, similar percentages of the population in Scotland (2.45%), Wales (2.05%) and East Anglia (2.5%) are found to have poor access. The new methodology used in the Countryside Agency's Parish Survey shows similar results for access to basic services. For example, in its old form the parish survey would report that only 55% of parishes in Derbyshire had a post office. Using straight-line distance, 97% of households in Derbyshire are within 2kms of a post office.

If it is taken that a walking distance of 2kms to a post office, or a fifteen minute drive time to a GP surgery defines reasonable access, then in the studies reported there appears a consistent percentage of 2% to 3% of the population that do not have reasonable access. This is not to suggest that these are reasonable terms of access, or that these percentages are consistent in all situations. For instance as the spatial unit of analysis gets smaller, the variation is likely to increase. The point is more that no information is given about the degree of isolation of those that are not within the 'reasonable access' frame.

There are a number of localised studies that have taken a reasonable access frame based on distance or time from a major centre. Researchers at Queens University in Belfast have undertaken work for the four Health Boards in Northern Ireland where the travel time to Belfast is part of the accessibility frame. In similar vein, the Planning and Development service in Highland Council has measured accessibility by areas more than a ten minute drive from five key services and 1.5 hours drive from Inverness. While such measures may find utility at a local level they do not help in a national system of measurement where values need to be standardised for the resource allocation process.

Flowerdew et al (2000) have created a matrix of travel times along the road network for the whole of England, and calculated a local authority single remoteness measure that would be comparable between local authorities of different size. Measures of remoteness were calculated according to the distance to the nearest settlement of a given size, based on the assumption that the availability of certain services will depend on the size of the settlement. Relatively ubiquitous services would be expected in quite small settlements of 5,000 people, while other services may only be available in settlements of 25,000 or 100,000, reflecting traditional geographical notions of a hierarchy of goods and services available in central places. One of the main problems this work encountered was that the more peripheral or remote the area, the greater the level of services at the smaller settlements. The traditional hierarchy of service provision is no longer sensitive enough.

4.2.4. Refined access measure to help calculate additional costs

PION Economics (2000) have constructed a measure to encapsulate the access difficulties experienced by isolated communities. This comprises nearest neighbour distances and an average weighted population distance measure for the resident population within a number of the Scottish local authority areas. The particularly useful part of this measure is that it is calculated for residents both within and outside settlements and as such gives a good indication of the level of isolation of those living outside settlements. This has obvious ramifications for policy in the provision of rural services. This measure demonstrates the much higher isolation that exists in some rural areas and shows that, even within rural areas, extensive isolation can exist outside settlements.

Information on the proximity of settlements to each other and the degree of isolation of those living without the settlements is likely to directly correspond to the resources needed to provide various types of service to a given quality standard. The work is still in its infancy and more research needs to be done to agree a consistent settlement size, and a consistent way of calculating nearest neighbour so that the values produced have the same meaning for all areas.

While the application of GIS techniques in academia is currently producing levels of analysis to promote a greater understanding of the complexity of rural service provision, its transferability into mainstream health provision does not look hopeful. Gary Higgs (Cardiff) is currently undertaking a study of how GIS has been adopted by Health Authorities, PCOs, general practice and acute and community trusts. Early results show a patchy uptake by health authorities. At the trust and PCO level, the use and understanding of GIS is minimal, and as might be expected, at the practice level it is virtually non-existent. However, it is important that this emerging technology should be known to the seventy or so rural PCOs, and that they should collaborate with academia to further these techniques that will help their own case for increased rural funding.

4.3. Service Quality in Rural Areas

The media currently make much of the adage that healthcare is a postcode lottery. The government are currently introducing a number of initiatives, such as the National Service Frameworks to reduce this criticism. However, equality in the

standards of care has a long way to go, and in rural areas in particular, patient choice can be very restrictive. The move towards improvement in rural areas is not particularly new. The Scottish Health Advisory Council (1995) notes that what was previously acceptable in terms of access is not necessarily the desirable standard for the future where high quality care and safety for patients must be the main criteria. The problems defined in their report are listed as: time spent travelling delays access to medical facilities; stress and tiredness when patients arrive for treatment; delays in discharge which can be detrimental to recovery; costs of travel to patients and families visiting; and the loss of time for patient care due to staff time spent travelling.

The report also notes that the recruitment of specialist staff is a problem in rural areas. Consultants providing outreach in situations such as community hospitals have to maintain shifts with small numbers of professional staff. The maintenance of skills can be a problem in many areas such as dentistry, radiology, maternity, mental health, pharmacy, haematology, biochemistry, bacteriology, residential and nursing homes. This, in conjunction with the problem of achieving economies of scale, can result in a more limited range of specialist services.

With regard to general practice, in rural areas small surgeries comprising one or two general practitioners and serving a small population are still quite common. In addition to restricting patient choice, this can result in perceived problems regarding patient confidentiality on such issues as contraceptive advice, gynaecological counselling, HIV testing and counselling and support for alcohol abuse or domestic violence. Concerns have also been expressed about access to good quality information regarding health services in rural areas.

4.3.1. Survey results on lack of choice

In our 1999 survey of rural Health Authorities, lack of choice was not identified as a significant problem by the MU&R group, though several mentioned that many of their rural general practices did not have as good ancillary services (e.g. physiotherapy, counselling) as their urban counterparts. The lack of rural dentists, opticians and out-of-hours pharmacies was also referred to.

The RC&C group respondents were more likely to refer to problems of lack of choice, which they associated with the larger proportion of single-handed and/or small GP practices in their areas. Patients often had no choice of practice and occasionally no choice of GP. This situation seemed even more acute with dentists. According to one respondent, patients wanted to see their surgeries open more in the evenings to improve access to the GP for the working population. The RC&C group respondents also cited lack of choice in secondary care.

4.3.2. Survey results on aspects of quality

Several issues were raised regarding quality in primary care, including the need to maintain small branch surgeries in many deep rural areas; a higher than average GP to patient ratio; and the lack of out of hours cover for rural practices.

Every HA in the RR&C group and several in the MU&R group referred to problems with their ambulance services. Whilst ambulance services were generally seen as efficient in terms of the resources at their disposal, response times in rural areas were far from satisfactory. HAs that experience high numbers of holiday makers also cited problems of high demand of A&E sub-centres.

Attitudes to voluntary services seemed to differ between groups. The RR&C group respondents were very positive in acknowledging the work done by voluntary agencies in their authorities. Their ability to raise funds and support very local needs such as transport was highlighted, as was the fact that voluntary agencies working with small and geographically dispersed groups themselves faced high service delivery costs.

The MU&R group offered few comments on voluntary agencies. One HA suggested that the lack of professional liaison made it difficult for voluntary groups to get up and running, leading to piecemeal provision. Another commented that its local voluntary car scheme (which received a grant from the HA and Social Services) seemed very expensive. It was well known that voluntary provision was very uneven, both between geographical areas and client groups. Perhaps the difference between respondents' attitudes towards this sector reflects differences in the extent to which highly rural and mixed areas *rely* on voluntary provision.

Despite growing concerns in the academic literature about the isolation and stigmatisation experienced by rural people with mental health problems, several respondents commented that they thought there was a greater tolerance of mental health problems in rural areas. One HA acknowledged, however, that many of the most severe mental health problems migrate to urban areas. Concerns about suicide in young males and the depressed farming community were raised. With regard to service delivery, a number of issues arose. These included poor access to specialist mental health services in rural areas; poor quality of access to day services in rural compared to urban areas; and difficulties in communication between community mental health teams and secondary mental health services due to the small size of primary teams.

4.4. Benchmarking

Rural and urban areas present quite different challenges for the optimal design of health services (Rice and Smith, 2001). Appeals for increased funding due to place effects such as rurality should not hide organisational inefficiencies. This creates a problem of identifying not only how well rural trusts manage their budgets, but also the level of quality their services provide compared to their more urban counterparts.

The National Service Frameworks may be viewed as an approach that is addressing the impact of investment of resources and attempting to level up standards of care within geographical areas by robust performance management and benchmarking. A major problem is that there is currently an information deficit at the micro level within provider trusts, which restricts analysis of expenditure between different types of service and client groups.

National standards can also be insufficiently sensitive to differences in the way that services are organized and delivered in different contexts. For example, there can be significant differences in nature of rural and urban general practice, rural practitioners fulfilling a number of functions (e.g. suturing) that would normally take place in the secondary care environment. Rural practitioners may also respond to difficulties in access to secondary care through more active prescribing. Again, however, nationally referenced targets can work against such flexibility.

The increasing interest in the quality of rural service provision and an increasing awareness that, in order to meet a quality audit, services may have to be delivered differently in rural areas at least makes specific the minimum staffing levels required. However, staff:patient ratios are not the only determinant of service quality. Issues also arise in the level of expertise needed.

White (2001) points out that the grade for nursing posts are determined using the Clinical Nurse Grading definitions. A key issue in the determination of grade is the amount of supervision and autonomy for the clinical work carried out. In rural areas there are fewer opportunities for the clinical work of staff to be supervised. Therefore more staff are required to have 24 hour responsibility for the patients on their caseload and their post has to be of a higher grading. The salary differences between grades are ordinarily around 20% and therefore the cost implications of requiring more highly graded staff are significant.

It is appropriate that institutions such as the Royal Colleges should be asserting realistic minimum standards for staff to assure patient quality and safety even though this has ramifications for rural service provision, particularly where highly

specialised skills are involved. The need to see a high number of patients to stop skills atrophying, balanced against diminished access for rural patients is a balancing act for managers to find acceptable service configuration and innovative ways to deliver services that meet such standards. It should also be incumbent on government to explicitly fund these additional costs.

4.5. Providing quality care for the elderly in rural areas

A particularly area that warrants greater consideration by the rural lobby is the quality of care for the elderly, both within the health service and its interface with Social Services and Local Authorities. The importance of identifying the increased costs in the supply of quality care services in rural areas is emphasised by a study undertaken by Meerding *et al* (1998). They point out that in the Netherlands healthcare costs are strongly age dependent, and are dominated by old age and disability, with costs increasing exponentially after the age of fifty. The study revealed that the amount of the healthcare budget spent on the main fatal diseases is relatively modest: all cardiovascular diseases and all cancers, which together cause 67% of all deaths, accounted for only 17% of all healthcare costs that could be allocated to a diagnostic group. Far more was spent on mental disability and musculoskeletal diseases. Normand, (1998), in a letter to the BMJ, argued that ageing is not the main factor in costs. Acute medical care in proximity to death is more important than age as a factor. Whichever view prevails, there is more death with age, more age in rural areas, and a high burden of care in areas where there are additional costs to providing that care.

Accepting that rural areas tend to have a more ageing population than urban areas, and as the main healthcare costs are for care, not cure, health care costs in rural areas are likely to continue to increase. This will partly be in response to greater longevity. However, evidence also suggests that there is considerable unmet need amongst older rural residents and that investment will be required if this is to be addressed. For example, Netten and Curtis (2000) suggest that in rural areas informal care is used to a greater extent than in urban areas, giving a hidden cost. Brown, (1999) noted that the Social Services Inspectorate found evidence that in a number of rural areas there was a distinct lack of choice leading to service refusal. A number of services were less accessible to country dwellers than those living in the town. It was also found that in rural areas inappropriate services were used because of proximity to the service user and a reliance on historical distribution of services, which did not necessarily reflect known need.

4.5.1. Interagency funding

As suggested in Section 2.8., improvements in the quality of services provided to older people in part rest on achieving closer collaboration between health and local government services (particularly social services). The pursuit of a seamless service for older people and their carers rests on the assumption that local government service delivery in rural areas is efficient and adequately funded.

On the premise that there are additional costs of providing health services in rural areas, and that the burden of care over cure is likely to be high in ageing rural populations, then the funding between the relevant agencies needs to be transparent. However, the criteria for most social care provided by Local Authorities have been very different to those of the NHS. Local Authorities have had some discretion over how much they spend on social care in the light of local priorities, which may not reflect local needs. The development of national guidelines surrounding joint commissioning and integrated provision may lead to a more coordinated approach to funding services for older people. However, it is important to recognise that, because of historical differences in funding levels, local priorities, etc, areas seeking to build up integrated services are starting from very different points.

4.5.2. Health and social care services

Craig and Manthorpe's (2000) survey of British local authorities found that rural authorities traditionally spent less on social care services and direct provision. They argue that it is no longer sufficient to identify transport difficulties as the main problem for rural areas and suggest that allowance for sparsity in the costs of rural social services is insufficient to cater for the different social care requirements of different types of rural areas. The additional costs of providing accessibility to available services are also more often than not borne by rural residents, rather than suppliers as evidenced by their greater reliance on private transport even at relatively low income levels.

The mechanism of calculating rural provision of Social Services is in need of revision. The money provided by central government to support local government services is calculated according to the Standard Spending Assessment system. The existing sparsity and super sparsity measures used in the SSA are not appropriate measures of remoteness because they are based purely on population density rather than on the relative location of rural areas to the places where services are delivered. It would seem logical that a sparsely populated ward or ED close to a service delivery centre would not be nearly as expensive to serve as one with a similar degree of sparsity located far away from the centre. However, the current use of sparsity and super sparsity does not capture this. A better measure would be based on the distance or travel time from the service delivery centre to the population.

4.5.3. Voluntary organisations

Health and Social Services both use agencies such as national charities to provide much of the care of the infirm. Netten and Curtis (2000) suggest that in rural areas there is a lot of unmet need, and often where need is met it is often of a much lower quality of service. The low availability of social care can lead to a high number of admissions, particularly in areas such as mental disorders.

Like the statutory sector, voluntary agencies in rural areas face additional costs due to increased travel time, the need for more outreach services, difficulties of networking etc. As a result, there tend to be far fewer voluntary organisations and self-help groups in rural areas with which to work. If the voluntary sector is to play a key role in improving the quality of service provision for older people, it is therefore likely to require greater funding itself. Investment into partnership working in order to pool resources for training, facilitation and the support of joint working can be a cost-effective solution to such difficulties.

4.6 Conclusions

Accessibility to services is to a large extent dependent upon supply, and despite policies since the 1970s aimed at a geographical equalisation of healthcare, significant variations in the provision of health care have been identified. Lower standards of services emerge because additional costs of rural service provision have not been adequately compensated in national formulae.

Programs such as the National Service Frameworks may help the case for increased funding due to place effects, such as rurality. There is a need, however, for closer coordination in funding streams for health and social services and for an acknowledgement of the additional costs of providing voluntary provision. The pursuit of more equitable approaches to access could also be informed by emerging research on the proximity of settlements to each other, the degree of isolation of those living without settlements and travel time to services. There are no major technical barriers to calculating the resources needed to provide services to a given quality standard.

Section Five: NHS Resource Allocation outside England

5.1. Introduction

Whilst the Advisory Committee on Resource Allocation appears to remain unconvinced that an adjustment needs to be made in recognition of the increased costs of service provision in rural areas, rurality is a significant factor in many local government allocations in England. England is the only country within the United Kingdom that does not make a major adjustment for rurality in its NHS funding formula. The higher costs of health service provision in rural or remote areas are also acknowledged in several systems outside the UK, including Australia, Canada, Finland and New Zealand (Rice and Smith, 1999).

In this section, we explore the major reviews of resource allocation that have been recently undertaken in Scotland (SHED, 1999a, 1999b), Wales (Gordon *et al*, 2001) and Northern Ireland (Capitation Formula Review Group, 2000). In all three reviews, greater acknowledgement is given to impact of additional costs in rural areas on service provision.

5.2. The Scottish 'Fair Shares' Model

5.2.1. Background to rurality costs in Scotland

Before the 'Fair Shares for All' review, the sparsity index in Scotland was applied only to 30% of the costs of community nursing services. This was based on a crude measure of the distance patients lived from their GP, and was only one part of the Community Health Services programme. The Arbuthnott Report notes that the sparsity measure was thought to be crude as it did not reflect the fact that the community services are generally delivered from locations other than GP surgeries. Excess costs also arise from the extra time taken to cover distances, rather than the distances themselves.

The Report also proposed that the excess costs associated with rurality and remoteness applied to other areas of healthcare. Consequently, remote/rural cost adjustments are now made for all hospital services and GP services as well as district nursing, health visiting and other travel-intensive community services.

The material effect of the rurality adjustment in the Fair Shares model was to redistribute a sum of £60m, which is 1.5% of total expenditure. The impact on the Scottish Health Boards ranged from reducing the allocation per head of population by just over 4% to increasing it by as much as 25%. Although the total sums being redistributed between Boards as a result of these different adjustments may not appear to be large, the effect on the allocations per head of population in individual Boards is significant. To put this in perspective with other adjustments, age and sex redistributed 1.3% of £3.9bn on HCHS and GP prescribing. Morbidity and life circumstances redistributed about 3.2% of the total expenditure of £3.9bn.

5.2.2. Rurality versus remoteness

Perhaps one of the most important points within the Arbuthnott review relating to additional costs was the distinction made between rurality and remoteness. It defined rurality as relating to areas of Scotland that incur increased costs from their rurality, but which are also sufficiently accessible to avoid having to maintain fixed services at levels that are significantly above optimum unit costs.

By contrast, remoteness related to islands or remote parts of the mainland whose extreme isolation requires that they maintain a level of service, which by necessity costs significantly more in cost-efficiency terms than comparable optimal levels of

services in more accessible parts of the country. An example given in the Arbuthnott Report was the delivery of an acceptable level of service to a remote area might require a full-time GP and attendant support services, although he/she may serve a patient list which is markedly smaller than the average GP list in more accessible locations. The adjustments proposed to account for the excess costs arising from both these elements are described by the standard term 'remoteness'.

5.2.3. The impact of rurality of hospital costs

Adjustments to Health Boards' allocations for hospital services in Scotland are based on estimates of the differences between actual expenditure on hospital services and the level of expenditure that each Board would incur if these services were provided at the average unit costs for all hospitals in Scotland. As might be expected, Health Boards in remote and rural areas faced higher costs because of the need to provide a higher proportion of services from relatively small hospitals.

Density (population per hectare) and sparsity (proportion of people living in settlements with a population of more than 500, 1000 and 10,000 people) measures were considered in the analysis. The Fair Shares Report shows that the pattern of population settlement has significant implications for the costs of delivering hospital services, mainly because of the effects of economies of scale on the costs of providing these services. The average size of hospital in Health Boards with low population density and with a significant proportion of their populations living in small communities is much smaller than in Health Boards providing hospital services in more densely populated urban areas.

While population density and the proportion of the population living in settlements of various sizes were shown to be (statistically) related to health boards' hospital expenditures (total and disaggregated by sector, in the final report, road kilometers per thousand population was the sole preferred remoteness indicator for estimating the extra costs of (total) hospital services.

For hospital services, the impact of rurality and remoteness on costs has therefore been measured by using an index of above or below average hospital costs for Scotland. Although a pragmatic measure, it should be acknowledged that this sparsity index is tainted by utilisation. The Arbuthnott Report points out that the measure is purely to capture the impact of diseconomies of scale on resource allocation, and it is up to the Health Boards to consider how to provide accessible services. It is, however, possible to identify and directly measure the physical geography and settlement patterns that lead to increased costs in rural service provision, then render those measures amenable to a process of resource allocation. A good example of this approach is the ORH (2000) report for the Home Office on the effect of rurality on Police services. ORH produced a simulation model that isolated and identified the increased costs of service provision at varying levels of rurality. However a proxy then had to be found for this measure that could be operationalised for the resource allocation process.

5.2.4. GP services

The Fair Shares model developed a complex formula to relate the influences of rurality and remoteness to total payments per patient in 1997/8 for 1042 GP practices in Scotland. Senior and Rigby (2001) note how the full formula controls for health board, age, gender, list inflation and deprivation influences, while simultaneously examining the rurality and remoteness factors. This formula has an adjusted R² of 45.47% and can be expressed in the following form, where the effects of the controlled influences are absorbed into the constant of £54.54:

$$\begin{aligned} \text{Total payments per patient} &= \text{£}54.54 + \text{£}1.88^* \text{ hectares per person} \\ &+ \text{£}0.14^* \text{ percentage of the population living in communities of} \\ &\text{less than 500 people} + \text{£}0.11^* \text{ percentage of Rural Practice} \\ &\text{Payment (RPP) patients.} \end{aligned}$$

Thus, per patient costs increase by: £1.88p for each hectare per resident; by £0.14p for each percentage point of residents living in small communities; and by £0.11p for each percentage point of RPP patients, although Senior and Rigby point out that the coefficient of £1.88p on hectares per resident is not particularly stable from one year to the next. This appears to be at least partly due to its correlation with the percentage of the population living in small communities.

5.2.5. Community services

The National Review of Resource Allocation Steering Group employed the consultants NERA to develop a methodology for estimating the costs of providing district nursing and health visitor services. The methodology they developed involved a number of assumptions on working hours, time spent with patients, travel speeds, skill mix and demands by size of population cluster. The results of this exercise for Scotland have proved robust to variations in the assumptions.

The demands by size of population cluster were particularly interesting. People predominately live in settlements or clusters, rather than in complete isolation from their neighbours. The population distribution can therefore be described by the size of the population clusters and the distribution of the population outside clusters. In this case those living within or outside clusters of more than 500 people were described. Estimates of demand for services were made for each population cluster based on national average contact rates for each population age group.

Estimates of travel costs focus on two groups of patients, those within clusters and those without. NERA also made assumptions about the skill mix, as district nurses working as a single-handed team in remote and rural areas may need to be of a higher grade to carry out a wider and more complex range of tasks.

These assumptions were used to generate a relative costs model with Scotland equal to 100, which showed that Health visiting and district nursing in Glasgow was 5.3% below the national average, while Argyll and Clyde was 3.3% above.

5.2.6. Age adjustment in Scottish formula

While strictly not an adjustment related to the increased cost of service provision, White (2001) points out that the Arbuthnott Report acknowledges that the aged use the health service significantly more, and the resulting costs of providing healthcare to this group are consequently considerably greater than other age groups. This is reflected in the Scottish acute formula, where the ratio of costs for the 85+ compared with the lowest cost group is 17:1, while in the English HCHS formula the ratio is 9:1.

White goes on to point out that the greater health need of the elderly is evident when the age profile of community staff contacts, such as district nurses and chiropodists, are considered. The services of district nurses and chiropidists in Cornwall are primarily used by those aged over 65. The numbers of contacts decrease at later age groups because of the smaller number of patients of ages over 80, but those aged over 65 accounts for almost three quarters of the service.

5.3. The Welsh Review of NHS Resource Allocation

The current Welsh resource allocation formula adjusts for the impact on sparsity on the provision of ambulance services, general medical services and a number of aspects of Community Health. The National Welsh Assembly recently commissioned a major independent review of health resource allocation in Wales. The main focus on the resulting independent report is a consideration of how NHS resources can be better distributed to tackle poor health and address health inequalities (Gordon *et al*, 2001). To this end, the report recommends the use of direct measures of health need rather than utilisation data to allocate resources

(a strategy that, according to our own analysis, would result in a shift of resources *towards* rural areas). However, as part of the research remit, the team was also asked to consider the implications of applying the Scottish recommendations to Wales.

5.3.1. *Welsh Local Health Groups and hospital services*

Senior and Rigby (2001) superimposed the Scottish formula over the geography of Wales, using Welsh Local Health Groups (LHGs). The Welsh LHGs had a very similar range of values to the Scottish health boards, apart from the Scottish islands (with a value of 62 road kilometres per 1000 population). Thus, the lowest values between 3 and 4 are found for Cardiff and Glasgow, while the highest are 43.5 for Powys and 41 for the Highland health board.

Applying the Scottish formula to the Welsh LHGs and Health Authorities, the researchers found that Cardiff's predicted expenditure on hospital services would be 4.1% below the national average, whilst the suggested expenditure for Powys would be 14.7% above that average. Questions were asked, however, about whether such a redistribution would be appropriate. While Powys LHG and the Highland health board are reasonably similar in road kilometres per 1000 population and therefore in predicted hospital expenditure ratios, they have very different relative locations with respect to hospital facilities elsewhere. Patients from Powys have access to hospitals, not only in England (Shrewsbury especially), but also in neighbouring Welsh health authorities. By contrast the Highland health board is mainly surrounded by sea, with neighbouring health boards only to the southeast.

The Fair Share formula had an adjusted R^2 of 78.46% and the following form:

$$\text{HB's hospital expenditure ratio} = 0.944 + 0.0046716 * \text{road kilometres}/1000 \text{ popn}$$

Senior and Rigby re-estimated the Scottish hospital expenditure formula, first without data for the island health boards, and then without data for both the island and Highland health boards. The re-estimated formulas are, respectively:

excluding island HBs (R^2 adjusted =53.9%)

$$\text{HB's hospital expenditure ratio} = 0.9558 + 0.0039805 * \text{road kilometres}/1000 \text{ popn}$$

excluding island and Highland HBs (R^2 adjusted =38.4%)

$$\text{HB's hospital expenditure ratio} = 0.9613 + 0.0035036 * \text{road kilometres}/1000 \text{ popn}$$

Their results were that the slope coefficients were smaller, indicating that the predicted expenditure ratios will be less sensitive to changes in road kilometres per 1000 population. Also, the R^2 values decreased substantially, so the modified formulas account for much less variation in hospital expenditures between health boards than the original formula. This suggests that the relatively high explanatory power ($R^2 = 78.46\%$) of the latter is strongly influenced by the inclusion of the island and Highland health boards.

The effects of using the modified formulas for Wales would be to compress the range of predicted hospital expenditure ratios. Thus Cardiff's predicted expenditure would be 2.7% less than the national average, while the predicted expenditure for Powys would be 11.4% above that average. The overall result, for nearly all areas, would be for the predicted expenditure to move closer to the national average.

Senior and Rigby (2001) conclude that given the differences between Wales and Scotland and the consequent problems of transferring Scottish evidence, it would be desirable to apply the methodology used in Scotland with Welsh expenditure data, although currently such quality data is not available in Wales.

5.3.2. *Welsh GP Services*

Senior and Rigby (2001) also applied the Scottish formula to Welsh data for GP services, but using only one indicator. The indicator was the percentage of rural practice patients, which was available for 519 GP practices in 1999. The two other indicators in the Scottish formula were, in Wales, only measured at unitary authority level, so all GP practices in the same Local Health Group were given the same values for hectares per resident and for residents of communities with less than 500 people. Data for the latter indicator was derived from the Pion Economics (1999) report, where the estimate of the population living in “rural areas” is twice as high as the corresponding figure produced by ONS (1997). Thus the Pion data may well be overestimates of residents of small communities.

The predictions from employing this Scottish GMS formula using Welsh data for the three rurality indicators derived at practice level were aggregated to Local Health Groups and Health Authorities. Senior and Rigby (2001) found that whilst the payment ratio of 1.249 for Powys was roughly of the magnitude of that for the Highland health board in Scotland, the ratio of 0.887 for Cardiff was distinctly lower than that for Greater Glasgow. The researchers concluded that while that it would be preferable to assemble and use payment per patient data for Welsh GP practices and derive a purely Welsh formula.

5.4. *Northern Ireland*

In Northern Ireland the resource allocation system is inclusive for Health and Social Services which operate under four Health Boards, East, West, South and North. Rurality adjustments are currently calculated for each service sector. The sectors are: acute, maternity and child health, family and child care, elderly care, mental health, primary health and adult community, physical and sensory disability, health promotion and disease prevention and learning disabilities.

In Northern Ireland, a different approach to Scotland and Wales has been taken to the increased costs of service provision in rural areas. Consultants have been recently commissioned to look into rurality and the economies of scale for hospital services. With regard to community services, the Department of Health, Social Services and Public Safety in Northern Ireland completed their report, ‘Allocating Resources to Health and Social Services Boards: Proposed Changes to the Weighted Capitation Formula. A Third Report from the Capitation Formula Review Group in October 2000. One of the aims of the review was to ‘adjust for differential costs associated with the provision of services in rural areas. This largely related to the costs of travel, including professional time, and to take account of the generally longer distances to be traveled in rural areas’.

In previously commissioned work an allocation method was developed to take account of the varying costs of providing health and personal social services in areas of different population distributions. Ten specific services thought to have a significant rurality cost associated with travelling were used to develop weightings to reflect the impact of rurality on those services, which involved travel, and the results from these were extrapolated to other like services. Total demand across HSS Boards was based on the age and needs weighted population within each HSS Board area. Total travelling distances and times produced by the model were then costed to produce a total ‘rurality budget’ for each modelled service along with each HSS Board’s share of that budget.

An interesting point is that services such as minor injuries units were included, even though patients travel to the service at their own cost. As these facilities must be within acceptable distances from the points at which incidents arise, rurality would increase the need for additional facilities to achieve equity of access between HSS Boards. The cost of providing the additional minor injuries units in each HSS Board area represents the rurality impact for which HSS Boards need to be compensated. Each HSS Board’s final ‘Rurality Budget’ for 2001/2002, varied from an addition of 22% to 30%.

More recent research carried out during 1999 by Queens University concluded that another component of rurality that needs to be considered is the distance from Belfast, as a number of specialist services for the province are based in this city.

5.5. Lessons for England

A number of interesting lessons from the work in Scotland, Wales and Northern Ireland can inform the English Resource Allocation system. Consideration should also be given to relevant work currently underway in the academic institutions.

5.5.1. *Rurality/remoteness*

It is perhaps because the geography of Scotland is considered to be so qualitatively different to that of England that the conclusions drawn in the Arbuthnott report regarding the need to adjust for rurality are not necessarily seen to apply to England. However, several rural *mainland* health boards in Scotland were estimated to need up to 10% additional resources per head to cover additional costs of hospital services, and up to 23% for GMS costs. Moreover, England contains a number of peripheral areas (e.g. Cornwall, East Anglia, Cumbria and North Yorkshire) and peripherality has also been found to be an important dimension of accessibility in the UK.

Thomson (1996), for example, notes that the physical landscape of Cornwall (which has a long indented coastline) results in the need to duplicate fire service facilities in a short linear distance. The location of settlements on the coast effectively reduces the potential service catchment area because of the sea. The long, narrow nature of the South West Peninsula exacerbates problems of peripherality as there is reduced scope for achieving economies of scale by sharing service provision with neighbouring providers.

5.5.2. *The market forces factor*

As discussed in Section 2.10., the financial impact of the pay adjustments relating to the Market Forces Factor (MFF) in England is considerable. We have already explored critiques of the Staff MFF which takes no account of the fact that most NHS staff are paid on a nationally agreed paid scale, that progress through the scale is dependent on length of service and that base pay, excluding allowances is significantly lower in central London than in rural areas. It is interesting to note that none of the reviews undertaken in Scotland, Wales or Northern Ireland could find any evidence to support the market forces factor.

5.5.3. *Ambulance services*

Funding for ambulance services was not directly changed as a result of the Arbuthnott Report. Ambulance services in much of Scotland are run in different ways to England and Wales, examples being a number of single manned vehicles in Scotland, many more dual purpose vehicles, and retained ambulance persons on duty at home.

In Wales, a sparsity factor is applied to the funding of ambulance services. This is calculated by taking the road length per thousand population, added to the Wales average road length per thousand population, and then weighted by inpatient and outpatient weighted populations for each health authority. The Steering Group for resource allocation for Wales are considering the replacement of the current sparsity factors for community health and ambulance services with a Rural Cost Premium.

In Northern Ireland a recent review of the ambulance service took a different approach to a rural cost premium by using SMOSS modelling techniques to determine the costs of rurality. This is discussed briefly in Section Six.

In England in 1997 the Department of Health commissioned research from Mallendar Hancock Associates and Operational Research in Health Ltd to examine the effects of rurality on the costs of providing emergency ambulance services, patient transport services and accident and emergency (A&E) services. For the emergency ambulance services, unit costs were found to be significantly related to a rurality index, the number of ambulance journeys and the proportion of journeys classed as emergencies. These three indicators are weighted and combined to produce an emergency ambulance cost adjustment index, which was introduced in 1998.

However, since this work was undertaken response standards in rural areas have changed and become more challenging. There has also been an increased interest in reporting emergency ambulance response standards to smaller spatial scales, making response times in many rural areas even more stark when the effect of averaging from more urban areas is lost. A strong case can be made for new work to be undertaken in this area.

5.5.4. Direct versus proxy measures

The overall approach used in Scotland represents current best practice for constructing a resource allocation formula using indirect evidence of health needs. However, concerns about the legitimacy of the utilisation-based approach are mounting and it is significant that the Welsh Review makes a strong recommendation to adopt a direct morbidity-based approach. In Section Two we have discussed how our own work has progressed in the use of direct measures of need for specific health areas. We conclude that the use of a morbidity-based capitation methodology could lead to fundamental changes in the distribution of NHS resources, to the probable advantage of many rural areas.

Given concerns about the current composition of the MFF, the development of methods to more directly capture unavoidable variations in the costs of providing services should also be considered.

5.5.5. Data availability

Gordon et al (2001) point out that the approach used in Scotland is very data demanding, requiring the use of complex statistical analyses, which hinders transparency and comprehensibility, and took two and a half years to complete.

The work done by Senior and Rigby (2001) of superimposing the Scottish model on Wales was often frustrated by the lack of comparable information, as the Scottish system of data collection seems to be in advance of the Welsh system.

There are certainly gaps in good quality data that are routinely available in England (particularly regarding community health services and costs of inputs at the micro level). However, many of the data systems are excellent and the Health Survey for England provides an unprecedented source of data from which epidemiological estimates can be derived at various spatial scales (including the PCO). It is important that concerns about data availability are not used as a smokescreen to avoid challenging established modes of research practice. To this end, it may be fruitful to subject decisions about major reviews to wide consultation *before* work is commissioned.

5.5.6. Model validity

The Welsh team made the very valid point that in Wales the costs of rurality/remoteness should be examined using Welsh data, rather than transferring formulas calibrated on Scottish evidence. The same would be true for England.

5.6. Conclusions

The English resource allocation system has rightly been commended for its technical excellence. The system has been subject to continual refinement. However, with the exception of the current review to identify ways of allocating resources to explicitly address health inequalities, core principles of the system have not changed for nearly a decade. These include the use of utilisation statistics to capture need for health care, the adjustment made to allocations to account for variations in the general labour market and the belief that rurality is not an appropriate basis for making major cost adjustments to funding targets. As we have discussed in this report, all of these issues have important repercussions for rural areas.

To various degrees, the reviews undertaken of resource allocation in Scotland, Wales and Northern Ireland challenge these principles. It is sometimes presumed that the United Kingdom is so geographically diverse that arguments relating to the additional costs of providing services in Scotland, Wales and Northern Ireland will have little relevance for England. However, England not only has highly peripheral areas. In absolute terms, its rural population is larger than any of the other countries in the Union. As all of these countries apply rurality factors in their NHS resource allocation systems, there are strong grounds for concluding that England should also consider the case for adjusting for rurality.

Section Six: Conclusion and Recommendations.

6.1. Introduction

In this Section we reach a series of conclusions based on the points made in the rest of the document, and put forward recommendations for action. Since our last report there have been a number of advances in identifying the increased costs of rural service provision. However, two issues, not directly related to additional costs of service provision have dominated the agenda. They are the increased interest in the use of direct measures of need for resource allocation, and the change in the unit of allocation from the HA to the PCO.

6.2. Direct measurement of need

There is growing interest in the use of direct measures of morbidity, rather than a mix of proxy measures of need and utilisation data for resource allocation purposes. Despite the legitimacy of the morbidity-based approach, there appears to have been little practical testing of such a model of resource allocation. For example, the report to the Welsh Assembly envisages that, in order to allow sufficient time for consultation and preparation, a direct model of measuring needs for health care could not be introduced until 2003-2004.

As part of a research project funded by the Economic and Social Research Council's Health Variations Programme, we have in fact made significant progress in demonstrating the feasibility and impact of using morbidity-based methodology to set health care capitations for specific clinical programmes. Through a process of attribution, we have used the same units of analysis that are used for resource allocation (English Health Authorities and Primary Care Organizations). Like the authors of the Welsh Assembly Report, we believe that this method offers both theoretical and practical advantages over 'indirect' utilisation-based approaches to measuring the health needs of populations because it is sensitive to the demographic and social distribution of specific conditions. However, our findings challenge the assumption made in the Welsh Assembly Report that a needs-based model will result in the targeting of more health care resources to 'deprived areas'. Rural areas, particularly those with older demographic profiles, would stand to gain most from the introduction of this alternative approach to resource allocation.

6.3. The need for clarity about the purpose of resource allocation

The central aim of the current resource allocation system is to allocate resources to geographical areas in order to secure equal opportunity of access for equal needs. The concept of *health care equity* has thus underpinned the approach to resource allocation in the NHS. ACRA is currently exploring the possibility of introducing a new equity criterion by developing a method of allocating resources that will contribute towards achieving equal health *outcomes* (i.e. reducing health inequalities between the most advantaged and least advantaged groups). This does not imply a departure from the principle of equal access to equal need. *Health care equity* is to remain a core objective. There is recognition, however, that the persistence of health inequalities demands policy action and that some resources should also be targeted at the objective of *health equity*.

For the foreseeable future, resource allocation for core services will continue to be based on the traditional utilisation model. However, if the distribution of core services should equitably reflect the existing burden of disease, the current formula appears to be deeply flawed. It incorporates several elements that result in a shift

of resources away from populations that have higher rates of *overall* morbidity toward populations that have higher rates of *relative* health need (according to standardized measures and indicators of premature morbidity and mortality). The latter populations would be expected to be targeted by the new health inequalities budget. However, there is no explicit rationale for such targeting of core services.

The fact that the current formula allocates resources to areas that would be expected to eventually benefit from a health inequalities budget may appear at first sight to be unproblematic. However, the goals of health care equity and health equity require very different policy responses. It is generally agreed that the NHS (and particularly national *hospital* services) have relatively little to contribute towards the reduction of health inequalities compared to other sources of variation such as income distribution, education, housing and lifestyle. It is, of course, essential that *additional health care needs* associated with deprivation are met in allocations for core services. By attaching weightings to morbidity-based capitations in a way that reflects how specific conditions are *socially* distributed, a direct needs-based model to resource allocation does just this. However, the targeting of core services to deprived populations over and above levels of underlying morbidity is not only likely to be an ineffective response to health inequalities. It introduces a new form of inequity by underestimating the needs of less deprived populations.

6.4. Spatial scale

The amalgamation of health authorities into Strategic Health Authorities and the shift in the basic unit of resource allocation to the PCO is likely to increase the variability in distance between actual and targeted resource use. Given evidence that the current resource allocation formula builds in systematic biases that discriminate against rural areas, this is likely to have particular implications for rural PCOs. The latter would benefit from forming an alliance to provide a political platform on which to highlight this concern.

6.5. Data quality and benchmarking

Data capture has improved significantly in recent years. However, there is still criticism from researchers and policy makers about the poor level of data available at a local level from provider trusts and primary care groups. In order to explore some of the additional costs associated with rurality, it may be fruitful to conduct preliminary analysis of a 'basket' of HRG average costs by proxy measures of rurality of the provider trusts. Currently it is difficult to ascertain whether differences in HRG average costs are due to inefficiencies or different methods of treatment. The adoption of the National Service Frameworks may help to overcome a number of the anomalies.

While local trusts should aim to improve the quality of local information, rural strategic health authorities and PCOs should challenge the introduction of service delivery systems that are tried and tested only on urban systems. Such systems may have implications for cost, methods of delivery and patient choice in rural areas. A possible example would be the use of assertive outreach in the Mental Health NSF.

6.6. A seamless approach

The point was made within the report that a good proportion of healthcare cost is associated with care in the later years of life, rather than cure. The burden of care is shared with local government and the voluntary agencies and should be seamless. To this end rural local government should also be making a strong case to government about the extra costs involved in funding rural service provision. Rural health agencies could benefit from a closer alliance with local government pressure groups such as the CCN to provide an evidence-based case for a rural premium.

6.7. Rurality and remoteness

The Arbuthnott Review made a distinction between the increased costs of service provision in rural areas and the increased costs in peripheral areas, which it termed remote. The Review defined rural as relating to areas of Scotland which incur increased costs from their rurality, but which are also sufficiently accessible to avoid having to maintain fixed services at levels that are significantly above optimum unit costs. However, remoteness relates to islands or remote parts of the mainland whose extreme isolation requires that they maintain levels of service that cost significantly more in cost-efficiency terms than comparable services in more accessible parts of the country.

However, the method employed to establish the additional costs of providing hospital services was based on utilisation. Average costs were calculated to establish a national average, against which health boards were then rated. The most remote had the highest costs because of smaller unit size and the associated increased staffing costs and lower utilisation. While there is a certain inevitability about the results of such an exercise, it does confuse the arguments of increased costs of service provision in rural areas with the historic provision and siting of hospitals. It is accepted that such hospitals are there and need to be funded, but it does not move the debate forward on the most appropriate way to meet rural need.

The debate about optimal hospital size in relation to the facilities provided is complex, and beyond the scope of this report. However, it is worth noting that the Arbuthnott team experimented with many potential measures to identify a rurality premium for different types of hospital provision, but in the end the remote rural cost adjustment was based road kilometres per thousand population. It is recommended that this approach is experimented with in the English situation to provide a starting point for the modelling of other potential measures.

6.8. Increased travel costs and low utilisation

In rural areas, service centres tend to cover a larger patch than their urban counterparts, leading to higher travel costs. A study of domiciliary care in England showed that travel related unit costs per head varied from £94 in Birmingham to £210 in North Yorkshire, a ratio of 2.2:1. When aspects such as unproductive time are also taken into account then a study of police services showed utilisation rates of 87% in the least sparse areas of England and Wales, and 30% in the most sparse area.

The scale of the above cost differences is dramatic. However, relatively little empirical work has been done to capture the impact of rurality on daily service organisation and practice. Both quantitative (e.g. SMOSS modeling and simulation) and more qualitative (e.g. the use of practitioners' diaries) methods can be used to isolate the rurality effect. Rural health authorities should be aware of the potential of these techniques.

6.9. Access to services

Several research projects in the last few years have concentrated on drive times to GPs and hospitals, with poor access being defined as those outside a buffer of x minutes drive. Drive times along certain types of road have not been standardised in all the studies, and the cut off between reasonable and poor access seems arbitrary. However it was interesting to discover that three studies in Scotland, Wales and East Anglia all identified 2-3% of the population as living outside of a 15 minute drive time to a GP. The East Anglia study (Lovett et al, 2001) was ambitious in that it included an estimation of access by public transport. As many of the vulnerable groups such as pensioners and children may not have access to a car this is a useful avenue of research. Martin *et al* at Southampton University have also been exploring the application of this type of work with a small project in Cornwall.

6.10. Nearest neighbour values for settlements

One of the problems facing rural agencies is that the way in which rurality is defined will have important implications for the way in which service needs and problems of access are interpreted. PION Economics (2000) has constructed a useful index which incorporates nearest neighbour distances and an average weighted population distance measure for the resident population. The measure has been calculated for residents within settlements, and for those not within a settlement, and as such gives a good indication of the level of isolation of those living outside settlements. This has obvious ramifications for policy in the provision of rural services.

Similar work was been undertaken on behalf of the Scottish Resource Allocation Review by the consultants NERA in order to identify the increased costs of service provision for community services in Scotland. NERA used national estimates of demand for district nurse services, and then used different length of times to service such a demand depending on whether the patients were within, or without a settlement of 500 persons or more. It is the combination of these approaches that hold the most value for research in this area. While in Australia, for instance, the geography determines that straight line distance is reasonable measure of access, in a country as urbanised as England a second order measure is needed. Distance related to the level of clustering appears one of the most exciting areas to follow.

6.11. Economies of scale

Issues of economies of scale are highly related with the earlier discussion on differentiating remoteness and rurality. One of the problems with differentiating rurality and remoteness is the threshold where lack of economies of scale cut in. These will vary with differing parts of the health service (acute, community, tertiary) and with differing service configurations. At the same time, the attempt to find differing measures of rurality for hospital provision in Scotland resulted in the use of one simple measure. For simplicity's sake, the nearest neighbour approach may be a useful starting point to find the thresholds on a continuous scale where diseconomies of scale start for differing types of services.

6.12. Ambulance services

Since the 1997 English review of the ambulance service, response standards in rural areas have changed and become more challenging. There has also been an increased interest in reporting emergency ambulance response standards to smaller spatial scales, making response times in many rural areas even more stark when the effect of averaging from more urban areas is lost. A strong case can be made for new work to be undertaken in this area.

6.13. Conclusions

The Arbuthnott report, the reports from the Welsh Assembly and the report of the review of resource allocation in Northern Ireland has taken forward the debate on how to identify and deal with the additional costs of rural service provision within resource allocation. In particular the Arbuthnott identification of the differences between rural and remote, the NERA work on identifying potential costs for community services and the modeling of the travel component for a series of services in Northern Ireland all have utility in the English environment.

Perhaps the most exciting development, however, is the growth of interest in the use of a direct morbidity-based approach to allocating health resources. The adoption of such an approach would have important implications for the funding of rural health authorities. The use of direct measures rather than proxies would also usefully inform the debate about the impact of rurality on unavoidable costs. To this end, technical developments such as the application of Geographical Information Systems (GIS) could aid the calculation of differences in the organization of urban and rural practice.

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Notes

