NHS RESOURCE ALLOCATION 1997 TO 2003 WITH PARTICULAR REFERENCE TO THE IMPACT ON RURAL AREAS

Christopher P. White

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University of St Andrews

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ABSTRACT

The central hypothesis of this study was that the allocation system for NHS hospital and community health services between 1997 and 2003 was not meeting key principles of compensating for differences in the need for services and unavoidable costs.

The review and analyses in this study indicate that the underpinning assumptions used when formulating the need adjustment were not robust and that this led to the selection of inappropriate proxies for need. In addition it is concluded that the age adjustment underestimated the costs of elderly care.

This study has concluded that the pay adjustment, which was the largest in the formula, did not reflect actual unavoidable differences in cost because the Warwick studies that were used to set the adjustment ignored the monopsonistic nature of the NHS. As a consequence the pay adjustment was based on the assumption that NHS salaries should be related to local salaries.

This study identified unavoidable additional costs of providing healthcare in rural areas. These findings were consistent with other comprehensive studies on healthcare costs in Scotland, Wales and Northern Ireland. This study concludes that the exclusion of a market forces adjustment for rurality was inconsistent with all other comparable allocation formulae in the Home Countries. The absence of a rurality adjustment resulted in rural areas receiving a lower proportion of NHS funding than was justified and this is referred to as the Inverse Share Law.

This study concludes that the central hypothesis was correct and that a rurality adjustment was justified, but that the principal determinant of service quality was an adequate focus on efficiency.

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CHAPTER 1 ~ SUMMARY

Government funding for hospital and community health services in England between 1997 and 2003 was allocated to local health economies according to a weighted capitation system. This was intended to ensure that there was equality of resources by compensating for differences in the need for healthcare and unavoidable differences in costs. This study took the form of a policy and systems review, underpinned by regression analyses, it was carried out to review the robustness of the formula and in particular how the adjustments reflected rural health needs and costs.

The central hypothesis of this study was that the resource allocation formula was not meeting the stated aims of adjusting for differences in need and unavoidable costs and that this had a particular impact on rural areas. The four specific hypotheses that were considered were firstly that the need adjustment was not compensating for actual differences in health need. The second hypothesis was that the pay adjustment was not reflective of actual differences in staff costs. The third was that there were unavoidable costs associated with providing healthcare in rural areas. The fourth was that there were other unavoidable costs that would have made a significant difference to allocations that were not included in the formula.

This study commenced because of closure plans were announced for four community hospitals in Cornwall that were submitted for approval to the Secretary of State by the Health Authority. One of the principal justifications for the closure plan was that Cornwall had more community hospitals than other rural areas. The initial regression analyses that were carried out as part of this study indicated that there was a positive correlation between rurality and community hospital numbers and that as Cornwall was the most rural county in England it was likely to have more hospitals than the

comparator areas selected by the Health Authority, particularly as the group selected included Dudley in the West Midlands.

One element of the initial research was to identify what rurality adjustments were used in comparable public sector allocations. This review identified that there were rurality adjustments in all of the equivalent resource allocation formulae including allocations for GP services, health services, all of the other Home Countries and local government allocations. These rurality adjustments were based on detailed analyses of costs by the leading university research groups in this field in the UK including York, Lancaster, St Andrews and Salford.

This study has concluded that the lack of an adjustment for rurality in the Hospital and Community Health Service allocation system and the failure to carry out research into the case for a rurality adjustment mean that the system was vulnerable to the conclusion that it was flawed and that the bodies charged with ensuring that the allocation formula was robust had failed to do so.

The initial research also included a review of how Government funding was allocated to the Home Countries. The Barnett Formula was developed to adjust allocations to reflect differences in sparsity, transport needs, relative health, rural needs for education, industrial needs and income per head and the aim was to facilitate the convergence of relative expenditure levels. It was estimated that the relative need was 16% greater in Scotland but that the allocation was 22% higher. However a decrease in population in Scotland has resulted in further divergence because there has been, as a consequence spending per capita increased to 25% more than that of England. This study concludes that it would be necessary for the funding for public services in the Home Countries to converge.

The initial focus of the study was on identifying a rurality measure that would be suitable for the study and then using this measure to complete analyses. It was concluded that the essential criteria for the study were that it should be suitable for regression analyses and that it must be credible. The road length measure used in the major review of the NHS allocation system in Scotland, however it was rejected because when it was applied to English counties the results appeared counter-intuitive. Geometric Mean Density (GMD) had been used in the resource allocation system for an adjustment to the formula to compensate for the differential in the cost of providing emergency services across England and it reflected population spread within an area and could be used in regression analyses. However it was concluded that GMD was not ideal for this study because it did not adjust for geographic and demographic factors of neighbouring areas or accessibility. In addition GMD does not include socio-demographic factors.

A measure could not be identified that met all of the essential and desirable criteria and therefore research was carried out to determine if it was possible to develop a composite index, based partly on GMD, road use and factors included in area classification indices. However it was concluded that whilst the new measures had advantages compared to GMD these were outweighed by the potential for the credibility of the analyses to be questioned because of the use of a novel rurality measure.

Accessibility measures like those developed by researchers for use in Northern Ireland and by Salford for the Grant Aided Expenditure analyses would have been preferable but they were not readily available and the development of such indices would have been time-consuming and as the measures would not have undergone in depth peer review the results of analyses may have been viewed as less credible. It was therefore concluded that GMD was the best compromise.

There is a significant body of research that indicates that socioeconomic group is strongly correlated to the incidence of the most common diseases. However this is not always the case that there is a strong correlation where the lower the socioeconomic group the greater the incidence of disease and in some there is a negative correlation and for other diseases U shaped relationships. A robust weighted capitation system would therefore need to reflect the impact of poverty across the full range of healthcare, taking into account this variation and the relative proportion of healthcare costs associated with different diseases and healthcare treatments.

This study has concluded that the underpinning assumptions for the need adjustment were not robust, including the central premise that health utilisation was a reliable predictor of health need. It is concluded that this resulted in health needs being underestimated, in particular for rural areas. The York study concluded that a significant over utilisation in rural areas compared to the model was not due to flaws in the model that needed to be addressed but a reflection of unmet need in urban areas. This conclusion by the York study was rejected by this study because it was at variance with distance decay research that indicated that there is a negative correlation between distance and access and that this has a particular impact in rural areas.

The need adjustment identified proxies that were closely correlated to the estimated health need. However the proxies selected for services such as district nursing, chiropody and mental health appeared counter-intuitive and resulted in areas with the greatest numbers of elderly and rural areas receiving significantly lower adjustments for health need.

The aim of the Market Forces Factors for pay, land and buildings, equipment and Emergency Ambulance and Critical Care Adjustment, was to compensate for unavoidable differences in the cost of providing services. The analyses in this study indicate that the system did not reflect actual salary differences or costs. It is concluded that the findings of the Warwick studies were based on conjecture and that the assumptions were not confirmed by any empirical analyses. It is clear that the NHS employs the majority of clinical and specialist healthcare staff in the UK. As a result the rationale for setting salaries for such staff on the basis of commercial salary rates appears highly questionable. The monopsonistic nature of the NHS makes a profound difference and this study concludes that the failure to adequately consider this and to ensure that the anticipated costs and lower quality were occurring meant that the formula based on the Warwick studies was not reflecting unavoidable differences in costs.

Initial analyses completed as part of this study indicate that the underpinning theory used for the Warwick studies, the Adam Smith theory of compensating differentials, may have had considerable merit. The analyses in this study indicated there was a *prima facie* case for asserting that a service quality adjustment was required. Such an adjustment could have enabled trusts that were in areas that were less attractive to staff to provide equity of service quality. Such a factor would be likely to increase resources for areas with the highest levels of deprivation. These areas would be likely to have lower salaries and as a consequence it would reduce allocations that received increased allocations as a result of the pay adjustment.

The study concludes that the unprecedented building programme will have a significant impact on the funding that can be allocated to service provision, in particular where large facilities have been constructed. Facilities funded by the commercial sector attract a revenue cost of 11.2% to 18.6% compared with a 6% for those that have secured Treasury funding. Whilst the figures were not directly comparable because commercially funded schemes may include other costs including maintenance and elements of support services such as cleaning the additional costs were significant. The potential impact of these schemes is clear when schemes like that at Barts and the London are considered. The estimated additional cost was £48 million and this was significant in the context of the income for the trust which was £480 million in 2004/5. This study concludes that the case for a factor to reflect the unavoidable costs of facilities should be considered.

The results of the analyses in this study on rurality and associated costs are consistent with those of other researchers. The key findings were that there was a positive correlation between the number of hospitals and rurality. Research has indicated that costs are higher in small hospitals and Ministers have not supported closures therefore this study has concluded that the incurred costs were unavoidable. The DH accepted that emergency ambulance costs were higher in rural areas because of higher travel time and transport costs. A lower target was also set for rural areas for response times. However no adjustment was introduced for community services and rural areas were expected to achieve the same national quality standards. This study concludes that, in the absence of a reduced target, a rurality factor should have been added to the formula.

The NHS has received an unprecedented increase in funding from just under £35 billion in the 1997/8 to over £92 billion in the 2007/8 financial year. However the NHS has had high profile funding crises and a large number of trusts have been in deficit. The key reasons cited by these trusts for these deficits are the costs of pay awards and the finance costs associated with new facilities. However it is concluded that the NHS could be significantly more efficient. The estimate by NHS London is that efficiency could be improved by between 15% and 35%. This study concludes that these figures may be conservative because of a lack of focus on maximising efficiency. Unlike other commercial sectors, staff numbers are not varied on a ‘real-time’ basis as workload changes, the utilisation of key infrastructure like operating theatres is exceptionally poor compared with the most efficient hospitals in the US, and there is a lack of consistency in support services, equipment and purchasing. This study concludes that there are considerable opportunities to make savings which would more than compensate for any under funding due to flaws in the allocation system. The Wanless review of the NHS concluded that, despite the unprecedented increases in funding, efficiency had not improved. Achieving efficiency improvements of 15% would enable the NHS in England to lead internationally in all key areas of clinical practice.

This study concludes that the resource allocation system may not be the overriding factor determining the quality, range and quantity of services that can be afforded by local health economies. This was because there were trusts in all areas that had performed exceptionally well in terms of quality of service and financial performance. Whilst resource allocation was important it appears that it was not necessarily the key factor. However it is concluded that weaknesses in the resource allocation system and the failure to introduce robust measures to adjust allocations to reflect unavoidable differences in costs, were likely to have been a contributory cause of the postcode lottery of access and quality of care.

This study concludes that there should have been an adjustment to compensate for the unavoidable costs of providing healthcare in rural areas and that the utilisation model underpinning the need adjustment should have been amended so that it was a satisfactory predictor of health need. The lack of cost adjustments for rural areas and a modification to the need adjustment led to an Inverse Share Law whereby rural areas received a reduced share of resources despite having greater costs.

CHAPTER 2 ~ INTRODUCTION AND BACKGROUND

This thesis considers the NHS resource allocation that applied to the NHS for Hospital and Community Health Services in England between 1997 and 2003. Government funding to local health economies was adjusted using a weighted capitation system that was intended to compensate for differences in need for healthcare and unavoidable differences in costs.

This study was a policy review that considered the robustness of the resource allocation formula and in particular how the adjustments that were applied reflected rural health needs and costs. The study was primarily composed of a detailed consideration of the studies that were used to underpin formula and this policy and systems review was supported by regression analyses.

The central hypothesis of this study was that the resource allocation formula that was applied between 1997 and 2003 was not meeting the stated aims of adjusting for differences in need and unavoidable costs and that this had a particular impact on rural areas. The four specific hypotheses were:

1. That the need adjustment was not compensating for actual differences in health need.
2. That the pay adjustment was not reflective of actual differences in staff costs.
3. That there were unavoidable costs associated with providing healthcare in rural areas.
4. That there were other unavoidable costs that would have made a significant difference to allocations that were not included in the formula.

The study commenced when the Health Authority in Cornwall outlined a plan to close four of the community hospitals in Cornwall. One of the principal justifications for the closure plan was a table that listed the most rural health authority areas in England and concluded that Cornwall had more community hospitals than the average rural health authority. This analysis did not reflect the position that the rurality of the health authorities was a spectrum rather than homogeneous and that it was likely that as rurality increases more community hospitals would be needed. Cornwall was acknowledged to be the most rural of the health authorities in England and therefore it would be expected to have more hospitals than average.

The regression analysis of rural health authorities and the number of hospitals carried out as part of this study indicated that, contrary to the assertions by the Health Authority, Cornwall had fewer community hospitals than would have been predicted. The conclusion from this initial analysis was that rurality needed to be taken into account in the resource allocation formula for England and that this was a principal cause of the ‘postcode lottery’. The analysis on hospitals and the conclusion on the need for a rurality factor was rejected by the Health Authority. The issue became a *cause célèbre* in Cornwall and in an attempt to resolve the issue the Health Authority asked the Regional Health Authority in Bristol to adjudicate. The conclusion was that the Health Authority were correct *id est* that Cornwall had more hospitals than other rural areas and therefore should look to rationalise.

It was apparent from this that political issues needed to be addressed and that any analyses needed to be readily accessible to the key decision-makers for the NHS, including those with the influence required to call for changes to the system including Members of Parliament and NHS trust board members. The Board of the Cornwall Healthcare NHS Trust considered analyses and the conclusions of the Health Authority and decided that a detailed study of the case for a rurality adjustment should be completed.

It was concluded that for the issue to receive greater consideration it would be helpful if health economics staff in a health authority or at the Department of Health completed the review of the need for a rurality adjustment. In the absence of an interest in completing such analyses at the Department of Health, local or regional health authority the Cornwall Healthcare Trust Board considered funding research by specialists in the field at the University of York. However it was concluded that one of the problems associated with the studies that were used for the allocation formula was that there was insufficient involvement from NHS staff. It was therefore concluded that the study should be led by a director from the trust with support from a leading academic department in the field.

The use of multiple regression and more complex statistical techniques was considered for inclusion in this study, but not for publication. The benefits would have been that it would have been possible to identify independent variables that would have more fully explained the issues considered such as the number of hospitals. In addition there may have been statistically significant results from regression analyses that were appropriate for curvilinear distribution for issues such as the rates of suicide. However it was concluded that the analyses that had been completed were adequate to identify the principal issues. It was concluded that the focus for this study should be on gaining an in depth understanding of the assumptions and potential flaws in the allocation system rather than a detailed statistical study. This was because it was concluded that one of the principal issues with the studies that were used for resource allocation was that there had been insufficient focus on consideration of the complexities associated with providing healthcare and that there had been a disproportionate focus on statistical analyses.

In addition more sophisticated statistical tests would not have been as readily accessible to key stakeholders and policy makers. It would have also been necessary to have carried out tests to ensure that data was appropriate for more sophisticated analyses. The use of regression meant that it was sufficient to assess homoscedasticity by visual examination because slight heteroscedasticity has little effect on significance tests (Tabachnick and Fidell 1996). The presence of significant skewedness, kurtosis and outliers was also assessed by visual inspection. Completing analyses where outliers were removed was considered, however it was concluded that could have been misinterpreted as being the result of a lack of objectivity. It was also concluded that it was not possible to determine that outlier results were inaccurate without detailed analysis, indeed it was concluded that there were plausible explanations for outliers.

The funding allocation system did not have an adjustment for rurality and therefore one of the initial areas for work was to determine what adjustments for rurality were included in the formulae used by Scotland, Northern Ireland and Wales, other countries and local government allocation in the UK. The review of other allocation systems is covered in Chapter 3.

From the initial research on the allocation system it became clear that an historical review would be necessary for a full understanding of the system. It was concluded that it was necessary to consider NHS financial issues because financial pressures were central to the decision to close hospitals. The review of the allocation system, management structures and financials is covered in Chapter 4.

It was concluded that it would be necessary to carry out analyses comparing areas of varying levels of rurality and degree of urbanisation. A broad range of rurality measures were considered to identify one that could be used in the analyses. This is covered in Chapter 5.

Chapter 6 covers the allocation formula adjustments to compensate for differences in need which also included adjustments for age. This chapter also includes a review that was completed as part of the research into the link between poverty and health need, in particular in rural areas and analyses of how indicators of need vary according to rurality. This chapter includes an analysis of the need adjustment that was based on a study by the University of York in 1994.

Chapter 7 considers the adjustment to compensate for unavoidable differences in the cost of providing services. The principal focus was on pay policies and a detailed analysis of the research underpinning the pay adjustment was completed. A series of analyses were completed on actual pay levels and differences between areas. Unavoidable land and building costs were considered, in particular the impact of the unprecedented building programme and the revenue costs of the Private Finance Initiative. The differential cost of utilities and transport were also reviewed.

Rurality was not included in the Market Forces Factors; therefore analyses were carried to determine if such an adjustment was warranted. This is covered in Chapter 8.

The key recommendations and these are detailed in Chapter 9 and this is followed by key conclusions in Chapter 10 and references in Chapter 11.

CHAPTER 3 ~ HEALTHCARE RESOURCE ALLOCATION ADJUSTMENTS AND UK PUBLIC FUNDING ALLOCATION SYSTEMS 1997 TO 2003

SUMMARY

The formulae used to allocate NHS funds for hospital and community services in England had an adjustment to reflect the additional costs of providing emergency services. The adjustment was introduced to compensate for differences in the costs of providing emergency services that were incurred as a result of congestion or rurality. There were no adjustments for community services, travel or hospital size.

Rurality was a key element in the General Medical Services allocation system used to determine the funding for GPs in England. Payments were made to compensate for smaller list sizes and the Rural Practice Payment Scheme and the Essential Small Pharmacy Schemes provide additional funding in the most rural areas. The funding system introduced as part of the GP contracts in 2003 also included rurality weightings.

In Scotland the formulae used to determine the proportion of healthcare funding to be allocated to health boards included an adjustment to compensate for the unavoidable costs incurred as a result of rurality. The detailed analyses completed as part of the "Fair Shares for All" review identified that there are higher costs in rural areas due to smaller facilities with a lower economy of scale and increased travel time and costs. The scale of the adjustments identified as necessary to compensate for differences in costs were very significant, ranging between +20.4% and -3.2% for hospital and community services and 31.4% to -6.2% for General Medical Services.

NHS resource allocations in Wales were also adjusted for rurality. The ‘Monte Carlo’ simulation was used to identify travel times for community nursing staff and adjustments were made to adjust for unavoidable differences in costs.

In Northern Ireland detailed research was carried out to ensure that the health allocation system resulted in Health Boards receiving an appropriate share of the resources available. An adjustment for rurality was found to be essential to adjust for the unavoidable costs of providing services in rural areas. It was also concluded that there are significantly higher costs in the smallest and largest hospitals. The adjustment for rurality in community services was based on detailed analyses of accessibility and not just distance.

Other countries have considered the additional costs that can be caused by rurality. Finland adjusts for land area and population density. In Australia the Rural Retention Programme provides additional funding for GPs in rural areas and various studies have shown a link between rurality and key health issues. In New Zealand there are premia for rural GPs and community nursing. Research in the United States concluded that rural services face additional costs and that those living in rural areas are more likely to self-assess their health as poor.

The Standard Spending Assessments for local authority allocations included an Area Cost Adjustment to compensate for differences in the cost of providing services. The rurality adjustments were based on population density, population sparsity, road and coast length. The allocations were calculated separately for each of the six services Highways maintenance, Fire, Education, Personal Social Services, Police and Environmental Protective and Cultural Services.

The Grant Aided Assessment system used to allocate local government funding in Scotland also had an adjustment for rurality. The adjustment was based on settlement size; however research by Salford University recommended replacing this with a system based on accessibility.

It was clear that during the 1997 to 2003 period rurality adjustments were viewed as essential in all key comparators including allocations for general medical services and for the health services in all of the other Home Countries and for local government allocations across the UK. The conclusions that adjustments were required were based on detailed analyses of costs by the leading university research groups on resource allocation in the UK including York, Lancaster, St Andrews, Bristol and Salford.

It was evident that equivalent studies would have concluded that an adjustment for rurality in the Hospital and Community Health Service allocation system should have been included. The failure to carry out research into the case for a rurality adjustment means that the system was flawed. It was concluded that there was a significant failure by the bodies that were charged with ensuring that the allocation formula was robust.

3.1 INTRODUCTION

This chapter focuses on the systems that were used for these allocations between 1997 and 2003 and considers whether the rurality adjustments adopted in these formulae were relevant to hospital and community services in England. There was also a consideration of rurality adjustments that were paid in other countries.

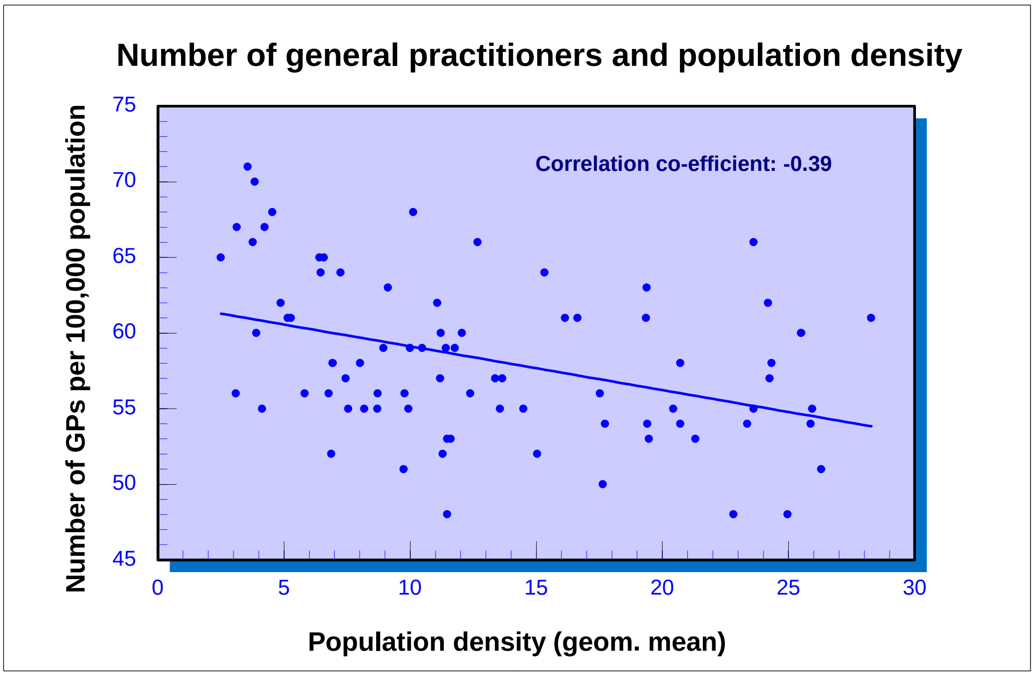
The first section considers the rurality adjustments that were made in the NHS General Medical Services system for England. This is followed by a review of NHS allocation systems that were adopted in Scotland, Northern Ireland and Wales and then healthcare adjustments and payments that were made in other countries. This is followed by a review of the rurality adjustments that were included in Standard Spending Assessment and Grant Aided expenditure local government allocation systems.

3.2 GENERAL MEDICAL SERVICES RURALITY PAYMENTS

3.2.1 General medical services rurality adjustments and analyses

There were rurality payments in the terms and conditions for general practitioners (GPs) which was referred to as the 'Red Book'. The adjustments for rurality in the Red Book were referred to as Rural Practice Payments. The adjustments were primarily for practices where 20% or more of patients lived 3 miles or more from the surgery and there were additional adjustments to remote areas such as the Isles of Scilly. The analysis of the correlation between the number of GPs and rurality is shown in Figure 3.1. This analysis indicates that there was a considerable variation in the number of GPs but that rural areas tend to have more GPs.

Figure 3.1 Correlation of the number of GPs a geometric mean density



An updated system for GP financing was proposed in “Implementing the new GMS contract” which was published by the Department of Health in December 2003. The new system acknowledged that the distance of the population from a practice and the density of that population influenced the costs of delivering services. The adjustment was calculated by identifying the average distance between the surgery and patient homes and the average population density of the wards. The rurality weighting was applied to 58% of the practice list, with the remaining 42% of the practice list given a weighting of 1.

3.2.2 Critique of system

The adjustments had a series of measures intended to identify all of the additional costs faced in rural areas. It was also flexible enough to be able to reflect exceptional cases like the Isles of Scilly. However the system was complex and this would have meant that it was time consuming to maintain. In addition the cost differential was more likely to be a continuum, so that a sliding scale would have resulted in the adjustment more accurately reflecting the actual differences in costs than a 20% cut off. This highlights concerns about the 58%/42% split in the revised system.

3.3 SCOTLAND

3.3.1 Rurality adjustments

The resource allocation system in Scotland had rurality adjustments. NHS allocations were based on the May 1977 report of the Working Party on Revenue Resource Allocation which was produced for the Scottish Home and Health Department. The report was titled Scottish Health Authorities Revenue Equalisation (SHARE) and rurality was one of the four measures used to allocate resources.

A significant proportion of the Scottish population lived in some of the most rural and remote areas of the UK. The Health Board covering the Highlands had an average of eight people per 100 hectares and four of the Health Boards had 30% or more of their population living in locations with less than 1,000 people. It was concluded that this level of rurality had a significant implication on the cost of delivering hospital and community services (SEHD 2000).

The sparsity index in the SHARE formula applied to 30% of the costs of the community nursing services element of community health services and was based on a measure of the distance that patients lived from their GP. The measure did not reflect the delivery of community services from locations other than GP surgeries or travelling time.

The Island Health Board and Argyll and Clyde received additional funding, referred to as the Island allocation, to reflect the costs faced in providing services. The formula did not include any generally applicable allowances for additional costs of providing hospital services in remote and rural areas.

The Scottish Executive established an independent review of resource allocation for the NHS in Scotland in 1997. Professor Sir John Arbuthnott, principal and vice chancellor of Strathclyde University was appointed to chair the steering group. Five criteria were set for the review. Firstly, the cost implications of variations in need across the country should be as accurately measured as possible; secondly, routinely collected data should be used so that the formula could be readily updated, that the formula's methodology should be clear and comprehensible and that assumptions made should be explicit; thirdly, the formula should be evidence-based as far as possible whilst taking care to avoid situations where perverse incentives could develop for attempting to manipulate the system; fourthly, there should be reasonable stability on year on year allocations; and finally, it should be possible for the outcome of using the system to be tested, i.e. that there should be an increase in the equity of access.

The review team produced two reports. The initial report used over 40 socio-economic factors in calculations aimed at modelling the differential in the need for services across the country. For district nursing nine different indicators were used. Whilst this approach meant the formulae closely modelled the need for services and minimised the impact of one-off extreme results this led to criticism about the lack of comprehensibility of the system. There was also concern about the reliability of the results as they were based on one year's data. There were also concerns that as the data for a large number of the variables was drawn from the 1991 Census that the information might be unreliable. As a consequence of these concerns a detailed review of the system proposed in the first report was completed.

The final "Fair Shares for All" report (Scottish Executive Health Department, 2000) was based on the same principles and had the same core analyses but was significantly less complex than the initial "Fair Shares for All" report (Scottish Executive Health Department, 1999). The measures used to model the differences in the need for services were reduced and a different rurality measure was adopted.

The approach developed was based on four indicators. These were the SMR for those aged under 65, the unemployment rate, the proportion of elderly claiming income support and households with two or more of the six indicators of deprivation. The six indicators of deprivation included were unemployed or permanently sick head of household, low socio-economic group of head of household, overcrowding, large households, lone parent family and all elderly household.

The analyses found that the equal weighting of the four indicators when tested against previous years showed considerable stability. The report concluded that the approach that was recommended was not consistent with the Carstairs Index. It was stated that this was because the factors selected in the Arbuthnott Formula had a close association with healthcare need.

The review of the remoteness adjustment concluded that the previous system had a greater adjustment than could be justified. It was concluded that the factors that were significant were population density in terms of hectares per person, the proportion of people living in communities under 500 people and travel between the proportion of the GP list that qualified as 'road mileage'

The review group considered analyses on land and buildings; cost variations and staff pay variations. From these analyses they concluded that average gross weekly earnings were similar across the country and that areas with low unemployment rates had similar vacancy rates for clinical staff and that a staff market forces factor was not required. It was concluded that a land and buildings adjustment was not required as the adjustment would make only a nominal difference to allocations.

It was found that the Health Boards covering predominantly rural areas tended to have significantly smaller hospitals than those providing services in densely populated urban areas. Analyses indicated that the costs of providing hospital services in small hospitals were significantly higher than those in larger hospitals. The analyses on the cost effectiveness of hospitals were based on average costs in small hospitals and those in large hospitals. For example, in large mental illness hospitals with more than 10,000 inpatient weeks, the average cost of providing care in 1997/8 was around £700-750 per week. This compared with average costs per week of more than £900 for the smallest hospitals. A similar pattern was found in acute hospitals, maternity units and hospitals caring for the elderly, as shown in charts 3a to d. These charts are derived from the “Fair Shares for All” report.

Figures 3.2a-d Arbuthnott Formula hospital cost comparisons - charts derived from the Fair Shares for All report 2000

Chart 3a

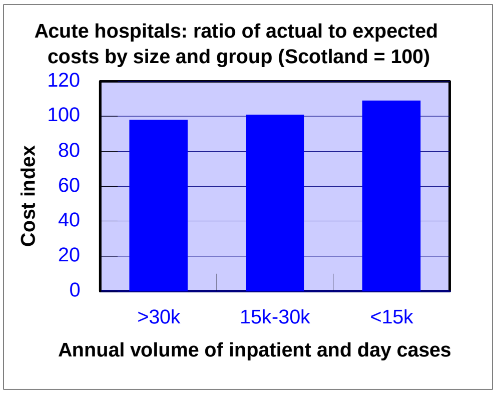


Chart 3b

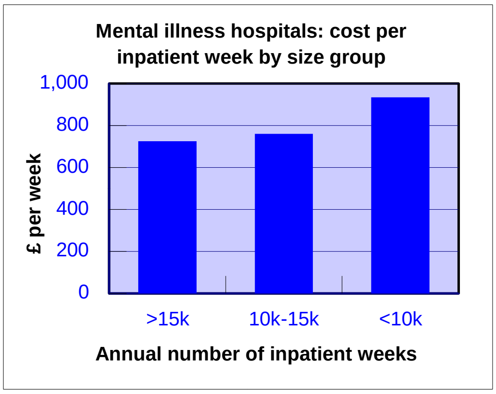


Chart 3c

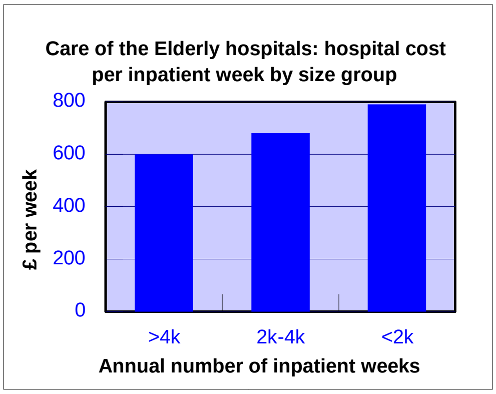
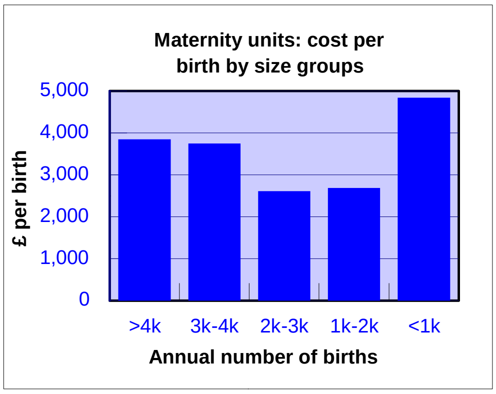


Chart 3d



The factor used to adjust allocations according to differences in the costs of providing hospital care was based on estimates of the differences between actual expenditure on hospital services for its residents and the level that each Board would incur if these services were provided at the average unit costs for all hospitals in Scotland.

Figure 3.3 HCHS remoteness adjustment (Based on Fair Shares for All 2000)

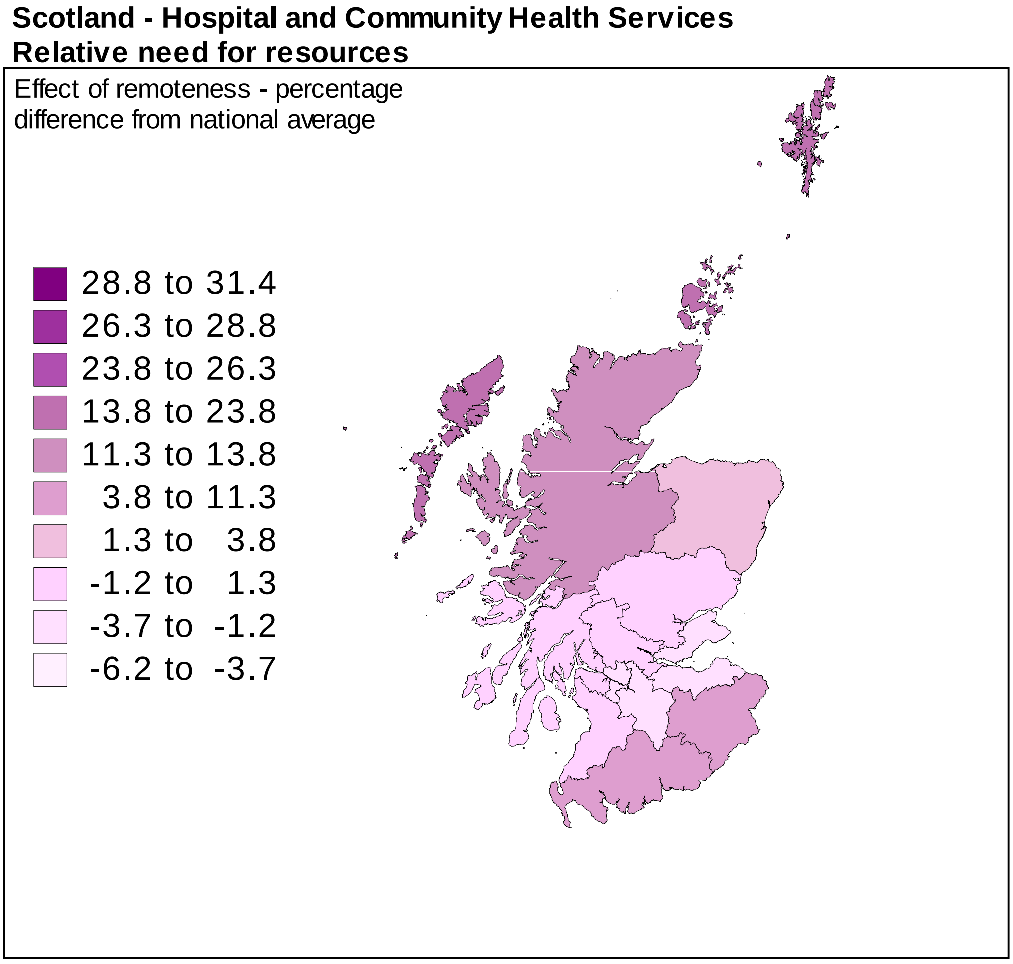
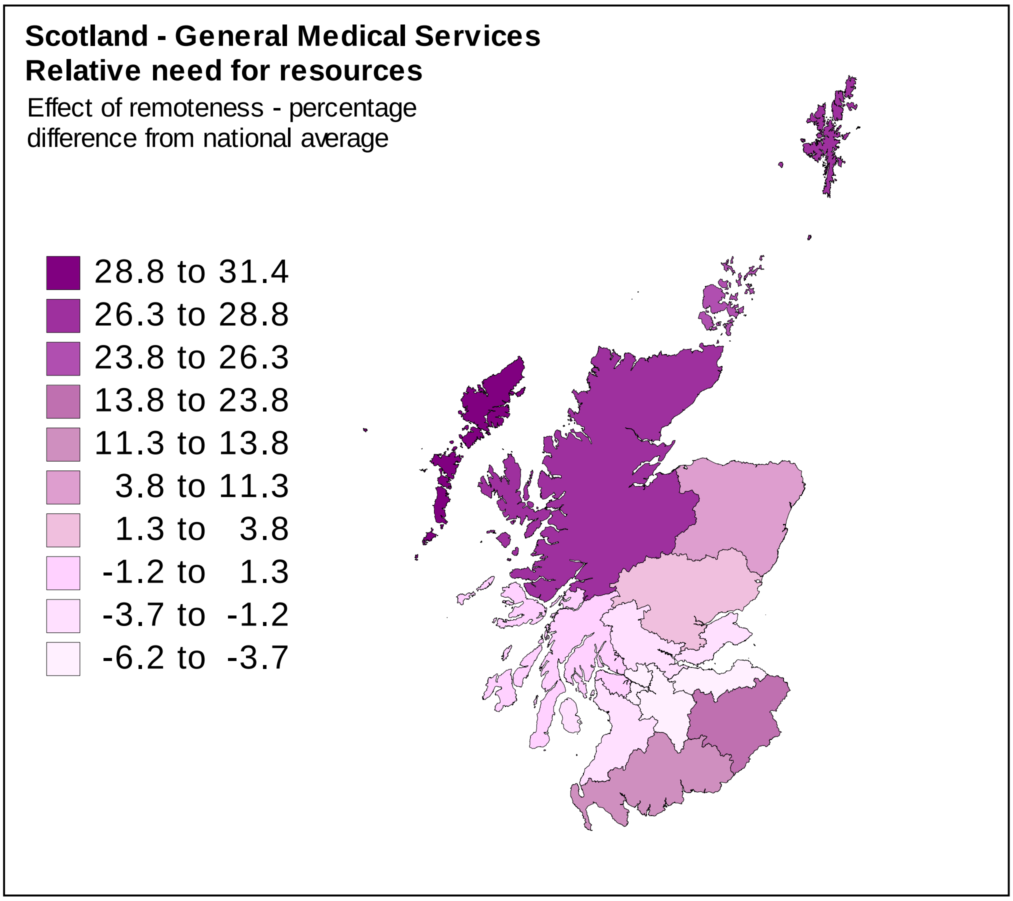


Figure 3.3 shows the percentage effect of remoteness within the formula for the constituent health boards for Hospital and Community Health services. The most rural area, Shetland and the Western Isles, received an adjustment of +20.4% and the most urban area greater Glasgow, had an adjustment of -3.2%.

Field-based studies were carried out into the excess costs of delivering community services in rural areas. The study identified that the cost index needed to consider increased travel time, staff costs and skill mix. The formula introduced resulted in the Western Isles receiving 31.4% extra and the most urban areas have a reduction of

6.2%. Figure: 3.4 shows the percentage effect with the formula for the health boards for General Medical Services.

Figure 3.4 GMS Services adjustment (Based on Fair Shares for All 2000)



3.3.2 Critique of the Scottish System

The strengths of the “Fair Shares for All” system are that there was a focus on ensuring the system was as accessible as possible. When compared with other resource allocation systems this was relatively transparent.

The approach taken on consultation and involvement and the detailed impact reviews were particularly notable and worthy of consideration by other government departments when considering changes of the scale recommended by the Fair Shares for All report. The transparency of the system when allied to extensive consultation was likely to have resulted in a more robust formula. The impact reviews meant that the consequences of introducing the formula could be fully analysed prior to implementation.

Having more than one of the indices of deprivation to be considered as deprived addresses the weakness of other allocation systems where it was possible for anomalies to occur. For example unemployment of the head of a household did not necessarily mean that the household was living in poverty as there may be other income from other members of the household or from investments.

The formula uses proxies for health need and therefore has similar potential difficulties to other weighted capitation systems. The indices have however been selected with considerable care and the necessity to have more than one measure may fully or partly address this issue.

It was concluded that there needed to be greater consideration of the impact of medical schools, the additional burden resulting from clinicians spending more time on the training of these staff and on the opposite side the benefits accruing from having the additional training staff. It was interesting to contrast the findings of the research in Northern Ireland with that in Scotland. In Northern Ireland the analyses indicated that there were significant additional costs in large hospitals.

The analyses on the costs of remoteness are based on road length. This was selected because it appeared to give a reasonable indication of relative rurality in Scotland. This measure may not fully account for accessibility issues as there was no assessment of key issues like the provision of public transport and there was no direct consideration of geographical barriers.

3.4 NORTHERN IRELAND

3.4.1 Historical perspective and revised formula

The Capitation Formula Review Group (CFRG) was responsible for determining the health allocations in Northern Ireland. The Proposals for the Allocation of Revenue Resources (PARR) had a rurality adjustment in the formula for community health and ambulance services. That for community services was based on the distance patients lived from their GP and for the ambulance service it was based on the average miles per patient carried. These adjustments were the subject of criticism for being inaccurate. The community adjustment was based on information from 1983 and the ambulance adjustment took no account of journey time.

The review of rurality costs was undertaken to assess where adjustments were necessary and develop new measures where appropriate. The reports Research into the Effect of Rurality on the Capitation Formula for Health and Social Services in Northern Ireland (PwC 1998) and Modelling the Impact of Rurality on the Provision of Accident and Emergency Services in Northern Ireland (1998) concluded that in addition to empirical research there needed to be research on the impact on the services affected by travel.

A review was commissioned to identify what if any adjustments to the allocation formula were necessary to compensate for the relative effects of rurality across the province. The research was carried out during 1999 by universities including Queens in Belfast and Lancaster and it concluded that the distance from Belfast and the number and size of facilities were the key issues. The review considered the maximum reasonable distance to travel in order to obtain a service. The potential need for more numerous and smaller facilities, resulting in a loss of economies of scale received particular focus. Accident and emergency units were highlighted because of the need for the service to be highly accessible. Non-productive travelling time was also identified as a potential area of increased cost. (Northern Ireland Health and Personal Social Services 1997, 2000)

It was concluded that the information from the NHS was insufficiently robust to be used for the analyses. As a result a series of models were developed to determine additional costs for rural areas. These simulated the situations being studied so that distances and times models could be estimated. Algorithms were used to determine the required number of routes each day and the travel distances and time to complete these routes.

The analyses of acute services indicated that there was a lower utilisation in rural areas. It was concluded that this did not reflect a reduced need but was a consequence of poorer access. The approach developed by the Health and Social Care Research Unit and York University used the assumption that utilisation after taking into account supply considerations was a robust indicator of need. The report concluded that notwithstanding the impact of congestion, rural areas experience additional costs for the same level of demand.

3.4.2 Peripatetic staff, patient transport & emergency ambulance model

The models for calculating the impact on costs for staff who are required to visit patients in their homes and community clinics, and that for patient transport, had the following elements: the distance from each enumeration district to delivery centres; the travelling times from each enumeration district to each delivery centre; and demand rates for each enumeration district. The model for determining emergency ambulance costs was based on a simulated incident pattern; road speeds in miles per hour for each road type based on time of call out; and response time requirements.

The study concluded that the costs of peripatetic healthcare workers are higher in rural areas due to direct costs associated with increased fuel usage and additional vehicle costs and indirect costs of non-productive health worker travelling time. The staff covered were district nursing, psychiatric nursing, health visiting, occupational therapy, podiatry, community midwifery and community social work. The study quantified the unavoidable costs of rurality in terms of unproductive time spent travelling and costs per mile. The emergency ambulance service analyses used computer simulations of emergency and doctor urgent requests. This has resulted in a quantification of the need for staffing, ambulance vehicles and travel related costs. A similar exercise was completed for non-emergency ambulance services giving the staff, vehicle and travel related costs.

The rurality budget was incorporated in the allocation formula by adjusting the final allocation of Boards. The final monetary allocation was adjusted by the difference between the rurality budget, and the weighted capitation adjusted for age, gender and need.

The review of the effect of rurality (PwC and University of Lancaster, 1998) covered the impact of rurality and made a series of recommendations. The modelling approach was based on three scenarios. Firstly, where a healthcare professional was required to make a series of trips to visit clients/patients in their places of residence; secondly, where patients are transported from their own homes to health or social care institutions and returned; and thirdly where an institution or service located in a sparsely populated area was unable to maximise throughput and thus benefit from economies of scale.

Distance, both physical and travelling time, from major urban centres was also an indication of rurality and in Northern Ireland it was concluded that this factor was effectively a function of the ‘distance from Belfast’.

The key recommendations were that there should be a revised rurality weighting consistent with the findings of the research and that further research should be undertaken as resources permit to isolate the effect of rurality on the relative costliness of providing hospital based services across the Boards in the province.

The subsequent study was carried out by MSA Ferndale and published in 2003. It concluded that there are significantly higher costs in small hospitals and that community service funding needed to reflect the unavoidable inefficiencies that occur due to the fluctuating nature of the workload. It was concluded that large acute hospitals have higher costs but that this could be due to poor management of resources, the impact of teaching or complexities associated with running multiple site hospitals. It was also concluded that additional research was required into the impact of cross boundary flows and the adjustments that need to be made.

3.4.3 Critique of Northern Ireland

The research into the potential impact of rurality and inefficiencies for large multiple site hospitals raised a series of issues that were pertinent to the NHS allocations in the other Home Countries.

The methodology adopted to develop the transport adjustment appears to be a rigorous approach for community based staff. It may not fully reflect patient accessibility issues as there was no assessment of key issues like the provision of public transport. This can be an important factor as patients may not be able to drive, or have access to a car. In addition they may not be sufficiently healthy to drive but may be fit enough to use public transport. Despite these reservations it was concluded that the calculation of travel times was a significant advance on the systems used for GMS in England and HCHS and GMS in Scotland.

Like other systems where the need adjustments are based on proxies, there was the potential for the measures and the coefficients selected to under or over predict the actual differences in healthcare needs.

3.5 WALES

3.5.1 Historical review

The resource allocation system used in Wales was like that for the rest of the UK as it was based on weighted capitation formulae, so that if no adjustments were applied, each area would have received allocations based solely on population. As with England the factors could be categorised as either cost or need adjustments.

The sparsity adjustment was calculated and used for the ambulance and some of the community health services. These weights were different for each area. For community health services the sparsity measure was used in the calculation of modified population shares to reflect the staff time spent in travelling.

For each staff group, health visitors, district nurses, midwives and auxiliary nurses, what was referred to as the "Monte Carlo" simulation was used to give an estimated average distance per visit. This was then applied to the expenditure and SMR weighted population of each area to yield an additional element corresponding to a travelling time distribution. The travelling time distributions were also directly combined to give an overall health authority share to apply to an estimate of the expenditure on travel and subsistence for community health staff. This approach was similar to the approach adopted by later studies in Northern Ireland.

For the ambulance sector, the sparsity factor was calculated by taking the road length per 1000 population added to the Wales average road length per 1000 population. This factor was applied to a weighted sum of the in-patient and out-patient weighted populations for each health authority. The out-patient weight was 5 and the in-patient weight was 1.

The estimate of the proportion of time spent travelling was taken from a 1982 OPCS survey “Nurses Working in the Community”. The community health service weightings were based on the simulation study carried out by the University of Swansea in 1983.

3.5.2 Townsend system to adjust for differences in health need

The Welsh National Assembly commissioned research by the universities of Bristol, Cardiff and Lancaster and additional statistical analyses were completed by the Office for National Statistics. The report of the independent research team concluded that it was more appropriate to allocate NHS funding according to statistics that directly relate to the need for health care rather than using proxies for health need (Gordon et al 2001).

A comprehensive review was led by Professor Peter Townsend of the London School of Economics and Bristol University (Townsend 2001). Like other health weighted capitation formulae used in the UK the recommended formula was based on making adjustments to compensate for differences in health needs and unavoidable differences in the cost of providing services.

The review concluded that the data required to complete an equivalent analysis to that for Scotland would take two years because of a lack of robust information and because some of the required information was not collected at postcode level. Areas of particular concern included the reliability of the Trust Financial Returns (TFR2) data from Trusts on expenditure the Welsh Health Survey (WHS), the validity of the indicators and their links to blocks of expenditure. It was concluded that the WHS and TFR2 data may not be robust and that this was a key issue because they were key components of formula and it was therefore essential that they were accurate and reliable enough for ranking between areas to be robust.

It was also concluded that the “indirect measures of capturing relative need” used in the Scottish, English and Northern Ireland formulae were all based on proxies for health need rather than the actual health need. It also asserted that the Scottish report was based on complex statistical analyses and that this hindered transparency and comprehensibility.

The report of Task Group C on the impact of rurality and remoteness concluded that significant adjustments needed to be added to the formula to compensate for rural factors, but it was acknowledged that this would require individual analysis because of the specialist nature of the service. It was concluded that the extant adjustment for rurality should continue until further research had been completed. The group concluded that there was insufficient information to justify a cost weighting for the costs of providing hospital services.

It was recommended that the new Welsh system should be introduced for allocations from 1 April 2004 however it was subsequently decided to phase in the adjustment as a result the adjustment applied to a proportion of the need factor but majority of the weighting was based on the previous system in 2004/5.

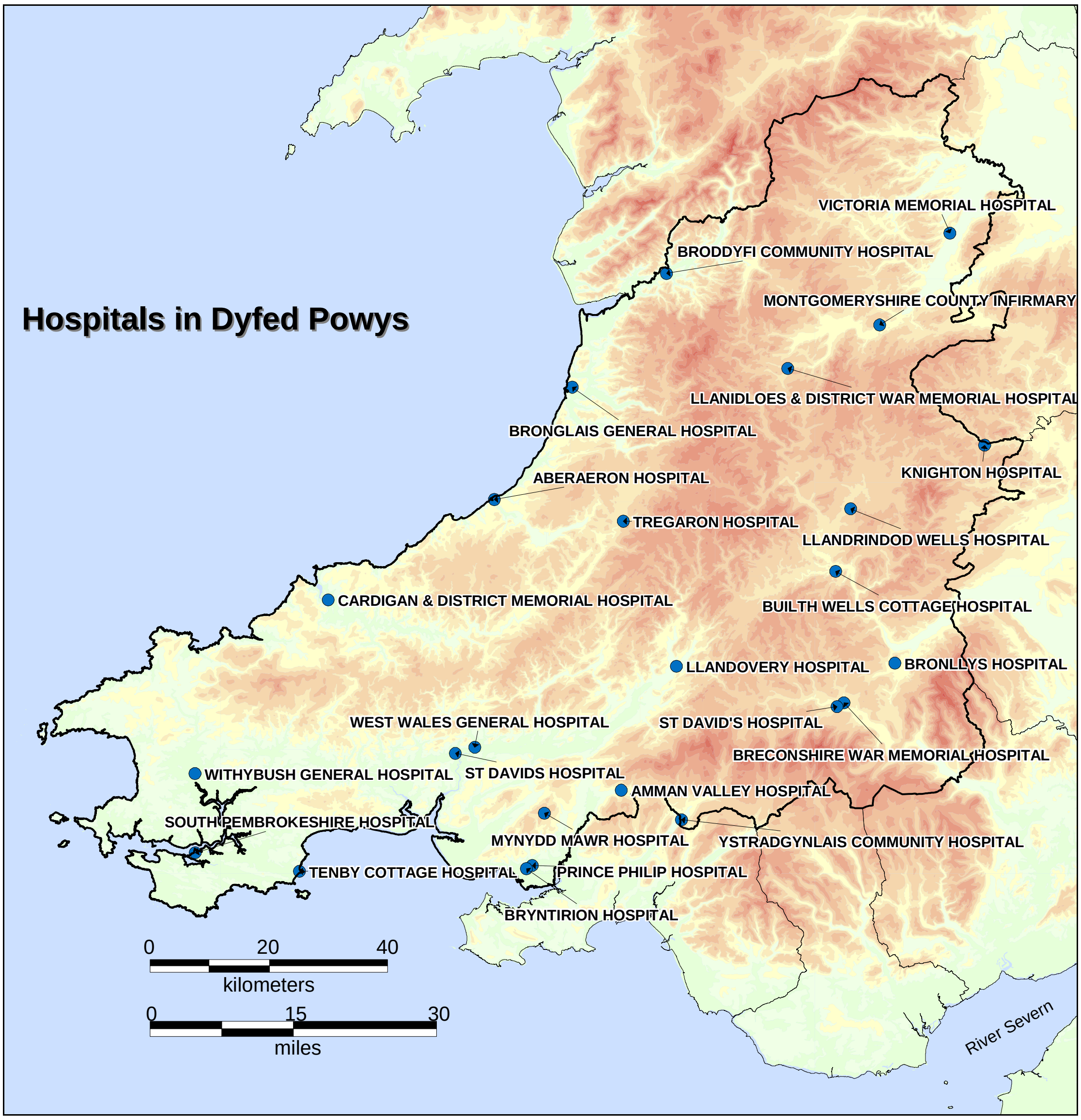
3.5.3 Critique of Townsend Welsh NHS Allocation Formula

It has been concluded by other researchers that the Welsh formula has theoretical and practical advantages over the proxy measures systems for identifying differences in need. One of the strengths of the system was that it recognises the historical link and funds existing facilities. I believe that this needs to be considered by any system that aims to adjust for unavoidable differences in costs as considerable resistance is encountered when there are proposals to rationalise health care facilities in rural areas (Banyard 1997).This means that areas like Dyfed Pows which had a large number of small community hospitals as shown in Figure 3.5 would have little prospect of rationalising facilities. However it is also the proverbial 'double edged sword' as this strength was also a potential weakness as it did not progress the issue of whether or not the facilities should be there and therefore it maintains the status quo (Asthana et al 2002). It was concluded that the formula should have recommended that efficiency improvements based on sound clinical practice for improving efficiency and minimising the unavoidable additional costs should have been key criteria for the detailed review of rurality.

It was concluded that rural areas need to develop and innovate. There have been significant advances in practice in rural areas. Scottish GPs led the use of thrombolysis in community hospitals and this was followed by treatment in the community, mobile screening for retinopathy has been introduced and it has been proved that GP and Midwife led community hospitals offer safe and effective maternity care (Murray et al 2002)

The key advantage of the Townsend approach was that the allocation would be clearly targeted at the need experienced by the health service rather a theoretical proxy of what the need should be. The approach would also have the major advantage of improving the focus on the quality of data on activity, outcome and costs.

Figure 3.5 Hospitals within the Dyfed Powys Health Authority area



Research identified two primary concerns about the new Townsend formula. Firstly, the formula did not identify the additional costs resulting from sparsity, but concluded that more research was required. It was possible that this review of rural costs could have a significant impact on the target allocation for Dyfed Powys and North Wales. As acknowledged in the report it was not practicable to reduce allocations once they have been used to develop services. The Crossman Principle of equalising using a greater proportion of additional funding was the practicable way to achieve the required changes. The new formula would give the most urban areas a greater proportion of funding and if this were introduced before the rural cost adjustments required for all services were completed, it could result in an over allocation to some areas that would take a significant period of time to redress.

The second concern relates to the use of current information on health need. There was a considerable body of research showing that the utilisation of health services can be affected by factors such as rurality and ethnic origin. This can lead to conditions not being diagnosed and therefore using this formula there would be an under allocation to such groups and areas. This was partly addressed by the report as it recommended some targeted funding to address this issue such as "Equity Training Grants" to enable staff to be freed to identify severe unmet health need. However it was possible that there was a significant under-presentation issue and therefore this area needs greater focus than that recommended.

Another concern highlighted when the report was published was that, whilst it had considerable merit, the system was untested. In such cases it was better to phase changes in to identify if there were unforeseen issues. This was particularly important where there were concerns about fundamentals of a new system. In this case there were acknowledged concerns about data. Previous experience of completing analyses with TFR2 data was like that experienced by the research teams completing the reviews in Northern Ireland, namely that the returns were often exceptionally poor in terms of accuracy. The decision to phase in the need adjustment means that it was possible to assess the benefits and potential difficulties of the system.

The pragmatic approach would in effect be meeting the healthcare need already identified and carrying out research to identify undiagnosed need so that it can be addressed as more clinical staff became available due to the increasing NHS funding.

This approach therefore could if carefully managed ensure that pressure incentives did not develop, and lead to a situation where it was easier to more reliably compare costs and outcomes. This would help increase to provide improvements in healthcare.

The conclusion by Task Group C on rurality and remoteness that there was insufficient information to justify a hospital costs weighting was at variance with the detailed study in Scotland where a significant impact was found. It is anticipated that larger hospitals should be more cost efficient to run because of economies of scale such as lower infrastructure costs, staff grading and the flexibility to manage a larger pool of staff more efficiently.

3.6 HEALTHCARE ADJUSTMENTS USED BY OTHER COUNTRIES

3.6.1 Finland

The State allocation for healthcare funding has used the following criteria to allocate funding: population age structure, morbidity, population density, land area and financial capability. The weighting for population density and land area in the allocation formula was 1% of the total allocated. Seventy five per cent was based on the population age structure and 24% on the morbidity. The formulae for calculating the rurality coefficients are as follows (Jämsén1998):

- For population density **4x ((4 - population density)/100)**
- For land area **4x ((land area/1250sqkm)/100)**

3.6.2 Papua New Guinea

There are few comparable issues between the health service in Papua New Guinea and the UK. The key health problems were malaria (61.4%), acute respiratory infections (30.7%), skin problems (9.8%), intestinal worms (1.9%) and diarrhoea (1.3%). However one research finding was relevant, this was that there was a highly statistically significant correlation between the numbers of attendances at rural health centres, with attendance decreasing exponentially with distance. The research also indicates that when using distance decay studies that the influence of natural barriers and transport systems need to be considered (Muller et al 1998).

3.6.3 New Zealand

New Zealand also has a weighted capitation formula for allocating healthcare resources. In 1998/9 a rural premium of $15NZ million was allocated to small publicly owned rural hospitals to compensate for additional revenue costs of providing hospital services in rural areas.

There were adjustments for GP services with a 10 percent premium paid for consultations and 25 percent travel premium paid to GPs in rural areas. The support package for rural GPs also covered GP and practice nurse training and indirect support for locums. There was also an adjustment for rural pharmacies a need for support in rural areas has been identified with a need to improve the recruitment and retention rates and to improve the care provided by rural clinicians. Measures adopted included promoting rural careers, targeting rurality bonuses to a rurality scale, strengthening teamwork and formalising support and ensuring that there was an increased focus on providing high quality emergency care (New Zealand Executive Government 2003). Access to health care in rural communities was seen as a key factor in the ten year strategic plan in New Zealand (Public Health Intelligence 2002).

3.6.4 Australia

The accessibility of health care was significantly different in urban and rural areas. As a consequence of the accessibility and availability of services those living in rural and remote areas have an average of 4.2 GP consultations per annum compared with 6.1 for those in state capital cities. It was identified that there was a significant shortage of GPs in rural areas of Australia. It was been estimated that 30% of the population live in rural areas but that only 22% of male GP's and 17% of female GPs had practices in these areas (Wronski 2003). The Rural Retention Program paid eligible GPs. This scheme gives an entitlement to a payment of between $AU 5,000 and $AU 25,000 for those providing services in rural areas depending upon the areas remoteness (Seward et al 2003).

There was a particular focus on the needs of rural areas in Australia. The Australian Medical Association sought to increase the number of training posts in rural areas, supporting GP's with locums and continuing education and research. It was recognised that infrastructure costs will be higher. There are also concerns about the isolation experienced and the need for rural doctors to be on key national groups was recognised (Australian Medical Association 2002).

The need for dental care in rural areas was also highlighted. Failure to provide adequate dental care leads to increased levels of periodontal disease and that this was a particular problem in uncontrolled onset diabetes. Diet needs to be carefully controlled in patients with diabetes and it was concluded that this was less likely when patients had poor dental health (Endean 2001).

There was an increasing focus on rural areas as a result of initiatives like the National Rural Health Alliance; the Rural health Sub-Committee; the New South Wales Rural Health Implementation Co-ordination Group; the Rural and Regional Health and Aged Care services Division in Victoria; the Ministerial Rural Health Advisory Council in Queensland; the Country and Disability Services Division in South Australia; and the Division of Community and Rural Health in Tasmania (Snowball 2003).

It was estimated that asthma prevalence doubled between 1982 and 1992 and that one in four children, one in seven adolescents and one in ten adults have asthma. Asthma was identified as a particular problem in rural areas because of the reduced access to medical staff and facilities. Reducing asthma triggers in rural areas was also cited as a key difficulty because of the exposure to triggers like chemical irritants, farm dusts, pollens and animals (Luttrell 2003).

Research has indicated that the more remote a GP the more likely that they are to be involved in providing regular critical care. This has an impact on the training required, pressure and responsibility (Mildenhall et al 2003).

It was concluded that those living in rural areas need to take responsibility themselves for ensuring that the healthcare they need was provided rather than wait for policy makers to do it for them (Lavelle 2003). It was concluded that this approach should be more fully considered by policy makers in England because measures such as a significant increase in the numbers trained in the community on resuscitation and greater self reliance on adopting lifestyle changes would be likely to result in reduced morbidity.

3.6.5 United States

There has been a considerable amount of research into rurality and costs in the United States however the fundamentals of the health system are so different that making comparisons was difficult. There was however some research that was of direct interest.

Analyses were completed on the cost of ambulance services. These indicated that it was more expensive to provide services in rural areas where there are fewer incidents. There was a similar impact on diagnostics where it was necessary to provide a service. It was concluded that the cost per patient treated varied considerably and that the issue needed to be addressed where there was a fixed item of service fee (Atkinson and Pini 2001).

Research has indicated that 36.6% of those aged 60 or over and living in rural parts of America rated their health as fair or poor compared with 31.7% in metropolitan areas. It was also noted that the number of physicians varied between an average of 308.5 and 223.5 physicians per 100,000 residents in metropolitan areas and an average of 147.2 and 80 for non metropolitan areas (Rogers 2002).

3.7 LOCAL AUTHORITY STANDARD SPENDING ASSESSMENTS

3.7.1 Review of allocation system

Standard spending assessments (SSAs) were used to determine the financial allocations for the local authorities across England. They were the amount which Central Government determined that it was appropriate for local authorities to spend on their revenue expenditure in order to provide a standard level of service consistent with the Government's overall spending totals. The services covered were: (I) Education, which has five sub blocks; (II) Social Services, which has three sub blocks; (III) Police; (IV) Fire; (V) Environmental, protective and cultural services; and (VI) Highway maintenance.

The system also uses weighted capitation whereby population has multiplied adjustments for demographic and social characteristics and the area cost adjustment. The formulae used in SSA calculations are based on statistical analyses, usually multiple regression analysis. This attempts to assess the significance of particular indicators that may influence the need for and cost of local authority services.

The aim of the Area Cost Adjustment was to compensate for unavoidable difference in the cost of providing services. The factors considered in this part of the SSA formula were for differences in rurality, labour costs and business rates. The rurality measures in the SSAs were sparsity, super sparsity, population density, coastline and road length. The definitions for each of the measures are shown in Figure 3.6. A different selection of measures was selected for each of the service groups as shown in Figure 3.6

Figure 3.6 Rurality measures for each SSA service group

Rurality Measure	**Services**
Population sparsity	I, II, III, VI
Population density	II, III, IV, VI
Road length	III, IV, V
Coast length	IV

The labour cost adjustment was introduced to ensure that authorities would be able to pay rates that would enable them to attract and retain staff in their local labour market. The adjustment was based on six zones and the rest of the country. The three London zones were: City of London; Inner London boroughs; and Outer London boroughs. The rest of the South East three zones are: Inner Fringe; Outer Fringe; and other South East Districts. The factor was based on the New Earnings Survey which was used to calculate a standard wage for each area. The approach was based on the assumption that each has the national average for each occupational group. The standard weighted wage relativities ranged from 1.65 for the City of London to 1.0485 for the Rest of England

The employed costs as a proportion of the total costs varied from service to service. The adjustment aimed to cover direct and indirect employment costs. The estimated employment cost share for each service is shown in Figure 3.7.

Figure 3.7 Employment share of SSA Services

Service	**%**
I Education	80
II Personal Social Services General Domiciliary	 75 100
III Police	85
IV Fire	85
V Highway maintenance	65
VI All other services	65

The Rates Cost Adjustment (RCA) to adjust for business rate differences was calculated in an equivalent way to the labour cost adjustment.

3.7.2 Concerns raised about SSA

Concerns were raised about the SSA formulae, in particular by rural councils and services. Rural areas have lower SSAs per person than urban areas. The SSA for children for North Yorkshire was 58% of the national average those for Cumbria, Cornwall and Lincolnshire were between 62% and 69% of the national average (Hale & Capaldi 1997).

A study in Cornwall concluded that authorities in rural areas tended to face additional costs for a number of reasons including: higher travel costs and time; additional transport costs in providing services; economies of scale are harder to achieve; there was poorer access to training, consultancy, and other support services. It was concluded that statistical, technical and service evidence presents a compelling case for sparsity to be recognised in the funding of local authority personal social services. (O'Donnell 1998a).

It was concluded that there are additional needs in rural areas. One factor cited was that inward migration may result in less support being provided from the local community as links may not have developed with neighbours. It was concluded that the lack of resources has resulted in significant differences in the domiciliary home care for the elderly between urban and rural areas. In 1995 Lincolnshire provided between one quarter and a half of the hours of service of that provided by the authorities in Inner London (Hale & Capaldi 1997).

A Steering Group was set up through the County Council Network in March 1998 with the objective of researching the issue further in order to articulate the case for improved funding for the personal social services in rural areas. This report concluded that, people living in rural areas tended to have access to fewer facilities than those living elsewhere, and that the people living in areas of sparse population tend to be older (County Council Network 1998).

A study was completed into the costs of providing home care services in areas of population sparsity compared with costs in non-sparse areas of the same authority. By analysing data from 14 counties, and comparing rural and non rural areas within those counties the research found that: in urban areas the proportion of time spent caring for the client, rather than travelling, was higher than in rural areas; in rural areas, travel hours were a larger element of home care assistants time; that there was a systematic tendency for travel time to increase as a proportion of home care assistants time as sparsity increases. It also concluded that mileage costs are a substantially higher proportion of home care costs in sparse and super sparse areas.

Analyses indicated that it took around 20% more time and expense to deliver a unit of home care in super sparse areas compared to non sparse areas and around 10% more in sparse areas. (Carr-Hill et al, 1998).

Analyses of police staff travel time indicated that for routine services there were very significant difference in the amount of time spent travelling. As shown in Figure 3.8 The analyses showed that local beat officers in Llanelli spend more than 5% more time travelling than equivalent staff in Brecon.

This would, *prima facie,* indicate that the service in Brecon would need around 5% more staff to provide an equivalent service. Clearly the situation was more complex due to factors like the need to respond to incidents in a reasonable time. Modelling by the police service in Wales also indicated that Dyfed Powys needed 50% more vehicles than average because of sparsity (White 1995).

Figure 3.8 Analyses of police travel time (White 1995)

Service	**Llanelli travelling time (%)**	**Brecon travelling time(%)**
All officers	2.90	5.50
Uniform patrol	2.85	4.65
Dog section	12.58	19.00
Local beat officers	0.41	5.67
Detectives	2.48	5.25

The Department for Transport, Local Government and the Regions paper on Developing an Allocation Formula for social service housing and probation (September

2001) identified that “authorities may face additional costs on account of providing services to relatively large dispersed and rural communities”. The report concludes that this needs to be analysed to consider inclusion in the cost indices.

3.7.3 Critique of Standard Spending Assessment System

The additional costs in high wage areas are taken into account on both direct staff pay expenditure and on non pay expenditure where it has been determined that suppliers will pass on their higher costs. Principal concerns about the SSA systems were that the mix of factors and weighting was complex and therefore it would have been difficult to ensure that the system was reliable. In addition some of the rurality measures were simplistic and did not take into account the nature of neighbouring areas.

3.8 GRANT AIDED EXPENDITURE

3.8.1 Review of allocation system

The GAE system was the Scottish Executive process for allocating shares of local government spending, the aim was to provide a standard level of service. A sparsity indicator was used in a range of local government GAEs: Education; Elderly; Police; and Environmental, Protective and Cultural services.

The indicator was composed of three indictors: settlement pattern, dispersion and density. These were combined to produce an overall sparsity measure. It was used in both an additive manner in some adjustments and a multiplicative fashion in others. A review by Salford University considered two thresholds to reflect a distinction between regional and district. These were set at 10000 and 1000 persons respectively. It was recommended that a low settlement threshold should be set so that the additional costs of providing services in small rural settlements and that there should also be an index that reflects the shortest distance between the service needed and settlements. Because of the presence of topographical barriers algorithms used to compute the shortest road distance were recommended (Salford University Business Services Ltd 1997).

3.8.2 Critique of Rurality Measures in GAE

The analyses carried out by Salford University were more detailed and considerably more sophisticated than those previously in place for GAE. I believe that a measure of accessibility was likely to produce a more robust system as it was a significant advance on measures like population density.

My primary concern was that despite the steps taken, the adjustments are inadequate to fully reflect the complexity of accessibility. This was because the system cannot reflect the following: fluid nature of the critical size needed to warrant facilities and services; the historical legacy of service and in particular facility distribution; the presence of public transport; the quality of the road network and its accessibility; topographical factors are complex and the analyses were based on making adjustments where there was clear evidence. The issues may not be clear from the analyses but may be readily apparent if viewed from a local perspective with local knowledge.

3.9 RECOMMENDATIONS

The Department of Health should use the research that has been completed in the UK and other countries to develop a robust rurality market forces factor for hospital and community allocations in England. The modelling and empirical approaches adopted in Northern Ireland, the communication of plans and systems in Scotland and the use of leading independent researchers were particularly noteworthy.

It was evident that the conclusion in Australia about the need to fundamentally change the approach taken by the public on the responsibility for healthcare has the potential to deliver significant improvements in morbidity.

The Welsh system proposed by Townsend addressed many of the principal concerns about other systems. The approach does however have it's own unique issues and issues that would need to be actively addressed if the system were to avoid the potential to simply reflect existing resources. Key examples included the need to identify patients who required treatment but failed to present; and the need to strive to improve efficiency, rather than to fund outdated and inefficient care models.

3.10 CONCLUSIONS

Rurality has been identified as a key issue for consideration in all comparator allocation systems. It was concluded that the lack of a rurality adjustment for general HCHS in the period 1997 to 2003 was because there was a lack of political motivation to change the funding system as the changes were likely to reduce the allocations for areas where politicians wished to target resources.

The research into the additional costs experienced in rural areas has been completed by some of the leading research groups in the UK and the research in Scotland and Northern Ireland on costs was particularly relevant. Resource allocation systems are highly complex and a rigorous approach was essential and reviews need to be independent. As a result the review in Wales was led by Professor Townsend and in the healthcare review in Scotland was chaired by Professor Arbuthnott. Another important factor was that the findings were published for consultation. It was concluded that by ensuring that the allocation of funds was robust was of such importance that it was important for any significant changes to be peer reviewed.

Accessibility measures like those developed in Northern Ireland and Grant Aided Expenditure in Scotland appear more robust.

The novel element of this Chapter was restricted to the analysis of GP numbers. The majority of the Chapter was dedicated to a review of other allocation systems.

CHAPTER 4 ~ HEALTHCARE ORGANISATION, ALLOCATIONS SYSTEMS AND FINANCE IN ENGLAND

SUMMARY

The principal factor in determining what healthcare services can be provided is the Government funding allocation for the NHS. The Barnett Formula is integral because it is used to set the allocations for public expenditure for the Home Countries. The NHS resource allocation system is also a key factor because it is used to share resources between areas. The aim of the allocation system is to produce a 'level playing field' whereby adjustments are made to compensate for differences in the need and unavoidable differences in the cost of providing services.

The share of public funding received by the Home Countries for public expenditure is based on the Barnett Formula. The formula was introduced to converge relative expenditure levels between Scotland and England because per capita spending was 22% greater per capita in Scotland, but the target taking into account differences in need and costs was 16% higher than England. However the formula has not been effective because of a population decrease and there has been an increased divergence to 25%.

It became clear during the study that a historical perspective was necessary because factors that required consideration such as the distribution of hospitals and ensuring equality of access pre-dated the formation of the NHS. A historical reviewed was commenced into public funding and provision of healthcare. The provision of free healthcare for the poor predates the formation of the NHS. The first hospitals were founded in the 13th Century; these were primarily provided by donation and religious organisations. The Industrial Revolution led to the development of hospitals provided

by employers. National Insurance was introduced in 1911, giving amongst other benefits free medical practitioner and tuberculosis treatment to those making payments.

There was little central coordination of services or consistency on decision making or planning of the location of hospitals before 1948. Many hospitals are still on the site that they were founded. The historical distribution, a lack of funding when allied to a resistance to closures, has meant that some areas were relatively well provided with hospital services whilst others have very poor access. A large proportion of hospitals transferred to the NHS were old and inappropriate for modern healthcare and a review in 1948 identified that 45% of hospitals were built prior to 1891.

When the NHS was first formed the focus was on ensuring that costs were controlled, rather than equity of access or funding. There was a small narrowing of the gap between the least and most well funded regions between the 1950/1 and 1971/2 financial years, however the differences were still extremely significant at sub-regional level. The Crossman weighted capitation formula was introduced in the early 1970s with the aim of addressing the relative differences of funding. It was based on three factors, population, beds and cases. The use of existing beds and cases, when allied to the lack of additional funding meant that the system was largely ineffective in equalising access. Crossman set the principle of only equalizing on an expanding budget.

The Resource Allocation Working Party was formed in 1975 to introduce systems that would "secure equal opportunity of access for people at equal risk" with an adjustment to reflect "unavoidable differences in the cost of providing services". The system used proxies for health need. In 1989 a revised system was introduced that was based on a large number of census variables as proxies for need. The system was revised in 1994 following a detailed study by the Centre for Health Economics at the University of York. This study developed a model for NHS healthcare need and costs and identified weighted census proxies that were closely correlated to the model. The number of proxies was minimised to achieve a parsimonious system.

The Market Forces Factors and the impact of the pay adjustment and rurality were amongst the key factors that led to repeated calls for the system to be revisited. It was concluded that the system needed to be changed and a review by the interim was initiated by the Department of Health. In the interim the Years Life Lost index was introduced to adjust for need.

The Payment by Results system was introduced in the 2003/4 financial year and the plan is to complete the process by 2008/9. The principle underpinning the system iwa that trusts should be funded for the service provided according to the volume of work carried out. This study concludes that whilst the underpinning concept was reasonable there were significant concerns about the way that the concept was applied. The concerns were as follows: the national tariffs for each condition were based on average costs for a wide variety of procedures and that the average complexity of the procedures carried out by a hospital may vary; the data used may not have reflected the clinical activity being carried out by the NHS due to under or over counting; acute trusts were likely to be assiduous in counting all treatment giving a notional increase in treatment and that this may attract unwarranted income; and that there could be a tendency to overstate the complexity of cases. A further concern about the system was that trusts could decide to cease providing care where it is not financially advantageous to continue.

The NHS has received an unprecedented increase in funding. In the 1997/8 financial year the funding for the NHS was £34.7 billion and the plan is for this to increase to

£92.2 billion for the 2007/8 financial year. Despite this increase the NHS has recorded the first deficits since spending was capped in the 1970s. The key reasons cited for these deficits were the costs of pay awards and the finance costs associated with new facilities. It was concluded that the principal reason is a lack of focus on efficiency.

The Private Finance Initiative (PFI) was introduced to address the historical under-investment and this resulted in the equivalent of over £18.8 billion committed to hospital and primary care redevelopment. This programme required a considerable amount of additional revenue to fund the capital and finance charges that ensued as these were between 6% and 18.6% of the capital value. The percentage paid depended upon the source of the funding as Government funding was attainable at a lower rate than from the commercial sector; this was because the commercial sector had increased costs associated with borrowing and because of the necessity to achieve a profit from the investment. It is concluded that to meet the principle of adjusting for unavoidable cost differences would mean having an adjustment that reflects the PFI costs.

Many of the issues affecting the NHS such as hospital development, rationalisation and realignment of funding require long term planning. The Government departmental and regional levels of management are responsible for coordination of services and setting policy. The stability is necessary in these bodies for NHS planning and strategic development to support the achievement of maximising efficiency and service quality. However changes in the structures at these levels have been incessant.

An NHS Management Board was formed in 1986 to oversee NHS policy and performance, this was later reorganised into what was termed the NHS Management Executive and subsequently the NHS Executive. The DHSS was split in 1988 to Department of Health and Department of Social Security. In 1996 the number of RHAs was reduced from 14 to 8. The NHS Executive was abolished in 2000 and responsibilities were split between the Department of Health and four regional intermediary tiers called Departments of Health and Social Care (DHSC) that were introduced in 2001 and abolished in 2003. In 2002 the Health authorities were replaced by 28 Strategic Health Authorities (SHAs) and in 2006 the number of SHAs was reduced to 10. There have been equivalent changes for hospital and community services. It is concluded that structural changes may delay service developments and that significant structural change should only be made if it is clear that it will result in significant improvements will ensue, and that it would not be possible to achieve these improvements in ways that would be less disruptive.

4.1 INTRODUCTION

It is necessary to consider the origins of publicly funded healthcare in England because the causes of issues that are covered in this thesis such as funding issues and hospital locations pre-date the formation of the NHS. The first section covers the Barnett Formula which is used to divide the funding between the Home Countries. There is then a brief historical review of healthcare funding issues and a more detailed analysis of NHS financial issues from the 1990s to 2006. The remainder of the chapter covers an historical review of allocation systems and a summary of the allocation systems that were in place between 1997 and 2003.

The second chapter provides a brief summary of the development of healthcare facilities. This is followed by a review of free healthcare for those most in need and the National Insurance scheme. The third chapter covers the management and planning of health services. This is important because senior management at departmental and regional level had and still have a key role in policy and coordination, and were responsible for capital and revenue allocation. The key changes have been detailed in structure and an opinion on the impact of these changes is discussed.

4.2 SUMMARY OF KEY EVENTS AND ISSUES

The following section details key historical events and issues that have occurred. The major reference for this section is "A Chronology of State Medicine, Public Health, Welfare and Related Services in Britain, 1066 – 1999" which was compiled by Michael D. Warren in 2000.

4.2.1 Barnett Formula

A consideration of the Barnett Formula is essential when considering resource allocation because it is integral to the setting of public expenditure budgets. The history of the Barnett formula and the issues relating to it are covered in two key papers, research papers by Robert Twigger and Timothy Edmonds from the Economics Policy section of the House of Commons Library (Twigger 1998, Edmonds 2001). These documents are the source for the majority of the material in this section.

From 1888 to 1959 public expenditure was allocated according to the Goschen Formula. This allocated 80 percent to England and Wales, 11 percent to Scotland and 9 percent to Northern Ireland. From 1959 to 1978 public expenditure was negotiated by Government departments and the Treasury (Heald and McCleod 2002).

The Barnett Formula was a needs based system that was devised in the 1970s by the Treasury. The development was led by Joel Barnett who was Chief Secretary to the Treasury. It was intended to provide a fair and reasonable basis to apportion public expenditure for the Home Countries and was first used for the allocations in 1978 for Scotland and in 1980 for Wales.

The origins of the Barnett formula are unclear as the Labour administration at the time did not place it on public record. Before the introduction of the formula the allocations for Scotland, Wales and Northern Ireland were settled in the same way as other public spending programmes. It was originally introduced to determine year on year changes in the budgets of Wales, Scotland and England. It was designed to consider income per head, population density, health, transport and education needs across England, Scotland and Wales. Joel Barnett stated that the formula was required to adjust allocations because of differences in sparsity, transport needs, relative health, rural needs for education, industrial needs and income per head.

The results of needs based assessments showed the average per capita need in Scotland, Wales and Northern Ireland were 16%, 9% and 35% greater relative to England. However in 1976/7 the actual additional funding levels relative to England were higher by 22%, 6% and 35% respectively for Scotland, Wales, Northern Ireland. The aim was for the formula to lead to convergence of expenditure and need and it was initially intended as a temporary measure. It applied to Scotland from 1978 and was then extended to Wales in 1980 and later Northern Ireland.

The three factors used in the system were: the spending plans and priorities of the UK government; population levels and the extent of comparable services between countries. The average weightings for the countries were as follows: 10.39% for Scotland; 5.94% for Wales and 3.4% for Northern Ireland and the remainder for England (Day 1999). The formula was responsible for allocating block cut grants of 96% of public spending in Scotland and Wales, the exclusions were agriculture, fisheries and food and finance for nationalised industries.

The annual public expenditure survey process sets departmental budgets for the following three years. The departmental adjustments were based on the ratios detailed in Figure 4.1. Using this system if £1 billion is allocated for health then Wales would receive £60.2 million.

Figure 4.1: Public Expenditure Barnett Allocation Differentials

Programme	**Pre 1992**	**Post 1992**
Scotland ~ Law and Order	0.1111	0.1006
Scotland ~ All programmes other than Law and Order	0.1176	0.1066
Wales	0.0588	0.0602
Northern Ireland	x	0.0287

The formula was intended to lead to a gradual reduction in the differences per capita of the allocations; however the opposite occurred as detailed in Figure 4.2. This was because even though additional funds were intended to be on a per capita basis, the population of Scotland has been decreasing. This has meant that the actual allocation per capita increased rather than decreased.

Figure 4.2: Mid-year population estimates and changes in the relative proportion of the UK 1976 to 2011

Year	England (million)	Wales (million	Scotland (million)	Scotland/ England (%)	Wales/ England (%)
1976	46.660	2.799	5.233	11.22	6.00
1981	46.821	2.813	5.180	11.06	6.01
1991	48.209	2.891	5.107	10.59	6.00
2001*	49.724	2.937	5.135	10.33	5.91
2011*	50.717	2.995	5.083	10.02	5.91

* projected from 1994 figures.

The population decreases in Scotland when added to additional allocations resulted in increased spending to 25% more than that of England (Day 1999). It was concluded that because the population of Scotland is continuing to decrease the per capita allocations will continue to diverge.

The Royal Commission on the National Health Service noted that Scotland had 50% more hospital doctors and 40% more nurses per capita than England and Wales (Royal Commission on the NHS, 1979). In 1976 the UK bed stock per 1000 population was 100, while England had 95 beds per 1000, Wales 100, Northern Ireland 128 and Scotland, 132. As a result there have been calls for the formula to be revisited. One of those calling for a review is Joel Barnett who was responsible for introducing the original formula.

It is highly unlikely that the Conservative or Labour parties will wish to be perceived as being at the vanguard of a reduction in the Scottish share of public funding. A failure to address this issue will mean that Scotland will be able to continue to invest in public sector policies that could not be afforded in the other Home Countries such as greater support for patients requiring personal care.

4.2.2 Free healthcare for the poor and National Insurance

The accessibility of services and the provision of services to those who were most in need were the fundamental issues considered in this thesis. There is a common misconception that prior to the formation of the NHS that healthcare was directly paid for, however as is shown in this section there has been a long history of National Insurance and free healthcare for the poor in the UK.

In 1697 Daniel Defoe proposed that there should be an insurance to cover the social problems of the poor, including disability pensions and medical and institutional care. Two years later the Court Physician, Dr Hugh Chamberlen, submitted a proposal that medical treatment should be available to "all sick, poor or rich ... for a small yearly certain sum assessed upon each house" (Warren 2000, page 33).

Historical records were available for many towns that detail the appointment and terms and conditions of publicly or employer funded clinicians. There were very comprehensive records, in particular for London where the first dispensary opened in 1697 at the Royal College of Physicians. The poor were given free consultation and dispensed drugs. Branches were subsequently opened in other parts of the City. Measures introduced in London were replicated in other towns and cities. For example midwives have been paid for by "the master of the Burton Town lands" since the late 16th century and in 1853 a surgeon in Burton was appointed to visit the most in sanitary houses. Some industrialists introduced healthcare for staff, for example

Colman's in Norwich introduced initiatives such as the first work based nurse (Warren 2000, page 91).

Interestingly the North South divide that is cited on a regular basis in the media and elsewhere, used to be reversed. In 1797 F M Eden published his report "The State of the Poor". This showed that there was a significant difference between conditions in the North and South of England, with higher wages and better diets in the north compared to the lower wages and poorer diets of the agricultural workers in the south (Warren 2000, page 49).

The Metropolitan Poor Act and The Poor Law Amendment Act in 1867 covered charging for poor relief and need to introduce dispensaries and hospitals that were separate from the workhouses for the poor who were sick or insane. The extent of the provision of free care was subsequently questioned in 1870 by a Committee of the Royal Medico-Chirurgical Society which reported on services provided at outpatients departments. It was concluded patients attending could afford to pay and that a large proportion of the illnesses were minor (Warren 2000, page 82).

It was not until 1911 that the National Insurance Act finally came into effect. It covered the provision of health and unemployment benefits, and the first payments were made in 1913. This system gave an entitlement to sickness, disablement and maternity benefits, free medical practitioner services and tuberculosis treatment. The costs of the scheme were paid for by employers, employees and the State. The scheme was compulsory for those earning less than £160 and aged between 16 and 60, this initially covered around 15 million people (Warren 2000, page 113).

The Government targeted particular illnesses that were of most concern to secure improvements in health and legislation was introduced to compel local authorities to provide free services for these conditions. In 1913 the Public Health Act addressed the recommendation of the Departmental Committee on Tuberculosis. One of the conclusions was that local authorities were made responsible for providing free diagnosis and treatment facilities for tuberculosis for the whole population. (Antoine et al 2000). In 1916 it was estimated that around 16% of the population of cities had contracted syphilis and that considerably more had gonorrhoea. The Royal Commission on Venereal Disease concluded that there should be free and confidential diagnosis and treatment. The Public Health (Venereal Disease) Regulations obliged county and borough councils to provide free diagnosis and treatment of venereal disease. The initial Act on Tuberculosis did not result in acceptable levels of care or isolation of patients and therefore a further Act was passed in 1921 that specified in more detail what care should be provided, including the need for hospitalisation of the highly infectious and the aftercare and stated that there should be no distinction between the eligibility for treatment between the insured and uninsured (Warren 2000, page 123).

In 1918 the Maternity and Child Welfare Act set out the responsibilities for local authorities with a model scheme that included midwives with medical back-up, hospital care for complicated pregnancies, nursing for illness during pregnancy and infancy, maternity and convalescent homes, maternity and child welfare clinics and health visitors. The service was means-based with charges made to those able to pay and free to the poorest (Warren 2000, page 119).

In 1920 it was concluded in the “Interim Report on the Future Provision of Medical and Allied Services” that the delivery of health services was not effective, in particular to the poorest in society. It recommended that GPs should be based at primary health centres and that these should provide medical, surgical and maternity wards, out patient treatment and diagnostics, with secondary care centres providing specialist treatment (BOPCRIS2).

The Interim Report of the Consultative Council of the Scottish Board of Health was also published in 1920. This recommended that the National Insurance scheme should be extended to all of the family members of the insured person. This issue was not formally considered in England until 1926 when the Royal Commission on the National Insurance Scheme concluded that the scheme was inadequate, there were significant variations in the benefits provided, it was not possible to extend those covered to be all dependants or to dental treatment, and medical services should be paid for from general public funds (BOPCRIS5).

The issue of extension was raised again in 1937 by the Committee on Scottish Health Services which recommended extending coverage by the National Insurance scheme. In 1942 the Medical Planning Commission Interim Report recommended that National Health Insurance should be extended to 90% of the population (Warren 2000, page 144).

A key paper was published on the link between poverty and malnutrition (M'Gonigle and Kirby 1937). This was followed in 1938 by research into the link between the incidence of disease and poverty that showed the extent of the additional numbers with diseases and the scale of the higher death rates in poorest regions (Titmuss 1938).

In 1942 the Medical Planning Commission Interim Report recommended that there should be a more even spread of consultants across the Country. Addressing differences in the distribution of medical staff was seen as a key requirement of the National Health Service Act in 1946. The Act also covered the plan to provide free health care, though the provision to charge for specific items of service was retained. The 1952 National Health Service Act covered the charging for drugs, appliances and dental treatments. Charges of £0.05 for drugs were introduced from June 1952. The charges were subsequently abolished from 1965-8 and reintroduced in 1968 at £0.13 (Hitris 2000).

In July 1948 The Ministry of Health produced guidelines entitled the Development of Specialist Services RHB(47)1. These guidelines were an attempt to address the inequality of services and were intended to relate staff levels to population. The guidelines were followed by the Ministry of Health report into the organisation of consultant services (BOPCRIS11).

J Tudor Hart, a GP, wrote in the Lancet of the “Inverse Care Law” and presented his findings that the availability of health care was inversely proportional to need (Tudor Hart 1971). It was concluded that additions to the numbers of doctors since 1948 had served to reinforce the pre-existing unequal distribution. For example, in the early 1970s, Newcastle had twice as many gynaecologists per female as Sheffield. In the 1970s, average list sizes were still significantly higher in the North than the South and in deprived areas.

In 1980 the Black Report detailed findings on a broad range of health and social issues. It found that mortality rates were significantly higher amongst the most deprived and that the utilisation of preventative healthcare services by those in poverty was markedly lower than for the most affluent. Analyses were published by researchers at the University of York (1978) which showed that expenditure per capita in the four Thames Regions was higher than the rest of England and Wales, but that it was significantly lower than expenditure in Scotland and Northern Ireland. In 1975 there were on average 114.1 doctors per 100,000 population in Wales, 146.5 in North West Thames and 160.3 in Scotland.

There was criticism of the review of weighted capitation in the early 1990s. It was concluded by some parties that the system favoured retirement districts, most of which were coastal, at the expense of inner cities and large business development areas. However there were counterarguments. However others contended that it was not necessarily the case that people in coastal retirement areas were automatically healthier than those in inner city areas. The example of heart disease was cited which was the single largest cause of both death and premature death and that a survey of heart disease in England and Wales by the Faculty of Public Health Medicine in 1986 listed two coastal areas, Southport, and Blackpool in the 10 worst areas, but that Tower Hamlets, Lewisham, Greenwich, and Waltham Forest in London were amongst the 10 areas with the lowest incidence. It was concluded that the complexities meant that it was difficult to ensure that the system was robust.

The Deprivation and Health in London report in 1996 concluded that the difference in mortality rates between deprived and most affluent areas in London had widened between 1981 and 1991. Mortality rates had improved by 0.7% in the most affluent wards but deteriorated by 8.4% compared to the national average in the areas of greatest deprivation (Bardsley and Morgan 1996).

The Issues Panel for Equity in Health report in 2001 focused on health inequalities the panel was comprised of leading healthcare researchers from across the UK including Townsend, Carr-Hill and Sheldon. The discussion papers concluded that the Inverse Care Law was still extant.

4.2.3 Location of hospitals

The provenance of hospitals is a significant factor when it comes to considerations of what is and is not avoidable. Some of today's largest and most famous hospitals were founded in London in the 12th and 13th centuries. St Thomas' developed out of a Priory near the church of St Mary Overie which was founded in around 1106. St Bartholomew's Hospital was founded in around 1123 and the Priory of St Mary of Bethlehem for the care of "distracted persons" was founded in around 1247. Further hospitals were developed throughout England with the support of local bodies, the church and the wealthy. Support from industrialists was central to the development of facilities for staff in some towns and cities. For example in 1867 a committee of the leading brewers in Burton agreed to pay for an infirmary to be built in the town (British History, 2003). The hospital continues to provide the acute services for the town and original parts of the hospital still exist. This is typical of a large number of acute hospitals. This pattern of development meant that there was no central planning of where hospitals were needed and this partly accounts for the current locations of acute hospitals.

There was greater planning for mental health hospitals because a Select Committee in 1807 recommended that each County should establish an "asylum for lunatics" financed by a county rate. Many of today's mental health facilities are still on the old asylum sites; however the size of most has been reduced very significantly due to the provision of more care in the community (Warren 2000, page 50).

The provision to transfer most of the hospitals in the UK into the NHS was a core element of the 1946 National Health Service Act. This presented the new organisation with major challenges as many of the hospitals were old and in a poor condition. A review in 1948 identified that 45% of hospitals had been built before 1891 and 21% before 1861. The development of new facilities required additional capital and revenue to pay for the consequences of providing the new services. The hospital building programme was estimated to have cost £157 million between 1948 and 1961. During this period the allocations depended on bidding processes and the capital that was available gravitated towards the small number of London teaching hospitals who received 12% of the value of all capital schemes in the period 1955 to 1962. As a consequence of the limited funding relatively few new hospitals were built between 1948 and 1962 (Smith 1984).

In 1960 The Nuffield Provincial Hospitals Trust concluded that many casualty departments were not of an unacceptable standard and that rationalisation and upgrading was necessary. It was also clear that a major investment in hospitals was essential. In 1962 the Ministry of Health Hospital Plan set out a £700 million building programme. It was suggested that there should be a norm of around 600-800 beds for a population of 100,000 to 150,000 with around 3.3 beds per 1,000 population for acute, 1.4 for geriatric,0.58 for maternity, 1.8 for mental illness and 1.3 for mental sub normality. The Hospital Plan stated that it was envisaged that there would be a reduction in the number of beds as a result of larger more efficient District General Hospitals (DGHs) replacing smaller hospitals, and as more patients that were mentally ill or those with learning disabilities were treated in the community (Smith 1984).

In 1969 the Committee of the Central Health Services Council recommended that DGHs should cover at least 200,000 people and have around 1,000 beds. It was also concluded that in-patient psychiatric and geriatric service should be provided at DGHs;

in-patient eye, and ear nose and throat should be concentrated at selected hospitals (Warren 2000, page 202).

Despite the central investment the condition of hospitals continued to be of concern. The 1970 report on Hospital Building Maintenance was highly critical over the lack of maintenance of hospitals and the lack of estates strategies covering the whole of the estate. The condition of facilities varied considerably and the backlog was estimated at £2,600 million in 1999 (Gaffney et al 1999). In a previous role as Estates and Support Services Director for The Royal Cornwall Hospital Trust in 2000 it was identified that there was a ‘backlog’ of over £12 million of critical infrastructure work, including an electrical system that was regularly ‘blacking out’ the whole hospital. Trusts like these had less capital to invest in new equipment and facilities as a greater proportion had to be spent on essential works. New equipment and facilities help to improve services and can be invaluable for improving efficiency and therefore the lack of available capital is a key issue in resource allocation however it is not directly considered by the resource allocation system.

The Private Finance Initiative programme (PFI) has led to the most significant investment in new hospitals in the history of healthcare in the UK as £17,795 million has been identified for PFI investment by 2007. Some of the largest schemes that were approved were for Barts and the London which was 1 billion pounds, Birmingham which was £512 million, Central Manchester which was £627 million and Leicester which was £711 million (DH2 2007). The Local Improvement Finance Trust (LIFT) initiative was introduced as a funding mechanism to enable primary care facilities to be upgraded using private finance. £1,044 million of capital expenditure on LIFT has been identified by 2007 (DH3 2007).

The financial consequences of PFI and LIFT have been reviewed by researchers who have concluded that the annual charges for the first and second waves of private schemes ranged from 11.2% to 18.6%. This compares poorly with the 6% annual charge for Treasury capital. The potential impact is clear when developments like that at the Barts and the London are considered where the cost has been estimated at £115 million (Pollock 2006).

According to Treasury rules must show that the private finance route is a lower cost. It appears inevitable that private finance will normally cost more than Treasury finance because commercial companies have to make a profit. From past experience of the commercial sector this is normally 15%+ and commercial companies pay a higher interest rate for borrowing than the Treasury. As a result a commercial provider would need to be able to provide buildings that were considerably more efficient than those developed by the NHS. It is not reasonable to develop business cases that have this degree of disparity because the NHS has the option of using equivalent technical specialists and construction companies as the PFI providers. As a result other services such as cleaning and catering were included in schemes. It is not possible to generate the efficiencies needed by cutting these costs and therefore a notional saving from reduced risk is applied. This has been questioned because when a service provider fails the NHS often has no option other than to provide support as services have to continue.

The scale of the PFI investment is such that in some health communities a significant proportion of the additional income that has been allocated to the NHS will be required to pay the annual charges on PFI and LIFT facilities. However if an upgrade or new hospital development has been funded by the Treasury a health community will have lower costs than where an equivalent facility has been privately funded. It was found that this fits the criteria for an unavoidable cost and therefore there should be an adjustment.

The financial difficulties will be compounded by the revenue consequences of the private finance led building programme.

4.2.4 Rationalising hospitals

The covenants and loyalty to local healthcare institutions means that it can be difficult to relocate or rationalise services as is clear from the national profile attained by closure programmes. The proposed closure of 4 small community hospitals attained a national profile and was subsequently rejected by the Health Secretary in 1998; the Chief Executive and Chairman of the Health Authority were replaced.

Having worked in Manchester in 2006 on another notable example - Altrincham General Hospital was in the centre of the town, over 100 years old, had no parking and no land to develop. The facilities were exceptionally poor and inpatient services had to cease because of the condition of the building and the likelihood of loss of life if a fire was to occur. The trust concluded that the only option that was acceptable to the local population was a refurbishment or rebuild of the facility on the same site. This was despite the potential to relocate to purpose built facilities within 1000m.

4.2.5 Organisation

There have been a very large number of management reorganisations as successive Governments have sought to find the most effective way of managing the provision of healthcare services. Petronus (AD 27 to 66) said “I was to learn in later life that we tend to meet any new situation by reorganising, creating the illusion of progress while providing confusion inefficiency and demoralisation”, this is also true of the NHS. When hospitals were first being constructed there was little if any planning or focus on ensuring that services were comprehensive and accessible across the country.

The first central body was a Consultative Board of Health that was established in 1831. It was subsequently replaced by a Central Board of Health which recommended that local boards of health should be appointed to appoint district inspectors to report on conditions for the poor and to take possible steps, within the charitable resources available, to remedy the deficiencies identified. 1200 boards were appointed and a significant number remained after 1832 when the Central Board was disbanded (Warren 2000, page 56).

There was a renewed focus on the need for coherent management and organisation following a major cholera epidemic and an influenza pandemic in 1848 that resulted in approximately 14,000 and 50,000 deaths respectively in London. A Public Health Act was subsequently passed and this led to the introduction of the General Board of Health. The provisions of the bill included the establishment of local boards of health in municipal boroughs and elsewhere for there to be boards elected by the rate payers (Warren 2000, page 56).

The responsibilities of the General Board of Health were transferred to the Privy Council and Home Office in 1858. John Simon, a highly influential medical officer, and supporting team were appointed with a remit to carry out investigations in any area of public health. In 1871 a Local Government Board was formed with a minister as president to cover public health, poor law administration and the supervision of local government. The Board was eventually replaced by the Ministry of Health in 1919 (Warren 2000, page 84).

In 1920 the report of the Political and Economic Planning Committee recommended that services should be administered through regional authorities. In 1921 the Ministry of Health Committee on Voluntary Hospitals concluded that greater organisation was necessary in hospital provision (Warren 2000, page 123).

In 1941 the Minister for Health announced that the Government had decided that there would be regional organisation of health services. It was stated that the regional organisations would be responsible for coordinating the provision of local authority and voluntary services funded by Treasury Grants, local authorities, payments from patients, patient societies and schemes (Warren 2000, page 143).

In 1946 the National Health Service Act included provisions to introduce new management structures including hospital management committees. Local councils were responsible for health centres, maternity and child welfare, health visiting, ambulance services, home nursing and immunisation (Warren 2000, page 152).

In 1970 the green paper on the “Future Structure of the NHS” proposed that the NHS should be administered by 90 new Area Health Authorities (AHAs). In 1971 the DHSS set out proposals for the new health authorities that would be responsible for strategic planning and the local allocation of resources. This tier of management below Regional Health Authorities was introduced in 1974. These authorities were generally coterminous with county and metropolitan districts and were responsible for administering the contracts of GPs, dentists, pharmacists and opticians (Warren 2000, page 206).

Between 1974 and 1986 organisation structures were relatively stable; however there were an unprecedented number of changes to structures between 1986 and 2006. Only detailed major changes have been noted; however there were a large number of others including the formation and dissolution of various national bodies. Many of the changes required in depth consultation at national, regional and local level before they could take place and it is believed that this leads to periods when there is a lack of focus on key issues like service provision.

An NHS Management Board was formed in 1986 to oversee NHS policy and performance, this was later reorganised into what was termed the NHS Management Executive and this subsequently became the NHS Executive. The DHSS was split in 1988 to Department of Health and the Department of Social Security. GP Fund holding was introduced in 1991 to give GPs finite budgets, first wave NHS trusts were formed and the ‘purchaser provider split was introduced. In 1996 the number of RHAs was reduced from 14 to 8. GP Fund holding was abolished in 1998 amid concerns about differences in services and the costs of the system. In 1999 the first primary care groups (PCGs) were formed as precursors to primary care trusts (PCTs) each had a board and management structure. It was originally intended that these PCGs would become PCTs however when the first were formed in 2000 it was decided to reduce the number of PCTs. The NHS Executive was abolished in 2000 and responsibilities were split between the Department of Health and four regional intermediary tiers called Departments of Health and Social Care that were introduced in 2001. In 2002 the health authorities were replaced by 28 Strategic Health Authorities and in 2003 the DHSCs were abolished. In 2004 the first semi autonomous Foundation Trusts were formed and the following year the first Independent Sector Treatment Centres commenced providing services. In 2006 the number of SHAs was reduced to 10 and the number of PCTs was reduced from 303 to 152 (Rathfelder 2006).

Further change is highly likely as there were some clear anomalies. It is notable that the SHAs vary in population size from 2.5 million to 7.4 million. There were two SHAs in the North East covering a combined population of 7.6 million whereas there was one SHA in the North West with a population of 6.8 million (NLH 2006). London had 31 PCTs, elsewhere in England there was consolidation and the SHA Chief Executive expressed the need to rationalise the number of PCTs (Carnall 2006)

4.2.6 NHS financials, deficits and efficiency

Major funding crises predated the formation of the NHS. In 1921 the Ministry of Health Committee on Voluntary Hospitals found 321 of the 565 hospitals from England and Wales that had responded to the Committee had insufficient income to cover expenditure.

Following the creation of the NHS the Ministry of Health concluded that there had been considerable service expansion between 1949 and 1954 but that there had been only a small increase in funding in real terms of £32 million (BOPCRIS 14).

Despite the limited funding ensuring value for money had a relatively low profile in the NHS and there were relatively few mentions of efficiency in national reviews or Acts. The first major report that has been located reporting on efficiency in the NHS was in 1966 by the National Institute of Economic and Social Research report on health and welfare and reviewed the trend on spending and concluded that the NHS needed to be more efficient. A report, published in 1974 by the DHSS, concluded that small hospitals needed to be used more efficiently and covered the use of these hospitals to provide care to patients not requiring DGH care (BOPCRIS 23). Efficiency was discussed with and executive director of the main board of the NHS in 2002. The view espoused was that the funding increases were so significant that efficiency was not a priority for the NHS. There have been reports more recently such as NHS Institute for Innovation and Improvement's report, Delivering Quality and Value in 2006 (DH1 2006) and the second Wanless Report published in 2007. It was evident that this report will be critical of the lack of productivity improvements in the NHS.

Pharmaceutical costs have however received particular focus. The Voluntary Price Registration Scheme was introduced in 1957 in order to attempt to reduce the cost of pharmaceuticals (BOPCRIS 15). There was a subsequent report on the savings possible in 1959 (BOPCRIS 16). In 1967 an inquiry into pharmaceutical costs by the Ministry of Health concluded that the NHS had been charged excessive amounts for pharmaceuticals and that companies would have to submit annual financial returns (BOPCRIS20).

As mentioned previously the NHS has had unprecedented increases in funding in the last 10 years. As shown in Figure 4.3 the 1997/8 financial year the expenditure was £34,664 million rising to £92,173 million by the 2007/8 financial year with "real term" increases varying between 2.1% and 11.9%.

Despite the increases in funding the NHS has experienced the largest deficits since the spending was capped in 1976. There was a deficit of £512 million in the 2005/6 financial year as detailed in Figure 4.4. Principal factors for the deficits included pay increases for staff, financial charges accruing from the replacement and upgrading of facilities and a lack of focus on efficiency.

Figure 4.3: NHS expenditure, 1997-2008 (House of Commons, Select Committee 2006)

Financial Year	**Status of figures**	**NHS expenditure (£ billion)**	**Real terms increase (%)**	**NHS spending as % of GDP**
1997-98	Outturn	34.664	2.1	5.4%
1998-99	Outturn	36.608	3.0	5.4%
1999-2000	Outturn	39.881	6.8	5.4%
2000-01	Outturn	43.932	7.8	5.6%
2001-02	Outturn	49.021	9.0	6.0%
2002-03	Outturn	54.042	6.9	6.3%
2003-04	Outturn	64.181	11.9	6.7%
2004-05	Outturn	69.306	5.1	7.0%
2005-06	Estimated	77.847	10.0	7.3%
2006-07	Plan	84.387	5.8	7.4%
2007-08	Plan	92.173	6.4	7.8%

Figure 4.4: NHS deficits, 2001- 2006 (House of Commons, Select Committee 2006)

Financial Year	**Surplus/(deficit) reported in audited accounts (£m)**	**% of NHS organisations with an overall deficit**
2001/02	71	8
2002/03	96	12
2003/04	73	18
2004/05	(251)	28
2005/06	(547)	31

It was concluded that when the unprecedented increase in funding ceases a significant number of trusts will overspend because focusing on efficiency has not been a priority for the NHS.

4.2.7 Allocation systems

The pattern of the allocation of resources for the NHS has been an issue since the inception of the service. In the early years of the NHS there was no focus on ensuring that areas received an equivalent proportion of the resources available and there was no explicit, public policy to reduce inequalities in resource distribution. The system has undergone a series of major changes in an attempt to make the system more robust and fair. Many of the current funding issues can be traced back through the history of the NHS.

During the period 1948 to 1962 the concern of financial policy makers in the Ministry of Health was to contain the increasing cost of the Health Service. Planning and funding of capital and revenue were largely incremental and ad hoc. Until 1974 the teaching hospitals negotiated directly with the Ministry of Health for their funds, all other hospitals bids were submitted to Regional Hospital Boards (RHB) for consolidation into regional bids to the Ministry. The funding for the NHS was increased to cover inflation and service developments as the general economy permitted. The NHS budget for England was divided among the boards in proportion to their expenditure. In 1956 the Committee of Enquiry into the Cost of the NHS concluded that there should not be an allocation formula based on factors such as population (Warren 2000, page 170).

Capital availability was exceptionally limited between 1948 and 1962 and the funds that were available tended to be allocated to replace obsolete buildings at acute hospitals. The Hospital Plan in 1962 was aimed at providing modern District General Hospitals (DGH) across the country and was intended to incrementally equalise healthcare provision through capital allocations and planning. However it became apparent that there was insufficient capital to fully implement the Plan (Ministry of Health, 1962). The 1962 Plan was revised in the 1966 Hospital Building Programme.

The equitable distribution of capital had to be postponed in recognition of the fact that insufficient resources had been made available up to 1966 and was unlikely to be available in the future. By the late 1960s there was significant criticism of the resource allocation system due to the slow pace of change, in addition to concerns over the method for calculating the bed numbers required. It became apparent that in the absence of a fundamental change in the allocation formula, geographical disparities would continue. Analyses showed that the inequalities in revenue spending per capita had been slightly reduced between 1948 and 1971/2. Despite this by 1971/2 regional hospital expenditure as a proportion of the national mean varied from –77% to +41% which is a reduction of the difference between regions of approximately 13%. However it was concluded that the differences at Area Health Authority level were larger. In the 1960s both the Green Papers on reorganisation in 1968 and 1970 mentioned the issue of resource allocation (Warren, 2000).

The 1970 Labour reorganisation Green Paper included a commitment to a new method of resource allocation; a key paragraph in the paper stated that: "...the population served by the Area, modified to take account of relevant demographic variables, underlying differences in morbidity, the characteristics of the capital plant inherited by each authority, and any special responsibilities undertaken for a wider area and particularly for the special needs of teaching and research." (DHSS, 1970a)

The Crossman formula covered the period 1970 to 1975. It was introduced in an attempt to have a fairer system of allocation. The Secretary of State, Richard Crossman, initiated the work and the new formula was introduced by his successor, Sir Keith Joseph. The aim of the formula was to allocate resources to the Regional Hospital Boards more objectively. It was based on three factors, population, beds and cases. The population was weighted by the national bed occupancy rates for age and gender, and adjusted for net patient flows between boards. This factor accounted for half of the total weighting and the other factors received a rating of one quarter. The beds in each specialty were weighted by the national average cost per year and the inpatient, outpatient and day cases were weighted by the national average cost per case (Edwards et al, 1993).

The inclusion of the existing cases and beds in the formula meant that the redistribution between areas was reduced as these factors were not necessarily indicators of need due to the historical development of services. Crossman set the principle of only equalizing on an expanding budget and this approach is still central to changing NHS allocations. The formula did not cover capital and the revenue required for previously agreed capital schemes. The formula also had the disadvantage that it only allocated funding to regional boards and there could therefore be significant variations between areas in each region (Edwards et al, 1993).

In 1975, the Secretary of State, Barbara Castle approved proposal from senior DHSS officials to appoint a Resource Allocation Working Party (RAWP). The terms of reference of the Working Party were firstly "To review the arrangements for distributing NHS capital and revenue to Regional Health Authorities (RHAs), AHAs and Districts respectively with a view to establishing a method of securing, as soon as practicable, a pattern of distribution responsible objectively, equitably and efficiently to relative need and to make recommendations." The second objective was to develop processes that remove "the remaining influence of historical accidents in past performance and uses instead additional objective measures relating to the needs of each region. The weaknesses of the present formula arise because it is only partially based on the objective needs of the regions through the use of adjusted populations. The other factors depend too heavily on the practices, staff, efficiency and capital of each region to escape the consequences of historical accident." (Department of Health, RAWP4).

The Resource Allocation Working Party report in 1976 "Sharing Resources for Health in England", defined the objective as "to secure equal opportunity of access to healthcare for people at equal risk". The recommendation from this working party was to allocate resources on the basis of size of population weighted according to the differentials in need and cost. The need adjustment was intended to reflect the differences in the need for healthcare across the Country. The cost adjustment was intended to compensate for unavoidable differences in providing services (Department of Health, RAWP4).

In 1989 the Health Secretary, Kenneth Clarke, announced that there would be a new system of resource allocation. The aim of the new system, like that of RAWP, was to adjust allocations according to differences in health need, taking into account population, age, mix, SMR for the under 75s, and in the Thames Regions, the relative cost of providing health services with additions for teaching research and tertiary care. The Resource Allocation Group was formed in April 1995 for England. Its aim was to look at the future resource allocation systems. Reports from the Resource Allocation Group published in 1996 and 1997 contained the background information to changes to the formulae for the years 1997/8 and 1998/9. This was followed by the Advisory Committee on Resource Allocation formed in September 1997 for England as the successor to the Resource Allocation Group. It was established to consider funding across the NHS and the committee now recommends how funds should be allocated across both primary and secondary care (Department of Health, RAWP4).

Weighted capitation formulae continued to be used throughout the period 1997 to 2003 to allocate the available resources between Health Authorities. The aim was to ensure that those with similar needs across the country receive equivalent healthcare. In England health authority allocations were based on the population, age distribution, healthcare needs and the unavoidable cost differences in the provision of services. The distance from the target allocation is calculated, this is the difference between the weighted capitation target for an area and its recurrent base line. The pace of change is applied; this is the speed at which Health Authorities were moved closer to their weighted capitation targets. Individual weighted capitation formulae were used in 1999/2000 for allocations for drug misuse and HIV (Health Authority Revenue Allocations Exposition Book, 1999).

Prior to April 1999, there were three main funding streams - Hospital and Community Health Services (HCHS), cash limited general medical services and prescribing. The

White Paper 'The New NHS' in 1998 proposed combining these three funding streams. As a result, since April 1999 Health Authorities and Primary Care Groups have been funded through this single unified allocation. The allocation for each area is then determined by combining the allocation for each of these for each Health Authority. For 1999/2000 the proportions of national expenditure for each of the three factors was as follows: HCHS 82%, General Medical Services Cash Limited (GMSCL) 3%, and Prescribing 15%, to give a target for healthcare allocation. Following the calculation of the distance from target for each health authority a single 'pace of change' policy was applied (Department of Health, RAWP4)

As a result of the 'stand alone' formula prior to 1999/2000 there was also a separate distance from target figure and a separate change of pace policy. There was also a separate formula for prescribing. However this was not used to set targets and was 'uncapped' (Department of Health, RAWP4).

ACRA made three main changes to the targets setting process for 1999/2000. Firstly the speciality cost weights in the HCHS component for age. Secondly an additional need adjustment was introduced to the prescribing component. Thirdly a supplement to the formula was introduced to reflect additional costs resulting from interpretation, advocacy and translation services for ethnic and minority populations (Health Authority Revenue Allocations Exposition Book, 1999).

Figure 4.5 The factors used in HCHS indices

Derived from tables 3.1 to 3.5 of Health Authority Revenue Cash Limits Exposition Book 1997/8

Activity	**Weighting***	**Factors**
General and Acute	63.98	Old alone$^{0.07649}$ x Single carer$^{0.04362}$ x Unemployed$^{0.0287}$ x Standardised Mortality Ratio for under 75$^{0.1619}$ x NSIR for under 75$^{0.2528}$
Psychiatric Need	11.08	Old alone$^{0.3609}$ x Proportion where head of household born in New Commonwealth$^{0.1073}$ x No Carer$^{0.1431}$ x Lone Parent$^{0.1846}$ x Standardised Mortality Ratio for under 75$^{0.519}$ x Permanently Sick$^{0.2616}$
Community Psychiatric Need		Proportion of household with no car$^{0.128}$ x Single, widowed or divorced$^{0.8}$ x Lone Parent$^{0.13}$ x Standardised Mortality Ratio for under 75$^{0.519}$
Chiropody Index	11.03	Proportion of household with no car$^{0.108}$ x Proportion where head of household born in New Commonwealth$^{0.139}$ x Proportion of the population aged 18+ that are qualified$^{-0.115}$ x Standardised Mortality Ratio for under 75$^{0.725}$
District nursing		Proportion of household with no car$^{0.263}$ x Proportion of households with 3 or more children$^{0.142}$ x Standardised Mortality Ratio for under 75$^{0.424}$
Health visiting Index		Residents with no central heating$^{0.088}$ x Elderly living alone$^{0.172}$ x Single parent households$^{0.069}$ x No Carer$^{0.1431}$
Community maternity		Single carer households$^{0.265}$
Other community health		Proportion of household with no car$^{0.108}$ x Proportion of households single, widowed or divorced$^{0.532}$

*13.90% has no weighting applied

The weighted capitation system used the population for each area and notionally adjusted the population to compensate for relative differences in need and costs. Figure 4.6 is derived from the Health Authority Revenue Cash Limits Exposition Book 1995/6. It details all of the adjustments and components of the resource allocation system and the weightings that are attached to each of the factors.

The Office of National Statistics produces population projections which are based on the decennial census of population, the last of which was in 2001. The population estimate is based on the population from the year before, adjusted for registered births and deaths, internal migration, external migration, ageing of the remaining population and boundary changes. The population estimates used to calculate health authority allocations were based on the population from the base year and projections of ageing and assumptions based on past trends about deaths, births and migration prepared by the Office of National Statistics in consultation with other government departments, local authorities and Health Authorities. The weightings applied are summarised in Figure 4.7

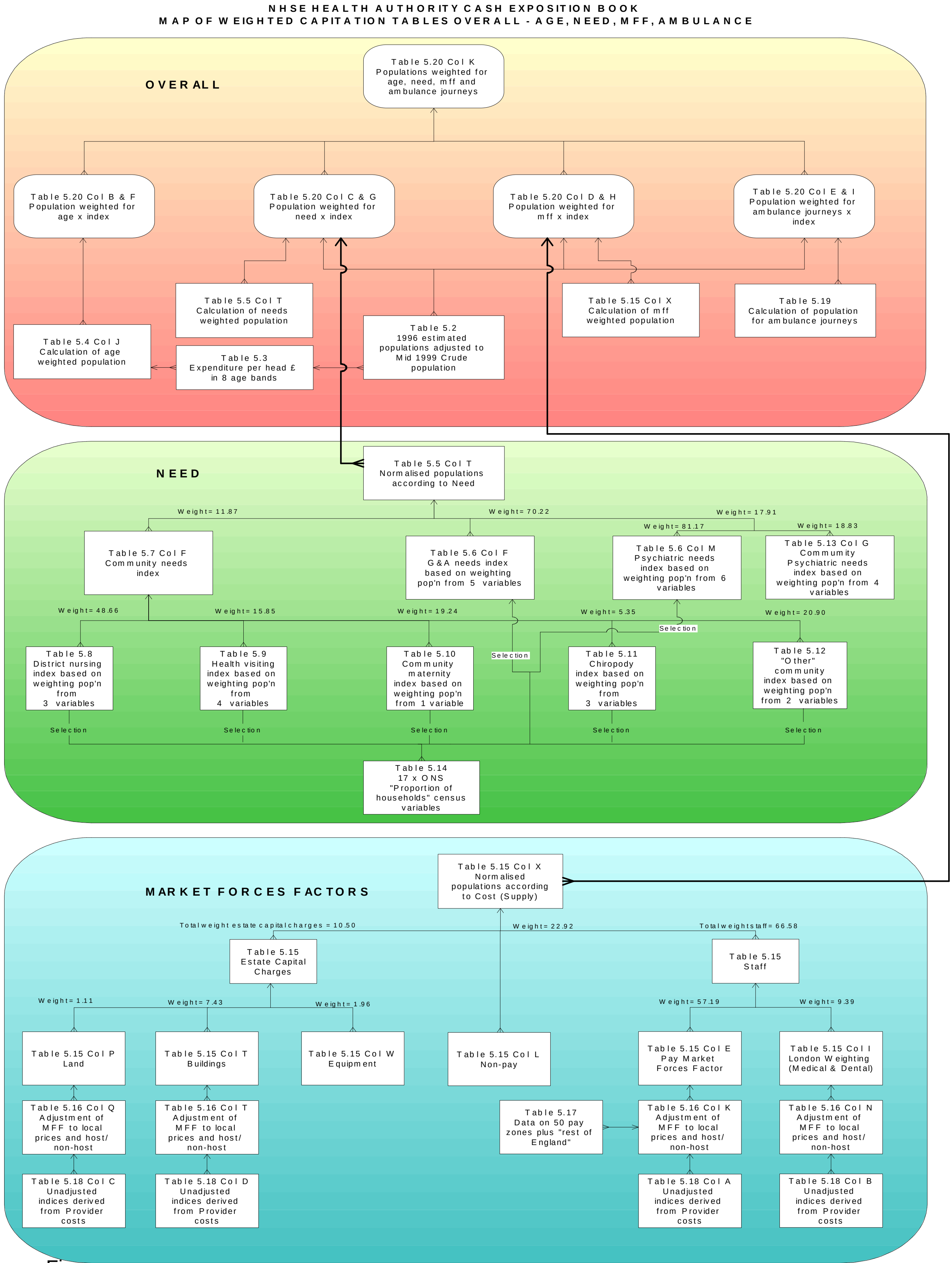


Figure 4.6: Summary of Hospital and Community Healthcare Services

Figure 4.7 The weightings applied for the HCHS indices 2002:

Index	**Factor**	**Percentage**
Need	Acute and community	85.53
	Mental Health	14.47
MFF	Staff	67.88
	Non-pay	23.70
	Land	1.11
	Buildings	5.77
	Equipment	1.54
EACA	Weighted population	1.8
	Normal crude population	98.2

4.2.8 Years of Life Lost Index

The Years of Life Lost Index (YLL) commenced in the 2001/2002 financial year and included circulatory diseases, cancers, accidents and suicides. This was extended in 2002/2003 to include infant deaths. It was introduced to adjust allocation based on health inequalities pending the outcome of the review of the allocation formula (DoH YLL, 2002). The adjustment was calculated using the following formula:

$$\textbf{YLL Rate}_{HA} = \frac{\sum(74.5 - y) \times Ny}{\text{HA resident population}}$$

y = age at death and Ny = number of death at age y

The deaths of those over 74.5 are not included. The results are then converted into an index where the lowest rate is given a value of 100. For 2002/3 the allocation to the health authorities with the 50 highest ratings were allocated an additional £88 million divided according to the weighted populations i.e. the share of the population under 75 of each health authority (Department of Health, RAWP 6, 2002).

4.2.9 Specialty cost weightings, HIV/AIDS, pharmaceuticals & translation

The other major changes between 1999/2000 and 2002/3 were the introduction of new specialty cost weights in 1999/2000 to increase the proportion of resources for HAs with a greater proportion of younger people; the inclusion of HIV/AIDS as main heading from 2002/3 and a new need adjustment for prescribing so that allocations for drugs more accurately reflects need; and introduction of a “monetary adjustment” to supplement the formula for interpretation, advocacy and translation services (Health Authority Revenue Allocations Exposition Book, 2001),.

4.2.10 Payment by Results

Payment by Results was implemented in a limited fashion in the 2003/4 financial year. The plan was to extend the system to cover the majority of other areas of service provision by 2008/9. The aims included the promotion of efficiency and increasing the amount of care provided within the same facility so that shorter waiting times could be achieved. It was concluded that the system could lead to a quantum improvement in the quality of data on the treatment provided as acute trusts were only paid for the activity that is recorded. One of the key concerns about the system was the national tariffs may not have adequately reflected the historical under-reporting of the volume of activity or complexity of cases by acute trusts. As a result acute trusts were likely to record activity that was previously overlooked. Any increase in activity would be notional but the acute trust would receive income (Department of Health 2002b).

4.3 CORRELATION BETWEEN ALLOCATED FUNDING AND RURALITY

Analyses were carried out as part of this study to determine if there was a correlation between the allocated funding and rurality. Figure 4.11 is based on the 2000/2001 resource allocation and indicates that there was a correlation of +0.7 between increasing urbanisation and funding. Figure 4.12 indicates how the funding changed for the need index between 1995/6 and 2000/2001.

Figure 4.8 Correlation between rurality and net revenue cash limit 2000/2001

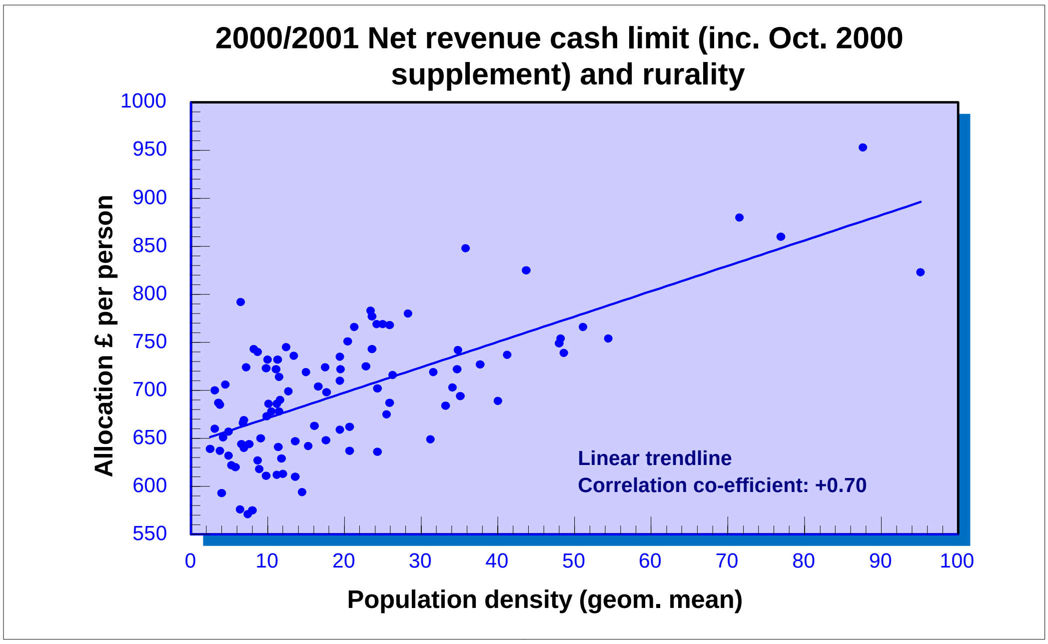
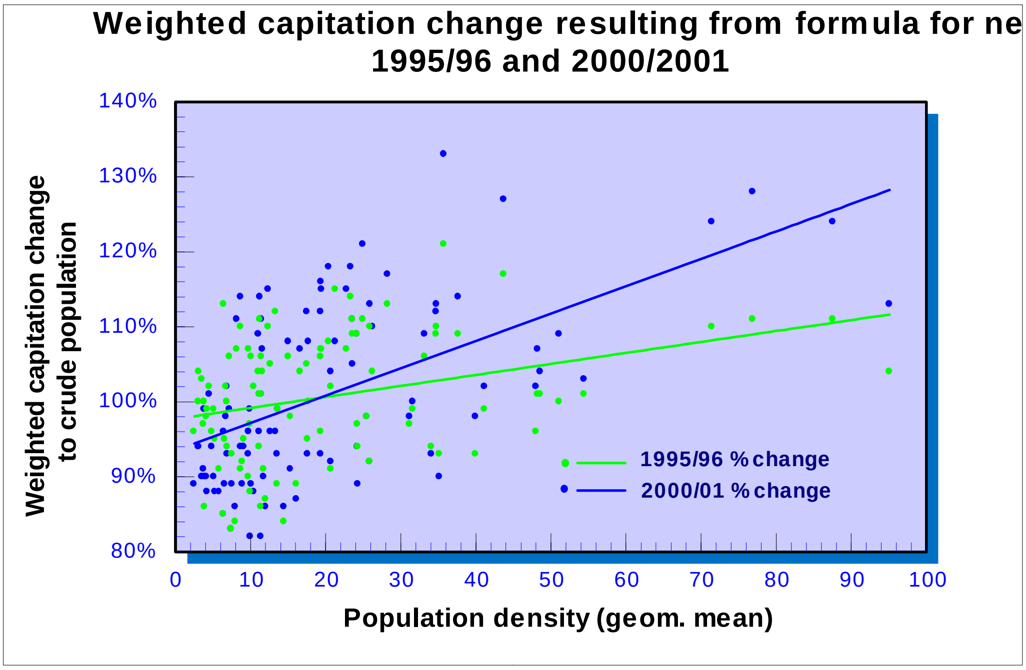


Figure 4.9 Change in capitation assessment of need 1995 to 2001



It is clear from these analyses that there was a negative correlation between rurality and the resource allocation formulae and that changes in the assessment of need resulted in rural areas being adjudged to generally have reduced healthcare needs relative to more urban areas.

There was considerable debate in the House of Commons about the allocation system. In November 1998 the Health Minister, John Denham, wrote to the Advisory Committee on Resource Allocation to ask them to determine if the resource allocation formula for the NHS in England required modification to take into account the following factors: rurality, special needs of inner cities, mental health, ethnicity and the impact of the private sector (Hansard, 2002a).

4.4 RECOMMENDATIONS

Ensuring that services are provided as efficiently as possible should be made one of the top two priorities for the NHS, along with improving the quality of care, without this there will continue to be major differences in the standard of healthcare provision.

The independence of the allocation system should be ensured by forming an independent standing committee similar to that for salaries. This is critical because the current system is vulnerable to inappropriate change.

The Barnett Formula and the split of public expenditure across the Home Countries should be reviewed by a Royal Commission because a continuation of the current system will mean that there will not be a convergence of spending and as a result there will be an increase in the divergence on policy.

The Pace of Change policy results in changes occurring too slowly. Areas that are over-funded should only receive funding for inflation and unavoidable cost increases, and additional targets from central Government. The aim would be for allocations to meet targets set within 5 years and exceptionally within 10 years.

The incessant structural changes should cease. It is concluded that any of the structures that the NHS has had over the last 20 years could have been effective and that refinement was necessary rather than wholesale change.

That data returns should be audited in the same way as finance to improve rigour. In the absence of accurate data it is more difficult to plan to improve service quality and efficiency. Accurate date is also critical fro studies such as that carried out by York. Where data is inaccurate it may lead to flawed conclusions.

There should be a system involving rigorous peer review of analytical based studies that are completed for Government departments, in particular where the findings or recommendations by the researchers would have a significant impact on Government policy or resource allocation.

That experts from the NHS or relevant Government department should be co-opted onto the research team for key studies.

4.5 CONCLUSIONS

In 1999 the Minister of State, John Denham, effectively asked for the whole system to be reviewed in a similar way to the reviews that had been completed by Arbuthnott in Scotland and Townsend in Wales. No report was published and either the review was not carried out or it was decided that it should not be made public.

The Pace of Change system that was adopted by ACRA was not that which was outlined by Crossman of "equalizing on an expanding budget" during the 1990s resulting in very gradual changes.

The absorption of hospitals into the NHS and the lack of capital for an updating and replacement programme have meant that hospitals may be in a poor condition, inefficient, inappropriate for modern healthcare and they may not be ideally located for the current needs. However the provenance may be such that it is extremely difficult to effect significant change. Where closure or elimination of a significant inefficiency is not possible, for example in the case of 19^{th} Century community hospitals, the costs that were incurred were unavoidable.

The Barnett formula resulted in considerable differences in the resources available per person across the UK for the NHS and other areas of public expenditure. The formula did not appear to be fortuitously reflecting a difference in need or costs and as a consequence it appeared to lead to differences in the services that could be afforded. Scotland dedicated more funding to areas of public expenditure like the NHS. If as predicted the divergence increases this could eventually become a significant issue of contention. There has been insufficient research into the impact of the Barnett formula and a review into the division of resources between the Home Countries is considerably overdue.

A lack of focus on efficiency is a key reason, along with the increased staff and facilities costs, for the financial difficulties in some trusts. This is where trusts that performed well in terms of national quality and financial performance targets and others that appeared equivalent in many respects performed exceptionally poorly.

CHAPTER 5 ~ RURALITY MEASURES

SUMMARY

Initial analyses used regression and it was concluded that this was an ideal technique for the study because all of the key variables that were being considered were on a continuum. The need to select a suitable rurality measure to correlate the variables against this required careful consideration. It was decided that there were three essential criteria that the selected measure had to meet. Firstly the measure had to be as credible as possible and used widely in resource allocation or unlikely to be contentious. Secondly it needed to be suitable for regression analyses. Thirdly the measure had to be robust. It was also highly desirable for the measure to include a broad range of the multiplicity of factors that are used to identify rural areas. This was the most challenging requirement because the indices that consider factors such as employment in farming, physical identifiers such as presence of islands and land use tend not to be suitable for regression analyses. It became clear that none of the existing indices use the breadth of factors that were desired.

Area classification indices were considered such as Cloke's and that developed by the Office for National Statistics. Whilst they were not suitable for regression analyses there were elements of the indices, in particular Cloke's, which were highly attractive including the consideration of employment type.

Population density and derivations such as sparity and super sparsity were widely used for public expenditure resource allocation; however it did not reflect the population spread within an area. This was most noticeable where there are areas with very few inhabitants near to towns or cities. Geometric Mean Density (GMD) and Weighted Population Density (WPD) gave more reliable results. The less homogeneous the

population distribution, the greater the difference will be between GMD and the population density of an area. The robustness issue was partly addressed by carrying out analyses on small areas such as enumeration districts, as this meant that there was a greater degree of homogeneity. GMD is useful for discriminating between rural areas which have a large area but where the majority of people live in urban centres and rural areas where the population is more homogeneously spread. Principal concerns about these measures were that they treat each area like an island and there was no element to reflect major barriers such as mountains or rivers, the nature of the border or nearby cities; areas may be highly accessible if they have major arterial routes or rapid public transport routes nearby; they do not consider social or accessibility factors.

Road length was considered for use in this study as it had been adopted for use in the Arbuthnott Formula for the NHS allocations in Scotland, as a result it would have been considered a credible rurality measure. In addition it would have been possible to carry out comparisons with the analyses carried out in Scotland. The rationale for using road length is that the more rural or inaccessible an area, the longer the roads that it will have. In addition the nature of the road network is such that geographic barriers and neighbouring areas impact on road length. However it was concluded that a road length measure was not sufficiently robust for application in England because there were a significant number of rural or urban areas where the results were counter-intuitive for example Leeds has a similar road length per capita to Buckinghamshire. It was decided that road length is likely to be due to historical factors such as previous distribution of population and land use, and the affluence of the area at the time that the roads were constructed.

Geographical Information Systems (GIS) have been used for NHS resource allocation in Northern Ireland, where the Capitation Formula Review Group study in Northern

Ireland (2000) reviewed ways of modelling accessibility based on travel times. The 'Monte Carlo' simulation in Wales which was used to give an estimation of travel times could be viewed as an early and rudimentary GIS system. These measures have significant advantages however they could not be used for this study because there was not a readily available measure for the whole of England.

As none of the indices were ideal further research was carried out into new indices that would address some of the disadvantages that have been outlined. An approach was developed to take neighbouring areas characteristics into account with a proportion of an area's GMD being based on the GMD figures of neighbouring areas. Whilst it was believed that for some research the adoption of neighbour weighted population measures would be an advance on the current systems there were concerns about the treatment of barriers, accessibility, roads, public transport, census issues like employment type and the use of healthcare facilities in neighbouring areas. Another concern was that the measure did not address the accessibility issue.

An index based on the presence of arterial roads was developed. It was believed that this provides an index that combines population spread and accessibility, however it does not take into consideration issues like land use, provision of public transport or employment type.

A derivation of the Cloke Index may also be useful for statistical analyses where a continuous scale is required by identifying the percentage of the population living in different categories of area, particularly if combined with other rurality measures into a composite index. Such an index would be an advance on GMD. However it would have been a novel measure and the benefits of using the measure would not have been sufficiently significant to overcome the disadvantage of being novel.

Whilst the novel measures had advantages over GMD it was concluded that all would attract criticism and that this would detract from the findings of the study and that none were a sufficient advance to warrant risking such criticism. The preferred measure would have been to use a GIS measure however in the absence of a comprehensive and robust dataset it was decided to adopt GMD as it met all of the essential criteria in that it had been used for resource allocation in England, it was robust and was suitable for regression analyses.

5.1 INTRODUCTION AND BACKGROUND

The research commenced when analyses were considered that were produced by the local health authority as part of a justification plan for the closure of four community hospitals. The health authority had concluded that Cornwall had more community hospitals than the average rural area. This then raised concerns about how the analysis had been completed as Cornwall appeared *prima facie* the most rural in the cohort. In addition the inclusion of areas such as Dudley in the comparator group appeared counter-intuitive.

It was concluded that the number of community hospitals was effectively a continuum and depended on the rurality of an area, and that the more dispersed and inaccessible an area the more likely it was to have additional hospitals. It was decided that the most appropriate way to determine whether or not the hypothesis was correct was to carry out regression analyses using a broad range of variables. Therefore a measure of rurality that was credible was required and was robust and suitable for use in regression analyses. This chapter details the measures considered and the rationale for the selection of GMD.

Rurality is an ill-defined term definitions can use a range of variables including population density, proportion of the workforce involved in work identified as rural such as agriculture, forestry and fishing, the proportion of the population living in non-urban or settlements of a small size, or remoteness and peripherality. Payne et al (1996) concluded that “defining ‘rurality’ is notoriously problematic so far as producing a definition which is capable of being used in a way which facilitates studies and comparisons of quantitative data on ‘rural areas’”. It has been concluded that the term rurality prevents a more complete understanding of rural areas and that it can result in misconceptions in particular of a rural idyll (Mills 2000).

Switzerland regards communities with less than 10,000 as rural whereas Norway defines rural as those communities with less than 200. One of the complexities is that the breadth of factors considered when defining rurality means that there is no clear point where rurality can be said to begin. The increase in ribbon development and urban sprawl compounds these difficulties (Mulley 1999).

Various definitions of rurality have been used in Scotland. The Rural Indicators Study defined rural districts as those with no urban settlements of 100,000 or more, with less than 50% of the population in settlements of 10,000 to 99,999 and 10% or more of the employed population working in agriculture. The Scottish Economic Bulletin defined rural districts as those with less than one person per hectare. According to the Registrar for Scotland rural enumeration districts are those that are not part of a continuously built up area and had a population of less than 1000 persons (Shucksmith 1990).

The decennial census is the source for much of the data used in various measures in the UK. As with other studies of issues related to health and rurality, maps are used extensively as they are particularly effective as a means of indicating the results. The smaller the area, the more likely that there will be a greater degree of homogeneity and as a result the most reliable measures of rurality are based on small areas, such as enumeration districts. Analyses at enumeration district and ward level have shown that of the 5 million people that have been identified as living in rural enumeration districts 3.3 million live in wholly rural wards and that at local authority level only the Isles of Scilly has a wholly rural population (Craig 1987,1988): there are therefore concerns about using small areas as rurality may be overstated if the neighbouring area is urban and research has indicated that enumeration districts may not give improvements in data robustness compared with ward level data (Carr- Hill and Rice 1995).

It was necessary to choose a measure and area level with considerable care and it was concluded that it would be preferable to use one measure for all analyses so that it cannot be viewed that there is an opportunistic selection of index.

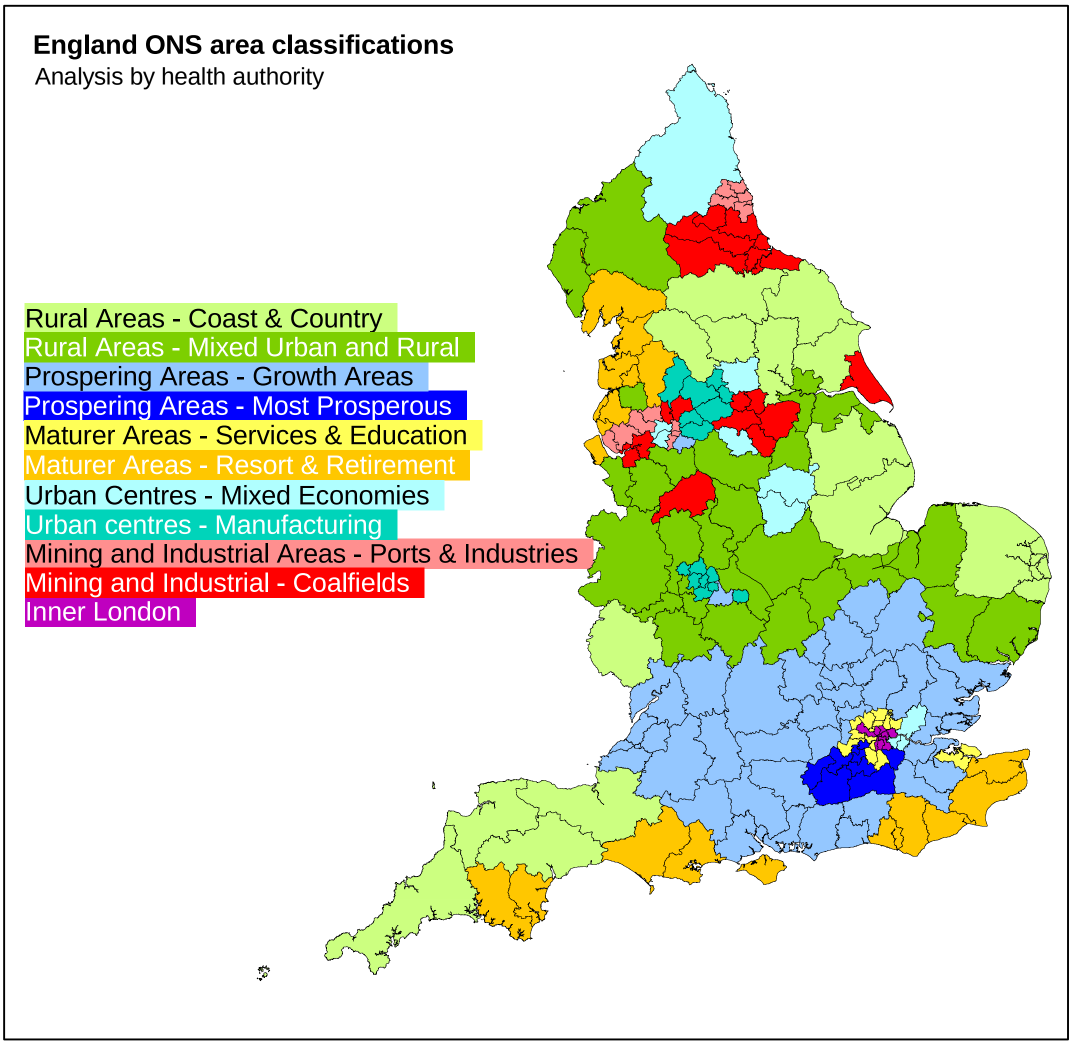
The first section covers area classification systems including the Cloke Index. This is followed by a consideration of population density type measures including sparsity and supersparsity which are used for local government allocations, and Geometric Mean Density. Travel and accessibility related measures are then considered, including road length which was adopted for use in the Arbuthnott Formula for NHS allocation in Scotland and the GIS used in research into rurality and NHS allocations in Northern Ireland.

5.2 RURALITY MEASURES

5.2.1 Area Classification Systems

The Office for National Statistics (ONS) system in the late 1990s clustered areas into six statistical families and eleven sub-families. The system has been widely used for analyses in the health sector for example to determine the prevalence of disease within groups, for performance monitoring and for benchmarking by local authorities. The six families and their eleven sub families are shown in Figure 5.1 and detailed in Appendix 1.

Figure 5.1 England Office for National Statistics Area Classifications



There were concerns about some of the classifications in the system, in particular Dudley in the West Midlands is listed as a ‘mixed urban and rural area’. Another concern related to the treatment of Northumberland, which covers one of the largest geographical areas in England, however it was classified as an ‘urban centre – mixed economy’.

5.2.2 OPCS Area Classification

The aim of the OPCS area system was to identify the closest matches between districts. The system was used to cluster groups of districts and identify the closest matches between areas. The system used 37 variables in five dimensions: demographic structure; household composition, housing, socio-economic character; employment (Wallace et al 1995).

There are no adjustments to reflect the nature of neighbouring areas or geographical factors like peripherality, environment, and accessibility. The selection of the variables results in counter-intuitive results such as Leeds being identified as a close match with Ipswich despite the 2001 census showing that the respective population estimates were 715,402 and 117,069, in addition Leeds is close to other urban centres including Bradford. Carrick has Lancaster identified as the closest matching district despite having a population of 87,865 and 133,914 respectively and most importantly Lancaster has relatively easy access to urban centres including Preston, Manchester and Carlisle, whereas Carrick is approximately 170 miles from Bristol which is the nearest city with a population over 350,000. It was concluded that this system may have some value for specific purposes; however the choice of the variables, the lack of weighting and the fact that it does not generate a continuous measure meant that it was not appropriate for this study.

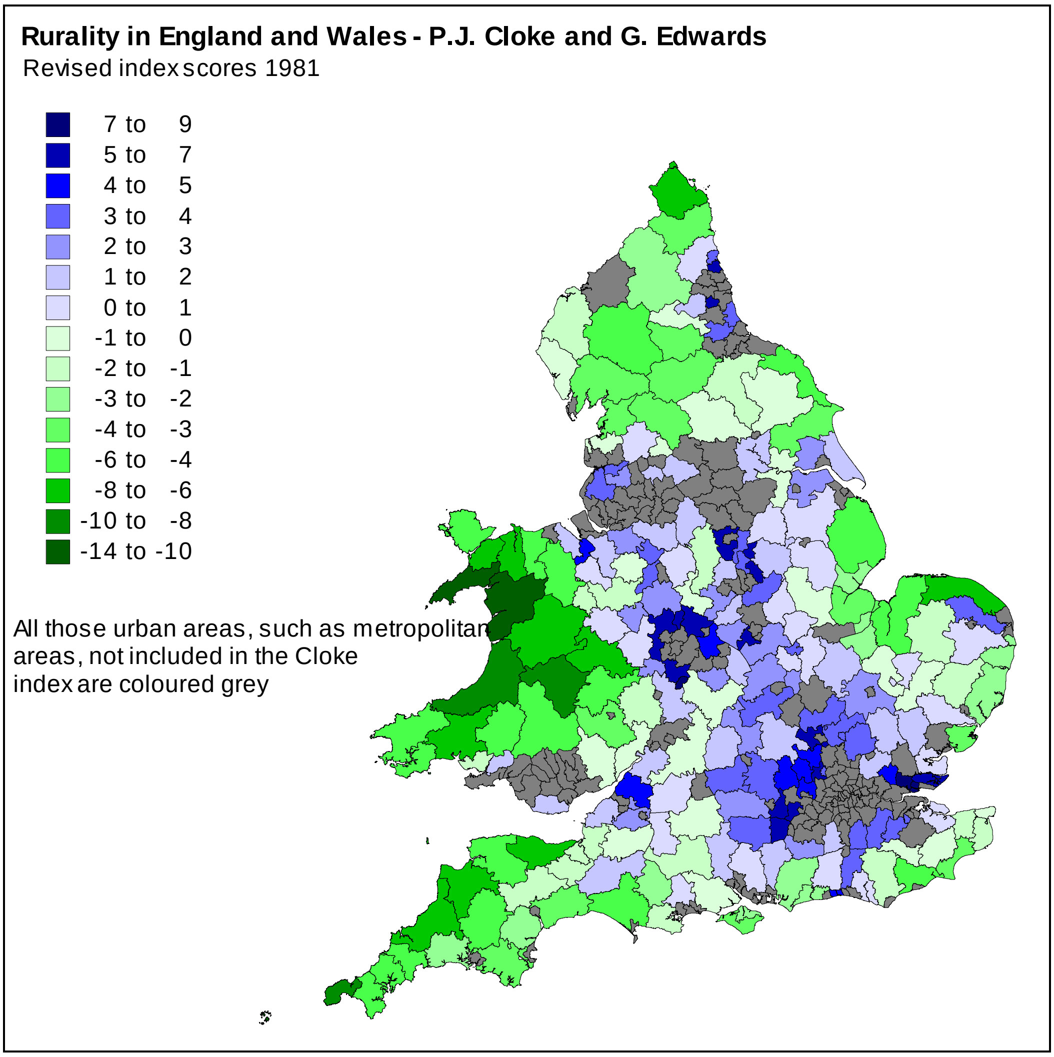
5.2.3 Cloke Index

The Cloke Index provides an index of rurality. The aim of the Cloke Index was to identify general socio-economic difference between urban and rural areas. It was devised to provide a tool for studies involving the comparison or contrast between rural areas (Cloke, 1977). The Index uses the factors listed in Figure 5.2. Figure 5.3 shows the 1981 Cloke Index results for England and Wales. The list of variables and details of the classification are shown in Appendices 2 and 3

Figure 5.2 List of Cloke (1971) factors

Occupancy rate of households
Commuting pattern
Population of women aged 15-45
Household amenities
Population density
Occupational structure
Population aged over 65
Distance from nearest urban node with a population of over 50k

Figure 5.3 Cloke Index scores for England and Wales 1981



5.2.4 Critique of area classification measures

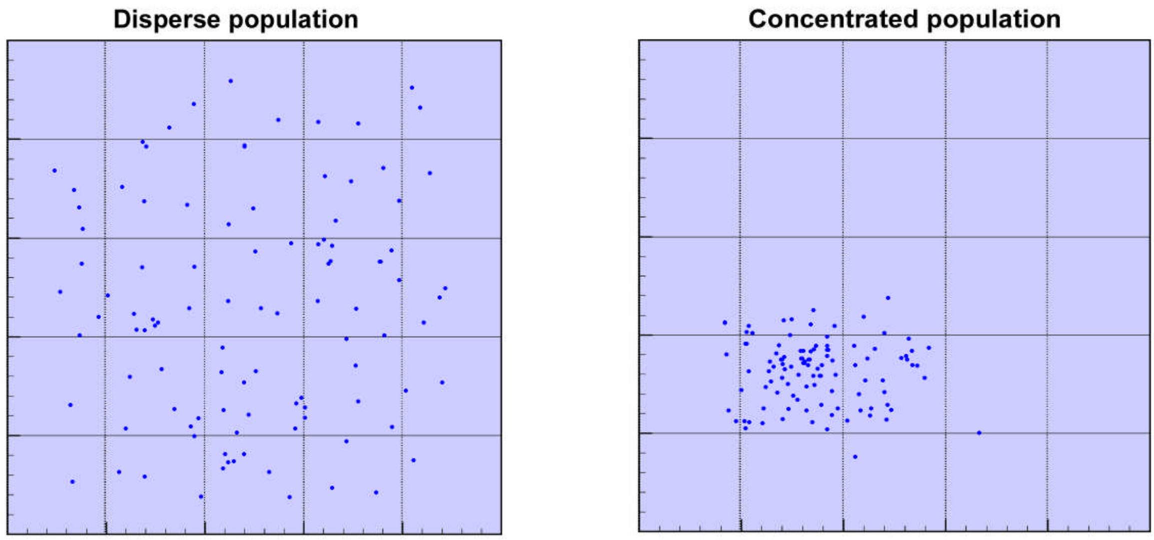
The principal difficulty is that statistical techniques, such as regression analysis, cannot be used with the Cloke index. This is because a continuous scale is required for it to be possible to compare the degree of rurality with factors such as number of hospitals or number of beds. In addition there is the added complexity that the council areas are not always coterminous with health authority areas. This means that it is necessary to estimate in areas such as, Derbyshire, Hampshire, Lancashire and Staffordshire.

Fundamental concerns about these measures was that the nature of areas can be so different that it is difficult to encapsulate the essential elements of an area with census and similar variables. Unless all the key criteria of an area are assessed it will inevitably be difficult to develop a robust comparison. The measures would also need a sophisticated weighting system to ensure the relative importance of each variable. The selection of variables and weighting is problematical because what is important is likely to be highly variable.

5.2.5 Population Density

Population density is calculated by dividing the estimate of the population by the area of the locality. Despite its simplicity and availability it is not widely used in studies on rurality. This is because it cannot discriminate between areas that have an even spread of population and those which have highly concentrated populations. For example, when consolidated up to council area, it is possible that an area with one large city surrounded by a large rural area may have the same population density as an area that has its population evenly spread. It is also apparent that some inner city and industrial areas that would be regarded as highly urban are scarcely populated. This is shown in figure 5.4 where both have the same population density, one is concentrated the other disperse.

Figure 5:4 Failure of population density to reflect population concentration



As a consequence of these weaknesses, the population density measure is most reliable for discriminating between areas where the population is spread homogeneously. This is shown in Figure 5.4. As can be seen from Figures 5.5 and 5.6, the smaller the areas that are analysed the wider the range in population density. The minimum population density at district council level is 0.60 and the maximum is 1.92. The minimum population density at ward level is 0.15 and the maximum is 57.40. The minimum population density at enumeration district level is 1.11 and the maximum is 164.39.

Figure 5.5 Population density of electoral wards in Cornwall

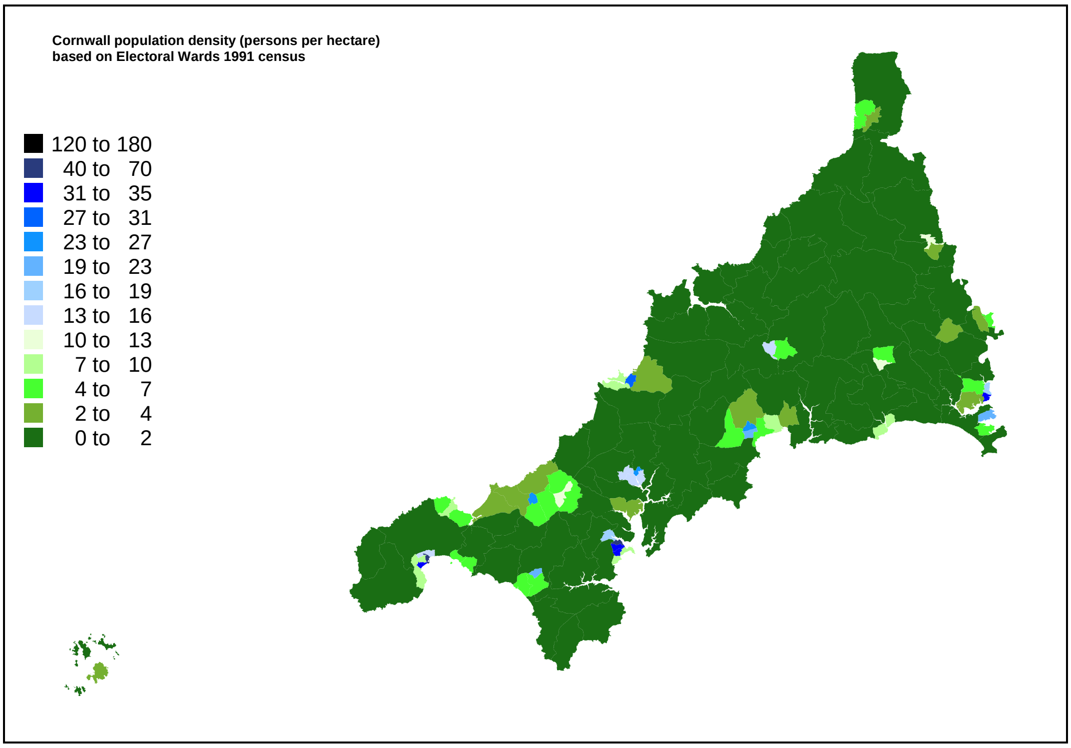
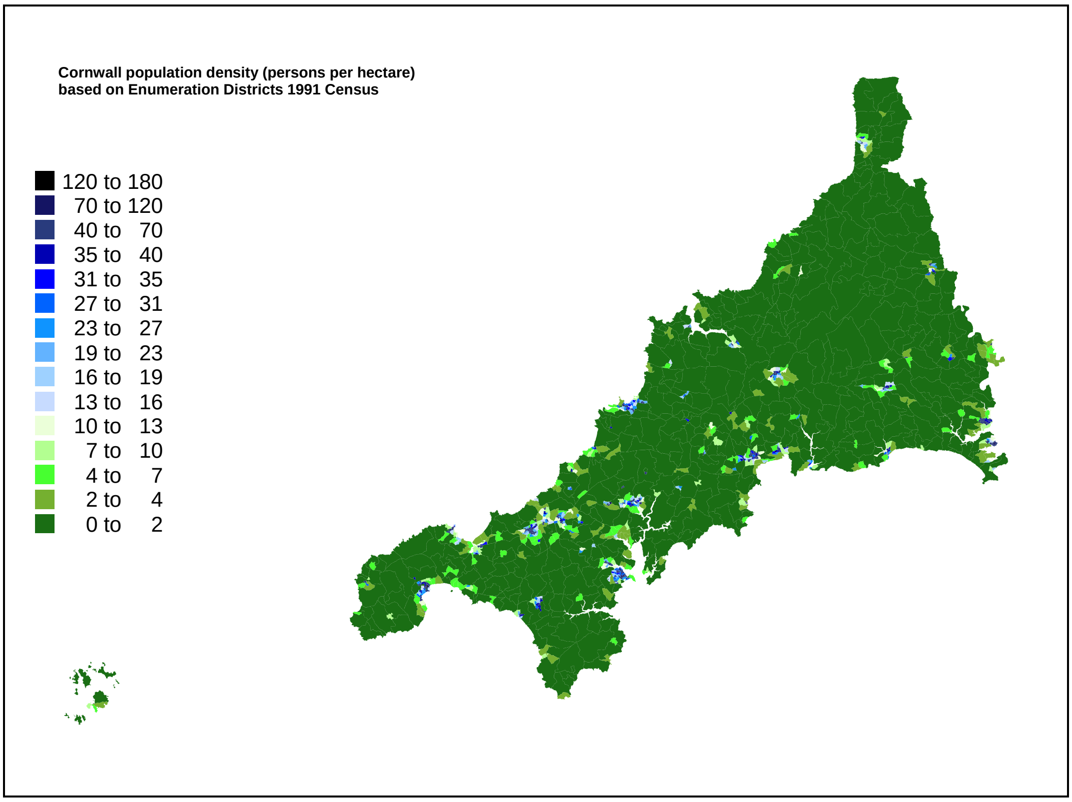


Figure 5.6 Population density of enumeration districts in Cornwall



Population density is a simple and readily available measure of rurality and the results for each area can be put onto a continuous scale, it can be used in a wide range of statistical analyses.

5.2.6 Sparse and Supersparse Population Measure

Many allocation systems for Local Government in England use what are termed sparsity and supersparsity measures of rurality. They are calculated at either ward or enumeration district level. Sparsity is the resident population of those wards or Enumeration Districts (EDs) within the area of the local authority at the 1991 census with more than 0.5 but less than or equal to 4 residents per hectare. Supersparsity is the resident population of those wards within the area of the local authority with 0.5 or fewer residents per hectare, multiplied by 2.

$$\frac{2 \text{ x population in supersparse EDs} + \text{population in sparse EDs}}{\text{total population}}$$

Like the basic population density measures, it does not address the issue of clustering or unevenness of population distribution. However the data is at ward and enumeration district level, it is likely to be a more reliable measure than one that is based on county level data.

This measure was considered at length because it met the key requirements as can be used in regression analyses and it has been widely used. The issue of population spread within an area is addressed, although not at ED level.

5.2.7 Geometric Mean Density and Weighted Population Density

It has been concluded that weighting populations is more meaningful for analyses where the distribution of the population is the important issue (Craig 1985). Geometric Mean Density (GMD) and Weighted Population Density (WPD) are more sophisticated measures of population density. The measures are useful when considering the relative differences in the density of populations. GMD was first used in the resource allocation system in England for an adjustment to the formula to compensate for the differential in the cost of providing emergency services across the country.

The WPD is the aggregated density of each constituent unit area weighted by its population. The formulae for WPD and GMD are as follows:

$$\mathbf{WPD} = \frac{\sum P_i^2 A_i^{-1}}{\sum P_i}$$

$$\mathbf{GMD} = \sum Pi\sqrt{}(P_1A_1^{-1})^{P1} \times (P_2A_2^{-1})^{P2} \times (P_3A_3^{-1})^{P3}\ldots$$

Where P_i = population of unit i and A = area of unit i

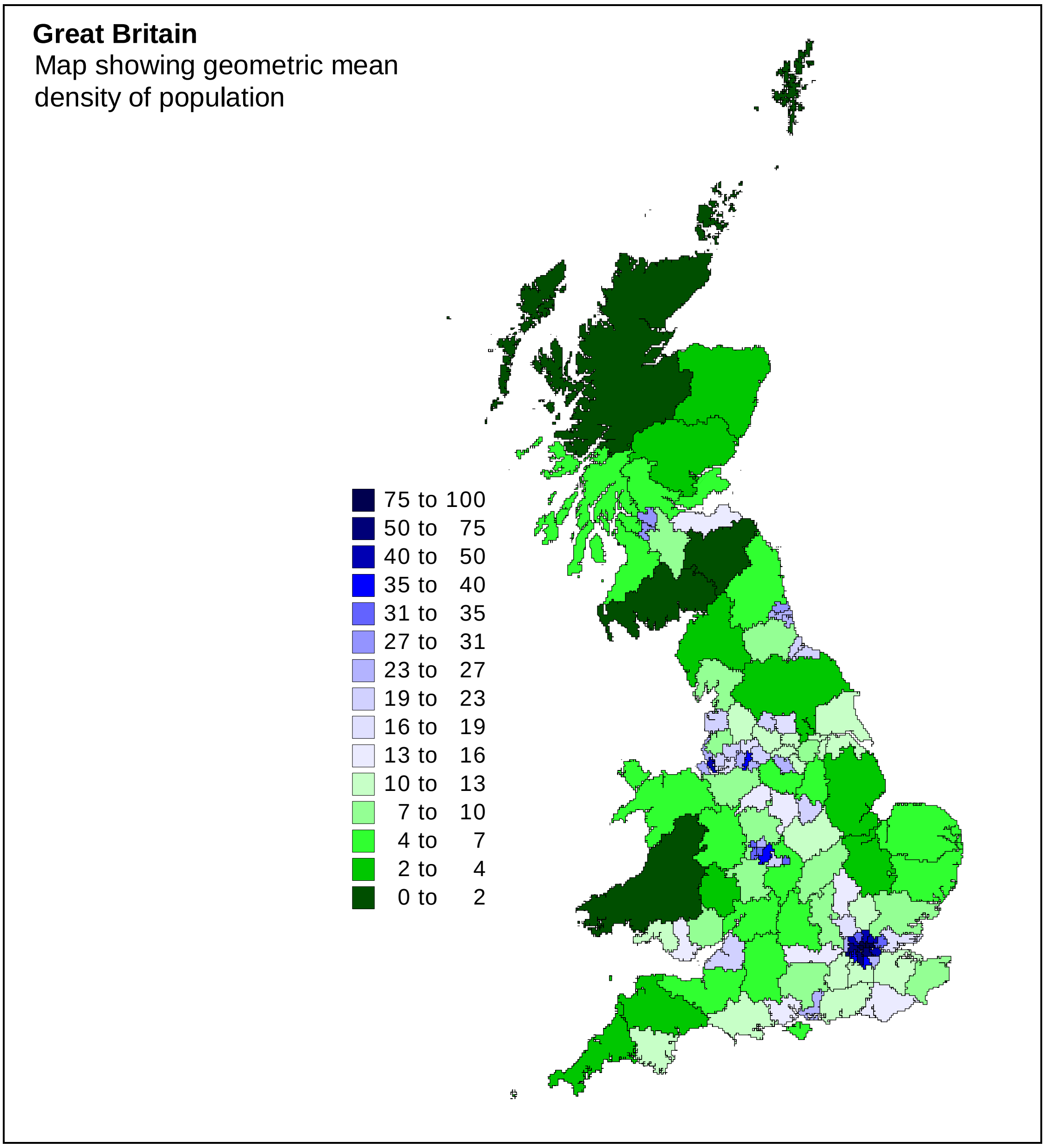
If the population density is precisely even throughout the area, WPD, will equal GMD. The more uneven the distribution of density, the more the WPD and GMD will increase above the conventional density, with the GMD value being between the population density and WPD figures.

GMD and WPD do not give any information of the relative position of the enumeration districts. Therefore it is possible to have all EDs with higher populations in one area and those with lower populations in another.

The importance of relative differences is apparent if a 1,000 population difference is considered in different settings. In a village with a population of 500 an additional 1000 people is a 200% increase whereas in a small town with 10,000 it would be a 10% increase. It is therefore the relative rather than the absolute density difference that is likely to be more important. This has been compared to the situation where it is the relative difference rather than the absolute one that is important to human perception as is the case with other relative scales like human hearing or the Richter scale (Craig, 1984). Geometric mean is a logarithmic scale and the population measure equivalent of the decibel.

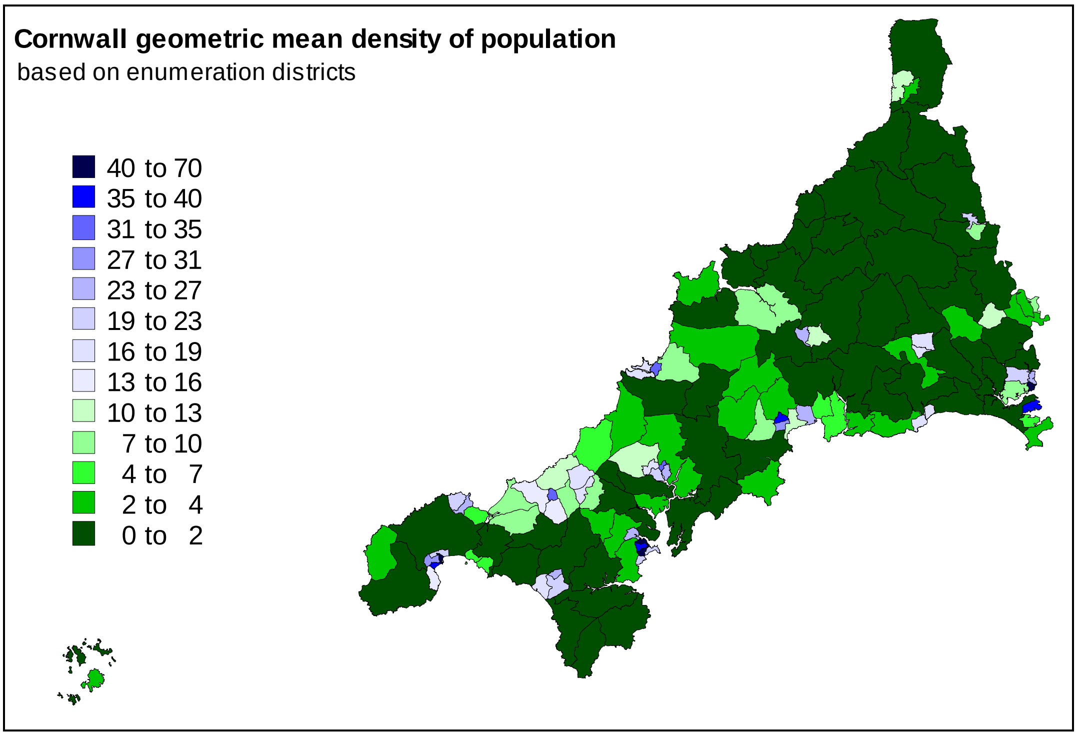
The less homogeneous the population distribution, the greater the difference will be between the population density of an area and the GMD. The measure discriminates between rural areas that have a large area but where the majority of people live in urban centres and rural areas that have a more homogeneous spread of population. Figure 5.7 shows the GMD figures for Great Britain. The GMDs for Health Authorities are detailed in Appendix 4.

Figure 5.7 Great Britain Geometric Mean Density



GMD measures can be calculated for wards using the population data from enumeration districts. This is useful for detailed analyses on using district health authority level data. Figure 5.8 indicates the rurality of Cornwall using the GMD measure.

Figure 5.8 Geometric Mean Density of enumeration districts in Cornwall



5.2.9 Critique of Population Density Measures

The population density measures are all based on the characteristics within a defined boundary such as that for a district council or enumeration district. They do not consider the characteristics of the surrounding area. Choropleth maps are not necessarily robust for the presentation of population information because of the artificial boundaries between areas and the continuous nature of population density (Langford and Unwin 1994). It is also apparent that there may be a very broad spread of population or a very narrow one.

The weakness of 'boundary type' measures becomes obvious when considering areas such as the Isle of Wight. This area has a similar weighting for rurality as areas on the mainland, however, as these are surrounded by other counties and therefore, they are not as rural or remote.

It has been concluded that it is not appropriate to treat enumeration districts and wards as discrete entities because of the links between them (Lorant 2002). This is an important factor when considering healthcare as there may be utilisation of neighbouring facilities including hospitals or primary care facilities.

5.2.10 Population Potential

Population potential is a measure used to indicate the degree of concentration of population round a geographical point or points. It may be defined as the number of persons per unit of distance or alternatively in terms of the average equivalent distance of the total population from a given point or points. It is in effect a distance weighted population density measure, and in principle could be aggregated either across population centres or across all wards in an area.

The formulae for population potential are as follows

Population potential = $\sum P_i/d_i$

Where d = distance from point at which potential is calculated.

Harmonic mean population distance = $\dfrac{\sum P_i}{\sum (P_i/d_i)}$

Adjustment for positional effects such as coastline = $\dfrac{\sum (P_i \times A_i/d_i)}{\sum (A_i/d_i)}$

$\sum P_i$ = mean distance weighted density
$\sum A_i$ = crude density of whole area
Where P_i = density or P_i/A_i

5.2.11 Critique of Population Potential Measures

Concerns about population potential were that it would have been complex and time-consuming to calculate, it had not been used for NHS allocations, distance is important but actual travel time and accessibility are the key factors and what is a population centre will vary according to a myriad of factors and the healthcare treatment required.

The complexities are clear when a clinical condition such as cancer is considered. The efficient and effective use of the linear accelerators are such that the services are commonly provided in specialist hospitals and regional centres and therefore the distance would be to the specialist centre, however some of the care may be provided more locally and for the local care it may be the distance to a GP or local hospital that is important. I believe that population potential would be more suitable for elements of care pathways or where there is a readily identified centre for care. However the measure would still have the disadvantage that it would not reflect travel time or geographical barriers, but it would be simpler to generate than Geographical Information Systems (GIS)

5.2.12 Travel Related Rurality Measures

Geographical rurality measures seek to reflect differences between areas based on factors such as transport links, coastline and physical barriers such as mountains and bodies of water.

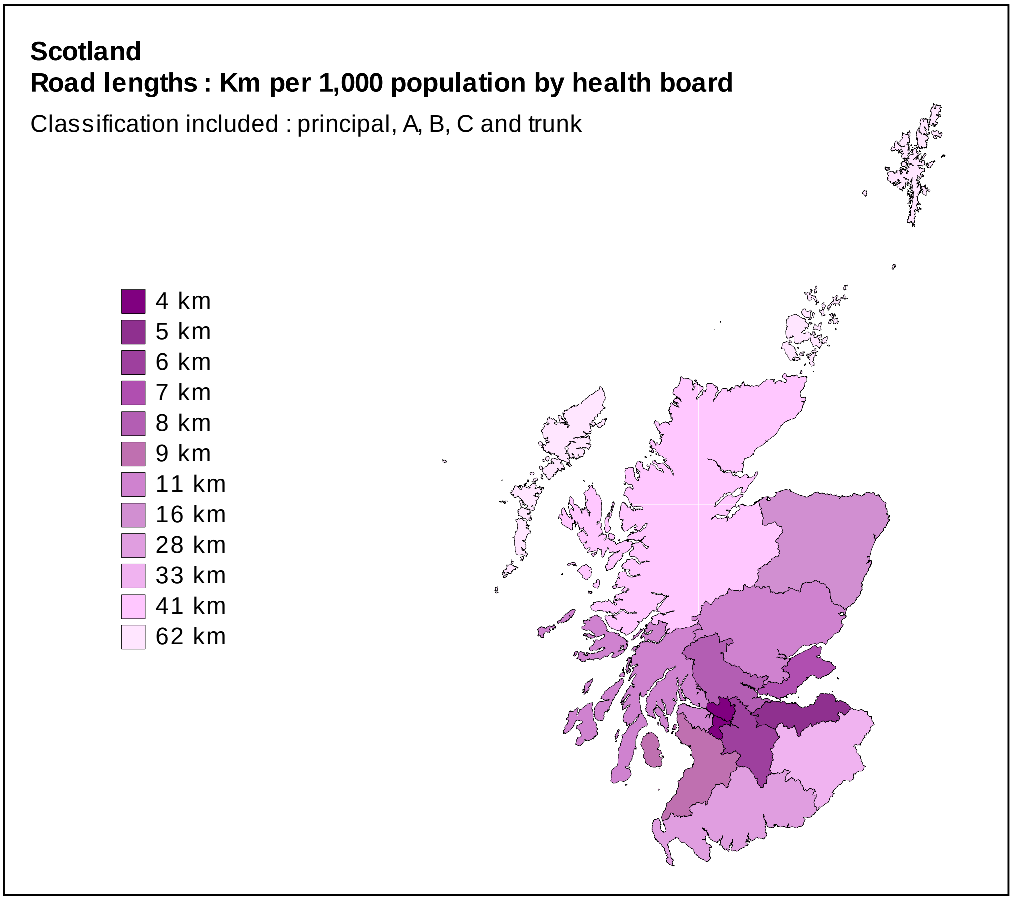
5.2.13 Road Length

The rationale for using road length is that more roads are needed when the population is dispersed or when there are natural barriers. Clearly road length is only one of the factors affecting time travel, as the quality of the road in question is a key issue; and in addition areas may have roads, that are present for historical reasons and are little used. The road lengths for England are shown in Appendix 5.

The Scottish Office used population communities of 500, 1,000 and 10,000 in the SHARE allocation system. The difficulty with using population thresholds is that the choice of the thresholds is arbitrary and that whilst they may have relevance for some services, they will not for others. GMD was considered when the analyses were being completed for the Arbuthnott Formula for NHS allocations in Scotland however it was concluded that road length is a better indicator of remoteness when considering the additional costs of service provision. The measure selected was road kilometres per 1,000 population, the results for each area are shown in Figure 5.9. The rationale is that the more inaccessible an area and the more dispersed the population, the greater the road length required; and that over time these roads will have been provided, or, population will be dispersed along road links.

The measure was attractive because it appears to have been accepted in Scotland where there is the most significant range between urban and rural areas. In addition road length would be likely to take into account geographical barriers such as mountains and estuaries. However this raised concerns about the use of the road length measure because the absence or presence of roads in an area may have a historical basis and the factors that were important when roads were constructed may no longer be relevant. It was concluded that it may be possible to minimise the potential for historical distortion by considering a narrow range of roads. The rationale was that trunk road dual carriageways and motorways are of more recent origin and therefore less likely to be affected by historical issues. It was concluded that the measure may not have been robust for use in England.

Figure 5.9 Road length rurality measure adopted for resource allocation in Scotland



Alternative measures of accessibility have been developed such as distance to the central business district including gravity type indices, exponential distance decay systems and weighted average distance indices (Song 1996). The complexity with these measures is that the definition of the central business district is an essential requirement and it has not been possible to develop a reliable definition. Measures adopted in Scotland are shown in Appendix 6.

5.2.14 Geographical Information Systems (GIS)

The analyses of rurality in Northern Ireland were based on models of travel time based on simulations, which reflect the proportion of road types and the average speeds for each. This gives a more reliable measure of actual travel time for staff and for healthcare provided transport such as emergency ambulances and patient transport.

Using a GIS would have been highly attractive as I believe that it would have given a more accurate reflection of the actual impact of rurality on key areas like staff time allocated to travel.

5.2.15 Critique of GIS

Producing these models would have been time consuming as this work had not been completed for the whole of the UK. It would also have been important to consider local and healthcare context when completing these analyses as it is necessary to understand how services are used and what access is required. The location of services varies according to specialty and point in the care pathway. Therefore a robust GIS system would have required highly complex modelling.

5.3 NEW MEASURES

One concern when considering the robustness of existing population-based measures of rurality was that they do not reflect the population of neighbouring areas, which may have a very different population profile. In essence, each area is treated as though it is an island. This issue particularly affects islands such as the Isle of Wight and areas with a large coastline border, such as peninsulas. .

5.3.1 Neighbour Adjusted GMD

As shown in Figure 5.10 Wiltshire has borders with 8 other local health economy areas. Depending on where people live they are more or less likely to use services in neighbouring areas. In the case of Somerset those living in the North West of the county are more likely to use the acute services in Devon at Barnstaple. In the North East they are more likely to use the services available in Avon and Bath. There is a similar situation in Cornwall, where those living in the Caradon local council district have the majority of the acute health services provided in Plymouth. In North East Cornwall the majority of acute services are provided in Barnstaple. Neighbour adjusted GMDs for the health authorities in England are shown in Appendix 7.

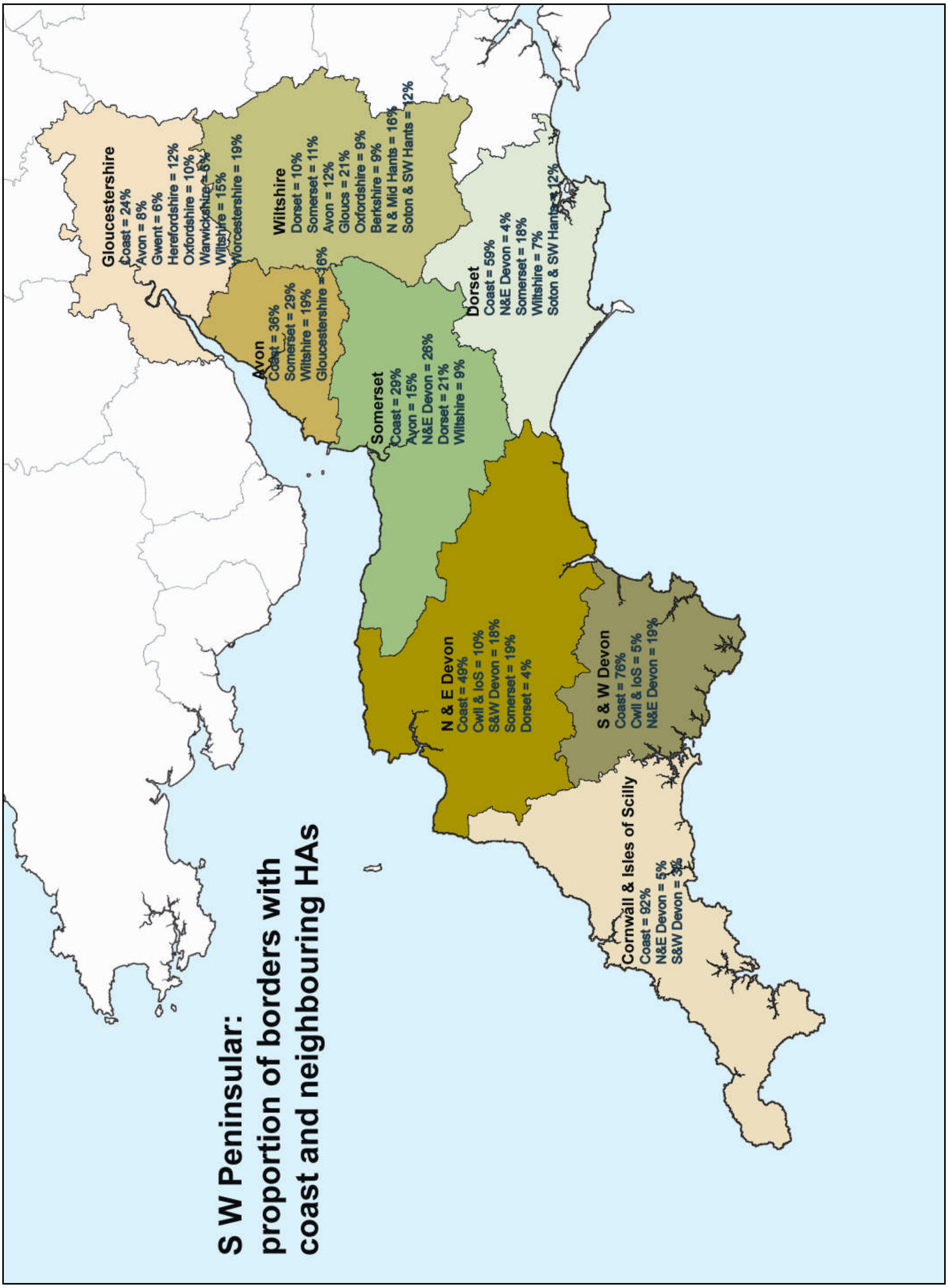


Figure 5.10 Boundary length between counties in South West England

The following new index is an amalgam of the GMD of the authority and the neighbouring health authorities s with which it shares a boundary. The ratio selected is 50:50. The boundary with each neighbour is calculated using MapInfo. The proportion of the overall boundary is calculated and used in the formula. The 50:50 ratio was selected arbitrarily. Other ratios could be selected, for example 25:75 or 75:25. The formula is as follows:

$$\mathbf{NAGMD = 0.5 \times (GMD_{HA}1) + 0.5 \left[\frac{(GMD_{N}1 \times B_{N}1)}{B_{HA}1} + \frac{(GMD_{N}2 \times B_{N}2)}{B_{HA}1} + \frac{(GMD_{N}3 \times B_{N}3)}{B_{HA}1} ..\right]}$$

NA GMD = Neighbour Adjusted Geometric Mean Density
$GMD_{HA}1$ = GMD of primary HA
GMD_{N} = GMD of neighbouring HAs
$B_{N}1$ = Boundary length of neighbouring HAs (miles)
$B_{HA}1$ = Total perimeter of primary HA (miles)

The example in Figure 5.11 indicates how the measure was computed:

Figure 5.11 Calculating neighbourhood adjusted GMD

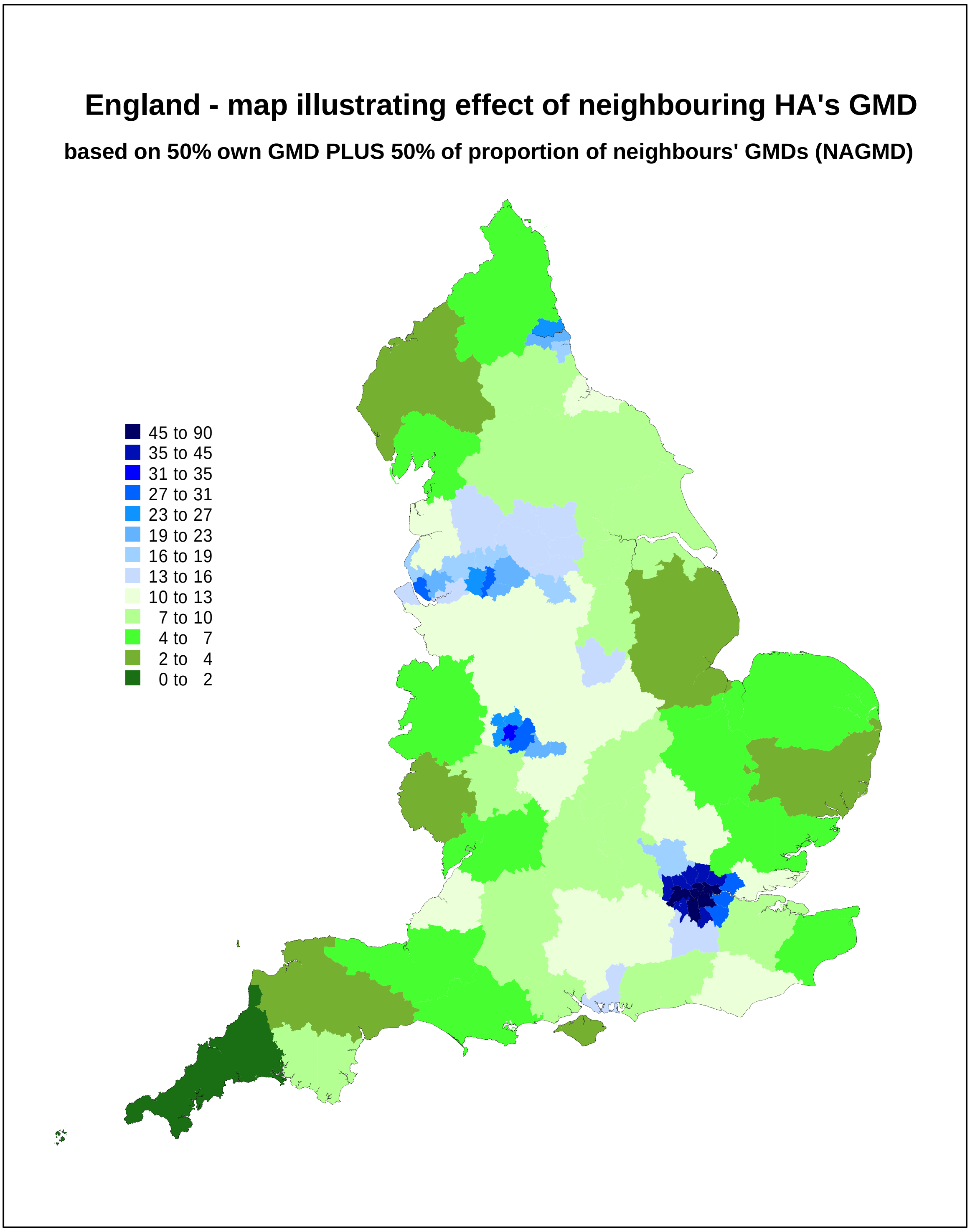
	GMD	*Border length with primary HA (miles)*	*Proportion of border*	*Border adjusted GMD*
Neighbour 1	*2*	*20*	*0.1*	*0.2*
Neighbour 2	*24*	*60*	*0.3*	*7.2*
Neighbour 3	*16*	*15*	*0.075*	*1.2*
Neighbour 4	*8*	*55*	*0.275*	*2.2*
Neighbour 5	*10*	*50*	*0.25*	*2.5*
Total border adjusted GMD				*13.3*

Primary Health Authority GMD = 4

NAGMD = (0.5 x 4) + (0.5 x 13.3) = 8.65

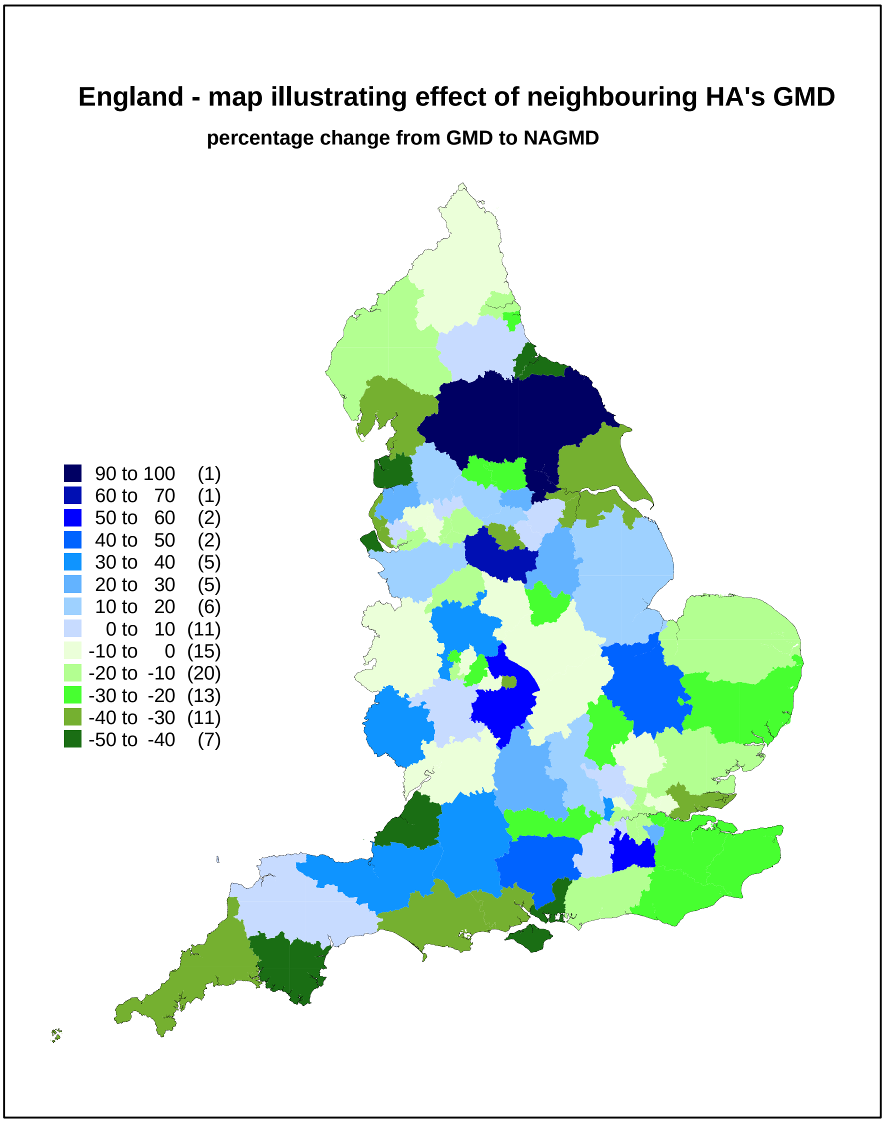
Therefore, the GMD for a rural area surrounded by other more urban areas would increase using this new measure and the GMD for peninsulas and islands would decrease. In the case of the Isle of Wight the GMD would have a NAGMD of 3.23 and Cornwall and the Isles of Scilly 1.84.

Figure 5.12 Health Authority Neighbouring Area GMD map of England using 50:50



The percentage impact on an area's original GMD can be calculated by dividing the NAGMD by the original GMD and multiplying this by 100. Map 5.13 shows the percentage change for each area. The NAGMD for the Isle of Wight is 50% lower. This is the maximum decrease. The next largest decreases are Wirral and South & West Devon, which have decreases of 45% and 44% respectively.

5.13 Impact of using Neighbour Adjusted GMD



Using this new index called NAGMD there is a significant change in the rurality figure for areas that border the sea in particular areas such as the Isle of Wight or the Isles of Scilly and peninsulas. Cities that are surrounded by largely rural areas are also assessed as having a greater rurality. The areas that are assessed as having a significantly lower rurality include Herefordshire, North Derbyshire and Yorkshire. All have borders with less rural neighbours.

The NAGMD figure for the S&W Devon is 7.11, down from 12.67. That for the Isle of Wight is halved from a GMD of 6.45 to an HW^1 of 3.23 because there are no adjacent health authorities. Using the HW^1 measure the Isle of Wight is ranked as the third most rural area after Cornwall and Cumbria, whereas using the GMD measure it was 14th in the order of rurality. Both rankings are for the 99 health authorities. The complete list of population measures covered in this report is given below.

5.3.2 Neighbour Adjusted Road Length (NAARL)

One of the concerns about an arterial road measure is that it would not consider the presence of major roads in neighbouring areas as an important issue as the presence of motorways just over the boundary in a neighbouring area could have a significant impact on remoteness and accessibility. It would be possible to construct a road length measure that was partly based on an areas road types and those of neighbouring areas. Any ratio could be used, however the following is based on a 50:50 split:

Neighbour Adjusted Arterial Road Length = $0.5\ ARL_{H1} + 0.5\ (ARL_{N1} \times B_1 + ARL_{N2} \times B_{2..})$

B_1 = border proportion of total border length between HA(H_1) and neighbouring HA(N_1) of total border length
ARL_{H1} = arterial road length in Health Authority H_1
ARL_{N1} = arterial road length in neighbouring Health Authority N_1

5.3.3 Combined Rurality Measure

The potential of using a measure that combined Neighbour Adjusted Arterial Road Length and Neighbour Adjusted GMD into a new Neighbour Adjusted Rurality Measure was reviewed to give a more robust measure of rurality. Some of the results from both the NAGMD and NAARL appear isolated. As a result the log of figures was used rather than raw data. Similarly multiplying figures led to a small number of extreme results, therefore the logs of the data were added. Finally, it was necessary to use the inverse of the log NAGMD so that the largest results on both scales were for rural areas.

The formula was:

$$\frac{\mathbf{1}}{\mathbf{\log GMD^{Na}}} + \mathbf{\log ARL}$$

GMD^{Na} = 50% GMD of home area + 50% GMD of neighbouring areas

ARL = all road lengths

In theory by utilising the new GMD measure it should adjust for population and population spread for the health authority and neighbouring health authorities. It should also take into account the impact of having a coast border. Incorporating the road length data should mean that the index takes into account barriers such as mountains, lakes and rivers.

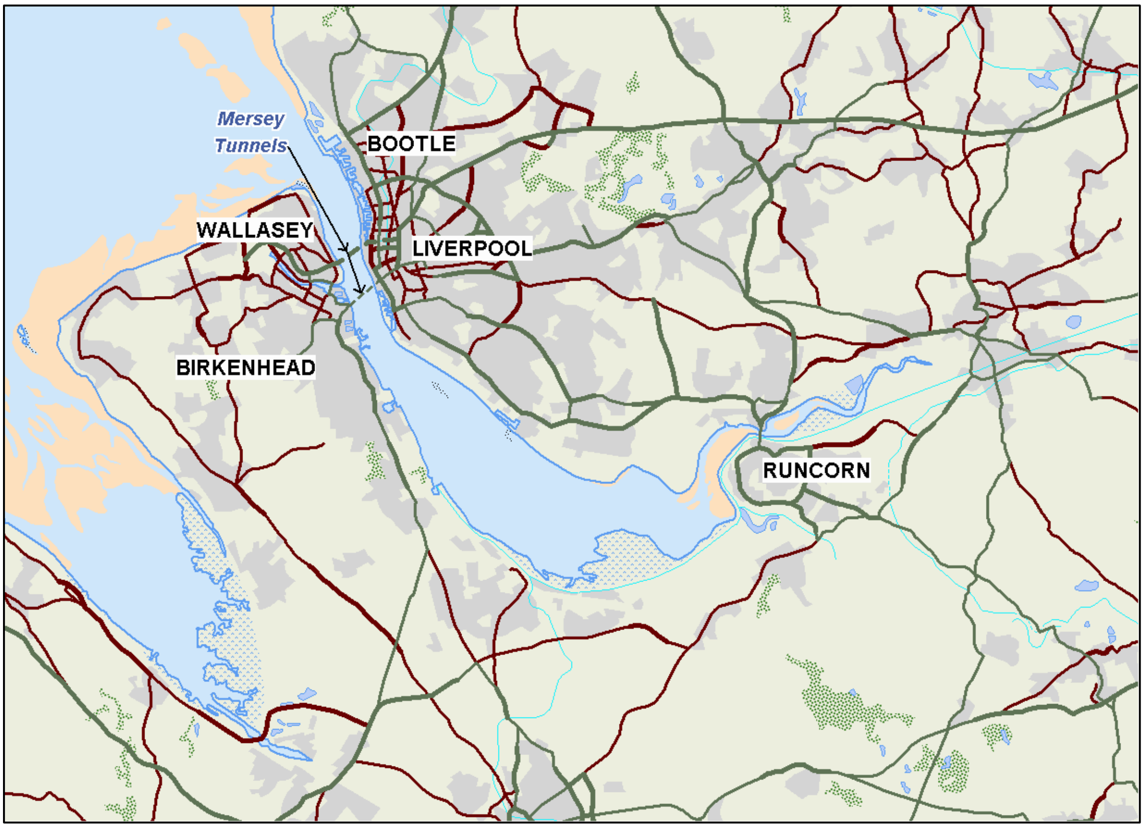
5.3.4 Critique of measures developed

There are a number of concerns about these new measures. Neighbour adjusted measures would not indicate the proximity of the population to core NHS services. One component of measures used for example in the Cloke Index was the proximity to urban centres. A derivation of this population potential type of measure could be incorporated into the formula. This could be used as a measure of accessibility and remoteness from services, however it would only be a proxy as there are large conurbations without, for example, A&E departments. In other areas small towns and cities with such facilities, e.g. Truro has a population of around 20,000 yet it has the main A&E department for Cornwall.

Identifying a reasonable split for the neighbourhood adjustment measures is a key factor. The selection of 50:50 was arbitrary but more robust measures could be calculated by identifying the proportion of treatment provided by neighbouring services. The NAARL measure is what adjustment is a reasonable one for the care received by neighbouring authorities.

The approach taken was to treat any area downstream of a bridge or tunnel as coastline. Whilst this may be appropriate in London or where there are regular crossing points, it appears intrinsically less reasonable where there is very limited connection for areas upstream. This is most apparent in areas with large or significant estuaries such as around the Humber or the Mersey or Bristol Channel as shown in Figure 5.24. Another factor is that the boundary for a health authority may in some cases be highly crenulated along the boundary with one area and effectively straight along another boundary. As a result this may result in an over emphasis of some boundaries and an under-representation of others and this also applies to the coastline.

5.14 Bridge and tunnels and Neighbour Adjusted GMD



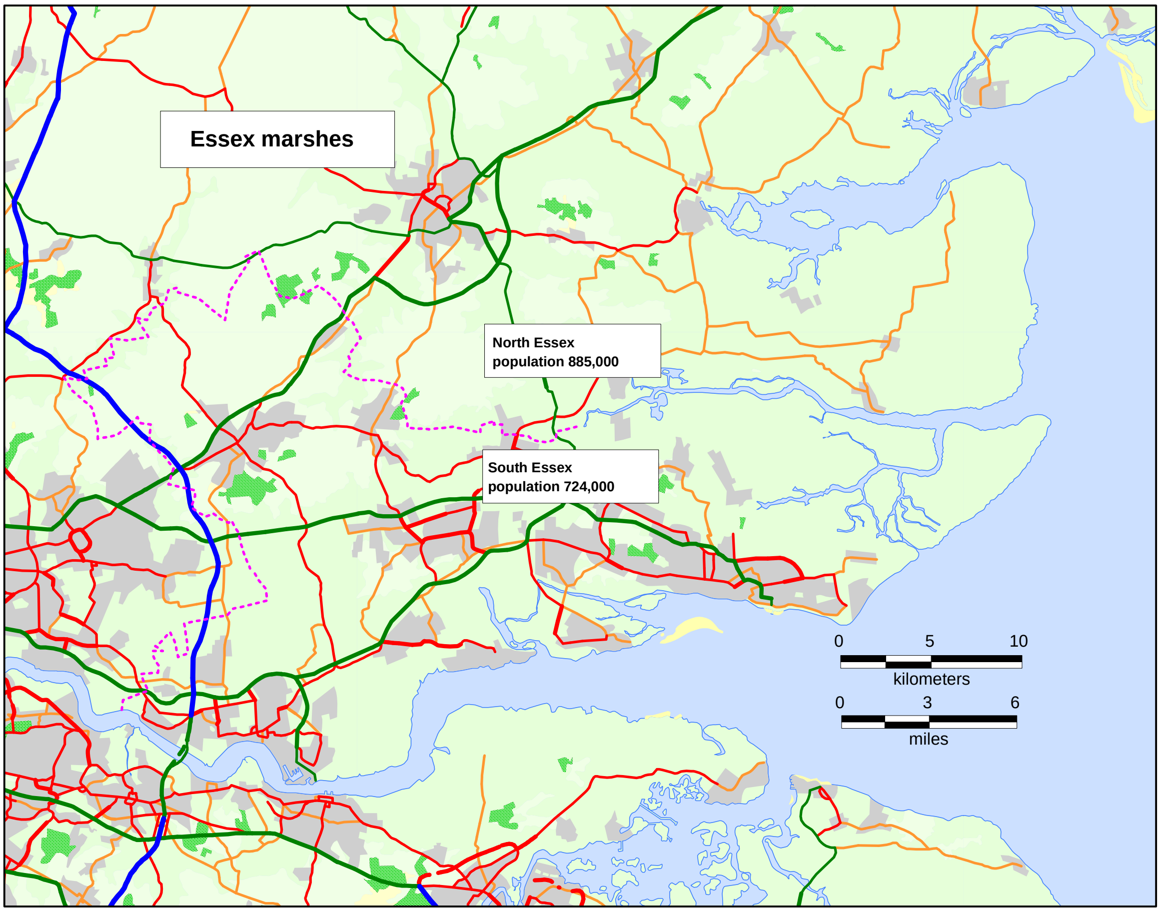
Another factor is that areas that have a relatively low population but a relatively large boundary area could result in a distortion of the measure for a health authority. This is most readily apparent when considering the coastline of the Essex Marshes, shown in Figure 5.15 where the large coastline is of little relevance to healthcare delivery.

The measure also fails to take into account factors that add to an area's inaccessibility including large bodies of water with few crossing points such as is the case in the Lake District.

Transport services have also not been considered including air, rail, and ferry. Ferries could have been handled in an equivalent way to a bridge with anything upstream being treated as a boundary. This was not done because it was concluded that in general they carry relatively little traffic, are often seasonal and very rarely 24 hour.

The need for healthcare is often not predictable and, therefore, reliance on ferries for emergency care is unacceptable. In remote areas responding to emergencies for remote areas such as islands, is commonly by air ambulance.

Figure 5.15 Estuaries and Neighbour Adjusted GMD



5.3.5 Personal Circumstances

All of the population measures covered to date relate to the rurality of the area lived in and considers these relative to each other for use in population studies. Whilst relative measures of population density and categorisation of areas may be indicative of accessibility for a more accurate measure of the accessibility of services it is necessary to consider the personal circumstances facing patients.

Transport is a key factor in considerations of accessibility and issues like public transport and car ownership. The type and condition of roads is also an important factor rather than just distance. In rural areas there are higher levels of car ownership than in inner cities because of the need to have a car to get to work or key services. However it is important to note that the presence of one or more cars in a household does not necessarily equate to the car being available or useable as shown in Figure 5.16 (Moseley et al., 1977). Even where a car is available it may not be possible to use it because if individuals need to have health treatment they may not be able to drive either directly because of the illness suffered or as a result of restrictions due to the medication or treatment.

Figure 5.16 Car ownership and usage

Cars in household	**0 cars %**	**1 car %**	**2 cars %**	**3 cars %**
No Licence	86	34	19	17
Has licence, never has car	13	4	2	0
Has licence, rarely has car	1	9	4	5
Has licence, nearly always has car	0	53	75	78
Base number of households	623	702	294	59

(From Moseley et al., 1979)

5.4 NOVEL AREAS IN THESIS

The formulation of new rurality measures that consider the nature of neighbouring areas was novel. This approach requires further refinement to address the issues raised; however following refinement it may be a more robust measure of rurality than GMD and other measures that treat areas like islands.

Conclusions and proposals on the development of composite analyses would enable indices to be developed that have the benefits of area based classification systems like the Cloke Index without the disadvantages associated with the measure and the index could be used in regression analyses.

5.5 RECOMMENDATIONS

New continuum rurality measures should be developed that can be used in regression analyses and are based on a composite of factors including population, accessibility, roads, neighbouring areas, and elements of area based classification systems such as land use and employment sectors. Once refined such measures would increase the focus on rurality as they would enable researchers to carry out analyses of the impact of rurality. An equivalent composite index on poverty should also be developed that takes into account accessibility and the support provided to those in need.

A derivation of the ONS system should be developed for statistical analyses where continuous data is required. For example, the ONS categorises each ward. For example, it lists wards that are viewed as the 'most rural'. An index could be developed based on the percentage of the population living in wards identified by the ONS in different categories such as 'most rural'. A derivation of the Cloke Index may also be useful for statistical analyses where a continuous scale is required. This could be calculated in a similar way to that outlined for the ONS data, again considering the percentage of the population living in different categories of area.

5.6 CONCLUSIONS

The criteria set out for selecting the measure for rurality analyses were that the index had to be credible or likely to be uncontentious, used in resource allocation, and suitable for regression analyses. Measures such as accessibility were highly attractive but impracticable for use in analyses. The road length measure used in Scotland also had intrinsic appeal but concerns were raised over the validity of the measure.

One of major concerns about area based measures was that they do not consider the nature of neighbouring areas. Work was carried out on the development of novel measures that calculate rurality by combining measures with neighbouring areas. It was decided not to use this new measure for analyses because it was concluded that the measures may be contentious and deflect focus away from the result of the analyses. This meant that the final choice was between the sparsity and supersparsity measure adopted in local authority allocations and GMD. The key reason for selecting GMD was that it had already been used in the NHS allocation formula for England.

CHAPTER 6 ~ ADJUSTMENTS FOR DIFFERENCES IN THE NEED FOR HOSPITAL AND COMMUNITY HEALTH SERVICES 1997-2003

SUMMARY

The need adjustment was introduced to compensate for differences in the requirement for healthcare. The adjustment was based on a comprehensive study by the Centre for Health Economics at the University of York. The study recommended the adoption of series of census variables as proxies for health need. The proxies were selected as those that were most closely correlated to the modelled health need.

Socioeconomic group and poverty are strongly correlated to the incidence of certain diseases; however the impact is highly variable. There may be a strong positive or negative correlation or for some conditions it has been concluded that there is a U shaped relationship. A robust need index would need to reflect the impact of poverty across the full range of healthcare conditions, taking into account this variation and the relative proportion of healthcare costs associated with different diseases and healthcare treatments. It would be possible to construct such a system however it would be highly complex, requiring a detailed understanding of the incidence of each key condition, its variation according to socioeconomic group and it would need to be updated regularly.

The York study detailed a series of assumptions and concerns about data quality and concluded that research was required to determine if utilisation is a good predictor of need. The concerns included the quality of NHS utilisation data and the quality of the cost information. These were key elements in the development of the model of health need and in the light of these concerns and assumptions it is concluded that the

Department of Health should have commissioned more research before implementing a fundamental change to the resource allocation system.

It is also concluded that the York study should have carried out more detailed research on rural utilisation. The York study commented that rural areas had a significantly higher utilisation than predicted by the model. It was asserted that the higher utilisation was to be due to higher unmet demand in urban areas. This assumption was contrary to a significant body of research on distance decay where the more inaccessible a service the less it will be utilised. The assumption made by the York study was that the identification of counter-intuitive proxies was due to a reflection of an unmeasurable demographic variables. This study concludes that the utilisation rate in rural areas and the identification of counter-intuitive proxies necessitated detailed analyses as they were indicators that the underlying assumptions may not have been robust.

It is concluded that the potential benefits of applying of sophisticated economic modelling were not realised because there was an inadequate focus on data robustness. It is also concluded that less counter-intuitive proxies may have been selected if the weaknesses in the York study had been addressed.

The adjustment for the proportion of elderly was significantly higher in the Arbuthnott formula where extensive research has found that there needs to be a large adjustment for age. The results from analyses of workload in Cornwall were consistent with the findings in Scotland. It appears from these analyses and the research in Scotland that the English adjustment for age was insufficient to reflect the true costs of providing healthcare to the elderly.

This study has shown that the allocation system used for hospital and community services was not consistent with the General Medical Services and Years of Life Lost

(YLL) indices. This is particularly notable as the YLL index is based on mortality rates rather than proxies.

All of the formulae used Standardised Mortality Ratios for the under 75s and excluded the over 75 age group. This is a significant issue because analyses has shown that there are often large differences in the SMRs for the under and over 75 age groups. The greatest impact of this is likely to be where the index applies to services that are primarily used by the elderly such as district nursing.

This study has indicated that the need adjustment for HCHS did not meet the aim of adjusting for differences in health need. This was because the assumptions made in the underpinning research were not robust, in particular for rural areas and that this led to the selection of counter-intuitive proxies. It is concluded that the other weaknesses of the need adjustment were the use of SMRs for age groups who were not the predominant users of services; the application of an age related cost model that may not have not adequately reflected the higher costs of caring for the elderly; the exclusion of an adjustment to compensate for differences in private medical insurance; and assumptions over the incidence of clinical conditions and the link to deprivation.

6.1 INTRODUCTION

This chapter covers the model adopted and adjustments that were made in the weighted capitation system to compensate for differences in the requirement for healthcare between 1997 and 2003. As stated in Chapter 4 the fundamental aim of the resource allocation system was to compensate for unavoidable differences in the need for health services and unavoidable cost of providing services so that it would be possible for local health communities to fund healthcare that is as equivalent as practicable. The adjustments for differences in need were based on proxies for need rather than the actual presentation rates by patients for treatment. This chapter considers this approach in detail to determine if the use of proxies was likely to have resulted in adjustments that were sufficiently robust. The approach adopted has been to consider existing research on health needs and to carry out research where necessary to determine how the need for healthcare varies according to factors such as gender, ethnic background, environment, disease and age.

The first of the seven sections in this chapter covers studies that have been completed into the differential need for healthcare due to poverty. There has been a significant body of research into poverty, socioeconomic groups and the link to health. The section initially covers a description of the Jarman, Townsend and Carstairs indices and research on their link to health service usage; there is then a review of the research that has been carried out into how utilisation varies according to socioeconomic group, poverty and ethnicity.

This is followed by descriptions of the outcome of research on mental health; studies into the impact of co morbidity; and the results of research focused on the specific health needs of rural areas. This is followed by a review of how the need for healthcare varies with age. There is an accepted correlation between increasing age and the need for healthcare. The section includes studies on how the need for healthcare changes with age.

The next section considers the impact of private medical insurance. This is not currently taken into consideration in the formula, but there may be an impact on the need for NHS treatment. In areas where there is a high level of use of private hospitals it may be that the NHS will not have to provide the services.

The fourth section contains analyses of the impact of the formulae, in particular on rural areas and includes a critique of the work completed. This is followed by recommendations and conclusions.

The references cited in this section have been selected to show the breadth of the research in an area and the contrasting results. Where it is believed that general perceptions need to be questioned more studies have been cited.

6.2 STUDIES COMPARING HEALTH NEEDS AND KEY VARIABLES

6.2.1 Health need and deprivation

6.2.1.1 Poverty and deprivation definitions and indices

The definition of poverty and deprivation has attracted considerable discussion. One of the leading researchers in this field, Townsend stated that individuals can be said to be in poverty “if their resources are so seriously below those commanded by the average individual or family that they are, in effect, excluded from ordinary living patterns, customs and activities” (1979). The associated term deprivation has also been defined by Townsend as individuals who have an “observable and demonstrable disadvantage relative to the local community or the wider society or nation” (1987). Based on these definitions poverty and deprivation are relative. Absolute poverty is defined as a household or individual who are deprived of two or more of what it terms the ‘seven basic need indicators’ which are: clean water, sanitation, shelter, education, information, food and health and is therefore not relative (Townsend Centre 2005).

A range of factors have been included when considering deprivation: income; work; health; accommodation; crime and disorder; education, training and skills; social environment; access to services. Material deprivation was defined as a relative lack of food, clothing, accommodation and recreation, and poverty as the lack of financial resources to obtain them. Social deprivation has been defined as the lack of access to ordinary activities and social relationships (Noble et al 1999).

Work by leading researchers on need and poverty has been of particular importance when considering health resource allocation and deprivation. The indices developed by Jarman, Townsend and Carstairs have been widely used for comparative studies on health service provision and disease prevalence. It has been concluded that the

Jarman Index has a significant association with the use of in-patient medical services and medical admissions for the elderly (Maheswaran 1997). The Jarman Index has also been found to have a positive correlation with mortality rates due to tuberculosis between 1979 and 1983 (Charlton and Lakhani 1985). Figure 6.1 details the variables included in the Carstairs, Jarman and Townsend Indices (derived from Morris and Carstairs 1991, Gatrell 2002).

Figure 6.1 Comparison of the variables in the Carstairs, Jarman and Townsend Indices

Variables	**Carstairs**	**Jarman***	**Townsend**
Unemployment	X	3.34	X
No car	X		X
Low social class	X	3.74	
Unskilled			
Overcrowding	X	2.88	X
Not owner occupied			X
Single parent		3.01	
Under age 5		4.64	
Lone pensioners		6.63	
1 year immigrants residential mobility		2.68	
Ethnic minorities		2.50	

*Weighting given for the Jarman Index

Analysis of health indicators and the Jarman, Carstairs and Townsend indices found that there was a stronger correlation between Carstairs and Townsend and the health needs selected, than between either of these indices and Jarman. The Carstairs study concluded that Jarman was less effective because of the inclusion of variables that were either poorly or negatively correlated to the health need considered in the study. The correlation between the proportion of the population permanently sick, temporarily sick and SMRs are shown. The use of unemployment in the indicators and the relative volatility of unemployment figures meant that there could be changes in assessments over short time periods (Carstairs 1995). These results indicate the importance of selecting a robust index for healthcare studies.

Figure 6.2 Correlation between deprivation indices and key health variables (Morris and Carstairs 1991)

Variables	Carstairs	Jarman	Townsend
SMR all ages	0.73	0.67	0.72
SMR 0-64	0.75	0.68	0.73
SMR 0-74	0.78	0.71	0.77
SMR 65+	0.53	0.49	0.53
Permanently sick	0.83	0.67	0.80
Temporarily sick	0.75	0.60	0.73

6.2.1.2 Findings of studies into poverty and health need

There is a considerable body of research into morbidity and poverty. This section details findings that are of particular interest when considering the way that health need varies as a result of deprivation. As covered in Chapter 4 proxies were selected because of the difficulties of identifying actual health needs and concerns about perpetuating previous patterns of healthcare provision that may not have been related to underlying healthcare need.

For a robust system it would be necessary for proxies to reflect actual differences in health need. This section considers the incidence of clinical conditions and deprivation variables and indices. The figures for the proxies for health authorities of note are shown in Appendix 8.

The conditions found to be most strongly correlated with material deprivation in a study of self-reported health status in Avon and Somerset in urban and rural areas were diabetic eye disease, emphysema and bronchitis (Eachus et al 1996). The incidence and severity of respiratory symptoms is highest in manual social classes and has been found to be related to smoking (Trinder et al 2000). A clear association has been found between smoking and deprivation (Kleinschmidt et al 1995).

Analyses have shown that deprived areas have a particularly high level of out of hour's workload and accident and emergency usage (Carlisle et al 1998). There are strong correlations between childhood injuries and socio-economic group with children in the poorest economic groups having the greatest morbidity (Hippisley et al 2002) but the link between material deprivation and injury has been found to be less significant in other age groups (Lyons et al 2003).

Significant differences have been found in the attendance at general practice in different socio-economic groups, however it was concluded that the differences become less marked with increasing age. The greatest attendance was from social classes IIIM, IV and V, the unemployed, those from South East Asia and those who were divorced or widowed (Scaife et al 2000). Analyses have indicated that men in manual roles use GP services and attend outpatient clinics more frequently than men in other occupations. Hospitalisation for men was found to be highest amongst men in manual roles, in particular those without access to a car (Balarajan et al 1987).

A wide range of reports have indicated that there is significant health benefits associated with breast-feeding. Bottle feeding was 12% in 1933 and this increased to 69% in 1965. By the mid 80s this had reduced to an average of around 55% however a very significant difference between the rates for different social classes was found ranging from 27% for social class I bottle feeding to 69% for social class V (Jones 1987). Therefore it would be anticipated that the long term health benefits associated with breast-feeding will be significantly less prevalent in the lowest socioeconomic groups.

Analyses have indicated that there is a significant difference in limiting long term illness (LLTI) and permanent sickness levels between travel to work areas where the employment prospects are poor compared to areas where there are relatively good employment prospects. For equivalent social deprivation conditions LLTI levels were found to be 20% higher in areas with poor employment prospects (Haynes et al 1997).

There are also specific diseases that are more prevalent in areas with the greatest poverty. Bacterial meningitis has been found to be correlated with overcrowding in housing. Meningococcal meningitis levels were 74% higher in the most deprived areas compared with the most affluent areas (Jones et al 1997).

It has been concluded that during the period 1981 to 1991 the inequalities in mortality between the poorest areas and the rest of the population widened in all age categories under the age of 75 (Phillimore et al 1994). During the same period it was found that the values of Townsend and Carstairs deprivation indices had fallen. As these indicators measure material deprivation it may have been anticipated that there would have been convergence rather than divergence of mortality rates. However there was a widening of the differentials between social classes (Dolan et al 1995).

This widening may be important as research has indicated that mortality rates are lowest in countries where there are the smallest differences between income rates, the conclusion of the study is that smaller differences in income increase social cohesion and reduce social divisions (Wilkinson 1997). A study of self assessed morbidity in Sweden found an increased risk of around 150% of those in the poorest communities reporting a high incidence of poor health compared with the more affluent areas (Sundquist et al 2003).

However there are some health needs that are negatively correlated with social class or where the relationship is more complex or condition specific. This is clear when considering cancer. The causes of many cancers are unclear and may have more than one causative factor. The occurrence of cancers such as those of the stomach, trachea, bronchus, lungs, oesophagus, and the larynx are all positively correlated with lower social class, whereas cancer of the colon, melanoma, leukaemia and non Hodgkin lymphoma are positively correlated with higher social class (Higginson 1992, Bithell et al 1995).

The potential complications during childbirth are positively correlated to maternal age and women have a progressively increased risk from teenage years onwards. There is a strong association between social class and elderly gravida and primigravida with women from the highest social groups starting a family at a significantly older age (Rosenthal and Paterson-Brown 1998). As a result it would be anticipated that the maternity care and associated costs would be greater in areas with a greater proportion of women from higher social groups.

In other cases healthcare need has been found to be U shaped. Women and men in the civil service tend to report similar levels of recent psychiatric symptoms, recurrent health problems and long standing illness, though there are lower rates of reported minor psychiatric morbidity in women and this is more marked in men. Significant differences in the incidence of neurotic disease have been found with those in the highest and lowest social class categories having a higher frequency of disease than those in the intermediate social groups (Stansfield and Marmot 1992, Lewis et al 1998).

The link between heart disease and deprivation has been considered in a large number of studies. The majority have shown that there is a significant link. Socio-economic circumstances in early life have been found to be strongly correlated to cardiovascular disease and premature death; although it has been found that socio-economic circumstances are not generally sufficient for a full explanation of the observed differences. Research has found that ischaemic heart disease (IHD) mortality is linked to socio-economic groups for women and that there is a U shaped relationship for men with those in the lowest and highest socio-economic groups having the highest mortality rates.

IHD has been found to be related to place of residence rather than birth. It has been concluded that this indicates that differential rates across Great Britain are not due to geographical differences in genetic make up of the population and that postnatal, prenatal diet are not major determinants (Elford et al 1989). However other research has found that there is a clear link between birth weight, and the incidence of coronary heart disease and stroke (Rich-Edwards et al 1997). What appears clear is that lifestyle is a key factor.

These studies show that whilst there is a clear positive correlation between a large number of clinical conditions and deprivation this is not always the case and that for some conditions such as cancer and heart disease the relationship is complex. For some conditions there is a negative correlation between deprivation and health need.

Figure 6.3 Odds ratio for women of Coronary Heart Disease using the six point graded definition of social class (Woodward et al 1992)

Occupational Social Class	Cases (%)	Total	Odds ratio
I	62(19)	320	1
II	209(17)	1222	0.80
IIIn	126(20)	642	0.93
IIIm	337(23)	1487	1.02
IV	166(25)	669	1.00
V	70(30)	236	1.32

Figure 6.4 Odds ratio for men of Coronary Heart Disease using the six point graded definition of social class (Woodward et al 1992)

Occupational Social Class	Cases (%)	Total	Odds ratio (adjusted risk & age)
I	64(18)	348	1
II	240(19)	1277	1.06
IIIn	92(20)	466	1.02
IIIm	433(23)	1878	1.20
IV	158(25)	641	1.28
V	68(29)	234	1.52

6.2.1.3 Inverse Care Law

Tudor Hart introduced the term the Inverse Care Law in 1971 to encapsulate the results of studies indicating that those with the greatest health need were often receiving the least healthcare. A number of studies have indicated that despite the increased resources for the NHS and the use of various resource allocation formulae that the Inverse Care law is still in evidence in the UK (Watt 1996).

Research has indicated that socio-economic disadvantage increases the risk of having a myocardial infarction and of this being fatal before reaching hospital (Morrison et al 1997). This is despite the findings of a study into the GP diagnosis of angina and non-exertional chest pain (Richards et al 2000). As this is the prime indicator of need for angioplasty it might have been anticipated that there would have been equal access to percutaneous transluminal coronary angioplasty and coronary artery bypass grafting. However this was not the case as both procedures have been found to be negatively correlated to socio-economic group (MacLeod et al 1999). Equivalent results have been found in other studies where the reoccurrence rates of myocardial infarction were found to be significantly reduced by coronary artery surgery and that patients in GP practices with higher rates of deprivation have lower rates of heart surgery and had longer waiting times for surgery (Smith et al 1997).

It has been concluded that GPs provide less comprehensive treatment to patients from lower socio-economic groups presenting with symptoms of depression. GPs in inner city areas were found to be more likely to view the care of depressed people as a problem, whereas GPs providing services to more affluent populations were more likely to view depression as a treatable illness and as rewarding work (Chew-Graham et al 2002).

6.2.1.4 Health and ethnicity

There have also been a range of studies comparing the health needs, utilisation rates and perceptions of health services of a range of ethnic groups. The studies have found significant differences in the occurrence and presentation between ethnic minorities and specific diseases.

Research in America has indicated that coronary heart disease in women is higher for African-Americans aged 25-74 than in white Americans of the same age (Gillum et al 1997). Research in the UK has indicated that Asians have an increased rate of coronary heart disease of around 40% compared with the white community (Lowry et al 1991). Asian women have been found to be at particular risk and have been found to have abnormally low serum concentrations of high density lipoprotein cholesterol (HDL-C)). This is of concern as low levels of HDL-C are linked with a higher incidence of heart disease (Toth, 2005).

Asthma rates have been found to be significantly different with children of Irish descent having a rate of 19.5%, Afro-Caribbean of 17.7% and the general population of 10.0%.

This research also found that longstanding illness was less common in Bangladeshi and Pakistani children. They concluded that this was contrary to what would have been anticipated because Afro-Caribbean, Indian, Pakistani and Bangladeshi children tended to be in lower social classes than the general population and therefore it would have been anticipated that health need would be greater than for children in the general population (Saxena et al 2002).

Studies of the health of Asian and Polish immigrants to Australia, England and Wales has indicated that the migrants tend to adopt the disease profile for various cancers of the new environment rather than the country of origin (Harding and Allen 1996). It has been concluded that a genetic predisposition in Asians to accelerated atherosclerosis is being exacerbated by western lifestyle (Dhawan 1996).

South Asian men have been found to have significantly lower rates of lung cancer than non-south Asian men. However contrary to what has been happening in the general population the incidence is increasing in south Asian men. Cancers of the head and neck are more common among south Asians than in the general UK population (Peake et al 2002).

There have been a considerable number of studies into the incidence of mental illness in ethnic minorities. Schizophrenia is diagnosed more frequently in those of Afro-Caribbean descent than in the general population; however the same study found that the rates of anxiety and depression may be lower than in the general population (Lloyd 1993). Other research found that there were raised incidences of psychoses in all ethnic minority groups, but not necessarily schizophrenia (King et al, 1994). Significant differences have been found in the rates of mental illness between Somali and Bengali ethnic groups in East London. One theory given for the difference is that they may be due to factors like housing and social support (Silveira and Ebrahim, 1998). However these findings are questioned by research which has concluded that there may be an overestimate for the incidence of mental illness where English is not the first language (McCracken et al, 1997).

Research into the utilisation of GP and outpatient services has shown that the rates are lower for some ethnic minorities. The study found that the use of GP services by ethnic minorities are generally equivalent to the white population, however the rate is significantly lower in females of Pakistani origin. The use of hospital outpatient services is significantly lower in ethnic minorities and this is also the case for Indian, Pakistani, Chinese and Bangladeshi children who are less likely to have attended an outpatient appointment (Saxena et al 2002). Ethnic minorities tend to have a poorer perception of GP services (Campbell et al 2001).

The 2001 census found that 87.5% of the population regarded themselves as white British. However ethnic minorities are a significant proportion of the population in some areas, for example 36% of the population in Tower Hamlets stated that they were Muslim. Therefore the disease incidence and utilisation rates could be important factors when determining healthcare need (Census, 2001).

6.2.2 Health and rurality

In Australia it has been concluded that rural communities may experience a greater need for health services because the poorer availability of specialist services may lead to delays between initial presentation and diagnosis and treatment. In rural Australia there were more asthma deaths than in urban areas. It was concluded that the closer proximity to emergency services may be life-saving (Watts 1999). It is not clear if there was a link between asthma deaths and rurality in the UK however it would be anticipated there would have been as there are lower standards for ambulance responses in rural areas where the target to achieve was to reach 95% of patients with immediately life threatening (Category A) conditions within 14 minutes of being alerted in urban areas but 19 minutes for rural areas. A slower response time has been linked very closely to decreased survival rates (Pell et al, 2001).

It has been concluded that levels of poor health are generally higher in urban areas than rural areas but that there are pockets of poor health in rural areas (Watt et al 1994). Urban areas have the highest deprivation scores based on census data and have the greatest proportion of individuals that have multiple deprivation including housing, unemployment and material possessions. The health needs of people living in rural areas have not received the same focus as for those living in urban areas (Mullins et al, Countryside Agency). However it has been concluded that the methods used to assess deprivation were developed for urban areas and were inappropriate for rural areas (Cullingford and Openshaw 1982). Payne et al (1996) concluded that "a key factor in the under estimation of deprivation in rural areas is the use of social and economic factors which are predicated on urban conditions as the norm".

It is also important to note that even the most deprived local authority areas only have a small proportion of the total number of deprived people. It is clear that most deprived people do not live in deprived areas and that most people in deprived areas are not deprived (Fieldhouse and Tye 1996). It has been concluded that there are areas of considerable deprivation and poor health in rural communities and that the use of averages of deprivation and health need over relatively large areas means that the favourable averages of health and affluence mask these issues (Haynes and Gale 2000). Rural disadvantage is often present in small areas and may be obscured by proximity to areas of relative wealth (Woodhouse 2002a).

It has been concluded that income data at ward or enumeration district level would be a suitable measure but that the data is insufficiently robust for it to be reliable (Dunn, Hodge et al 1998). Rural deprivation has been defined as containing at least two of the following three factors: resource opportunity or mobility deprivation (PION 2000). Another definition is the “unavailability because of distance of goods and services such as healthcare, education and the welfare services” (Phillips and Williams, 1984). Rural disadvantage may be lees concentrated than urban disadvantage and is therefore less visible (PION 2000). There are however considerable differences in rural areas and it has been concluded that the complexity makes it necessary to use information at local levels (Rushton et al 2000). Small area analysis has been found to show the strongest correlation between socio-economic status and self–assessed poor health (Reijneveld et al 2000).

Analyses of poverty in rural areas have identified enumeration districts with very high uptake rates of income support and housing benefit (Milner 1998). Analyses of census data from 1991 indicate that there are higher levels of LLTI in rural areas than predicted. This indicates that there are either different perceptions of LLTI or that there is greater morbidity in rural areas (Bartley et al 2002). It has been concluded that the migration of those of working age out of rural areas leaves the frail and elderly remaining (Shucksmith et al 1990).

A study in Dumfries and Galloway into the centralisation of cancer services may result in significant disadvantages in rural areas, where patients had to travel considerable distances to receive treatment (Baird et al 2000).

As would be intuitively expected, research has shown that people living in rural areas face particular difficulties because of the location of key services. In rural areas more time is spent travelling by care staff and providing support is more difficult (Woollett

1993). The lack of accessible frequent and reliable transport to day services also means that those in need are likely to receive less support (Brown 1999, Payne 1996). The elderly have been found to experience more difficulty accessing services (Shucksmith et al 1996). It has also been concluded that people living in rural areas are less likely to be open about personal hardship and are less likely to know about or claim support (McColl et al., 1994).

Patients in hospital from rural areas tend to have fewer visitors and this has a particular impact on women, children and the elderly (Haynes and Bentham 1979). The severely ill, elderly and young have the lowest levels of mobility, this leads to reduced use of preventative services, primary care and hospital services because of the costs and inconvenience of long journeys (Bentham and Haynes 1985, Haynes et al 1999), and this has been found to lead to poorer health outcomes (Jones and Bentham 1997). Poorer availability of specialist services may increase the time between initial presentation and confirmation of the diagnosis by a specialist and if this is the case then increased morbidity would be anticipated (Peacock et al 2001).

Studies have indicated that farmers have a greater risk of being involved in accidents due to the need to work with complex machinery and chemicals, and lower rates of healthcare utilisation when conditions are diagnosed (Burnett and Mort 2001).

There have been considerable amounts of research on the incidence of mental illness in urban areas. Studies such as those from the National Survey of Psychiatric Morbidity were completed so that the prevalence and severity of psychiatric conditions could be determined. Analyses of the data from the survey indicate that there is a strong correlation between living in an urban area and mental illness (Jenkins et al 1997). The census variables that have the strongest correlation with the admission rate to a mental health facility have been found to be: overcrowding of more than 1.5

people per room, lack of household amenities, living in one room, change of address in the last year, overcrowding of more than one person per room, population density, ethnic composition, no access to a car, and being a single parent (Thornicroft 1991). Psychiatric morbidity has been calculated from questionnaires returned by teachers as 25.4% in London compared with 12.0% in the Isle of Wight (Maughan 1989).

A clear correlation has been found between unemployment and psychiatric morbidity. The causation is unclear whether psychiatric morbidity leads to unemployment or unemployment leads to psychiatric morbidity (Stansfield et al 1992). Analyses of the General Health Questionnaire also supported the conclusion that there was a significant difference found between the employed and unemployed (Weich et al 2003).

The validity of the psychiatric morbidity indices for rural areas has been challenged as the components of the indices may not be valid for rural areas (Thornicroft 1991, Jessop, 1992). Using these indices psychiatric morbidity is higher in urban than rural areas. However there are a number of studies that indicate that there is greater incidence of psychiatric illness in rural areas than would be anticipated (Gregoire & Thornicroft 1998). A study of pre-school children and parents found that those living in rural areas had the same rates of mental health problems as those in urban areas and that the service needs were equivalent (Thompson et al., 1996). A number of studies have concluded that the rates of most mental illnesses are likely to be similar in urban and rural areas (Romans-Clarkson et al., 1990, Mueller, 1981, Blazer et al 1985, Duncan et al 1994). A General Health Questionnaire study found that there was no statistically significant difference between urban and rural wards in the prevalence of the most common mental health disorders (Weich et al 2003).

It has also been concluded that there is no difference in alcohol or drug dependency once individual and social characteristics have been taken into account (PION 2000).

During the period 1974 – 1986 the majority of the highest suicide rates were in men in Northern Scotland (Crombie 1991). Suicide rates are also higher in rural areas than for the general population (Shucksmith et al 1996).

Psychiatric morbidity has been found to have increased between 1977 and 1984/5 by research based on the General Health Questionnaire. For Greater London the increase was estimated as being at least 8% and that the increase is not due to an increase in the willingness to acknowledge mental illness (Lewis and Wilkinson 1993).

An understanding of the core reasons for differences in psychiatric morbidity would enable more robust formulae to be developed for resource allocation. The reasons for the higher incidence of mental illness amongst women than men have been the subject of numerous studies. The hypothesis that it is due to women having a larger number of roles, the "role strain" hypothesis has not been supported by a study of 8979 adults in Great Britain (Weich et al 1998).

One rationale given for the differences between the referral patterns in urban and rural areas for mental health is that of stigma. In rural areas of Eire a negative attitude to mental health has been noted, in particular to in-patient facilities coupled with a tendency to under-report mental illness and a higher threshold before help is sought (Keatinge 1987). The incidence of schizophrenia was found to be the same in urban and rural areas but the first admission for patients in rural areas was found to be at a later stage when the disease was more chronic (Keatinge 1988). It has been argued that rural areas are more self sufficient on mental health issues and that this self-sufficiency has led to decreased mental health funding. However the care provided may not be that required leading to a greater incidence of the mental illness becoming chronic in nature (Elder, 1996). However not all studies have come to the same conclusions, in one study rural residents disagreed with the suggestion that shame was an issue causing under presentation of mental illness in rural areas. The study concluded that there was evidence of a higher proportion of females receiving treatment in rural areas (Gift & Zastowny 1990). It has been found in Sweden that where patients are given similar and equally accessible services in urban, suburban and rural settings the emergency psychiatric workload was found to be equivalent (Gyllenhammar et al 1998).

There is a significant body of research in the UK and overseas linking psychiatric presentation to accessibility. In Nigeria it has been found that in rural areas where there is a lack of accessible community facilities, more people suffering from schizophrenia have been found to be treated at home by family and informal carers (Martyns-Yellowe, 1992). There may be a similar situation in the UK as GPs in rural areas have been found to perceive that secondary mental healthcare is not as accessible (Stansfield et al., 1992). Primary care staff have been found to be more involved in mental health issues in rural areas (Seivewright et al., 1991). In New Zealand the utilisation of mental health services has been found to be linked to accessibility, so that the more accessible a service, the more likely it is to be used (Hall, 1988). If there is an equivalent situation in England and mental health services were made more accessible in rural areas, it would be anticipated that there would be increased utilisation and that if the more accessible services were targeted at early intervention for severe mental illness that this would improve mental health outcomes.

People living in rural communities have been found to have a lack of information on the mental health services available (Booker, 1993). It has also been concluded that there are more restricted services in rural areas (Green and Castellano, 1996). This is an important issue because it has been found early intervention is particularly important in mental health services as it results in a significantly lower likelihood of in-patient treatment being needed and a better prognosis for the future. Studies have shown that around one in ten of those with severe mental illness commit suicide and that around two thirds of these deaths occur in the first five years of illness (Wiersma et al 1998). Department of Health studies have concluded that the first few years of severe mental illness is when there is the highest risk of severe physical and social harm (NIMHE, 2003). There is also evidence that there are higher thresholds for admissions to mental health units in rural areas (Cuffel, 1994).

There is a strong link between physical illness and mental illness with more than 50% of GP patients that have a moderate or severe physical illness also having a mental illness, compared with less than one third of those who are physically well (Kisely & Goldberg 1996).

Issues impacting on rural health are not insurmountable as it would be possible to provide significantly more of the care in such a way that patients would not need to travel to specialist services (Baird 1999). Clinical services targeted at farming community based clinical services such as the two nurse practitioners and support worker appointed to provide targeted care to farmers have been found to be highly effective (Burnett and Mort 2001).

6.3 UNIVERSITY OF YORK REVIEW OF REVENUE ALLOCATION

6.3.1 Centre for Health Economics review of health need

The need formula was based on a study by the Centre for Health Economics at York University in 1994. The study used the national Hospital Episode Statistics (HES) to develop a model of health need based on utilisation rates at ‘small area’ level. HES data is based on Office of Population and Census Surveys (OPCS) codes of activity.

There are specific OPCS codes for each procedure. It is necessary to group the codes were grouped into similar procedures for analyses because of the large number of codes, for example there are 37 codes for coronary artery bypass grafts (OPCS, 2008). The OPCS Data was grouped by postcodes into 5035 areas and incidence of each type of procedure was used to calculate utilisation rates. The modelling and analyses included checking for endogeneity, use of Two Stage Least Squares and checking for heteroscedasticity (Carr-Hill et al 1994). The York study included an analysis of the national datasets of activity including finished consultant episodes, bed numbers and Hospital Episode Statistics (HES) data. It concluded was concluded that the HES data was the most representative by the York researchers and the advisors at the Department of Health.

The York study included a detailed review of data completeness. This was assessed by carrying out a comparison with a statistical return made by NHS trusts of activity called KP70. With the exception of North East and North West London the KP70 data and HES data were within 5%. There was no data for Rugby and so it was excluded from the analyses, as were 45 of the total of 4985 wards due to low utilisation rates.

The York study used procedure cost data from a previous study by the East Cheshire Statistical Analysis Consultancy to determine models for each service based on utilisation and cost. Analyses were carried out into a broad range of proxies and weightings to identify proxies that most closely matched the model for each service. It was concluded that the proxies selected reflected “unmeasurable social factors which could be equally successfully captured by other variables, so that the precise variable selected is less important” (Carr-Hill et al, Chapter 4,1994).

The York study included a detailed specification of the assumptions made as part of the study. There was an explicit assumptions that “utilization of NHS inpatient resources is a good predictor of need” and that the data from the East Cheshire was sufficiently robust. The York study states that “Moreover, no study using a methodology based on utilization can capture variations in health need that are not reflected in utilization”. (Carr-Hill et al,1994, page 137). The York study also concluded that that research was required to determine if utilisation was a reasonable predictor of need as detailed in the following paragraph.

> “This entire study was predicated on the assumption that utilisation of NHS inpatient resources is a good indicator of health care need. For many reasons, this assumption may be suspect. Some groups of the population may be systematically excluded from NHS sevices, while others may “capture” more NHS resources than their clinical need justifies. There is a clear need for research to establish whether utilisation is a legitimate predictor of need” (Carr-Hill et al,1994, page 138).

Concerns were noted in the York study about the quality of the HES data quality. The researchers sought “more detailed advice on the likely accuracy of the HES data”. Particular concerns were noted about the variation of lengths of stay variations between specialties and postcode “dumping” where patients with unknown postcodes were allocated to a random postcode (Carr-Hill et al, Chapter 4.3,1994). Concerns were also detailed about the potential for data from patients with a long stay distorting findings. It was concluded that “there are considerable problems involved in arriving at satisfactory measures of fixed and variable costs” (Carr-Hill et al,1994, page 64).

The study concluded that “The strong negative coefficients on density suggests higher utilization than expected in rural areas.” It then proceeds to state that “Again, therefore, this phenomenon was interpreted as reflecting residual supply characteristics not captured in our chosen supply variables. For example, there might be higher levels of unmet demand in urban areas than rural areas" (Carr-Hill et al,1994, page 87).

6.3.2 Critique of need formulae

The York study concluded that "the only method likely to yield significantly more robust and credible results than the present study is the use of long term cohort studies of individuals" (Carr-Hill et al, Chapter 4.3,1994). However it would have been possible to have had a greater focus on the development of a robust data, for example with a representative sample of health authorities and by modelling the impact of age, complexity and accessibility. It is also notable that research has been completed by other research groups in the development of allocation formulae for the other Home Countries and they have not adopted the same research methodologies.

The interpretation by the York study that the higher than anticipated utilization was due to a greater unmet demand in urban areas was at variance with the conclusions in the study that improved accessibility results in greater utilisation (Carr-Hill et al, Chapter 4.23,1994). It is also at variance with a considerable body of research on distance decay. The link between utilisation and accessibility had been widely researched when the York study was completed by, amongst others Haynes and Bentham (1979, 1982, 1986) and is covered in detail in Chapter 8. The studies showed that there was 'distance decay' whereby the less accessible a service the less likely it was to be accessed from research by Haynes and Bentham. Figure 6.5 uses data from the Haynes and Bentham study in 1982. It is clear from this analysis that there is a significant reduction in consultation rates. The largest reductions were for male patients aged under 5 where the reduction was 14.6%, male patients aged between 15 and 64 and where the reduction was 16.3%. However the patient group of greatest concern is the 65+ age group as they have the greatest utilisation of services. In this group the reduction was 9.6% for females and 8.8% for males. The York study included an in depth analysis of accessibility, however the subsequent treatment of distance decay in rural areas was unclear.

Figure 6.5 Relationship between GP consultation rates and the proximity of patients (derived from Haynes and Bentham 1982)

Age group	**Distance (Km)**	**Male attendances**	**Percentage of males attending compared to under 2Km total**	**Female attendances**	**Percentage of males attending compared to under 2Km total**
Under 5	<2	5.1	100	4.8	100
	2-5	4.6	90.2	4.5	93.4
	>5	4.4	86.3	4.1	85.4
5-15	<2	2.2	100	2.5	100
	2-5	2.0	90.9	2.3	92.0
	>5	1.9	86.4	2.3	92.0
15-64	<2	2.5	100	4.9	100
	2-5	2.4	96.0	4.4	89.8
	>5	2.2	88.0	4.1	83.7
65+	<2	5.2	100	5.7	100
	2-5	4.8	92.3	5.1	89.5
	>5	4.7	90.4	5.2	91.2

This study concludes that the higher utilization in rural areas was an indication that the model was not robust.

As detailed in Chapter 6 section 2, there was also research available at the time that indicated that there was under-presentation, in particular from some ethnic groups. Therefore the York modelling is likely to underestimate activity where services are inaccessible. This is likely to have a particular impact on rural areas and areas with ethnic minorities that under-present.

The York study details concerns about the treatment cost analyses from East Cheshire Statistical Analysis Consultancy, it states that “these calculations are based on the assumption that fixed and variable specialty costs are constant across age groups. Whilst this is unlikely, there was no alternative data source” (Carr-Hill et al, 1994, page 66). As detailed in Chapter 6 section 4 there was considerable research available at the time of the study that indicated that the incidence of, what are referred to as, complications and co-morbidities increases with age and that therefore cost inevitably increase with age. This is considered when the payment by results system was being developed. Dawson and Street (1998) from the Centre for Health Economics at York described how there would be higher payments for 120 group procedures for the elderly and for patients that had complications and co-morbidities. If the proportion of elderly were evenly spread then the approach would have been reasonable, however as shown by the analyses in Chapter 6 of this study, rural areas tend to have significantly more elderly than urban areas and that the percentage of the population over 65 and over 75 varies considerably between areas. As a consequence it is likely that the cost model that was applied did not reflect differences such as complexity and comorbidities, and the impact of age. It therefore appears that the lack of an age and complexity weighting may have led to an inaccurate model of health need.

The York study contained a critique of the quality of NHS data. Various steps were taken by the York researchers to improve the robustness of data including the truncation of lengths of stay over 1 year and exclusion of data from the health authority covering Rugby. The data quality issues of HES data in the late 1980s and early 1990s were also highlighted by a large number of other researchers including Lee et al (2002). It was cited as an issue in other reports from Centre for Health Economics at York University. It was concluded by Dawson and Street at York (1998) that, in the absence of financial incentives, hospitals were unlikely to invest in improving data quality. In a study by Söderlund and van der Merwe at (1999) at York concluded that multiple FCEs may be recorded by some hospitals when patients transfer from one department to another and that in other hospitals FCEs may not be fully recorded. Therefore it is possible that inaccuracies in the HES data may have meant that the health need model was inaccurate.

There was considerable focus in the York study (Carr-Hill et al, 1994) on completing comprehensive and complex statistical modelling. This study concludes that there should have been equal if not greater focus on ensuring that the underpinning assumptions had been thoroughly tested. If this had occurred then models could have been developed that would have made the health need model more robust. The lack of such rigour meant that it is possible that the health need model that underpinned the need formula was inaccurate.

6.3.3 Analyses of Health Episode Statistics

The earliest data available on the Hospital Episode Statistics website is from 1999/2000 and the latest year where the figures are presented in the same format is for 2005/06. If there were significant data anomalies in HES data it would be anticipated that there would be inexplicable differences in the numbers of procedures. Figures 6.6 and 6.7 detail the largest percentage decreases and increases in admissions. The complete list of procedures is given in Appendix 12.

No significant anomalies are apparent from an initial analysis of the data. A large increase in heart surgery would be anticipated over this period (Milburn, 2002) and the change to more outpatient and less invasive urological procedures would also be anticipated (Iyengar & Acheson 2008). Whilst this analysis supports the use of HES data by the York research team it does not give a definitive answer on the robustness of HES data. Analyses of the admission rates by consultant in the clinical specialties may be able to identify potential data anomalies. It is possible that analyses of data at ward and hospital level would identify significant anomalies. It is also possible that the 1990/1991 data used by the York study was less robust.

Figure 6.6 Hospital Episode Statistics - Procedures showing the greatest decrease in admissions 1999/2000 to 2005/06

Main operations	**Admissions 1999/2000**	**Admissions 2005/06**	**Change in admissions 2005/06 divided by 1999/2000**
AC1 Extracranial extirpation of vagus nerve (A27)	57	13	0.22807
KC1 Replacement of coronary artery (K40-K44)	10,717	3,422	0.319306
QB2 Open occlusion of fallopian tube (Q27-Q28)	678	224	0.330383
RC Other obstetric (R28-R34)	12,074	4,782	0.396058
AG1 Electroconvulsive therapy (A83)	4,843	2,026	0.418336
QB3 Endoscopic occlusion of fallopian tube (Q35-Q36)	40,354	18,133	0.449348
WC7 Open operations on semilunar cartilage (W70)	479	283	0.590814
PB Vagina (P14-P31)	59,587	37,142	0.623324
NB1 Excision of vas deferens (N17)	31,997	20,336	0.63556
LF Other arteries (L65-L72)	10,922	7,015	0.642282
QB Fallopian tube (Q22-Q41)	68,892	44,391	0.644356
AG Other parts of nervous system (A75-84)	26,806	17,288	0.64493
QA1 Operations on cervix uteri (Q01-Q05)	59,692	38,933	0.652231
QA3 Evacuation of contents of uterus (Q10-Q11)	141,272	94,795	0.671011
LD Abdominal branches of aorta (L41-L47)	3,226	2,181	0.676069
NB Spermatic cord and male perineum (N15-N24)	40,003	27,064	0.676549
QB4 Other endosocpic operations on fallopian tube (Q37-Q39)	2,638	1,886	0.714936
P Lower female genital tract (P01-P31)	80,770	58,764	0.727547
GB1 Excision of stomach (G27-G28)	1,902	1,389	0.730284
DC Inner ear and eustachian canal (D22-D28)	5,016	3,695	0.736643

Figure 6.7 Hospital Episode Statistics – Procedures showing the greatest increase in admissions 1999/2000 to 2005/06

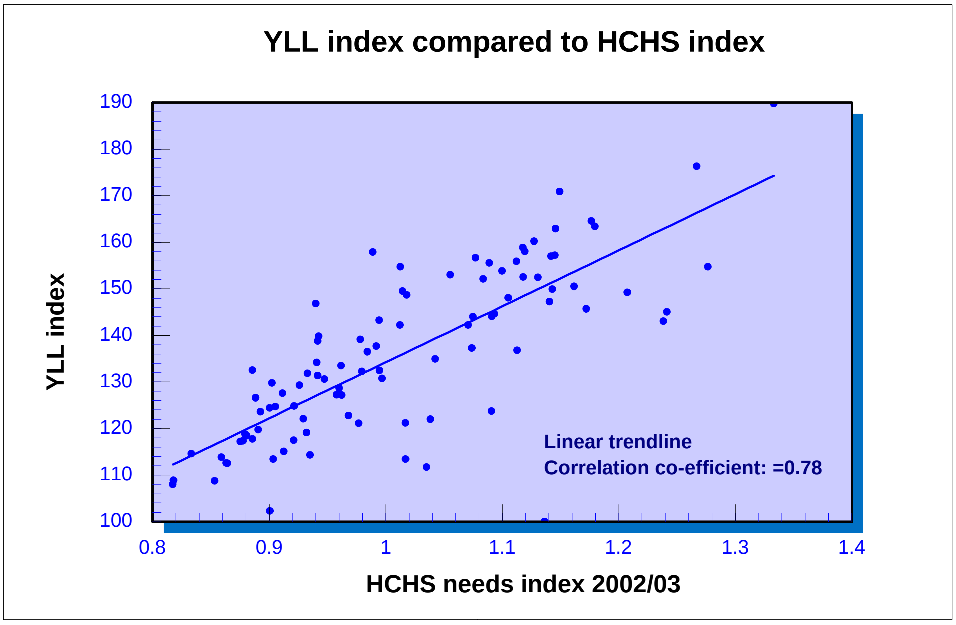
Main operations	**Admissions 1999/2000**	**Admissions 2005/06**	**Change in admissions 2005/06 divided by 1999/2000**
AF1 Release of entrapment of peripheral nerve at wrist (A61)	35,904	49,958	1.391433
FB2 Simple extraction of tooth (F10)	47,608	67,237	1.412305
KD Other parts of heart and pericardium (K52-K71)	117,919	169,196	1.434849
BC Other endocrine glands (B18-B25)	561	818	1.458111
K Heart (K01-K71)	161,804	242,197	1.496854
MA3 Endoscopic operations on kidney (M09-M11)	2,302	3,454	1.500434
QC Ovary and broad ligament (Q43-Q56)	19,806	30,544	1.542159
GA2 Operations on diaphragmatic hernia (G23-G25)	2,290	3,764	1.643668
VE Other operations on spine (V37-V50, V54)	27,573	45,378	1.64574
SA4 Suture of skin or subcutaneous tissue (S42-S42)	11,994	19,795	1.650409
KC Coronary artery (K40-K51)	36,016	63,599	1.765854
WC2 Total prosthetic replacement of other joint (W40-W45)	35,423	62,966	1.777546
VC Decompression operations on spine (V22-V27)	6,031	10,802	1.791079
KC2 Other bypass of coronary artery (K45-K46)	6,612	13,838	2.092861
MD2 Open excision of prostate (M61)	1,670	3,514	2.104192
XB1 Compensation for renal failure (X40-X42)	29,928	64,560	2.157177
XA2 Operations for sexual transformation (X15)	52	114	2.192308
WC4 Prosthetic replacement of other articulation (W49-W54)	3,061	7,329	2.394316
KC5 Heart operations (K49-K50)	18,616	46,030	2.472604
KC3 Transluminal operations on coronary artery (K49-K51)	18,656	46,304	2.48199

6.4 YEARS OF LIFE LOST INDEX

6.4.1 Rationale for index

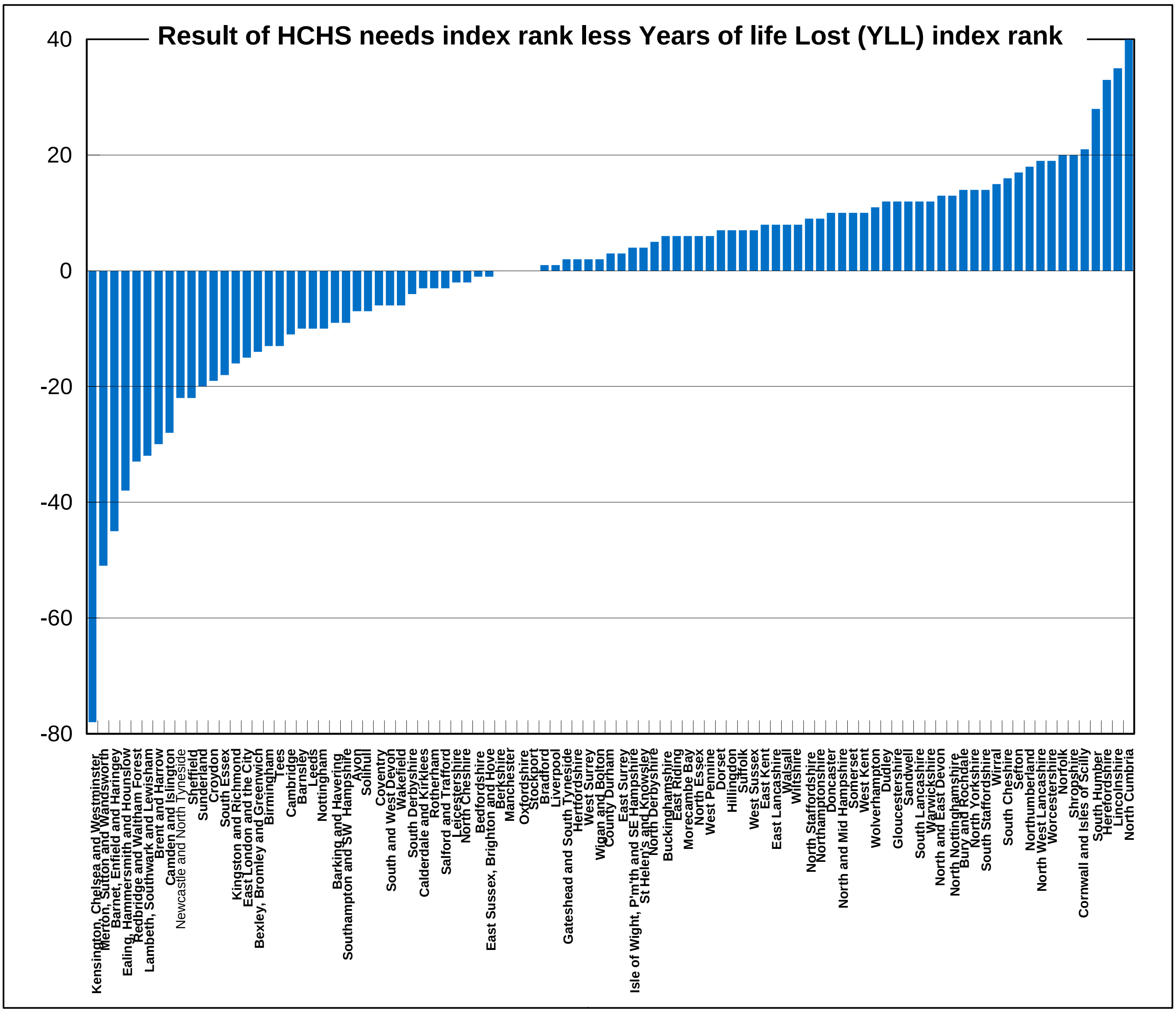
The Years of Life Lost Index (YLL) was introduced to adjust allocation based on health inequalities. There is a positive correlation between YLL and the HCHS of 0.78, indicating that the areas that received the greatest weighting for need using the HCHS index were more likely to have a higher rating for YLL.

Figure 6.8 Correlation between Years of Life Lost and HCHS indices



There were however a number of health authority (HAs) areas where there was a significant variance from the regression line. The rank of HAs was subtracted in the YLL index from the needs index rank in the HCHS formula so that the outlying HAs could be identified. The most notable results were for HAs in London and rural areas. Kensington, Chelsea & Westminster; Merton, Sutton & Wandsworth; and Barnet, Enfield & Haringey are HAs that received a significantly higher weighting in the HCHS index than the YLL index. North Cumbria, Lincolnshire and Herefordshire were the three HAs that had a significantly lower weighting in the HCHS index. It appears clear from this analysis that the HCHS index was overcompensating urban areas, in particular HAs in London and resulting in under resourcing of rural areas.

Figure 6.9 HCHS index minus YLL index



6.4.2 Critique of YLL system

Ensuring that differences in health need are adjusted in the resource allocation formula is a principal aim and the YLL had a significant advantage over HCHS in that it was directly related to actual health outcomes rather than proxies. However this raised concerns about the way that the index was applied. There was no adjustment within the index for the scale of the health inequality. The average adjustment for a health authority was £1.7 million and there was a cut off rather than a gradual tapering. This resulted in South Derbyshire which had an index of 132.46 i.e. 0.32 lower than Herefordshire, receiving no YLL adjustment.

It is believed that the approach would have been more robust if the standard approach for weighted capitation had been applied whereby the adjustment would have been proportional to the YLL index rather than ranking. Adopting this approach would have resulted in the area with the lowest YLL index receiving no YLL adjustment and all other areas receiving a proportionate share of the resources available based on their YLL index.

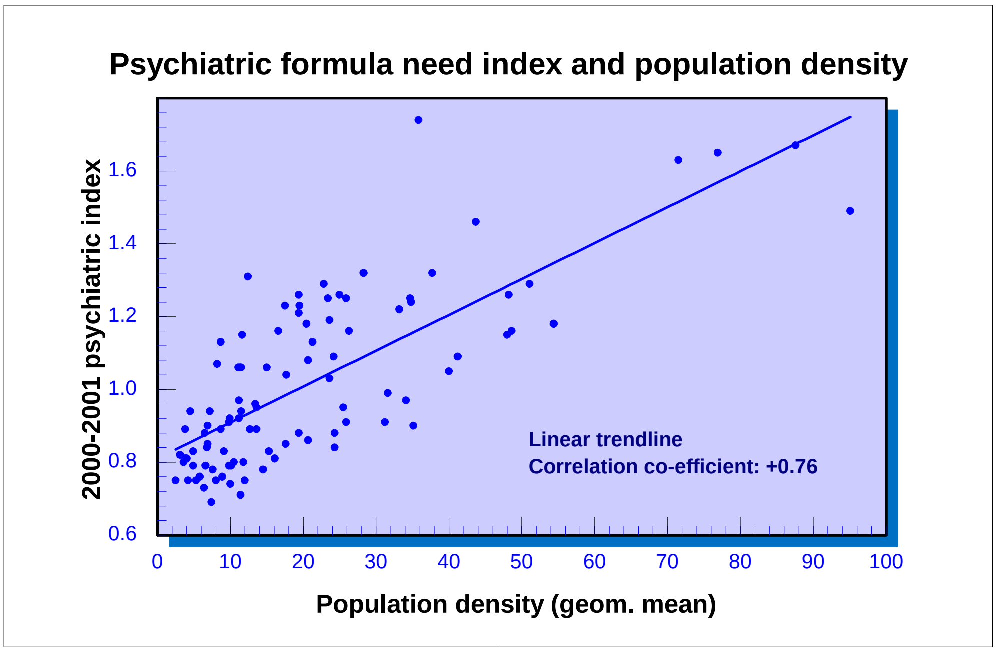
6.5 MENTAL HEALTH

6.5.1 Analyses of the impact of the mental health adjustment

The mental health need index was based on the proportion of those of pensionable age living alone; the SMR for those aged under 75; the proportion of persons in lone parent households; the proportion of households where head of family was born in the new commonwealth; the proportion of dependants in no-carer households; and a reduction based on the proportion of the adult population that is permanently sick.

Analysis was carried out on the relationship between the need index and the GMD measure of rurality. The result is shown in Figure 6.10, which shows that there was a significant correlation of +0.76 between the adjustment and GMD. It is clear from this analysis that the formulae were heavily weighted towards urban areas. The community psychiatric weighting was over 175 for Manchester, Lambeth Southwark and Lewisham, Camden and Islington and under 75 in North and mid Hampshire, East and West Surrey, and Cambridge and Huntingdon. This scale of difference in the need for mental health services is not supported by published studies. The reason for the difference was that the indices used were: no car, marital status, lone parent families and the SMR for the under 75 age group. However it is important to note that this does not necessarily mean that the funding was directed towards mental health as the resources were not ring-fenced.

Figure 6.10 Comparison of the psychiatric formula needs index and GMD

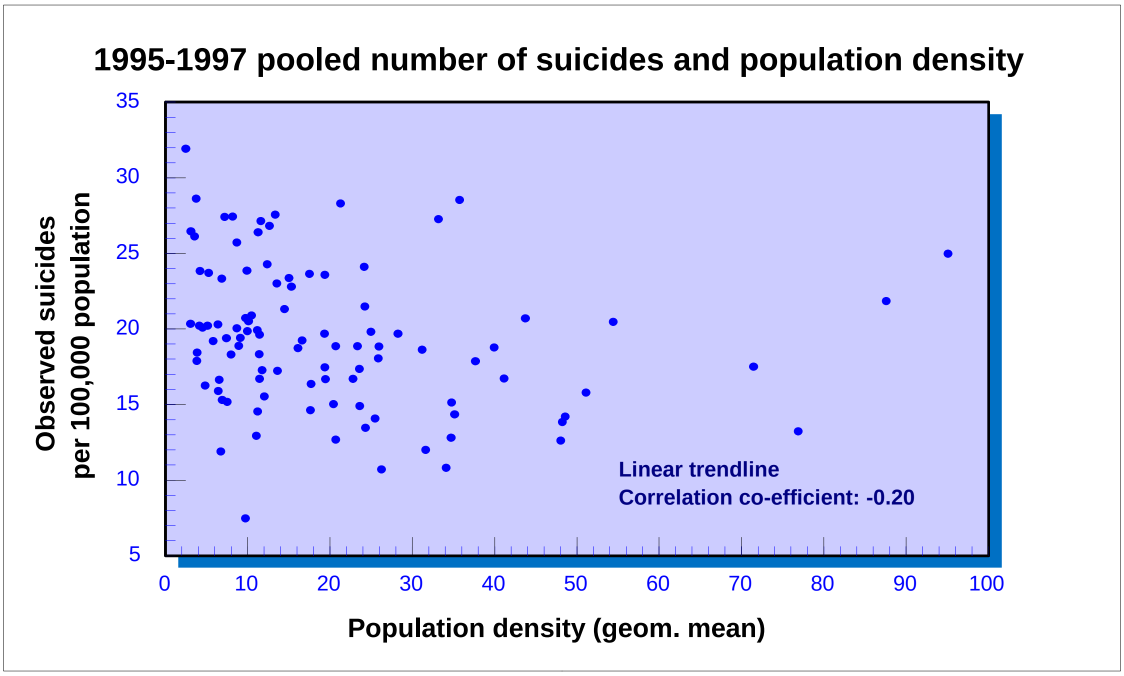


Suicide rates are used as a key indicator of the effectiveness of mental health services. However it has been found that only one quarter, approximately 1200, of the people that commit suicide each year have been in contact with mental health services in the preceding year. In addition it has been concluded that only 22% of these suicides would have been preventable, although it was concluded that there would have been lower risks in approximately three quarters of the cases (NCI, 2005). As suicide is an indicator of mental health and the mental health indices are intended to adjust for differences in mental health needs there should be a higher suicide rate in areas that have the largest adjustment. However as is shown in Figure 6.11 this is not the case as there is no significant difference. More sophisticated statistical techniques may conclude that the distribution is 'U' shaped, however suicide rates are not significantly higher in urban than rural areas. It could be asserted that this is because the adjustment is being effective and that increased expenditure is equalising suicide rates. However this argument is untenable because the majority of suicides are for those that are not in contact with mental health

Whilst there may be some link between the proxies used for mental health allocations in HCHS and the incidence for mental health services the use of the proxies was not based on published research and robust statistical analyses.

services.

Figure 6.11 Comparison suicide numbers between 1995 and 1997 with GMD



6.5.2 Critique of mental health analyses and further work required

The analyses that have been completed are simple and use readily available data. More information may be available from using more complex statistical analyses or by using statistical techniques to identify and exclude unreliable data. However such analyses have not been carried out as the analyses completed provided sufficiently clear results for the purpose of this research.

It is possible that people committing suicide in rural areas have not accessed the mental health services that they needed. Further analyses of more comprehensive and robust data could be used for the analysis of suicides. This may be of particular use in reducing suicide rates.

Additional detailed research on the incidence of severe mental illness in rural areas would be of considerable benefit to the NHS. It appears clear from other studies that there are a significant number of people in rural areas who are not receiving the mental health services that they need. Studies that quantify this and identify ways of finding such people would help ensure that early intervention is provided and this in turn could improve the prognoses of the mentally ill in rural areas and reduce the levels of suicide. As shown rates are at particularly high levels in some rural areas and there is currently no clear programme to address this important issue.

Co-morbidity is a complex area and has not been covered in this study because robust data was not readily available. It is possible that co-morbidity where a patient has a physical and mental health issue is not additive but multiplicative in terms of the care required. If there was a compounding effect this was not taken into account in the allocation formulae. Multiple regression has been used in studies underpinning the formulae but these are by nature additive rather than multiplicative and it is possible that the impact of co morbidity has a greater impact than the sum of the parts. Research and analyses of the types and seriousness of the mental illness of those with physical illnesses may help clinicians improve the treatment and care of those affected. It is not clear what the causative link is, if any, between many forms of physical illness and mental illness or vice versa. If this was rigorously researched it may be possible to identify profiles of patients that are at an avoidable risk of developing either mental or physical illness as a result of their primary condition. Increased research into co morbidity areas that have not received focus may also identify areas where patient care and prognosis could be improved.

6.6 AGE ADJUSTMENT

This section covers the adjustments made to the English HCHS formula to compensate for the costs associated with different age profiles. The section includes the following: a detailed comparison with the system developed as part of the Arbuthnott Index for Scotland; the use of services in Cornwall by different age groups; and the impact of the formulae, in particular on rural areas.

6.6.1 Studies detailing the increasing need for healthcare with age

There is a considerable body of evidence detailing the positive correlation of increasing age with a wide range of illnesses. Research has shown that some mental illnesses increase with age. Organic disorders, depressive conditions and neuroses are all higher in women than men. The prevalence rates for those aged 65 and over have been found to be 4.7% for organic disease such as dementia that relate to the structural pathology of the brain and central nervous system, 2.5% for neuroses and 10.0% for depressive conditions. It is clear that organic disorders increase with age, however it has been concluded that neuroses and depressive disorders do not increase (Saunders et al 1993). Mental illness in the elderly is frequently associated with the loss of the capacity to live independently. The increasing age of the population when linked to the increase in organic mental illness with increasing age will result in a greater need for resources to provide care for the elderly with mental illness (Livingston and Hichcliffe 1993).

The incidence of key cancers including those of the pancreas, stomach, rectum, urinary tract, lung, breast and prostate all increase significantly after the age of 55 with the incidence for people aged 80+ being over three times that of people aged 50 to 59 (Balducci and Lyman 1997).

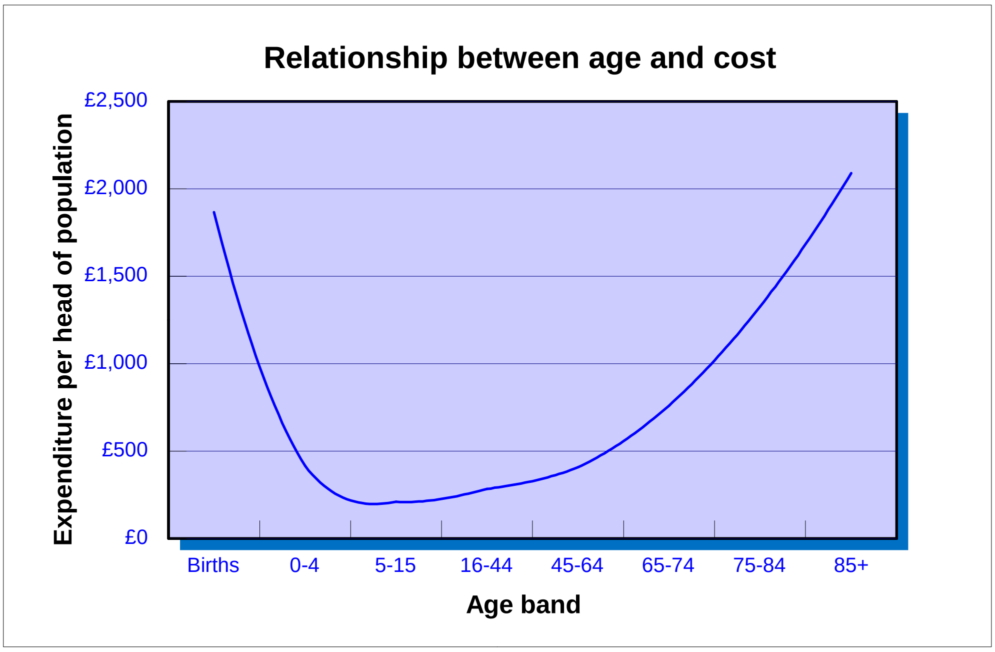
A significant proportion of the elderly have relatively low incomes compared to population of working age. The cessation of the linking of pension increases to average salary increases exacerbated this position. It has been concluded that this differential will lead to a more significant difference in the accessibility of healthcare services (Fowlie and Winner 1991).

The incidence of comorbidities has been found to be directly correlated to age (Yancik et al 2007) and in a wide range of conditions including lung cancer (Ludd et al, 2003). Providing care where there are comorbidities is more complex and as a consequence has a higher cost. As a result it would be anticipated that there would be a greater cost for areas that have a higher proportion of elderly.

6.6.2 HCHS profile of cost and age

The allocations were adjusted by a factor that was intended to compensate for differences in the cost of providing services to different age groups. The major users of the health service are those under the age of 5 and over the age of 65. This is acknowledged in the guide to the resource allocation formula and is shown in Figure 6.12.

Figure 6.12 HCHS cost curve relative to age (derived from DH, 1997)



6.6.3 Age Adjustment in Arbuthnott Formula

The results of the analyses of the relationship between age and NHS cost are fundamentally different from that found in the detailed study in Scotland. The "Fair Shares for All" study found that the elderly use the health service significantly more and the resulting costs of providing healthcare to this group are consequently considerably greater than other age groups.

In the Scottish acute formula the ratio of costs for the 85+ compared with the lowest cost group is 17:1 in the English HCHS formula the ratio is 9:1. Figures 6.13 and 6.14 are derived from the "Fair Shares for All" report and illustrate the male and female cost curves for the main service groups. The costs for ages 5 to 64 were comparable as were the costs per birth which varied in 1996/7 between £2000 for the average birth where the mother was aged 30-34 and £2930 for those aged 45-49.

Figure 6.13 Cost curve relative to age for males in "Fair Shares for All" report

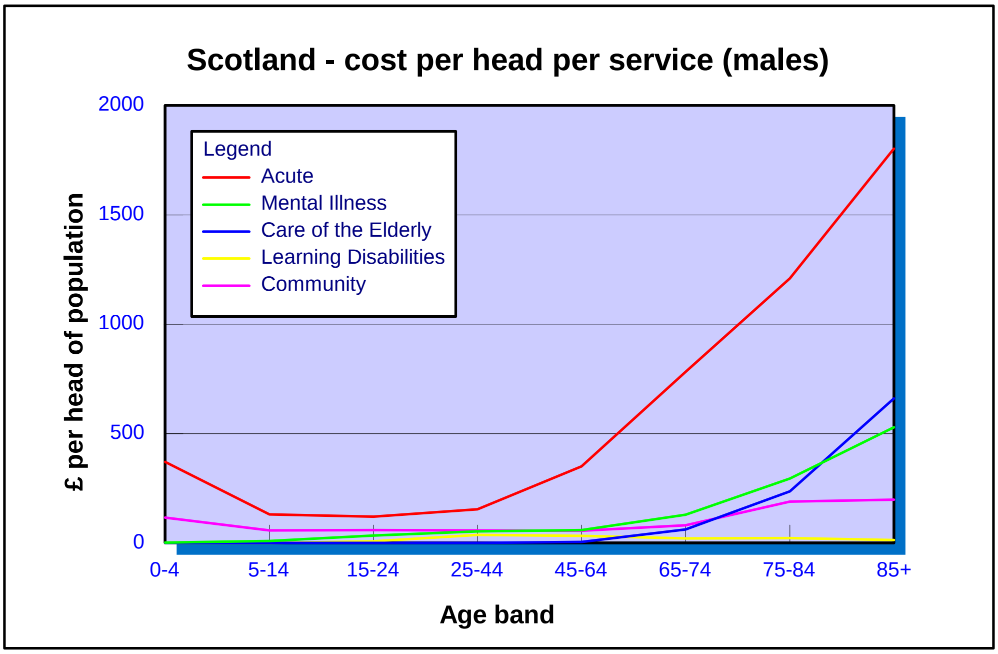
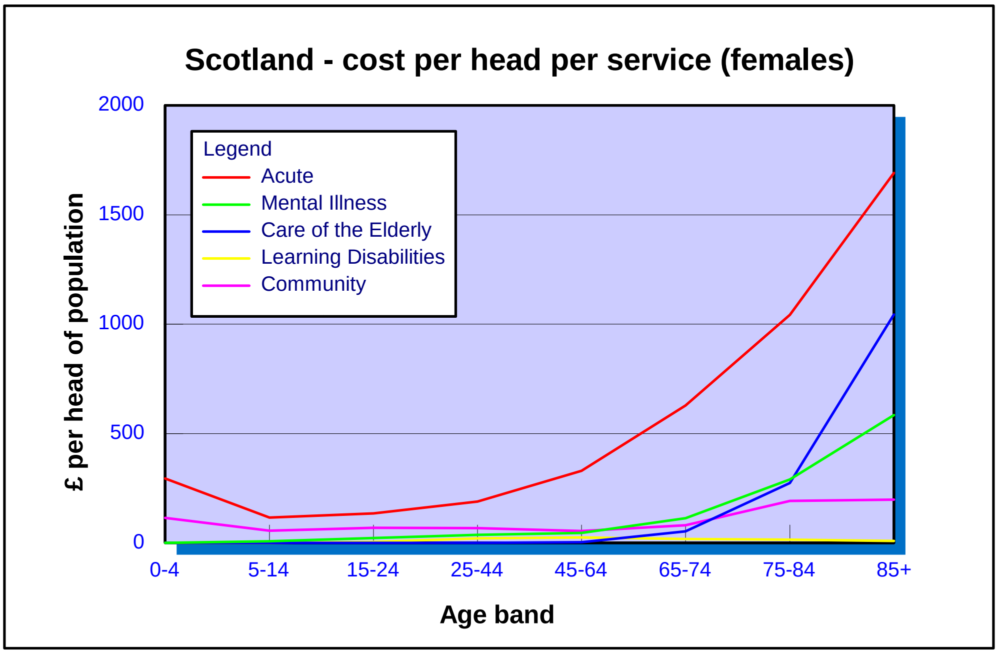


Figure 6.14 Cost curve relative to age for females in Scottish formula

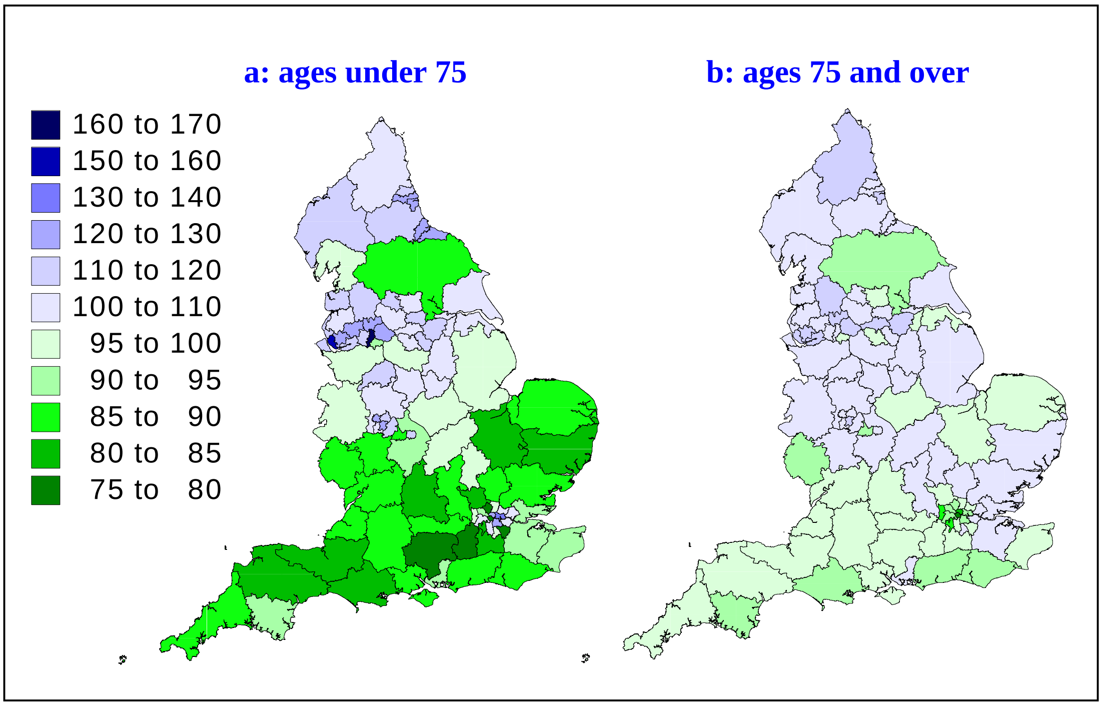


The Barnett Formula results in Scotland receiving more per capita than England however this is insufficient to explain this large difference in costs.

6.6.4 Standardised mortality ratios comparison of under and over 75

Standardised mortality ratios (SMRs) were a key component on the need adjustments. The formulae all used the SMRs for the under 75 age group. It is apparent from the presentation of the SMRs in Figure 6.15 that there are significant differences between the SMRs for the under 75 and over 75 age groups in a large number of many areas including Suffolk, Cambridgeshire, Somerset, North and East Devon, Oxfordshire, Cornwall, Buckinghamshire and Essex. It is also apparent from this presentation of the figures that the differences in SMRs are significantly greater in the under 75 age group than the over 75 age group. Ward et al (2004) concluded that for coronary heart disease there was no association with the healthcare need and prescription rates.

Figure 6.15 Comparison of the SMRs for the under and over 75 age groups



As detailed the HCHS adjustments acknowledge that healthcare is predominantly utilised by the very young and the elderly. The use of SMRs for an age group that are not the principal users of the services is counter-intuitive. The significant difference in the SMRs for the under 75 and over 75 age groups resulted in a reduction in the allocations for areas that had relatively healthy under 75s despite the fact that the SMRs for the over 75s are relatively similar across England. It is apparent from a consideration of Figure 6.15 that a significant number of rural areas are negatively impacted by the utilisation of the SMR for the under 75 age group.

6.6.5 Analyses of the association between rurality and age

Analyses were carried out on the geographical differences in the over 65 and over 75 age groups, plotting the percentages in each case against GMD. These analyses indicate that rural areas tend to have a significantly greater proportion of the elderly than urban areas. As shown in Figures 6.16 and 6.17 it is also evident that the relative differences between areas in age profiles have increased as the correlation coefficients increased from 0.57 in 1998 to 0.60 in 1999 and 0.62 in 2000 for those aged over 65. There was been a similar increase in the correlation for those aged over 75 where the correlation has changed from 0.48 to 0.54 over the same period. The increased number of elderly in rural areas compounds the impact of the utilisation of the SMR for the under 75 age group.

Figure 6.16 Comparison of percentage of those aged 65+ with GMD (2000)

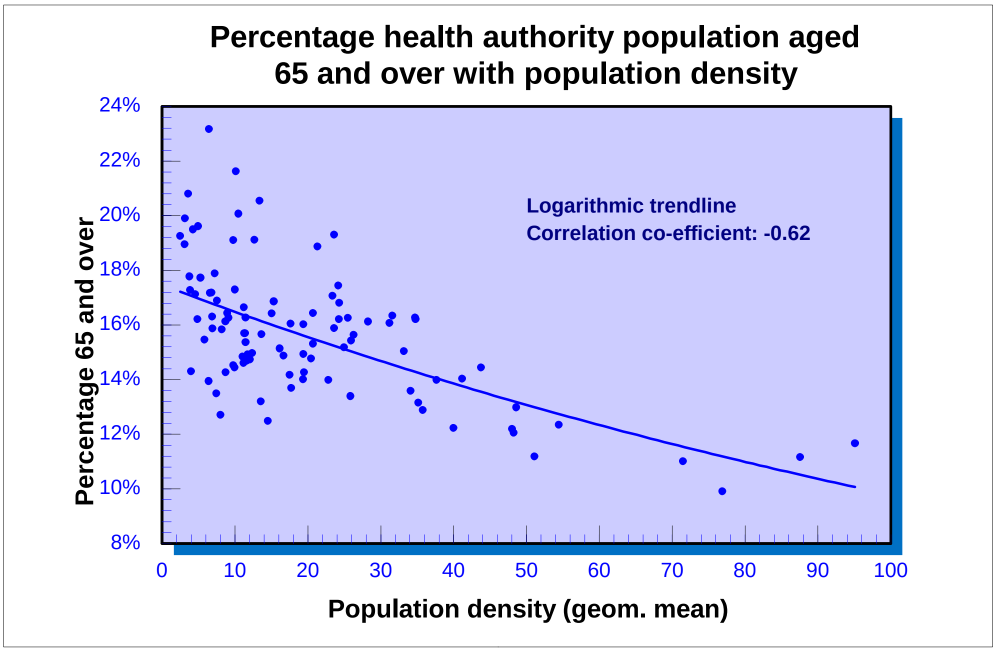
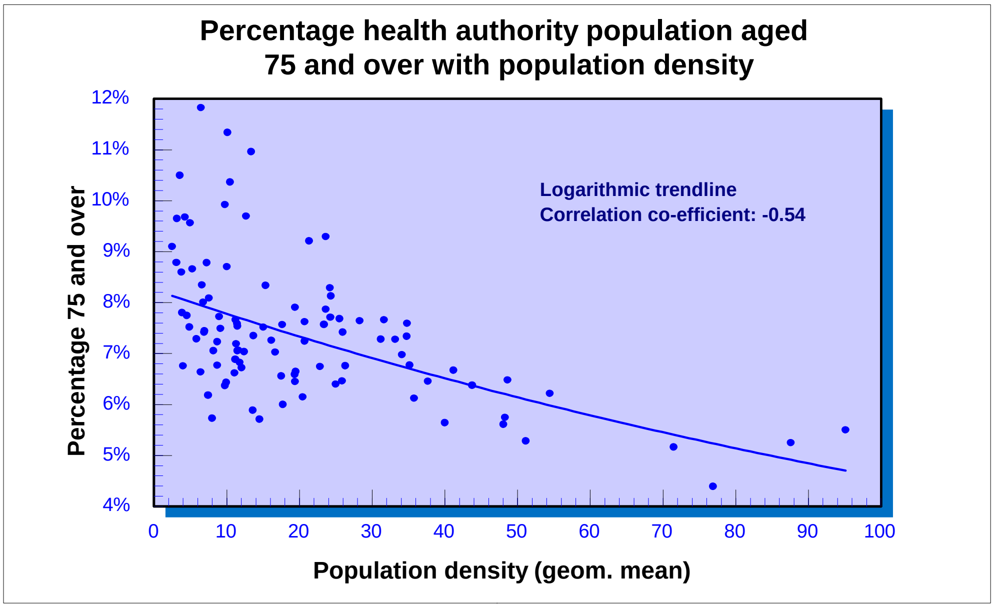


Figure 6.17 Comparison of percentage of those aged 75+ with GMD (2000)



6.6.6 Analyses of chiropody and district nursing need by age in Cornwall

The greater health need of the elderly is evident when the age profile of patients visited by community staff such as district nurses and chiropodists is considered. Community activity data was collected by staff in Cornwall on palmtop computers. This data was used to analyse the activity of groups of staff and relate this to factors such as age. These analyses showed that 74% of chiropody activity in Cornwall was with patients aged 65 and over. The usage pattern is shown in Figure 6.18. The numbers of contacts decrease at later age groups because of the smaller number of patients of ages over 80. Figure 6.19 shows that there was a similar pattern in the need for district nursing services as 83% of district nurse activity in Cornwall was with patients aged 65 and over.

Figure 6.18 Chiropody treatments according to age in Cornwall 1999 to 2000

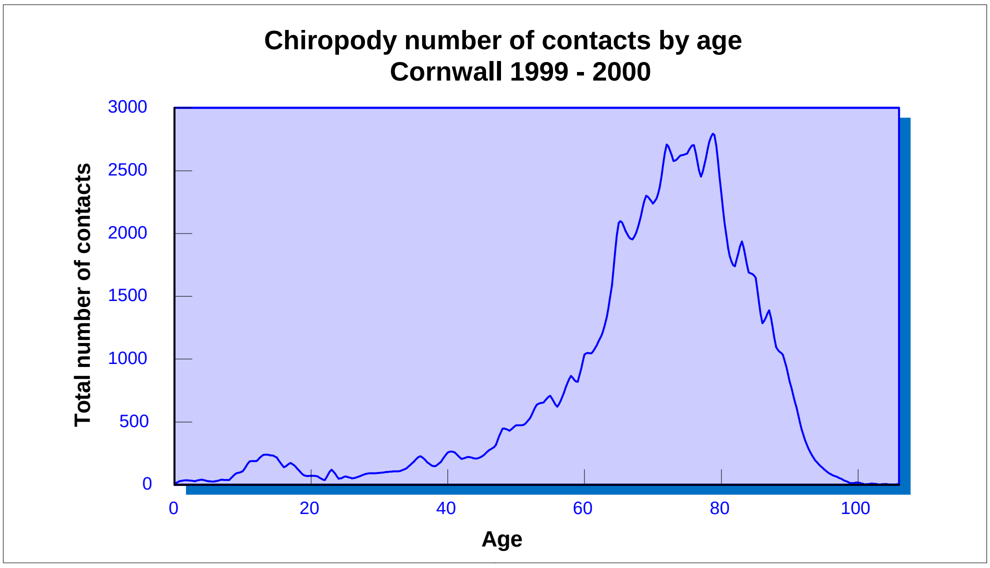
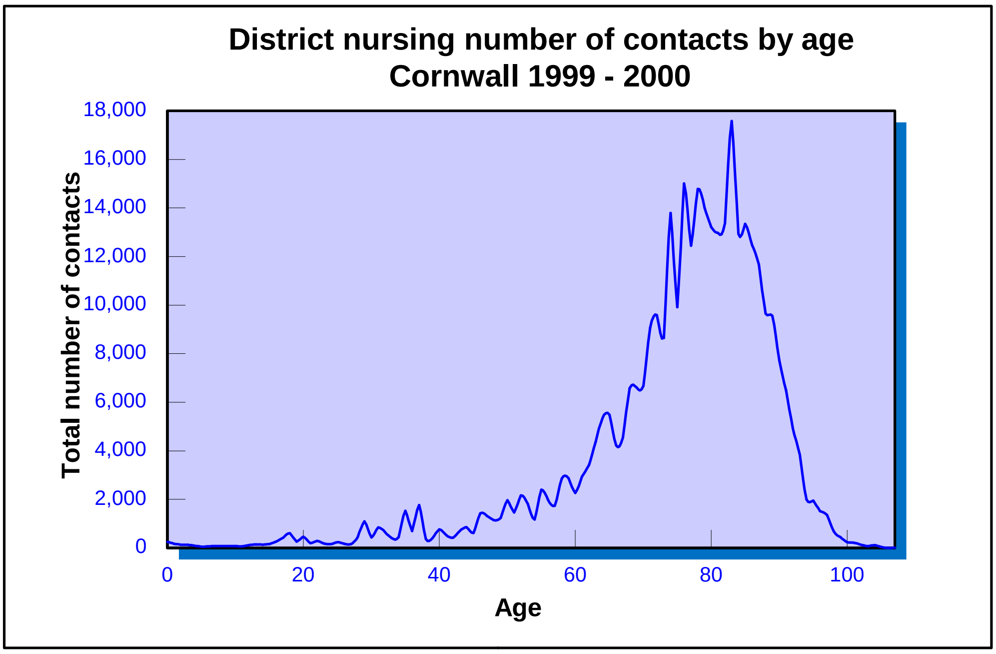


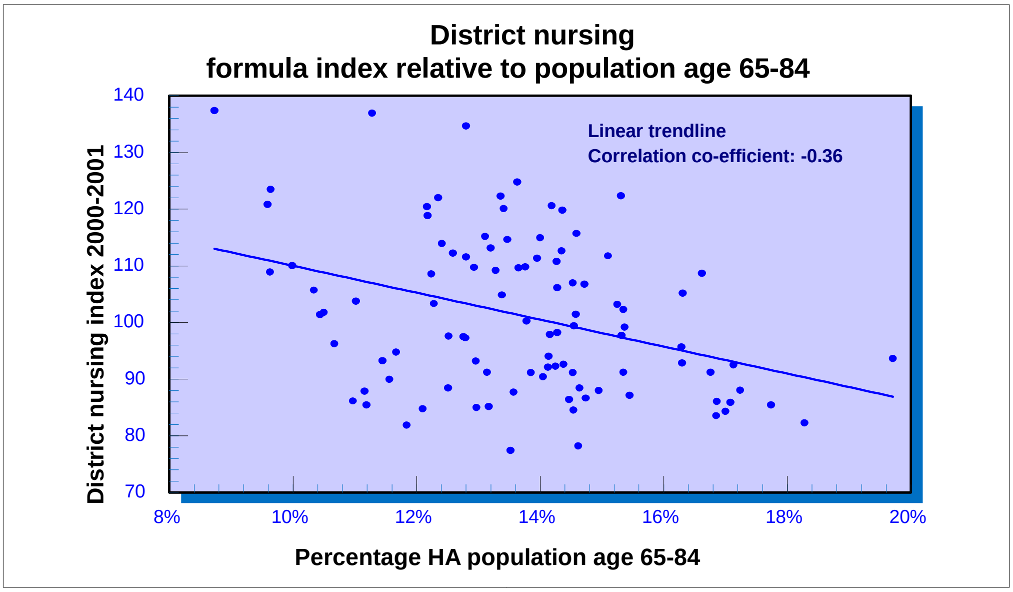
Figure 6.19 District nurse treatment according to age in Cornwall 1999 to 2000



6.6.7 Impact of age formulae on rural areas

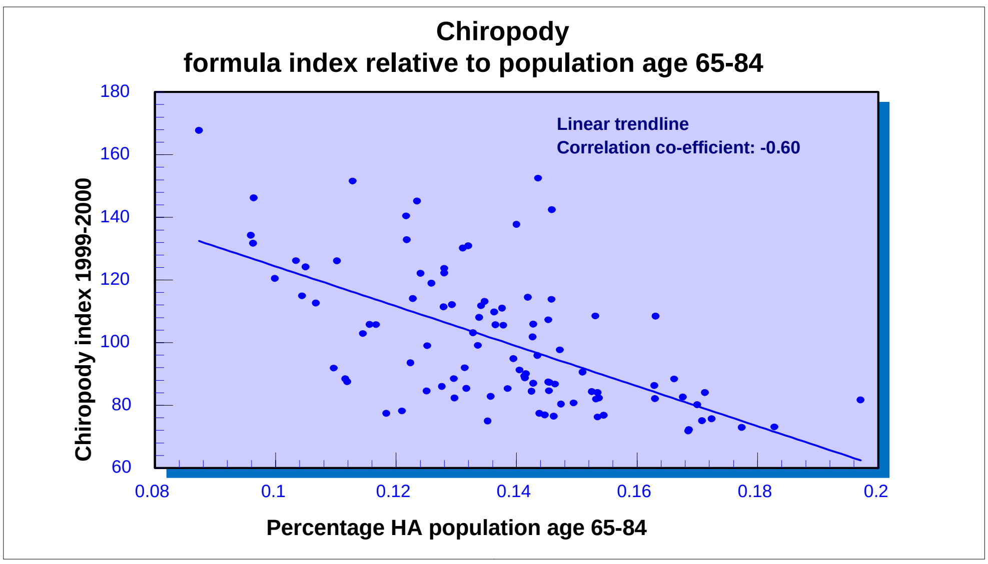
Analyses were carried out of age and need assessments to identify the relationship between the need assessment by the formula and the number of elderly. The results of these analyses are shown in figures 6.20 and 6.21. Any areas with an index above 100 receive increased funding and below 100 have their funding decreased. It is clear from these analyses that the areas with the highest proportion of elderly have their funding decreased. The correlation coefficient of -0.36 indicates greatest need weighting from the district nursing and chiropody formulae tended to be for areas with a lower proportion of elderly people.

Figure 6.20 Comparison of district nursing formula with % aged 65-84



Analyses of chiropody services show that the adjustments resulted in areas with the greatest proportion of elderly receiving under half of that of the areas with the least number of elderly. Therefore the smaller scale of the age adjustment means that it is more than outweighed by the need index.

Figure 6.21 Comparison of chiropody formula with % aged 65-84



6.6.8 Critique of system

Standardised Mortality Ratios (SMRs) are used in most of the formulae. One key area of merit is that SMR data is readily available and reliable, however they are not ideal for use in formulae used to determine the relative health of areas as cause of death is an important factor when considering the healthcare costs of treatment. A chronic, terminal condition is likely to be very much more costly than, for example, a fatal drug overdose or fatal road traffic accident. As a result, SMRs may not accurately reflect the costs to the health service.

Most of the 'need' formulae use SMRs and in each case the age group selected is the under 75 age group. This means that the death rates of those aged over 75 are ignored in the formula. One case propounded for excluding those aged over 75 is that there are difficulties in determining cause of death. If the death rates for specific ages or disease types were used in the allocation formulae then this approach would have some basis, however analyses of this type are not included in the formulae. Therefore there is no readily apparent reason why this should preclude the use of the data for the over 75s from the formulae. Indeed excluding the age group that use services the most appears counterintuitive. This is of particular importance because of the significant differences that are apparent between the SMRs of the two age groups. The use of the SMRs for the under 75 age group is not consistent with the aim of the allocation formula of adjusting the funding for areas to compensate for differences in need because the SMR selected is for the section of the population that have a lower utilisation of the majority of health services.

Figures 6.18 and 6.19 show that 43% of the need for chiropody and 62% of the need for district nursing in Cornwall was in the over 75 age group. This was an important issue because there were major differences in the SMRs for those aged under 75 and over 75 as shown by consideration of figure 6.15. It is believed that it was unreasonable to exclude the SMR for the age group that use services the most. Indeed it would appear, *prima facie*, most reasonable to use the SMRs for the age group using each service in the formula or to use the average SMRs for all age groups.

6.6.9 Critique of analyses

It is not clear from the analyses completed what the district nurses and chiropodists are doing including the complexity of the work. The relationship between district nursing and rurality was not as strong as for chiropody. It could also be concluded that the proportion of the adjustment that relates to community services is 11.03% and therefore even if the formula is not robust for these services that this would only have had a modest impact on allocations. It could also be argued the analyses showing the areas with the greatest proportion of elderly receive the lowest adjustments for need were not critical because there was an adjustment for age. However it is clear that each element would have needed to have been as robust as possible.

6.6.10 Further research

Further research on the use of SMRs for under 75s would determine whether or not the use of this factor is appropriate. This could be completed by carrying out analyses of how workload varies in areas with significantly different age profiles. The workload in terms of patients seen or a similar measure could then be plotted against the SMR for the under 75 and the over 65. If the formula is robust there should be a positive correlation between patients seen and the SMR for the under 75s. The hypothesis is that there would be a negative correlation, but a positive correlation between and SMR for 65+ and the patients treated.

6.7 PRIVATE HEALTHCARE

There was no adjustment for private healthcare in the allocation formula. An adjustment would be justified if there was a significant difference in the level of private health insurance and this had a consequence on the utilisation of the NHS care. The potential impact of private healthcare received relatively little attention. In theory in areas where there is a high level of use of private hospitals the NHS will not have to provide the services.

6.7.1 Laing and Buisson surveys

The Health Minister, John Denham asked for a review of the resource allocation system in 1998. As part of this review he asked for the impact of the private sector to be determined. No papers or reports have been published on the impact of the private sector by the Department of Health or the Advisory Committee on Resource Allocation.

Data from the Laing and Buisson survey (2001) indicates that in 2000 6.88 million of the population had private medical insurance. This is over 12.5% of the population, with claims of £1.93 billion, and as a result it may be a significant factor in resource allocation. The Laing and Buisson figures from 2002 were that 6.71 million people were covered and that 0.85 million were covered with non-insured schemes and that the value of the claims had increased to £2.2 billion.

It should be noted that exclusions to insurance cover and limitations to the private healthcare service, in particular for emergency care mean that it cannot be assumed that those with private medical insurance had all of their potential healthcare needs provided. However it would be counter-intuitive for there not to be a greater reduction in the need for NHS care where a larger proportion of the population have private health insurance.

Clearly it would be expected that it is less likely that those living in the poorest areas would have private health insurance and that it would be greatest in areas with the highest incomes, including parts of Inner and Outer London, Hertfordshire, Surrey, Sussex, Berkshire, Buckinghamshire and Oxfordshire. However the link between affluence and private health insurance may not be as strong as that envisaged because of the proportion of the insurance that is provided by companies. The survey also indicated that 4.79 million of those with private medical insurance have it provided by employers with 2.09 million having personal schemes. The complexities of this area mean that a study would have been necessary to determine the relationship between health utilisation and private health insurance. With the scale of any adjustment depending upon the impact of this on the work carried out by the NHS.

In the Carr-Hill et al report (1994) two hypotheses were given on the private hospital beds, the first was that they are substitutes for NHS hospital beds and the second is that they only complement. Other research has indicated that an expansion in private care appears to result in an increase in the average dependency of the patients treated by the NHS (Martin & Smith 1996).

It is also unclear what will happen to the private health sector if the NHS meets waiting time targets and shortens waiting times to 18 weeks for operations and less time for the more urgent interventions like suspected cancers. It may be that the private health sector will be more robust due to obtaining contracts that assist in the target of reducing waiting times or it may be that individuals and companies see less benefit of private health insurance. It is likely that patients will be less willing to pay for private healthcare unless there is a significant quality difference such as lower rates of MRSA.

6.7.2 Research required

It would be anticipated that if there is an impact the most significant would be for routine elective interventions carried out by the NHS such as hip replacements. Analyses of the numbers of specific routine operations carried out per 100,000 population, adjusted for need and age may indicate if there was an impact.

A more direct approach would be to identify the treatment received and if this treatment would have been provided by the NHS then the national tariff rate for the treatment could be subtracted from the primary care allocation for the area. This allocation could be used for initiatives to target health inequality.

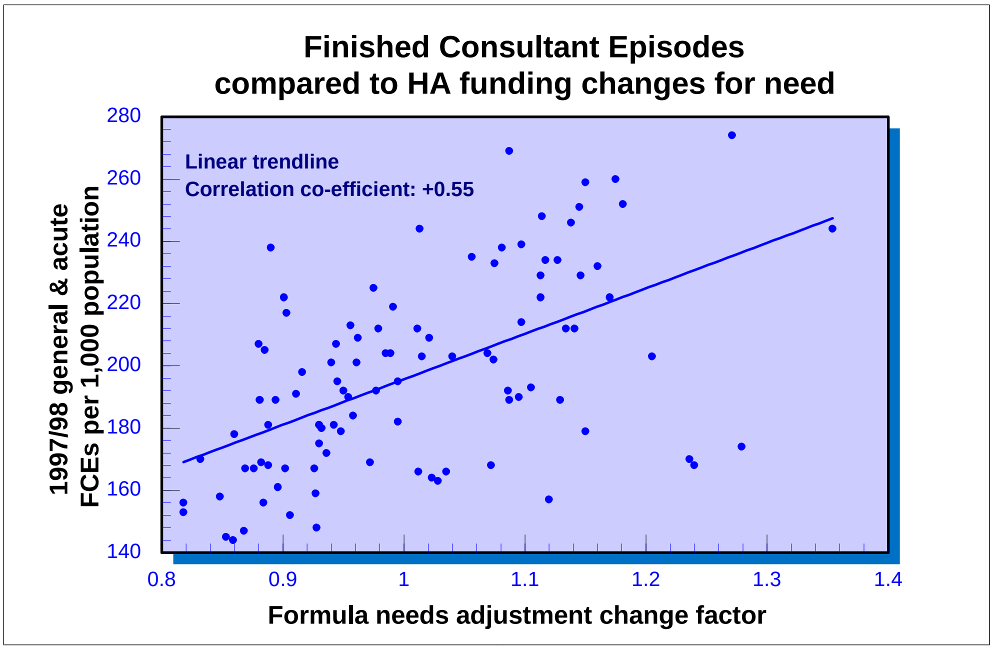
6.8 ANALYSES OF THE NEED ADJUSTMENTS

6.8.1 Factors used in Need Indices

A detailed review of the individual health authority areas and the individual factors used in need adjustments is of interest. The impact of the factors is only clear when considered at this level of detail. Key factors used in the indices are car ownership, the proportion of persons living in lone parent households, proportion of persons aged 18+ with some qualification, proportion of dependants in single carer households, persons of pensionable age living alone, and the proportion of dependants in no carer households. The impact on rural areas of using car ownership as a measure of deprivation results in an underestimate of the deprivation in rural areas as car ownership is inevitably higher in rural areas because of issues like a generally less well developed public transport system.

It would be anticipated that the formulae, which have an underlying principle to adjust for differences in the need for healthcare, would increase the allocation to areas with high levels of poverty. As many of the formulae include factors that are proxies for poverty there should be a strong correlation between the overall need adjustment in the allocation formula and the amount of acute care provided. One measure used to assess workload is Finished Consultant Episodes (FCE), these are the point when the treatment provided by a consultant is deemed to have ceased.

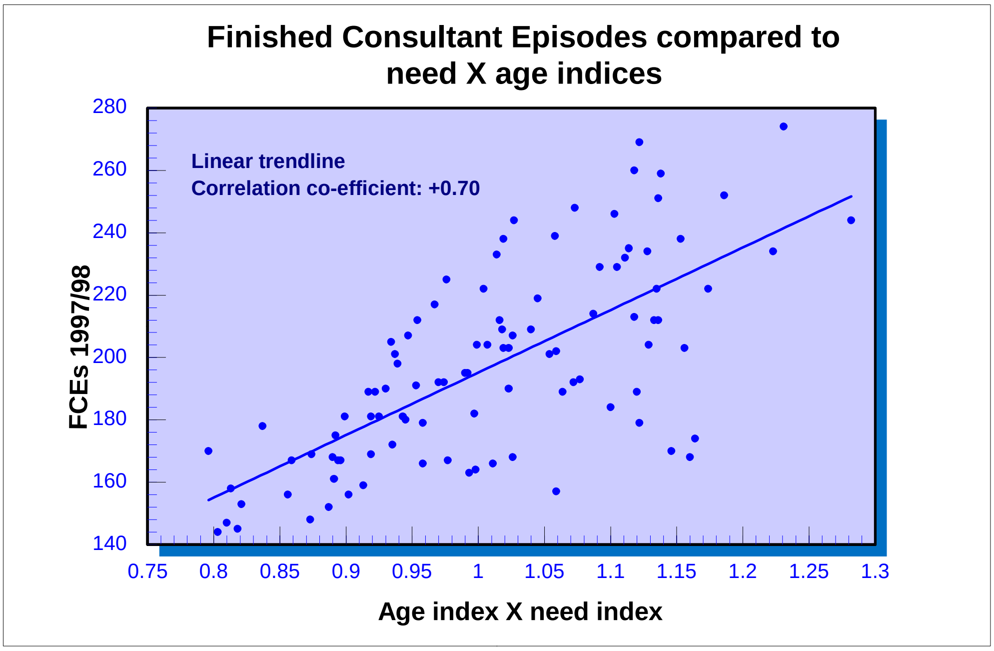
Figure 6.22 Comparison of FCEs and need adjustment



Whilst they are a widely used measure of activity, analyses based on the figures have to be treated with care because of the differences that exist in the way that FCEs are measured. Despite this variation the large amounts of data mean that, it is still possible to gain useful information from analyses involving FCEs. Analyses of the need adjustment and FCEs indicate that there is a positive correlation. As shown in Figure 6.22 as funding increases the number of FCEs tends to increase.

As detailed previously age is an important factor in the need for healthcare services. Therefore including this adjustment in the analysis should increase the correlation. Analyses have showed that this was the case as adding in the adjustment made for age the correlation between age and need, and FCEs increases from 0.55 for need alone to 0.7 when age is included, as shown in Figure 6.23

Figure 6.23 Comparison of FCEs with a composite of the need and age indices



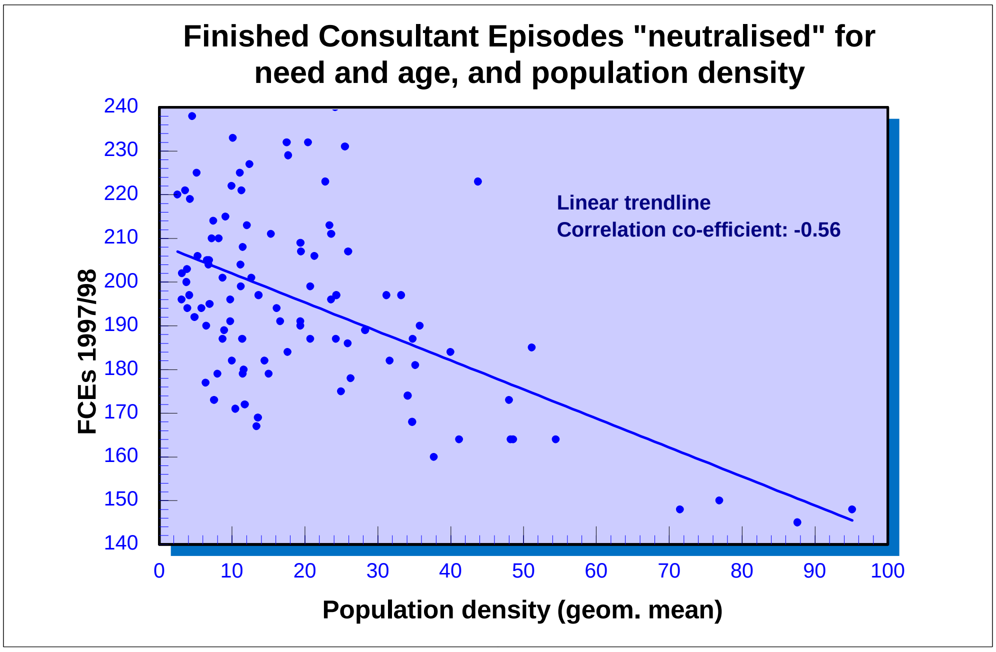
6.8.2 Analysis of FCEs ‘neutralised’ for Age and Need indices

It is clear from the previous analyses that there is a strong correlation between FCEs and the need and age adjustments. Dividing the FCEs for each area by their adjustment for age and need and plotting the results against rurality should result in a random distribution. However this is not the case as shown in Figure 6.25. Further analyses indicate that the rural areas have more FCEs than predicted by the resource allocation formula model. Rural areas are tending to complete significantly more FCEs than would be expected according to the need formulae

One explanation for these findings is that there is greater elasticity in the provision of healthcare with services in rural areas tending to complete more FCEs than anticipated by the ‘need’ formula. The formula results in rural areas receiving less funding and therefore rural areas appear to be completing more FCEs for the same funding. One possible explanation is that where people are exceptionally ill they will tend to receive treatment almost regardless of the availability of services as clinicians will try to ensure that patients receive the healthcare that they need.

The ‘isolated’ health authority on Figure 6.24 with a population density of 43.74 and a neutralised FCE of 223 is Liverpool and this analysis indicates that the area may have more FCEs completed than would be anticipated from the need adjustment

Figure 6.24 Comparison of GMD with FCEs 'neutralised for need and age



6.8.3 Analysis of the District Nursing formula and population density

The district nursing need index reduces funding for rural areas and increases it for urban areas. The chiropody need index for rural areas is half that of urban areas, despite the fact that there is a greater proportion of the elderly in rural areas.

Figure 6.25 Comparison of district nursing need index and GMD

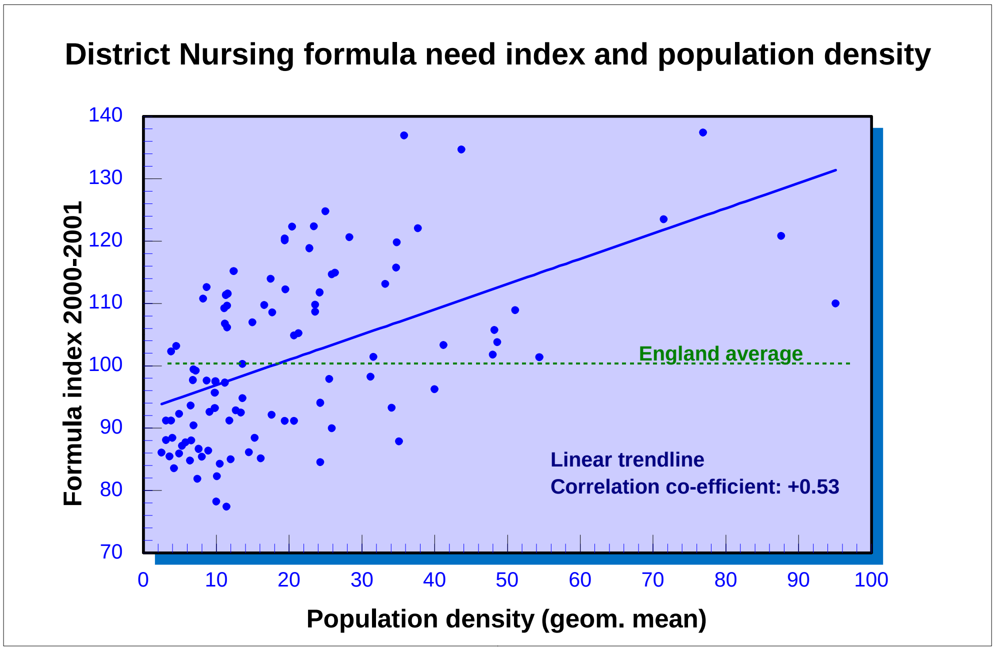
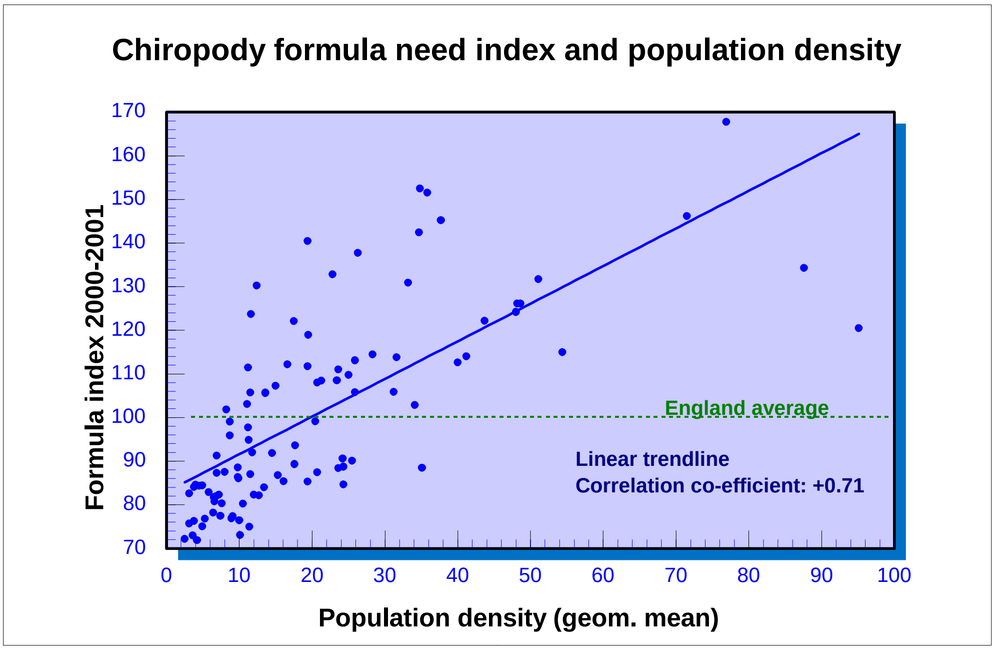


Figure 6.26 Comparison of chiropody need index and GMD



6.8.4 Critique of system

Car ownership is an unreliable indicator of the need for healthcare. This is because a car is often a necessity in a rural area because of the paucity of public transport. Without a car it is not possible to access the health services needed (Wood 2002). This factor also fails to take into account the value of the car. A factor based on the average value of cars would appear to be a more reliable indicator of wealth.

It is believed that the use of single factors in the need adjustments was unlikely to result in a robust formula because the need for healthcare was significantly more complex than can be predicted by the use of a small number of factors such as ‘Pensionable people living alone’. This was because even though a pensionable person was living alone they may have a high standard of living. The same was true of other factors in the formulae such as households with lone parents; dependants in single carer household; dependants in no carer household; and areas with a high proportion that are single, widowed or divorced. It was for this reason that areas containing some of the most affluent parts of the country have the highest rates for many of the factors. It is clear that areas that are acknowledged to have a high level of poverty would, as a consequence of the factors used in the ‘need’ formulae, received a lower weighting for health need than affluent areas including Kensington, Chelsea and Westminster. Systems that require the presence of two or more indicators of deprivation would appear more robust such as ‘Pensionable people living alone’ and ‘Receiving income support’. If this system were adopted it would address concerns that the needs in areas such as Kensington, Chelsea and Westminster are over stated because of the use of inappropriate proxies for need.

6.8.5 Critique of analyses and further research

One possible reason for rural areas and Liverpool having more FCEs than predicted by the need adjustment was that these areas may have been more assiduous in recording FCEs. It is also possible that there is a flaw in the logic outlined and that the results are spurious or indicative of another issue.

Further research into issues such as average car value, rather than car ownership rates may be of interest when considering poverty. Such a measure would intuitively appear likely to be more closely linked to deprivation.

6.9 GENERAL MEDICAL SERVICES FUNDING

6.9.1 Review of adjustment

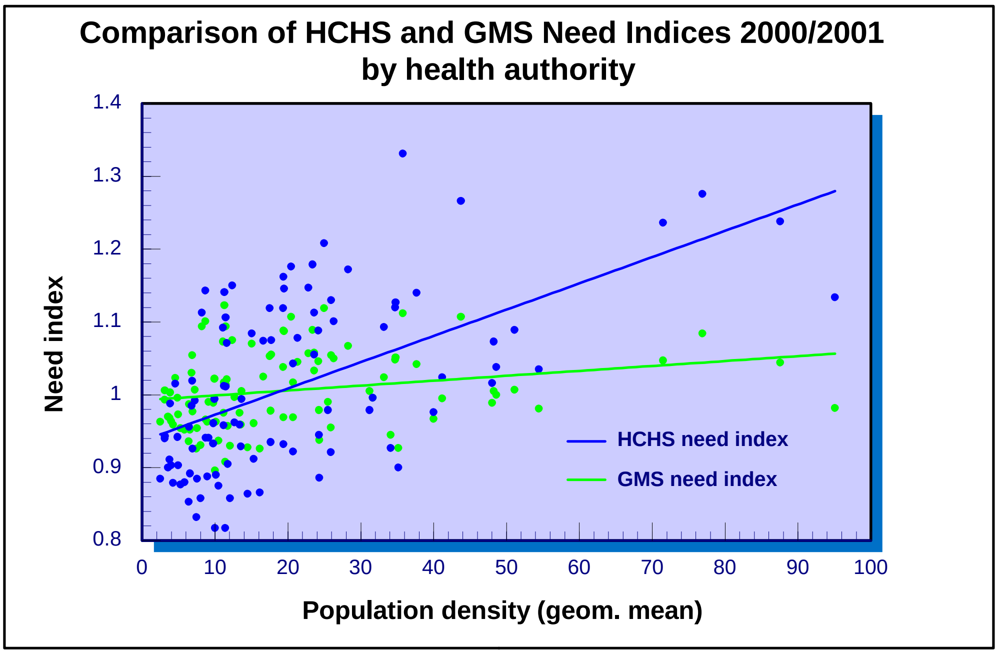
As detailed in Chapter 4 the General Medical Service formulae were also based on a weighted capitation system. It had the same three key elements as the HCHS formula; these were adjustments to compensate for differences in cost, need and age.

The GMS need adjustment was based on the National Standardised Illness Ratios (NSIR) for those aged under 75. The results of the NSIR need adjustment had a smaller range than the HCHS adjustment. In addition many areas that received a high weighting for need in the HCHS formula have a low rating for need in the GMS formula as shown in Figures 6.23 and 6.24. The alteration for Kensington Chelsea and Westminster is particularly notable as it decreases from +13% to -2%.

Figure 6.27 Areas with a significant disparity between HCHS and GMS indices

Health authority	HCHS need index	GP need index
Manchester	1.33	1.11
East London & the City	1.28	1.08
Liverpool	1.27	1.11
Camden & Islington	1.24	1.04
Sunderland	1.21	1.12
Kensington, Chelsea & Westminster	1.13	0.98
Cornwall	0.94	1.01
Lincolnshire	0.94	0.99

Figure 6.28 Comparison of HCHS and GMS need indices



There are considerable differences between the funding formulae for GPs and Hospital and Community Health Services for some areas. The GP formula had a bigger adjustment to compensate for differences in the use of services by different age groups. Unlike HCHS, the GP formula rates a number of areas acknowledged to be particularly affluent as having a low health need. There is no explanation given in the resource allocation documentation for the fundamental differences between the GP and the HCHS results on health need

A revised system was introduced in 2004/5 as part of the new GP contracts that were introduced. The revised formula used data such as consultation rates and home visit activity to adjust for differences in need.

6.9.2 Critique of system

The HCHS system had a significant differentiation between areas. From personal experience of managing services across a mix of some of the most deprived and affluent areas in the UK raised concerns that the lack of differentiation in the GMS system may not have reflected the true differences in need. These concerns are supported by studies that indicate that the need for healthcare is under reported in some groups in particular lower socioeconomic groups, some ethnic groups and rural areas. From personal experience it has been found that there were exceptionally large differences in workload on areas like child protection between areas according to socioeconomic variables.

It is believed that the ‘evidence based’ approach is the most reliable way of allocating funding based on the activity being carried out. However it does not overcome the issue that some patients are less likely to present for treatment. It is most important that this is addressed where delay in diagnosis has a significant impact on prognosis such as cancer. One option could be by having a supplement to the formula to adjust for under-presentation with trusts expected to use this funding to increase the access of healthcare by those who are currently under-presenting in specialties where early diagnosis is critical.

6.9.3 Critique of analyses and research required

The analyses are relatively basic and more complex analyses comparing the differences between the systems may be useful for deriving more information. Research into the range of the increases and decreases resulting from the GMS formula would be helpful to determine if it was too narrow to properly reflect the differences in health need.

6.10 RECOMMENDATIONS

A system should be developed to identify how healthcare need varies and the impact of age. An independent standing committee should be appointed to refine this model on an annual basis. The results of this analysis should be phased in over a maximum of 10 years according to the Crossman Principle.

The system needed to be changed to one where there are standard treatments with standard prices, adjusted for unavoidable differences in costs and case complexity. There are practical difficulties with this approach of agreeing the standard treatments, identifying costs and then introducing an appropriate pace of change of policy. This is similar to the Payment by Results system that was first introduced in 2003. However the lack of a sliding scale complexity rating meant that operations of a certain type were costed in the same way unless the case was sufficiently complex to attract a higher tariff. It is believed that this approach does not reflect the clinical care provided where that there is often a continuum with several quantum jumps in complexity due to age and co morbidities.

There should be research into diseases where a delay in presentation would be expected to lead to a worse health outcome. One area would be a comparative study of death rates from cancers like colorectal cancer to determine if there was a later presentation in rural areas and in lower socioeconomic groups and as a consequence an increased death rate. It is accepted that there will be slower response times for emergencies like heart attacks in rural areas. However it is necessary for the DH to take all reasonable steps to mitigate the potential impact of this. Research into the steps could be taken in rural areas to help stabilise patients in the time until ambulances arrive to reduce avoidable deaths.

The impact of the Foundation Trust (FT) and Payment by Results (PbR) initiatives is unclear; however it is believed that the semi autonomous nature of the trusts is likely to result in a lack of coordinated planning. A detailed review is necessary to identify what measures need to be taken to address the issues that are likely to arise. Government strategies need to be aligned as failure to do so may lead to increases in the 'post code lottery. The alignment needs to include FTs, PbR and the resource allocation system. FTs are able to determine independently which services should be provided, this could lead to FTs deciding that services are not viable with the market forces factors and PbR rate that are applied and should no longer be provided. Such a review could set key principles and safeguards for service providers.

A series of holistic reviews of the allocation and PbR systems should be commissioned. The reviews should be overseen by an independent chair and organised in a similar way to the Arbuthnott review in Scotland with external scrutiny and extensive consultation on the results. The support would need to be from the Department of Health and from sub-groups responsible for key areas that sponsor research as necessary from appropriate bodies. The reviews would inform the

Advisory Committee on Resource Allocation on modifications to the allocation system, tariffs for treatment and safeguards developed to ensure that the system promotes efficiency and quality improvement and do not result in the loss of services that are deemed to be essential.

6.11 NOVEL AREAS IN THESIS

It is believed that the regression analyses completed between the weightings produced by the psychiatric, chiropody and district nursing indices and GMD were the first of their kind. The analyses indicated that there was a significant negative correlation between rurality and the weightings received.

The conclusion to date has been that it is appropriate to use SMR for the under 75 age group for conditions that primarily affect the over 65 age group. Analyses of the differences between SMRs have indicated that the “accepted wisdom” that this was the correct approach was of questionable validity.

The analyses that compared ‘neutralised’ FCE activity with the weightings received was the first to indicate using regression analyses that the weightings appear significantly higher than necessary to compensate for differences in activity.

It is believed that the comparison of the GMS and HCHS systems and the differential weightings were also novel and indicate that the approaches adopted within England were inconsistent.

6.12 CONCLUSION

Socioeconomic group is strongly correlated to the incidence of certain diseases, but the impact is highly variable. In many cases there is a strong correlation where the lower the socioeconomic group the greater the incidence of disease. In others there is a negative correlation and for other diseases a statistically significant highly variable relationship or ‘U’ shaped relationship. A robust weighted capitation system would therefore need to reflect the impact of poverty across the full range of healthcare, taking into account this variation and the relative proportion of healthcare costs associated with different diseases and healthcare treatments.

It would be possible to construct such a system however it would be highly complex, requiring a detailed understanding of the incidence of each key condition and the variation according to socioeconomic group. The system would need to be updated regularly as the treatment of conditions changes the relative cost and to reflect changes in the incidence of disease.

The York study identified a series of assumptions and concerns about data quality and concluded that research was required to determine if utilisation is a good predictor of need. Findings that rural areas had a significantly higher utilisation than predicted were assumed to be due to higher unmet demand in urban areas. This assumption was contrary to a significant body of research on distance decay where the more inaccessible a service the less it will be utilised.

The assumption made by the York study was that the identification of counter-intuitive proxies was due to a reflection of an unmeasurable demographic variable. This study concludes that the unexpectedly high utilisation rate in rural areas and the identification of counter-intuitive proxies necessitated detailed analyses as they were indicators that the underlying assumptions may not have been robust.

The impact of the need adjustment on rural areas was compounded by the use of SMR ranges that did not relate to the age group actually using services. Including those aged under 65 in the assessment of differences in the need for care where the majority of the patients are over 65 is a highly questionable approach. The exclusion of the age group that uses the service the most appeared unreasonable and was not underpinned by research. This would not have been important if the SMRs for each area tended to follow the same pattern, so that the relative SMR was similar for each age group. However this was not the case as there were large differences between the relative SMRs at different ages. This study concludes that it would have been intuitively more reasonable to have weighted the application of the SMRs according to the predominant use of the service in question.

The adjustment for the proportion of elderly is considerably greater in the Scottish formula than that used in England. In Scotland extensive research has found that there needs to be a very significant adjustment for age. This is supported by analyses of workload in Cornwall, where the results were consistent with the adjustment in Scotland. It is believed that the adjustment for age in England was inadequate to reflect the true costs of providing healthcare to the elderly.

It would be expected that, because of major differences in the use of services by the different age groups, that areas with the most elderly would have been likely to be assessed as having the greatest adjustment when need and age were combined. However it is clear that the opposite was the case. The relatively small scale of age adjustment means that it was overshadowed by the scale of the adjustment for differences in need. The difficulties were compounded by the exclusion of the SMRs for the age group that has the greatest need for healthcare. As a consequence, areas with the highest proportion of elderly were adjudged to have the smallest need for services.

The findings of the research and other studies are that mental illness may be similarly prevalent in urban and rural areas. However the mental health index in the allocation system reduced the funding for rural areas. As a result there was less funding available for the provision of measures such as early intervention in rural areas.

CHAPTER 7 ~ PAY ADJUSTMENT AND OTHER MARKET FORCES FACTORS 1997 to 2003

SUMMARY

The aim stated by the Department of Health for the Market Forces Factor (MFF) adjustment was that it was to compensate for unavoidable differences in the cost of providing services. The MFF adjustments were for pay, land and buildings, equipment and Emergency Ambulance and Cost Adjustment (EACA).

The pay MFF was a key adjustment in the resource allocation formula because of the scale of the impact that it had on the allocations that local health economies received. For a significant proportion of local health economies it was the largest single adjustment in the resource allocation formula. It was therefore important for the robustness of the resource allocation formula that the Pay MFF reflected, as accurately as possible, the unavoidable differences in staff costs.

The pay MFF used for non medical and dental staff was based upon studies by the University of Warwick in 1996 and 2002. Warwick did not recommend the new adjustment as a result of differences in salary cost. The justification was based on the conclusion that failing to have the recommended changes would result in lower service quality and higher non-wage costs, such as increased staff turnover and agency costs. A central tenet of the report was that organisations will need to pay most in areas that are least desirable and that NHS pay needs to reflect local salaries.

This study concludes that the scale of the adjustment is such that the Warwick recommendations should not have been accepted without robust and quantified information on lower service quality, higher turnover or higher non-wage costs. There

is no reference to data that was available on staff turnover; this data showed that staff turnover was high in a range of areas and not just London.

It was concluded in 1976 by the Department of Health that the NHS is effectively in a monopsonistic position and therefore there is little competition for clinical staff. This study concludes that monopsony makes a profound difference and that because this was not adequately considered the Warwick studies were flawed. Analyses in this study have shown that base pay levels for staff, excluding London Weighting, were often higher in rural areas. It is concluded that this may have been due to staff staying in the same grade for longer in rural areas and that this resulted in staff being higher in pay bands.

This study also concludes that the Warwick studies should have more fully considered specific cost systems like that retained to adjust allocations for medical and dental staff and that contrary to Warwick's conclusions it is possible to develop an adjustment based upon actual differences in salaries. Such a system would need to reflect the salary costs of staff employed and the unavoidable costs resulting from increased staff turnover, overtime, bank and agency usage, and an adjustment address the quality differential if subsequent research shows that this exists and is quantifiable.

This study has also determined that there are additional factors that have a differential impact on costs such as rurality, the cost of utilities, land and buildings including the additional costs resulting from major PFI developments and costs resulting from the size and condition of the estate.

It is concluded that the MFF adjustments did not accurately reflect the unavoidable costs of providing services and that this may have been a cause of a lack of Foundation Trusts in some areas.

7.1 INTRODUCTION

The aim of the allocation formulae was to adjust the funding provided to local health economies so that they would have been able to provide equivalent healthcare. The amount of income required by local health economies to be able to fund equivalent healthcare depended upon two groups of factors. The first of these was the difference in the demand for services or ‘need’ indices including the variations due to differences in demographics as detailed in Chapter 6. The second group of factors were used to adjust allocations to reflect unavoidable differences in the underlying costs of service provision. This second group were termed Market Forces Factors (MFFs) by the Department of Health.

The five MFFs used in the resource allocation formula in England for the NHS in the period 1997 to 2003 were for pay, land, buildings, equipment, and the adjustment for ambulance and accident and emergency services referred to as EACA. The inclusion of equipment MFF appears to be superfluous as all areas have the same adjustment in the formula and it is not considered further in this report.

The first section covers elements of pay theory as this helps to explain the actions taken by staff both prior to and since the inception of the NHS. In addition it is referred to in research carried out when changes have been made to NHS pay systems. This is followed by details of key historical changes on pay in healthcare. This is of interest as many of the current terms and conditions for NHS staff have historical roots which date back many decades. The section includes a review of pay pre and post the formation of the NHS, the changes made due to findings of the Resource Allocation Working Party (RAWP) and the period from the early 1990s when the ‘Local Pay Initiative’ was introduced to 1997 when the first system based on the research carried out by the University of Warwick was implemented.

This is followed by a summary of the system used between 1997 and 2003 and the studies that were used to formulate the system. This section details the key issues and findings of the two studies by the Institute for Employment Research at the University of Warwick and this includes the use of Adam Smith's theory of compensating differentials. The first report and supporting technical papers were used to formulate a new pay adjustment introduced in 1997. This was the overarching study used to formulate a new pay adjustment system. This section gives a summary of the key points and conclusions of the main report and also includes points raised in the supporting technical papers. The second report which was published in 2001 was produced as a consequence of concerns that were raised about some of the effects of implementing recommendations from the first study. It was led by the same research group at Institute for Employment Research.

The next section includes a detailed critique of the Warwick studies. The first issue addressed is conclusions made about the employment market that the NHS operates in. There is then a critique of the use of the compensating differentials theory and of the conclusions made in the Warwick study about the adequacy of the data available for econometric studies.

This is followed by a series of analyses using the available data and there is a comparison of these results with the theoretical conclusions and results of the Warwick analyses. The next section covers a critical assessment of the analyses. This is followed by details of the additional work required and conclusions on NHS pay.

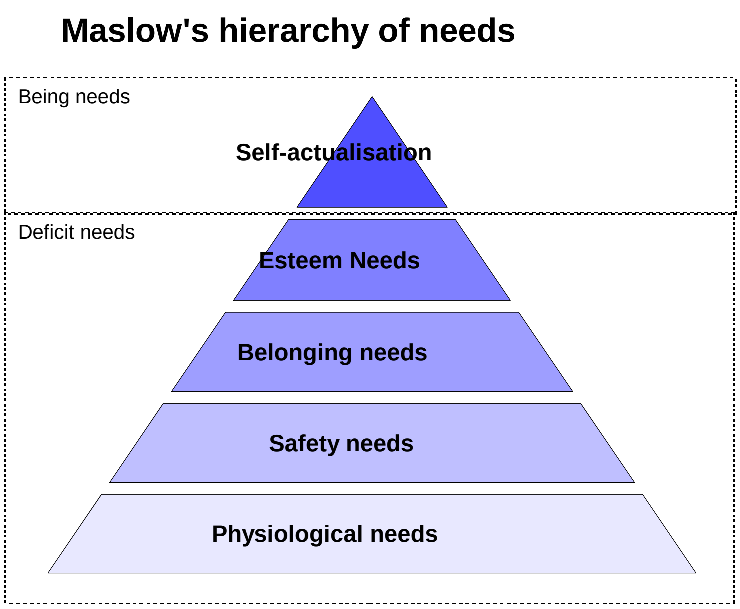
There is then a review of the other MFFs, EACA, land and buildings and other non pay costs with particular reference to utilities. The final sections of the chapter contain a summary of the novel areas of research, a summary of the key recommendations and the main conclusions.

7.2 NHS PAY

7.2.1 Pay and Maslow's hierarchy of needs

Setting pay levels for healthcare staff, so that they are affordable but sufficiently attractive is a key issue for the NHS. The desire to receive appropriate recompense for the work is at the core of pay theory. Maslow's hierarchy of needs encapsulates the theory that people will look to satisfy their essential needs and, where possible, their desired wishes; and is illustrated in Figure 7.1.

Figure 7.1 Maslow's hierarchy of needs (Norwood 2003)



Based on this theory where a job does not provide sufficient pay to satisfy essential needs like basic housing or food then individuals will be highly likely to seek other employment. Where a person perceives that it will be possible to satisfy more 'deficit' or ‘being’ needs they may consider seeking other employment, however this will be counterbalanced by concerns about the risks of change.

7.2.2 History of NHS pay

The origins of the current systems for determining pay and terms and conditions predate the formation of the NHS in 1948. Healthcare pay is also of interest because similar issues have occurred repeatedly and may therefore recur. There have been reports in every decade since the 1930’s recommending significant increases to one or more groups of staff. There have been multiple changes in payment systems and disputes with staff. Some of the conclusions drawn in these reports and points raised in these disputes are highly relevant to the pay issues faced by the NHS in the period 1997 to 2003.

The principal reference for the following section, in particular the period 1941 to 1974, is the Chronology of State Medicine which was written by M D Warren and published by the Faculty for Public Health in 2000. It is a leading reference on NHS history and was completed on behalf of the Faculty, which promotes an understanding of the NHS in addition to its core function of being the standard setting body for the joint Royal Colleges of Physicians.

The roles of the Royal Colleges cannot be underestimated. In addition to promotion of improvements in quality, standard setting and monitoring the Royal Colleges set stringent requirements on the maximum number of sessions that a consultant should work, they have to approve any job description and they have a representative on the panel for consultant appointments. They also advise ministers and the Department of Health on the priorities.

The Royal Colleges significantly predate the formation of the NHS. The forerunner of the Royal College of Surgeons, the Barbers Guild, was granted a Royal Charter in 1462. The members of the Guild treated the sick and hurt. In 1511 the Physicians and Surgeons Act limited medical practice to those who had been examined by the local bishop. The Royal College of Physicians of London was granted a Royal Charter in 1518 to oversee the practice of medicine within a seven mile radius of the City by licensing recognised physicians. The Provincial Medical and Surgical Association was founded at Worcester Infirmary in 1832. In 1856 it became the British Medical Association and it has been a key negotiating body for medial staff throughout the history of the NHS. In 1905 the Medico-Political Authority of the British Medical Association (BMA) reported on the terms and conditions of 850 doctors providing services at a range of sites including work and private clubs, friendly societies and dispensaries. It was concluded that contracts for doctors should be agreed through the BMA. The forerunner of the Royal College of Midwives, the Trained Midwives Registration Society was formed in 1881 and the College of Nursing, which later became the Royal College of Nursing, was formed in 1916.

Calls for significant increases in pay for clinical staff have been made repeatedly and many pre-date the formation of the NHS. William Blizard a surgeon at the London Hospital concluded in his 1796 paper Suggestions for the Improvement of Hospitals and Other Charitable Institutions that “The salaries to the medical attendants of such places are, generally, inadequate to the duties that ought to be performed.” The formation of national representative bodies gave a focal point for salary issues to be raised and the Royal Colleges and the BMA have been at the vanguard of a number of calls for changes to pay.

There are records of public and charitable salaries paid to staff for health and related services dating back many centuries. There are echoes, even of the very early systems in some aspects of recent pay systems. In the nineteenth century there were two main types of hospital, Poor Law Institutions and voluntary hospitals. Before 1865 it was usual for the Poor Law infirmaries to be staffed by pauper nurses who were inmates and received little if any pay, by 1897 the use of pauper nurses was prohibited. The voluntary hospital system was made up of endowed hospitals, St Bartholomew's, and St. Thomas's and Guy's, and the un-endowed hospitals such as Westminster Hospital and St Georges. The salaries for staff in these hospitals came from donations, subscriptions and patient fees. Councils also employed medical staff; in 1846 Leicester Borough had a programme to remove “nuisances and annoyances” and paid Dr Barclay and Dr Buck 20 guineas a year to support this programme and to attend court as necessary. As detailed in Chapter 4 on NHS history, companies such as the Hodbarrow Mining Company in Cumbria funded hospitals for staff. A Medical Officer was appointed in 1867 on an initial salary of £80 per year; this was subsequently increased to £150 per annum with an additional payment of 10/6 for Midwifery cases. A nurse was appointed later that year to the hospital and her wages were twelve shillings per week, or £31.4s per year, plus a rent-free house. The salary for the Medical Officer was subsequently increased to £500 per annum however this had to cover the medical and surgical care, medicines and appliances for the workmen and their wives and children under fifteen years old, and he was only able to provide private practice to elder children of the workmen or people living in their house (Wardropper 2006). This fee type system is similar in general approach to payment systems that have been introduced subsequently such as GP Fundholding and the current DH initiative, Practice Based Commissioning. Providing staff with subsidised accommodation is still widely practised across the NHS.

The collective bargaining machinery used for setting terms and conditions is based on the Whitley Council system that was introduced for the public sector in the period 1916 to 1918. J H Whitley was a Speaker of the House of Commons, he was appointed in 1916 to lead a bipartite committee charged with investigating how relations could be improved between employers and employees (Sissons and Arrowsmith 2002). In the unionised local authority health services there was some introduction of standard pay, however in other areas of healthcare there were generally poor terms and conditions for non medical staff (Webster 1995). Nursing was viewed as a vocation rather than a profession and the term vocation is still in general use in the NHS.

The low levels of pay for nursing staff caused increasing recruitment and morale difficulties. The report of the Lancet Commission on Nursing in 1932 recommended that there should be significant increases in pay for nursing staff. By 1937 the position had become acute; there were over 600 vacancies for staff nurses in London. In 1939 The Inter-Departmental Committee on Nursing Services, chaired by the Earl of Athlone concluded that pay should be increased and dealt with on a national basis; that there should be grants from national funds to recognised training hospitals; that working hours should be reduced; that living and working conditions should be improved; and that the role of assistant nurses should be established. The proposals were viewed as contentious by the British Hospitals Association which had particular concerns about such moves resulting in greater unionisation (Webster 1995).

In 1941 the Ministry of Health guaranteed the salary levels of student nurses and urged hospitals to pay a minimum wage for nurses. There were also concerns about payments for General Practitioners. The Medical Planning Commission was formed in 1940 with a broad membership including the Royal Colleges and the British Medical Association. The interim report concluded that national health insurance should be extended to cover the majority of the population, that General Practitioner payments should have three elements a basic salary, fees for additional work and capitation fees. A minority of the members advocated a salaried service. The report was viewed as contentious and a final report was not completed (Hill 1940).

In 1942 the Medical Planning Commission Interim Report recommended that GPs should be paid on the basis of capitation but that there should be a basic salary and fees for work, and in 1942 the Nurses Salary Committee chaired by Lord Rushcliffe recommended that ward sisters should be paid £130 per year rising to £180 and student nurses £40 per year rising to £50. It also concluded that there should be a 96-hour fortnight and that living out allowances should be paid to most nurses. Similar recommendations were made for midwives. It is interesting to note that this 48 hour week is the same as that set by the European Working Time Directive.

The formation of the NHS from organisations from across the UK that had different policies and pay levels meant that setting national pay levels was a very significant issue. In the National Health Service Act in 1946 proposals for the payments to medical and dental staff varied between the professions, with consultant posts being salaried, dentists paid on the basis of the work completed and GPs having their payments based on capitation (BOPCRIS10). In May 1946 the Government agreed to introduce a Whitley Council structure for the NHS. This was intended to help address a shortage of nurses.

In 1948 The Interdepartmental Committee on the Remuneration of Consultants and Specialists concluded that the same salaries should be paid in each specialty and that there should be the potential to gain merit awards for notable performance. The NHS Amendment Act in the same year included the provision that GPs could not be salaried.

By the end of 1950 there were Whitley Councils for different occupational groups and the General Whitley Council that had the responsibility of negotiating terms and conditions for NHS staff. The numbers of councils subsequently varied. The key groups were: administrative and clerical, ambulance, ancillary, nurses and midwives, optical, pharmaceutical, and two professional and technical groups A and B (Chadwick and Thompson 2000).

In 1952 the Danckwerts report reviewed the payments for general practice and compared these with other professions and recommended that the Central Pool, which was the annual national fund divided between GPs, should be increased to £51 million. This amounted to an increase of approximately 25% and it was significantly greater than envisaged by Ministers, however it was eventually accepted when it was agreed that the increases would be accompanied by the following: changes to make group rather than single-handed practice more attractive; a flat capitation fee to make it easier for new doctors to set up practice; financial advantages for intermediate list sizes; and reductions in the maximum list sizes for single-handed GPs.

This was followed by a review of Doctors' and Dentists' Remuneration. In 1955 the Royal Commission, chaired by Lord Pilkington recommended a general increase of 21 per cent in pay and the establishment of an independent standing review body to keep doctors and dentists' pay under review and to make recommendations as necessary.

In 1960 the Royal Commission on Doctors and Dentist Remuneration recommended that there should be an increase of 21% and that an independent review body should be formed to keep pay rates under review (BOPCRIS17). This was a significant measure because of the discontent that was generated by the ‘feast and famine’ approach to pay increases.

In 1965 the British Medical Association published the Charter for Family Doctors, this called for the following: changes in the pay and contracts of general practitioners; the development of support services; improvements in premises and equipment; the establishment of an independent corporation to provide funds; and direct reimbursement of expenditure on staff and maintenance of premises. This report was largely accepted by the Ministry of Health and the 1966 NHS Act established the General Practice Finance Corporation to make loans for the purchase, erection or improvement of practice premises. The other key changes were that from 1967 family doctors could, in prescribed circumstances, be salaried. In addition the Central Pool was abolished and it’s payments were based on capitation, the major costs of ancillary staff, basic practice allowances, services provided at night and weekends, fees for certain items of service and dispensing.

In 1966 the Salmon Committee recommended that there should be new grades for staff and these were adopted in 1968 when the National Board for Prices and Incomes reported on the pay of nurses and midwives and introduced rates of pay for the new grades. The Committee on Senior Nursing Staff Structure reported in the same year and it proposed that there should be a senior nurse for every hospital group who would be responsible to the Governing Body. It also recommended that there should be numbered grades for first line, middle and top management, relating to the responsibilities undertaken and gave guidance on the application of the new grades in midwifery and psychiatric nursing (BOPCRIS19).

The members of the Review Body on Doctors and Dentists Remuneration resigned in 1970 when the Government refused to implement the recommendations. A new review body was formed in July 1971 to recommend pay increases and a new chair was appointed (BOPCRIS 22).

In March 1973 there was a national strike of hospital ancillary staff over pay. It was initially concluded by unions that all of the demands by staff had been met, however NHS management subsequently tightened the application of pay practices and terms and agreements. These changes largely eroded the benefits that had been secured (Cliff 1979).

In 1974 The Committee of Inquiry into Pay and Related Conditions of Service of Nurses and Midwives chaired by Lord Halsbury recommended substantial increases in salaries. There were also major changes for professions such as physiotherapy and occupational therapy. The Working Party on the Remedial Professions chaired by E L McMillan recommended that there should be a broad range of changes for staff in the professions allied to medicine including a new salary structure and methods of training.

In 1975 the Halsbury Committee of Inquiry into the Pay of the Paramedical Professions recommended substantial increases in pay. Another notable change was that General Practitioners started providing free contraceptive advice and supplies after negotiating an extra "item for service" payment. Hospital consultants began working strictly to their contracts and were subsequently awarded pay rises averaging 30 per cent. The Equal Pay Act came into force, this disallowed discrimination between men and women in terms and conditions of pay; and obliged firms to pay men and women who are doing the same job the same wage. This has subsequently resulted in some of the most profound changes to NHS pay as detailed later in the section on Agenda for Change.

The RAWP report “Sharing Resources for Health in England” (McCarthy, DHSS 1976) stated that “the costs of exactly the same form of care may vary from place to place depending on local variations in market forces”. The report emphasised that in the NHS salaries are negotiated nationally and that for many staff groups the NHS is a monopsonist. It was concluded that for staff such as ancillary, estates, managerial and administrative staff, the NHS competed for staff with other employers. It was asserted that there could be grade drift and salary drift in scales leading to higher pay in areas where there is more competition for staff. It concluded that factors which could lead to costs were staff turnover and the need to have more staff because of a possible lower quality, higher utilisation of agency staff and increased overtime payments.

The Winter of Discontent in 1978/9 involved the largest mass strikes since the Great Strike of 1926. The strikes followed inflation peaking at 26.9% in 1975 and pay controls introduced by Government to limit inflation. A broad range of NHS staff went out on strike including members of the Royal College of Nursing, ambulance and support staff, as a result only emergency care was provided by ambulance services and 1100 hospitals stopped all but urgent admissions (Aspden 2007).

The Advisory Group on Resource Allocation report (DHSS 1980) recommended that the general labour market should be the comparator. The labour cost adjustment for non-medical and dental staff was based on a General Labour Market (GLM) approach. The GLM used measures of earnings outside the NHS to estimate the wage differentials needed to ensure consistency and was based on data from the New Earnings Survey produced by the Office for National Statistics. The standard occupational comparators from the survey were as follows: craft and related (5) for the maintenance staff; corporate managers (1a); clerical (4a), secretarial (4b) for administrative and clerical staff; personal service (6b) for unqualified nurses and auxiliaries; drivers and mobile machine operators for ambulance staff; and scientific technicians (3a) for qualified nurses, midwives, professions allied to medicine and professional and technical staff. The data from the New Earnings Survey was not viewed as sufficiently robust to discriminate between earnings outside the Thames Regions. The adjustment is shown in Figure 7.2

Figure 7.2 Pay Relativities for Staff Market Forces Factor 1976 to 1978

London	Rest of Thames	Rest of England
111.9	98.4	95.6

The data from the survey was in some cases aggregated to increase the robustness of the information. The lack of coterminosity between district council areas and health authority areas resulted in District Health Authorities (DHAs) being assigned the county average (DHSS 1980).

After a prolonged dispute the Government agreed, in 1982, to set up a Pay Review Body for nurses pay and this was established in 1983. The Prime Minister later stated that the no strike agreement was central to the decision to form the pay review body (Thatcher 1988).

A review of the formula (DHSS, 1988) concluded that, despite the presence of national pay bargaining, it was reasonable to conclude that the different entry points onto pay scales for new staff were being utilised in higher cost areas and other costs could be higher turnover, greater use of agency staff, buying services from the private sector, substitution of other staff and inputs where vacancies appear. It concluded that using the external labour market as a general proxy for the direct and indirect costs of areas with high labour market costs was reasonable.

The clinical nurse grading system was introduced in 1988; however in 1991 the Health Secretary informed Parliament that it was not clear when appeals grades would be completed. In a former role as HR Director for the NHS in Cornwall in 1995 they were still holding appeals 7 years after the system was introduced. This was because of the large number of appeals that occurred.

7.2.3 Local Pay Initiative

In the period before the local pay initiative there was a clearly defined process for pay progression and any significant deviations were only permissible in exceptional circumstances. Following the local pay initiative in 1991 there has been more local autonomy for NHS employers on pay issues. Whether or not healthcare is a vocation, it is clear that if the NHS is to be able to attract, retain and motivate the staff that it needs, as with other forms of employment, that there will need to be adequate pay (Caines 2000).

The key intention of the local pay initiative was that areas having particular difficulties in recruiting and retaining staff would be able to pay more and that areas where there was low pay in the commercial sector would be able to pay less. A small number of trusts did secure agreements from staff representatives to the payment of awards of 1%, however there was a concerted campaign against what were seen as derisory awards. This culminated in the rescinding of agreements not to strike by organisations representing NHS staff including the Royal College of Nursing and the Royal College of Midwives (Thornley 1998). As a consequence of the action taken it was announced by the NHS Executive in 1995 that there should be what was termed a National Framework Agreement This set a minimum pay award of 3% and concluded that any staff groups receiving less than this award would have their pay increased. As a consequence approximately 99% agreed pay increases equivalent to the minimum pay award (Beecham 1995).

Salary levels in Cornwall were 25.9% below the national average in 1997 (Cornwall County Council, 1999), as a result there was considerable interest on pay levels from the NHS National Personnel Director, Eric Caines and the Cornwall and Isles of Scilly Health Authority. Their aim was for the NHS to pay staff less in Cornwall and other areas where the commercial sector had lower rates of pay. However the pay negotiations in Cornwall and other similar areas in England with low pay did not result in staff receiving lower pay increases.

The key reason was that an agreement to increase pay for NHS staff across the Country, effectively ended the Caines local pay initiative. Even if there had not been a national settlement it is believed that the local pay initiative was highly unlikely to have been successful for three principal reasons. Firstly as pay negotiations had historically been completed centrally, NHS trust personnel staff had little experience in pay negotiations, whereas some of the unions in healthcare also had considerable experience of pay negotiations such as the GMB and AEEU. Secondly it was assumed that areas, like Cornwall, would be able to attract staff and it was found that this was often not the case. The key reasons included the following: a national shortage of clinical staff in many disciplines; a lack of employment opportunities for partners; a lack of research opportunities because there was no university; and a lack of opportunities for private practice. Thirdly the local pay initiative was introduced at a time when the pay rises available in the NHS were less than 3.5% and giving a zero or nominal pay rise was not found to be possible.

Where there were recruitment difficulties trusts could decide to increase pay. However from my experience the pay rates for most staff that stayed in the same role were still within very clearly defined bands. There were fewer controls on what new staff, including managers could be paid. However the limited availability of additional revenue income to increase pay acted as a restraint, as did instructions from the NHS which gave instructions on controlling the salary increases for managers (Simkins 1997).

The freedom was in effect to pay staff anywhere in nationally defined pay ranges. These pay ranges were generally 20% but for medical and dental there was a broader range because of the availability of performance awards. These were particularly noteworthy for medical and dental staff as they were up to £69,347 in 2004 on top of the maximum of their scale (NHSE, 2004).

The 1993 Review of Weighted Capitation concluded that the staff market forces should be extended to cover all clinical and technical staff with the exception of doctors and dentists. The staff MFF had four zones and the adjustments are shown in Figure 7.2 for the period 1995 to 1997.

Figure 7.3 Pay zones used for MFF 1995 to 1997

Zone	1995/6	1996/7*
Inner London	125.0	133.7
Outer London	115.9	124.0
Rest of South of England	104.9	112.2
Rest of England	93.5	100.0

*effectively the same weighting as 1995/6

This system attracted criticism that it over estimated the interaction between the NHS and the external labour market and that as a consequence the adjustment was too large (Rural Development Commission 1996), and that it did not reflect with sufficient robustness variations in non pay costs such as recruitment difficulties, turnover rates, overtime and bank and agency usage. There were also concerns about the sharp cliff edges between zones, some authorities asserted that they were in the wrong zone and it was also asserted that zones did not necessarily overlap with local labour markets (Trickett 1997). The Health Secretary, Alan Milburn, also concluded that there were concerns about the adjustment. In a parliamentary debate on the allocation formula and the market forces factor he said that "The honourable Gentleman is not alone in expressing doubts about the operation of that element in the current formula" (Milburn 1997)

7.2.4 Market Forces Factors 1997 to 2003

The pay MFF was based upon the pay theory of compensating wage differentials and analyses of local salaries. The weighting for MFFs for each area was calculated using the national average expenditure on each factor. As shown in Figure 7.4 it was determined that, on average, 66.58% of expenditure was on staff pay.

Figure: 7.4 Market Forces Factor adjustment shares

Market Forces Factor	**National average expenditure share**
Non medical and dental staff	57.19
Medical and dental staff	9.39
Land	1.11
Buildings	7.43
Equipment	1.96
Other non-pay	22.92
Total	100.00

The Resource Allocation Group (RAG) commissioned a study by the Institute for Employment Research based at the University of Warwick of the adjustments required for pay and the resulting report was published in September 1996. The aim of the Warwick study was to develop a system that was "just and fair from both a theoretical perspective and in terms of the actual operation of the formulae" (Wilson et al 1996).

One of the core aims of the Warwick study was the identification of the salaries that NHS employers need to pay to be able to recruit and retain staff of equal quality. The seminal work by Adam Smith (1776), the Wealth of Nations, contains the theory on compensating wage differentials. This was the underpinning justification for the pay adjustment proposed in the Warwick study. A central tenet of this theory is that the differences in salaries reflect the overall balance of the advantages and disadvantages of a particular job.

Understanding what the key factors are for each individual is highly complex and what is likely to attract, retain and motivate may vary considerably from person to person. These factors may be grouped together in the five clusters: economic, geographical, facilities, travel, and personal.

The economic factors include the salary being paid and the cost of living in the area, including the net disposable income following expenditure on essential items such as housing. This can be complex in the NHS because of the significant additional income paid to some staff as a result of their private practice and this income is not included in published NHS pay information

The geographical factors include weather, proximity to mountains and the sea. The enthusiasm for living outside a city centre may be counterbalanced by other factors such as the reduced access to facilities.

The facilities factors include the availability of appropriate and affordable property for purchase or rent; the proximity of facilities such as schools and services such as childcare and care for other dependants, hospitals, shops, leisure facilities and research facilities.

Personal issues are also highly complex. They include the location of family and friends and future opportunities for the individual and their family. Job opportunities for other family members are a key characteristic for both the economic and personal satisfaction issues. Travel is also a key issue because of the cost, time and view of what is a reasonable journey.

Job and company attractiveness is also a key factor and this includes reputation of the company and manager, professionalism of the recruitment process, scope of the role, training and development opportunities, relocation package including 'golden hellos'.

Warwick concluded that in the NHS the differences in salaries would need to reflect the overall balance of the advantages and disadvantages of a particular job. So that higher wages would be necessary in 'unattractive areas' to be able to recruit and retain staff. It stated that "some occupations in the public sector operate in 'closed' markets, isolated from general labour market pressures" and that "once their career choices have been made they do not appear to exhibit great mobility". It however goes on to conclude that this ignores the issue of quality. It asserts that "if providers in high cost areas are not in a position to compensate staff for working there, staff quality is bound to decline in the long run". Where NHS employers do not pay such premia they conclude that the consequence will be higher staff turnover and lower staff quality.

The Audit Commission report on turnover (Audit Commission 1997) estimated the costs resulting from staff turnover are higher because of training and recruitment costs. Additional costs are faced by trusts with high levels of staff turnover as a result of factors such as retraining costs, replacement with bank agency, increased overtime and recruitment costs for replacement staff.

The Warwick study considered the Specific Recognised Cost (SRC) approach for determining the pay index. If this had been adopted it would have meant basing the factor on the local salaries and costs experienced by the NHS. This was rejected for two reasons, firstly it was concluded that the data available was insufficiently robust and secondly there were concerns that such an approach would reflect historical actions rather than unavoidable differences. It also concluded that even if the data was available that a General Labour Market (GLM) approach would be preferable. This was because an SRC approach would have meant that salaries would be set without consideration of local salaries in other sectors. The use of a GLM system for other public sector allocation systems was also cited as support for its application in the NHS. It was stated that trusts in areas with high local salaries would experience greater costs in particular because of higher base salaries, increased staff turnover, lower staff quality, agency costs and scale drift.

It was concluded that a GLM approach would have “sound theoretical foundations” and was a “practical and robust method for dealing with the problem of compensating purchasers for the higher costs faced by their suppliers”. A GLM approach involves adjusting funding so that employers can pay staff according to the pay levels in the local environment. In essence the recommendation was to adopt a system that was based on local salary rates. The report also concluded that “in a system dominated by national pay bargaining that it is inevitable that observed wage cost differences would be minimal”.

The GLM approach selected was based on regression analyses of salaries to counter the impact of differences in education levels, industrial sectors and occupational sectors. Using these analyses and pay data from the New Earnings Survey the Warwick researchers calculated what they termed Standardised Spatial Wage Differentials (SSWD) for areas across the country. SSWD are an estimate of the average differences in wage attributable to location after compensating for age, gender, industry and occupation. The Warwick report stated that “it is not possible to demonstrate that the SSWD approach provides exact compensation for all costs at a particular time. However, there is clear evidence that such cost differentials do exist, that they are substantial and that they depend upon relative wage levels offered”.

It was concluded that contrary to the view that had been propounded by some at the time, that the previous system did not overstate the costs experienced but actually understated the costs. It stated that the move to local pay bargaining was immaterial and that providers would experience the same market conditions as other employment groups. It was also concluded that in the longer term NHS salaries would develop that reflect the local market. Warwick recommended that GP staff costs should be treated in the same way and an equivalent adjustment made to General Medical Service Cash Limited allocations.

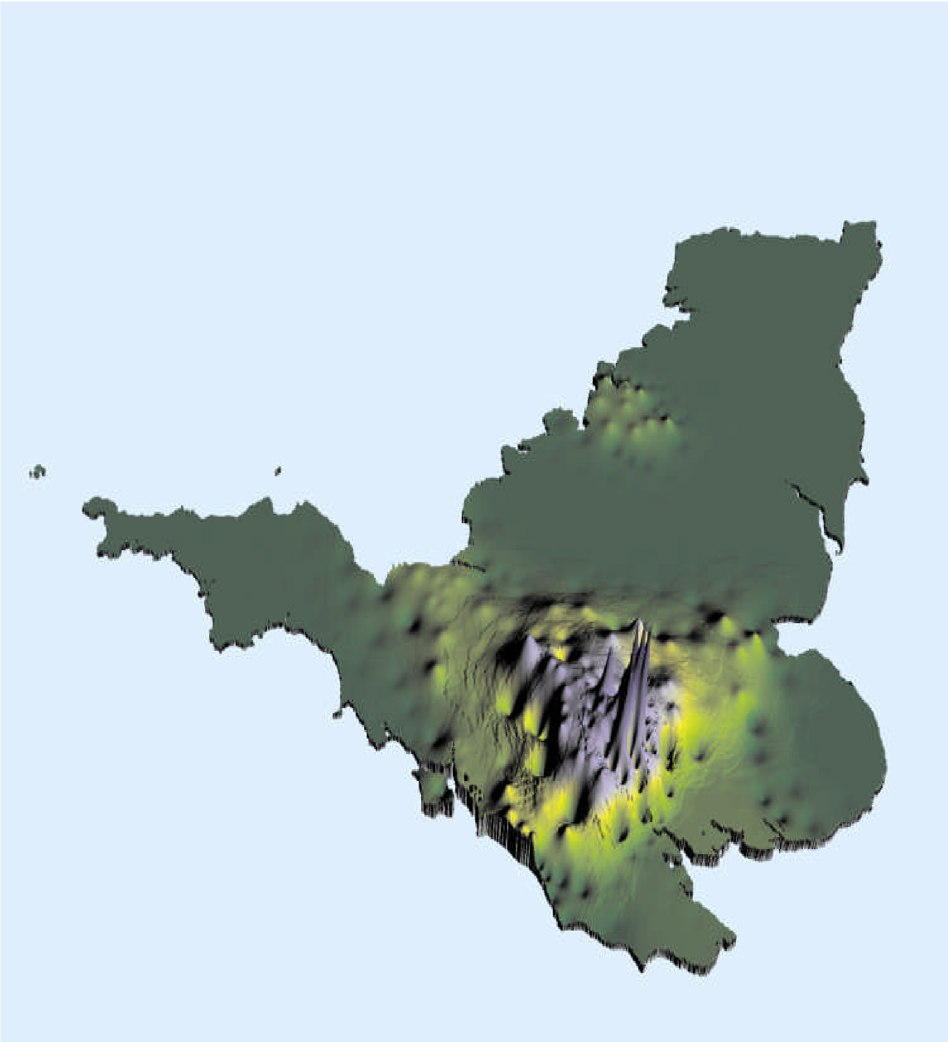
The Warwick research staff considered introducing aggregation in London because of significant ‘cliff edges’ between areas but concluded that a disaggregation model was the preferred option. It concluded that the staff MFF should be based on 78 different areas using SSWD derived from the New Earnings Survey.

The pay adjustment for medical and dental staff accounts for 15% of the overall pay factor and was calculated using a SRC system, this meant that it was based on data on actual salary differences including adjustments like London Weighting. The Warwick study recommended that the medical and dental costs should also be based on a GLM system.

The DH accepted the majority of the recommendations of the Warwick Study. However there were two exceptions, firstly it was concluded that there would be too many distinct adjustment factors and consequently the number of areas was reduced from 78 to 50. Secondly it was concluded by the Department of Health that the Pay MFF for medical and dental staff should not be altered i.e. that it should continue to be based on an SRC methodology.

The impact of the new MFF was very significant as shown in Figure 7.5. There were considerable differences between areas, most notably in London as shown in Figure 7.6.

Figure 7.5 3D map of Staff MFF



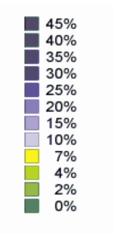
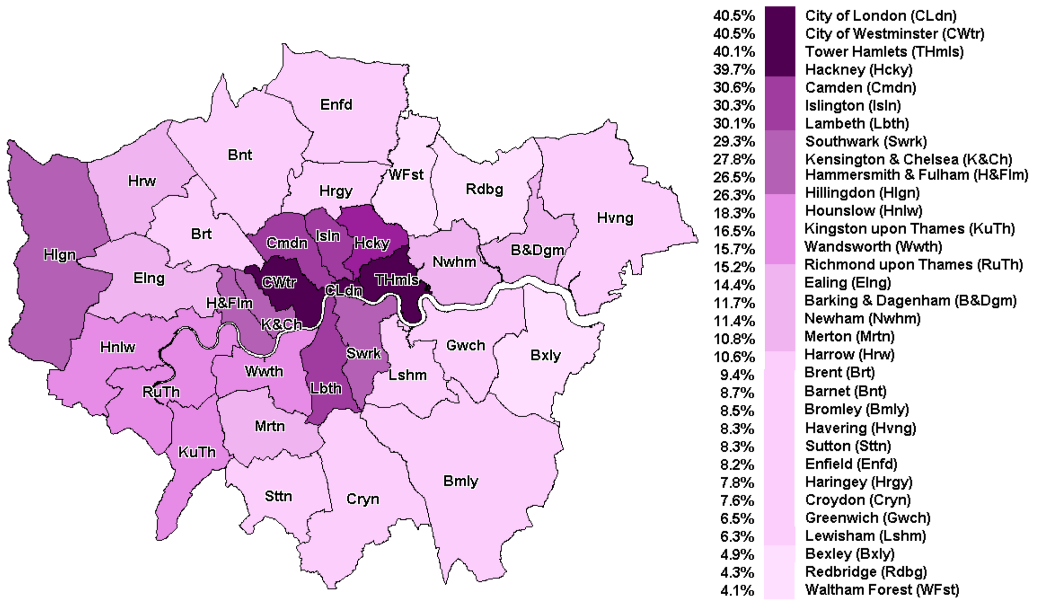


Figure 7.6 Staff MFF in London



7.2.5 NHS expenditure on each staff group

Staff within the NHS are normally broken down into 11 general occupational groups for internal reporting. The percentage in each group in 2000 is shown in Figure 7.7 and the percentage spent on each staff group is shown in Figure 7.8

Figure 7.7 Numbers of NHS staff in 11 occupational groups in 2000

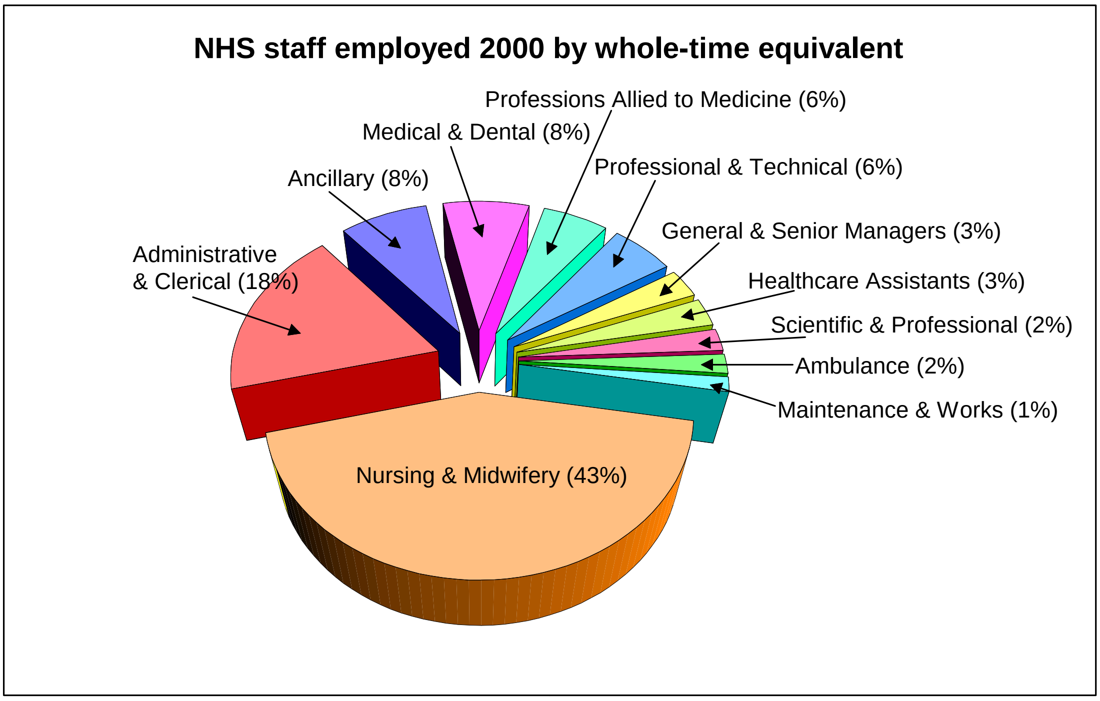
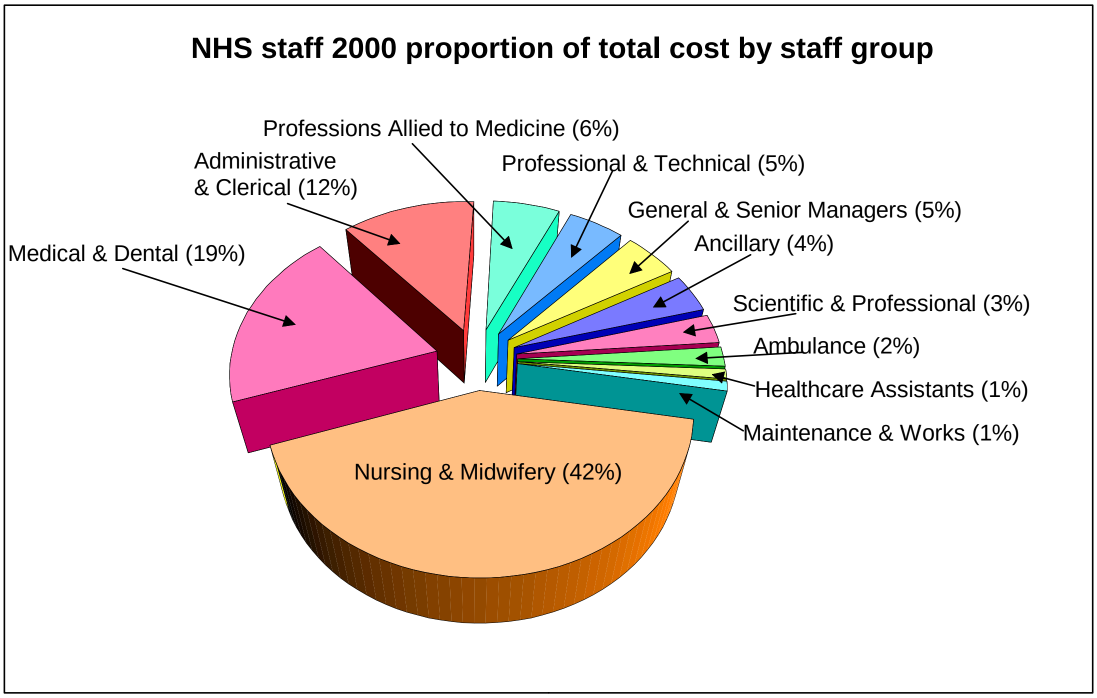


Figure 7.8 Percentage of NHS staff in 11 occupational groups in 2000



7.2.6 Agenda for change and pay agreements for GPs and consultants

An understanding of NHS pay is central to a review of the Staff MFF because the MFF needs to reflect unavoidable differences in staff pay. NHS pay changed significantly between 1997 and 2003 and as the MFF is one of the key adjustments of the resource allocation formula these changes justified close scrutiny.

The Equal Pay Act in 1970 was one of the most influential change agents for NHS pay, however the potential of the Act was not experienced until 1993. The Act made it necessary to ensure that staff carrying out equivalent work were rewarded with equivalent terms and conditions. Pam Enderby was the Head of Speech and Language Therapy at Frenchay Hospital in Bristol when she brought an equal pay case against the trust citing article 119 of the Treaty of Rome, her employer was subsequently co joined as respondent by the Secretary of State for Health. At this time as Personnel Director and I had been given the opportunity to meet one of the leads for the case who detailed the case to me. The case was based on the assertion that the role of as head of service was equivalent to that of the head of the hospital pharmacy service and clinical psychologists. The majority of these staff were male and paid at a significantly higher rate. Dr Enderby was co joined in her case by 2000 other staff. The case involved 26 court appearances, the key ones of which were at an Employment Appeal Tribunal, the Court of Appeal and the European Court of Justice. The scale of the potential claims for the NHS was never fully quantified however the back pay and compensation costs for the 2,000 staff were estimated at £30 million (Enderby and others v Frenchay Health Authority and others 1994, IRLR 593).

It was clear from regional and national personnel meetings previously attended that the NHSE were exceptionally concerned about the potential for a large number of equivalent claims. As a result the case was not settled in the UK but referred to the European Court. There was absolutely no prospect for a successful outcome for the NHS. It was appealed, because of the extremely high costs that the NHS would face by completing a fundamental salary review. Negotiations occurred with national staff representatives on a new grading system and it is believed from meetings previously attended and the fact that cases were not lodged across the UK by staff representatives, that there was an unwritten agreement that unions would not promote equal pay claims pending the introduction of a new grading system.

The House of Commons Health Committee reported on "Future NHS Staffing Requirements" and concluded the following: that there should be support for plans to increase the number of students to be admitted to medical schools; that there should be a review of medical education; an emphasis on training health care workers; that there should be integrated workforce planning; that plans for a single pay structure for all NHS staff and the plans to replace the pay review bodies for doctors and nurses by a single body should also be supported (Health Committee 1999).

It was apparent in the national meetings on the planned pay system that the BMA were unwilling to have a single pay system for all staff. However union officials from UNISON and the RCN saw the inclusion as of fundamental importance. As a result of this and the complexity of rationalising approximately 650 different staff grades into a single system and multiple differences in terms and conditions, it was not until 1999 that the consultation document Agenda for Change (AfC) was published. It was proposed that there should be fundamental changes to NHS pay systems. Key measures included a new national evaluation system for all jobs with the exception of medical and dental professions; making trusts responsible for setting local payscales for staff including doctors and nurses; determining where new staff should join pay scales; and setting out the first stages for introducing performance related pay. AfC was contentious because of the scale and cost of the changes proposed. It meant introducing a harmonised pay and conditions structure for the NHS and moving away from the existing structure of separate Whitley Councils that had existed since 1946, it resulted in unprecedented numbers of staff being in posts that were regraded. It was also apparent that whilst for many it would mean a pay increase for others it would result in pay protection.

When the case was won at the European Court it meant that staff representatives were able to exert considerable pressure and as a result DH negotiators capitulated to union demands and gave larger increases to secure agreement. The RCN estimated that the average cost of Agenda for Change would be 15.8% over 3 years. Approximately 330,000 nurses were employed by the NHS (House of Commons 2006). It should also be noted that there are up to 9 annual increments and the full financial impact would not be experienced for several years.

The system resulted in changes to the NHS London weighting system. The payment of London Weighting in the NHS was more complex than may be initially anticipated as there were a series of historical agreements in place that result in some staff employed outside the area who received the allowance. The primary reasons for these anomalies date back to hospital reconfigurations where hospitals that were in an area receiving an award moved to another area but staff retained their entitlement to the previous cost of living adjustment. The allowances agreed for 2004 are detailed in Figure 7.9. For many staff, particularly those in the lowest pay groups such as ancillary workers, the new payments are worth significantly more and produce a substantial boost to earnings.

Figure 7.9 High Cost Area Adjustments (Mulkearn 2005)

High Cost Area allowances at 1.10.04			
Area	% of basic pay	Minimum £pa	Maximum £pa
Inner London	20	3,197	5,328
Outer London	15	2,664	3,729
Fringe areas	5	799	1,385

The possibility of more local pay variation arises with the fact that the new system permitted other high cost areas to apply for an allowance. However local employers and staff side organisations would have to show that their area had higher living costs and as a result faced significantly worse recruitment and retention problems compared to neighbouring areas in order to qualify for extra payments. Therefore it was concluded that it was unlikely, in the short-term at least, that the new system would spread beyond the traditional high-cost areas of London and the South East.

The Review Body and the national negotiating council were given the flexibility to recommend that premia should be paid for particular occupations where nationwide recruitment and retention problems occur. This could be in the form of a flat-rate premium or guidance could be issued to employers on how to determine the premia. A limit of 30 per cent of basic pay was set for the combined value of nationally determined or locally determined recruitment and retention premia (Mulkearn 2005).

Foundation trusts were given additional autonomy on the amount they could award in recruitment and retention premiums and were exempt from the capping agreement. It was also agreed that they could offer accelerated pay progression or additional non-pay benefits to attract or retain staff. However the DH stated that this autonomy must not undermine the ability of other providers in the local health economy to meet their NHS obligations (Mulkearn 2005).

The Department of Health also sought to have new performance based contracts with GPs, hospital consultants and dentists. I believe that there was high level pressure for a rapid resolution on DH negotiators who were charged with negotiating increases for GPs, medical and dental staff. Having had dinner with the lead negotiator for the BMA who said that they could not believe what the DH agreed to, indeed he described it as absolutely incredible as the DH completely capitulated.

The increase in salaries for staff and GPs that have been negotiated have given some staff unprecedented increases in salary and the Wanless Report (2007) concluded that these increases have not been linked to increases in efficiency. The hourly rate for the lowest paid NHS staff rose from £4.85 in April 2004 to £5.89 in April 2005, an increase of more than 21% in one year (House of Commons 2006). The GP contract has resulted in around 150 GPs earning £250,000 per annum or more and the average salary for a GP increased by 31% in one year (BBC 2006). There have also been large increases for consultant staff. The average consultant earnings rose by 14.32% by the 2003-04 financial year and by 26.78% by the 2005-06 financial year as shown in Figure 7.10.

Figure 7.10 Average consultant earnings, 2002-2006 (House of Commons, Select Committee 2006)

Year	**2002-03**	**2003-04**	**2004-05**	**2005-06**
Average consultant earnings	86,746	99,168	103,648	109,974
% increase relative to 2002/3	n/a	14.32%	19.48%	26.78%

It is clear that these salary rises are significantly in excess of the funding increases that the NHS has received. Pay accounts for the largest proportion of NHS expenditure and these increases were one of the reasons why NHS trusts experienced unprecedented deficits.

7.2.7 Market Forces Factors 2003 to 2006

The DH detailed the concerns raised over the staff MFF (RAWP1, 1998). They were as follows: “it is argued that it involved an act of faith that general labour market indicators can adequately proxy the additional (unavoidable) costs faced by NHS providers in different parts of the country” and that “NHS labour is less mobile geographically than other labour” and “since providers are largely constrained by national pay scales they cannot raise (local NHS) wage levels to competitive levels”. There were particular concerns raised about the ‘cliff edges’ between areas in London as these resulted in large disparities in the funding of neighbouring health authorities as shown in Figure 7.6. As a result of these concerns the Advisory Committee on Resource Allocation was asked to carry out a review of the staff MFF.

The DH commissioned the Institute for Employment Research at Warwick, who had completed the initial study, to complete this follow up review. The ensuing report (Wilson et al, 2001) reviewed the concerns raised and recalculated the comparable salaries from local communities. The NES had undergone a series of changes which impacted on the second review. The increase in the number of local pay zones from 78 to 119 meant that it was possible to split zones down to smaller areas. The first Warwick study had used salaries in the private sector as a basis for setting NHS pay. However changes to the NES meant that the comparison between the public and private sector was no longer possible and therefore the Warwick team carried out analyses to compensate for this change.

The Warwick team considered eleven ways of smoothing the data and concluded that the smoothing system should be based on pay levels in an area but also neighbouring areas. The pay of neighbouring areas was weighted by the inverse of the squared distance from the population weighted geographical centroids to the equivalent centroid of each neighbour. This system smoothed out cliff edges in London.

The impact of AfC on the Pay MFF was questioned and was reviewed and the research that was planned was aimed at identifying how NHS pay varies. It also considered factors such as turnover rates (NHS Partners 2006). The findings of this research may result in further changes to the staff MFF.

7.2.8 Critique of the Warwick studies

Initial concerns about the Warwick studies relate to the assumptions underlying the analyses and the smoothing system adopted. The rationale given to justify the inclusion and scale of the staff MFF was that in areas with high local salaries there would be one or more of the following: higher base salaries; greater rates of staff turnover; increased agency costs; lower staff quality; and grade drift. However despite the scale of the adjustments that would result from such an approach none of these assertions were supported by econometric analyses. Warwick's conclusion about the paucity and quality of data has not been accepted by other researchers who have used NHS data for studies on staff.

The NHS is treated like any other employer that competes in a local economy for staff. It is believed that this was inappropriate because the only significant competition for a large proportion of NHS employed staff is either in the NHS or publicly funded organisations like nursing homes. There is little competition with, for example the financial sector for the majority of staff. Indeed it is clear that the study ignored some of its own findings on monopsonistic nature of the NHS as the Human Resource Directors interviewed by Warwick as part of the study confirmed that, with very few exceptions, competition with the private sector is not an issue and that "there was no interest in the wider labour market". Directors at the two acute hospitals in the London area interviewed as part of the study felt that "there would be pressure to offer very slightly more than the national average". It was accepted in the report that "in a system dominated by rational pay bargaining that it is inevitable that observed wage cost differences would be minimal".

The Elliott report into the impact of local pay markets on health services, published in 2004, also concluded that trusts are less likely to compete with other employment sectors, that most trusts were reluctant to increase pay to attract and retain staff and that non pay factors are key including reputation, teaching, new buildings and equipment.

There would appear to be merit in ensuring that the salaries paid to specialist staff at all levels, whether there is competition or not for staff, is appropriate with staff in other employment sectors as this may help to ensure that the NHS is an attractive career option long term. It is believed that this could become increasingly important if there is less guarantee of employment.

The Warwick studies assert that the quality of staff will be affected in areas where the NHS cannot compete with high salaries. The impact it anticipated was that greater costs would be experienced because of needing to employ additional staff. However the Human Resource from London who were interviewed as part of the initial Warwick study stated that this was not a significant issue.

It is believed that the Warwick researchers were correct in their conclusions about the robustness of routinely collected information. During meetings with main board members of the DH and the Healthcare Commission all of the directors concluded that the biggest challenge facing the senior team at the DH was the paucity of robust information on the service.

The difficulties of access to reliable information have been a particular difficulty for this thesis. For example when reviewing the expenditure on transport it was found that there were some rural trusts that were reporting in their trust financial returns that they had no or exceptionally low expenditure on transport. The explanations for this are likely to include incorrect reporting or the use of capital funding to purchase cars rather than revenue for leases or an exclusion of travel expenses from the figures. Unfortunately there has been little focus on ensuring that information returns are completed accurately and there is no action taken if information is incorrect. In addition much of the information is not utilised, partly because of the evident lack of robustness. This in turn means that errors are probably not detected and again remedial action is not taken.

However if Warwick had concluded that additional information should be routinely collected, then the Department of Health could have taken measures that would have significantly improved the robustness of the information available. It is believed that one of the reasons for data inaccuracy is that NHS staff cannot always see a direct link between data submissions and an impact on trusts. This would have been less likely to have been the case where data was being used to adjust financial allocations. In addition there are internal and external audit functions that could have been tasked with auditing returns to improve the accuracy of returns.

Despite the complexities caused by poor data quality, meaningful studies have been completed. A study into the impact of local wage differentials between nurses and other local employment sectors found that the responsiveness of vacancy rates to wage differentials is lower for qualified nurses than for all nurses (Bell 2005).

It is also clear that a system based on adjusting for actual costs incurred was and still is in place for medical and dental staff.

The Warwick report refers to the indirect costs of not competing effectively on salaries such as increased staff turnover, agency costs. A need to compensate for factors such as staff turnover is also given as part of the rationale for the pay adjustment in Department of Health papers. There was no reference to data that was available that showed that staff turnover was high in a range of areas and not just London.

The first Warwick report was underpinned by a series of detailed technical papers. In one of these, technical paper 1c, it was concluded that the outcome of the 1995 award was that most trusts negotiated the same award i.e. a 1% national component and a 2% local award and that the national award in 1996 would be based on the outcome of the awards agreed in 1995 rounded up to 3% even if NHS trusts had agreed lower awards locally. It is believed that it was readily apparent at the time of the first study that the local pay initiative was highly unlikely to result in any significant differences in pay and that this issue was inadequately considered in both reports.

It is believed that the way that the Adam Smith theory was used was too simplistic as the attractiveness of a job will vary from person to person. It can depend on a range of factors including developing clinical skills in a centre of excellence, job opportunities, other benefits such as car, pension share options, status, personality of other members of the department, work environment, quality of schools, social life, countryside, housing costs, transport, location of family and friends, and research opportunities. In addition job opportunities for other family members are key factors for some potential staff. Even a significant pay premium may be inadequate to compensate for the loss of a second income and it was found that this had a major impact on the recruitment of senior staff in rural areas.

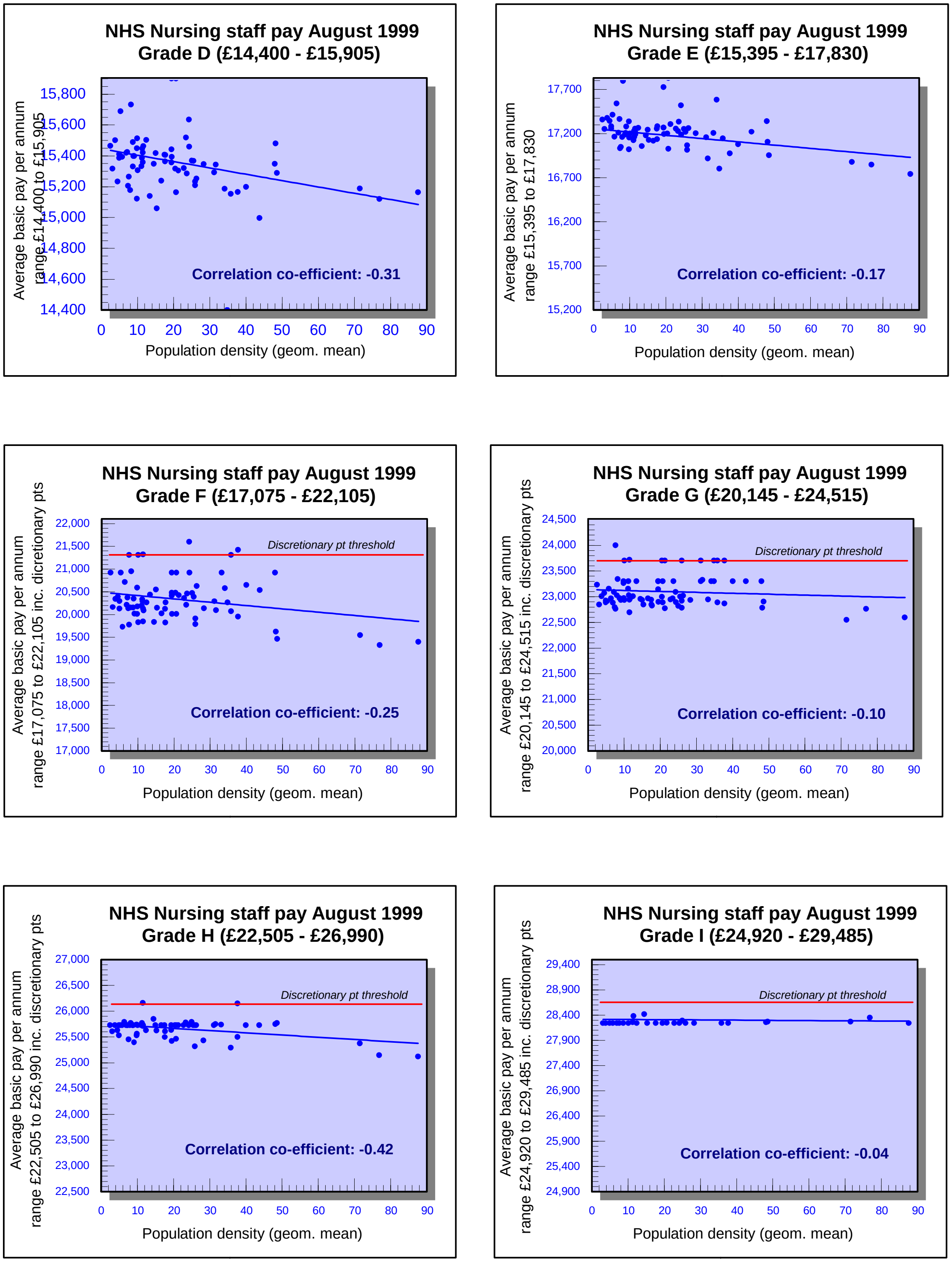
Whilst it is believed that it would be possible to develop a model of the wage differentials required to compensate for attractiveness it would be extremely complex, time consuming and require regular updating because of the fluidity of the factors that would need to be taken into account. To be robust there would need to be comparative studies between staff groups and between staff at different grades and personal circumstances within staff groups. It is believed that it would be much simpler to monitor what happens and adjust the formula accordingly. The disadvantage of this approach is that it could compensate poor employers for poor employment practices. However if there was smoothing between adjacent areas then this could reduce the impact of this on healthcare and the employment.

7.2.9 Analyses of NHS pay

Further analyses were designed to test whether or not the Staff MFF resulting from the Warwick studies meet the requirement to adjust for unavoidable differences in the cost of providing services. The hypothesis was that the system did not do so. Having considered each of the reasons given for the staff MFF and carried out analyses on the data available or identified what analyses could be carried out to determine the veracity of the conclusions made by Warwick. Statistical analyses were used where possible to determine if there is a correlation between the data and the staff MFF.

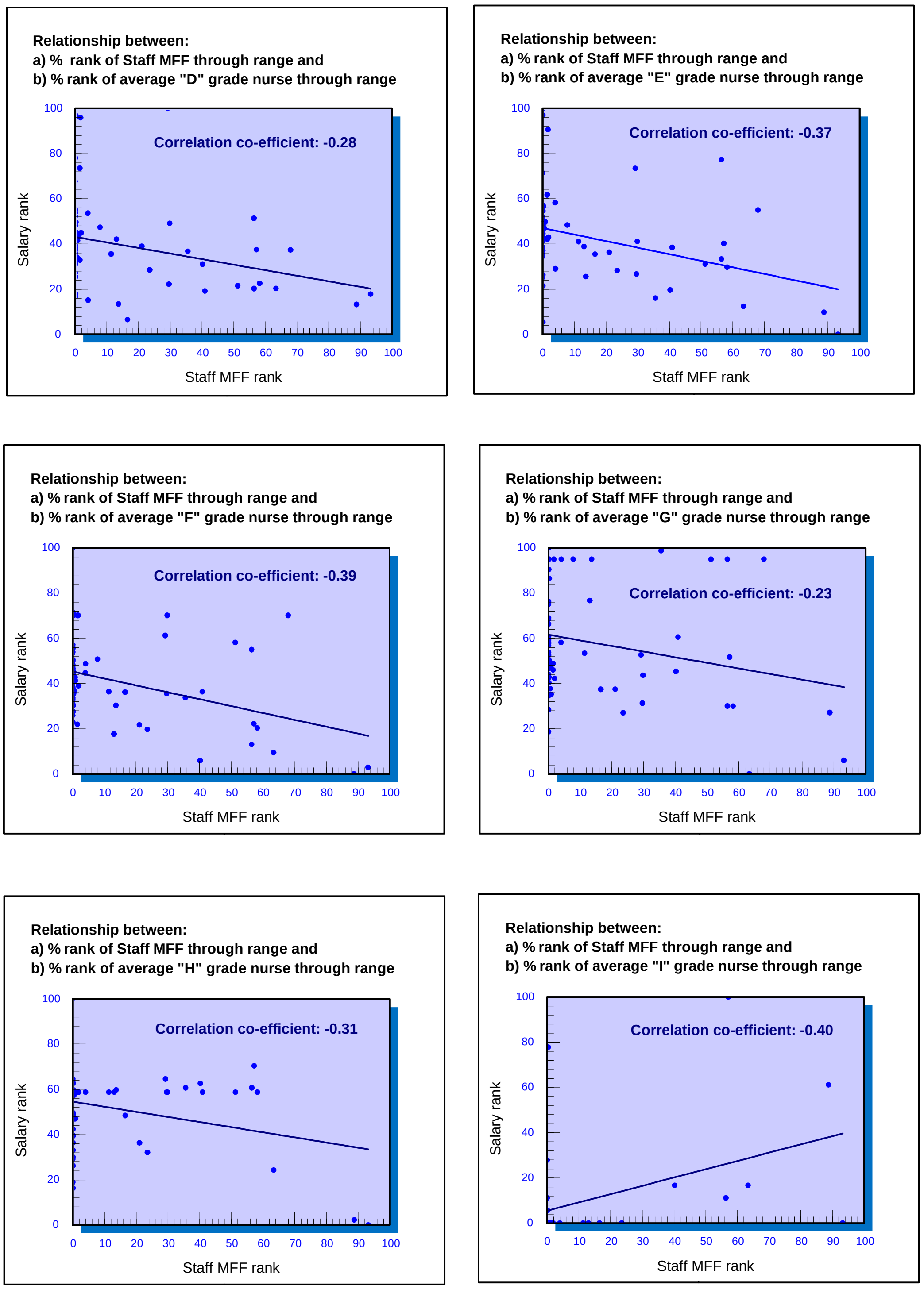
The average base pay for staff varied across the country in each staff grade. The graphs in Figure 7.11 show the average salaries for each of the nursing grades D to I. The data was not available for all trusts because of incompatible systems; however there was sufficient data for regression analyses. The average salaries were plotted against the rurality of the area for the employing NHS trust.

Figure 7.11 Analyses of staff pay 1999



These analyses indicate that there was a small correlation between higher pay and rurality for staff in most grades. It would appear from my analyses that if the staff MFF had been based on an SRC rather than a GLM approach that rural areas would have received increased rather than decreased funding for staff if the adjustment had been based on actual staff salaries.

Figure 7.12 Correlation of average salary and Staff MFF



Analyses of the average position of staff in their payscale are shown in Figure 7.12 It is possible to compare the rankings of the staff MFF with the average of actual pay. This indicates that for all grades of staff, other than the small number of senior 'I' grade staff that there was a negative correlation between the Staff MFF and actual pay levels.

7.2.10 Staff turnover

Analyses of staff turnover rates were completed and are shown in Figures 7.13 and 7.14, however a significant number of the results appeared spurious, for example Avon and Wiltshire had the highest turnover rates in 1999 to 2000 at over 30% and 44% respectively. The reasons for these figures cannot be determined without detailed investigation. However it is believed that the figures are most likely to be due to reorganisations where staff have transferred between organisations and were counted as leavers. It is also possible that there could be differences in the way that changes in grade are reported. As a result of the concerns over the robustness of the data it is not possible to make reliable conclusions.

Even with what are likely to be spurious results from some areas the analyses indicate that there was a positive correlation between the turnover rates and the staff MFF.

Therefore the Warwick conclusion appeared to have some substance. Further research would be needed to determine the turnover rates and to calculate the financial impact. It also appears clear that there was high staff turnover in areas like Birmingham which was reported to have over 600 nursing vacancies in 1999 in a Parliamentary report (Hansard 1999) however the area did not receive a significant Staff MFF.

Figure 7.13 Staff turnover in 1999 to 2000

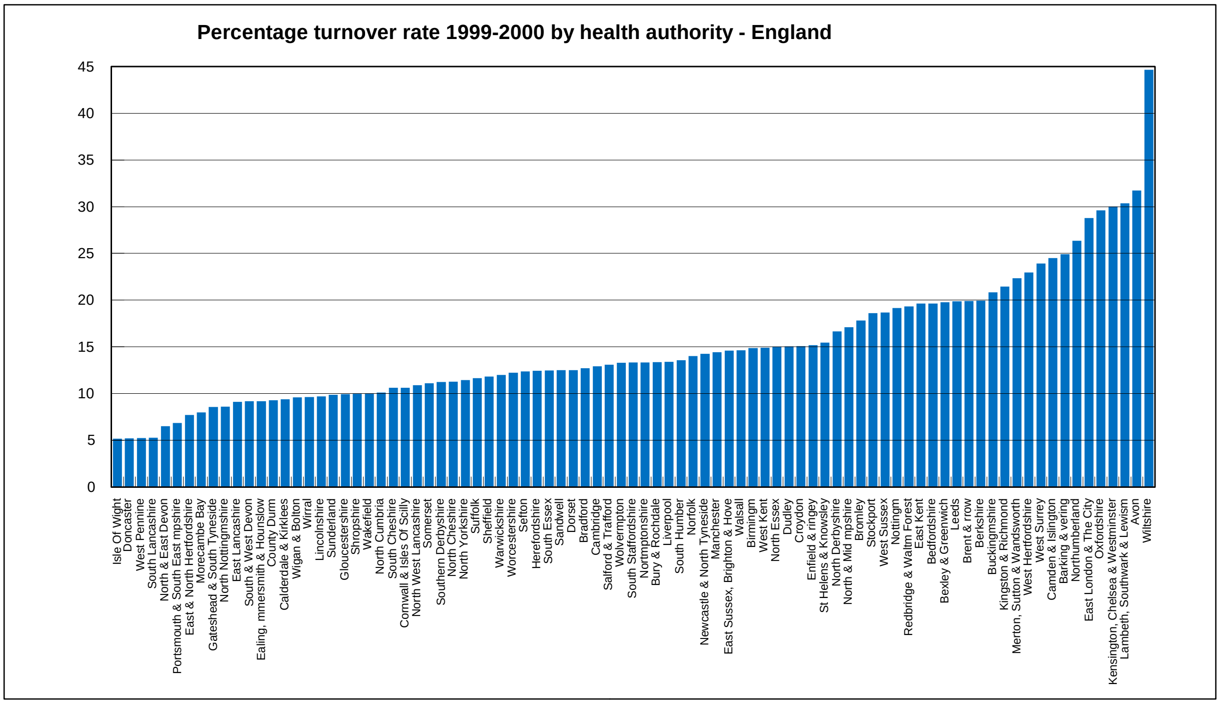
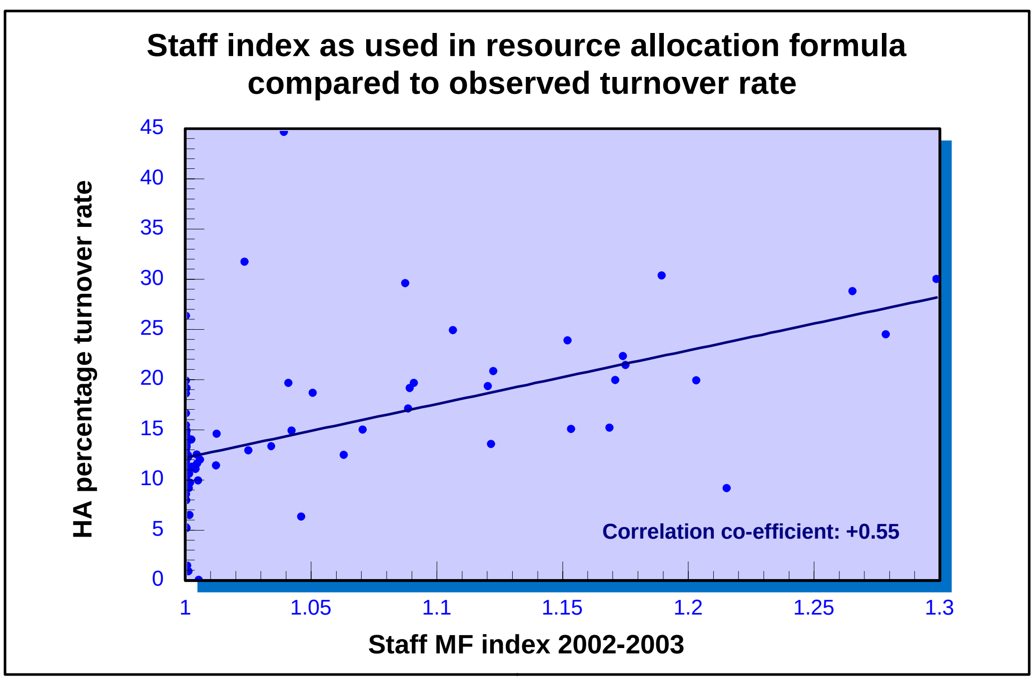


Figure 7.14 Correlation between Staff MFF and turnover 1999 to 2000



7.2.11 Conclusions on NHS pay

The scale of the changes made to NHS pay mean that the impact of the Staff MFF should be subject to a series of independent reviews to determine if the MFF needs to be altered to reflect unavoidable differences in costs.

It is believed that the potential impact of reducing controls on the ability to set pay for medical staff when there were a limited number of doctors available was not considered and it was one of the factors leading to significant pay increases for medical staff. The number of doctors has been restricted in many countries. In France a quota was applied on the number of students that were able to progress to the second year of training, in Germany, Italy and the Netherlands the number of entrants was restricted to a constant level. In 1996 Australia made postgraduate qualifications mandatory for new graduates that wished to provide Government subsidised health care. In the UK the number of doctors has been limited by the number of training places.

However the decision to increase the number of doctors in training England was increased due to the decision to provide more training places at existing medical schools and the approval of the formation of additional medical schools from 2002 based in Norwich and Plymouth (Ross et al 1999).

The increase in training and the financial constraints resulted in a widely reported change in the employment prospects for doctors. From previous experience it was exceptionally difficult to fill positions for medical and specialist clinical staff. This resulted in the need to re-advertise posts and often there was only one candidate. As a consequence even non-ideal applicants could demand a salary at the top of the salary scale. The equivalent happened for senior management posts whilst in a previous role in Cornwall where advertising did not attract suitable candidates for Finance Director and Nursing Director posts. For medical posts it resulted in the UK 'importing' clinical staff from other countries, many of which could ill afford to lose the doctors that had been trained. The impact for other countries was widely reported and focused primarily on the potential health consequences for other countries, many of which were 'second and third world' however there were also financial consequences and it appeared totally iniquitous for a relatively affluent country to be recruiting a large number of clinicians at the cost of these other countries.

In addition to being sounder on moral grounds it is believed that training more doctors than required has had financial benefits. The pay range was £67,133 to £90,838 in 2004 and trusts could pay recruitment and retention supplements of typically up to 30% for up to 4 years (BMA, 2003). Medical pay progresses via annual increments and after 8 years a consultant may be on the top of a pay scale. The cost of training a doctor has been estimated at £200,000 to £250,000 (Hansard February 2005). Therefore if 25% more doctors were trained than there were posts available this would cost an additional £50,000 to £62,500 per doctor. It is believed that training of additional doctors could eliminate the need to pay new consultants above the minimum of the salary range. An analysis of consultant starting salaries and recruitment and retention premia would indicate the impact of training more doctors than required. It would need to be monitored because such a policy could impact on the quality or number of applicants for the training.

It is possible that some posts such as those for senior managers may be considered to be worthy of a premium because of the performance and greater autonomy of the organisations. It is believed that salaries for directors and senior managers will become more consistent with those in the commercial sector. It is also notable that many of the NHS organisations employ in excess of 5000 staff and that if equivalent packages to the commercial sector are paid then this will mean large increases in salaries. This would not be an unprecedented result as the equivalent has already occurred in utility and privatised companies. This is of importance to staff MFF as it needs to reflect the unavoidable differences in pay if it is to be possible to be able to offer equivalent services across the country. The scale of the impact of the pay factor is such that it is necessary to make this adjustment as accurate as possible on an ongoing basis.

The change in the nature of employment for senior managerial staff in the NHS may have long term implications for pay levels because, as for clinical staff, the NHS acts monopsonistically. Therefore the limited supply of senior staff will result in significant increases in salaries. Senior managerial costs are a relatively small proportion of NHS pay costs, however it would become more significant if ‘pay drift’ occurs and there are subsequent increases for second and third line managers. It is believed that pay increases are warranted in view of the reduced job security; however personal preference would be to see significant bonuses based on successful performance. This approach would have the advantage of rewarding success and be less likely to result in ‘pay drift’. Additional research should be carried out to determine the likely changes in NHS pay for senior managers and to propose a system that would reflect the challenges faced. If this does not occur there will be a lack of planning and coordination and this could impact on public confidence and perception.

The scale of the changes resulting from introducing AfC was unprecedented in the history of the NHS. The impact of AfC on pay will need to be closely monitored to determine how pay varies as a result of pay progression, the end of pay protection, and the outcome of tribunal cases and grievances. The impact of Foundation Trusts on pay is also as yet unclear. It will also be necessary to carry out research to determine how pay changes in these trusts as the plan is for all trusts to achieve Foundation status.

It may be that the lack of job opportunities in rural and less accessible areas can mean that it is possible to appoint highly skilled staff to relatively junior posts. Intuitively this would appear a reasonable hypothesis and from personal experience it would appear that this probably is the case. However there is also a potential negative of low turnover where there is too much stability and new ideas are stifled.

One measure of successful performance could be Foundation Trust (FT) status. Trusts that have a proven record of successful performance were assessed to determine if they had the capacity to take more responsibility. Further research could indicate if there is a link between trusts that have been successful in their applications and the MFF. It is anticipated that the number of specialist centres in London would mean a relatively large number of FTs. However only 10 of the 62 FTs that had been approved in England by 2007 (Monitor 2007) were in London. All of the 5 of the FTs in London that provided district general hospital services were funded by Centrally based PCTs as detailed in Figure 7.15. This appears significant and it may indicate that the trusts in Outer London were not able to attract retain and motivate staff required to ensure that trusts performed well relative to others in the NHS. It is notable that the 9 PCTs that had the largest Staff MFF adjustments were significant commissioners of services for the only trusts in London that achieved FTs status by 2007.

Figure 7.15 Foundation trusts in London 2007

Trust	Services provided and location
Chelsea and Westminster Hospital NHS Foundation Trust	DGH services, Lead PCT Westminster
Guy's and St. Thomas' NHS Foundation Trust	DGH and specialist services, Lead PCT Lambeth & Southwark
Homerton University Hospital NHS Foundation Trust	DGH services, Lead PCT City and Hackney
King's College Hospital NHS Foundation Trust	DGH services, Lead PCT Lambeth & Southwark
Moorfields Eye Hospital NHS Foundation Trust	Specialist services, Central London and clinics throughout London
Oxleas NHS Foundation Trust	Mental health services, SE London
South London and Maudsley NHS Foundation Trust	Mental health services, SW London
Tavistock and Portman NHS Foundation Trust	Mental health services, Central London
The Royal Marsden NHS Foundation Trust	Specialist services, Central London and research and hospital site in SW London
University College London Hospitals NHS Foundation Trust	DGH and specialist services, Lead PCT Camden

It is possible that the providers in areas with high salaries are addressing turnover issue by allocating more resources to employing staff. If this were the case then the total base salary costs for staff divided by the population in an area should tend to be higher in these areas. Such analyses would need to be carried out with considerable care because of outsourcing of support services such as cleaning and catering, the utilisation of the private sector and the development of Independent Sector Treatment Centres for the provision of clinical services.

It is unclear whether or not the FT spread in London in 2007 indicates that the allocation formula may not have been adjusted for unavoidable costs or needs for healthcare. Further research into funding and quality would be of particular interest and benefit to the NHS because being able to provide an equivalent service is the core rationale of the resource allocation formula. In the absence of effective measures of quality and research on how quality varies according to funding it will not be possible to know if the resource allocation formula is effective.

If research identified that there were differences in quality and that these were endemic it could be argued that a new adjustment factor was justified that would give such trusts additional income to focus on improving quality through enhancing staff numbers, skill mix, training and development, retention or attraction premia or a mix of initiatives.

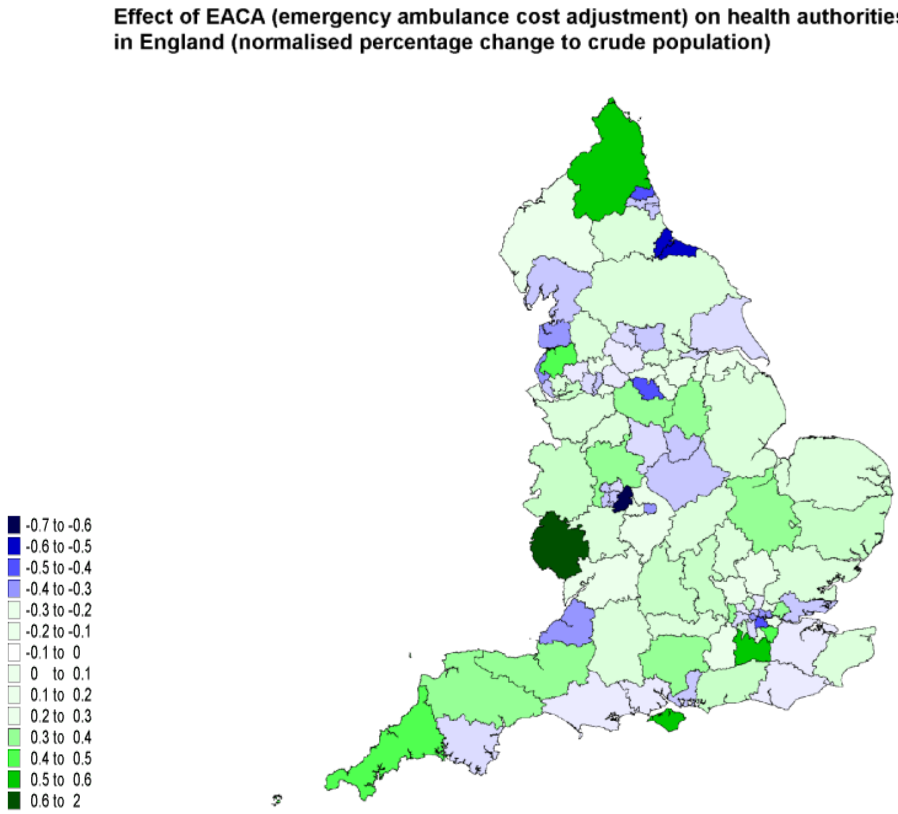
It is believed that a new system based on the actual unavoidable costs incurred should be introduced. This would need to reflect the actual salary costs of staff employed directly and indirectly. It would also need to reflect the unavoidable costs resulting from increased staff turnover, overtime bank, agency usage and achieving equivalent quality of services. The research previously discussed would need to be central to the adjustment to support the achievement of equivalent services. The majority of this data on staff and pay is already collected but it would be necessary to ensure that there was consistency of data collection.

7.3 EACA

The Emergency Ambulance Cost Adjustment (EACA) was introduced for the 1998/9 financial year and followed representations from ambulance trusts that it would not be possible to meet the ambulance response time targets without additional funding. The targets were viewed as a priority and therefore research was commissioned to identify if an adjustment was justified. The findings were that rural and the most urban areas face additional costs and that an adjustment was required to reflect the unavoidable costs. The aim is to adjust allocations according to differences in the costs of providing emergency ambulance services. The EACA Index was based on conclusions that a 1 per cent increase in Geometric Mean Density led to a 0.23% increase in costs per journey, that a 1% per cent increase in the total number of journeys led to a 0.17% decrease in unit costs and that a case-mix effect: a 1% increase in emergencies as a proportion of total journeys added a premium of 0.96% to unit costs (MHA 1997). The adjustments are relatively small in the context of MFF as only one area, Herefordshire, had an adjustment of over 1% as shown in Figure 7.16.

It is believed that the conclusion that Herefordshire had the highest additional costs is counter-intuitive and requires further scrutiny and that it is the result of considering each area in isolation, in effect as if it were as island. This does not reflect the way that the NHS works and it does not take into account geographical factors such as neighbouring areas as detailed previously.

Figure 7.16 Emergency Ambulance Cost Adjustment



7.4 LAND AND BUILDINGS

The Land and Buildings MFFs received relatively little focus. This may be due to the smaller impact that the factor had on the allocations received. However with a combined impact of 8.54% it was still a significant factor and was therefore deserving of further attention. There was no adjustment to reflect the condition of the estate. This is worthy of consideration because the condition of the estate varied considerably. Trusts that had an estate that was in relatively good order would have consequently required less capital for upkeep of the facility. They would therefore have had more capital available for equipment expenditure that could have enabled the local health service to provide improved services compared with areas with an estate that was in a relatively poor condition. All trusts are able to invest in new facilities through the Private Finance Initiative and there is also limited funding available from the Treasury. However this investment attracts capital charges, or in the case of PFI charges from a commercial organisation, and these payments decrease the revenue funding available for healthcare.

A series of reviews were completed in 2001 of the condition of the infrastructure of the Royal Cornwall Hospitals NHS Trust. It was found that the acute trust would need to spend in excess of £2million per annum for 6 years to complete essential electrical refurbishment and health and safety works. This requirement was the result of the age of the main hospital facility where the natural life of the key infrastructure had been exceeded and the lack of addressing the under-investment.

Having held various posts with the DH and NHS since 1991 and visited or worked at over 100 acute hospital sites in particular in London, the South and the North West it is clear that the position in Cornwall on buildings was common (Harrison 2001). It is believed that a key factor was that a number of NHS trusts with district general hospitals that had been built in the 1960s secured the required investment for significant rebuilds, refurbishment or replacement whereas others had little if any significant investment. The position has been exacerbated in trusts where hospital developments have taken a protracted period of time because there is a logical tendency to scale down investment where sites are scheduled for closure.

The impact of under-investment in new equipment becomes clear when the potential uses of the capital are considered. Investing in new equipment can mean that efficiency or quality improvements that are possible by using new equipment and therefore there is a lost opportunity to achieve recurring cost savings or improvements in the quality of healthcare. For example Computerised Tomography and Magnetic Resonance Imaging scanners reduce the need for invasive surgery however they require considerable capital for purchase and facilities costs. Trusts that have not had to invest significant capital in outdated infrastructure are more likely to be able to afford such equipment. Further research would be necessary to determine whether or not this is a sufficiently significant issue for an adjustment to be made to the allocation formula.

The under-investment was one of the reasons for the PFI programme. The annual charge for PFI schemes has been calculated as ranging between 9.1% and 18% of the construction cost of the facility (Gaffney et al 1999). The capital charge rate for major capital used by trusts was 6% (Hansard 2002); however the figures are not directly comparable as a small payment would also be made by the NHS for maintenance. It is however clear from a wide range of studies completed on PFI developments that they are generally viewed as more costly. Despite assurances from the DH about the cost effectiveness of PFI schemes it would be counter-intuitive for PFI to cost less. This is because Government can borrow money at a lower rate than commercial companies, there are complex legal and financial arrangements and the costs have to be recouped through the contract, the private sector has to make a profit and it is not possible to make major savings on support services due to the minimum wage.

It is believed that the costs incurred by the NHS are often over-looked and they should be considered when determining the costs and benefits. The list of hospital development schemes that have been completed using PFI is shown in Appendix 9.

There are also potential unavoidable differences when land costs are considered. Land is valued according to locality and the standard approach has been to value the land for hospitals in urban areas as though they were suitable for housing redevelopment. This has overstated land values as was found when appointed to a financial recovery post for the Trafford Hospitals Trust in Manchester, where the case for a £750,000 per annum in capital charges was put forward. The land costs for trusts vary considerably and alter as land is purchased or sold. This area is worthy of further consideration when refining the MFFs.

7.5 RURALITY AND OTHER NON PAY COSTS

If the Advisory Committee on Resource Allocation had determined that it had been necessary to introduce a general adjustment for rurality it would have been included as an MFF. However the Advisory Committee concluded that there was insufficient justification for such an adjustment. This factor is discussed separately in Chapter 9 as it is a central element to this study.

There was also no direct adjustment for the differences that existed between areas in the cost of local taxes and utilities, in particular water and effluent charges. The national average expenditure share on what was termed as ‘Other non-pay’ was 22.92%. This covered a broad range of areas and includes expenditure on the purchasing of consumables and pharmaceuticals, services provided to the trust, transport and utilities and waste costs.

As the NHS representative with OFWAT from 1995 to 1999 one of the concerns that was raised with the regulator was that most NHS trusts pay the same water charges as domestic customers, unless they have a ‘one off’ agreement with their local water company. This agreement was negotiated for the trusts in Cornwall with South West Water. OFWAT publish information on the average cost of water and sewerage across England and Wales. The average water charges vary considerably across the UK as shown in Figure 7.17.

Figure 7.17 Average expected household bills for water and sewerage (OFWAT 2004)

Company	**Water**	**Sewerage**	**Total**
Anglian	122	172	294
Dwr Cymru	123	163	286
Northumbrian	100	132	232
Severn Trent	116	105	221
South West	126	231	357
Southern	91	168	259
Thames	113	98	211
United Utilities	133	136	269
Wessex	126	151	277
Yorkshire	117	126	243

The utilities charge for a large NHS Trust like that in Cardiff was £5.4 million of which water charges accounted for £1.1 million and electricity £4.3 million. Trust income for the same period was £548.7 million and therefore the utilities charge was approximately 1% of the trust income. The amount paid by the trust for waste disposal was £1.4 million (Ross 2005). Information on the charges paid per tonne by the NHS trusts for waste treatment is not readily available.

Further research would show if there should be an adjustment for other costs and rurality. The analyses in this thesis indicate that *prima facie* there is a case requiring further scrutiny by the Department of Health.

7.6 CRITIQUE OF ANALYSES

The principal weaknesses of the analyses on pay are the limited number of analyses and the quality of NHS data. As a result it could be argued that whilst a *prima facie* case has been made that base pay levels in rural areas were higher and that the staff MFF did not appear to be consistent with actual base salary levels, the results are not definitive.

The conclusions on land and buildings and utilities costs are not based on in depth analyses of NHS costs. It is accepted that these could have been completed by analysis of trust financial returns. However it was concluded that data quality would make such analyses complex and extremely time consuming.

7.7 NOVEL AREAS IN THESIS

The major novel areas in the thesis are the analyses of actual pay levels and the regression analyses of pay relative to the MFF adjustment and the GMD measure of rurality. This approach could be used to assess the impact of an SRC pay adjustment factor.

Analyses highlighted the impact of the pay MFF in London, in particular on some of the poorest areas. It is believed that the papers including one in Parliamentary Briefing and copies of a personal report entitled “Who gets what, where and why” (White and

Flowerdew 1999), accompanying letters detailing the impact of the ‘cliff edges’ in London that were sent to MPs, NHS and DH senior executives had an impact on the pay MFF and were a contributory factor to the decision to have a second report on pay. The Chief Executive of the SHA in Dorset who later became the Acting Chief Executive for the NHS wrote to express his interest in the report.

Whilst there has been some criticism of the Warwick studies nothing like the critique in this thesis has been published. As stated Warwick is the leading business school on pay and the studies were underpinned by a series of detailed and complex working papers. Completing a critique of the studies was challenging.

There has been little consideration of resource allocation, the impact of other factors and the potential requirement for adjustments to compensate for unavoidable cost differences. Areas that have been focused on that have not received focus previously include the implications of utilities costs, PFI and the condition of buildings.

There has been no equivalent construct proposed for a MFF resource allocation system that has a specific aim to support areas to provide an equivalent quality of service, in particular one that seeks to identify the unavoidable staff costs including staff turnover.

7.8 RECOMMENDATIONS

Financial analyses are carried out by all trusts of expenditure and income. The first phase should be for the system to be standardised, with audit and sign off to ensure compliance to a standard process, so that reliable comparisons are possible. Phase two should be to identify the costs of individual services and departments, and therefore treatments provided. This data could then be used to identify additional costs encountered and analyses could be carried out to determine if the costs should be avoidable. If unavoidable a MFF should be applied and if avoidable it would identify for trusts where increased expenditure is being incurred. This is equivalent to the systems used by leading global companies.

7.9 CONCLUSIONS

Analyses support the un-researched assertion by Warwick that staff turnover tended to be higher in areas where local commercial salaries were higher. Indeed it is believed that if what was viewed as spurious results from areas like Wiltshire could be removed from the analyses there would be a strong correlation. It could therefore be determined that the central tenet of the Warwick study that the Pay MFF needed to be adjusted according to the theory of compensating differentials was reasonable as the Audit Commission had concluded that staff turnover was a major cost for the NHS. However the Warwick study did not review staff turnover or staff costs. If this analysis had been carried out it would have been clear where staff turnover and costs were highest and this may not have been in areas with high commercial salaries.

It could be asserted that conclusions on the numbers and locations of FTs also support the conclusions made by Warwick on quality. It was concluded that quality would be lower in areas which have an inadequate cost adjustment as they will not be able to afford to take the actions required to mitigate the impact of high staff turnover and lower staff quality. However analyses show that it is the areas in London with lower staff MFFs that did not have FTs. It could be argued that the impact of the changes made following the second Warwick report which resulted in ‘smoothing’ has still to be fully effective.

It is believed that an SRC approach should have been adopted for the pay MFF. However the development of an accurate adjustment would be complex if it took into account all of the factors that have been listed such as salary levels, total salary costs, staff turnover, agency and overtime costs. It could be argued that it would be impossible to fully determine an accurate adjustment and that it would need ongoing research to keep the adjustment current due to the volatility of staff pay. It could also be concluded that NHS information on pay and associated issues was and is too unreliable for robust analyses to be completed. My counter-argument would be that as staff pay is the biggest cost for the NHS it should be kept under continual scrutiny and that accurate information on costs is vital.

It is believed that the rates paid for utilities are a prime example of why it is important to collect and scrutinise such data at SHA and national levels. If this occurred then senior staff within the NHS could identify and take appropriate action to address issues like the quality of facilities, as it would for example be clear where areas were spending a disproportionate amount on maintaining facilities and on payments made for water and the treatment of effluent.

Staff bodies have been central to the development of working practices for staff and terms and conditions. However staff bodies have negotiated large increases for members including annual increases of 31% for GPs, 21% for the lowest paid staff and 14.32% for consultants. The nursing body the RCN has estimated that the Agenda for Change job evaluation and pay system will result in increases of 15.8% on top of inflation over a period of 3 years. .

Staff representatives and colleges have been instrumental in the development of the current terms and conditions and working practices. The veto that the representatives of Royal Colleges have on work plans for posts that are being advertised and their role on the appointment boards means that they are particularly influential and these bodies therefore bear some of the responsibility for past inefficiencies and developing new more efficient services for the future. However it is believed that the raison d'etre of the Colleges is to promote the interests of their members and changes could be resisted by those who wish to maximise the time that they have to be able to provide private services and others may not wish to change. It is believed that this issue needs to be addressed by a Royal Commission.

The Market Forces Factors are highly significant in the resource allocation system. The pay MFF has received considerable focus and has been modified as successive attempts have been made to develop an appropriate adjustment. There has been less focus on other areas such as buildings, land, rurality and utilities.

The scale of the pay MFF is such that it is essential that it reflects unavoidable differences in the cost of providing services. This study has identified concerns with the GLM approach that has been adopted following research by Warwick. It is also argued that the theory on wage differentials was used too simplistically as the attractiveness of an area will vary according to personal preferences and circumstances.

It is concluded that there are a number of major concerns about the Warwick studies and the way that they were applied by the Department of Health. Firstly it is believed that the research that underpins the pay adjustment did not adequately consider the monopsonistic nature of the NHS or the national pay structure. The NHS does not, for most jobs, compete with the commercial sector. This was made clear by the NHS directors interviewed as part of the Warwick study. It is immediately apparent that senior clinical staff do not have the experience required to secure jobs in the commercial sector or vice versa. It is believed that including such comparators means that the formulae based on the Warwick Studies do not reflect the unavoidable differences in costs experienced by the NHS.

Secondly it should have been apparent to the DH and Warwick that the recommendation to base Medical and Dental salaries on the general staff MFF would have led to a 400% increase in this adjustment when compared to the previous adjustment for some areas. The scale of this difference should have resulted in Warwick determining that a rigorous investigation was required of the general approach and assumptions for all staff groups.

Research has shown that base salaries tend to be higher in rural areas. This is because staff tend to be higher on their pay scale. This is almost certainly because staff tend to stay in a job for longer in rural areas. As pay progression is related to length of service, this has a disproportional impact on areas with low staff turnover.

Whatever system is adopted it is clear that there will need to be a continued focus on the pay MFF because of the volatility of the pay systems as a result of Agenda for Change and Foundation Trusts.

The scale of the MFF is such that it was essential that it adequately reflected unavoidable differences in costs. It is concluded that the MFF were flawed and that they were a contributing factor to some areas being able to afford to pay for treatments that other areas will not, therefore perpetuating a postcode lottery of healthcare.

The system is too important for any significant changes to be made without rigorous and robust studies that have been independently critiqued by experts in the field. This occurs for research papers, even where the implications of the findings are relatively minor. However the DH has been prepared to approve resource amendments that exceed £100M for some areas without detailed peer review. It is believed that this is completely inadequate and that it has almost certainly been a contributing factor to the postcode lottery of access and care quality.

CHAPTER 8 ~ RURALITY MARKET FORCES FACTOR

SUMMARY

This chapter considers the costs of providing healthcare in rural areas. The principles underlying the resource allocation formula are that an adjustment should be included if costs vary unavoidably due to rurality. There was a commitment in a Commons debate in 1997 to review the case for a rurality market forces factor. It is not clear if the intended review occurred, if it was completed a report was not published.

The findings of this study support those of other researchers. Using regression analyses it was that rural areas tend to have more hospitals, more hospital beds and lower bed utilisation rates. The time required for travel, travel costs for staff and patient transport were also found to be likely to be higher in rural areas.

The assertion by the Department of Health was that there has been insufficient evidence to support the introduction of a rurality adjustment. This is inconsistent with NHS adjustments introduced in the other Home Countries and the resource allocation formula in England. There were adjustments for additional travel time and transport costs in the Emergency Ambulance Cost Adjustment, and the NHS resource allocation systems in Scotland, Wales and Northern Ireland.

On the basis of the findings in this study and those by other researchers it appears clear that there are unavoidable costs related to providing services in rural areas such as additional travel time and associated costs for staff and patients, additional facilities and smaller facilities that are less efficient to operate.

This study has indicated that some costs may be lower in rural areas including, for example staff turnover and the higher costs for some urban areas would need to be reflected in a revised formula.

There is a significant body of evidence that there may be reduced and later referrals in rural areas for conditions that require urgent attention. There needs to be a fundamental review of healthcare provision as it is unrealistic for rural and urban areas to have identical services. The key requirement is to ensure that services are of the best quality possible within available resources and this may mean adopting different approaches in rural areas. Timely access to healthcare services is needed where a condition is urgent including accident and emergency (A&E), maternity, cancer services and mental health.

There was limited research into the impact of rationalising maternity and A&E. The studies that have been completed on A&E indicate that fatality rates are positively correlated to distance. Proposals to improve service quality and efficiency by rationalising maternity and A&E departments would need to be reviewed very carefully and alternatives put in place if services are to improve because there would be a risk that complication and mortality rates could increase if appropriate measures and safeguards were not adopted. Independent research into the likely impact of rationalisation and the possible measures to improve services, accompanied by piloting of measures prior to full implementation would reduce the risks.

The need for a rurality adjustment has been raised repeatedly in the House of Commons and the case appears robust. The failure to introduce an adjustment or complete and publish a review, despite repeated assurances by senior ministers, would imply that the reason that a rurality adjustment has not been introduced in England was that there was not the political appetite for rural areas receiving a greater proportion of the funding available.

In the absence of a rurality market forces adjustment rural areas will either need to have lower targets so that they can spend a greater proportion of their funding on providing rural services or they will need to be significantly more efficient than services with lower unavoidable costs. In the absence of such measures the 'Inverse Care Law' propounded by Tudor Hart will continue and this is compounded by an Inverse Share Law where rural areas receive less funding and this has a disproportionate impact on the poor and elderly who are those most in need of services.

8.1 INTRODUCTION

The initial sections of this chapter cover the background to the market forces factor and research that has been carried out into rurality and deprivation in rural areas. This is followed by the research that has been completed as part of this study. Analyses have been completed on hospital and bed numbers,

This is followed by a description of the complexity and issues that may arise when hospital closures are proposed

There is then a critique of the research carried out as part of this study and a description of areas where further research would be of particular benefit to the NHS. This is followed by recommendations, details of the novel areas in the thesis and conclusions.

8.2 BACKGROUND

The Department for Environment, Food and Rural Affairs (DEFRA) outlined key principles for national policy makers, including the need to ensure that the decisions taken by Government and entities of the state like the NHS consider the needs of those living in rural areas, and the transport of vulnerable service users (DEFRA, 2002) when developing or implementing policy or plans. This approach was referred to as “rural-proofing”. The DH funded a programme aimed at ensuring “rural-proofing” occurs in the NHS. This programme was run in collaboration with the Countryside Agency and DEFRA. One aim was to develop systems that enable trusts to rural proof policies. The project was intended to identify areas where rurality had an impact on health care services (Rural Health Forum 2003a).

The resource allocation formula does not have a market forces factor to adjust hospital or community service allocations for rurality. As detailed in Chapter 7 the only adjustment in the Hospital and Community Health Services allocation in England that can be viewed as reflecting the increased costs experienced in rural areas was for emergency ambulance services. This adjustment resulted in increases for rural areas and the most urban areas. The increase for urban areas was because of the extra costs resulting from delays caused by congestion. The maximum adjustment was for Hereford and was for less than 1.5%.

It has been concluded by the DH that the case for such a factor has not been made. There was a commitment in a Commons debate in 1997 from the Minister of State for Health, Alan Milburn, to review the case for a rurality market forces factor. He said that "We shall also ask the advisory committee to investigate over the next year the impact of rurality on resource allocation". It is not clear if the intended review occurred; even if it was completed a report was not published.

Calls for a rurality formula continued to be made and researchers concluded that the absence of a rurality adjustment would mean that it would not be possible for rural areas to be able to develop the services needed and that the consequence would be that there would be a different pattern of service delivery in rural and urban areas (Ward, 1999, Bretman 1999, Tobias 2003).

The DH has accepted that it is not possible to have identical services in urban and rural areas by setting a lower standard for ambulance response times and by recognising that it was not even possible to meet the lower targets without additional funds. However there has not been a different target set for any other services and rural areas are expected to meet the same standards as urban areas in all other respects.

8.3 RESEARCH INTO RURALITY AND UTILISATION

There is a significant body of research into the impact of rurality and healthcare; however there has been relatively little research specifically into the interaction between rurality and poverty and the need for healthcare. As detailed in Chapter 6 there is a considerable body of research into poverty and urban areas and some of these studies have resulted in adjustments to the resource allocation formula. The majority of these studies have shown that there is a correlation between poverty and prevalence for a significant number of conditions. There has been less focus on poverty and rural areas however it has been concluded that the degree of relative deprivation in rural areas is increasing (Jones 2000).

8.3.1 International research conclusions on utilisation rates in rural areas

Studies have been completed in a large number of countries of how referral patterns differ between urban and rural areas. Most of these studies have indicated that there is a significant difference between rural and urban areas in the services provided and the impact that this has on healthcare. However a study in the United States of mortality rates in rural hospitals found that mortality rates were not statistically different from hospitals of a similar size in urban areas (Glenn & Jijon, 1999). This study concluded that referral rates on to specialist hospitals were occurring appropriately. However this conclusion is at variance with other studies on rurality and the accessibility of services as a large number of studies have found that there is evidence that referral rates by GPs in rural areas for key illnesses may be later and lower. One potential explanation for the different conclusions is that the study in the United States did not take health status and social factors into account and therefore the populations in the rural and urban areas may not have been equivalent. In addition it is difficult to compare the NHS with the health system in the United States because of the significant differences in healthcare services.

In Norway it has been found that there is a decreased referral rate by GPs in rural areas and this study took into account differences in health and social factors (Fylkesnes et al., 1992). In France it has been found that a lower proportion of the rural population with colorectal cancer were treated in specialised health centres than in urban areas and that a higher percentage of the cancers were diagnosed at a later stage. This has a direct link to prognosis as the earlier a cancer is detected and treatment commences the better the prospects for a full recovery (Launoy et al., 1999). In Cantabria it was found that there was a reduced onward referral to consultants where the hospital services are not as accessible (Vazquez-Barquero 1985). In Denmark it has been found that there is a strong negative correlation in the referrals to specialist coronary angiography services and distance (Niemann et al 2001).

Research into the impact of rurality on healthcare has also been carried out in the United States. It was concluded that the elderly in rural areas have lower rates of health service utilisation and that a greater proportion of the elderly in rural areas assess their health as poor (Rogers 2002).

8.3.2 Research into utilisation rates in rural areas of the UK

A significant body of research has been carried out by the team led by Robin Haynes at the University of East Anglia into the accessibility and utilisation of health services in rural areas. They have concluded that the poor, old and disabled have the lowest levels of mobility and are therefore affected most by the centralisation of GP services and that this reduced mobility results in lower utilisation in rural areas compared with the equivalent socio-economic group in urban areas (Bentham & Haynes, 1986).

The old, poor and very young are most likely to need health care services and the least mobile. Haynes and Bentham have concluded that the availability of health care in rural areas has been decreasing as GP and hospital services have been progressively more centralised. Primary care studies have concluded that the distance from a GP surgery and consultation rates are negatively correlated (Haynes & Bentham 1982, 1986, Gatrell 2002) as shown in Figure 8. The average difference for some age groups is 16%.

It would be anticipated that analyses based on the full dataset using regression analyses would show a clear correlation with those living furthest away having the lowest consultation rates. It is clear from this analysis that the only age group not to have a declining attendance rate as distance increases is for females aged 65+ that live 2 or more kilometres from the GP surgery. It is not clear from this study if patients that require a GP are more likely to live near a surgery. It would be necessary to incorporate a dependency measure to determine if this is the case.

Figure 8.1 Relationship between GP consultation rates and the proximity of patients (Haynes and Bentham 1982)

Age group	**Distance (Km)**	♂ **Male**	♀ **Female**
Under 5	<2	5.1	4.8
	2-5	4.6	4.5
	>5	4.4	4.1
5-15	<2	2.2	2.5
	2-5	2.0	2.3
	>5	1.9	2.3
15-64	<2	2.5	4.9
	2-5	2.4	4.4
	>5	2.2	4.1
65+	<2	5.2	5.7
	2-5	4.8	5.1
	>5	4.7	5.2

These findings were consistent with a study by the Rural Development Commission which found that in 1991 16% of parishes had a permanent GP surgery. It was found that where there is not a GP surgery consultation rates tend to be lower. Where a branch surgery is provided this has been found to increase consultation rates, often to the same level as that for accessible villages with a permanent surgery (Rural Development Commission, 1994). The Countryside Agency (CA) has published a significant number of reports into rurality. In 2002 a report from the CA stated that 4.8% of the population in England have been estimated to be living more than 4 Km away from a doctors surgery. In a report in 1999 it was concluded that 75% of parishes had no daily bus service and 91% had no day care for older people.

Various studies in the UK have concluded that utilisation of a health facility, attendance at outpatient clinics and admissions for elderly are linked to distance, with the further the facility from patients the lower the utilisation rates (Scottish Consumer Council, 1978, Ritchie et al 1981, Parkin, 1979). It was also found that distance to the nearest GP

surgery reduced elective acute episodes by up to 15%. Distance to facilities was been found to have a significant impact on utilisation. For acute services the reduction found was 17%, for psychiatric services 37% and geriatric services 23% (Haynes et al 1999). In a previous study very marked differences were found between the attendance rates of those with long standing illness as consultation rates were significantly higher in Norwich than remoter areas without GP surgeries. It was concluded that the use of hospital based services is inversely associated to distance and that those affected most were the least mobile members of the community namely the old, poor and women (Haynes & Bentham 1979). There have been similar conclusions in other studies. The accessibility and utilisation of hospitals has been linked to two issues, how much time it takes to get to the hospital and how much it costs (Salisbury DHA 1993). Analyses also showed that patients in GP practices that were 20 Km or more from revascularisation centres had lower rates of angiography and revascularisation (Hippersley-Cox and Pringle 2000).
It has been concluded that there are significant differences in the way patients travel to primary care services. Most patients in rural Wales relied on transport of one form or another to get to a GP surgery. In Greater London it was found that 65% of patients walk to a GP whereas in rural Wales the figure was 37% (Wenger 1984).

A comparative study of home visits by GPs and district nurses found that health professionals were more than twice as likely to make home visits to patients aged over eighty that lived in “more rural” compared with patients living in “less rural areas”. This is an important finding when considering costs because increased travel time will result in a reduced amount of time for staff to carry out the clinical work required. In theory this will necessitate additional staff to complete the same amount of work and lead to proportionately higher non pay costs on travel.

The same study found that there had been a decrease of around 35% of home visits by GPs to patients aged over eighty in less rural areas and a decrease of around 14% in more rural areas between 1979 and 1987. The changes in district nurse home visits were markedly different in less rural areas showing there was a decrease of around 17% whereas in more rural areas the number of elderly that had received home visits had increased by over 53% (Wenger & Shahtahmasebi, University of Wales, Ref B).

It has also been found in an obstetrics study in Oxford that there are lower referral rates to consultants from surgeries that are further from consultant based units. There are no recent studies of mortality however the study in 1966 by Hobbs and Acheson found that for mothers in high risk groups perinatal mortality was found to be positively related to distance.

Research in Scotland has shown that 60% of those living in the 15% most deprived areas have no access to a car for private use. The convenience of accessing hospital services was 50% for the 15% most deprived that did not have access to a car and 75% for GP services. Where there was access to a car the convenience increased to 59% and 83% respectively (Scottish Executive 2005).

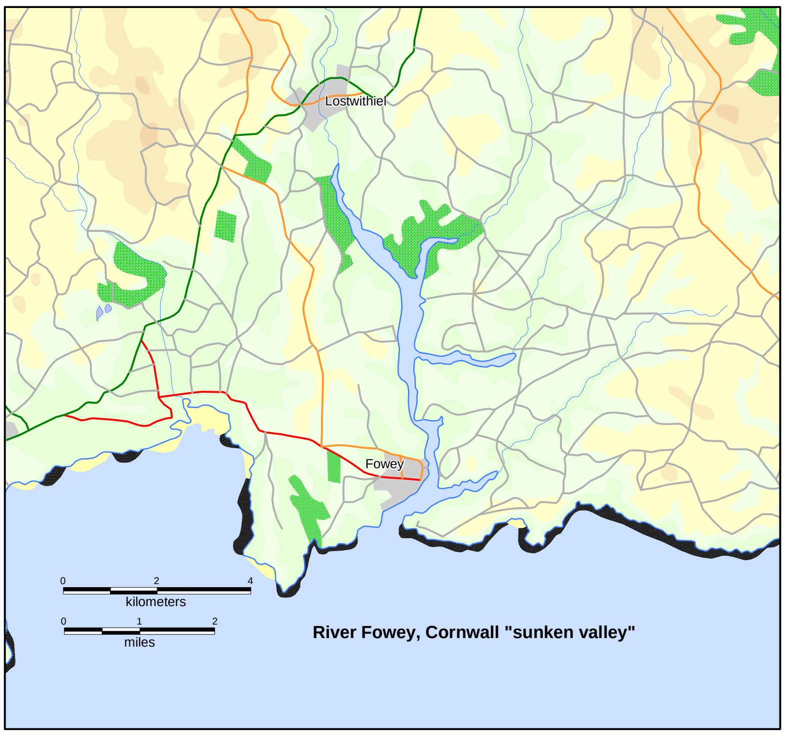
8.3.3 Importance of public transport when considering healthcare in rural areas

Public transport is of greater importance when requiring hospital services as patients may not be able to drive, but may not be ill enough for hospital transport to be provided. Research funded by the ESRC on accessing public transport found that 19.1% of respondents were concerned about using public transport because of a lack of grab rails and 28.9% about the lack of toilets. 35.8% concluded that there was a lack of public transport in their area. The issue of the length of bus journeys was cited as an important factor by 35.8% and the necessity to change buses or trains by 40.8%. Another finding was that the elderly were less likely to ask for a lift for any purpose including going to hospital or GP. In other cases a settlement may prima facie appear to have reasonable public transport. However 40.8% of those surveyed concluded that it was difficult to get public transport when they wanted. In these cases the settlement may have regular buses or train links the time tabling is such that it is of limited use due to connections to other services, arrival times, journey times and return times (Gilhooly et al 2002).

The importance of public transport becomes most evident when examples of the issues that arise are considered. In the late 1990s the cash crisis in the NHS in Cornwall led to the proposal to close Fowey hospital with services transferring to St Austell, a distance of less than 10 miles. A highly vocal campaign was led by residents because of the poor quality of public transport. The elderly were the primary users of the hospital and they are less likely to be able to drive, in particular when ill or taking medication as this may be incompatible with driving. It was shown by residents of Polruan, which is within half a mile of Fowey that it would be impossible to attend appointments in St Austell and return the same day. This was because the village was on an opposite river bank; there was no bridge nearby, the length and time required for journeys by public transport and the timetables for the buses and ferries.

The difficulties faced are also clear when considering services like those provided by St Michael's Hospital in Cornwall. The hospital is accessed via minor roads and is on the outskirts of Hayle which is near St Ives in the West of the Cornwall. The hospital was used for a proportion of the planned surgery in Cornwall. The journey time by car is estimated by AA routeplanner as 1 hour from the centre of Bodmin. The journey was impracticable by the public transport from much of the county and the number of patients travelling was too small to make it economically viable to introduce public transport to and from the hospital. Patients that have had a general anaesthetic are not permitted to drive and therefore the only options are hospital transport, private transport or an extended length of stay until fit to drive.

Figure 8.2 Access difficulties in the Fowey area of Cornwall



8.3.4 Research into additional healthcare costs in rural areas

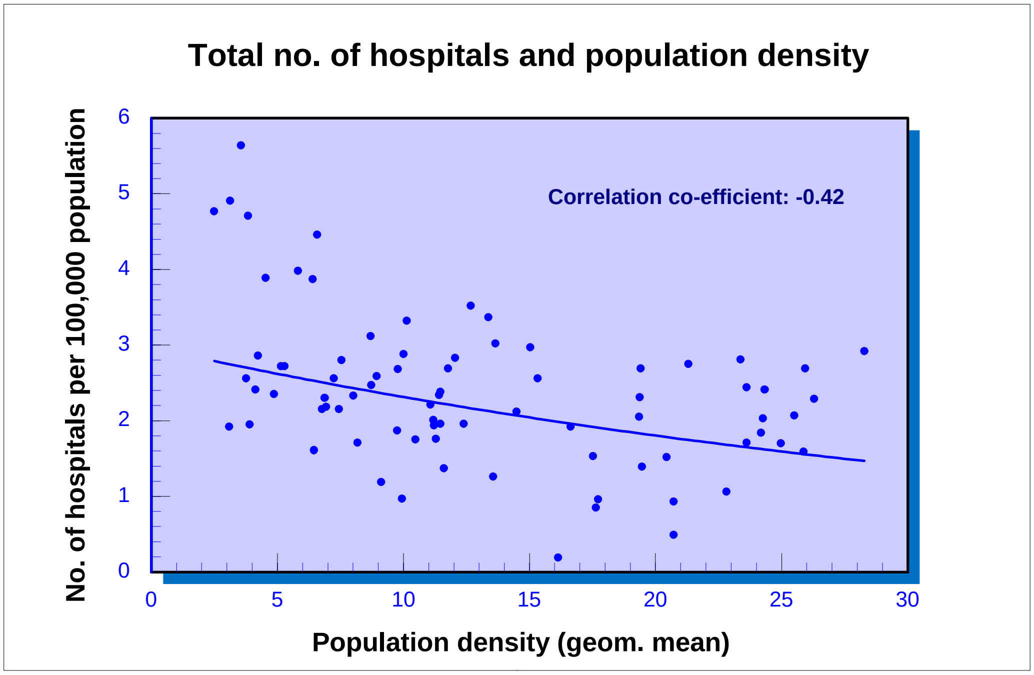
There has been research into rural healthcare costs by a large number of researchers. Watt & Sheldon (1993) concluded that there is some existing evidence that indicates the costs of providing services in rural areas are higher than in urban areas. It has been concluded that some hospitals in rural areas would be unable to reduce their costs and should receive a sparsity grant (Wilkinson 1993; RDC, 1996; Watt et al 1999).

The Rural Health Forum which was established by the DH has concluded that issues for rural communities include a lack of economies of scale, additional travel costs and travel time, poor access to training and development for staff, the costs of providing out of hours cover and difficulties experienced by patients accessing services (Rural Health Forum 2003b).

8.3.5 Analyses of the number of hospitals

When community bed numbers are plotted against population density it is clear that as areas become more sparsely populated they tend to have more community beds, as illustrated in Figure 8.3. Access to hospital services is an essential part of healthcare provision. In urban areas there are often no community hospitals, this is because patients have ready access to a District General Hospital that offers equivalent services. As rurality increases it is necessary to have progressively more community facilities for patients to be able to access services. This is shown in Figure 8.3 where the most rural areas may have up to 6 hospitals per 100,000 people. The need for additional local hospitals is particularly evident in rural areas with a large number of small towns such as Somerset, Cornwall, Dyfed Powys and Devon.

Figure 8.3 Correlation of number of hospitals and geometric mean density



There are a range of factors that need to be considered when identifying why some areas have community hospitals and others do not. As covered in the historical review of the NHS a significant proportion of the hospital sites were transferred to the NHS when it was established. In Cornwall the only community hospital that did not pre-date the formation of the NHS is Penrice Hospital in St Austell.

As a consequence historical reasons are important when considering the location of hospitals. The majority of the community hospitals were originally funded by philanthropists such as John Passmore Edwards, by councils, public subscription, religious bodies and employers. As a consequence there was little if any coordination of where hospitals would be built and this resulted in some relatively small towns such as Liskeard having three hospital sites; these were for mental health, care of the elderly, and the other provided maternity, minor surgery and outpatients.

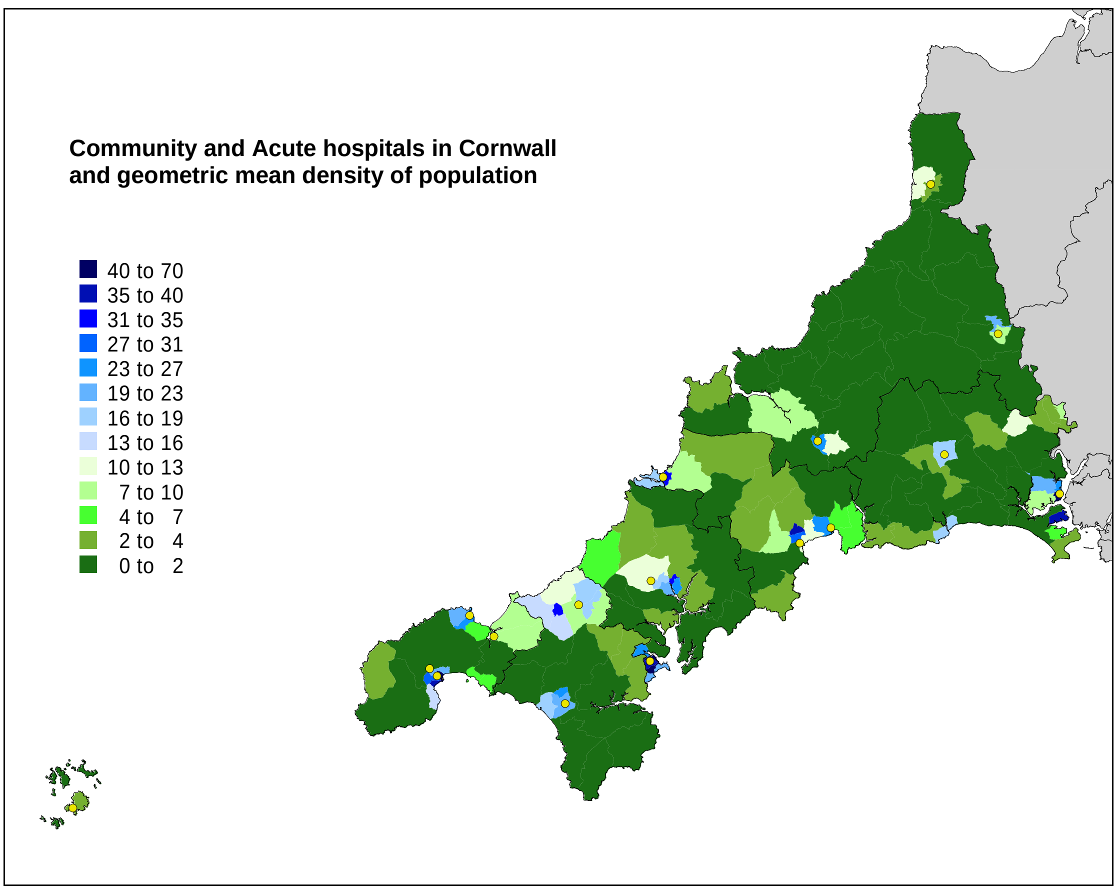
Cornwall has the largest number of community hospitals in England. Figure 8.4 lists the towns in Cornwall with a population of over 2000 and whether or not they have a community or acute hospital. Although Camborne and Redruth are separate towns they are adjacent and form a conurbation and share a community hospital and therefore they are both counted as having a community hospital in the table and map. Figure 8.5 also shows the Geometric Mean Density of the county to show the position of community hospitals relative to population.

Figure 8.4 Population of Cornish towns and location of hospitals

Town	**Population 2001**(from census)	**Acute or Community hospital within 5 miles**
Camborne/Redruth	39937	Yes
St Austell	22658	Yes
Falmouth	21635	Yes
Truro	20920	Yes
Penzance & Newlyn	20255	Yes
Newquay	19562	Yes
Saltash	14124	Yes
Bodmin	12778	Yes
Helston	10578	Yes
St Ives	9866	Yes
St Blazey/Par	9256	Yes
Torpoint	8633	No
Liskeard	8478	Yes
Bude/Stratton	8217	Yes
Hayle	7844	Yes
Penryn	7166	Yes
Launceston	7135	Yes
Wadebridge	6222	No
Looe	5280	No
Callington	4048	No
Porthleven	3190	Yes
St Columb Major	3101	No
Perranporth	3066	No
Gunnislake	2959	No
St Agnes	2759	No
Lostwithiel	2602	Yes
Padstow	2449	No
Fowey	2064	Yes

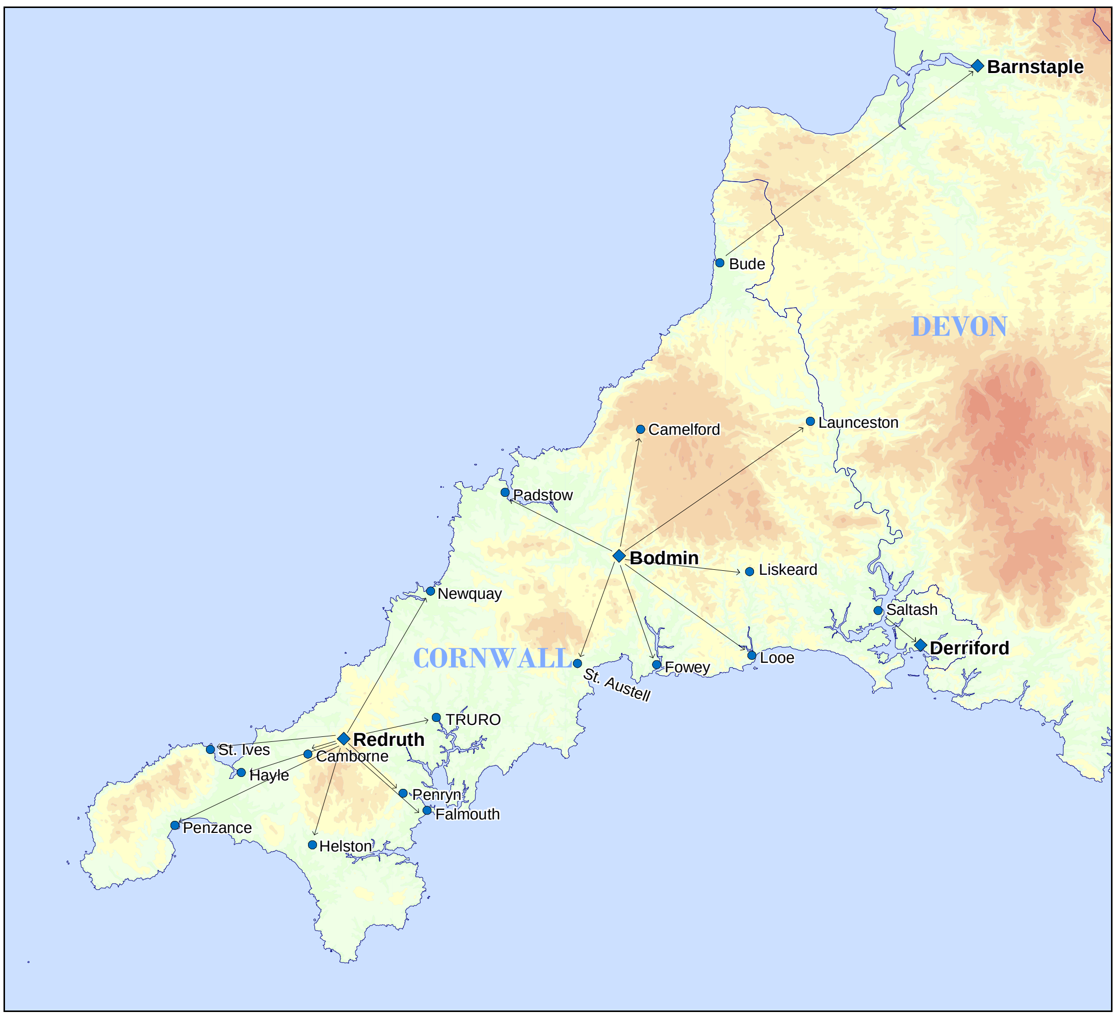
It is clear from Figures 8.4 and 8.5 that there were large areas of the county that did not have access to a community hospital, whereas in other areas with an equivalent population there are two hospitals within a relatively short distance. The position was most noticeable in North Cornwall and Caradon. There were no hospitals in Camelford, Wadebridge, or Padstow, and in Caradon where Torpoint, Looe, Callington and Gunnislake have no hospital.

Figure 8.5 Distribution of community and acute hospitals in Cornwall



The historical rather than strategically planned nature of hospital locations was clear from consideration of acute services in Cornwall. There have been repeated local calls for a district general hospital (DGH) in Bodmin so that those in the East of the county can have easier access to acute services. The distribution of acute services was discussed with an executive director of the Cornwall and Isles of Scilly Health Authority in 1997. It was explained that there had originally been a plan to have one DGH in Redruth and another in Bodmin.

Figure 8.6 Distances from principal towns in Cornwall to District General Hospital



St Austell was not considered even though it was larger than Bodmin because it was less accessible from areas in North Cornwall. In addition Bodmin was near to all of the main arterial routes, the A30, A38 and A39. He added that there would not have been theatres in Penzance or Hayle. However this plan was unacceptable to influential senior clinicians and managers at the time who did not want to move from Truro or West Cornwall. As a consequence Cornwall retained and developed acute services in Truro, Hayle, and Penzance. Figure 8.6 indicates how accessibility would have improved for patients in the North of Cornwall if Bodmin had been selected for an acute hospital. Travel times would have been significantly improved because both sites were on the A30 which was the major arterial route through Cornwall and all towns have good access from this road.

£750 million additional funding was announced to support the development of community hospitals (DH 2007). This announcement meant that the DH would support plans by local communities, however the funding was capital only and the revenue consequences would need to be funded from local budgets. The revenue costs are significant as capital charges for NHS capital were 6% per annum of the asset value. The capital charges were not disclosed in public documents, as the funding was from the commercial sector it was likely that the charges applied would be higher as detailed by other researchers on Public Finance Initiative schemes (Pollock et al 2002).

Geographical factors are also of key importance when considering accessibility. This is most evident when considering areas like Cumbria and the Isles of Scilly. As a result of remoteness small towns can become a centre of health provision, for example, St Mary's on the Isles of Scilly where the helicopter journey is 20 minutes or the ferry 2 ½ hours.

Figure 8.7 Hospital and transport issues for the Isles of Scilly

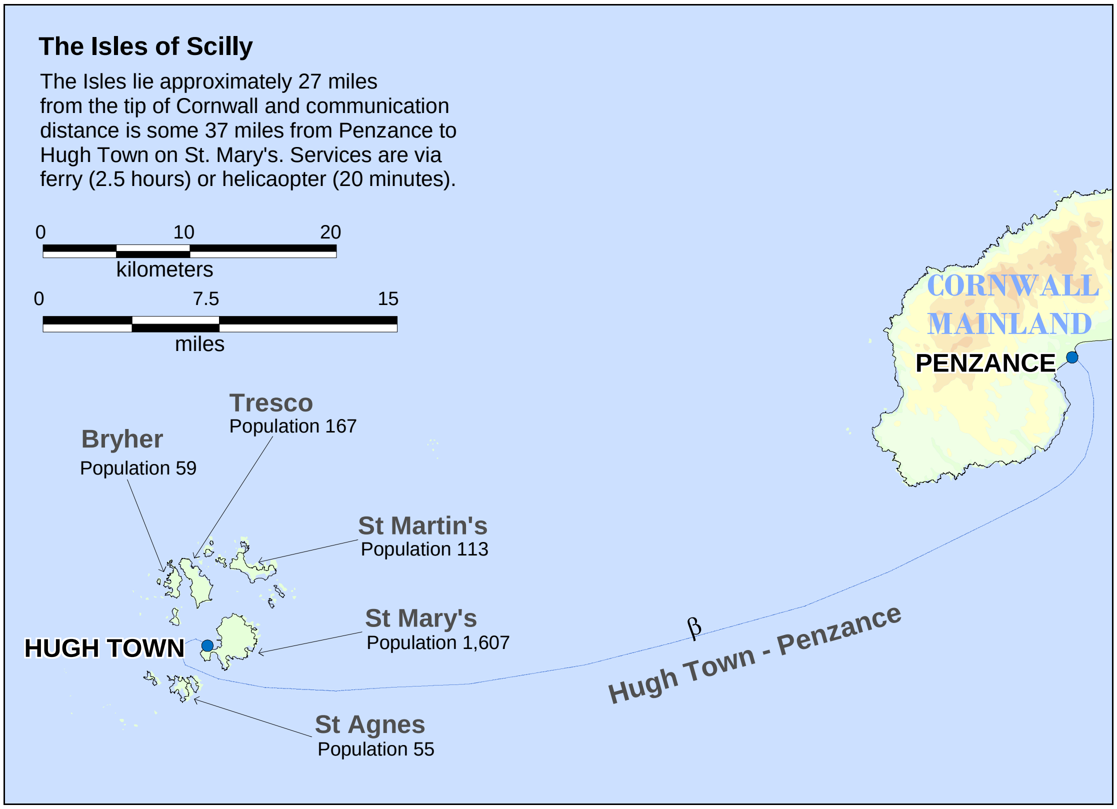
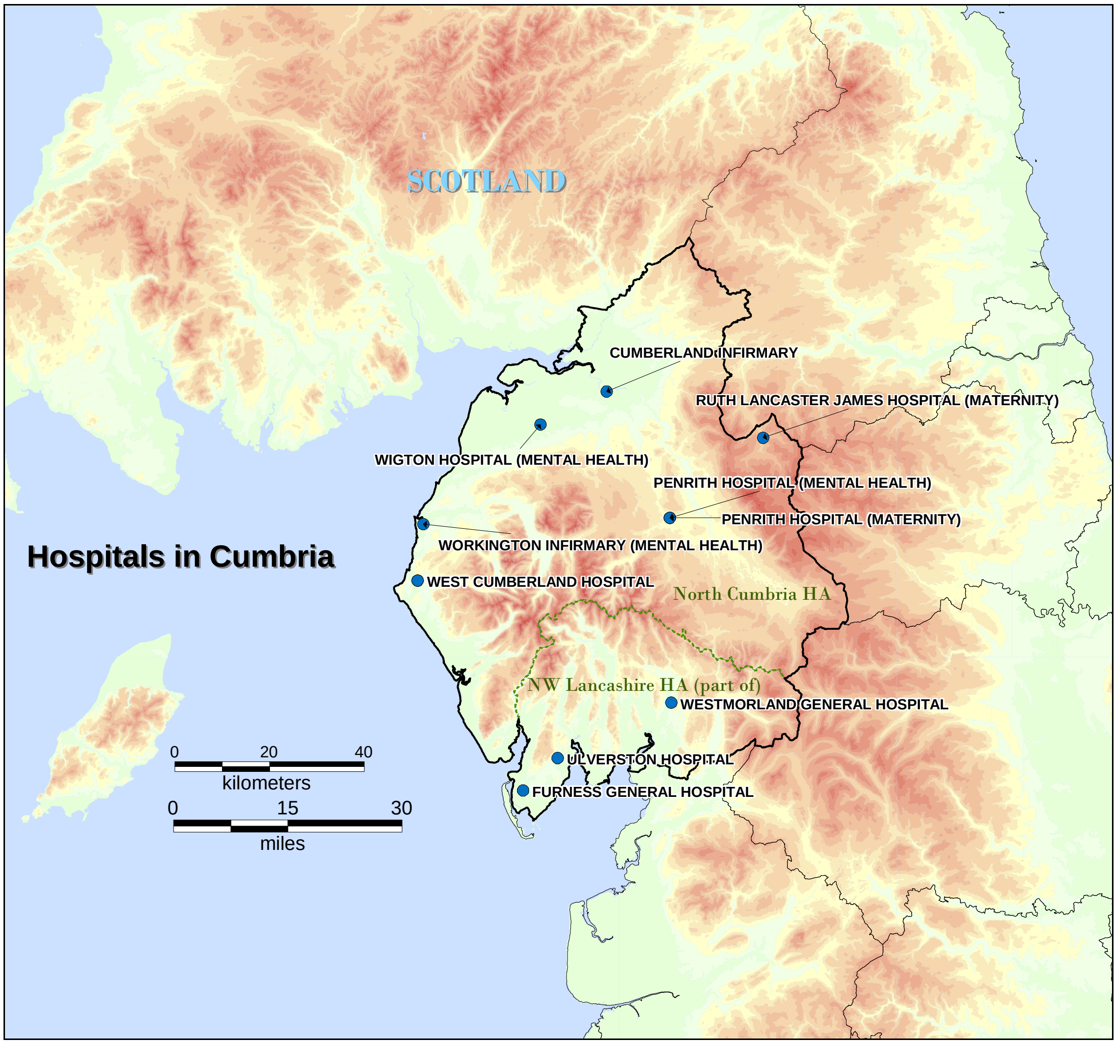


Figure 8.8 Distribution of hospitals in Cumbria



8.3.6 Closure of hospitals

It has proven to be exceptionally difficult to close community hospitals as patients see this as a diminution of their local NHS. As a result of the political pressure that has ensued there have been commitments to retain community hospitals, for example the Health Secretary in 1998, Frank Dobson, intervened to stop the closure of four community hospitals in Cornwall. There were similar proposals in Dyfed Powys, Lincolnshire and Devon. Mr Dobson stated that he wanted to see as many community hospitals as possible retained and the closure plans were rejected (Snell 1998). There have been various campaigns since this time and most have resulted in similar commitments from senior managers within trusts and the regional bodies.

Where a closure decision has been upheld this has resulted in a significant backlash. The most notable example was where a Dr Richard Taylor, a retired consultant stood for election to Parliament in 2001 to stop the closure of the accident and emergency and acute in-patient beds at his local hospital in Kidderminster. He overturned the large majority of the sitting labour junior minister by campaigning on this single issue. It is believed that this has been a salutary lesson for ministers and it is notable that Hazel Blears campaigned for maternity services to be maintained at her local hospital in December 2006 despite being Labour Party Chairman at the time.

The following example makes it clear that the provenance of hospitals is often an important factor when their future is being considered as there may be restrictive covenants and there may be very strong emotional ties to hospitals and the hospital may have been paid for by local subscription. It is also common for parts of hospitals to be listed due to their historical significance design or appearance.

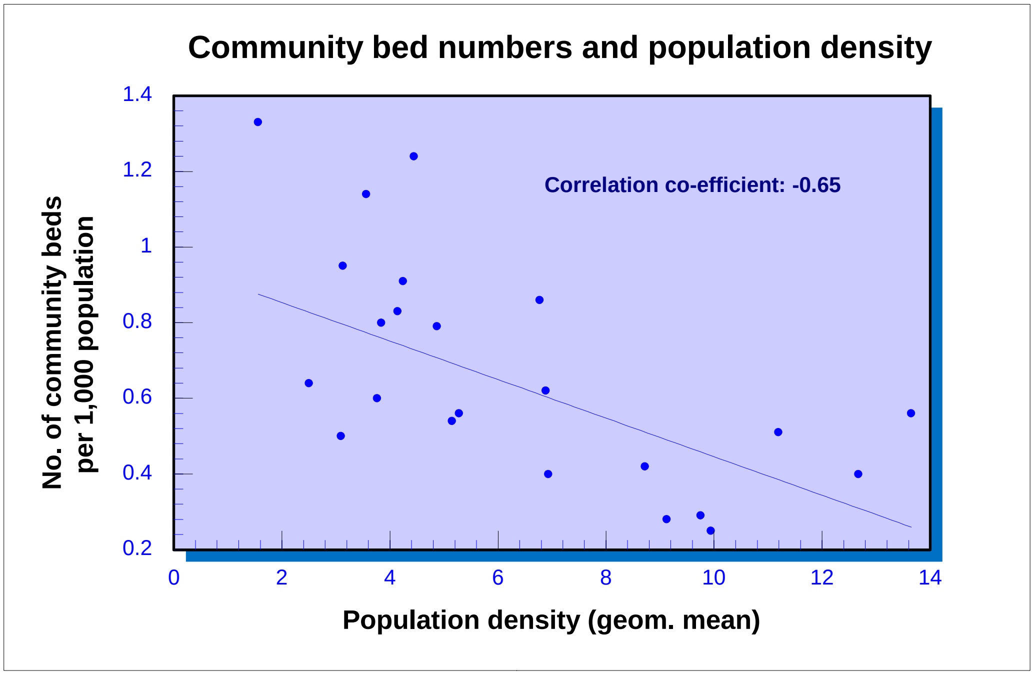
In a former role a hospital review was carried out in 2006 in Manchester. The local trust, Trafford Hospitals NHS Trust, had closed hospital beds without consultation at Altrincham General Hospital which was a small community hospital providing outpatient and minor injury and prior to their closure two small wards for respite and ‘step down’ type patients.

It was obvious as soon as the review was commenced that the current hospital was totally unfit for the services that it is tasked with providing. In the event of a large fire it was highly likely that there would have been fatalities due to factors such as inaccessible escape routes for the elderly and infirm which were across unlit roofs and down ladders. There was a significantly increased risk of fire because of the poor condition of the electrical infrastructure and water leaks. The building had large amounts of asbestos and large parts of the roof that were too dangerous to test for structural integrity. There was also a danger to people in the surrounding residential and commercial buildings as a 15m chimney near the boundary of the hospital was close to collapse. Much of the building was inaccessible to the elderly or disabled, who were the predominant users of the hospital and there was no parking for staff or patients. Added to which the general décor and internal environment of the hospital was exceptionally poor. A detailed review concluded that Altrincham General should be replaced by a purpose built hospital within easy reach of the town centre. The other options of a rebuild or refurbishment of the old site were found to be considerably higher cost, would cause major disruption to services and local residents and businesses, and would not have provided improvements like parking. However as a result of a well orchestrated campaign in the local and national press to retain the buildings the NHS agreed that the existing site should remain. It is clear that health managers who wish to reduce costs by making significant changes to service provision need to ensure that provenance issues are understood and addressed and that local services are protected. Even where this is the case it may still not be possible to close facilities. If this is the case then the costs cannot be avoided.

8.3.7 Community Bed Numbers

An analysis by the North Devon Health Authority identified the number of community beds in the English rural areas. The number of community beds in Dyfed Powys and North Wales were determined by searching the database of The Medical Directory published by The Financial Times combined with first-hand contact with each of the trusts in the two Authority areas. Areas were selected and identified by the Office for National Statistics classification system as rural or mixed urban and rural. This showed that there was a positive correlation between rurality and bed numbers.

Figure 8.9 Correlation between rurality and community bed numbers



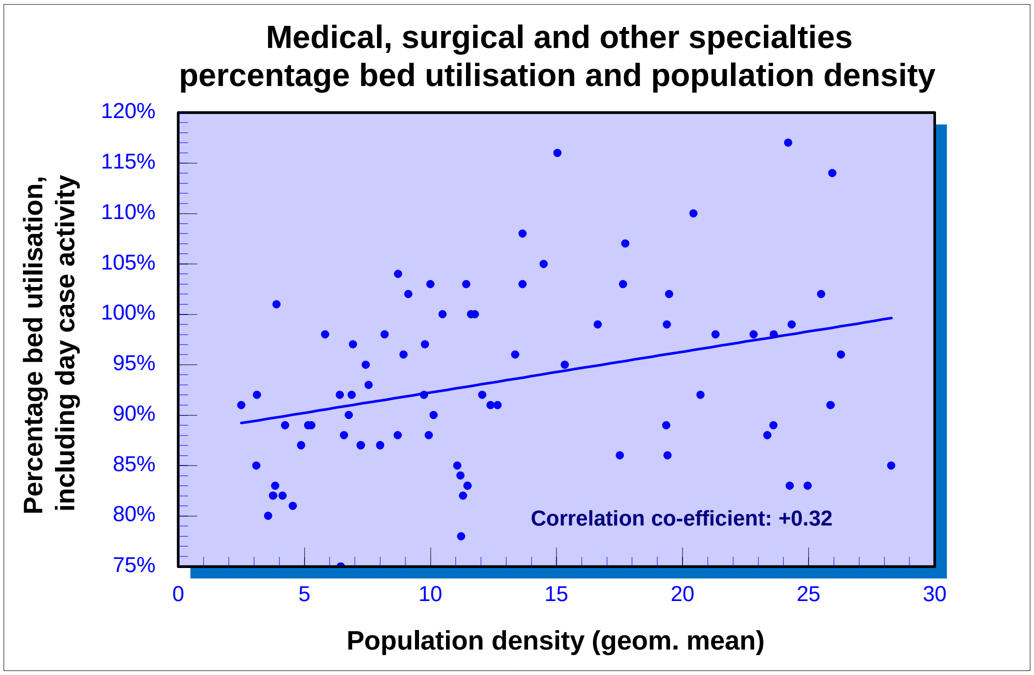
One possible reason for this correlation is that in highly rural areas a critical mass of beds is required. For example, the Isles of Scilly has a population of about 2,000. Its links to mainland UK are by ship and in the summer helicopter service. As a result the hospital for the Isles of Scilly had 14 beds with a daily average occupancy of 3.7. The rationale given by the general manager for the hospitals West Cornwall and the Isles of Scilly was that a large number of beds are required because of the necessity to provide cover for serious health crises on the Islands.

8.3.8 Bed Utilisation

The measure used by the DH in England to record bed use is called bed occupancy. This is a measure of how many beds are full at midnight each night. The national bed statistics show that the average for 2005/6 was 84.6% occupancy (DH September 2006). However this measure does not reflect how intensively beds are utilised because of patients discharged in the evening and the use of beds by multiple patients in one day, in particular where there is a high proportion of day surgery in the case mix for a ward. A measure was developed as part of this study that more accurately reflects bed use and has have called bed utilisation. It is straight-forward to calculate as it involves dividing the daily average of patient days by the number of available beds. Analyses indicate that rural areas tend to have a lower bed utilisation rate than urban areas as shown in Figure 8.9.

It was concluded that there are three key factors responsible for this difference in utilisation. Firstly the ‘Isles of Scilly’ effect detailed previously and secondly it is likely to be easier to use beds more efficiently when they are on one site, than when they are on a large number of sites across a large geographical area. Thirdly it is likely to be more difficult to use resources effectively when they are spread over a wide geographical area and difficulties with moving patients between facilities because of inadequate patient transport, differences in systems and protocols, poor communication and concerns over 'cost shifting', in particularly when the hospitals are managed by separate organisations.

Figure 8.10 Correlation of bed utilisation and rurality



8.3.9 Travel Costs and Staff Travel Time

Very little research has been carried out for the NHS in England on transport costs. One such study on mental health services compared the costs of providing assertive outreach services in urban and rural areas of the Southwest Peninsula. It found that in urban areas the cost of transport per service user was an average of £338 compared to £1,102 in the most rural area (Brigham and Asthana 2002).

One reason for the limited research is that identifying the transport costs incurred by trusts is far more complicated than it would initially appear. This is because there is a variety of possible ways of recording all of the different aspects of transport. There are six key elements of transport costs and income. Cars may be bought in which case they appear as capital costs and will have depreciation charges. The other costs are for fuel costs where purchased by the trust or by staff that have fuel cards for use in vehicles that are used for business use only; and staff travel claims. The costs may be offset by car volume related reimbursements from leasing companies or manufacturers and payments by staff for personal use. The reimbursements and staff contributions can be significant; in Cornwall in 2001 the total exceeded £625k. The difficulties of comparing costs are exacerbated by the number of transport fleets that a trust may have. These can include estates, clinical records, clinical waste, laundry, catering and pathology and each of these departments may code costs differently. The complexities on coding when added to the number of transport fleets makes comparisons between trusts unreliable.

8.3.10 Ambulance services

There has been relatively little focus on survival rates and emergency ambulance journey times. A study in the United States found that survival rates were unaffected by journey length (Sloan et al 1989). However the findings are counter-intuitive as it would be anticipated that for some emergencies such as serious road traffic accidents that there would be a positive correlation between the time taken to get to hospital and mortality rates. Research in the UK has found that distance travelled by ambulance is positively correlated with mortality rates, with every additional 10km resulting in an average increase in the death rate of 1% (Nicholl et al 2007).

The results of the US study are nonetheless of interest as they imply that care in the ambulance is a critical factor. One possible cause for the differences in the findings is that the increase is relatively small when all ambulance journeys are included. Time and distance are only likely to be significant factors where the patient being transported has a ‘time urgent’ condition where paramedics are limited in the care that they are able to provide such as complex trauma, heart failure, stroke and head injury cases. In such cases ambulance travel time is likely to have a significant impact on survival rates. Further research should be carried out to determine the survival rates of patients with critical conditions.

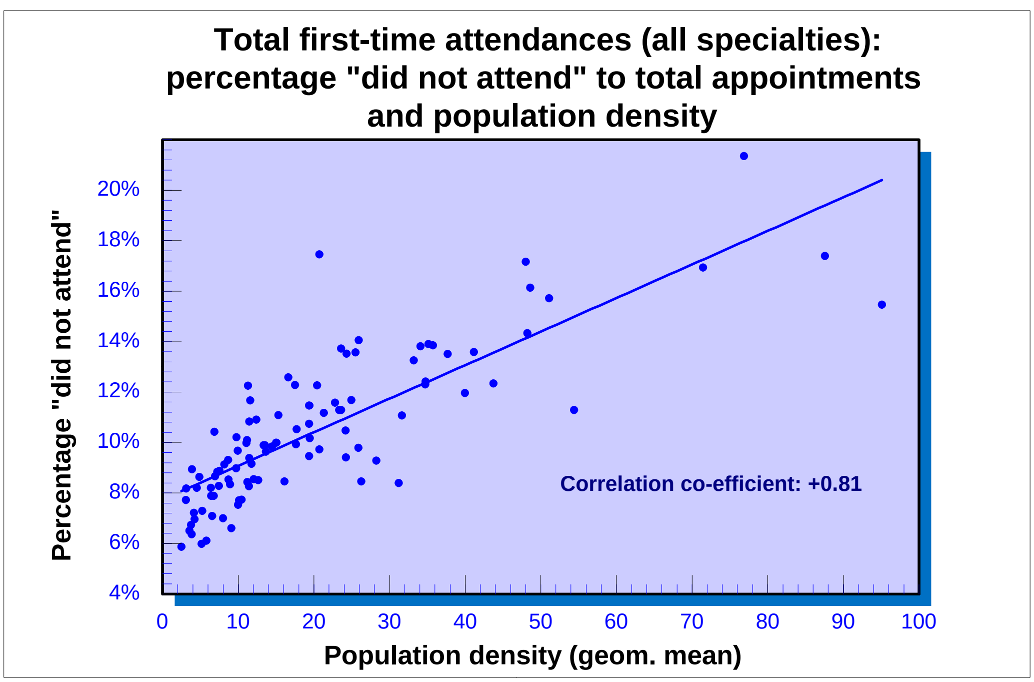
It is believed that time travelled is a more appropriate measure because road length measures do not take into account factors such as differences in driving conditions resulting from factors such as type of road, maintenance, weather, the amount of traffic. An ambulance can cover a distance of 10km in less than 5 minutes if it is on a trunk road with no congestion but on minor or congested roads the same journey would be likely to take significantly longer.

8.3.11 Did Not Attend Rates

Rural areas have proven to be more efficient in limiting the number of patients who do not attend (DNA). Figure 8.8 shows that there is a clear link between population density and DNA rates, with a positive correlation of 0.81. Various trusts have reduced their DNA rate very significantly and therefore even though the analyses indicate that trusts in urban areas experience higher costs it is believed that there would need to be further research before incorporating the factor into an adjustment to increase the allocations for trusts in urban areas. It is possible that trusts in rural areas have been more assiduous in focusing on DNA rates; however I it is felt that it is more likely that there are fundamental differences between rural and urban areas that mean that higher DNA rates are unavoidable in urban areas.

In rural areas it is more difficult to access services and it is believed that this means that there will need to be more planning by patients when planning outpatient appointments and rearranging appointments will therefore be more complex. It does however mean that there is less opportunity to make significant reductions in the time lost as a result of non-attendance in rural areas than in urban areas.

Figure 8.11 Link between 'Did Not Attend' rates and rurality



8.3.12 Critique of research in this study

The main criticisms of the analyses undertaken relate to inadequate analyses of hospital costs and outliers and referral rates by specialty and GMD. Nursing homes have not been considered and this is important as community hospitals are only one source of community beds. Also the costs incurred by trusts in London for services that they do not provide have not been considered.

Analyses of hospital costs would have been time consuming because of the variation in the way that finance departments code expenditure and the difficultly to get agreement with other trusts to complete the analyses. However it would have been possible to have completed such analyses for different community hospitals in Cornwall and this could have been a useful proxy for hospitals elsewhere.

Investigation of the outliers and discussions with senior staff in the trusts may have identified errors and this would have improved the robustness of the figures. It may also have been possible to ascertain underlying reasons for the results and this may have provided a useful insight into what could be done to improve quality or efficiency.

8.4 RECOMMENDATIONS

The allocation system will continue to be a contentious issue, in particular when the period of significant funding growth ceases. It would be helpful to identify the additional costs at trust level so that regression analyses could be completed.

It is unlikely that there would be the political will to close a significant number of community hospitals. However many of these hospitals are old, inefficient to staff and have poor access for patients. A nation-wide community hospital redevelopment programme allied to a rationalisation of primary care and nursing home facilities onto the same site, with the nursing home and hospital run in tandem to maximise efficiency could improve the service provided and reduce costs.

The analyses have shown that rural areas tend to have more hospitals, hospital beds and lower utilisation rates. It would be helpful to identify the additional costs at trust level so that regression analyses could be completed. Information on costs is relatively poor as trusts code expenditure differently. Consistency and an understanding of what should and should not be included in costs are essential for a robust analysis. Consultancies such as KPMG and PwC are highly experienced in financial analyses of trusts due to their involvement in financial turnaround work that has been carried out across the NHS. The results of these financial analyses could be used in regression analyses to determine if as would appear logical there are cost implications of having more beds and community hospitals. It would also help to identify where costs may be avoidable and unavoidable. A comparative study of costs of community hospitals would be exceptionally useful to trusts as it would enable them to identify where costs are higher than comparable hospitals, so that efficiency measures could be identified.

In the absence of a robust rurality need index it would be possible to consider readily measurable key indicators of health status. It would be relatively straight-forward to complete analyses on health status on key health indicators such as blood pressure, cholesterol, body mass index for heart disease and stroke risk, blood sugar for diabetes, peak flow and blood oxygen for respiratory disease.

One approach that could be adopted would be to select a randomised sample of those living on low incomes compared with the median after household costs in rural areas and urban areas to compare how often they access healthcare. Regression analyses could be carried out to determine if there is a link between the rurality (GMD) of an area and the utilisation of GP services. There would also need to be a general health section to the study as it could be that there is a difference in the health needs in urban and rural areas. Measures could include body mass index (BMI), smoking and alcohol consumption patterns, blood pressure, and cholesterol levels. Regression analyses could be carried out to determine if there is a link between GMD for the area lived in and the percentage through the range of observed results. If there was a positive correlation then this would need to be taken into account in resource allocation because it would mean that those with poorer health were living in more inaccessible areas. If however there was a negative correlation this would reduce the pressures of providing health in rural areas.

Figure 8.12 Approach proposed to enable regression analyses of clinical conditions

Total cholesterol (desirable below 5.2 mmol/l)	Percentage through the range of observed results	Enumeration district GMD
10	74%	35
8	51%	8
12.5	100%	20
3	0%	6
4	11%	8
7	42%	14
9	63%	28
5	21%	2
6	32%	10
11	84%	31

Research has not been published into the differential costs associated with providing services in old buildings. Anecdotal evidence indicates that it is possible to achieve significant efficiencies by moving to new purpose built facilities with flexible rooms. It is possible that trusts in rural areas are more likely to have a greater proportion of their buildings that are old and less flexible. From previous experience these buildings tend to require more nursing staff due to poorer access to patients and non-optimal ward sizes and poor 'line of sight'. In these types of buildings there tends to be poorer access for patients, duplicates of equipment are needed for example for manual handling. It is believed that a study into control of infection issues would be likely to find that older buildings are less likely to have adequate hand-basins and toilets, and may not have design features like smooth surfaces, sealed joints and materials that can withstand aggressive decontamination such as hydrogen peroxide and bleach. It would be helpful to choose hospitals providing the same or very similar specialty or range of specialties to an equivalent mix of patients for this research.

It is possible that there could be a differential in costs between urban and rural areas due to patients staying in hospital longer following treatment. The hypothesis is that clinicians will be more cautious with patients that live in remote areas because of the difficulties of reaching the patient if there is a relapse. A study comparing the average length of stay and readmission rates with the rurality of a patient's residence would determine if there may be a link. This study would be relatively easy to complete as a very large sample of patients could be used in the analyses. The home postcode for each patient is known and this can be used to assign patients rurality measures. Most patients have a treatment code termed HRG or OPCS4 code. These codes specify the treatment that a patient has received. The length of stay in hospital is known for each patient. Regression analyses could be carried out on length of stay and GMD for patients in each HRG or OPCS4. If this analysis showed that patients in rural areas had longer lengths of stay further research could be carried out with patients and clinical staff to determine the causative factors. This would enable PCTs to develop measures to give greater support to patients in rural areas to reduce or eliminate any unnecessary delays in hospital discharge that are caused by rurality issues.

Reducing stigma has been identified as a potential block to patients accessing services, in particular in rural areas. Hospitals have been visited where consultant names and clinical specialties are put on information boards and patients are then called via a public-address system. There is often little if any confidentiality when reporting to a reception desk to await a consultation. There are many similar examples of where the NHS does not design service provision to ensure that all practicable steps are taken to respect the privacy of patients.

There has been some research into the impact of lower primary and secondary care consultation rates; however it would be helpful to have a definitive study in the UK. In view of the results of studies like those in East Anglia by Haynes and Bentham it may be that studies in rural areas in England of similar 'time critical' illnesses like cancer, heart disease, stroke and diabetes would find equivalent results to those of the study of cancer and referral delays in rural areas of France (Launoy et al., 1999). There has been no recent research into referral rates in obstetrics or on the incidence of complications. One measure could be an estimate by the clinician of how long the condition or complication, coded according to HRG or OPCS4, had existed prior to the first referral. This could be correlated with GMD. It would also be helpful to analyse the time elapsed between the GP referral and first outpatient to determine if there are delays in rural areas. If this research indicates that there are delays in rural areas, research could identify what changes could be made to increase and expedite referrals.

Health planners are increasing the sophistication of modelling to identify where patients live when planning new facilities. It would be helpful to identify where referral rates are lower than would be envisaged when planning services, because without this any accessibility issues cannot be fully addressed. This research would be similar in many respects to that detailed previously and would include identifying cohorts of patients who have a lower referral rate, in particular in time critical conditions and identifying what would make services more accessible.

The link between transport costs and rurality has been researched by Brigham and Asthana (2000), but this was only for one patient group. A range of conditions from different specialties need to be considered so that a representative sample of a hospital activity is identified so that costs for other specialties can be estimated. When any differentials in costs have been identified these need to be aggregated to give an estimate for individual trusts. Without this trust level estimate it is likely to be more difficult to secure support for consideration of amending the allocation formula. It will be important to consider all aspects of transport costs in any such study including patient transport, staff time and an accurate calculation of travel expense, lease car and transport fleet costs.

The NHS and DH should improve the accessibility, quality and efficiency of patient care in rural areas care by developing different treatment models, in particular for emergency services. Such models could be adapted from those introduced in rural areas in other countries.

The link between the distance travelled by emergency ambulance and mortality rates has been shown. However a second study that considers travel time and the survival rates for patients with critical conditions may give an indication of a link between rurality and death rates. The study could use ambulance records as they are required to maintain data on every emergency journey and in previous experience these are generally completed assiduously. Ambulance trusts have excellent data on incidents, journey times and conditions and it would be relatively easy to carry out correlation analyses to determine if there is a positive correlation between journey time and mortality for some conditions. This research would be valuable as it could help to inform prioritisation for ambulance and helicopter services, in particular in rural areas.

8.5 NOVEL AREAS IN THESIS

The novel parts of this chapter of the thesis were regression analyses that indicated that there was a positive correlation between increasing rurality and key elements of NHS infrastructure, in particular hospital numbers. These analyses have proven to be readily accessible to senior staff in the NHS and DH and to elected officials including MPs. As a consequence they stimulated considerable debate about the issue of rurality and funding.

8.6 CONCLUSIONS

Research in East Anglia has shown that the use of services is strongly linked to accessibility, in particular for the elderly and the very young. This is an inevitable consequence of the difficulties of getting to healthcare facilities in rural areas where travel costs may be prohibitive and there is often only limited public transport. Rural market towns, which are significant distances from major acute hospitals, need to have key local services if the most vulnerable are going to be able to access the healthcare they need. The range of services provided in community hospitals varies. Those commonly provided are minor injuries; care of the elderly, in particular sub-acute and post-operative rehabilitation; outpatients; and midwifery.

There has been insufficient research in England to determine the health consequences of these lower referral and consultation rates. Research from other countries indicates that lower referral and consultation rates are highly likely to be significant in conditions such as cancer and mental health, where timeliness is important to long term prognosis. It has not been determined if the differences that have been identified are avoidable within existing resources or if they are unavoidable what the funding requirement would be to provide equivalent access. If they are unavoidable the position is the same as for ambulance transfer times and either additional funding would have to be allocated, efficiency improvements would be necessary or there would need to be lower targets.

This is a key area and further research is needed as a matter of urgency because of the current plans to rationalise maternity services (DH 2006). The rationalisation will lead to some expectant mothers having to travel further for the care required. The theory outlined by the DH is that smaller numbers of specialist units will be able to provide improved care. This may be the case once the patient arrives, but if patients do not attend or there are delays in access then this could result in a lower standard of care and this could include increased perinatal mortality and long term disability rates.

The analyses in this study have shown that it is not only access to healthcare that differs but also the facilities and their utilisation. Hospital and bed numbers are positively correlated with increasing rurality and bed utilisation is negatively correlated. It also appears clear that staff in rural areas travel more and that there are higher travel costs, however NHS data collection was insufficiently robust for worthwhile analyses to be completed.

Whilst there has not been a rigorous financial comparison of the costs of running small and large hospitals carried out in England, analyses in other countries have indicated that economies of scale are achieved in larger hospitals. For rural areas to have the same hospital costs for hospitals as urban areas, it would be necessary to centralise services and this would not be possible politically due to the public outcry that would ensue, or clinically as it would reduce accessibility in particular for the elderly, young and those living in poverty. For rural areas to have the same transport and travel costs it would be necessary to reduce community services. Again this would not be politically or clinically viable.

It is clear that the differences in numbers of beds and hospitals are largely unavoidable due to local pressure to retain the facilities and the lack of support by NHS and DH management and national politicians for closures. Therefore there would either need to be a market forces factor for rurality or, as is the case for the ambulance service, different targets would need to be applied to enable rural areas to have lower costs in other areas to compensate for the additional costs of providing services in rural areas. This could be longer waiting times for non-time critical conditions. However such measures would be unpalatable and it is believed that it would be possible to make significant improvements to services by being more efficient to reduce expenditure.

The allocation formula did not meet the aim of producing a ‘level playing field’ where commissioners of healthcare across the NHS in England would have the resources required to offer equivalent services.

The need for additional funding for rural areas had been accepted for ambulance services and a longer response time target had been set. However a rurality adjustment was not considered despite repeated calls for this to occur and rural areas were expected to achieve the same targets the rest of the NHS for all other services.

When the Health Secretary Alan Milburn said “That will not be the end of the story. We shall also ask the advisory committee to investigate over the next year the impact of rurality” he was mistaken as no reports have been published and no changes have occurred.

CHAPTER 9 ~ KEY RECOMMENDATIONS

It is concluded that there is likely to be a heightened interest in resource allocation following the period of financial growth due to financial pressures and a greater willingness by trusts to raise concerns about the allocation system. Changes in systems, such as the implementation of Payment by Results (PbR), pay increases for staff and increased pressures on the NHS to shorten waiting times, provide new drugs, use the latest equipment and improved facilities are likely to cause significant cost pressures.

The key recommendations are as follows:

1. That research used by Government that has a significant effect, like that for resource allocation, should be subject to detailed scrutiny by leading researchers and that the conclusions of peers should be carefully considered by Government prior to adoption.

2. That research teams should include co-opted members from the NHS or Department of Health who would have a specific remit to ensure that analyses are aligned with service issues and requirements. Such an approach may have addressed the weaknesses that have been identified as part of this study, in particular on the studies on the health need adjustment by the Centre for Health Economics and on the pay adjustment by the Warwick Business School. Pedhazur concluded that "Knowledge and understanding of the situations when violations of assumptions lead to serious biases “ (Pedhazur, 1997, p. 33).

3. That there should be a Royal Commission into the Barnett Formula to determine what the allocation split should be between the four Home Countries. That this should set a target share for each public service based on a system that adjusts for differences in need and unavoidable differences in costs. The Crossman principle should be applied where there is equalisation on an expanding budget with an aim to reach the target of increases and decreases over a maximum of 10 years. An independent standing committee should be formed to update the target share on an annual basis.

4. It is concluded that, if introduced with care and modified as necessary, virtually any management and payment structure could work, but that incessant changes are not conducive to the long term planning or decision making. It is recommended that there should be a moratorium, other than *in extremis*, on major structural or financial system changes for a minimum of 10 years. This would give the service the stability required to make the fundamental changes in service quality and efficiency that are possible. There would however need to be an independent review of the current structures throughout the Department of Health and NHS to identify where efficiency savings could be made and to determine what minor modifications are necessary to ensure that the current structures are as effective as possible. Such a review is a top priority for PbR and Foundation Trusts as these systems were introduced without adequate piloting or consideration of the potential impact.

5. That there should be a detailed financial analysis of all trusts to identify the costs of individual services and departments, and therefore treatments provided. This should include staff pay and infrastructure costs so that the costs of providing services in old and PFI buildings can be identified. All trusts should be required to review the

results, develop and implement financial improvement plans. The information could be analysed by researchers to determine how costs vary according to rurality and other factors such as age of buildings so that a more robust market forces formula can be developed.

6. That new continuum rurality measures should be developed that are suitable for regression analyses and are based on a composite of factors including population, accessibility, roads, neighbouring areas, and elements of area based classification systems such as land use and employment sectors. Once refined such measures would increase the focus on rurality as they would enable researchers to carry out analyses of the impact of rurality. An equivalent composite index on poverty should also be developed that takes into account accessibility and the support provided to those in need.

7. That research should be carried out to develop a quality adjustment, based on the principles underpinning the Warwick pay adjustment of compensating differentials to provide an increased share of the proportion of funding for areas that are less attractive for staff. The term staff quality adjustment may be contentious and therefore the phrase compensating differentials adjustment may be more politically sensitive.

8. That research should be completed that would enable the General Labour Market based pay Market Forces Factor to be replaced with a Specific Recognised Cost system that reflects actual staff costs.

9. That research should be completed to determine the unavoidable costs associated with different health systems in rural, urban and mixed areas so that this could be included in the hospital and community healthcare services allocation formula.

10. That research should be completed to identify which groups in society are under presenting for treatment and allocating an increased share of resources to provide services that would increase access. Research to date indicates that the groups are likely to include women in some ethnic minorities and farmers and those with mental illness in rural areas.

11. That the Payment by Results system should be based on standardised care using international best practice as the ‘benchmark’.

CHAPTER 10 ~ PRINCIPAL CONCLUSIONS, CHANGES TO NHS SYSTEMS AND FINDINGS OF THIS STUDY WITH CURRENT RELEVANCE

The principal conclusions of this study relate to the case for the inclusion of a rurality adjustment, the need, pay, and land and buildings adjustments. The changes that were made to the NHS systems are reviewed and the publication and circulation of analyses and conclusions of this study on issues of current and future relevance.

This study concludes that rurality was a principal factor in all of the comparator funding allocation systems. It was a key element of the overarching public funding allocation system, the Barnett Formula; it was used in local authority allocations for all services; Scotland, Northern Ireland and Wales all had rurality adjustments; the allocations for GPs in England were adjusted for those in rural areas. The inclusion in other schemes and the logic that costs for staff, facilities and transport were likely to be related to rurality was such that this should have been considered at the inception of the formulae in the 1970s. The lack of the review that was committed to by ministers, to determine the need for a rurality adjustment may indicate that political support for such a review was reduced when it became apparent such a study could result in greater pressure for an adjustment that would reduce the share of resources received by urban areas.

It is concluded that the need adjustment that was based on the research carried out by the Centre for Health Economics at the University of York was based on assumptions that were of questionable validity, in particular that health utilisation was a reasonable predictor of health need. It is notable that the York study stated that there were higher levels of demand in rural areas than predicted by the model. The conclusion made in the study was that there may be higher levels of unmet demand in urban areas was inconsistent with the research cited in the study and a considerable body of research that indicates that there is distance decay in rural areas.

This study concludes that the results of the application of the need adjustments on specific services were counter-intuitive. Analyses carried out as part of this study indicate that the majority of services like chiropody and district nursing are used by the elderly, rural areas tend to have a significantly higher proportion of elderly, however the proxies resulted in the areas with the greatest proportion of elderly receiving a significantly lower adjustment for the need for chiropody and district nursing services. There is also a significant negative correlation between rurality and the adjustments for chiropody, district nursing and psychiatry.

A detailed review of the research by the Warwick Business School that had been used to underpin the pay adjustment identified issues that indicated that the pay adjustment was not meeting the aim of compensating for unavoidable differences in staff costs. The approach adopted by Warwick entailed setting the target for NHS staff costs according to local salary levels. This ignored the monopsonistic nature of healthcare in the UK and the fact that the attempt to introduce locally negotiated pay levels in the NHS had failed. The pay adjustment resulted in the most affluent areas in the UK receiving a significant increase in their share of healthcare funding. This was because it was assumed that the high salaries in areas such as the City of London, Kensington and Chelsea resulted in the need to pay staff including clinicians significantly more than nearby areas such as Barking and Havering, where salaries of the local population were relatively low. Analyses completed in this study indicated that the adjustment for areas such as Barking, Havering and Redbridge was insufficient to cover London Weighting.

The review of the land and buildings adjustments carried out in this study indicated that trusts were experiencing unavoidable differences in costs. The most notable example was for Barts and the London where it was estimated that the additional revenue costs of the new £1 billion hospital would be £48 million per annum, this equated to 10% of the trust annual budget. It was concluded that this was likely to become a significant issue because the total investment programme that had been approved by the DH by 2007 exceeded £18 billion. The unavoidable costs associated with providing services in old hospitals were also considered. It was concluded that hospitals with major backlog maintenance issues would not be able to invest in new equipment that would improve services or efficiency.

As a result of this issue and the poor quality performance of trusts in Outer London and the South East it was concluded that the case for an explicit quality adjustment should have been considered for inclusion in the allocation formula. The relatively poor performance of the trusts in this area may have been coincidental or it could have been due to issues such as area was not able to attract and retain high calibre staff. It is also possible that the resource allocation formula could have been partially responsible because these areas may have had higher costs or health needs than was catered for by the formula.

Analyses of utilities costs indicated that there were unavoidable differences in costs. Whilst small in comparison to the need and pay adjustments, an adjustment for utilities would have been larger than other adjustments that were considered worthy of inclusion, including that for emergency ambulances.

The articles and reports written as part of this study have contributed to the debate on resource allocation. The aim of bringing the findings and conclusions of the initial analyses to the attention of the key decision makers on resource allocation was achieved through a series of articles and reports. Articles were published in Parliamentary Brief, Public Finance, the Health Service Journal. These were selected because they were read by Government, NHS board members, civil servants and NHS finance leads. Parliamentary Brief was widely read by MPs, Public Finance was the journal for the Chartered Institute of Public Finance and Accountancy which was the leading professional organisation for public sector finance staff and the Health Service Journal which was widely read by NHS, Department of Health and Ministers of Health.

A full report titled “Who Gets What Where and Why” and a summary report were circulated to DH Main Board Directors, members of the Advisory Committee on Resource Allocation, Strategic Health Authority staff, Chief Executives, Chairmen and Finance Directors of the NHS trusts that, according to analyses in this study, were not receiving the appropriate share of resources. Copies were also sent to elected officials including local MPs for these constituencies. There was a large and positive response to the reports. Respondents included MPs, NHS trust board members and senior staff in health authorities, a Government Minister and key staff from strategic health authorities.

A series of revisions have been made to the formula. The need adjustment was, as proposed in this study and the associated reports and articles, changed to one that was based on factors that were more directly and obviously linked to health need. This has resulted in areas that were previously viewed as having a higher health need than average such as Kensington, Chelsea and Westminster being assessed as having a significantly lower health need than average. The pay smoothing revision reduced the direct link between salaries in an immediate area and the adjustment for trusts. The impact of this change was most noticeable in London where the ‘cliff edges’ between neighbouring areas were significantly reduced. It is possible that the pay adjustment had an impact on quality because it was notable that all of the Foundation Trusts providing acute hospital services in London in 2007 were funded by commissioners who received the greatest pay market forces factor adjustments.

However the changes that have occurred to the resource allocation formula since 2003, have not included any change to reflect unavoidable costs incurred by rural areas. The pay system is, despite the revision, still based on the Warwick approach that allocations should be adjusted to reflect local salaries. There have also been no adjustments introduced to compensate for unavoidable differences in facilities resulting from the large investment in buildings through the Public Finance Initiative, utilities or private medical insurance.

The most significant change to NHS resources has been the increase in funding so that it is at an equivalent level to comparator countries in Continental Europe. The impact and use of this additional funding has been well documented. Particular concerns have been the substantial increases in pay that appear not to have been accompanied by significant increases in efficiency. In the case of GPs the increase was accompanied by a significant reduction in hours and night-time cover. The DH have publicly stated that the costs of the pay increases were significantly in excess of what had been envisaged. Despite the unprecedented increases the NHS has faced widespread financial difficulties. Regression analyses were completed as part of this study to determine if overspends were more prevalent in urban or rural areas however there was no correlation.

The independent nature of Foundation Trusts and the competitive nature of the commissioner provider system may result in parochial decisions and these decisions may be counter to maximising efficiency for example retention of services when consolidation would improve quality and efficiency. This is a consequence of having a number of competing organisations rather than local and regional entities that are responsible for all services. One option would be to reorganise services so that there is no competition, however any further reorganisation would deflect attention from the effective provision of services. In addition any structure has strengths and weaknesses and it is notable that the Area Health Authority structure had local management of all services, there was however no clarity over national minimum standards of care, national care pathways, standard systems including procurement, robust information on performance with clear trajectories, and rapid support and intervention when service quality or efficiency deviated from plan.

The potential benefits of the NHS are not being fully realised. The number of leading clinical staff when allied to the scale of funding allied to national nature of the organisation provides the opportunity to develop clinical practices and services that lead internationally. However the NHS does not provide a service that leads internationally. I believe that this is because it has not maximised the benefits that result from being a national organisation.

National commercial organisations have common systems, purchasing, standard services, layout of public facilities and prices. The NHS has none of these and whilst there have been attempts to have greater standardisation through national targets, the National Institute for Health and Clinical Excellence and staff policies and PbR there are considerable differences in services, treatments, waiting times and accessibility. It is concluded that the title National Health Service is a misnomer as the service is not truly national.

It is concluded that the NHS should have a target set by Parliament to exceed international performance on all key indicators including access times, cancer treatment, healthcare association rates, access to pharmaceuticals. Meeting this level of performance would necessitate adapting international best clinical practice, carrying out research into new clinical practices, standardisation of care, maximising efficiency by adapting best practice on the use of resources from the healthcare and commercial sectors.

The extended period of time that this study has been completed over has been highly beneficial as it meant that findings could be considered in the light of a detailed understanding of the NHS from different perspectives. From experience of working with financially challenged trusts across England, it appears that, whilst the DH miscalculation on pay awards was a contributory factor, the principal difficulty facing trusts is not related to the resources allocated but to the way that trusts are managed. It has also been concluded that even in the most successful trusts that service efficiency could be significantly improved. The strategic health authority for London has stated that the potential savings are considered to be in the range of 15% to 35%. In 2006 NHS overspending was estimated at £1 billion and a significant proportion of the largest overspends were in trusts in the outer ring of London and trusts in the Home Counties.

Professor Stone carried out a review of the resource allocation formula in 2006 and described it as “a witches brew” and concluded that the systems were too complex. The complexity is, in part, the inevitable consequence of adopting a system that is based on attempting to model the differences in healthcare need. .

This study concludes that it would be preferable to introduce a system for NHS hospitals and service providers where payment are based on standardised and highly efficient care pathways that have been developed to provide services that are comparable or better than international best practice. A cost adjustment would be needed for each service to compensate for unavoidable cost differences.

This system would make a fundamental difference to service quality and efficiency as care pathways would be evidence based and there would be an efficiency target for each service with an explicit set of measures that would enable the service to improve productivity. The measures would need to be updated each year as new procedures and systems are developed. To be accepted the definition of 'World Class' quality and efficiency would need to be led by acknowledged experts within each clinical field and there would need to be funding for clinicians seeking to improve care pathways.

It would take time to maximise efficiency on staff, buildings and equipment. Staff changes would need to be implemented in stages to avoid additional costs as a result of redundancies and early retirements. It would also be necessary to handle issues sensitively with staff, as efficiency maximisation may lead to changes to roles, hours, base and management and changes of this nature can cause considerable distress if not handled appropriately. It may take several years to build new facilities or for it to be cost effective to replace newly purchased or leased equipment. An effective communications plan for staff, patients and carers, that indicates how services are being improved and that the changes are not the result of a need to rationalise services, would be essential.

There complexities are such that there would need to be a phased introduction of tariffs based on maximal efficiency. One option would be to assess each service and estimate the timescales needed to partially and fully implement maximal efficiency. A principle could be adopted that a period of several years should be added to these targets so that providers have adequate time to achieve the efficiencies and to give an incentive for achieving savings earlier.

The efficiency assessments would need to be carried out by highly experienced staff and the service provider would need to be involved and have the right to seek to alter recommendations on changes to clinical pathways and tariff targets. This approach would need to be extensively tested prior to roll-out across the NHS to determine if it is effective.

Adopting this approach would appear *prima facie* to enable the Government to reduce the proportion of public expenditure allocated to healthcare whilst continuing to improve the quality and accessibility of care. It would be necessary to set mandatory targets or reward trusts where there is an increase in the services provided to 'hard to reach' groups.

There may be other better systems for allocating healthcare funding than the one proposed and whilst it would not be possible for a simple formula to be completely accurate it would be preferable to the system that was in place as it was neither accurate or simple to follow. If the Theory of Relativity can be boiled down to $E=MC^2$ then it should be possible for the NHS allocation formula to be made less complex.

Addendum

Report of the Advisory Committee on Resource Allocation

An extensive review of the resource allocation system was carried out by the Advisory Committee on Resource allocation between 2005 and 2008. The principal conclusions of the review are given in Appendix 10.

Significant changes have been made to the need adjustment and as a consequence areas that were previously deemed to be under target, are now deemed to be significantly over target as detailed in Appendix 11.

It has been determined that there was no case proven for an adjustment to the formula on the basis of specific health needs in rural areas. However of the 26 areas that will, according to the 2008 report, be under budget by 2011, 11 cover rural areas including Cornwall and Isles of Scilly PCT, Lincolnshire Teaching PCT, North Lincolnshire PCT, South Staffordshire PCT, North Somerset PCT and Norfolk PCT. The 10 areas that the report estimates will be most over budget are all in London as shown in the following figure

PCT	2009-10 allocation £000s	2010-11 allocation £000s	Two year increase £000s	Two year increase %	2010-11 closing DFT %
Islington PCT	412,126	433,316	41,655	10.6	11.70
Lewisham PCT	484,939	509,873	49,014	10.6	12.00
Camden PCT	453,989	477,331	45,886	10.6	12.40
Kingston PCT	249,459	262,286	25,213	10.6	13.50
Wandsworth PCT	488,965	514,106	49,421	10.6	14.40
Lambeth PCT	580,017	609,840	58,624	10.6	14.80
Hammersmith and Fulham PCT	326,448	343,232	32,995	10.6	16.20
Kensington and Chelsea PCT	337,424	354,773	34,104	10.6	20.40
Westminster PCT	447,789	470,813	45,259	10.6	20.80
Richmond and Twickenham PCT	267,442	281,193	27,031	10.6	23.40

This appears *prima facie* good news for rural areas because, if the target is met there will be significant increases, in the case of Cornwall the increase would be £50.1 million. However it should be noted that the Pace of Change policy is such that all areas will receive a minimum uplift of 10.6% and the maximum uplift for areas under target is 13.8%. The Pace of Change policy is such that, in the past, the formula has been changed before areas have achieved their target allocation. In addition the Pace of Change could decrease if Government spending is reduced because of the Crossman Principle of only adjusting on an expanding budget.

The case for an adjustment to the Market Forces Factor for rurality was rejected. No adjustment has been made to compensate for differences in the revenue costs of land, buildings or utilities. The rationale for these decisions is currently unclear as the Technical Papers have not been published.

The number of issues that have not been addressed by the review, when combined with the scale of the target reductions will make the revised formula a further focus for criticism. It is notable that areas that could be considered Conservative heartlands are likely to be most concerned about the formula. If the Conservative party forms the next Government there could be pressure for the system to be revised.

CHAPTER 11 ~ REFERENCES

Report of the Advisory Committee on Resource Allocation, (2008), www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_091484

Allocation of Resources for the Northern Ireland Health and Personal Social Services Second Report (September 1997), Capitation Formula Review Group

Antoine, D., Gatto, A., Story, A. (2000), Annual report on tuberculosis cases reported in 2000 in England Wales and Northern Ireland, Communicable Disease Surveillance Centre, Health Protection Agency, www.hpa.org/infections/topics_az/tb/pdf/tbreporting2000.pdf

Arrowsmith J., Sisson K., (2002), Decentralization in the Public Sector, *Healthmatters* issue 21,

Aspden A., (2007) The Winter of Discontent http://libcom.org/history/1978-1979-winter-of-discontent

Asthana, S., Gibson, A., Moon, G., Dicker, J., Brigham, P., (2002), Rural areas may need more health care resources in England too, *British Medical Journal*, **324**

Asthana, S., Brigham, P., Gibson, A., (2002), Health resource allocation in England: What case can be made for rurality, *Rural Health Allocations Forum*, University of Plymouth, ISBN 1841020990

Asthana, S., Brigham, P., Halliday, J., Gibson, A., (2002), Rural deprivation and service need: a review of the literature and an assessment of indicators for rural service planning, *South West Public Health Observatory*, www..swpho.org.uk/ruraldep/ ISBN 0954135954

Atkinson, J. G., Pini D., (2001), Rural ambulance economics, *The Center for Health Policy Research and Ethics*, http://rhr.gmu.edu/briefspublications/papers/ambulanceecon.pdf

Audit Commission, (1997), Finders keepers: the management of staff turnover in NHS trusts

Australian Medical Association, (2002), Victoria rural health policy, www.amavic.com.au_rural.htm#rurality%20and%20remoteness

Baird, A. G., Donnelly, C. M., Miscampbell, N. T., Wemyss, H. D., (2000), Centralisation of cancer services in rural areas has disadvantages, *British Medical Journal*, **320**, 717

Balarajan, R., Yuen, P., Machin, D., (1987), Socio-economic differentials in the uptake of medical care in Great Britain, *Journal of Epidemiology and Community Health*, **41**, 196-199

Balducci, L., Lyman, G. H., (1997), Cancer in the elderly, epidemiologic and clinical implications, *Clinics in Geriatric Medicine*, **13**, 1-15

Banyard, R., (30 January 1997), Out in the field, *Health Service Journal*, 30-31

Bardsley M., Morgan D., (1996) Deprivation and Health in London http://www.lho.org.uk/Download/Public/8004/1/depr_hth_3.pdf

Barnett, S., Roderick, P., Martin, D., Diamond, I., (2001), A multilevel analysis of the effects of rurality and social deprivation on premature limiting long term illness, *Journal of Epidemiology and Community Health*, **55**, 44-51

Bartley, M., Plewis, I., (2002), Accumulated labour market disadvantage and limiting long-term illness, *International Journal of Epidemiology*, **31**, 2, 336-341

BBC, (2006), GP Pay rises http://news.bbc.co.uk/1/hi/health/6157219.stm

Bentham, G., Eimermann, J., Haynes, R., Lovett, A., Brainard, J., (1995), Limiting long term illness and its association with mortality and indicators of social deprivation, *Journal of Epidemiology and Community Health*, **49**, S57-64

Bentham, G. , Haynes, R., (1986), A Raw Deal in Remoter Areas?, *Family Practitioner*

Services, **13, 5,** 84-87
Bentham, G., Haynes, R., (1985), Health, personal mobility and the use of health services in rural Norfolk, *Journal of Rural Studies*, **1**, 231-239
Biscoffi, G., De Salvia, D., et al (1993), Urban-rural differences in the associations between social deprivation and psychiatric service utilisation in schizophrenia and all disagnoses: A case-register study in northern Italy, *Psychological Medicine***, 23**, 487-496
Bithell, J. F., Dutton, S. J., Neary, N. M., Vincent T. J., (1995), Controlling for socio-economic confounding using regression methods, *Journal of Epidemiology and Community Health*, **49**, S15-19
Blazer, D., George, L., Landerman, R., et al, (1985), Psychiatric disorders: a rural/urban comparison. *Archives General Psychiatry*, **42**, 651-656
BMA (2003) Terms and Conditions – Consultants http://www.bma.org.uk/ap.nsf/Content/CCSCContractTCS
Booker, D., (1993), Mental Health in the Countryside, East Anglian Regional Conference.
British History, (2003), www.british-history.ac.uk/report.aspx?compid=12338 - 108k
British Official Publications Collaborative Reader Information Service 2, Interim Report on the Future Provision of Medical and Allied Services, (1920), www.bopcris.ac.uk
British Official Publications Collaborative Reader Information Service 5, National Health Insurance, (1926), www.bopcris.ac.uk
British Official Publications Collaborative Reader Information Service 10, National Health Service (1943-1944), www.bopcris.ac.uk
British Official Publications Collaborative Reader Information Service 11, Development of consultant services, (1950), www.bopcris.ac.uk
British Official Publications Collaborative Reader Information Service 14, Report of the Ministry of Health, (1955), www.bopcris.ac.uk
British Official Publications Collaborative Reader Information Service 15, Grading structure of administrative and clerical staff in the hospital service, (1957), www.bopcris.ac.uk
British Official Publications Collaborative Reader Information Service 16, Cost of prescribing, (1959), www.bopcris.ac.uk
British Official Publications Collaborative Reader Information Service 17, Doctors' and dentists' remuneration, (1960 -1961), www.bopcris.ac.uk
British Official Publications Collaborative Reader Information Service 19, Report of the committee on senior nursing staff structure, (1966), www.bopcris.ac.uk
British Official Publications Collaborative Reader Information Service 20, Relationship of the pharmaceutical industry with the National Health Service, (1967), www.bopcris.ac.uk
British Official Publications Collaborative Reader Information Service 22, Review of doctors' and dentists remuneration, (1971 - 1972), www.bopcris.ac.uk
British Official Publications Collaborative Reader Information Service 23, Organisation of medical work in hospitals, (1974), www.bopcris.ac.uk
Boyle, P., Pearce, J., (2000), Commuting patterns in rural areas, *The countryside Agency*
Bretman, M., (16 September 1999), Field day, *Health Service Journal*, 24-25
Brigham, P. & Asthana, S. , (December 2002), Costs of providing assertive outreach in a rural setting, *Rural Health Allocations Forum*, www.rural-health.ac.uk/ftdownloads/rmdreport.doc
Brown, D., (1999), Care in the country. Inspection of community care in rural communities, *Business Support Unit, Social Care Group, Department of Health*, CI(99)8

Burnett T., Mort M., Improving access to healthcare www.lancs.ac.uk/fass/ihr/publications/farmershealth.pdf
Cahill, K., (October 2001), The killing of Cornwall, *Business Age*, 18-19
Caines, E., (2000), The NHS Plan - Time Is Already Running Out http://www.sourceuk.net/indexf.html?01127
Campbell, J. L., Ramsay, J., Green, J., (2001), Age, gender, socio-economic and ethnic differences in patients' assessments of primary healthcare, *Quality and Safety in Health Care*, **10**, 2, 90-95
Carlisle, R., Groom, L. M., Avery, A. J., Boot, D., Earwicker, S., (1998), Relation of out of hours activity by general practice and emergency services with deprivation in Nottingham, *British Medical Journal,* **316**, 520-523
Carnall R., (2006) http://www.publications.parliament.uk/pa/cm200607/cmselect/cmhealth/uc1106-i/uc110602.htm
Carr-Hill, R., Dixon, P., O'Reilly, D., (June 1998), Population Distribution and Sparsity: Effects on Personal Social Services
Carr-Hill, R. A., Jamison, J. Q., (1998), Basing resource allocation formulas on standardised mortality ratios would be wrong, *British Medical Journal*, **316**, 1169
Carr-Hill, R. A., Jamison, J. Q., O'Reilly, D., Stevenson, M. R., Reid, J., Merriman B., (2002), Risk adjustment for hospital use using social security data, *British Medical Journal*, **324**, 390
Carr-Hill, R., Hardman, G., Martin, S., Peacock, S., Sheldon, T., ,Smith P., (1994), A Formula for Distributing NHS Revenues Based on Small Area Use of Hospital Beds, The University of York, Centre for Health Economics
Carr-Hill, R., Rice, N., (1995), Is enumeration district level an improvement on ward level analysis in studies of deprivation and health? *Journal of Epidemiology and Community Health*, **49**, S28- 29
Carr-Hill. R., Rice, N., Roland, M., (1996), Socio-economic determinants of rates of consultation in general practice based on fourth national morbidity survey of general practices, *British Medical Journal*, **312**, 1008-1012
Carstairs, V., (1995), Use of deprivation indices in small areas studies of environment and health – general discussion, *Journal of Epidemiology and Community Health*, **49**, S81-88
Chadwick R., Thompson A., (2000), Professional Ethics and Labour Disputes, *Cambridge Quarterly of Healthcare Ethics* **9**: 483
Charlton, J. R. H., Lakhani, A., (1985), Is the Jarman underprivileged area score valid? *British Medical Journal*, **290**, 6483, 1714-1716
Chew-Graham, C. A., Mullin, S., May, C. R., Hedley, S., Cole, H., (2002), Managing depression in primary care: another example of the inverse care law, *Family Practitioner*, **19**, 6, 632-637
Cliff A., (1979), The balance of class forces in recent years, *International Socialism,* **2**:
Cloke, P. J., (1977), An Index for Rurality for England and Wales, *Regional Studies*, **11**, 31-46
Cloke, P. J., (1977), Changing Patterns of Urbanisation in Rural Areas of England and Wales, 1961-1971, *Regional Studies*, **12**, 603-617
Cloke, P. J., (1985), Rurality in England and Wales 1981: A Replication of the 1971 Index, *Regional Studies*, **20**, 289-306
Cloke, P. J., An Index of Rurality for England and Wales, (1977), *Regional Studies*, **11,** 31-46, Pergamon Press
Cloke, P. and Edwards, Rurality in England and Wales, (1981), A Replication of the 1971 index, *Regional Studies*, **20(4)**, Cambridge University Press)
Cornwall County Council, (1998), Key socio-economic statistics for Cornwall in

support of the claim for Objective One status for Cornwall, *Research and Information Support Services, Cornwall County Council*
Cornwall County Council, (1999), Socio-Economic Profile Poverty, Deprivation and Social Exclusion, http://www.cornwall.gov.uk/Facts/Socio-ec/SE011.htm
County Councils Network, (1998), Population sparsity and the personal social services, *Personal Social Services and Sparsity Steering Group*
Countryside Agency, (2002), Rural proofing in 2002/2003, A report to Government by the Countryside Agency, www.countryside.gov.uk/ruralproofing/pdf/ruralproofing2002_3.pdf
Craig, J., (1984), Averaging Population Density, *Demography*, **Vol 21 No. 3**
Craig, J., (1985), Better measures of population density, *Population Trends*, **39**, 16-21
Craig, J., (1987), An urban-rural categorisation for wards and local authorities, *Population Trends*, **47,** 6-11
Craig, J., (1988), Local Authority urban-rural indicators compared, *Population Trends*, **51,** 30-38
Crombie., I. K., (1991), Suicide among men in the Highlands of Scotland, *British Medical Journal*, **302**, 761-762
Cuffel, B. J., (1994), Violent and destructive behaviour among the severely mentally ill in rural areas: evidence from Arkansas' community mental health system. *Community Mental Health Journal*, **30,** 495-504
Cullingford, D. and Openshaw, S., (1982), Identifying areas of rural deprivation using social area analysis, *Regional Studies*, **16**, 6, 409-418
Davey-Smith, G., Hart, C., Blane, D., Gillis, C., Hawthorne, V., (1997), Lifetime socio-economic position and mortality, *British Medical Journal*, **314**, 547-552
Dawson D., Street, A., (1998), Reference Costs and the Pursuit of Efficiency in the 'New' NHS, *DISCUSSION PAPER 161*, University of York
Day, K., (1999), Squeeze falls on Barnett, *Public Finance*, October 8-14
DH1, (2006) Delivering Quality and Value http://www.dh.gov.uk/en/Publicationsandstatistics/Pressreleases/DH_4135963
DH3 (2007) List of LIFT schemes April http://www.dh.gov.uk/en/Procurementandproposals/Publicprivatepartnership/NHSLIFT/NHSLIFTschemesandcontracts/index.htm
DH (2006) http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4090523.pdf
DH (2006) Bed Occupancy http://www.performance.doh.gov.uk/hospitalactivity/data_requests/download/beds_open_overnight/bed_06_summary.xls
Department of Health, RAWP 1, History of staff market forces factor, www.doh.gov.uk/pub/docs/doh/rawp1.pdf
Department of Health, RAWP 2, Population data for allocations, www.doh.gov.uk/pub/docs/doh/rawp2.pdf
Department of Health, RAWP 3, the Exeter data set and attribution, www.doh.gov.uk/pub/docs/doh/rawp3.pdf
Department of Health, RAWP 4, A brief history of resource allocation in the NHS 1948-98, www.doh.gov.uk/pub/docs/doh/rawp4.pdf
Department of Health, RAWP 5, A history of GP distribution, www.doh.gov.uk/pub/docs/doh/rawp5.pdf
Department of Health (2002b) http://www.dh.gov.uk/en/Consultations/Closedconsultations/DH_4016901
Department of Health, (2002) RAWP 6, The years of life lost index and the health inequalities adjustment, www.doh.gov.uk/pub/docs/doh/rawp6.pdf

Department of Health, (2003), The Government's expenditure plans, www.doh.gov.uk/dohreport/report2003/
Department of Health, (2002), Advisory Committee on Resource Allocation, terms of reference, www.doh.gov.uk/allocations/review/termrefs.htm
Department of Health, (2002), Departmental report, expenditure plans 2002-3 to 2003-4
DHSS, (1980), http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_41218756
Department for Environment, Food and Rural Affairs, (2002), The way ahead for rural services, www.defra.gov.uk/wildlife-countryside/ruralwp/index.htm
Department for Environment, Food and Rural Affairs, (2002), Rural services standard, www.defra.gov.uk/wildlife-countryside/ruralwp/index.htm
Dhawan, J., (1996), Coronary heart disease risks in Asian Indians, *Current Opinion in Lipidology*, **7**, 196-198
Dolan, S. A., Jarman, B., Bajekal, M., Davies, P. M., Hart, D., (1995), Measuring disadvantage: changes in the underprivileged area, Townsend and Carstairs scores 1981-1991, *Journal of Epidemiology and Community Health*, **49**, S30-33
Dolk, H., Mertens, B., Kleinschmidt, I., Walls, P., Shaddick, G., Elliott, P., (1995), A standardisation approach to the control of socio-economic confounding in small area studies of environment and health, *Journal of Epidemiology and Community Health*, **49**, S9-14
Duncan C., Jones, K., Moon, G., (1994), Psychiatric morbidity: a multilevel approach to regional variations in the UK, *Journal of Epidemiology and Community Health*, **49**, 290-295
Dunn,J., Hodge, I., Monk, S., & Kiddle, C., (1998), Developing Indicators of Rural Disadvantage, Final Report to the Rural Development Commission, Department of Land Economy
Eachus, J., Williams, M., Chan, P., Davey-Smith, G., Grainge, M., Donovan, J., Frankel, S., (1996), Deprivation and cause specific morbidity: evidence from the Somerset and Avon survey of health, *British Medical Journal*, **312**, 287-292
Edmonds, T., (2001),The Barnett Formula, Research Paper 01/108, Economic Policy and Statistics Section, House of Commons Library
Edwards, B., Linton, J., Potter, C., (1993), The National Health Service, *Nuffield Provincial Hospitals Trust*, ISBN 0900574836
Elder, K. S., (1996), Mental health in rural communities, what are the issues? A Report by Rural Mind.
Elford, J., Phillips, A. N., Thomson, A. G., Shaper, A. G., (1989), Migration and geographical variations in ischaemic heart disease in Great Britain, *The Lancet*
Endean, C., (2001), Dearth in the desert, *6th National Rural Health Conference*, http://www.nrha,net.au/nrhapublic/publicdocs/conferences/6thnrhc/endean2paper.htm
Fieldhouse, E. A., Tye, R., (1996), Deprived people or deprived places? Exploring the ecological fallacy in studies of deprivation with the Samples of Anonymised Records, *Environment and Planning*, **28,** 237-259
Fowlie, S., Winner, S., (1991), Income and health in an ageing society, *Care of the Elderly*
Fylkesnes, K., Johnsoen, R. & Forde, O. H., (1992), The Tromso study: factors affecting patient-initiated and provider-initiated use of health care services, *Sociology of Health and Illness*, **14**, 275-292
GAE Population Distribution Indicators, Version 2, (1997), Report Prepared for the Scottish Office
Gaffney D., Pollock A.M., Price D., Shaoul J., (1999), NHS capital expenditure and the

private finance initiative—expansion or contraction?*BMJ,* 319:48–51
Gaffney D., Pollock A.M., Price D., Shaoul J., (1999), PFI in the NHS *BMJ* ;319:116
Gatrell, A. C., (2002), Geographies of health, Blackwell, ISBN 0631219854
Gibson, A., Asthana, S., Brigham, P., Moon, G., Dicker, J., (2002), Geographies of need and the new NHS, *Health and Place*, **8**, 1, 47-60
Gift, T. E., and Zastowny, T. R., (1990), Psychiatric service utilization differences by sex and locale, *The International Journal of Social Psychiatry*, **36**, 11-17
Gilhooly, M., Hamilton, K., O'Neil, M., Gow, J., Webster, N., Pike, F., (2002) Transport and Ageing: Extending Quality of Life for Older People via Public and Private Transport, *ESRC Report Reference Number L480 25 40 25*
Gillum, R. F., Mussolino, E., Madans, J. A., (1997), Coronary heart disease incidence and survival in African-American women and men, *Annals of internal medicine*, **127**, 111-118
Glenn, L. L., Jijon, C., (1999), Risk-adjusted in-hospital death rates for peer hospitals in rural and urban regions, *The Journal of Rural Health*, **15**, 94-107
Glover, G. R., How much English health authorities are allocated for mental health care, (1999), *British Journal of Psychiatry*, **175**, 402-406
Gordon, D., Lloyd, E., Senior, M., Rigby, J., Shaw, M., Ben-Shlomo, Y., (2001), Wales NHS resource allocation review, Independent report of the research team,
Green, G. & Castellano, Y., (1996), Rural Health Project Final Report, Oxfordshire Health Promotion
Gregoire, A. & Thornicroft, G., Rural Mental Health, (1998), *Psychiatric Bulletin*, **22**, 273-277
Gyllenhammar, C., Lundin, T., Otto, U. et al, (1988), The panorama of psychiatric emergencies in three different parts of Sweden. *European Archives of Psychiatry and Neurological Sciences***, 237**, 61-64
Hale, R., Capaldi, A., (1997), Local authority services in rural England, *Rural Development Commission* ISBN 1869964616
Hall, G.,(1988), Monitoring and predicting community mental health centre utilisation in Auckland, New Zealand, *Social Science and Medicine*, **26**, 55-70
Hansard, (1999), http://www.publications.parliament.uk/pa/cm199899/cmselect/cmhealth/38/38ap38.htm
Hansard, (2002), http://www.publications.parliament.uk/pa/ld200102/ldhansrd/vo021028/text/21028-20.htm
Hansard (2002a) http://www.parliament.the-stationery-office.com/pa/ld200102/ldhansrd/vo020611/text/20611-21.htm
Hansard (2005), http://www.parliament.the-stationery-office.co.uk/pa/cm200405/cmhansrd/cm050201/text/50201w37.htm
Harding, S., Allen, E. A., (1996), Sources and uses of data on cancer among ethnic groups, *British Journal of Cancer*, **74**, S17-S21
Harrison, (2001), http://www.cipfa.org.uk/publicfinance/search_details.cfm?News_id=8227&keysearch=harrison
Haynes, R., The Geography of Health Services in Britain, (1987), Croom Helm, ISBN 0709937660
Haynes, R. M., & Bentham, C. G., (1982),The effects of accessibility on general practitioner consultations, out patient attendances and in patient admissions in Norfolk, England, *Soc. Sci. Med*, Pergamon Press Ltd, **16**, 561-569,.
Haynes, R. M., & Bentham, C. G., Accessibility and the use of hospitals, (1979), **11,**

186-191, School of Environmental Sciences, University of East Anglia
Haynes, R.M., Bentham, C. G., Lovett, A., Eimermann, J., (1997), Effects of labour market conditions on reporting of limiting long-term illness and permanent sickness in England and Wales, *Journal of Epidemiology and Community Health*, **51**, 283-288
Haynes, R.M., Bentham, C. G., Lovett, A., Gale, S., (2000) Effects of distances to hospital and GP surgery on hospital inpatient episodes, controlling for needs and provision, *Social Science & Medicine*, **49**, 425-433
Haynes, R. & Gale, S., (2000), Deprivation and poor health in rural areas: inequalities hidden by averages, *Health and Place***, 00**, 1-11
Haynes, R. & Gale, S., (1999), Mortality, long-term illness and deprivation in rural and metropolitan wards of England and Wales, *Health and Place***, 5,** 301-312
Heald D., McLeod A., (2002), 'Public Expenditure', *Stair Memorial Encyclopaedia*, Edinburgh, Butterworths, paras 530, 532
Health Authority Revenue Allocations Exposition Book 2002/2003, (2001),Resource Allocation and Funding Team, Finance and Performance Directorate NHS Executive
Health Authority Revenue Allocations Exposition Book 2001/2002, (2000),Resource Allocation and Funding Team, Finance and Performance Directorate NHS Executive
Health Authority Revenue Allocations Exposition Book 2000/2001, (1999),Resource Allocation and Funding Team, Finance and Performance Directorate NHS Executive
Health Authority Revenue Allocations Exposition Book 1999/2000, (1998),Resource Allocation and Funding Team, Finance and Performance Directorate NHS Executive
Health Authority Revenue Cash Limits Exposition Book 1998/1999, (1997), Resource Allocation and Funding Team, Finance and Performance Directorate NHS Executive
Health Authority Revenue Allocations Exposition Book 1997/1998, (1996),Resource Allocation and Funding Team, Finance and Performance Directorate NHS Executive
Health Authority Revenue Allocations Exposition Book 1996/1997, (1995),Resource Allocation and Funding Team, Finance and Performance Directorate NHS Executive
Health Authority Revenue Allocations Exposition Book 1995/1996, (1994),Resource Allocation and Funding Team, Finance and Performance Directorate NHS Executive
Health Committee, (1998), www.publications.parliament.uk/pa/cm199899/cmselect/cm**health**/38/3802.htm - 13k
Higginson, J., Muir, C. S., Munoz, N., (1992), Human Cancer: epidemiology and environmental causes ISBN:0521412889
Hippisley-Cox, J., Groom, L., Kendrick, D., Coupland, C., Webber, E., Savelyich, B., (2002), Cross sectional surey of socio-economic variations in severity and mechanism of childhood injuries in Trent 1992-7, *British Medical Journal, **324**,* 1132
Hippisley-Cox, J., Hardy, C., Pringle, M., Fielding, K., Carlisle, R., Chilvers, C., (1997), The effect of deprivation on variations in general practitioners' referral rates, *British Medical Journal*, **314**, 1458
Hippisley-Cox, J., Pringle, M., (2000), Inequalities in access to coronary angiography and revascularisation, *British Journal of General Practice*. **50**, 449-454
Hitris, T., (2000), Prescription charges in the United Kingdom, University of York, www.york.ac.uk/depts/econ/dp/0004.pdf
Hobbs, M. S. T. & Acheson, E. D., (1966), Perinatal mortality and the organisation of obstetric services in the Oxford area in 1962, *British Medical Journal*, I, 499
House of Commons, (2006), Average staff earnings, *Memoranda from the Department of Health, Public Expenditure on Health and Personal Social Services, HC 1692*
Iyengara, S., Acheson, N., (2008), Premalignant vulval conditions, *Obstetrics, Gynaecology & Reproductive Medicine*, Volume 18, Issue 3, Pages 60-63
Ministry of Health, (1962), Hospital Plan for England and Wales
Jämsén, R., (1998), The state subsidy reform of 1993 in Finland, Ministry of Social

affairs and health, Helsinki, Finland
Jenkins, R., Lewis, G., Bebbington, P., Brugha, T., Farrell, M., Gill, B., Meltzer, H.,(1997), The national psychiatric morbidity surveys of Great Britain – initial findings from the Household Survey, *Psychological Medicine*, **27**, 775-789
Jessop, E. G., (1992), Individual morbidity and neighbourhood deprivation in a non-metropolitan area. *Journal of Epidemiology and Community Health*, **46**, 543-546
Jones, A. P., Bentham, G., (1997), Health service accessibility and deaths from asthma in 402 local authority districts in England and Wales, 1988-92, *Thorax*, **52**, 218-222
Jones, D. A., (1987), The choice to breast feed or bottle feed and influences upon that choice, *Child: care, health and development*, **13**, 75-85
Jones, K. & Smith, P., The Rural Service Deficit, (2000), *Changing Views of Rural Britain*, New Policy Institute
Keatinge, C. (1987), Community factors influencing psychiatric hospital utilisation in rural and urban Ireland, *Community Mental Health Journal*, **23**, 192-203
Keatinge, C., (1988), Psychiatric admissions for alcoholism, neuroses and schizophrenia in rural and urban Ireland, *International Journal of Social Psychiatry*, **34**, 58-69
King M., Coker E., Leavey G., Hoare A., Johnson-Sabine E., (1994) Incidence of psychotic illness in London: comparison of ethnic groups. *BMJ*; 309: 1115-1119

Kisely, S. R., Goldberg, D. P., (1996), Physical and psychiatric comorbidity in general practice, *British Journal of Psychiatry*, **169**, 236-242
Kleinschmidt, I., Hills, M., Elliott, P., (1995), Smoking behaviour can be predicted by neighbourhood deprivation measures, *Journal of Epidemiology and Community Health*, **49**, S72-77
Laing and Buisson, (2001), Private Medical Insurance, www.laingbuisson.co.uk/Statistics/pmimain.html
Laing and Buisson, (2003), Private Medical Insurance, www.laingbuisson.co.uk/PMI.htm
Langford, M., Unwin, D., (1994), Generating and mapping population density surfaces within a geographical information system, *The Cartographic Journal* , **31**, 21-26
Launoy, G., Le Coutour, X., Gignoux, M., Pottier, D. & Dugleuz, G., (1999), Influence of rural environment on diagnosis, treatment and prognosis of colorectal cancer, *Journal of Epidemiology and Community Health*, **46**, 365-367
Lavelle, P., (2003), Country life: a health hazard?, *Health Matters Features*, http://www.abc.net.au/health/regions/features/countrylife/default.htm
Lee, F., Patel, H., Emberton, M., (2002) The 'top 10' urological procedures: a study of hospital episodes statistics 1998–99 *BJU International, Volume 90 Issue 1, Pages 1 –* 6, Institute of Urology and Nephrology, University College London
Lewis, G., Wilkinson, G., (1993), Another British disease? A recent increase in the prevalence of psychiatric morbidity, *Journal of Epidemiology and Community Health*, **47**, 358-361
Livingston, G., Hinchliffe, A. C., (1993), The epidemiology of psychiatric disorders in the elderly, *The International Review of Psychiatry*, **5**, 317-326
Lloyd, K., (1993), Depression and anxiety among Afro-Caribbean general practice attenders in Britain, *The International journal of Social Psychaitry*, **43**, 1, 1-9
Lorant, V. J., (2002), Downplaying the role of ecology, *British Medical Journal*, **324**, 390
Lowry, A. G. J., Woods, K. L., Botha, J. L., (1991), The effects of demographic shift on coronary heart disease mortality in large migrant population at high risk, *Journal of Public Health Medicine*, **13**, 4, 276-280

Ludbrook, J. J., Truong, P. T., MacNeil, M. V., Lesperance, M., Webber, A., Joe, H., Martins, H., Lim, J.. (2003), Do age and comorbidity impact treatment allocation and outcomes *Int J Radiat Oncol Biol Phys.* Apr 1;55(5):1321-30
Luttrell, C., (2003), Allergies and asthma in the rural setting, www.nhra.net.au/nrhapublic
Lyons, R. A., Jones, S. J., Deacon, T., Heaven, M., (2003), Socio-economic variation in injury in children and older people: a population based study, *Injury Prevention*, **9**, 1, 33-37
M'Gonigle., G. C. M., Kirby, J., (1937), Poverty and public health, Victor Gollancz Ltd ISBN 000169968
MacLeod, M. C. M., Finlayson, A. R., Pell, J. P., Findlay, I. N., (1999), Geographic and socio-economic variations in the investigation and management of coronary heart disease in Scotland, *Heart*, **81**, 252-256
Maheswaran, R., (1997), Supply of inpatient medical services, *Public Health*, **111**, Part 6, 411-5
Martin, S., Smith, P., (1996), Explaining the variations in inpatient length of stay in the National Health Service, *Journal of Health Economics*, **15**, 279-304
Martyns-Yellowe, I. S., (1992), The burden of schizophrenia on the family. A study from Nigeria, *British Journal of Psychiatry*, **161**, 779-782
Maughan, B., (1989), Growing up in the inner city, *Paediatric and Perinatal Epidemiology*, **3**, 195-215
Maynard A, Walker A., (1978) Doctor Manpower 1975-2000: Alternative Forecasts and Their Resource Implications (Research Paper No. 4, Royal Commission on the NHS). London: HMSO
McCarthy, Lord, (1976), Making Whitley work, a review of the operation of the NHS Whitley Council System, Department of health and Social Security
McColl, E., Rousseau, N. & Eccles, M., (1994), Issues for Equity and Resource Management – a literature review, Centre for Health Services Research University of Newcastle upon Tyne
McCracken, C. F. M., Boneham, M. A., Copeland, J. R. M., Williams, K. E., Wilson, K., Scott, A., McKibbin, P., Cleave, N., (1997), Prevalence of dementia and depression among elderly people in black and ethnic minorities, *British Journal of Psychiatry*, **171**, 269-273
MHA and Operational Research in Health Ltd, (1997), Study of Costs of Providing Health Services in Rural Areas, Progress Report to Resource Allocation Group Volume 1
MHA and Operational Research in Health Ltd, (1997), Study of Costs of Providing Health Services in Rural Areas, Progress Report to Resource Allocation Group Volume 2
Milburn, A., (2002) ,www.guardian.co.uk/society/2002/feb/02/NHS
Milburn, A., (1997) http://www.parliament.the-stationery-office.co.uk/pa/cm199798/cmhansrd/vo971126/debtext/71126-14.htm
Mildenhall, D. et al, (2003), Sustaining healthy rural communities through viable rural medical practices, *National Rural Health Conference*, http://www.abc.net.au/rural/ruralhealth2003/stories/s799661.htm
Mills, B., (2000), Why the search for a definition of rurality may be a fool's errand, Cornwall Business School, http;//www.users.globalnet.co.uk/~rossm/issue2/bryan/rurality.htm
Milner, P., (1998), Wiltshire Health Authority, *Director of Public health Annual Report*
Monitor, (2007), http://www.monitor-nhsft.gov.uk/ratings.php
Morris, R., Cartairs, V., (1991), Which deprivation. A comparison of selected deprivation indexes, *Journal of Public Health Medicine*, **13**, 4, 318-326

Morrison, C., Woodward, M., Leslie, W., Tunstall-Roe, H., (1997), Effect of socio-economic group on incidence of , management of and survival after myocardial infarction and coronary death, *British Medical Journal*, **314**, 541-546
Moseley,M,J., et.al.,(1977), **'**Rural Transport and Accessibility – Volume One', Main report,
University of East Anglia,
Moseley,M,J., (1979), 'Accessibility: The Rural Challenge', Methuen & Co. Ltd., London
Mueller, D., (1981), The current status for urban-rural differences in psychiatric disorder: an emerging trend for depression, *Journal of Nervous and Mental Disorders*, **169**, 15-27
Mulkearn K., www.lra.org.uk/pay_symposium-2.doc
Muller, I., Smith, T, Mellor, S., Rare, L., Genton, B., (1998), The Effect of distance from home on attendance at a small rural health centre in Papua New Guinea, *International Journal of Epidemiology* , **27**, 878-884
Mulley, S. J., (1999), Constructing the countryside: vernacular culture and conceptions of rurality, http://www.uogelph.ca/~smulley.comp.html
Mullins, A., McCluskey, J., Taylor-Browne, J., Challenging the rural idyll, *NCH and Countryside Agency*, www.nch.org.uk
Murray, D. et al, (2002), Solutions for the provision of health care in the remote and rural areas of Scotland in the 21st century, *Scottish Remote and Rural Areas Resource Initiative*.
Netten, A., Rees, T., Harrison, G., (2001), Unit Costs of Health & Social Care, Personal Social Service Research Unit, University of Kent at Canterbury
New Zealand Executive Government, (2003), Maintaining and improving rural health and disability support, www.executive.govt.nz/96-99/minister/creech/rural/03.htm
NHSE, (2004), www.ome.uk.com/downloads/OME%20-%20DDPRB%202005%20Cm%206463.pdf
NLH, (2006) Map and population of SHAs
http://nlhcms.library.nhs.uk/nlhdocs/SHAmap.pdf
Noble, M., Penhale, B., Smith, G., Wright, G., (1999), Measuring multiple deprivation at the local level, *Social Disadvantage Research Group, Department of Applied Social Studies and Social Research, Oxford University*
Northern Ireland Health and Personal Social services, (1997), Allocation of resources, Second report form the Capitation Formula Review Group
Northern Ireland Health and Personal Social services, (2000), Allocation of resources, Third report form the Capitation Formula Review Group
Norwood, G., (2003), Maslow's Hierarchy of Needs,
http://www.connect.net/georgen/maslow.htm
O'Donnell, S. (1998a), Sparsity and the Provision of Services, *Performance Department*, *Cornwall County Council, Department of Social Services*
O'Donnell, S. (1998b), The sparsity factor and its effect on the provision of services in Cornwall, *Performance Department*, *Cornwall County Council, Department of Social Services*
OFWAT, (2004),
www.ofwat.gov.uk/aptrix/ofwat/publish.nsf/AttachmentsByTitle/pr04DD_correction090904.doc/$FILE/pr04DD_correction090904.doc.
OPCS codes, (2008),
http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1215501690196
Parkin, D., (1979), Distance as an influence on demand in General Practice, *Epidemiology and Community Health*, **33,** 96-99
Payne, S., Henson, B., Gordon, D., Forrest, R., (1996), Poverty and deprivation in

West Cornwall in the 1990s, *United Nations Department of Public Information, DPI/1771/POV – 95-38892*, Statistical Monitoring Unit, School for Policy Studies, University of Bristol
Peacock, S., Segal, L., Richardson, J., (2001), Predicting the expected costs of health care methods for risk adjustment in health services, *Health Economics Unit, Centre for Health Program Evaluation,* University of Melbourne, Victoria
Pedhazur, E. J., (1997). Multiple Regression in Behavioral Research (3rd ed.), *Harcourt Brace*, Orlando, FL:
Pell J. P., Sirel J. M., Marsden A. K., Ford I., Cobbe S. M., (2001), Effect of reducing ambulance response times on deaths from out of hospital cardiac arrest: cohort study *BMJ*;322:1385-1388
Phillimore, P., Beattie, A., Townsend, P., (1994), Widening inequality of health in Northern England, 1981-1991, *British Medical Journal*, **308**, 1125-1128
Phillips D., Williams A., (1984), Rural Britain, a social geography, Blackwell, Oxford
PION Economics, (2000), Accounting for rural deprivation, *Pion Economics pe493.doc:Ver1.3*
Pollock A., (2006) http://www.guardian.co.uk/society/2006/feb/07/privatefinance.comment
PwC and University of Lancaster, (1998), Research into the Effect of Rurality on the Capitation Formula for Health and Social Services in Northern Ireland
PwC and University of Lancaster, (1998), Modelling the Impact of Rurality on the Provision of Accident and Emergency Services in Northern Ireland
Public Health Intelligence, (2002), A ten year strategic plan for a co-ordinated national population survey programme, *Public Health Directorate,* New Zealand Ministry of Health
Rathfelder M., (2006) NHS Reorganisation http://www.sochealth.co.uk/news/NHSreform.htm
Reijneveld, S. A., Verheij, R. A., de Bakker, D. H., (2000), The impact of area deprivation on differences in health: does the choice of geographical classification matter? *Journal of Epidemiology and Community Health,* **54**, 4, 306-313
Rice, N., Smith, P., (1999), Approaches to Capitation and Risk Adjustment in Health Care: An International Survey, The University of York, Centre for Health Economics
Richards, H., McConnachie, A., Morrison, C., Murray, K., Watt, G., (2000), Social and gender variation in the prevalence, presentation and general practitioner provisional diagnosis of chest pain, *Journal of Epidemiology and Community Health,* **54**, 9, 714-718
Rich-Edwards J. W., Stampfer M. J., et al, (1997), Birth weight and risk of cardiovascular disease in cohort of women followed up since 1976, *British Medical Journal*, **315**, 396-400
Ritchie, J., Jacoby, A. Bone, M., (1981) Access to Primary Health Care, HMSO, London
Rogers, C. C., (2002), Rural health issues for the older population, *Rural America*, **17**, 30
Romans-Clarkson, S., Walton, V., Herbison, P., et al, (1990), Psychiatric morbidity and women in urban and rural New Zealand: psychosocial correlates, *British Journal of Psychiatry*, **156**, 84-91
Rosenthal, A. N., Paterson-Brown, S., (1998), Is there an incremental rise in the risk of gynaecological intervention with increasing maternal age? *British Journal of Obstetrics and Gynaecology*, **105**, 1064-1069
Ross, (2005), http://www.cardiffandvale.wales.nhs.uk/pls/portal/docs/PAGE/INTERNET_HOME_PAGE/PUBLICATIONS/ENVIRONMENT_REPORT/CARDIFF%20AND%20VALE%20N

HS%20TRUST%20ENVIRONMENT%20REPORT%202005.PDF
Ross, B., Hallam, A., Snasdell-Taylor, J., Cass, Y., Clarke, L., (1999), International approaches to funding health care, Australian Commonwealth Department of Health and Aged Care, *Occasional Papers Health financing series*, **Volume 3**, ISBN 0642415633
Rural Development Commission, (1996), Fair shares for rural areas? An assessment of public resource allocation systems, Rural research report 22, ISBN 1869964497
Rural Development Commission, (1994), Rural services: challenges and opportunities, *Policy Information*
Rural Health Forum, (2003a), Rural proofing for health project, http://www.ruralhealthforum.org.uk/proofing.htm
Rural Health Forum, (2003b), Rural health week, http://www.ruralhealthforum.org.uk/healthweek.htm
Rushton, G., Elmes, G., McMaster, R., (2000), The challenge of improving health and human services using GIS, *Public Health and Human Services*, http://www.ucgis.org/apps_white/public_health.html
Salisbury District Health Authority, (1993), Health of Salisbury District Health Authority, Report of Director of Public Health,19-23
Salford University Business Services Ltd, (1997), GAE Population Distribution Indicators, Report for the Scottish Office
Saunders, P. A., Copeland, J. R. M.,, Dewey, M.E., Gilmore, C., Larkin, B. A., Phaterpekar, H., Scott, A., (1993), The prevalence of dementia depression and neurosis in later life, *International Journal of Epidemiology*, **22**, 5, 838-847
Saxena, S., Eliahoo, J., Majeed, A., (2002), Socio-economic and ethnic group differences in self reported health status and use of health services by children and young people in England, *British Medical Journal*, **325**, 520
Scaife, B., Gill, P., Heywood, P., Neal, R., (2000), Socio-economic characteristics of adult frequent attenders in general practice, *Family Practice*, **17**, 4, 298-304
Scottish Consumer Council, (1978), Island Health Care, Institute of Medical Sociology, University of Aberdeen,
Scottish Executive, (2005) http://www.scotland.gov.uk/Publications/2005/09/2792129/21401/Q/Zoom/80.
Scottish Executive Health Department, (2000), Fair shares for all, Final Report of the National Review of Resource Allocation for the NHS in Scotland, J Arbuthnott, Principal and Vice-Chancellor of Strathclyde University,
Scottish Executive Health Department, (1999), Fair shares for all, Report of the National Review of Resource Allocation for the NHS in Scotland, J Arbuthnott, Principal and Vice-Chancellor of Strathclyde University
Seivewright, H., Tyler, P., Casey, P., et al, (1991), A three year follow up of psychiatric morbidity in urban and rural primary care, *Psychological Medicine*, **21,** 495-503
Select Committee on Health Fourth Report (2006) http://www.parliament.the-stationery-office.com/pa/cm200607/cmselect/cmhealth/171/17105.htm
Seward Thorgersen L., Paton G., (2003) nrha.ruralhealth.org.au/conferences/docs/7thNRHC/Papers/general%20papers/seward.pdf
Shucksmith, M., Roberts, D., Scott, D., Chapman, P., Conway, E., (1990) Disadvantage in rural areas, *Rural Development Commission*, ISBN 1869964551
Shucksmith, M., (1990) The definition of rural areas and rural deprivation, Report to Scottish Homes, Department of Land Economy, University of Aberdeen
Simkins A., (1997) HSG (97)39 NHSE
Silveira, E. R. T., Ebrahim, S., (1998), Social determinants of psychiatric morbidity

and well-being in immigrant elders and whites in East London, *International Journal of Geriatric Psychiatry*, **13**, 801-812
Sloan, E. P., Callahan E.P., Duda, J., Sheaff, C. M., Robin, A. P. & Barrett, J. A., (1989), The Effect of Urban Trauma System Hospital Bypass on Pre Hospital Transport Times and Level 1 Trauma Patient Survival, *Annals of Emergency Medicine Journal*, **18 (11**), 1146-1150
Smith, G. D., Hart, C., Blane, D., Gillis, C., Hawthorne, V., (1997), Lifetime socio-economic position and mortality, *British Medical Journal*, **314**, 547
Smith, J., (1984), Hospital Building in the NHS, *British Medical Journal*, **289**, 1298
Smith L. K., Peake M. D., Botha J. L., (2003), Recent changes in lung cancer incidence for south Asians: a population based register study. *BMJ* ;326:81–82
Smith, P., Sheldon, T. A., Carr-Hill, R. A., Martin, S., Peacock, S., Hardman, G., (1994), Allocating resources to health authorities: results and policy implications of small area analysis of use of inpatient services, *British Medical Journal*, **309**, 1050-1054
Snell, J., (1998), Ahead of the field, *Health Service Journal ,* 5 November, 12
Snowball, K., (2003), Healthy horizons: outlook 2003-2007, www.nhra.net.au/nrhapublic
Söderlund, N., van der Merwe, R., (1999), Hospital Benchmarking Analysis and the Derivation of Cost Indices, University of York
Song, S., (1996), Some tests of alternative accessibility measures: a population density approach, *Land economics*, **72**, 4, 474-482
Stansfield, S. A., Head, J., Fuhrer, R., Wardle, J., Cattell, V., (2003), Social inequalities in depressive symptoms and physical functioning in the Whitehall II study, *Journal of Epidemiology and Community Health*, **57**, 5 ,361-367
Stansfeld, S. A., Marmot, M. G., (1992), Social class and minor psychiatric disorder in British Civil Servants: a validated screening survey using the General Health Questionnaire. *Psychological Medicine* **22**, 739-749.
Stansfeld, S. A., Gallacher, J. E. J., Sharp, D. S. & Yarnell, J. W. G., (1991), Social factors and minor psychiatric disorder in middle-aged men: a validation study and a population survey. *Psychological Medicine* **21**, 157-167.
Stansfield, S. A., Leek, C. A., Travers, W., et al, (1992), Attitudes to community psychiatry among urban and rural general practitioners, *British Journal of General Practice*, **42**, 322-325
Sundquist, K., Malstrom, M., Johansson, S-E., Sundquist, J., (2003), Care need index, a useful tool for the distribution of primary health care resources, *Journal of Epidemiology and Community Health*, **57**, 5, 347-352
Tabachnick, B. G., Fidell, L. S., (1996), Using Multivariate Statistics (3rd ed.)., *New York: Harper Collins College Publishers*
Thatcher M. H., (1988) http://www.publications.parliament.uk/pa/cm198889/cmhansrd/1988-12-06/Orals-2.html
Thompson, M. J. J., Stevenson, J., Sonuga-Barke, E., Nott, P., Bhatti, Z., Price, A., & Hudswell, M., (1996), Mental Health of Preschool Children and their Mothers in a Mixed Urban/Rural Population. *British Journal of Psychiatry* **168**, 16-20
Thornicroft, G., (1991), Social deprivation and rates of treated mental disorder-Developing statistical models to predict psychiatric service utilisation, *British Journal of Psychiatry*, **158,** 475-484
Thornley C., (1998),Contesting Local Pay: The Decentralization of Collective Bargaining in the NHS, *British Journal of Industrial Relations***, 36** (3), 413–434.
Titmuss, R. M., (1938), poverty and population – A factual study of contemporary waste, Macmillan

Tobias, G. J., (2003), Post code lottery – more complex than it appears, *British Medical Journal*, **327**, 511-512
Toth, P. (2005) The Good Cholestrol, *Circulation*; **111**:e89-e91.)
Townsend P.. (1979). 'Poverty in the United Kingdom' Allen Lane: London
Townsend P., (1987), Deprivation *J Soc Policy*;**16**(2):125S46.
Townsend, P., (2001), NHS resource allocation review, Targeting poor health, *The national Assembly for Wales*.
Townsend Centre, (2005), http://www.bris.ac.uk/poverty/defining%20and%20measuring%20poverty.html
Trickett J., (1997), www.**parliament**.the-stationery-office.com/pa/cm
Trinder, P. M., Croft, P. R., Lewis, M., (2000), Social class, smoking and the severity of respiratory symptoms in the general population, *Journal of Epidemiology and Community Health*, **54**, 5, 340-343
Tudor Hart, J., (1971), The inverse care law, *Lancet*, 405-412
Twigger, R., (1998), The Barnett Formula, Research Paper 98/8, Economic Policy and Statistics Section, House of Commons Library
Vazquez-Barquero, J. L., Herrera Castanedo, S., Artal, J. A., et al, (1995), Pathways to psychiatric care in Cantabria, *Acta Psychiatrica Scandinavia*, **88**, 229-234
Wallace, M., Charlton, J., & Denham, C., (1995), the New OPCS Area Classifications
Wanless D., (2007), http://www.kingsfund.org.uk/publications/kings_fund_publications/our_future.html
Ward, S., (1999), Field Day, Article, *Health Service Journal*, 16 September 1999
Ward, P. R., Noyce, P. R., & St Leger A. S., (2004), Are GP practice prescribing rates for coronary heart disease drugs equitable?, *Journal of Epidemiology and Community Health*; **58**:89
Wardropper J., (2006) Hospitals Built by the Owners of Industry, For Their Workers, in Great Britain 1840 -1950 http://www.rosetta.bham.ac.uk/Issue_01/Wardropper.htm J Wardropper 2006
Warren, M., (2000), A chronology of state medicine, public health, welfare and related services in Britain: 1066-1999 ISBN 1900273063 www.chronology.org.uk
Watt, G. C. M., (1996), All together now: why social deprivation matters to everyone, *British Medical Journal*, **312**, 1026-1029
Watt, I. S., Sheldon, T. A., (1993), Rurality and resource allocation in the UK, *Health Policy,* **26**, 19-27
Watt, I. S., Franks, A. J., Sheldon, T. A., (1994), Health and health care of rural populations in the UK: is it better or worse, *Journal of Epidemiology and Community Health*, **48**, 16-21
Watt, I. S., Franks, A. J., Sheldon, T. A., (1999) Give rural services a sparsity grant. *Rural health and health care BMJ*. **306**, 1358-9
Watts, R. W., (1999), Asthma management in rural Australia, *Australian Journal of Rural Health*, **7**, 249-252
Weich, S., Lewis, G., (1998), Material standard of living, social class and the prevalence of common mental disorders in Great Britain, *Journal Epidemiology Community Health*, **52**, 8-14
Weich, S., Twigg, L., Holt, G., Lewis, G., Jones, K., (2003), Contextual risk factors for the common mental disorders in Britain: a multilevel investigation of the effects of place, *Journal of Epidemiology and Community Health*, **57**, 616-621
Wenger, G. C., (1996), Community care in rural areas for people over eighty, *CSPRD Working Paper*, Centre for Social Policy Research and Development, University of Wales
Wenger, G. C. & Shahtahmasebi, S., Ageing and Dependency in rural areas: eight years of domiciliary visiting of the old elderly, Centre for Social Policy Research and

Development, University of Wales
Wenger, G. C., (1995), A comparison of urban with rural support networks: Liverpool and North Wales, Centre for Social Policy Research and Development, University of Wales
Wenger, G. C., (1984), Ageing in rural North Wales, twelve years of domiciliary visiting services, *Contemporary Wales*, **7**, 153-171
White, C. P., (2001), Who gets what, where – and why? Report Summary, *University of St Andrews*, ISBN095417240x
White, C. P., (2001), Who gets what, where – and why? The NHS allocation system in England is failing rural and disadvantaged areas, *University of St Andrews*, ISBN095417240x
White, C. P., (2001), Avoiding the postcode lottery, *Overview*, **35**, 46-47
White, C. P., Flowerdew, R., (1999), Rural health formula revisited, *Public Finance*, 26-28,10 December
White, C. P., Halton, P., Flowerdew, R., (2000), The Scottish lesson in healthcare funding, *Parliamentary Brief, Health Special*, **6**, 4, 22-25
White, C. P., Halton, P., Flowerdew, R., (1999), Country strife: rural areas will continue to receive a raw deal unless funding formulas are changed, *Health Service Journal*, 20-21,12 August
White R., (1995), ‘Pounds for Coppers’ Funding the Police Service Dyfed-Powys Police Force
Wiersma D., Nienhuis F. J., Slooff, C. J. and Giel, R., (1998), ‘Natural course of schizophrenic disorders: a 15-year follow up of a Dutch incidence cohort’, *Schizophrenia Bulletin*, 24, 1, 75–85
Wilkinson, J., (1993), Give rural services a sparsity grant, *British Medical Journal*, **307**
Wilkinson, R. G., (1997), Health inequalities: relative or absolute material standards? *British Medical Journal*, **314**, 591-595
Wood, A.P., (2002), Rural drivers need a different response, *British Medical Journal*, **325**, 277
Woodhouse, A., (2002a), Mental health in rural communities, *Dispensing Doctor*, **18**
Woodhouse, A., (2002b), Rural proofing – Is it the answer?, *Dispensing Doctor*, **18**
Woodward, M., Shewry, M. C., Smith, W. C. S., Tunstall-Pedoe, H., (1992), Social status and coronary heart disease: results from the Scottish Heart Health Survey, *Preventive Medicine*, **21**, 136-148
Woollett, S., (1993), Counting the Rural Cost, the case for a rural premium, second edition, National Council for Voluntary Organisations
Wronski. I., (2003), Country life: a health hazard?, GP’s leave, *Health Matters Features*, http://www.abc.net.au/health/regions/features/countrylife/default.htm
Yancik, R., Ershler, W., Satariano, W., Hazzard, W., Cohen, H. J., & Ferrucci, L., (2007), Report of the National Institute on Aging Task Force on Comorbidity, *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences* **62**:275-280

Software program	**Data Source a)**	**Data Source b)**
	HM Treasury	
iGrafx	HARCLEB (Health Authority Revenue Cash Limits Exposition Book)	
HG	HARCLEB 2000/1 and supplement	
HG	HARCLEB 1995/6 and	

	2000/1	
MapInfo	HARCLEB 2000/1	Census District Borders ©EdLine, ©Crown
MapInfo	HARCLEB 2000/1	Census District Borders ©EdLine, ©Crown
Word	OPCS (now ONS) Area Classification Wallace et al	
MapInfo	OPCS (now ONS) Area Classification Wallace et al	HA Borders ©EdLine, ©Crown
MapInfo	Rurality in England & Wales Paul Cloke and Gareth Edwards	Census District Borders ©EdLine, ©Crown
MapInfo	HARCLEB 2000/1	HA Borders ©EdLine, ©Crown
MapInfo	CCC Ward populations	ED and Ward Borders ©EdLine, ©Crown
MapInfo	Dept. for the Environment SSAs rurality indicator (sparsity)	Census District Borders ©EdLine, ©Crown
MapInfo	Scottish Executive "Fair Shares for All" Sept 2000	HB Borders ©EdLine, ©Crown
MapInfo	HARCLEB 200/1	HA Borders ©EdLine, ©Crown
Word		
MapInfo	DH SMRs 1999	HA Borders ©EdLine, ©Crown
Word	Scottish Executive "Fair Shares for All" Sept 2000	
HG	Scottish Executive "Fair Shares for All" Sept 2000	
MapInfo	Scottish Executive "Fair Shares for All" Sept 2000	HB Borders ©EdLine, ©Crown
MapInfo	Scottish Executive "Fair Shares for All" Sept 2000	HB Borders ©EdLine, ©Crown
Word		
HG	Local HAs	HARCLEB 2000/1
MapInfo	WO	HA Borders ©EdLine, ©Crown
HG	Local HAs	HARCLEB 2000/1
MapInfo	CCC (populations)	HA Borders ©EdLine, ©Crown
HG	DH Common Information Core	HARCLEB 2000/1
HG	DH Medical Statistics	HARCLEB 2000/1
HG	DH Statistics	HARCLEB 2000/1
HG	NHS Earnings Survey 1999	HARCLEB 2000/1
Word	HARCLEB 2000/1	
MapInfo	Dept of Health SMRs 1999	HA Borders ©EdLine, ©Crown
HG	HARCLEB 2000/1	
HG	HARCLEB 2000/1	
HG	Scottish Executive "Fair Shares for All" Sept 2000	

HG	Scottish Executive “Fair Shares for All” Sept 2000	
HG	CHT activity 1999-2000	
HG	CHT activity 1999-2000	
HG	HARCLEB 2000/1	
HG	HARCLEB 2000/1	
HG	HARCLEB 2000/1	
HG	HARCLEB 2000/1	
MapInfo	HARCLEB 2000/1	HA Borders ©EdLine, ©Crown
HG	DH Statistics	HARCLEB 1997/8
HG	DH Statistics	HARCLEB 1997/8
HG	DH Statistics	HARCLEB 1997/8
HG	HARCLEB 2000/1	
HG	HARCLEB 2000/1	
HG	DH Common Information Core#	
HG	HARCLEB 2000/1	
HG	HARCLEB 2000/1	
Word	HARCLEB 2000/1	

It is defined in the 2000/2001 Service and Financial Framework (SaFFR) 2001 – 2 (formerly Common Information Core)

APPENDICES

Appendix 1 Office for National Statistics Areas classifications

Family	Sub-family
Rural Areas	Coast and Country
	Mixed Urban and Rural
Prospering Areas	Growth Areas
	Most Prosperous
Maturer Areas	Services and Education
	Resort and Retirement
Urban Centres	Mixed Economies
	Manufacturing
Mining and Industrial Areas	Ports and Industry
	Coalfields
Inner London	Inner London

Family 1 ~ Rural areas

Coast & Country	Mixed Urban and Rural
East Norfolk	South Lancashire
Lincolnshire	Northamptonshire
Somerset	North West Anglia
North Yorkshire	Suffolk
Cornwall & Isles of Scilly	North Derbyshire
North & East Devon	South Derbyshire
Herefordshire	Leicestershire
	Nth Nottinghamshire
	South Cheshire
	North Cumbria
	Dudley
	Shropshire
	South Staffordshire
	Warwickshire
	Worcestershire

Family 2 ~ Prospering areas

Growth Areas	Most Prosperous
Hillingdon	Bromley
Bedfordshire	Kingston & Richmond
Berkshire	East Surrey
Buckinghamshire	West Surrey
Cambridge & Huntingdon	
West Kent	
West Sussex	
North Essex	
South Essex	
Stockport	
Oxfordshire	

North & Mid Hampshire	
Portsmouth & S E Hampshire	
Southampton & S W Hampshire	
Wiltshire	
Avon	
Gloucestershire	
Solihull	
East & North Hertfordshire	
West Hertfordshire	

Family 3 ~ Maturer Areas

Services & Education	**Resort & Retirement**
Enfield & Haringey	East Kent
Redbridge & Waltham Forest	East Sussex, Brighton & Hove
Croydon	Morecambe Bay
Merton, Sutton & Wandsworth	Sefton
Barnet	North West Lancashire
Brent & Harrow	Isle of Wight
Ealing, Hammersmith & Hounslow	South & West Devon
	Wirral
	Dorset

Family 4 ~ Urban centres

Mixed Economies	**Manufacturing**
Bexley & Greenwich	West Pennine
Barking & Havering	East Lancashire
Salford & Trafford	Birmingham
Nottingham	Bradford
Sheffield	Calderdale & Kirklees
Leeds	Coventry
Northumberland	Sandwell
	Walsall
	Wolverhampton

Family 5 ~ Mining and Industrial areas

Ports & Industry	**Coalfields**
Liverpool	Barnsley
Manchester	Doncaster
St Helens & Knowsley	Rotherham
Wigan & Bolton	Bury & Rochdale
Gateshead & Sth Tyneside	North Cheshire
Newcastle & Nth Tyneside	County Durham
Sunderland	East Riding
	South Humber
	Tees
	Wakefield
	North Staffordshire

Family 6 ~ Inner London	
Kensington, Chelsea & Westminster	
Lambeth, Southwark & Lewisham	
Camden & Islington	
East London & The City	

Appendix 2 Variables list for the 1981B Cloke index

Variable name	Census data
Population density	Population/acre
Population change	% change 1971-81
Population over age 65	% total population
Population men age 15 – 45	% total population
Population women age 15 – 45	% total population
Occupancy rate	% population at 1 ½ rooms
Occupancy rate	Households/dwelling
Household amenities	% households with exclusive use of: (a) fixed bath (b) inside WC (1971)
Mobility	% households owning two cars
Occupational structure	% in socio-economic groups 13. Farmers - employers and managers 14. Farmers - own account 15. Agricultural workers
Commuting out pattern	% residents in employment working outside the rural district
In-migration	% population resident for less than 1 year
Second homes	% of dwellings used as second homes
Holiday accommodation	% of dwellings used as holiday accommodation
Distance from nearest urban centre of 50,000 population	-
Distance from nearest urban centre of 100,000 population	-
Distance from nearest urban centre of 200,000 population	-

Appendix 3 Cloke indices B list revised 1981

County/District	Index	County/District	Index
ENGLAND		**Leicestershire**	
Avon		Blaby	5.9373
Kingswood	2.8719	Harborough	2.2862
Northavon	4.5576	Hinckley and Bosworth	2.6939
Wansdyke	2.9076	Melton	0.156
Woodspring	1.5571	North West Leicestershire	1.3671
Bedfordshire		Rutland	0.138
Mid Bedfordshire	3.375	**Lincolnshire**	
South Bedfordshire	5.6183	Boston	-2.9621
Berkshire		East Lindsey	-5.3079
Bracknell Forest	6.0867	North Kesteven	0.8954
Newbury	2.6444	South Holland	-3.9085
Wokingham	6.8485	South Kesteven	-0.4589
Buckinghamshire		West Lindsey	0.2474
Aylesbury Vale	1.7186	**Norfolk**	
Chiltern	4.4944	Breckland	-1.8051
South Buckingham	4.3765	Broadland	3.055
Wycombe	4.1941	North Norfolk	-6.8933
Cambridgeshire		South Norfolk	0.4569
East Cambridgeshire	-0.6189	King's Lynn and West Norfolk	-4.0599
Fenland	-2.6732	**North Yorkshire**	
Huntingdonshire	1.7159	Craven	-3.2612
South Cambridgeshire	2.7728	Hambleton	-1.0079
Cheshire		Harrogate	-0.0978
Chester	1.186	Richmondshire	-3.587
Congleton	3.3388	Ryedale	-0.567
Crewe and Nantwich	-0.6338	Scarborough	-4.8572
Macclesfield	1.8825	Selby	1.2585
Vale Royal	2.2965	**Northamptonshire**	
Cornwall		Corby	3.6363
County/District	**Index**	**County/District**	**Index**
Caradon	-2.1571	Daventry	2.3682
Carrick	-4.8842	East Northamptonshire	0.3898
Kerrier	-5.7724	Kettering	0.0364
North Cornwall	-6.2529	South Northamptonshire	3.2926
Penwith	-8.3967	Wellingborough	2.2806
Restormel	-4.017	**Northumberland**	
Isles of Scilly	-12.9688	Alnwick	-3.8986
Cumbria		Berwick-upon-Tweed	-6.1349
Allerdale	-1.5904	Blyth Valley	6.5308
Copeland	-0.6071	Castle Morpeth	0.85
Eden	-5.0499	Tynedale	-2.438
South Lakeland	-3.8152	Wansbeck	3.3088
Derbyshire		**Nottinghamshire**	
Amber Valley	1.6061	Ashfield	3.8766

Bolsover	3.4295	Bassetlaw	0.5675
High Peak	1.1723	Gedling	6.2886
North East Derbyshire	5.0242	Mansfield	5.2112
South Derbyshire	2.2411	Newark and Sherwood	1.0976
W Derbys and Derbyshire Dales	-1.7483	Rushcliffe	3.649
Devon		**Oxfordshire**	
East Devon	-3.9153	Cherwell	2.4524
Mid Devon	-1.9928	South Oxfordshire	3.0492
North Devon	-4.4302	Vale of White Horse	3.0382
South Hams	-3.1022	West Oxfordshire	1.6165
Teignbridge	-2.4084	**Shropshire**	
Torridge	-6.1128	Bridgnorth	0.1581
West Devon	-4.0644	North Shropshire	-1.7025
Dorset		Oswestry	-1.4983
North Dorset	-2.9198	Shrewsbury and Atcham	0.4509
Purbeck	-1.4503	South Shropshire	-6.2624
West Dorset	-4.2921	The Wrekin	2.7851
Wimborne	0.8737	**Somerset**	
Durham		Mendip	-0.8593
Chester-le-Street	6.6881	Sedgemoor	-1.1202
Derwentside	1.5313	Taunton Deane	-1.5649
Easington	3.1283	West Somerset	-7.0265
Sedgefield	3.2115	Yeovil and South Somerset	1.9298
Teesdale	-3.4162	**Staffordshire**	
Wear Valley	-0.6611	Cannock Chase	6.0597
East Sussex		East Staffordshire	-0.3073
Lewes	0.0126	Lichfield	5.0566
Rother	-4.9229	Newcastle-under-Lyme	3.7335
Wealden	-1.3578	South Staffordshire	6.2151
Essex		Stafford	2.0734
Basildon	7.5175	Staffordshire Moorlands	0.9783
Braintree	1.6623	**Suffolk**	
Brentwood	4.4462	Babergh	0.3045
Castle Point	8.9331	Forest Heath	0.2167
Epping Forest	1.5189	Mid Suffolk	-1.8778
Maldon	0.9931	St.Edmundsbury	-0.1005
County/District	**Index**	**County/District**	**Index**
Rochford	5.5646	Suffolk Coastal	-2.5366
Tendring	-3.3982	Waveney	-2.5845
Uttlesford	1.5353	**Surrey**	
Gloucester		Mole Valley	1.8733
Cotswold	-0.8372	Tandridge	3.2538
Forest of Dean	-0.3715	Waverley	2.1749
Stroud	1.0907	**Warwickshire**	
Hampshire		North Warwickshire	4.099
Basingstoke and Deane	3.3555	Rugby	1.1405
East Hampshire	1.4891	Stratford-on-Avon	-0.2903
Hart	5.7894	Warwick	2.2855

New Forest	-0.1473	**West Sussex**	
Test Valley	1.6409	Adur	4.2688
Winchester	0.5389	Arun	-2.0603
Hereford and Worcester		Chichester	-2.651
Bromsgrove	5.0237	Horsham	0.8901
Leominster	-5.543	Mid Sussex	3.2881
Malvern Hills	-1.0952	**West Yorkshire**	
Redditch	7.0671	Calderdale	1.262
South Herefordshire	-3.0214	**Wiltshire**	
Wychavon	1.3535	Kennet	-0.8671
Wyre Forest	2.8419	North Wiltshire	0.9475
Hertfordshire		Salisbury	-1.2846
Dacorum	4.4969	West Wiltshire	0.8512
Stevenage, Watford and E Herts	3.641	**WALES**	
North Hertfordshire	3.3931	**Clwyd**	
Three Rivers	5.8553	Alyn and Deeside	4.1923
Humberside		Colwyn	-4.9342
Beverley	2.6443	Delyn	1.5567
Boothferry	-0.2111	Glyndwr	-4.1909
East Yorkshire	-3.0637	Wrexham Maelor	0.8256
Glanford	2.2791	**Dyfed**	
Holderness	1.036	Carmarthen	-6.4008
Isle of Wight		Ceredigion	-9.7718
Medina	-2.3904	Dinefwr	-5.2171
South Wight	-3.387	Llanelli	-1.2887
Kent		Preseli Pembrokeshire	-5.1285
Ashford	-0.1046	South Pembrokeshire	-5.5764
Canterbury	-1.6129	**Gwent**	
Dover	-1.7112	Monmouth	-0.091
Sevenoaks	3.3459	**Gwynedd**	
Shepway	-3.4546	Aberconwy	-6.6913
Swale	0.4418	Arfon	-6.3002
Thanet	-0.8115	Dwyfor	-13.7048
Tonbridge and Malling	3.2932	Meirionnydd	-10.8699
Tunbridge Wells	-0.3127	Ynys Mon-Isle of Anglesey	-5.809
Lancashire		**Powys**	
Chorley	2.8866	Brecknock	-4.1953
Lancaster	-3.0127	Montgomeryshire	-7.95
Pendle	-0.2809	Radnor	-8.4669
County/District	**Index**	**County/District**	**Index**
Ribble Valley	0.264	**South Glamorgan**	
Rossendale	1.323	Vale of Glamorgan	1.1532
South Ribble	3.7013	**West Glamorgan**	
West Lancashire	3.4543	Lliw Valley	1.8167
Wyre	-0.041		

Appendix 4 Table of Health Authority GMDs

Health Authority	Geometric Mean Density of Population (GMD)
Bradford	19.36
Calderdale & Kirklees	11.61
County Durham	8.70
East Riding	11.47
Gateshead & South Tyneside	23.37
Leeds	16.64
Newcastle & North Tyneside	28.28
North Cumbria	3.84
North Yorkshire	3.76
Northumberland	4.54
Sunderland	24.97
Tees	19.41
Wakefield	11.07
Barnsley	11.29
Doncaster	8.18
Leicestershire	11.19
Lincolnshire	3.09
North Derbyshire	6.77
North Nottinghamshire	6.88
Nottingham	20.72
Rotherham	11.47
Sheffield	23.61
South Derbyshire	13.65
South Humber	11.22
Bedfordshire	13.56
Cambridge	3.98
East and North Hertfordshire	12.05
Norfolk	4.95
North Essex	7.55
South Essex	17.64
Suffolk	5.28
West Herts	16.14
Barking & Havering	31.62
Barnet	34.11
Bexley & Greenwich	41.17
Brent & Harrow	48.04
Bromley	24.33
Camden & Islington	87.58
Croydon	39.98
Ealing, Hammersmith & Hounslow	51.13
East London & City	76.89
Enfield & Haringey	48.25
Hillingdon	25.87
Kensington, Chelsea & Westminster	95.10

Kingston & Richmond	35.15
Lambeth, Southwark & Lewisham	71.48
Merton, Sutton & Wandsworth	54.44
Redbridge & Waltham Forest	48.60
Berkshire	14.49
Buckinghamshire	8.01
East Kent	9.78
East Surrey	10.00
East Sussex, Brighton and Hove	13.37
Isle of Wight	6.45
North & Mid Hampshire	7.44
Northamptonshire	8.72
Oxfordshire	6.41
Portsmouth & SE Hampshire	24.26
Southampton & SW Hampshire	15.33
West Kent	11.77
West Surrey	11.42
West Sussex	10.48
Avon	19.38
Cornwall & Isles of Scilly	3.13
Dorset	10.13
Gloucestershire	6.58
North & East Devon	3.56
Somerset	4.24
South and West Devon	12.67
Wiltshire	5.82
Birmingham	37.67
Coventry	33.19
Dudley	31.20
Herefordshire	2.50
North Staffordshire	15.04
Sandwell	34.79
Shropshire	4.87
Solihull	20.72
South Staffordshire	9.75
Walsall	26.29
Warwickshire	6.93
Wolverhampton	34.73
Worcestershire	8.94
Bury & Rochdale	17.52
East Lancashire	12.39
Liverpool	43.74
Manchester	35.75
Morecambe Bay	7.24
North Cheshire	17.73
North West Lancashire	21.31
Salford and Trafford	25.94
Sefton	23.62

South Cheshire	9.12
South Lancashire	9.94
St. Helens & Knowlsley	20.44
Stockport	25.50
West Penine	22.82
Wigan & Bolton	19.47
Wirral	24.19

Appendix 5 health Authority road length

Health Authority	Population 2000-2001	Length of non-built-up Trunk Rd	Length of non-built-up Trunk Dual-Carr	Length of non-built-up Principal Rd	Length of non-built-up Principal Dual-Carr	Length of non-built-up B Rd	Total road length per 1,000 population
Avon	1,003,577	0	0	13	7	1	0.02
Barking and Havering	87,556	19	18	2	0	7	0.12
Barnet	329,907	16	15	0	0	0	0.09
Barnsley	233,937	21	1	74	11	24	0.56
Bedfordshire	566,308	98	44	113	4	80	0.60
Berkshire	826,357	43	35	165	37	180	0.56
Bexley and Greenwich	424,049	17	17	12	11	0	0.14
Birmingham	1,035,202	5	5	4	2	6	0.02
Bradford	486,930	22	11	18	0	15	0.14
Brent and Harrow	464,096	1	1	2	0	0	0.01
Bromley	300,302	3	3	7	2	2	0.05
Buckinghamshire	706,222	52	25	288	55	106	0.74
Bury and Rochdale	383,538	0	0	8	0	6	0.04
Calderdale and Kirklees	579,109	7	1	105	7	44	0.28
Cambridgeshire	734,407	258	157	297	42	396	1.56
Camden and Islington	374,179	0	0	0	0	0	0.00
Cornwall and the Isles of Scilly	487,072	220	83	349	12	456	2.30
County Durham	606,394	81	46	275	27	288	1.18
Coventry	321,327	7	7	12	8	4	0.12
Croydon	336,599	0	0	1	0	0	0.00
Doncaster	294,265	16	10	65	4	30	0.42
Dorset	696,774	88	28	287	44	310	1.09
Dudley	308,271	5	5	2	0	1	0.04
Ealing, Hammersmith and Hounslow	685,515	16	16	2	1	2	0.05
East and North Hertfordshire	521,652	69	48	115	36	105	0.72
East Kent	592,919	72	54	220	45	126	0.87
East Lancashire	513,351	30	10	88	11	65	0.40
East London and the City	636,252	9	9	4	4	0	0.04
East Riding	582,338	75	32	223	5	253	1.01
East Surrey	409,631	23	20	100	30	61	0.57
East Sussex	747,086	89	23	207	8	171	0.67
Enfield and	478,619	4	4	7	1	0	0.03

Haringey							
Gateshead and South Tyneside	358,079	23	21	45	16	11	0.32
Gloucestershire	558,343	133	48	394	39	374	1.77
Herefordshire	167,915	84	17	296	0	268	3.96
Hillingdon	245,282	15	14	10	8	0	0.19
Isle of Wight	125,791	0	0	60	2	40	0.80
Kensington, Chelsea and Westminster	392,976	0	0	3	4	0	0.02
Kingston and Richmond	348,335	8	6	0	0	1	0.05
Lambeth, Southwark and Lewisham	734,615	0	0	0	0	0	0.00
Leeds	736,647	50	22	77	11	40	0.27
Leicestershire	931,474	169	89	253	35	204	0.80
Lincolnshire	641,145	327	81	714	11	756	2.95
Liverpool	465,990	0	0	5	3	0	0.02
Manchester	457,718	1	1	0	0	25	0.06
Merton, Sutton and Wandsworth	620,717	2	2	0	0	0	0.01
Morecambe Bay	311,976	146	38	280	19	238	2.31
Newcastle and North Tyneside	472,368	33	31	39	21	36	0.34
Norfolk	760,972	270	95	451	7	556	1.81
North and East Devon	478,427	185	109	453	23	339	2.32
North and Mid Hampshire	545,520	98	83	292	53	162	1.26
North Cheshire	308,952	26	10	115	39	36	0.73
North Cumbria	319,261	214	47	358	10	313	2.95
North Derbyshire	369,191	94	53	161	9	148	1.26
North Essex	872,704	75	62	276	70	366	0.97
North Nottinghamshire	386,347	201	77	283	35	139	1.90
North Staffordshire	469,378	55	35	105	4	70	0.57
North West Lancashire	462,228	16	5	38	5	30	0.20
North Yorkshire	733,992	354	144	594	3	577	2.28
Northamptonshire	563,192	221	87	282	54	101	1.32
Northumberland	308,161	220	68	298	28	555	3.80
Nottingham	641,358	4	4	4	1	0	0.02
Oxfordshire	630,115	358	1973	358	1973	332	7.93
Portsmouth and South East Hampshire	545,497	23	20	62	15	37	0.29
Redbridge and Waltham Forest	440,245	15	13	3	1	1	0.08
Rotherham	241,687	8	0	37	10	42	0.41
Salford and Trafford	448,696	4	4	14	6	13	0.09

Sandwell	302,936	0	0	3	3	0	0.02
Sefton	275,686	11	10	4	0	4	0.10
Sheffield	538,143	0	0	43	9	18	0.13
Shropshire	424,758	196	28	371	17	520	2.67
Solihull	209,631	6	6	30	21	21	0.40
Somerset	486,590	89	44	583	23	413	2.37
South and West Devon	591,538	95	61	212	13	153	0.90
South Cheshire	677,607	162	40	329	26	143	1.03
South Derbyshire	576,763	94	58	148	13	130	0.77
South Essex	717,894	37	33	106	34	99	0.43
South Humber	312,035	14	13	40	5	15	0.28
South Lancashire	307,677	17	6	38	4	31	0.31
South Staffordshire	570,544	111	71	217	9	142	0.96
Southampton and South West Hampshire	558,416	42	36	133	29	70	0.56
St. Helens and Knowsley	342,095	27	27	36	18	25	0.39
Stockport	288,767	0	0	9	8	0	0.06
Suffolk	674,004	203	132	295	8	451	1.61
Sunderland	285,764	13	13	38	26	10	0.35
Tees	550,121	57	54	130	48	25	0.57
Wakefield	324,542	13	2	49	10	39	0.35
Walsall	252,036	6	0	5	1	0	0.05
Warwickshire	499,069	151	70	217	13	327	1.56
West Hertfordshire	534,939	38	27	63	19	57	0.38
West Kent	979,953	76	57	261	64	145	0.62
West Pennine	449,277	0	0	31	3	4	0.08
West Surrey	629,908	30	27	129	39	80	0.48
West Sussex	756,432	75	72	312	66	212	0.97
Wigan and Bolton	569,965	14	14	33	9	5	0.13
Wiltshire	597,348	125	54	428	15	249	1.46
Wirral	322,315	3	3	12	5	13	0.11
Wolverhampton	243,097	0	0	3	4	0	0.03
Worcestershire	531,533	84	36	290	47	198	1.23
England Total	**49,530,409**	**6,585**	**4,980**	**14,019**	**3,532**	**12,147**	**0.83**

Appendix 6 Indicators of rurality and remoteness used for the Scottish formula

Health Board	Road kilometres per 1,000 people	Population per 100 hectares	Percentage of population living in urban locations with less than 1,000 people
Argyll and Clyde	11	57	8.8
Ayrshire and Arran	9	112	8.6
Borders	33	24	30.0
Dumfries and Galloway	28	23	34.9
Fife	7	273	8.0
Forth Valley	8	89	8.9
Grampian	16	61	19.6
Greater Glasgow	4	1,589	0.4
Highland	41	8	34.8
Lanarkshire	6	230	6.0
Lothian	5	433	4.4
Tayside	11	54	14.6
Island Boards	62	14	56.8

Appendix 7 Neighbour adjusted GMD

Health Authority	Border length weighted GMD	Health Authority	Border length weighted GMD
Avon	3.38	North and Mid Hampshire	14.61
Barking and Havering	26.71	North Cheshire	11.54
Barnet	38.68	North Cumbria	2.50
Barnsley	15.45	North Derbyshire	15.79
Bedfordshire	7.99	North Essex	4.97
Berkshire	7.68	North Nottinghamshire	9.92
Bexley and Greenwich	17.37	North Staffordshire	9.07
Birmingham	18.02	North West Lancashire	2.97
Bradford	10.59	North Yorkshire	11.24
Brent and Harrow	40.98	Northamptonshire	8.32
Bromley	34.22	Northumberland	4.34
Buckinghamshire	10.04	Nottingham	9.95
Bury and Rochdale	18.49	Oxfordshire	9.00
Calderdale and Kirklees	15.95	Portsmouth and S E Hampshire	3.14
Cambridgeshire	7.25	Redbridge and Waltham Forest	38.99
Camden and Islington	69.14	Rotherham	12.80
Cornwall and the Isles of Scilly	0.71	Salford and Trafford	22.73
County Durham	10.20	Sandwell	32.40
Coventry	9.44	Sefton	8.90
Croydon	31.18	Sheffield	9.17
Doncaster	9.68	Shropshire	3.95
Dorset	3.34	Solihull	17.89
Dudley	21.34	Somerset	7.53
Ealing, Hammmith & Hounslow	39.30	South and West Devon	1.54
East and North Hertfordshire	10.78	South Cheshire	11.05
East Kent	3.93	South Essex	4.41
East Lancashire	17.14	South Humber	4.34
East London and The City	57.69	South Lancashire	15.68
East Riding	3.13	South Staffordshire	15.82
East Surrey	21.35	Southampton & S W Hants	3.91
East Sussex, Brighton and Hove	6.67	Southern Derbyshire	11.34
Enfield and Haringey	35.37	St. Helens and Knowsley	24.02
Gateshead and South Tyneside	18.24	Stockport	19.38
Gloucestershire	5.99	Suffolk	2.56
Herefordshire	4.43	Sunderland	11.00
Hillingdon	44.18	Tees	3.84

Isle of Wight	0.00	Wakefield	16.02
Kensington, Chelsea & Wstmnster	65.42	Walsall	22.15
Kingston and Richmond	35.46	Warwickshire	13.99
Lambeth, Southwark & Lewisham	49.05	West Hertfordshire	16.80
Leeds	9.51	West Kent	5.81
Leicestershire	10.27	West Pennine	17.90
Lincolnshire	4.18	West Surrey	12.96
Liverpool	15.85	West Sussex	7.01
Manchester	22.21	Wigan and Bolton	16.93
Merton, Sutton and Wandsworth	42.63	Wiltshire	10.19
Morecambe Bay	2.49	Wirral	2.64
Newcastle and North Tyneside	22.32	Wolverhampton	16.46
Norfolk	3.30	Worcestershire	9.30
North and East Devon	3.73		

Appendix 8 Need variables for health authorities of note

	Households without car %	Those of pensionable age living alone %	Persons in lone parent households %	Dependants in single carer households %	Single, widowed or divorced %	Dependants in no carer households %
Kensington, Chelsea & Westminster	55	47.8	15.9	24.6	66	20.5
Camden & Islington	57	44.1	20.5	29.0	67	19.8
Hillingdon	28	31.9	7.3	16.8	53	12.5
Ealing, Hammersmith & Hounslow	39	36.5	11.9	22.4	61	14.2
Barking & Havering	33	32.1	9.1	20.0	53	14.8
Redbridge & Waltham Forest	36	34.7	9.7	19.8	57	14.6
Bradford	41	36.3	9.9	20.2	56	14.4
Birmingham	44	34.5	12.2	22.4	58	14.6
Barnsley	40	34.2	8.3	24.2	51	18.9
Salford & Trafford	40	36.5	11.7	23.0	56	18.6
Cornwall	25	29.7	7.5	20.3	50	14.4

Appendix 9 Prioritised Capital Schemes approved to go ahead since May 1997 (England)

Strategic Health Authority	Scheme	Capital Value £m
PFI Schemes		
PFI Schemes that are operational		
North West	North Cumbria Acute Hospitals NHS Trust - Carlisle	67
South East Coast	Dartford & Gravesham NHS Trust	94
South Central	Buckinghamshire Hospitals NHS Trust	45
London	Queen Elizabeth Hospital NHS Trust	96
North East	County Durham & Darlington Acute Hospitals NHS Trust (North Durham)	61
Yorkshire & the Humber	Calderdale & Huddersfield NHS Trust	65
North West	South Manchester University Hospitals NHS Trust	67
East of England	Norfolk & Norwich NHS Trust	158
West Midlands	Hereford Hospitals NHS Trust	64
London	Barnet & Chase Farm Hospitals NHS Trust	54
West Midlands	Worcestershire Acute Hospitals NHS Trust	87
North East	County Durham & Darlington Acute Hospitals NHS Trust (Bishop Auckland)	48
London	King's Healthcare NHS Trust	76
South West	Swindon & Marlborough NHS Trust	100
Yorkshire & the Humber	Leeds Community & Mental Health Services Teaching NHS Trust	47
London	Bromley Healthcare NHS Trust	118
Yorkshire & the Humber	Hull & East Yorkshire Hospitals NHS Trust	22
South Central	Berkshire Healthcare NHS Trust	30
London	West Middlesex University Hospitals NHS Trust	60
North East	South Tees Acute Hospitals NHS Trust	122
London	St George's Hospital NHS Trust	46
South West	Gloucestershire Hospitals NHS Foundation Trust	32
West Midlands	Dudley Group of Hospitals NHS Trust	137
London	University College London Hospitals NHS Trust	422
London	North West London Hospitals NHS Trust - Central Middlesex	69
South West	Avon & Western Wiltshire Mental Health NHS Trust	83
North West	East Lancashire Hospitals NHS Trust - Blackburn	110
West Midlands	University Hospitals Coventry and Warwickshire NHS Trust - Walsgrave	379
28	**Total operational PFI Schemes**	**2,759**
PFI Schemes reached Financial Close with work started on site		
East Midlands	Derby Hospitals NHS Trust	312

South Central	Oxford Radcliffe Hospitals NHS Trust	134
London	Barking, Havering & Redbridge Hospitals NHS Trust	238
South East Coast	Brighton Health Care NHS Trust	36
London	Lewisham Hospital NHS Trust	72
Yorkshire & the Humber	Leeds Teaching Hospitals NHS Trust	265
North West	Central Manchester Healthcare/Manchester Childrens Hospitals NHS Trusts	512
North East	Newcastle Upon Tyne Hospitals NHS Trust	299
East Midlands	Sherwood Forest Hospitals NHS Trust	326
South Central	Portsmouth Hospitals NHS Trust	236
South Central	Oxford Radcliffe Hospitals NHS Trust	129
Yorkshire & the Humber	Hull & East Yorkshire Hospitals NHS Trust	67
London	Barts & The London NHS Trust	1,000
North West	St Helens & Knowsley Hospitals NHS Trust	338
West Midlands	University Hospital Birmingham/Birmingham & Solihull MH NHS Trust	627
15	**Total PFI Schemes reached financial close with work started on site**	**4,591**
PFI Schemes which have released OJEU notices but not yet reached financial close		
West Midlands	University Hospital of North Staffordshire NHS Trust	272
East Midlands	University Hospitals of Leicester NHS Trust	711
Yorkshire & the Humber	Mid Yorkshire Hospitals NHS Trust - Wakefield	280
London	North Middlesex Hospitals NHS Trust	108
East of England	Mid Essex Hospitals NHS Trust	186
North West	Salford Royal Hospitals NHS Trusts	190
North West	Tameside & Glossop Acute Services NHS Trust	109
East of England	Peterborough & Stamford Hospitals NHS Foundation Trust	307
West Midlands	Walsall Hospitals NHS Trust	141
South East Coast	Maidstone & Tunbridge Wells NHS Trust	428
South West	South Devon Healthcare NHS Trust	163
North East	Tees, Esk & Wear Valleys NHS Trust	78
12	**Total PFI Schemes released OJEU notices but not yet reached financial close**	**2,973**
PFI schemes which have not yet placed OJEU adverts		
East Midlands	Leicestershire Partnership NHS Trust	50
London	Royal National Orthopaedic Hospital NHS Trust	144
London	Hillingdon Hospital NHS Trust	338
South West	United Bristol Healthcare NHS Trust	104
West Midlands	Royal Wolverhampton Hospitals NHS Trust	317

South Central	Southampton University Hospitals NHS Trust	69
East of England	East and North Hertfordshire NHS Trust	550
East of England	West Hertfordshire Hospitals NHS Trust	330
South West	North Bristol/South Gloucester PCTs	400
East of England	Papworth Hospital NHS Trust	148
West Midlands	Sandwell and West Birmingham Acute Trust	500
South West	Taunton and Somerset NHS Trust	80
East of England	Southend Hospital NHS Trust	100
North East	Northumberland, Tyne & Wear - Cherry Knowle	50
London	North West London Hospitals NHS Trust	305
South Central	Heatherwood & Wexham Park Hospitals	200
South West	Plymouth Hospitals	209
South West	Plymouth Hospitals	400
London	Barnet & Chase Farm Hospitals NHS Trust	40
North West	Aintree Hospitals	42
North West	Royal Liverpool & Broadgreen University Hospitals	500
North West	Mersey Care	170
North West	Royal Liverpool Children's Hospital	300
London	Whipps Cross Hospitals NHS Trust	328
Yorkshire & the Humber	Leeds Teaching Hospitals NHS Trust	260
25	**Total schemes yet to release OJEU adverts**	**5,934**
80	**Total PFI**	**16,257**

Publicly Funded Schemes

Publicly Funded Schemes that are completed		
North West	Penine Acute Hospitals MHS Trust - Rochdale	24
Yorkshire & the Humber	Sheffield Teaching Hospitals NHS Trust	24
South Central	Royal Berkshire & Battle Hospital NHS Trust	84
London	Guys & St.Thomas NHS Trust	50
London	Great Ormond Street Hospital for Children NHS Trust	75
5	**Total Publicly Funded schemes that are completed**	**257**
Publicly Funded Schemes yet to commence construction		
London	West London Mental Health NHS trust - Broadmoor	243
1	**Total Publicly Funded schemes yet to commence construction**	**243**
6	**Total Publicly Funded schemes with work started on site or completed**	**500**
86	**Total prioritised capital Investment given go ahead**	**16,757**

Non prioritised schemes (over £10m)

Strategic Health Authority	**NHS Trust**	**Value £m**

PFI Schemes		
PFI Schemes that are operational		
London	Queen Mary's hospital Sidcup	15
East Midlands	Nottingham University Hospitals - QMC	17
South East Coast	Sussex Partnership	22
West Midlands	North Staffordshire Combined Healthcare	28
London	Oxleas	11
London	North East London Mental Health	11
West Midlands	Birmingham & Solihull Mental Health	18
South West	Cornwall Healthcare - Bodmin	10
London	East London & The City Mental Health - Newham	15
East of England	Luton & Dunstable	15
North East	Northumbria Healthcare - Wansbeck	18
East of England	Royston, Buntingford & Bishop Stortford PCT	15
West Midlands	Royal Wolverhampton Hospitals	13
North East	Northumbria Healthcare - Hexham	55
South East Coast	Guildford & Waverley PCT - Farnham	29
North East	County Durham & Darlington Acute Hospitals - Chester-le-street	10
South Central	Newbury & Community PCT	19
South West	Mid Devon PCT - Tiverton	10
Yorkshire & the Humber	Leeds Teaching Hospitals - Wharfedale	14
North East	Tees, Esk & Wear Valleys - West Park	16
London	Brent PCT - Willesden	21
Yorkshire & the Humber	Doncaster & South Humber Healthcare	15
Yorkshire & the Humber	Kirklees PCT	27
West Midlands	Sandwell & W Birmingham Hospitals - City Hospital	26
London	Wandsworth PCT - Queen Mary's Roehampton	75
North East	Northumberland, Tyne & Wear - Morpeth	32
South West	Salisbury Health Care	24
North West	East Lancashire Hospitals - Burnley	30
South Central	Buckinghamshire Hospitals - Stoke Mandeville	47
London	Newham Healthcare	55
30	**Total operational PFI Schemes**	**712**
PFI schemes reached Financial Close with work started on site		
London	The Whittington	32
London	Kingston Hospital	33
South Central	Nuffield Orthopaedic Centre	37
Yorkshire & the Humber	Sheffield Teaching Hospitals	35
South Central	Hampshire PCT - Lymington	36
East of England	Cambridge University Hospital - Addenbrookes	76

North East	Northgate & Prudhoe - Neuro Disability Centre	24
East Midlands	Nottinghamshire Healthcare	19
East of England	Ipswich Hospital	36
East Midlands	Northamptonshire Teaching PCT	28
East of England	South West Essex Teaching PCT	30
11	**Total PFI Schemes reached Financial Close with work started on site**	**386**
PFI Schemes in negotiation but not yet reached financial close		
South West	Taunton & Somerset	21
East Midlands	Derbyshire Mental Health NHS Trust (Mental Health batch scheme)	29
East of England	South Essex Partnership	30
North East	Redcar & Cleveland PCT	40
North East	Lincolnshire Teaching PCT (Mental Health batch scheme)	26
East Midlands	Northamptonshire Healthcare	36
North West	Blackpool PCT	51
East Midlands	Leicestershire County & Rutland PCT - MR&H	32
East Midlands	Leicestershire County & Rutland PCT - H&B	36
North East	Tees, Esk & Wear Valleys / County Durham PCT	40
10	**Total PFI schemes not yet reached financial close**	**341**
51	**Total PFI**	**1,438**

Publicly Funded Schemes

Publicly Funded Schemes that are operational		
South East Coast	Eastern & Coastal Kent Teaching PCT	14
London	Camden & Islington	26
Yorkshire & the Humber	Northern Lincolnshire & Goole Hospitals	12
London	West London Mental Health	14
North West	Lancashire Teaching Hospitals	40
North West	Wrightington, Wigan & Leigh - Royal Albert Edward Infirmary	25
West Midlands	Royal Wolverhampton Hospitals - Heart & Lung Centre	57
London	Central & North West London Mental Health	35
London	Barnet PCT - Edgware Community	40
South East Coast	Brighton & Sussex University	12
London	West London Mental Health - Broadmoor DSPD	36
London	Hammersmith Hospitals - Renal Centre	25
London	East London & The City Mental Health - Tower Hamlets	34
South West	Plymouth Hospitals - South West Cardiothoracic Centre	31
North West	Blackpool, Fylde & Wyre - Cardiac Centre	45
South Central	Southampton University Hospitals - Cardiac	53
16	**Total Publicly Funded Schemes that are under construction**	**499**
Publicly Funded Schemes that are under construction		
North West	The Cardiaothoracic Centre - Liverpool	49
East of England	Basildon & Thurrock Uni Hospitals - Essex Heart & Lung Centre	59
Yorkshire & the Humber	Hull & East Yorkshire Hospitals - Cardiac	51
South West	United Britsol/North Bristol - Cardiothoracic Centre	
4	**Total publicly funded that are under construction**	**159**
20	**Total publicly funded**	**658**
71	**Total non prioritised Capital Investment**	**2,096**

Appendix 10

Report of the Advisory Committee on Resource Allocation

December 2008

Summary of Recommendations

The Advisory Committee on Resource Allocation's (ACRA) review of the weighted capitation formula culminated in a series of recommendations to Ministers on potential changes to the weighted capitation formula, which will ultimately be used to inform Primary Care Trusts (PCTs) revenue allocations.

A list of ACRA's main recommendations is below.

Population base for revenue allocations

- That the definition of a PCT responsible population is tied explicitly to responsible commissioner guidance, and that PCT responsible populations continue to comprise GP registered populations, and unregistered resident population components that can be defined robustly and accurately using nationally available data.
- That Office for National Statistics (ONS) population projections continue to be used as the basis for resource allocation for 2009/10 and 2010/11.
- That all prisoners are counted in the population base of the PCTs where prisons are located, rather than only those who are serving sentences over six months as at present, (excluding the primary care components of the formula – prescribing and primary medical services – because the budget for prison primary healthcare remains centrally funded).
- That prisoners receive the national average needs weighting rather than the PCT specific needs weighting.
- That armed forces receive a national average needs weighting, rather than the needs weighting of their host PCT as previously, (excluding the primary care components of the formula).
- That all asylum seekers, after their initial applications and processing, are counted and receive a national average needs weighting.
- That temporary residents are removed from the prescribing component of the formula as the relevant data is no longer collected.
- That GP registered lists should be used as the population base for future resource allocation (post 2010/11) if GP registered lists can be demonstrated to be robust and up-to-date.

Need Formula

- That in the new acute formula, age and additional need are calculated in a single index rather than separately as present.
- That the new formulas for acute and maternity are based on admitted patient and outpatient data for the first time.
- That there will be new separate needs formulas for acute and maternity, replacing the current combined formula.
- That there will be a new need formula for prescribing.
- That the mental health formula will not be changed as the review did not produce a need formula that is robust and an improvement on the current mental health formula.

- That resources for community health services be allocated using the acute index and resources for learning disabilities be allocated using the acute and mental health indices.
- That the English Language Difficulty Adjustment is removed because its differential impact on allocations is not significant.
- That there should be a separate formula for health inequalities.
- That no further adjustment is made for rurality.

Health Inequalities

- That there should be a separate health inequalities formula and that disability free life expectancy is used as the health inequalities measure.
- That the weight to be given to the health inequalities formula should be a ministerial decision as no technical way of assessing how much weight should be applied to the health inequalities formula has been found.
- That the health inequalities formula should be applied to all elements of the weighted capitation formula except mental health and HIV/AIDS.
- That the health inequalities formula is an interim measure and that the issue of health inequalities and resource allocation should form part of ACRA's future work programme.

Market Forces Factor

- That there is still a requirement for a market forces factor (MFF) component within the weighted capitation formula and that it should continue to be based on the General Labour Market approach.
- That part-time workers are included in the calculation of the MFF as they reflect a significant part of the general labour market and the NHS workforce.
- That City of London workers are included in the calculation of wage differentials used to produce the MFF.
- That a job responsibility adjustment is made to the MFF to recognise the fact that the same job titles reflect different jobs in different parts of the country.
    - That the staff MFF is not applied to spend on doctors as their costs
    - (e.g. productivity and vacancy rates) do not vary differentially across the country as they do for other groups of workers.
- That the "raw" MFFs, i.e. the differentials in pay rates, should be smoothed to reflect actual labour markets using a method that takes into account the distance from all other PCTs, not just neighbouring PCTs to recognise the fact that NHS organisations in one PCT might draw their labour force from a variety of PCT areas.
- That provider-level MFFs should be additionally smoothed ("interpolated") to reflect the distance of the provider site(s) from the centre of each PCT, rather than only taking the MFF of the PCT in which they are situated. This will help to reduce significant differences between the MFFs of some neighbouring providers.
- That no further adjustment is made for rurality.

Appendix 11

2009-10 AND 2010-11 PCT REVENUE ALLOCATIONS

PCT	2009-10 allocation £000s	2010-11 allocation £000s	Two year increase £000s	Two year increase %	2010-11 closing DFT %
Ashton, Leigh and Wigan PCT	511,831	539,982	54,834	11.3%	-4.5%
Barking and Dagenham PCT	301,080	316,599	30,789	10.8%	1.3%
Barnet PCT	528,745	555,931	53,442	10.6%	6.7%
Barnsley PCT	409,151	437,291	57,837	15.2%	-6.2%
Bassetlaw PCT	167,978	182,407	26,671	17.1%	-6.2%
Bath and North East Somerset PCT	255,385	268,516	25,812	10.6%	4.4%
Bedfordshire PCT	551,987	585,386	62,176	11.9%	-3.5%
Berkshire East PCT	532,623	560,009	53,833	10.6%	3.7%
Berkshire West PCT	597,061	627,760	60,346	10.6%	5.1%
Bexley Care Trust	321,350	337,896	32,552	10.7%	1.4%
Birmingham East and North PCT	674,108	711,184	72,219	11.3%	-2.5%
Blackburn with Darwen PCT	258,536	272,755	27,698	11.3%	-2.4%
Blackpool PCT	263,731	278,236	28,254	11.3%	-3.6%
Bolton PCT	439,803	463,992	47,117	11.3%	-2.6%
Bournemouth and Poole Teaching PCT	509,384	535,575	51,485	10.6%	3.6%
Bradford and Airedale Teaching PCT	810,920	856,745	88,101	11.5%	-1.2%
Brent Teaching PCT	501,538	527,325	50,692	10.6%	7.7%
Brighton and Hove City PCT	438,902	461,469	44,361	10.6%	7.7%
Bristol PCT	660,306	695,459	68,412	10.9%	0.4%
Bromley PCT	466,265	490,239	47,126	10.6%	8.6%
Buckinghamshire PCT	652,120	685,650	65,911	10.6%	2.1%
Bury PCT	282,130	297,647	30,225	11.3%	-3.1%
Calderdale PCT	308,563	325,895	33,418	11.4%	-1.4%
Cambridgeshire PCT	777,313	827,498	90,708	12.3%	-2.1%
Camden PCT	453,989	477,331	45,886	10.6%	12.4%
Central and Eastern Cheshire PCT	645,100	679,543	67,099	11.0%	0.4%
Central Lancashire PCT	688,006	725,915	73,777	11.3%	-2.2%
City and Hackney Teaching PCT	472,222	496,502	47,729	10.6%	6.6%
Cornwall and Isles of Scilly PCT	808,369	856,214	94,181	12.4%	-6.2%
County Durham PCT	886,825	935,601	95,008	11.3%	-5.4%
Coventry Teaching PCT	529,616	558,745	56,739	11.3%	-0.3%
Croydon PCT	526,752	553,836	53,240	10.6%	5.1%
Cumbria Teaching PCT	783,807	826,917	83,971	11.3%	-2.0%
Darlington PCT	166,081	174,705	16,913	10.7%	0.9%
Derby City PCT	405,847	428,169	43,479	11.3%	-5.8%
Derbyshire County PCT	1,048,875	1,107,225	118,065	11.9%	-6.2%
Devon PCT	1,088,020	1,152,427	121,128	11.7%	-1.0%
Doncaster PCT	502,312	529,939	53,814	11.3%	-5.5%
Dorset PCT	580,964	613,261	62,584	11.4%	-0.6%
Dudley PCT	461,918	487,324	49,487	11.3%	-3.9%
Ealing PCT	545,775	573,837	55,163	10.6%	8.0%

East and North Hertfordshire PCT	759,311	803,338	83,612	11.6%	-0.6%
East Lancashire Teaching PCT	629,300	663,912	67,419	11.3%	-0.2%
East Riding of Yorkshire PCT	432,198	458,519	49,720	12.2%	-6.2%
East Sussex Downs and Weald PCT	513,310	539,702	51,881	10.6%	2.4%
Eastern and Coastal Kent PCT	1,151,643	1,216,563	124,958	11.4%	-0.8%
Enfield PCT	436,718	459,173	44,140	10.6%	2.1%
Gateshead PCT	357,224	376,601	38,000	11.2%	0.1%
Gloucestershire PCT	825,908	868,490	83,597	10.7%	1.3%
Great Yarmouth and Waveney PCT	361,014	381,535	39,341	11.5%	-2.9%
Greenwich Teaching PCT	424,160	445,968	42,871	10.6%	4.0%
Halton and St Helens PCT	537,116	566,657	57,543	11.3%	-4.5%
Hammersmith and Fulham PCT	326,448	343,232	32,995	10.6%	16.2%
Hampshire PCT	1,709,698	1,799,471	175,170	10.8%	0.7%
Haringey Teaching PCT	424,321	446,139	42,887	10.6%	2.1%
Harrow PCT	313,370	329,483	31,673	10.6%	7.4%
Hartlepool PCT	163,405	172,392	17,506	11.3%	-4.3%
Hastings and Rother PCT	303,746	319,363	30,700	10.6%	2.1%
Havering PCT	376,447	396,316	39,278	11.0%	0.5%
Heart of Birmingham Teaching PCT	523,451	550,366	52,906	10.6%	10.2%
Herefordshire PCT	256,778	272,050	28,658	11.8%	-3.1%
Heywood, Middleton and Rochdale PCT	358,484	378,201	38,405	11.3%	-0.0%
Hillingdon PCT	379,496	399,009	38,357	10.6%	6.4%
Hounslow PCT	362,964	381,627	36,686	10.6%	5.1%
Hull Teaching PCT	455,982	481,061	48,959	11.3%	-6.0%
Isle of Wight NHS PCT	232,671	245,882	25,341	11.5%	-1.2%
Islington PCT	412,126	433,316	41,655	10.6%	11.7%
Kensington and Chelsea PCT	337,424	354,773	34,104	10.6%	20.4%
Kingston PCT	249,459	262,286	25,213	10.6%	13.5%
Kirklees PCT	598,931	631,872	64,165	11.3%	-1.8%
Knowsley PCT	303,843	320,554	32,552	11.3%	-0.1%
Lambeth PCT	580,017	609,840	58,624	10.6%	14.8%
Leeds PCT	1,169,992	1,235,149	126,152	11.4%	-1.7%
Leicester City PCT	488,731	515,611	58,787	12.9%	-6.1%
Leicestershire County and Rutland PCT	830,158	879,975	93,096	11.8%	-5.6%
Lewisham PCT	484,939	509,873	49,014	10.6%	12.0%
Lincolnshire Teaching PCT	1,060,265	1,127,697	136,737	13.8%	-6.2%
Liverpool PCT	906,876	953,504	91,817	10.7%	1.7%
Luton PCT	282,841	298,802	30,707	11.5%	-2.4%
Manchester PCT	925,276	979,818	102,780	11.7%	-3.5%
Medway PCT	391,582	412,814	41,635	11.2%	0.2%
Mid Essex PCT	461,830	488,887	51,133	11.7%	-3.5%
Middlesbrough PCT	257,714	271,888	27,610	11.3%	-0.6%
Milton Keynes PCT	315,520	338,522	39,450	13.2%	-3.2%
Newcastle PCT	466,097	490,062	47,110	10.6%	2.8%
Newham PCT	510,371	536,897	51,869	10.7%	0.9%
Norfolk PCT	1,069,968	1,133,968	119,781	11.8%	-5.1%
North East Essex PCT	489,796	520,205	55,943	12.0%	-5.3%
North East Lincolnshire Care Trust	259,146	273,399	27,763	11.3%	-1.9%

Plus					
North Lancashire Teaching PCT	520,037	549,674	56,748	11.5%	-3.7%
North Lincolnshire PCT	238,152	252,197	28,256	12.6%	-6.2%
North Somerset PCT	287,957	306,265	33,320	12.2%	-5.2%
North Staffordshire PCT	316,252	333,646	33,881	11.3%	-2.9%
North Tyneside PCT	345,791	364,810	37,046	11.3%	-1.2%
North Yorkshire and York PCT	1,076,587	1,139,019	118,557	11.6%	-2.4%
Northamptonshire Teaching PCT	927,249	983,436	104,527	11.9%	-1.4%
Northumberland Care Trust	498,897	526,337	53,448	11.3%	-3.2%
Nottingham City PCT	487,694	514,727	53,945	11.7%	-6.2%
Nottinghamshire County Teaching PCT	943,520	997,415	105,012	11.8%	-6.2%
Oldham PCT	379,096	399,946	40,614	11.3%	-1.4%
Oxfordshire PCT	830,948	873,673	83,986	10.6%	3.2%
Peterborough PCT	244,676	257,356	24,830	10.7%	1.0%
Plymouth Teaching PCT	393,303	416,482	43,682	11.7%	-5.9%
Portsmouth City Teaching PCT	311,043	328,095	33,267	11.3%	0.0%
Redbridge PCT	365,515	385,618	39,159	11.3%	-1.1%
Redcar and Cleveland PCT	233,544	246,388	25,020	11.3%	-1.6%
Richmond and Twickenham PCT	267,442	281,193	27,031	10.6%	23.4%
Rotherham PCT	409,554	432,140	45,922	11.9%	-6.2%
Salford PCT	425,994	449,125	45,339	11.2%	0.1%
Sandwell PCT	523,488	552,279	56,083	11.3%	-5.4%
Sefton PCT	479,220	503,861	48,463	10.6%	1.9%
Sheffield PCT	885,052	931,076	90,381	10.8%	0.9%
Shropshire County PCT	412,573	436,629	45,564	11.7%	-3.8%
Solihull Care Trust	294,018	310,080	31,371	11.3%	0.1%
Somerset PCT	751,518	796,505	84,166	11.8%	-2.6%
South Birmingham PCT	587,304	619,168	62,482	11.2%	0.1%
South East Essex PCT	500,226	527,738	53,591	11.3%	-2.2%
South Gloucestershire PCT	323,108	339,722	32,657	10.6%	2.2%
South Staffordshire PCT	826,224	873,709	104,752	13.6%	-6.2%
South Tyneside PCT	279,272	294,039	29,326	11.1%	0.5%
South West Essex PCT	602,217	635,283	64,461	11.3%	0.0%
Southampton City PCT	368,298	388,555	39,457	11.3%	-1.9%
Southwark PCT	492,748	518,084	49,803	10.6%	5.7%
Stockport PCT	431,751	453,950	43,638	10.6%	3.4%
Stockton-on-Tees Teaching PCT	287,728	303,980	31,252	11.5%	-6.0%
Stoke on Trent PCT	451,376	476,202	53,205	12.6%	-5.5%
Suffolk PCT	820,056	869,582	92,277	11.9%	-4.0%
Sunderland Teaching PCT	510,293	537,800	54,110	11.2%	0.2%
Surrey PCT	1,565,807	1,646,316	158,260	10.6%	11.6%
Sutton and Merton PCT	583,188	613,174	58,944	10.6%	9.7%
Swindon PCT	277,524	294,545	31,489	12.0%	-1.3%
Tameside and Glossop PCT	383,015	404,080	41,033	11.3%	-1.5%
Telford and Wrekin PCT	237,482	251,590	26,636	11.8%	-6.2%
Torbay Care Trust	236,008	249,424	25,720	11.5%	-3.4%
Tower Hamlets PCT	447,591	470,605	45,239	10.6%	3.4%
Trafford PCT	340,332	357,831	34,398	10.6%	7.7%
Wakefield District PCT	564,093	595,118	66,463	12.6%	-6.2%

Walsall Teaching PCT	425,164	448,548	45,549	11.3%	-2.2%
Waltham Forest PCT	395,510	415,846	39,977	10.6%	2.2%
Wandsworth PCT	488,965	514,106	49,421	10.6%	14.4%
Warrington PCT	290,606	306,628	31,172	11.3%	-1.4%
Warwickshire PCT	739,819	781,747	80,496	11.5%	-1.4%
West Essex PCT	390,481	410,562	39,470	10.6%	1.6%
West Hertfordshire PCT	773,604	813,380	78,190	10.6%	5.3%
West Kent PCT	926,518	977,459	98,922	11.3%	0.0%
West Sussex PCT	1,172,602	1,232,894	118,518	10.6%	3.7%
Western Cheshire PCT	375,103	394,678	38,320	10.8%	0.8%
Westminster PCT	447,789	470,813	45,259	10.6%	20.8%
Wiltshire PCT	610,462	642,526	62,527	10.8%	0.6%
Wirral PCT	565,696	594,782	57,176	10.6%	2.3%
Wolverhampton City PCT	408,545	431,015	43,769	11.3%	-2.6%
Worcestershire PCT	771,728	815,248	83,752	11.4%	-2.6%
England	80,030,703	84,432,392	8,573,905	11.3%	0.0%

Appendix 12

Hospital Episode Statistics 1999/2000 and 2005/6 comparison

Operation type	Admissions 1999/2000	Admissions 2005/2006
All operations	6,227,448	6,836,850
A Nervous system (A01-A84)	192,123	220,224
AA Tissue of brain (A01-A10)	5,792	7,330
AA1 Excision of lesion of tissue of brain (A02)	2,201	2,915
AB Ventricle of brain and subarachnoid space (A12-A22)	4,150	4,537
AC Cranial nerves (A24-A36)	2,319	2,433
AC1 Extracranial extirpation of vagus nerve (A27)	57	13
AD Meninges of brain (A38-A42)	3,217	3,928
AE Spinal cord and other contents of spinal canal (A44-A57)	80,795	98,529
AF Peripheral nerves (A59-A73)	69,043	86,179
AF1 Release of entrapment of peripheral nerve at wrist (A61)	35,904	49,958
AG Other parts of nervous system (A75-84)	26,806	17,288
AG1 Electroconvulsive therapy (A83)	4,843	2,026
B Endocrine system and breast (B01-B37)	90,203	97,129
BA Pituitary and pineal glands (B01-B06)	867	926
BB Thyroid and parathyroid glands (B08-B16)	10,309	12,123
BB1 Excision of thyroid gland (B08)	7,229	8,369
BC Other endocrine glands (B18-B25)	561	818
BD Breast (B27-B37)	78,465	83,262
BD1 Excision of breast (B27-B28)	52,856	55,655
C Eye (C01-C86)	387,798	463,156
CA Orbit (C01-C08)	3,099	3,495
CB Eyebrow and eyelid (C10-C22)	56,270	66,759
CC Lacrimal apparatus (C24-C29)	11,183	12,256
CD Muscles of eye (C31-C37)	12,350	11,588
CE Conjunctiva and cornea (C39-C51)	10,768	11,328
CF Sclera and iris (C53-C64)	15,890	11,779
CG Anterior chamber of eye and lens (C66-C77)	230,404	301,756
CG1 Extraction of lens (C71,C72,C74)	6,868	7,955
CG2 Prosthesis of lens (C75)	202,845	278,844
CH Retina and other parts of eye (C79-C86)	47,834	44,195
D Ear (D01-D28)	95,567	85,480
DA External ear and external auditory canal (D01-D08)	25,343	26,965
DA1 Clearance of external auditory canal (D07)	4,112	3,522
DB Mastoid and middle ear (D10-D20)	65,208	54,820
DB1 Operations on mastoid (D10-D12)	6,432	6,601
DB2 Repair of eardrum (D14)	7,202	8,032
DB3 Drainage of middle ear (D15)	45,123	34,562
DC Inner ear and eustachian canal (D22-D28)	5,016	3,695
E Respiratory tract (E01-E63)	193,620	181,411
EA Nose (E01-E10)	79,735	74,694
EA1 Operations on septum of nose (E03)	25,601	23,042
EA2 Operations on external nose (E09)	12,361	14,590
EB Nasal sinuses (E12-E17)	10,986	9,657
EC Pharynx (E19-E27)	21,183	18,051
EC1 Operations on adenoids (E20)	9,725	7,593

ED Larynx (E29-E38)	21,438	21,677
ED1 Endoscopic operations on larynx (E34-E36)	19,709	19,658
EE Trachea and bronchus (E39-E42)	50,295	44,636
EE1 Operations on trachea (E39-E44)	3,298	4,005
EE2 Endoscopic operations on bronchus (E48-E51)	46,656	40,390
EF Lung and mediastinum (E53-E63)	9,984	12,696
EF1 Operations on lung (E53-E59)	8,283	10,973
F Mouth (F01-F58)	256,008	261,335
FA Lip (F01-F06)	13,702	14,431
FB Tooth and gingiva (F08-F20)	150,129	160,602
FB1 Surgical removal of tooth (F09)	80,485	72,926
FB2 Simple extraction of tooth (F10)	47,608	67,237
FC Tongue and palate (F22-F32)	13,966	15,297
FD Tonsil and other parts of mouth (F34-F42)	70,206	63,565
FD1 Excision of tonsil (F34)	59,323	51,166
FE Salivary apparatus (F44-F58)	8,004	7,440
FE1 Excision of salivary gland (F44)	4,723	4,432
G Upper digestive tract (G01-G82)	505,949	431,299
GA Oesophagus including hiatus hernia (G01-G25)	25,374	23,266
GA1 Endoscopic operations on oesophagus (G14-G19)	16,207	13,085
GA2 Operations on diaphragmatic hernia (G23-G25)	2,290	3,764
GB Stomach pylorus & gen uppr gastr'int'l tract endoscop. (G27-G48)	467,784	393,551
GB1 Excision of stomach (G27-G28)	1,902	1,389
GB2 Endoscopic operations on upper gastrointestinal tract (G43-G45)	454,338	382,298
GC Duodenum (G49-G57)	2,772	2,459
GD Jejunum (G58-G67)	1,174	1,094
GE Ileum (G69-G82)	8,845	10,929
H Lower digestive tract (H01-H62)	443,454	521,248
HA Appendix (H01-H03)	38,869	39,752
HB Colon (H04-H30)	304,928	380,682
HB1 Excision of colon (H04-H11)	16,590	16,949
HB2 Endoscopic operations on colon (H20-H28)	281,620	356,741
HC Rectum (H33-H46)	26,307	25,242
HC1 Excision of rectum (H33)	12,046	12,287
HD Anus and perianal region (H47-H62)	73,349	75,572
HD1 Operations on haemorrhoid (H51-H53)	27,126	24,257
J Other abdominal organs - principally digestive (J01-J72)	84,964	95,915
JA Liver (J01-J16)	15,712	17,661
JB Gall bladder (J18-J26)	36,585	49,408
JB1 Excision of gall bladder (J18)	36,143	48,982
JC Bile duct (J27-J52)	29,811	25,765
JC1 Endoscopic operations on bile and pancreatic ducts (J38-J45)	27,551	23,323
JD Pancreas (J54-J67)	1,641	2,015
JE Spleen (J69-J72)	1,215	1,066
K Heart (K01-K71)	161,804	242,197
KA Wall septum and chambers of heart (K01-K23)	2,651	3,079
KB Valves of heart and adjacent structures (K25-K38)	5,217	6,323
KC Coronary artery (K40-K51)	36,016	63,599
KC1 Replacement of coronary artery (K40-K44)	10,717	3,422
KC2 Other bypass of coronary artery (K45-K46)	6,612	13,838

KC3 Transluminal operations on coronary artery (K49-K51)	18,656	46,304
KC4 Heart operations (K40-K46)	17,329	17,260
KC5 Heart operations (K49-K50)	18,616	46,030
KD Other parts of heart and pericardium (K52-K71)	117,919	169,196
L Arteries and veins (L01-L97)	166,063	164,743
LA Great vessels and pulmonary artery (L01-L13)	1,543	4,374
LB Aorta (L16-L26)	9,262	8,730
LC Carotid, cerebral and subclavian arteries (L29-L39)	12,524	13,514
LD Abdominal branches of aorta (L41-L47)	3,226	2,181
LE Iliac and femoral arteries (L48-L63)	31,798	27,932
LF Other arteries (L65-L72)	10,922	7,015
LG Veins and other blood vessels (L74-L97)	96,789	100,997
LG1 Operations on varicose vein of leg (L85-L87)	48,111	37,069
M Urinary (M01-M83)	496,970	543,982
MA Kidney (M01-M16)	30,730	36,680
MA1 Transplantation of kidney (M01)	1,197	1,409
MA2 Excision of kidney (M02-M03)	4,880	5,873
MA3 Endoscopic operations on kidney (M09-M11)	2,302	3,454
MB Ureter (M18-M32)	23,454	29,116
MB1 Endoscopic operations on ureter (M26-M30)	18,401	24,325
MC Bladder (M34-M49)	355,884	385,053
MC1 Open operations on bladder (M34-M41)	6,265	6,454
MC2 Endoscopic operations on bladder (M42-M45)	260,039	276,713
MD Outlet of bladder and prostate (M51-M70)	62,179	68,349
MD1 Operations on outlet of female bladder (M51-M58)	10,123	11,374
MD2 Open excision of prostate (M61)	1,670	3,514
MD3 Endoscopic operations on outlet of male bladder (M65-M67)	35,423	27,655
ME Urethra and other parts of urinary tract (M72-M83)	24,723	24,784
N Male genital organs (N01-N34)	98,029	87,199
NA Scrotum and testis (N01-N13)	25,322	23,454
NA1 Placement of testis in scrotum (N08-N09)	6,677	6,091
NA2 Operations on hydrocele sac (N11)	6,173	6,146
NB Spermatic cord and male perineum (N15-N24)	40,003	27,064
NB1 Excision of vas deferens (N17)	31,997	20,336
NC Penis and other male genital organs (N26-N34)	32,704	36,681
NC1 Operations on prepuce (N30)	25,902	28,629
P Lower female genital tract (P01-P31)	80,770	58,764
PA Vulva and female perineum (P01-P13)	21,183	21,622
PA1 Operations on bartholin gland (P03)	4,627	4,491
PB Vagina (P14-P31)	59,587	37,142
PB1 Repair of prolapse of vagina (P22-P23)	19,087	22,236
Q Upper female genital tract (Q01-Q56)	451,312	390,452
QA Uterus (Q01-Q20)	362,614	315,517
QA1 Operations on cervix uteri (Q01-Q05)	59,692	38,933
QA2 Excision of uterus (Q07-Q08)	51,290	38,542
QA3 Evacuation of contents of uterus (Q10-Q11)	141,272	94,795
QB Fallopian tube (Q22-Q41)	68,892	44,391
QB1 Excision of adnexa of uterus (Q22-Q24)	12,562	15,367
QB2 Open occlusion of fallopian tube (Q27-Q28)	678	224
QB3 Endoscopic occlusion of fallopian tube (Q35-Q36)	40,354	18,133
QB4 Other endosocpic operations on fallopian tube (Q37-Q39)	2,638	1,886
QC Ovary and broad ligament (Q43-Q56)	19,806	30,544

R Female genitl tract ass'd with preg.,birth & puerperium (R01-R34)	543,152	578,253
RA Fetus gravid uterus (R01-R12)	6,074	5,704
RB Induction and delivery (R14-R27)	525,004	567,767
RB1 Caesarean delivery (R17-R18)	110,601	132,872
RB2 Manipulative delivery (R19-R23)	62,784	63,007
RB3 Normal delivery (R24)	337,080	362,827
RC Other obstetric (R28-R34)	12,074	4,782
S Skin (S01-S70)	307,812	320,789
SA Skin or subcutaneous tissue (S01-S62)	287,909	304,916
SA1 Extirpation of lesion of skin or subcutaneous tissue (S05-S11)	171,975	184,246
SA2 Skin flap operations (S17-S31)	3,266	3,394
SA3 Skin graft operations (S33-S39)	6,413	6,104
SA4 Suture of skin or subcutaneous tissue (S42-S42)	11,994	19,795
SA5 Incision of skin or subcutaneous tissue (S47)	22,910	27,724
SB Nail (S64-S70)	19,903	15,873
T Soft tissue (T01-T96)	287,787	310,956
TA Chest wall pleura and diaphragm (T01-T17)	28,128	32,386
TB Abdominal wall (T19-T31)	113,222	121,364
TB1 Operations on inguinal hernia (T19-T21)	78,518	78,998
TB2 Operations on other abdominal hernia (T22-T27)	26,439	34,966
TC Peritoneum (T33-T48)	57,473	57,234
TC1 Endoscopic operations on peritoneum (T42-T43)	41,164	34,066
TD Fascia, ganglion and bursa (T50-T62)	27,204	29,758
TE Tendon (T64-T74)	33,501	39,069
TF Muscle (T76-T83)	6,485	7,880
TG Lymphatic and other soft tissue (T85-T96)	21,774	23,265
V Bones and joints of skull and spine (V01-V54)	70,690	96,274
VA Bones of cranium and face (V01-V13)	17,330	16,867
VB Jaw and temporomandibular joint (V14-V21)	8,502	9,997
VC Decompression operations on spine (V22-V27)	6,031	10,802
VD Operations on intervertebral disc (V29-V35, V52)	11,253	13,230
VE Other operations on spine (V37-V50, V54)	27,573	45,378
W Other bones and joints (W01-W92	522,528	623,716
WA Complex reconstruction of hand and foot (W01-W04)	2,014	2,767
WB Bone (W05-W36)	217,871	234,042
WB1 Excision of bone (W06-W08)	11,432	13,065
WB2 Division of bone (W12-W16)	10,595	14,041
WB3 Reduction of fracture of bone (W12-W16)	128,731	132,493
WB4 Graft of bone marrow (W34)	888	897
WC Joint (W37-W92)	302,644	386,907
WC1 Total prosthetic replacement of hip joint (W37-W39)	45,665	59,247
WC2 Total prosthetic replacement of other joint (W40-W45)	35,423	62,966
WC3 Prosthetic replacement of head of femur (W46-W48)	21,194	21,013
WC4 Prosthetic replacement of other articulation (W49-W54)	3,061	7,329
WC5 Fixation of joint (W59-W64)	9,382	12,580
WC6 Reduction of traumatic dislocation of joint (W65-W67)	7,342	9,252
WC7 Open operations on semilunar cartilage (W70)	479	283
WC8 Endoscopic operations on joint (W82-W88)	96,508	121,054
X Miscellaneous operations (X01-X59)	790,848	1,062,328
XA Operations covering multiple systems (X01-X27)	17,780	16,479
XA1 Amputation (X07-X12)	12,884	11,645

XA2 Operations for sexual transformation (X15)	52	114
XA3 Corrections of congenital deformity of limb (X19-X27)	4,525	4,260
XB Miscellaneous operations (X29-X59)	773,068	1,045,849
XB1 Compensation for renal failure (X40-X42)	29,928	64,560

Appendix 13

Example of OPCS codes

Coronary artery bypass graft

Open chest procedure to perform direct revascularization of heart, for example, using suitable vein from leg for grafting, internal mammary artery, etc.

K40	**Saphenous vein graft replacement of coronary artery *(Clean)***
K40.1	Saphenous vein graft replacement of one coronary artery
K40.2	Saphenous vein graft replacement of two coronary arteries
K40.3	Saphenous vein graft replacement of three coronary arteries
K40.4	Saphenous vein graft replacement of four or more coronary arteries
K40.8	Other specified saphenous vein graft replacement of coronary artery
K40.9	Unspecified saphenous vein graft replacement of coronary artery
K41	**Other autograft replacement of coronary artery *(Clean)***
K41.1	Autograft replacement of one coronary artery not elsewhere classified
K41.2	Autograft replacement of two coronary arteries not elsewhere classified
K41.3	Autograft replacement of three coronary arteries not elsewhere classified
K41.4	Autograft replacement of four or more coronary arteries not elsewhere classified
K41.8	Other specified autograft replacement of coronary artery
K41.9	Unspecified other autograft replacement of coronary artery
K43	**Prosthetic replacement of coronary artery *(Clean)***
K43.1	Prosthetic replacement of one coronary artery
K43.2	Prosthetic replacement of two coronary arteries
K43.3	Prosthetic replacement of three coronary arteries
K43.4	Prosthetic replacement of four or more coronary arteries
K43.8	Other specified prosthetic replacement of coronary artery
K43.9	Unspecified prosthetic replacement of coronary artery
K44	**Other replacement of coronary artery *(Clean)*** *Includes: Coronary artery bypass graft not elsewhere classified*
K44.1	Replacement of coronary arteries using multiple methods
K44.2	Revision of replacement of coronary artery
K44.8	Other specified other replacement of coronary artery
K44.9	Unspecified other replacement of coronary artery
K45	**Connection of thoracic artery to coronary artery *(Clean)***
K45.1	Double anastomosis of mammary arteries to coronary arteries
K45.2	Double anastomosis of thoracic arteries to coronary arteries not elsewhere classified
K45.3	Anastomosis of mammary artery to left anterior descending coronary artery
K45.4	Anastomosis of mammary artery to coronary artery not elsewhere classified
K45.5	Anastomosis of thoracic artery to coronary artery not elsewhere classified
K45.6	Revision of connection of thoracic artery to coronary artery
K45.8	Other specified connection of thoracic artery to coronary artery
K45.9	Unspecified connection of thoracic artery to coronary artery
K46	**Other bypass of coronary artery *(Clean)*** *Excludes: Coronary artery bypass graft (K40-K44)*
K46.1	Double implantation of mammary arteries into heart
K46.2	Double implantation of thoracic arteries into heart not elsewhere classified
K46.3	Implantation of mammary artery into heart not elsewhere classified
K46.4	Implantation of thoracic artery into heart not elsewhere classified
K46.5	Revision of implantation of thoracic artery into heart
K46.8	Other specified other bypass of coronary artery
K46.9	Unspecified other bypass of coronary artery