Resource Allocation: Weighted Capitation Formula

Sixth Edition

Department of Health

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Preface

In 2009-10 and 2010-11 the weighted capitation formula has informed the allocation of £164 billion to Primary Care Trusts (PCTs). This is a significant proportion of public expenditure. It is therefore important that NHS finance managers, and others with an interest in the funding of the NHS, have access to an explanation of how the formula has been used to set PCTs' target shares of available resources.

We have tried to make this booklet[1] accessible to non-specialists, and to satisfy the needs of those requiring a fuller understanding of how the formula works. We explain some of the technical terms in the glossary. However, for full details of the modelling upon which various elements of the formula are based, we still refer readers to the reports of the researchers who undertook this work. We have provided a list of Resource Allocation Research Papers (RARPs) in Appendix 2. These, and other information about allocations, including the 2009-10 and 2010-11 PCT Revenue Allocations Exposition Book, are available at www.dh.gov.uk/allocations.

We welcome comments on whether this booklet meets the needs of our readers. We can be contacted at allocations@dh.gsi.gov.uk.

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1   Previous editions of this booklet were published in October 1994, February 1997, July 1999, March 2003 and May 2005 and are available at www.dh.gov.uk/allocations.

Executive summary

Introduction

1. The Department of Health has used a weighted capitation formula since 1977-78 to determine target shares of available revenue resources between NHS areas.

2. The underlying principle of the weighted capitation formula is to distribute resources based on the relative needs of each area. This is to enable Primary Care Trusts (PCTs) to commission similar levels of healthcare for populations with similar healthcare needs, with the further objective since 1999 of helping to reduce avoidable health inequalities.

3. The weighted capitation formula has informed the allocation of £164 billion to PCTs in 2009-10 and 2010-11. Under the formula, PCTs' target shares of the available resources are based on their share of the England population, and adjusted, or weighted, to account for their populations' needs for healthcare services relative to that of other PCTs.

4. Four elements are used to set PCTs' actual allocations:

   (a) weighted capitation targets – set according to the national weighted capitation formula which calculates PCTs' target shares of available resources based on PCT populations adjusted for

      (i) their age distribution

      (ii) additional need over and above that relating to age

      (iii) unavoidable geographical variations in the cost of providing services (the market forces factor (MFF))

   (b) recurrent baselines – which represent the actual current allocation which PCTs receive

   (c) distances from targets (DFTs) – which are the differences between (a) and (b) above. If (a) is greater than (b), a PCT is said to be under target. If (a) is smaller than (b), a PCT is said to be over target

   (d) pace of change policy – which determines the level of increase which all PCTs get to deliver on national and local priorities and the level of extra resources to under target PCTs to move them closer to their weighted capitation targets. PCTs do not receive their target allocation immediately but are moved to it over

a number of years. The pace of change policy is decided by Ministers for each allocations round.

5. PCTs have been given control over an increasing proportion of the NHS revenue budget and this is reflected in the formula which has three components:

    (a) hospital and community health services (HCHS – by far the largest component, accounting for over 76% of the formula)

    (b) prescribing (the drugs bill) and

    (c) primary medical services.

6. HCHS in turn has separate need formulas for acute services, maternity, mental health and HIV/AIDS.

7. Each of the components has adjustments for age, additional need and unavoidable costs with the exception of prescribing which has no adjustment for unavoidable costs. While these adjustments necessarily differ in detail for each component, they are based on the same common principles.

8. The Advisory Committee on Resource Allocation (ACRA) advises the Secretary of State for Health on the weighted capitation formula. ACRA is an independent expert body whose membership includes individuals with a wide range of expertise from within, and outside, the NHS. ACRA is supported by a Technical Advisory Group (TAG).

9. ACRA's most recent review, covering the main elements of the formula – the population base, the need adjustments and the MFF – is published in *Report of the Advisory Committee on Resource Allocation (December 2008)*[2].

10. The weighted capitation formula and the sixth edition of this booklet have been fully updated to incorporate the outcome of ACRA's review. As with earlier editions, the focus of the booklet is on the weighted capitation formula. Further information about actual allocations, recurrent baselines, DFTs and pace of change policies is available in the PCT Revenue Allocations Exposition Books, available at www.dh.gov.uk/ allocations.

Population

11. Health services are for people and the starting point and primary determinant of weighted capitation targets must therefore be the size of the populations for which PCTs are responsible.

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2   This, and other information about resource allocation, is available at www.dh.gov.uk/allocations.

12. The PCT responsible population for resource allocation purposes consists of:

    (a) the number of people permanently registered with the GP practices within each PCT area. This means that those patients permanently registered with a GP practice in one PCT area, but who are resident in a neighbouring or other PCT area, remain the responsibility of the PCT with which their GP practice is associated

    (b) the number of residents within the geographical boundaries of each PCT who are not permanently registered with any GP practice and for whom accurate national data are available. This group is restricted also to those for whom the PCT has formally been defined as the responsible commissioner of health services to be funded by PCT revenue allocations. In practice, this group includes prisoners, armed forces and asylum seekers.

13. PCT responsible populations are based on Office for National Statistics (ONS) subnational population projections (SNPPs) for 2009 and 2010, adjusted for patients resident in one PCT while registered with the GP practice of a neighbouring or other PCT.

14. In addition to recommending that ONS SNPPs remain the basis for resource allocation for 2009-10 and 2010-11, ACRA also recommended that:

    (a) all prisoners are included in the populations of PCTs where prisons are located, rather than only those who have served sentences over six months as previously

    (b) all asylum seekers after their initial applications and processing are included

    (c) the national average needs weight, rather than the host PCT needs weight, is applied to prisoners, armed forces and asylum seekers.

Need

15. Population is the starting point but the make-up of the population is also critical. People do not have identical needs for health care. A key difference is that need varies according to gender and age, and in particular, the very young and elderly, whose populations are not evenly distributed across the country, tend to make more use of health services than the rest of the population. The weighted capitation formula therefore takes into account the different age structures of local populations.

16. Even when differences due to age are accounted for, populations of the same age distribution display different levels of need. An additional need adjustment to reflect the relative need for health care over and above that accounted for by age is necessary.

17. Observing need directly has not proved possible to date. Instead, statistical modelling by academics has examined the relationship across small geographical areas between the utilisation of health services, socio-economic characteristics, health status and measures of the existing supply of health services. These models have been used to decide which characteristics to include in the formula as indicators of additional need, and with what relative weights.

18. Previous formulas have accounted for age related and additional needs in two separate adjustments, or stages, which did not allow additional need to vary between different age groups in a PCT. As a result of research published in *Combining Age Related and Additional Needs (CARAN) Report* (2007), ACRA recommended an acute formula which adjusts for age and additional need in one single stage. This one stage approach, however, was undertaken separately for each age group, thus allowing the relationship between age and additional need to vary between 18 different age bands.

19. CARAN also developed a separate formula for maternity services, where previously it had been combined with acute services, and a new formula for prescribing. The need formulas for mental health and for primary medical services (which reflects the GP contract) remain unchanged.

20. The new formulas capture need better than the previous formulas. However, as they are based on utilisation of health care, they capture the NHS's response to current patterns of health inequality. ACRA felt that they did not adequately address the objective of contributing to the reduction in avoidable health inequalities. ACRA therefore recommended a separate formula for health inequalities. This uses disability free life expectancy (DFLE), which is the number of years from birth a person is expected to live which are free from limiting long-term illness. It is applied by comparing every PCT's DFLE to a benchmark figure of 70 years.

21. It is not currently possible on a technical basis to determine the weighting for this health inequalities formula. Ministers decided to apply it to 15% of 2009-10 and 2010-11 allocations (with the exception of mental health, which already includes an adjustment for unmet need, and HIV/AIDS).

Unavoidable costs

22. The weighted capitation formula has to take account of the fact that the cost of commissioning or providing healthcare is not the same in every part of the country due to the impact of market forces on local costs. The market forces factor (MFF) is included in the weighted capitation formula to allow for these unavoidable geographical variations in costs. Under Payment by Results (PbR), a MFF is also paid to NHS providers.

23. The HCHS MFF consists of separate indices for staff, medical and dental London weighting, buildings and land.

24. The majority of HCHS spending is on staff. There are two methods for assessing the staff MFF: the Specific Cost Approach (SCA), which analyses variations in the actual staff costs incurred between NHS organisations, and the General Labour Market (GLM) approach, which analyses variations in wage costs in the private sector.

25. The SCA approach was most recently reviewed in *Review of Specific Cost Approach to Staff Market Forces Factor* (2007). This study represents the most detailed attempt to date to investigate the SCA in relation to an area cost adjustment in the NHS or government services generally. It concluded that it is still appropriate to have a MFF in the weighted capitation formula and in PbR because of the evidence on variations in NHS staff costs by geographical area. Although wages are determined nationally in the NHS, variations in staff costs are represented through, for example, higher staff turnover and vacancy rates. The study found, however, that it was not possible to distinguish between unavoidable and avoidable variations in costs and provide robust data for the staff MFF through the SCA approach. For this reason, and evidence of the relationship between variations in staff costs and the staff MFF derived from the GLM approach (except for medical and dental staff), the SCA study concluded that the GLM approach is the appropriate method for determining the staff MFF.

26. The recommendation that the staff MFF should be based on the GLM approach follows previous practice since the staff MFF has always been based on the GLM method. The GLM approach was most recently reviewed by the Health Economics Research Unit (HERU) in *Review of the Market Forces Factor Following the Introduction of Payment by Results: Exploring the General Labour Market Method* (2006). The basic premise of the GLM approach is that the private sector sets the going rate for a job in a given area. In the NHS, where wages are determined nationally, if these wages in a given area are below the going rate, this leads to higher indirect costs in the form of a poorer quality workforce, recruitment and retention difficulties, increased reliance on bank and agency staff, and lower productivity.

27. Statistical modelling of private sector wages (using 2004 to 2006 Annual Survey of Hours and Earnings (ASHE) data) controls for the influence on earnings of age, gender, industry and occupation, and isolates the independent effect of geographical work area on earnings. These are called Standardised Spatial Wage Differentials (SSWDs) and were estimated for each PCT.

28. Some of the SSWDs differed markedly between neighbouring PCTs. These "cliff edges" are unlikely to represent accurately the true underlying differences in wages, not least near the borders of PCT areas, but instead are likely to reflect to some extent the effect of using a geography of administrative boundaries which are not self-contained labour markets. A smoothing technique was applied to remove artificial cliff edges. The smoothed figure for a given PCT is the weighted average of all PCTs initial SSWDs, with the SSWD of the PCT in question being given the largest weight, and the weights of the other PCTs declining the further the geographical distance from the PCT in question. Smoothing in previous years took into account only the SSWDs of neighbouring PCTs.

29. Previously, NHS providers were assigned the same smoothed MFF as the PCT where they were located (or the weighted average of PCTs' MFFs where the Trust had split sites in more than one PCT area). Under this approach, there are still likely to be cliff edges between neighbouring providers which operate in the same labour market but are located in different PCT areas. A further level of smoothing was therefore introduced, carried out at NHS provider site level, to reduce further the impact of cliff edges between NHS organisations. This similarly used the weighted average of smoothed PCT MFFs, but with the weights being the distance from the NHS providers' actual sites. The weights also declined with distance from the provider.

30. In addition to HERU's refinements, ACRA recommended that the staff MFF is not applied to expenditure on medical and dental staff because their indirect costs do not vary differentially across the country as they do for other NHS staff. Instead, there is a separate index for medical and dental staff based on London weighting.

31. Each PCT's final MFF is a weighted average of the MFFs of the providers from which it commissions for acute activity, calculated using a purchaser provider matrix (PPM), and the PCTs' own MFFs for community programmes and maternity.

32. The primary medical services component of the formula also has separate MFFs for practice staff, buildings and land, and a GP pay MFF which is intended to compensate deprived PCTs which face greater GP recruitment and retention difficulties. The prescribing component does not have an MFF.

33. The emergency ambulance cost adjustment (EACA) within the HCHS component reflects the unavoidable cost variations of delivering emergency ambulance services in different areas.

Combining the formula adjustments

34. A separate index is generated for each adjustment for age, additional need and MFF. Each index is a relative index, comparing the PCT score on the adjustment to a mean value of 1. The weighted population for each PCT is calculated by simultaneously multiplying the PCT's crude population by these indices as follows:

    Weighted Population = Population x Age Index x Additional Need Index x MFF Index

35. The weighted populations produced from this calculation are then scaled back at the same proportionate rate for all PCTs, so that the total weighted population across all PCTs sums to the total crude population for England, a process known as normalising.

36. Normalised weighted populations are calculated separately for the HCHS, prescribing and primary medical services components and combined using national expenditure weights to create a single weighted population for each PCT. Each PCT's monetary target share of the total resources available, before any supplements to the formula are added, is the same as its weighted population as a share of the total England population.

Supplements to the formula

37. There is one supplement to the formula. The ONS SNPPs that form the basis for calculating weighted capitation targets are based on past trends for births, deaths and migration, and do not take into account Government policy on expanding the housing supply in parts of the country. The Growth Area Growth Points adjustment therefore uses dwelling led population projections provided by the Department for Communities and Local Government (DCLG) which forecast the impact on population of additional housing for PCTs in the Growth Areas and Growth Points.

Section 1: Introduction

ELEMENTS OF RESOURCE ALLOCATION

1. The weighted capitation formula is used to determine PCTs' target shares of available revenue resources, to enable them to commission similar levels of healthcare for populations with similar healthcare need, and to help reduce avoidable health inequalities.

2. The following four elements are used to set PCTs' actual allocations:

   (a) weighted capitation targets – set according to the national weighted capitation formula which calculates PCTs' target shares of available resources based on PCT populations adjusted for

       (i) their age distribution

       (ii) additional need over and above that relating to age

       (iii) and unavoidable geographical variations in the cost of providing services (the market forces factor (MFF))

   (b) recurrent baselines – which represent the actual current allocation which PCTs receive. The recurrent baseline is the actual recurrent allocation from the last year of the previous allocation round, plus any recurrent adjustments made subsequently

   (c) distance from target (DFT) – which are the differences between (a) and (b) above. If (a) is greater than (b), a PCT is said to be under target. If (a) is smaller than (b), a PCT is said to be over target

   (d) pace of change policy – which determines the level of increase which all PCTs get to deliver on national and local priorities and the level of extra resources to under target PCTs to move them closer to their weighted capitation targets. PCTs do not receive their target allocation immediately but are moved to it over a number of years. The pace of change policy is decided by Ministers for each allocations round.

3. The remainder of this booklet is solely concerned with the weighted capitation formula. For information about actual allocations, recurrent baselines, distances from targets and pace of change policies refer to the Exposition Books published for each allocations round at www.dh.gov.uk/allocations.

COMPONENTS OF THE FORMULA

4. Recurrent revenue allocations to PCTs cover hospital and community health services (HCHS), prescribing (the drugs bill) and primary medical services. This funding is resource and cash-limited and PCTs have a statutory duty not to exceed these limits.

5. The weighted capitation formula has three components to reflect this funding:

    (a) HCHS

    (b) prescribing

    (c) primary medical services.

6. Each component of the formula is used to produce a weighted population for each PCT. These weighted populations are combined into a single weighted population for each PCT and converted into monetary targets. A single distance from target is calculated for each PCT and a single pace of change policy is applied.

7. The schematic diagram at Appendix 1 illustrates the components of the formula and their need and cost adjustments.

DEVELOPMENTS IN THE WEIGHTED CAPITATION FORMULA

RAWP

8. For the first thirty years of the NHS, resources were distributed largely on the basis of historical patterns of spending. By the early 1970s this was recognised as leading to inequities and inefficiencies. The Resource Allocation Working Party (RAWP) was set up to recommend a resource allocation system which was responsive to the health needs of the population, and to identify and correct inequalities in the existing pattern of distribution.

9. Since RAWP reported in 1976, in *Sharing Resources for Health in England Report of the Resource Allocation Working Party*[3] (RARP 1), there has been a clear objective for resource allocation, "to secure equal opportunity of access to healthcare for people at equal risk".

10. RAWP recommended distributing resources on the basis of the size of population, weighted according to two basic criteria:

    (a) need – adjustments were to be made to reflect perceived differences in the need for healthcare

    (b) cost – unavoidable geographical differences in the cost of providing services.

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3   We have listed the major research papers on resource allocation, known as Resource Allocation Research Papers (RARPs), at Appendix 2. We have also listed some of the more substantive working papers, known as Resource Allocation Working Papers (RAWPs), at Appendix 3. RARPs and RAWPs are available at www.dh.gov.uk/allocations.

11. This underlying principle of weighted capitation, whereby resources are distributed between NHS areas on the basis of the relative needs of their populations, has remained in place from 1977-78 to this day.

12. Under RAWP, need was established by acknowledging the role played by demographic characteristics. The national average hospital bed utilisation rates by age and gender were applied to the population of each area disaggregated by age and gender. RAWP recognised that additional need for health care, over and above age, could not be measured directly and chose Standardised Mortality Ratios (SMRs) as a proxy measure of morbidity.

13. Because costs were recognised as being substantially higher in the London area than in other parts of the country RAWP recommended that an allowance should be made in the formula. Further research was carried out into the differences between areas in the cost of providing healthcare and a market forces factor (MFF) was subsequently introduced in 1980-81 to reflect higher staff costs, over and above London Weighting.

14. RAWP revealed large disparities between the way resources had traditionally been distributed and the way they would have been allocated according to the weighted capitation formula. It was accepted that change would have to take place over time and the four elements of resource allocation policy, described in paragraph 2, were introduced.

15. RAWP was used as the basis for allocations to 14 Regional Health Authorities (RHAs), and modified by RHAs to inform allocations to District Health Authorities (DHAs).

Review of RAWP

16. A review of RAWP was published in 1988 in *Review of the Resource Allocation Working Party Formula* (RARP 5). For the first time, additional need was based on a small area regression analysis of the determinants of variations in hospital utilisation adjusted for the supply of facilities accessible to small areas. A modified version of the recommended formula, using the square root of all-cause SMRs under 75 years as the measure of additional need, was introduced in 1990-91.

17. Resource allocation changed in 1990-91 as a consequence of the reforms introduced by the National Health Service and Community Care Act 1990. HAs were now funded for their resident population as purchasers, whereas previously they were funded for services provided to a catchment population as providers. Targets were set for RHAs on a weighted resident population basis.

1995-96

18. The availability of data from the 1991 Census provided a further opportunity to review the formula. A team from the University of York was contracted to carry out the work. The research, again taking the small area utilisation approach, was reported in 1994 in *A Formula for Distributing NHS Revenues Based on Small Area Use of Hospital Beds* (RARP 7). The most significant change was the replacement of SMR as the sole proxy for additional need with two separate needs indices for acute and psychiatric inpatient services (covering 76% of HCHS) containing various health and socio-economic variables.

1996-97

19. Allocations were made direct to 100 Health Authorities (HAs) from 1996-97 following the abolition of the 14 RHAs and the replacement of DHAs by the new HAs.

20. A rough sleepers adjustment was introduced.

1997-98

21. In April 1995 a national standing Resource Allocation Group (RAG) had been set up with the specific aim of looking at the future of resource allocation within the context of a primary care led NHS. As part of their work programme, new needs indices for community health services were introduced, which meant that 100% of HCHS was now weighted for need. A new staff MFF was also introduced, based on work commissioned from the University of Warwick and published in *Labour Market Forces and NHS Provider Costs Final Report* (RARP 12).

1998-99

22. An emergency ambulance cost adjustment (EACA) was introduced to reflect the unavoidable cost variations of delivering emergency ambulance services in different areas.

1999-00

23. The Advisory Committee on Resource Allocation (ACRA) was established in September 1997 as the successor body to RAG. ACRA advises the Secretary of State for Health on the distribution of resources across primary and secondary care to ensure that these fully reflect local population needs and operate as fairly as possible. ACRA is an independent expert body whose membership includes individuals with a wide range of expertise from within, and outside, the NHS. A Technical Advisory Group (TAG) provides technical support to ACRA.

24. ACRA's work programme for 1999-00 was dominated by *The new NHS* White Paper (1998) which introduced three main changes for resource allocation:

(a) the creation of Primary Care Group (PCGs) as groups of GP practices with responsibility for the healthcare of their populations. Since 1999-00, allocations have been made on the basis of the responsible population, patients registered with GP practices and unregistered patients resident in the area, rather than the resident population

(b) HAs and PCGs were to have unified allocations covering HCHS, General Medical Services Cash Limited (GMSCL)[4] and prescribing. Before 1999-00, GMSCL and prescribing were separate allocations

(c) a national formula to set fair shares for PCGs. HAs were to allocate resources to their PCGs using the same formula (with the exception of the MFF) which had been used to allocate resources to them.

25. Other changes in 1999-00 were:

(a) a revised additional need adjustment in the prescribing component

(b) an English Language Difficulty Adjustment (ELDA) for the extra costs of interpretation, advocacy and translation services.

26. In November 1998 Ministers announced a wide ranging review of the formula suitable for *The new NHS*. A new objective for the new formula was set from 1999: "to contribute to the reduction in avoidable health inequalities". Other than routine data changes, the formula was frozen during the period of the review.

2001-02

27. While the longer term work on the review took place, an interim health inequalities adjustment (HIA) was introduced to tackle health inequalities. The HIA was based on years of life lost (YLL) under 75.

2002-03

28. In 2002-03:

(a) a new General Medical Services Non-Cash Limited (GMSNCL)[5] component was introduced. The NHS Plan had included a commitment to a single resource allocation formula covering all NHS expenditure including GMSNCL. The aim was to ensure that HAs and PCGs received, as far as possible, their fair shares of funding in primary care. GMSNCL remained non-discretionary, but unified allocations took account of GMSNCL expenditure for the first time

(b) the additional need adjustment in the new GMSNCL component replaced the existing adjustment in the GMSCL component

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4   GMSCL covered payments to GPs for practice staff, premises and computer costs.
5   GMSNCL was, until the introduction of the new GP contract in 2004-05, a demand led central budget for the remuneration of GPs.

(c) the staff MFF was revised, increasing the number of pay zones from 78 to 117 and smoothing the cliff edge anomalies between HAs by an approach of averaging the wage rate for each area with its immediate neighbours

(d) the HIV/AIDS special allocations for treatment and prevention were mainstreamed within unified allocation.

2003-04 to 2005-06

29. In December 2002 three year allocations for 2003-04 to 2005-06 were made to 303 PCTs for the first time.

30. The wide ranging review initiated in 1998 had concluded and as a result new need adjustments, which took account of the new objective of contributing to the reduction in health inequalities. were introduced in the HCHS and prescribing components. These were based on research commissioned from a team led by the University of Glasgow, reported in *Allocation of Resources to English Areas (the AREA Report)* (RARP 26). The new formulas used measures of deprivation, such as the Indices of Deprivation 2000 (ID2000), which were capable of being updated more regularly than Census data. For the first time the formulas also took account of unmet need, as well as the met need predicted in the utilisation approach, where certain groups within the population e.g. ethnic minorities and socio-economically deprived groups do not receive healthcare services to the same level to that of others with similar health characteristics. The researchers included two sets of determinants that were felt to reflect more directly health inequalities. They were, firstly, additional morbidity measures developed by analysing data from the Health Survey for England (HSE), which were felt to capture some aspect of illness that was not reflected in the other morbidity measures such as limiting longstanding illness. Secondly, counterintuitive negative coefficients were found on ethnic minority and employment deprivation variables, which were interpreted to represent underutilisation by ethnic minority and other groups. The variables with the counterintuitive signs were included in the preferred model but excluded from the formula for actual allocations, thereby giving areas with these groups an element in their allocations for unmet need. At the same time as introducing the new formula, the interim HIA was added to PCT baselines.

31. The staff MFF was extended in two ways. Firstly, all 117 pay zones were used whereas previously the number of zones had been reduced to 50, 60 or 70 specific zones and a rest of England zone. Secondly, it was applied to medical and dental staff costs.

2006-07 and 2007-08

32. For 2006-07 and 2007-08 allocations:

(a) Office of National Statistics (ONS) subnational population projections (SNPPs) provided the population base. ONS produce population estimates annually and

population projections periodically. The former are the best estimates of population for recent past years since the last Census, while the projections forecast the population from a base year estimate taking into account ageing and assumptions based on past trends about births, deaths and migration. Population projections have generally been preferred to estimates in terms of directing funds towards where the population is expected to be in the allocation year, rather than where they were. The 2003-04 to 2005-06 allocations had been an exception, because only 2001 ONS population estimates from the 2001 Census were available at the time the allocations were made and not 2001 Census based SNPPs

(b) a primary medical services component was introduced into the formula following the devolution of this funding to PCTs as a result of the new GP contract in 2004-05, replacing the GMSCL and GMSNCL components

(c) the MFF was reviewed to support the implementation of Payment by Results (PbR). The main resulting change was an increase in the number of zones in the staff MFF from 117 to 303 to match the geography of PCTs

(d) the rough sleepers adjustment was dropped

(e) a Growth Area adjustment was introduced in support of the Office of the Deputy Prime Minister (ODPM), now Department for Communities and Local Government (DCLG), initiative to increase levels of housing supply in certain parts of the country.

2008-09 to 2010-11

33. Following the 2006-07 and 2007-08 allocations announced in 2005, ACRA began a review embracing the main elements of the formula:

   (a) the population base

   (b) the need adjustments

   (c) the MFF, which has also had a direct impact on Trust incomes since the introduction of Payment by Results.

34. ACRA did not complete this work programme in time to inform 2008-09 allocations. The formula was frozen and the four elements of resource allocation described in paragraph 2 were not applied. Instead, all PCTs received the same uplift on their 2007-08 recurrent allocations.

35. ACRA concluded their review during 2008 and report their recommendations in *Report of the Advisory Committee on Resource Allocation* (December 2008) available at www.dh.gov.uk/allocations.

36. As a result of ACRA's recommendations, 2009-10 and 2010-11 allocations:

(a) for the population base

    (i) use 2008 GP registered lists constrained to 2006 based ONS SNPPs for 2009 and 2010

    (ii) count all prisoners in the populations of PCTs where prisons are located, rather than only those who have served sentences over six months as previously

    (iii) count asylum seekers in PCTs using Home Office data

    (iv) apply the national average needs weighting, rather than host PCT needs weighting to prisoners, armed forces and asylum seekers

    (v) remove temporary GP registrations from the prescribing component

(b) for the need formulas

    (i) introduce new separate indices for acute and maternity in the HCHS component

    (ii) calculate acute age and additional need in a single index rather than separately as at present

    (iii) introduce a new index for the prescribing component

    (iv) introduce HIV/AIDS as a separate index within HCHS and remove it as a separate component

    (v) remove the ELDA

(c) for health inequalities

    (i) introduce a separate formula using disability free life expectancy (DFLE), applied to all allocations except mental health and HIV/AIDS

    (ii) give a 15 per cent weighting to health inequalities

(d) for the MFF

    (i) smooth the staff MFF so that it takes account of distance from all other PCTs not just neighbouring PCTs

    (ii) additionally smooth provider staff MFFs to take into account the distance of provider sites from the centre of each PCT rather than just taking the MFF of the PCT in which they are situated

    (iii) not apply the staff MFF to spend on doctors and reinstate a separate index for doctors based on London weighting

(e) extend the growth area adjustment to include the new growth points.

Section 2: Population

- Population figures are the basis for calculating weighted capitation targets

- GP registrations in the Attribution Data Set are the starting point

- These are reconciled to ONS subnational population projections to produce PCT responsible populations

Introduction

37. Health services are for people and the primary determinant of resource allocation to PCTs must be the size of the populations for which PCTs are responsible. Population is therefore the starting point for the calculation of weighted capitation targets.

38. The population base for PCTs was reviewed before the 2009-10 and 2010-11 allocations by the Prescribing Support Unit (PSU) of the Information Centre for Health and Social Care. Their report, *Review of the population base for PCT revenue allocations post 2007-08* (RARP 29), is available at www.dh.gov.uk/allocations.

39. The definition of a PCT responsible population for resource allocation follows the guidance set out in *Who pays? Establishing the responsible commissioner*[6] which states that in general, the responsible commissioner will be determined on the basis of registration with a GP practice or, where a patient is not registered, their place of residence.

40. The PCT responsible population for resource allocation is therefore:

    (a) the number of people permanently registered with the GP practices that make up each PCT. This means that those patients permanently registered with a GP practice in one PCT area, but who are resident in a neighbouring or other PCT area, remain the responsibility of the PCT with which their GP practice is associated

    (b) the number of residents within the geographical boundaries of each PCT who are not permanently registered with any GP practice and for whom accurate national data are available. This group is restricted also to those for whom the PCT has formally been defined as the responsible commissioner of health services to be funded by PCT revenue allocations. In practice, this group comprises:

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6   Who pays? Establishing the responsible commissioner can be found on the DH website at http://www.dh.gov.uk/en/
    Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4069634.

(i)   all prisoners in PCTs where prisons are located, regardless of whether they have been sentenced or the length of sentence served

(ii) all UK armed forces, foreign armed forces and foreign armed forces dependants

(iii) all asylum seekers, after their initial applications and processing, for whom data are available.

41. The calculation of PCT responsible populations involves a reconciliation between GP registrations and resident populations produced by the ONS. List variation between GP registrations and ONS populations has been recognised for many years. List variation differs between age bands, between males and females and, most crucially, between PCTs. GP registrations are therefore constrained to ONS resident populations, ensuring that PCT responsible populations sum to the ONS resident population for England (after accounting for cross border flows with Wales) and that list variation in different parts of the country does not distort resource allocation. It is not possible to use ONS population projections alone for resource allocation, because they do not allow for patients resident in one PCT area but registered with a GP practice for which a different PCT is responsible.

42. Two population data sources are used for this reconciliation:

(a)   the Attribution Data Set (ADS) of GP registrations

(b)   ONS SNPPs.

Attribution Data Set

43. The ADS is an anonymized, non-disclosive dataset that records the home postcode of patients registered with every GP practice. It is an aggregated extract from the National Health Applications and Infrastructure Services (NHAIS) General Practice Registration systems. Each record in the extract has the structure shown in Table 1. In this illustrative example there are ten male patients aged 19-24 with postcode BN5 9XX registered with practice G11111.

Table 1: Illustrative ADS record

	PCT code	National practice code	Gender	Age band	Number of registrations
Example	5MF	G11111	M	19-24	10

44. Persons recorded with a dummy practice code (for example, persons removed from a practice list) are assigned to PCTs on the basis of their postcode. Registrations with invalid postcodes are redistributed to the overall postcode geography of the practice. Practice affiliations are validated with PCTs.

45. The ADS is used in resource allocation to:

    (a) build populations to any reference geography using patient postcode or GP practice

    (b) calculate weighted averages of socio-economic variables for PCTs from their small area values.

ONS subnational population projections

46. Population projections are considered to provide the best fit in terms of directing funding towards where the population is expected to be in the allocation year. ONS make subnational population projections from a base year estimate (i.e. the latest year for which ONS have figures (termed an estimate) for the actual population), basing their assumptions for future levels of births, deaths and migrations on observed levels, mainly from the past five years. The projections are produced on a consistent basis across all 354 local authority districts (LADs) in England.

47. The 2009-10 and 2010-11 PCT allocations use 2006 based long-term subnational population projections[7] for 2009 to 2010 respectively, published by ONS on 12 June 2008. These are consistent with the 2006 mid-year population estimates published on 22 August 2007 and are constrained at a national level to the 2006 based national population projections published by ONS on 23 October 2007.

Prisoners

48. A number of groups of people who are not registered with GP practices need to be removed from the 2006 based ONS SNPPs before 2008 GP registrations are constrained to them. As PCTs are responsible for these unregistered groups, they then need to be returned to the PCT responsible population after constraining. The first of these groups are prisoners.

49. For the purpose of ONS mid-year population estimates, a person is regarded as usually resident in a prison if they have been sentenced and have served six months or more of their sentence in any prison. But for PCT allocations, all prisoners regardless of length of sentence and including those untried or unsentenced are counted in the population base of PCTs where prisons are located. Data were obtained from the Research Development and Statistics Directorate in the Ministry of Justice (MoJ) for the prison population in each PCT at 30 June 2008 and assigned to PCTs on the basis of the prison postcode.

50. Prisoners are included in the HCHS component of the formula but excluded from the primary care components of the formula – prescribing and primary medical services – because the budget for prison primary care remains centrally funded.

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7   ONS have published a methodology guide to their 2006 based subnational population projections for England at http://www.statistics.gov.uk/downloads/theme_population/SNPP-2006/2006_Methodology_Guide.pdf.

51. When adjusting for need (Section 3), the national average needs weight is applied to prison populations, adjusted for age, rather than the PCT specific needs weight.

Armed forces

52. Armed forces are also added to the constrained GP registrations to give PCT responsible populations. They include:

    (a) UK armed forces in the ONS 2006 subnational population estimates

    (b) foreign (mainly United States (US)) armed forces and foreign armed forces dependants provided by ONS.

53. The data are provided by 354 LADs and assigned to PCTs using a matrix which estimates the proportion of each LAD's general population in each PCT. Where LADs and PCTs are not geographically coterminous, and where there were significant numbers of armed forces in an LAD, the PCTs confirmed that the distributions in the matrix were also appropriate for their armed forces.

54. Armed forces are included in the HCHS component of the formula but excluded from the prescribing and primary medical services components. This is because the Ministry of Defence (MoD) is responsible for the primary care of UK armed forces through the Defence Medical Services (DMS), and the US have their own arrangements for the primary care of their armed forces and dependants.

55. When adjusting for need, the national average needs weight is applied to armed forces populations, adjusted for age, rather than the PCT specific needs weight.

Asylum seekers

56. Asylum seekers are counted using data from Home Office Asylum Statistics: 4th Quarter 2007 available at http://www.homeoffice.gov.uk/rds/immigration1.html for the following groups:

    (a) in accommodation

    (b) receiving subsistence only support

    (c) receiving Section 4[8] support

    (d) persons recorded as being detained in removal centres under Immigration Act powers (excluding Dover, Haslar and Lindholme, which are counted in the prison populations).

57. The data are assigned from LAD to PCT using a matrix and included in all components of the formula.

8   Support under Section 4 of the Immigration and Asylum Act 1999 is generally provided to individuals whose asylum application has been finally determined as refused, but who are destitute and temporarily prevented from leaving the United Kingdom

58. When adjusting for need, the national average needs weight is applied to asylum seekers, adjusted for age, rather than the PCT specific needs weight.

Calculating PCT responsible populations

59. The steps taken to calculate PCT responsible populations are as follows:

    (a) construct the ADS from April 2008 extracts of the 87 NHAIS systems that group registered populations by gender, 18 5-year age bands (0-4, 5-9, 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85+) patient postcode and GP practice

    (b) calculate the resident population in 376 LADs (354 in England and 22 in Wales) using the home postcode of registrations in the ADS

    (c) create comparable ONS 2006 based SNPPs for 2009 and 2010 by removing the following unregistered groups using ONS 2006 mid-year estimates (MYEs):

        (i) prisoners

        (ii) UK armed forces

        (iii) foreign armed forces

        (iv) foreign armed forces dependants

        (v) asylum seekers

    (d) compare the ADS constructed LAD population with the adjusted ONS 2006 based SNPPs to calculate list variation factors by age and gender for each LAD

    (e) constrain ADS registrations to ONS 2006 based SNPPs by dividing by the relevant list variation factors

    (f) create PCT registered populations by aggregating the constrained GP practice lists which form the PCT

    (g) add the following groups of unregistered populations to create PCT responsible populations (which in the case of prisoners and asylum seekers have different counts to the populations removed from the ONS 2006 based SNPPs):

        (i) prisoners

        (ii) UK armed forces

        (iii) foreign armed forces

        (iv) foreign armed forces dependants

        (v) asylum seekers in accommodation

(vi) asylum seekers receiving subsistence only support

(vii) asylum seekers receiving Section 4 support

(viii) persons detained in removal centres.

60. These steps are schematically represented in Figure 1.

Figure 1: Calculating PCT responsible populations
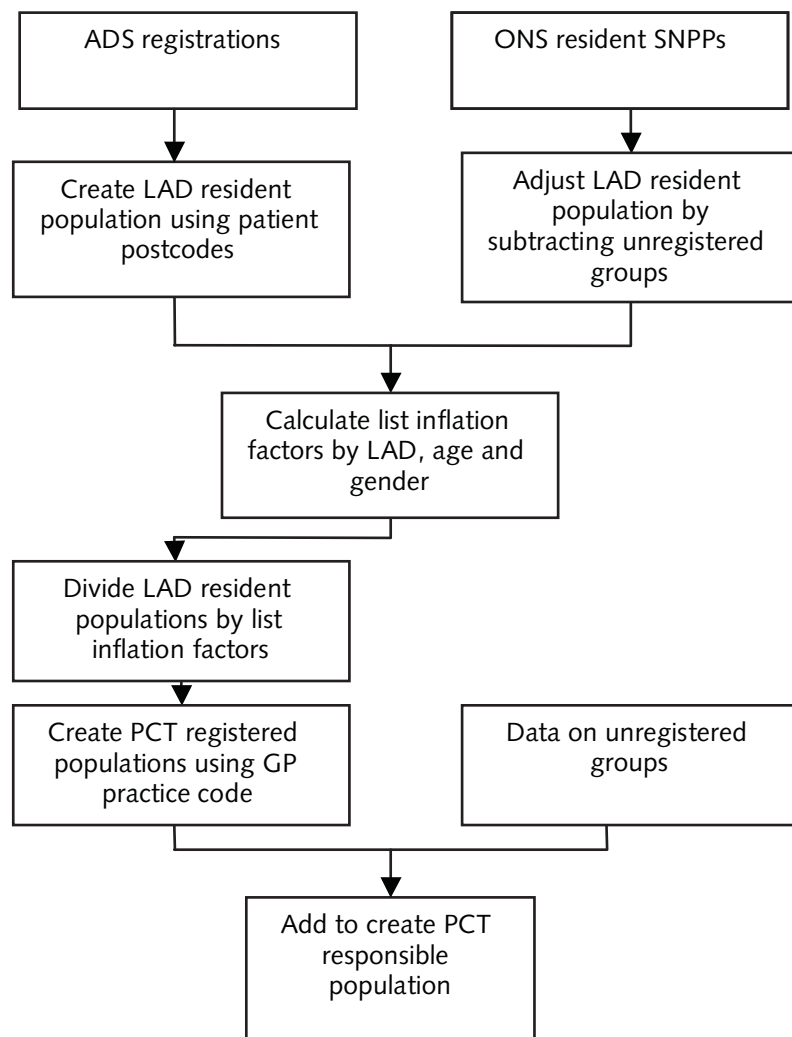
Section 3:
Hospital and Community Health Service Component

The HCHS component has adjustments for:

- need for acute, maternity, mental health, HIV/AIDS treatment and care and HIV prevention services
- health inequalities
- variations in the unavoidable cost of providing healthcare (market forces factor and emergency ambulance cost adjustment).

POPULATION

61. The PCT responsible population described in Section 2, before adjustments for need and cost are made, is known as the crude population.

NEED

Introduction

62. Population is the starting point for the calculation of weighted capitation targets but the make-up of the population is also critical. People do not have identical needs for health care. A key difference is that need varies according to gender and age, and in particular, the very young and the elderly, whose populations are not evenly distributed throughout the country, tend to make more use of health services than the rest of the population. The weighted capitation formula therefore takes account of the age structure of local populations.

63. Even when differences due to age and gender are accounted for, populations of the same age and gender distribution display different levels of need. An additional need adjustment to reflect the relative need for health care over and above that accounted for by age is necessary.

64. Previous formulas have progressively developed a method of measuring need for health care in different areas which is referred to as the utilisation approach applied to small areas. This attempts to establish a target equitable share of resources to areas by

    (a) quantifying the separate effects of various population characteristics on the utilisation of health care services, through the modelling of utilisation across small areas with different population characteristics

(b) removing the effects on utilisation of the differential availability of health care facilities between small areas, as these reflect supply rather than need

(c) producing a measure of relative need by applying the quantified effects of population characteristics to the actual population characteristics of each area.

65. The approach is illustrated in Figure 2.

Figure 2: Utilisation approach
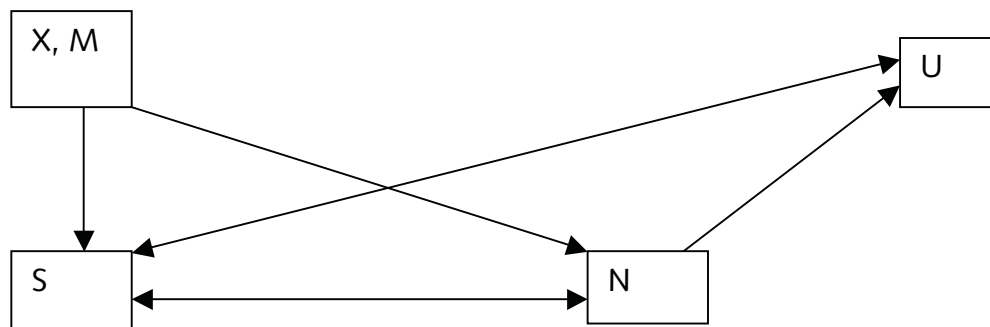
X: socio-economic characteristics
M: measures of health
S: supply characteristics
N: need (unobserved)
U: utilisation

Source: AREA Report (RARP 26), page 50

66. Underpinning the utilisation approach is the idea that the provision of health care in different areas contains information on relative needs, and that while needs are not observed directly they may be derived from utilisation data using appropriate techniques. The utilisation of services U is determined by needs N and supply factors S. Needs cannot be observed directly but are assumed to be an aggregate of decisions made by health care professionals best placed to assess relative needs subject to resource constraints and will depend on socio-economic factors X and morbidity M. Hence, by examining the relationship between utilisation and socio-economic status and morbidity after sterilising the effects of supply, the X and M variables are identified that determine needs and the strength of their effect on needs for health care estimated. If the levels of these needs variables in different areas are known it is then possible to use the results from the model to estimate needs in each area and to allocate resources accordingly.

67. Within the utilisation approach, previous formulas have used a two stage framework that accounts separately for age related and additional needs. At the first stage, age related needs are calculated by estimating average levels of use for different age groups. The estimates are then used to adjust crude population counts to give target allocations that reflect differences in the age structure of populations. At the second stage, additional needs (i.e., needs over and above those pertaining to age) are

estimated from a regression model of cost-weighted activity against additional needs indicators and supply variables. The coefficients on the additional needs indicators are used to adjust crude population counts to compute indicative target allocations related to additional needs.

68. As part of the most recent review of the weighted capitation formula, a team led by Brunel University were asked to review the need formulas for HCHS and prescribing. Their report, *Combining Age Related and Additional Needs (CARAN) Report* (RARP 30), is available at www.dh.gov.uk/allocations. The CARAN Report used as the starting point for its analysis the two stage utilisation framework applied at the small area level as described above. It also considered other approaches.

69. Within the HCHS component, need is modelled separately for five services:

    (a) acute

    (b) maternity

    (c) mental health

    (d) HIV/AIDS treatment and care

    (e) HIV prevention.

70. CARAN did not review the HIV/AIDS treatment and care or HIV prevention models.

Acute

71. The preferred acute model from the CARAN Report uses an alternative to the two stage approach based on a one stage approach. The two stage approach assumes a multiplicative relationship between age related and additional needs. Therefore, the effect of the additional needs adjustment is proportional, which means that the absolute effect of, for example, deprivation on needs will be higher in areas with higher age related needs, and vice versa. An additive one stage approach assumes that the absolute effects of the additional need variables are constant across all age groups. A stratified one stage approach is more flexible than the two stage approach because it allows the effects of the additional need variables to depend on age but does not impose the restriction that these increase with age in proportion to the age-cost curve.

72. CARAN recommended a stratified one stage acute model which allows the relationship between age and additional need to vary between 18 different age bands (0-4, 5-9, 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85+).

73. The dependent variable in the model is mean cost weighted activity per head in every age group in every middle layer super output area (MSOA), of which there are 6,781 in England. MSOAs have a minimum population of 5,000 and a mean population of 7,200.

74. The activity data were taken from Hospital Episode Statistics (HES) returns for 2004-05 and 2005-06. Using two years of data resulted in a more stable dataset than using data for a single year, which is important because some of the age-specific models are based on relatively small number of episodes in some MSOAs.

75. Historically, the activity data from HES used in previous formulas have comprised hospital admitted patients (inpatients and day cases) only. Newly released data from HES on outpatient activity allowed CARAN to include outpatient activity in the model for the first time in a review of the formula. CARAN presented evidence that cost weighted outpatient activity is not proportional to admitted patient activity at the same rate in every area. The addition of outpatient activity allows for a more appropriate measure of need.

76. To cost weight the 2004-05 and 2005-06 inpatient and outpatient activity data, CARAN used the 2004-05 National Reference Costs underpinning the 2006-07 National Tariffs. Applying the same unit costs to two years activity ensured that any difference between the years is not a result of changes in costing policy but due to changes in the geographical distribution of activity only. CARAN applied some features of the 2006-07 Tariff, by including specialist top-ups and adjusting for long lengths of stay using the appropriate trim points and excess bed-day adjustments.

77. The independent variables in the model were selected from a wide range of supply factors that may be expected to influence utilisation (for example, distance from location of treatment or number of GPs in a practice) and need indicators assembled from several sources including births and deaths from ONS, administrative datasets and the Indices of Deprivation 2004 (ID2004). The variables were selected on the basis of statistical criteria, informed judgement and face validity.

78. For ease of presentation, the needs indicators are transformed into z-scores (i.e. the population mean of each variable is subtracted from the value for every MSOA and the result divided by the standard deviation of the variable). The PCT values are the weighted averages of the values for the MSOAs in each PCT area.

79. The full acute model, which has a total of 7 supply variables and 14 need indicators across the 18 age groups, is shown in Table 1. Only the needs variables coefficients are included in the formula to determine resource allocation. The supply variables are sterilised (removed), but nevertheless remain in the underlying model as their omission would otherwise lead to inaccurate estimates of the needs variables coefficients that are used to determine resource allocation.

80. The acute weighted population is calculated as follows:

   (a) within each age band, the relevant coefficients are applied to the transformed PCT values of each need indicator. These scores are aggregated with the constant term to produce an average cost per head in each age band for each PCT. The following is an example for the 0-4 years age band:

   317.6 +
   202.5 death rates +
   13.7 income deprivation affecting children +
   9.5 standardised proportion aged 16-74 with no qualifications +
   5.4 proportion of births that are low birthweight

   (b) the resulting average costs per person in each age band are multiplied by the population in each age band for each PCT to derive the total cost in each band for each PCT

   (c) the total costs are summed across all age bands to give a total cost for each PCT. These total costs are normalised to the total population to derive an acute weighted population.

Table 2: One stage acute model

	0-4 years	5-9 years	10-14 years	15-19 years	20-24 years	25-29 years	30-34 years	35-39 years	40-44 years
Constant	317.6	401.5	378.9	216.0	536.0	328.5	378.3	413.8	476.9
Supply									
Mean waiting time			-0.2	-0.1	-0.2	-0.2	-0.1	-0.2	-0.3
Access to admitted care providers	9.6	9.8	10.6					7.6	13.8
Distance to outpatient providers		-0.6	-0.3				-0.5	-0.6	-0.7
Distance to admitted patient providers	-0.4								
Number of GPs					11.9				5.5
Accessibility score for acute provider capacity									
Accessibility score for outpatient capacity									
Needs									
Age-specific death rate	202.5	541.5	494.5	465.7	883.1	209.5	316.5	344.9	418.0
Standardised no qualifications	9.5	11.9	6.2			23.6	21.5		22.4
Young people not staying in education				13.7	20.6			7.1	
Standardised limiting long term illness				12.1	14.5			23.9	27.6
Pension credit claimants									
Low birthweight births	5.4								
ID2004: income deprivation affecting children	13.7	10.4							
Disability living allowance claimants under 16			13.0						
New deal for Young People claimants						8.5	6.5		
Disability living allowance claimants						16.3	15.9		
Incapacity Benefit/ Severe Disability Allowance claimants								24.5	15.7
Disability living allowance claimants over 60									

Table 2 (continued)

	45-49 years	50-54 years	55-59 years	60-64 years	65-69 years	70-74 years	75-79 years	80-84 years	85+ years
Constant	492.4	554.0	658.0	818.4	985.2	1,211.2	1,423.9	1,616.5	2,705.0
Supply									
Mean waiting time	-0.6	-0.6	-0.8	-0.9					
Access to admitted care providers	13.4	15.0	22.1	25.7	18.8			66.1	13.6
Distance to outpatient providers	-0.7	-1.0	-0.7	-1.2	-1.7	-1.5		-2.3	
Distance to admitted patient providers									
Number of GPs						10.0			
Accessibility score for acute provider capacity						0.0	0.0		
Accessibility score for outpatient capacity									159.6
Needs									
Age-specific death rate	292.2	285.6	294.1	173.5	211.9	180.2	148.8	117.5	21.8
Standardised no qualifications	27.4	31.0	23.9	20.0			38.2	28.4	
Young people not staying in education									
Standardised limiting long term illness	32.3	32.8	42.3	33.5					
Pension credit claimants	18.7	25.1	33.3	48.1	65.5	57.5	44.5	33.3	124.1
Low birthweight births									
ID2004: income deprivation affecting children									
Disability living allowance claimants under 16									
New deal for Young People claimants									
Disability living allowance claimants									
Incapacity Benefit/ Severe Disability Allowance claimants									
Disability living allowance claimants over 60					36.3	62.1			258.2

Maternity

81. CARAN developed a separate model for hospital maternity activity. The previous formula had a single model for acute and maternity combined. Separating maternity from the acute model allows the need indicators for both to be different and thus more accurate.

82. The model is based on a cost per birth approach. This approach was preferred over the two stage approach because it is unnecessary to model the number of births in an area when reliable sources of birth data are available. ONS birth registrations were preferred to HES data for the number of births.

83. The mean costs per birth in every MSOA were regressed against supply variables and needs indicators that were selected using the same procedures used for the acute model and transformed into z-scores.

84. The full maternity model is shown in Table 3. However, only the needs variables are included in the formula to determine resource allocation. The supply variable is sterilised but nevertheless remains in the underlying model.

Table 3: Maternity model

Variable	Coeffient
Constant	2308.8
Supply variable	
Capacity at maternity providers	1605.4
Needs variables	
Low birth weight births	24.7
Mean house price	-96.1

85. The maternity weighted population for each PCT is calculated as follows:

(a) the relevant coefficients are applied to the transformed PCT scores of each need indicator and aggregated with the constant term to produce an average cost per birth in each PCT, as follows:

2308.8 +
24.7 proportion of low birth weight births -
96.06 mean house price

(b) the resulting average costs per birth are multiplied by the number of ONS registered births to derive the total cost for each PCT

(c) the total costs for each PCT are then normalised to the total crude population to derive a maternity weighted population for each PCT

Mental health

86. The mental health model was developed by a team led by the University of Glasgow. Their report, *Allocation of Resources to English Areas (AREA) Report* (RARP 26), is available at www.dh.gov.uk/allocations. The CARAN team were unable to recommend an improvement on this model.

87. The model has a two stage approach, with separate adjustments for age and additional need.

88. The age weights were constructed using mental health services activity from 2000-01 HES and the national average costs per bed-day from the National Reference Cost Schedule 2000 shown in Table 4.

Table 4: Cost per bed-day for mental health services

Mental health services	Cost per day
Children	£321
Adult	£173
Elderly	£150

89. The age weights were calculated as the average expenditure per person in each age band (i.e. number of bed days times cost per day), divided by the average expenditure per person over all age bands, to produce a relative cost per head in each age band. These weights are shown in Table 5.

Table 5: Mental health services age weights

Age band years	Relative age weight
0-4	0.0032
5-9	0.0281
10-14	0.1655
15-19	0.5952
20-24	1.0908
25-29	1.1674
30-34	1.1448
35-39	1.1182
40-44	1.0419
45-49	0.9951
50-54	0.8867
55-59	0.9258
60-64	1.0043
65-69	1.2047
70-74	1.6138
75-79	2.4244
80-84	3.1792
85+	3.2985

90. These age weights are multiplied by the population in each age band in each PCT and the sum of these is normalised to the total crude population. The mental health age weighted population is divided by the crude population to calculate a mental health age index for each PCT.

91. The additional need adjustment is based on a model of utilisation of healthcare and comprises a number of socio-economic and health related variables. There are two types of variable in the model:

(a) standard variables derived from small area statistical modelling of utilisation at ward level

(b) an additional morbidity variable designed to capture some of the effect of unmet need where certain groups, for example ethnic minorities and those on low incomes, do not receive healthcare services to the same level to that of others with similar health characteristics.

92. Table 6 show the various socio-economic and health status variables with their statistically estimated coefficients that are used in the mental health services model. This is the full model. However, only the standard needs variables and additional morbidity variable are included in the formula to determine resource allocation. The supply variables are sterilised but remain in the underlying model. The other variables with counterintuitive negative coefficients are also sterilised but remain in the underlying model because they were felt to represent underutilisation by some groups in the population.

Table 6: Mental health need index variables

Variable	Coefficient
Constant	0.385
Supply variables	
Distance to mental health hospital	-0.072
Other variables	
Proportion of ethnic minorities	-0.034
ID2000 housing domain	-0.046
Standard needs variables	
Comparative mortality factor (CMF) under 65 years	0.358
Proportion aged 60 and over claiming income support (IS)	0.338
ID2000 housing domain scores	0.034
Additional morbidity variable	
Psycho-social morbidity index	0.636

93. The psycho-social morbidity index is one of the additional explanatory variables in the utilisation models developed by AREA to reflect the prevalence of certain diseases in areas. Similar indices for other longstanding illnesses (circulatory, nervous system and musculoskeletal) were used in the acute and maternity and prescribing utilisation models developed by AREA which have now been replaced by the CARAN models. Further detail on their derivation is contained in the fifth edition of this booklet which is available at www.dh.gov.uk/allocations.

94. The mental health need factor is calculated using an additive process for combining variable scores. The values for each of the needs variables are first transformed by dividing by the population weighted mean and subtracting one. The relevant coefficients are then applied to the transformed score at PCT level and these scores aggregated with the constant term to produce a single need index. The derivation of the factor is as follows:

0.385 +
0.358 Comparative mortality factor under 65 years +
0.338 Proportion aged 60 and over claiming income support +
0.034 housing domain +
0.636 psycho-social morbidity index

95. These factors for each PCT are multiplied by the crude population for each PCT and normalised to the total crude population. The mental health additional need weighted population is divided by the crude population to calculate a mental health additional need index for each PCT.

96. A mental health age index and additional need index are simultaneously applied to the crude population of each PCT and the results normalised to the total crude population to derive the mental health weighted population of each PCT.

HIV/AIDS treatment and care

97. An epidemiological approach is possible using the Survey of Prevalent HIV Infections that are Diagnosed (SOPHID) conducted annually by the Health Protection Agency (HPA). This gives the number of HIV infected persons by PCT of residence seen for HIV related care at NHS sites. 2007 SOPHID data are normalised to the total PCT crude population to give the HIV/AIDS treatment and care weighted population for each PCT.

HIV prevention

98. An HIV prevention weighted population is calculated by normalising to the total PCT crude population:

   (a) the 15-44 year old population and weighting this by 60%

   (b) the 2007 SOPHID data and weighting this by 40%.

99. These weightings were informed by the *UK Health Departments' HIV and AIDS Health Promotion: An Evolving Strategy* (1995), which concluded that although there remained a need for HIV prevention work for the general population, some emphasis should be placed on developing work directed at vulnerable groups.

Other HCHS services

100. Neither the CARAN Report nor AREA Report were able to produce well specified models for community health services and people with learning disabilities due to data limitations.

Health inequalities

101. The two objectives of resource allocation are to provide equal access to healthcare for people at equal need and to contribute to the reduction in avoidable health inequalities.

102. The need models described above, which are generally based on the small area utilisation approach, meet the first objective of equal access for equal need. ACRA considered them less successful at meeting the second objective of reducing health inequalities. There are two key reasons for this:

    (a) the utilisation approach cannot capture unmet need. If unmet need is more common amongst those with the poorest health status, this is a fundamental problem

    (b) current patterns of utilisation, especially of hospital based services, are largely driven by the NHS's response to the current patterns of health status. They are not sufficiently focussed on reducing the current levels of health inequality.

103. There have been several attempts to allocate resources more directly in line with the objective of reducing avoidable health inequalities since Ministers introduced it in 1999. These are covered briefly in Section 1.

104. For 2009-10 and 2010-11 allocations, a separate health inequalities formula has been introduced. This uses disability free life expectancy (DFLE) as its measure, combining 2005 life expectancy data with 2001 limiting long-term illness (LLTI) data, and so capturing morbidity as well as mortality. It is applied by comparing every PCT's DFLE to a benchmark figure of 70 years. For example, a PCT with a DFLE of 60 years is given an index of 10. This index is applied to each PCT's crude population and the results normalised to the total crude population to give a health inequalities weighted population for each PCT.

Weighting the need and health inequalities formulas

105. The breakdown of current gross expenditure on HCHS in 2006-07 shown in Table 7 is used to inform the weightings for the different needs models.

Table 7: HCHS gross current expenditure 2006-07

	£m	%
General and acute	26,978	57.6%
Mental illness	6,579	14.0%
Maternity	1,617	3.5%
Accident and emergency	1,697	3.6%
Learning difficulties	2,049	4.4%
Community health services	5,584	11.9%
Other contractual	1,859	4.0%
HIV/AIDS	490	1.0%
Total HCHS	**46,853**	**100.0%**

Sources: 2006-07 PCT summarisation form ASF08
2006-07 programme budgeting data

106. The needs models are applied to this expenditure as follows:

    (a) the acute model is applied to general and acute, and community health services expenditure

    (b) the maternity, mental health and HIV/AIDS models are applied to their respective expenditure

    (c) the acute model and mental health model are applied to remaining expenditure – accident and emergency, learning difficulties and other contractual – in proportion to their relative share of expenditure.

107. ACRA considered a number of approaches for determining the weight for the health inequalities formula, including the proportions of a range of categories of health service expenditure that normatively should be spent on reducing health inequalities, the effectiveness of health services expenditure in reducing health inequalities, and lessons from the Spearhead areas. ACRA concluded it is not currently possible on a technical basis to determine the weighting.

108. For 2009-10 and 2010-11 PCT allocations, Ministers decided to apply the health inequalities to 15% of allocations, excluding mental health (which already includes an adjustment for unmet need) and HIV/AIDS.

109. The 80% weighting for HIV/AIDS treatment and care and 20% weighting for HIV prevention, relative to total expenditure on HIV/AIDS, reflect the separate funding that was made available for these services before they were mainstreamed within general allocations in 2002-03.

110. Table 8 shows the resulting weights.

Table 8: HCHS need and health inequalities weights

	%
Acute	67.5%
Maternity	2.9%
Mental health	16.1%
HIV/AIDS treatment and care	0.8%
HIV prevention	0.2%
Health inequalities	12.4%
Total HCHS	100.0%

COST

Market forces factor

Introduction

111. The MFF is used in both resource allocation and PbR to compensate for unavoidable differences faced by NHS organisations in the costs of commissioning or providing healthcare in different parts of the country.

112. The MFF consists of four separate elements for:

   (a)   staff

   (b)   medical and dental (M&D) London weighting

   (c)   buildings

   (d)   land.

113. Other costs (equipment, consumables, drugs etc) are assumed not to vary across the country and are given a common index of 1.00.

Staff MFF

114. Economic theory underpins the staff MFF. The theory predicts that it is more expensive to employ staff in some areas, notably London, than others, due to market forces. Competitive wages will rise or fall according to the cost of living, plus the relative amenity of different geographical areas and are given a common index of 1.00.

115. In the NHS, where wages are determined by national structures, Trusts in areas with low cost of living and low market wages (low MFF areas) will be paying above the

going rate for staff, in contrast to Trusts in high cost and high wage areas (high MFF areas) which will be paying staff below the market rate.

116. The theory predicts that this asymmetry between NHS and general labour markets will lead low MFF areas to attract more staff of better quality, who will stay longer, reflecting better recruitment and retention conditions. The outcome is expected to be higher productivity, lower turnover and fewer vacancies. Conversely, the theory predicts that high MFF areas will attract a poorer quality workforce and experience greater difficulty in recruitment and retention, reflected in higher turnover rates, increased reliance on bank and agency staff and lower productivity. Economic theory also suggests that the NHS wage in high MFF areas will have a tendency to drift upwards (as employers strive to recruit) and be measurably higher for the same job than wages in low MFF areas.

117. Two methods of estimating geographical staff cost variations are available:

(a) the Specific Cost Approach (SCA) analyses actual variations in costs between NHS organisations

(b) the General Labour Market (GLM) approach analyses variations in costs in the private sector.

Specific Cost Approach

118. The SCA approach was most recently reviewed by a team led by Crystal Blue Consulting Ltd. Their report, *Review of Specific Cost Approach to Staff Market Forces Factor* (RARP 31), is available at www.dh.gov.uk/allocations. This study represents the most detailed attempt to date to investigate the SCA in relation to an area cost adjustment in the NHS or government services generally.

119. The study was divided into a micro study of Trusts with different MFF rankings, and a macro study using national datasets of NHS costs. It made three main conclusions:

(a) spatial variation in staff costs reflected the patterning of the existing staff MFF. With the exception of medical staff, the researchers therefore found strong evidence to support the use of a GLM approach as a proxy for NHS unavoidable costs

(b) it was virtually impossible to separate avoidable and unavoidable cost differentials, partly due to cause and effect (the costs under investigation were at least part the product of resource allocation already shaped by the staff MFF)

(c) the feasibility of implementing the SCA as an alternative to the current GLM method was rejected on the grounds of cost and practicality (the absence of a suitable nationally available dataset), the lack of a unified methodology, and conceptual problems with cause and effect. The GLM approach was supported

by the evidence from this study across all staff groups with the exception of medical staff.

General labour market approach

120. The staff MFF has always been based on the GLM approach and was most recently reviewed by a team led by the Health Economics Research Unit (HERU) of the University of Aberdeen. Their report, *Review of the Market Forces Factor Following the Introduction of Payment by Results (2005): Exploring the General Labour Market Method* (RARP 32) is available at www.dh.gov.uk/allocations.

121. The GLM approach is based on variation in wages in the private sector and uses a multiple regression analysis of earnings data. Economists have been studying the pattern of wage differentials for many years. The work shows that average wages exhibit substantial variation between areas because of differences in the composition and skills of the workforce in different areas. In order to isolate the impact of location alone, by controlling for other factors, the regression equation has the following general form:

$$\text{Log (earnings)} = a + \sum b_i \text{ (age dummies)} + \sum c_j \text{ (industry dummies)}$$

$$+ \sum d_k \text{ (occupational dummies)} + e \text{ (sex dummy)} + \sum g_f \text{ (area dummies)}$$

122. The dependent variable is hourly wages, calculated by dividing the gross weekly pay in the reference week by the sum of basic and overtime hours worked during the reference week. The sample includes employees aged 16 to 70 whose pay had not been affected by absence during the survey reference week.

123. The explanatory variables are age, gender, industry, occupation and geographical work area. These explanatory factors have been singled out in economic research as systematic influences on earnings, and after controlling or standardising for the influence of age, gender, industry and occupation, it is possible to isolate the independent effect of work area on earnings. These are known as Standardised Spatial Wage Differentials (SSWDs).

124. Previous staff MFFs were estimated from SSWDs calculated using data from the New Earnings Survey (NES). In 2004 the Annual Survey of Hours and Earnings (ASHE) superseded the NES. The updated SSWDs were calculated using 2004 to 2006 ASHE data with the 152 PCTs as the relevant geography. Welsh and Scottish labour market data were included in the estimates of the SSWDs for England and in smoothing options. This increases the robustness of the estimates of SSWDs and the validity of smoothing (see later discussion).

125. HERU introduced a number of refinements to their calculation of SSWDs:

(a) the data for the three years are pooled and run as a whole rather than running the models separately for each year and averaging the results as in the previous

method. This results in each observation being given equal weight in the sample. In the previous method, the results for each year were given equal weight, but as the sample sizes were not identical in each of the three years, each observation did not have the same weight. Pooling also creates a larger sample and reduces variation between updates

(b)   part time workers are included as they reflect a significant part of the general labour market and NHS workforce

(c)   City of London workers are included for the first time, because they have an obvious influence on the London labour market and no other groups of workers are omitted. Their effect is smoothed across other London PCTs

(d)   a job responsibility adjustment is included to take account of the impact of the size of firms and of managerial role on job responsibility. There will be greater managerial responsibility in areas with higher proportions of large firms, such as metropolitan areas. For example, a banker in cental London is likely to have a different role than a banker in a different part of the country. The adjustment acknowledges the relationship between higher responsibility and higher wages. The job responsibility adjustment is at Government Office Region level rather than PCT level due to problems with the number of data observations at PCT level.

Smoothing

126. A major issue with the MFF methodology is the cliff edge problem. This is when neighbouring PCTs receive markedly different SSWDs because of arbitrarily drawn geographical boundaries. These discontinuities may lead to inequitable MFFs, particularly for providers in close proximity and facing similar local labour market pressures but in different PCTs. Smoothing techniques soften cliff edges to produce a more continuous profile of SSWDs across PCTs.

127. The HERU team recommended that smoothing should take into account the MFFs of all PCTs rather than just the neighbouring ones as in previous staff MFFs, to recognise the fact that NHS organisations in one PCT might draw their labour force from a variety of PCT areas. Smoothing uses the attributes of the geographical areas surrounding the base PCT to adjust its SSWD. The weights of the SSWDs of the surrounding areas fall the further the distance from the base PCT using an exponential distance decay function which has the following form:

$$\exp(-cd)$$

where d is the distance from each geographical centroid and c, which has a value of 0.01, is the constant that controls the influence that distance has on the weights. Figure 3 illustrates exponential smoothing.

Figure 3: Exponential smoothing
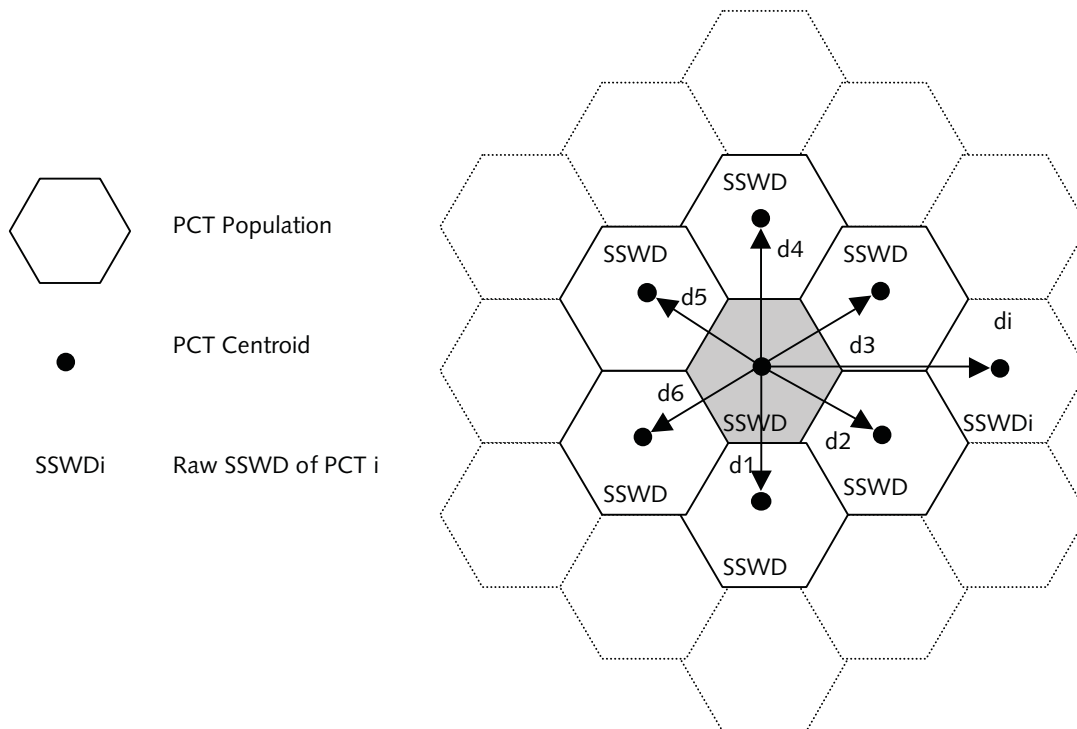
Notation for the other 11 hexagons in addition to i has been omitted for clarity of presentation.

128. Smoothing brings each PCTs' MFF more in line with those of its neighbours. It also increases the sample size, reduces the confidence interval around the estimate and reduces instability. Exponential smoothing gives proportionately more emphasis to those areas in closer proximity than those further away. This is what would be expected if labour markets could be accurately observed.

Interpolation

129. Under PbR the MFF is paid to NHS Trusts in respect of the activity they carry out. The MFF therefore has a direct impact on Trust income. The smoothed SSWDs for PCTs described above still result in cliff edges between Trusts. There is also likely to be spatial variation within the geographical areas that have been used to construct the SSWDs. Trusts are not located across a whole area but at a point within the area. Two Trusts operating near the border of neighbouring PCTs might have different MFFs but operate in the same labour market. The HERU team introduced a further refinement to smoothing called interpolation.

130. Interpolation is a technique that uses two or more values to create an intermediate value. It involves a second stage smoothing carried out at Trust level, after smoothing at PCT level, to reduce further the impact of cliff edges. It works the same way as smoothing in that the MFF of a Trust is the distance weighted average of the surrounding PCTs' MFFs. Figure 4 illustrates interpolation.

Figure 4: Interpolation
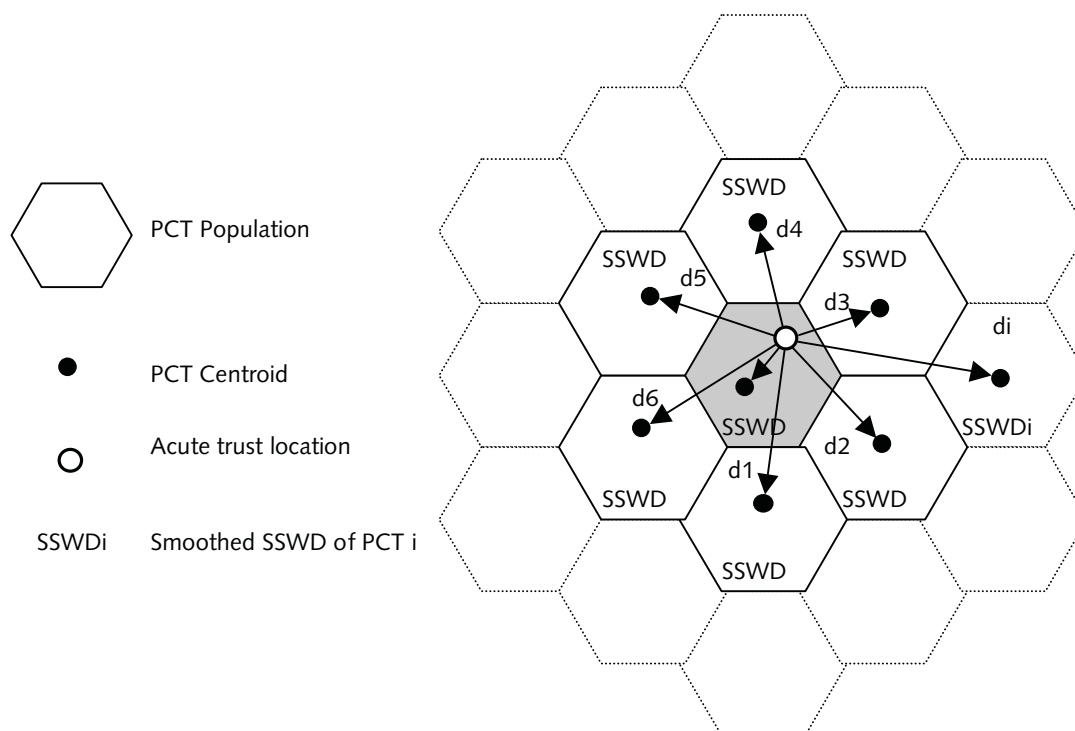
Notation for the other 11 hexagons in addition to i has been omitted for clarity of presentation.

131. Interpolation is carried out at Trust site level. Where a Trust has more than one site, the different indices for each site are weighted together in proportion to activity on each site. The most consistent indication of activity by site held centrally is the 2006-07 Estates Return Information Collection (ERIC) return on numbers of beds.

Medical and dental London weighting

132. The staff MFF is not applied to expenditure on medical and dental staff. Both the *Review of the Market Forces Factor Following the Introduction of Payment by Results (2005): Exploring the General Labour Market Method* and the *Review of Specific Cost Approach to Staff Market Forces Factor* found strong evidence that the GLM is inappropriate for medical and dental staff, because their indirect costs do not vary differentially across the country as they do for other NHS staff. Instead there is a separate index based on the direct, higher costs of employing medical and dental staff in London, i.e. on the London weighting. It is calculated as the ratio of the average pay bill for hospital doctors in 2005-06 including London weighting to the average pay bill excluding London weighting, applied to Trusts in London.

Building MFF

133. The buildings index uses location factors calculated by the Building Cost Information Service (BCIS) from an analysis of tender prices for public and private contracts at LAD level. BCIS provided a set of average location factors for the period between January 2005 and March 2007 for 152 PCTs. They were indexed by dividing by their population weighted mean.

134. Trusts were assigned values depending on the PCT in which they are located, with account taken of multi-site Trusts in the same way as for the staff MFF.

Land MFF

135. A land index is calculated for each NHS Trust and PCT, using data from the Valuation Office Agency's (VOA) valuation of the NHS estate in 2004.

136. There are two technical adjustments made to the figures provided by the VOA. A small number of PCTs do not own any land due to leases and the VOA did not provide data in these cases. Instead, the relevant county average is assigned. Second, London Trusts that have a significant non-London site have a land index for each site weighted together in proportion to activity on each site. This is in recognition of the value of land in central London compared to less urban areas.

137. The land index is calculated as the land value per hectare for each NHS Trust and PCT divided by the national average land value per hectare.

MFF matrix

138. The focus of the MFF is on the costs experienced by providers. Each PCT's final MFF is a weighted average of the MFFs for each of the providers from which it commissions, mapped from provider to PCT through a purchaser-provider matrix (PPM). The matrix is derived from the application of 2007-08 Payment by Results tariffs to admitted patient care activity data from 2005-06 HES.

139. The HES data only provide information on admissions to NHS hospitals and outpatients. There are no equivalent national datasets for other HCHS programmes which allow providers to be mapped to PCTs. To overcome this it is assumed that most other programmes follow the pattern of inpatients. These are designated non-host provision. However, in the case of maternity and community programmes it is assumed that they are provided 100% within the host PCT. These are designated host provision.

140. Provider MFF indices are passed through the PPM to produce PCT MFF indices to which a non-host weight of 83.6% (derived from the 2006-07 HCHS expenditure excluding maternity, community health services and HIV/AIDS in Table 7) is applied.

141. A host weight of 16.4% (from maternity, community health services and HIV/AIDS expenditure in Table 7) is applied to unadjusted PCT MFF indices. The weighted indices are summed to give the MFF indices used within the main MFF adjustment.

Overall MFF

142. The final step to produce an overall MFF is to expenditure weight the separate MFF elements. The purpose of the expenditure weights is to reflect national average spend on each MFF element so that local decisions on the mix of inputs do not affect PCT targets. The weights in Table 9 are based on an analysis of 2006-07 expenditure from the financial returns and accounts of PCTs, NHS Trusts and NHS Foundation Trusts.

Table 9: HCHS MFF weights

	%
Staff	56.1
Medical and dental London weighting	13.8
Buildings	3.0
Land	0.6
Other	26.5
Total HCHS	100.0

EMERGENCY AMBULANCE COST ADJUSTMENT

143. The emergency ambulance cost adjustment (EACA) was introduced for 1998-99 allocations. It reflects the unavoidable cost variations of delivering emergency ambulance services in different areas.

144. EACA had its origins in a study of rurality and unavoidable cost commissioned from a joint team of researchers from Mallender Hancock Associates (MHA) and Operational Research in Health Ltd. The results of the research were reported in the *Study of Costs of Providing Health Services in Rural Areas* which is available as RARP 14 at www.dh.gov.uk/allocations.

145. The research produced a model that explained or predicted unit costs for emergency ambulance services.

146. Three drivers were combined to produce a single EACA index:

(a) a rurality index: a 1 per cent increase in rurality led to a 0.23 per cent increase in costs per journey

(b) a scale effect: a 1 per cent increase in the total number of journeys led to a 0.17 per cent decrease in unit costs

(c) a case-mix effect: a 1 per cent increase in emergencies as a proportion of total journeys added a premium of 0.96 per cent to unit costs.

147. The rurality index was based on standard HA boundaries and referred to 1991 Census resident populations. Unit cost data and journeys data were based on 1995-96 HA outturn data. Emergency journey proportions were based on the KA34 ambulance return.

148. The values for Birmingham HA and Herefordshire HA are illustrated in Table 10:

Table 10: EACA values for Birmingham and Herefordshire

	Rurality index	Total number of journeys	Emergency journeys as a proportion of total journeys	EACA need factor $A^{-0.23}$ X $B^{-0.17}$ X $C^{0.96}$
Birmingham	37.67	113,148	0.69	0.04
Herefordshire	2.50	9,791	0.64	0.11

149. The HA values have been mapped to PCTs, and, as for other adjustments, the EACA need index is multiplied by each PCT's crude population, the product of which is normalised to the total crude population to produce an EACA weighted population.

HCHS WEIGHTED POPULATION

150. Dividing the normalised weighted population in each adjustment by the crude population generates a separate index, comparing the PCT score on the adjustment to a mean value of 1. An overall index of need (reflecting acute, maternity, mental health, HIV/AIDS treatment and HIV prevention need, and health inequalities), an MFF index and an EACA index are created. To calculate the HCHS weighted population, each PCT's crude population is simultaneously multiplied by these indices as follows:

Weighted population = Population x Need Index x MFF Index x EACA Index

151. The results of this calculation are normalised to the total crude population.

Section 4:
Prescribing Component

The prescribing component has adjustments for:

- age and sex related need

- additional need, over and above that accounted for by age and sex

- health inequalities

- It does not have an adjustment for unavoidable costs.

POPULATION

152. The prescribing component uses the same crude populations as the HCHS component, other than excluding prisoners, members of the UK armed forces, and members of foreign armed forces and their dependants[9].

AGE AND SEX RELATED NEED

153. The adjustment for age and sex uses weights developed by the Prescribing Support Unit (PSU) from an analysis of total prescription cost data of 120 English practices over a one-year period. They are known as Age, Sex, Temporary Resident Originated Prescribing Units (ASTRO(97)-PUs) and are shown in Table 11. The separate weighting for temporary registrations is no longer utilised.

Table 11: ASTRO(97)-PUs

Age band	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75+
Male	1.0	1.4	1.7	2	2.8	4.4	7.6	10.1	11.8
Female	0.8	1.2	2.1	2.4	3.2	5.4	7.2	9.6	10.6

ADDITIONAL NEED

154. The prescribing model for additional need was developed by a team led by Brunel University. Their report, *Combining Age Related and Additional Needs (CARAN) Report* (RARP 30), is available at www.dh.gov.uk/allocations. The new model could not adopt the one-stage approach used for HCHS acute services because prescribing activity data are not available for age groups for individual practices.

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9   This is explained in paragraphs 50 and 54.

155. In the regression analysis to estimate additional need, the dependent variable is cost-weighted prescribing activity in 8,415 practices in England standardised to account for the age and gender distribution of the practice using ASTRO-PUs.

156. The independent variables were similar to those available at MSOA level for the acute model. Some practice characteristics were added to the list of supply variables. The low income scheme index (LISI), which is available directly at practice level, was added to the list of needs indicators. Other variables were attributed to practices from MSOAs using the ADS. As with the acute model, needs indicators were transformed to z-scores. The variable selection procedures were the same as for the acute model.

157. Table 12 shows the full model. However, only the needs variables are included in the formula to determine resource allocation. The supply variables are sterilised but remain in the underlying model.

Table 12: Prescribing model

Variable	Coefficient
Constant	0.997
Supply variables	
Proportion of GPs that are female	-0.037
Average GP age	-0.002
One-partner practices	-0.037
Dispensing practice	0.028
Need variables	
Percentage limiting long-term illness	0.044
Disability living allowance claimants	0.050
Low income scheme index (LISI)	0.006
Low birthweight births	0.007

158. The prescribing need index is calculated using an additive process for combining variable scores. The values for each of the needs variables are transformed into z-scores and the relevant coefficient applied to the transformed score at PCT level. These scores are aggregated with the constant term to produce a single need index.

159. The derivation of the index is as follows:

0.997 +
0.044 percentage limiting long-term illness +
0.050 disability living allowance claimants +
0.006 LISI +
0.007 low birthweight births

which is multiplied by the crude population to give the weighted population for each PCT.

HEALTH INEQUALITIES

160. A health inequalities formula is applied in the same way as described in the HCHS component and given a weighting of 15%.

COST

161. The prescribing component does not have an adjustment for unavoidable costs since the prices of drugs do not vary by geographical location.

PRESCRIBING WEIGHTED POPULATION

162. Dividing the normalised weighted population in each adjustment by the crude population generates a separate index, comparing the PCT score on the adjustment to a mean value of 1. An age index and an additional need index are created. To calculate the prescribing weighted population, the crude populations of each PCT are simultaneously multiplied by these indices and then normalised so that they sum to the total crude population.

Section 5:
Primary Medical Services Component

The primary medical services component has adjustments for:

- age and sex related need

- additional need, over and above that accounted for by age and sex

- health inequalities

- variations in the unavoidable cost of providing healthcare (market forces factor).

POPULATION

163. The primary medical services component uses the same crude populations as the HCHS component, other than excluding prisoners, members of the UK armed forces, and members of foreign armed forces and their dependants[10].

AGE AND SEX RELATED NEED

164. The age and sex related need adjustment is based on research used to derive a new General Medical Services (GMS) Global Sum Formula for the GP contract from 2004-05, reported in *GMS contract: workload formula* (RARP 27) at www.dh.gov. uk/allocations.

165. Table 13 shows the age-sex workload index, which is based on an estimate of GP consultations in minutes per year for each age and sex group, expressed as the ratio to males aged 5-14.

Table 13: Age-sex workload index

Age band	0-4	5-14	15-44	45-64	65-74	75-84	85+
Male	3.97	1.00	1.02	2.16	4.23	6.01	7.22
Female	3.64	1.04	2.20	3.37	4.95	6.95	8.85

166. GP consultations can take place in the surgery, the patient's own home or in a nursing or residential care home. The age-sex workload index is derived from separate analyses of consultations in the surgery and home visits, with an adjustment for nursing and residential home consultations.

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10   This is explained in paragraphs 50 and 54.

Consultations in the surgery

167. The analysis of surgery consultations is based on the General Practice Research Database (GPRD) which includes data from 240 practices (220 of which are in England). 68 million patient file openings between 1999 and 2001 were analysed.

168. Annual practice workload for each age and sex group was estimated by the average total time a patient file was opened by all members of the primary healthcare team, weighted by an average staff input cost factor.

Home visits

169. A large proportion of consultations with very elderly patients take place in the patient's home rather than in the surgery. The GPRD does not systematically record home visits. Although there may be a patient file opening corresponding to home visits, this is likely to be very short as the information will be added after the home visit has taken place. It is also unlikely to reflect the full workload of home visits, which are often longer than surgery consultations and have an associated travel time. For this reason, home visits have been treated separately.

170. The proportion of total consultations accounted for by home visits was taken to be 6.4%, based on the 2000 General Household Survey (GHS). Home visit rates by age and sex were taken from the 1991-92 Morbidity Statistics for General Practice 4 (MSGP4). These rates were multiplied by a consultation length of 25.2 minutes (13.2 minutes for the average consultation and 12 minutes for the average travel time) from the 1992-93 General Medical Practitioner's workload survey.

171. Home visit lengths were added to patient file openings for surgery consultations to estimate the workload in minutes per year for each age and sex group.

Nursing and residential homes

172. Nursing and residential home visits are adjusted for separately.

173. Although the GPRD included nursing and residential home residents, their consultation times would have been under-estimated for the same reason as they were for home visits. It was assumed they were recorded at 10%[11] of their actual length (e.g. 1 minute instead of 10 minutes). An adjustment to the age-sex workload index was made for these consultations by taking the percentage of the population in each age band in care homes and uprating their average consultation length. Figures from the 2001 census were used to estimate the percentage of people in each age band in care homes. For those aged 85 and over this was 10.3% for men and 19.6% for women, 2.5% and 4.3% respectively for those aged 75-84 and less than 1% for all other ages.

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11 Sensitivity analysis suggests that any reasonably plausible assumption makes little difference to the results.

174. This adjusted age-sex workload index multiplied by the percentage of the population not in care homes, added to the same index multiplied by the percentage of the population in care homes and a factor of 1.43, which represents the average extra workload for all patients in nursing and residential homes, gives the figures in Table 13.

ADDITIONAL NEED

175. The additional need adjustment is based on research used to derive a new General Medical Services (GMS) Global Sum Formula for the GP contract from 2004-05. The report, *An analysis of the factors predicting GP consultations: a small area level analysis using Health Survey for England (HSE) data* (RARP 28), is available at www.dh.gov.uk/allocations.

176. The modelling used HSE data between 1998 and 2000. The HSE asks survey respondents whether they have had a GP consultation in the past two weeks, and if yes the number of such consultations. The survey also includes information on age, sex, geographic location and a range of socio-economic indicators. These were combined with a range of other small area level explanatory variables, including census variables, mortality rates, and supply variables. The analysis was conducted at ward level, and wards were excluded where there were less than five observations in the ward. This reduced the sample size to 2,404 wards.

177. Table 14 shows the variables, with their statistically estimated coefficients, which were found to be significant and the best at explaining variations in workload over and above age and sex.

Table 14: primary medical services additional need

	Coefficient
Standardised limiting long-term illness (SLLTI)	0.26115
Standardised mortality ratio for those aged under 65 (SMR<65)	0.23676

178. They are related to workload by the following formula (which includes a constant term of 48.1198):

48.1198 + 0.26115 SLLTI + 0.23676 SMR<65

which is multiplied by the crude population for each PCT to give the weighted population in the same manner as the other additional need adjustments.

HEALTH INEQUALITIES

179. A health inequalities formula is applied in the same way as described in the HCHS component and given a weighting of 15%.

COST

180. The MFF consists of the following indices:

    (a) GP pay

    (b) practice staff

    (c) land

    (d) buildings

    (e) other.

181. A common index of 1.00 is given to (e). The separate MFFs are described below.

GP pay MFF

182. The GP pay MFF is intended to compensate for the fact that PCTs with higher deprivation face greater GP recruitment and retention difficulties. Evidence suggests that one of the main factors which influences where GPs choose to practice is the level of deprivation (and associated factors) of the area. Research by the National Primary Care Research and Development Centre (NPCRDC) suggested that GPs valued the disamenity of living and working in a deprived area at £4,200 (approximately 7.5% of the average salary). The GP Pay MFF is based on the Index of Multiple Deprivation from the Indices of Deprivation 2007 (ID2007) for each PCT. The ID2007 score is scaled so that there is a 7.5% difference between the upper decile most deprived PCT and the lower decile most deprived PCT. The result is indexed.

Practice staff MFF

183. The practice staff MFF is the same as the HCHS component, except that PCT values unadjusted by the PPM are used because primary medical services are commissioned locally.

Land MFF

184. The land MFF uses the average small site (up to five houses) value in each LAD area supplied by the VOA and mapped to PCTs. The index is calculated as the ratio of the average small site in an area to the national average value. An average of the twice-yearly valuations in January and July between 2005 and 2008 is used.

Buildings MFF

185. The buildings MFF is the same as the HCHS component, except that PCT values unadjusted by the PPM are used because primary medical services are commissioned locally.

Overall MFF

186. These separate MFFs are combined into an overall MFF using weights derived from Inland Revenue data published in the GP Earnings and Expenses Enquiry 2005-06[12] that reports national average expenditure on GP income and different types of expenses. The data do not provide a breakdown between buildings and land. A judgement was made to split these in the ratio of 5 to 1. The weights are shown in Table 15.

Table 15: Primary medical services component MFF weights

	%
GP pay	44.9
Practice staff	30.7
Buildings	5.8
Land	1.2
Other	17.5
Total	100.0

PRIMARY MEDICAL SERVICES WEIGHTED POPULATION

187. Dividing the normalised weighted population in each adjustment by the crude population generates a separate index, comparing the PCT score on the adjustment to the national average of 1. An age index, an additional need index and an MFF index are created. To calculate the primary medical services weighted population, the crude populations of each PCT are simultaneously multiplied by these indices and then normalised so that they sum to the total crude population.

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12 The GP Earnings and Expenses Enquiry 2005-06 is available at http://www.ic.nhs.uk/statistics-and-data-collections/primary-care/general-practice/gp-earnings-and-expenses-enquiry-2005-2006:-final-report.

Section 6:
Supplements to the formula

The Growth Area and Growth Point adjustment is a monetary supplement to the formula.

Growth Area and Growth Point Adjustment

188. In conjunction with the former Office of the Deputy Prime Minister (ODPM), now the Department for Communities and Local Government (DCLG), a Growth Area adjustment was introduced into the weighted capitation formula for 2006-07 and 2007-08 PCT allocations. It has been updated and extended to include Growth Points for 2009-10 and 2010-11 PCT allocations.

189. The Growth Areas were established in the Sustainable Communities Plan in 2003 to help tackle housing supply issues in the wider South East. The four Growth Areas are:

    (a) Ashford

    (b) London-Stansted-Cambridge-Peterborough

    (c) Milton Keynes and South Midlands

    (d) Thames Gateway.

190. 29 New Growth Points were announced in 2006 with a wide regional spread covering East and West Midlands, the East, South East and South West of England. In 2008 a further 21 local authorities and partnerships were announced as second round Growth Points, including into areas of the North for the first time. Appendix 5 lists the PCTs in the Growth Areas and Growth Points.

191. The ONS subnational population projections that form the basis for calculating weighted capitation targets are trend based and do not take account of Government policy on future housing supply. DCLG commissioned dwelling led population projections which forecast the impact on population of additional housing in the Growth Areas and Growth Points.

192. For Growth Points and Growth Areas excluding the Thames Gateway the modelling compared the growth that would result if original regional plan targets were achieved (usually taking figures from Regional Planning Guidance (RPG) or the 2000 London Plan) with those that would result from the more recent Regional

Spatial Strategies (RSS) or 2006 update to the London Plan. The difference between the two gives the potential population growth.

193. For Thames Gateway, the modelling estimated growth based on RSS and on the estimated Thames Gateway target of 160,000 additional dwellings by 2016. The difference between the higher of the two estimates and ONS 2004 based SNPPs gives the potential population growth.

194. The results were presented at LAD level to 2016. A small number of LADs showed negative change, because the additional housing originally planned for them had been redistributed elsewhere. These are treated as having zero growth. The variant population projections used for 2007-08 PCT allocations are also removed from the latest variant populations for the Growth Areas since these were addressed in 2007-08 PCT allocations and carried forward in 2009-10 PCT baselines.

195. The resulting dwelling led potential population growth in all Growth Areas and Growth Points is 177,848 in 2009 and 245,172 in 2010. After mapping the populations from LAD to PCT they were:

(a) adjusted using each PCT's HCHS need and MFF index

(b) multiplied by the average allocations per head in 2009-10 and in 2010-11

(c) and the resulting adjustments made to each PCT's monetary target.

Section 7:
Calculation of Targets and Distances From Targets

WEIGHTED CAPITATION TARGETS

196. The weighted populations calculated separately in the HCHS, prescribing and primary medical services components are combined using national expenditure weights for the latest available year to create a single weighted population for each PCT. The weights are shown in Table 16.

Table 16: component weights

	£m	%
HCHS	46,853	76.3
Prescribing	7,593	12.4
Primary medical services	6,943	11.3

Sources: 2006-07 PCT summarisation form ASF08

197. The weighted capitation formula is used to calculate relative population shares. It does not determine a monetary value of itself. The relative weighted population shares, plus the growth area adjustment, determine each PCT's target share in monetary terms of the total resources available.

DISTANCES FROM TARGETS

198. Targets are subtracted from baselines to produce DFTs for each PCT. DFTs inform the distribution of extra resources for allocations.

199. The tables at Appendix 6 show simplified worked examples for four PCTs. For the actual calculation of PCT targets for 2009-10 and 2010-11, see the 2009-10 and 2010-11 PCT Revenue Allocations Exposition Book, which is available at www. dh.gov.uk/allocations.

List of abbreviations

ACRA   Advisory Committee on Resource Allocation

ADS   Attribution Data Set

AIDS   Acquired Immuno-Deficiency Syndrome

AREA   Allocation of Resources to English Areas

ASHE   Annual Survey of Hours and Earnings

ASTRO-PU   Age, Sex, Temporary Resident Originated Prescribing Unit

BCIS   Building Cost Information Service

CARAN   Combining Age Related and Additional Needs

CHS   Community Health Services

CMF   Comparative Mortality Factor

DCLG   Department for Communities and Local Government

DFLE   Disability Free Life Expectancy

DFT   Distance from Target

DHA   District Health Authority

DLA   Disability Living Allowance

DMS   Defence Medical Services

EACA   Emergency Ambulance Cost Adjustment

ELDA   English Language Difficulties Adjustment

ERIC   Estates Return Information Collection

GHS   General Household Survey

GMS   General Medical Service

GMSCL   General Medical Services Cash Limited

GMSNCL   General Medical Services Non-Cash Limited

GP   General Practitioner

GPRD	General Practice Research Database
HA	Health Authority
HCHS	Hospital and Community Health Services
HERU	Health Economics Research Unit
HES	Hospital Episode Statistics
HIA	Health Inequalities Adjustment
HIV	Human Immuno-Deficiency Virus
HPA	Health Protection Agency
HSE	Health Survey for England
ID2000	Indices of Deprivation 2000
ID2004	Indices of Deprivation 2004
ID2007	Indices of Deprivation 2007
IS	Income Support
JSA	Job Seekers Allowance
LAD	Local Authority District
LISI	Low Income Score Index
LLTI	Limiting Long Term Illness
MFF	Market Forces Factor
MHA	Mallender Hancock Associates
MoD	Ministry of Defence
MoJ	Ministry of Justice
MSGP	Morbidity Statistics from General Practice
MSOA	Middle Layer Super Output Area
NES	New Earnings Survey
NHS	National Health Service
NPCRDC	National Primary Care Research and Development Centre
ODPM	Office of the Deputy Prime Minister
ONS	Office for National Statistics

PbR	Payment by Results
PCG	Primary Care Group
PCT	Primary Care Trust
PPM	Purchaser Provider Matrix
PSU	Prescribing Support Unit
RAG	Resource Allocation Group
RARP	Resource Allocation Research Paper
RAWP	Resource Allocation Working Paper
RHA	Regional Health Authority
RPG	Regional Planning Guidance
RSS	Regional Spatial Strategy
SHA	Strategic Health Authority
SLLTI	Standardised Limiting Long Term Illness
SMR	Standardised Mortality
SOPHID	Survey of Prevalent HIV Infections that are Diagnosed
SSWD	Standardised Spatial Wage Differential
TAG	Technical Advisory Group
UK	United Kingdom
US	United States
VOA	Valuation Office Agency

Glossary

Additional needs

Health care needs over and above those relating to age and gender.

Attribution Dataset (ADS)

A dataset extracted from the 87 NHAIS systems that records the home postcode of people registered with GP practices.

Coefficient

Coefficients show the quantified relationship between the dependent and independent variables (holding all other variables constant) and are normally obtained by statistical analysis of historical data on the variables.

Comparative mortality factor (CMF)

A measure of mortality rates which uses direct standardisation. The CMF reflects the number of deaths that would have occurred if the area had the same age structure as for England. The national age structure is applied to the local area death rates by age. The CMF is the expected number of deaths in the area divided by the observed number of deaths in the area.

Counter-intuitive signs

Refers to variables that have coefficients with unexpected signs in a regression model. For example, areas with more employment deprivation might be expected to have higher utilisation all else being equal when they are found to have lower use. These may be due to unmet needs but may be due to other factors as well.

Dependent variable

The variable that is being modelled. Its value is known, but an explanation of why it is high in some circumstances and low in others is sought.

Disability living allowance (DLA)

A non means-tested benefit for those with a severe physical or mental illness or disability and who are under age 65. It is payable to both children and adults.

Epidemiological approach

An approach to allocating health resources based on the assumption that health care needs in an area are proportional to the number of cases of disease in an area.

Explanatory variable

The variables which are used to try and explain the behaviour of the dependent variable.

Exponential distance decay function

A function used to smooth Standardised Spatial Wage Differentials (SSWDs) so that SSWDs of areas in close proximity to the base area receive greater weight than areas further away.

Health care resource groups (HRGs)

Groupings of clinically similar treatments which use similar levels of health care resources.

Housing domain (ID2000)

Includes the following variables:

- Homeless households in temporary accommodation 1997-1998

- Household overcrowding 1991 Census

- Poor private sector housing (modelled from 1996 English House Condition Survey and RESIDATA).

Income deprivation domain (ID2004)

Includes the following variables:

- Adults and children in Income Support households (2001).

- Adults and children in Income Based Job Seekers Allowance households (2001).

- Adults and children in Working Families Tax Credit households whose equivalised income (excluding housing benefits) is below 60% of median before housing costs (2001).

- Adults and children in Disabled Person's Tax Credit households whose equivalised income (excluding housing benefits) is below 60% of median before housing costs (2001).

- National Asylum Support Service supported asylum seekers in England in receipt of subsistence only and accommodation support (2002).

CARAN created an Income Deprivation Affecting Children Index.

Income support (IS)

A means tested benefit for people under 60 on a low income who are not required to be available for work.

Indices of Deprivation

The DCLG Index of Multiple Deprivation combines a number of indicators, chosen to cover a range of economic, social and housing issues, into a single deprivation score for each small area in England.

These Indices of Deprivation contain several domains of deprivation, and each domain contains a number of indicators.

DCLG have produced Indices of Deprivation 2000 (ID2000), ID2004 and ID2007.

The AREA Report used various domains from the ID2000. The CARAN Report uses various domains from the ID2004 (the ID2007 was not available at the time of the Report).

Limiting long term illness (LLTI)

Numbers of persons in households with limiting long-term illness are based on answers to the question from the 2001 Census "Do you have any long-term illness, health problem or disability which limits your daily activities or the work you can do?" In the modelling of need, the number of people with a limiting long term illness was expressed as a proportion of the total number of people for each local area.

Low income scheme index (LISI)

LISI is derived from practice prescribing data. The LISI score for a practice is defined as the percentage of costs of dispensed prescriptions that are exempt from prescription charges on the grounds of low income, and that are not exempt under some other criterion.

Needs indicator

Variables that ought to affect the use of health services.

Normalisation

The process whereby figures are scaled, e.g. when weighted populations are scaled back so they sum to the crude population for England a normalisation factor is used. The normalisation factor in this case is the population of England divided by the sum of weighted PCT populations. Relative shares are unaffected by this process.

One stage approach

A variant of the utilisation approach that accounts for age related needs and additional needs in a single stage estimation methodology.

Regression analysis

Regression analysis is a statistical technique used to explain the dependence of one variable – called the dependent variable (Y), on one or more other variables – called

variously the independent, the explanatory or control variables (X). In a very simple two variable model (one dependent and one explanatory variable) the data can be plotted as a scatter of points on a two dimensional graph. Regression analysis involves putting a line through these points. The degree of scatter around the line measures what is called goodness of fit. The objective is to minimise this degree of scatter.

The slope of a regression line indicates the nature of the relationship between the two variables – positive, i.e. an upward sloping line, or negative, i.e. a downward sloping line. However, the real power of regression analysis lies in its ability to quantify the separate effect of each independent variable on the dependent variable. The quantified effect of each variable is also called its coefficient.

Spearhead areas

The Spearhead areas are the 70 LADs, and the 62 PCTs which map to them, which are in the bottom fifth nationally for three or more of the following five health and deprivation indicators:

- male life expectancy at birth
- female life expectancy at birth
- cancer mortality rate in under 75s
- cardio vascular disease mortality rate in under 75s
- Index of Multiple Deprivation 2004.

Standardisation

The aim of standardisation is to allow a more precise comparison of the measure of interest between geographical areas by eliminating the effect of differences between the age and gender structures of populations. There are two main methods of achieving this: direct standardisation (e.g. CMF) and indirect standardisation (e.g. SMR).

Standardised birth ratio

The ratio of the number of births in an area to the expected number of births in the area, where the expected number of births is calculated by multiplying the number of women in each age group in the area by national age-specific fertility rates.

Standardised mortality ratio (SMR)

A measure of mortality rates which uses indirect standardisation. The SMR reflects the number of deaths that would have occurred if the area had the same death rates as for England. The local age structure is applied to the national age specific death rates, giving an expected number of deaths for each age group. The SMR is the observed number of deaths in the local area divided by the expected number of deaths in the area.

Standardised spatial wage differential (SSWD)

The SSWD represents the additional pay that employers in any area would need to offer to be able to recruit and retain labour of a comparable quality. The underpinning regression analysis attempts to control or standardise for factors such as age, sex, occupation and industry. Area wage differentials which remain after all measurable differences in worker quality and job attributes have been controlled for, are taken to reflect the size of compensation that workers require to work in any particular area.

Sterilisation

A method in which variables that ought not to affect the allocation of resources are removed so that they do not affect allocations either directly or indirectly via their relationship with other variables.

Supply variable

Variables that measure the availability of, access to, and costs of using health care services in an area.

Transformation

The values of variables in regression analysis are often transformed to eliminate statistical problems associated with the use of crude values.

In the AREA Report, most of the needs indicators are transformed by dividing by the population weighted mean and subtracting one. The exceptions are some of the ID2000 domain scores, which are already transformed, and the morbidity indices.

In the CARAN Report, the needs indicators are transformed by subtracting the population mean value from the raw value and then dividing the difference by the population standard deviation. These are called z-scores.

Two stage approach

A variant of the utilisation approach that accounts for age related needs and additional needs in two separate stages.

Z-score

A method of transformation used in the CARAN Report. They allow the straightforward comparison of the values of coefficients of the independent variables, when we would otherwise have to take account of the different scales on which the independent variables are measured.

Appendix 1
Schematic Diagram of Weighted Capitation Formula
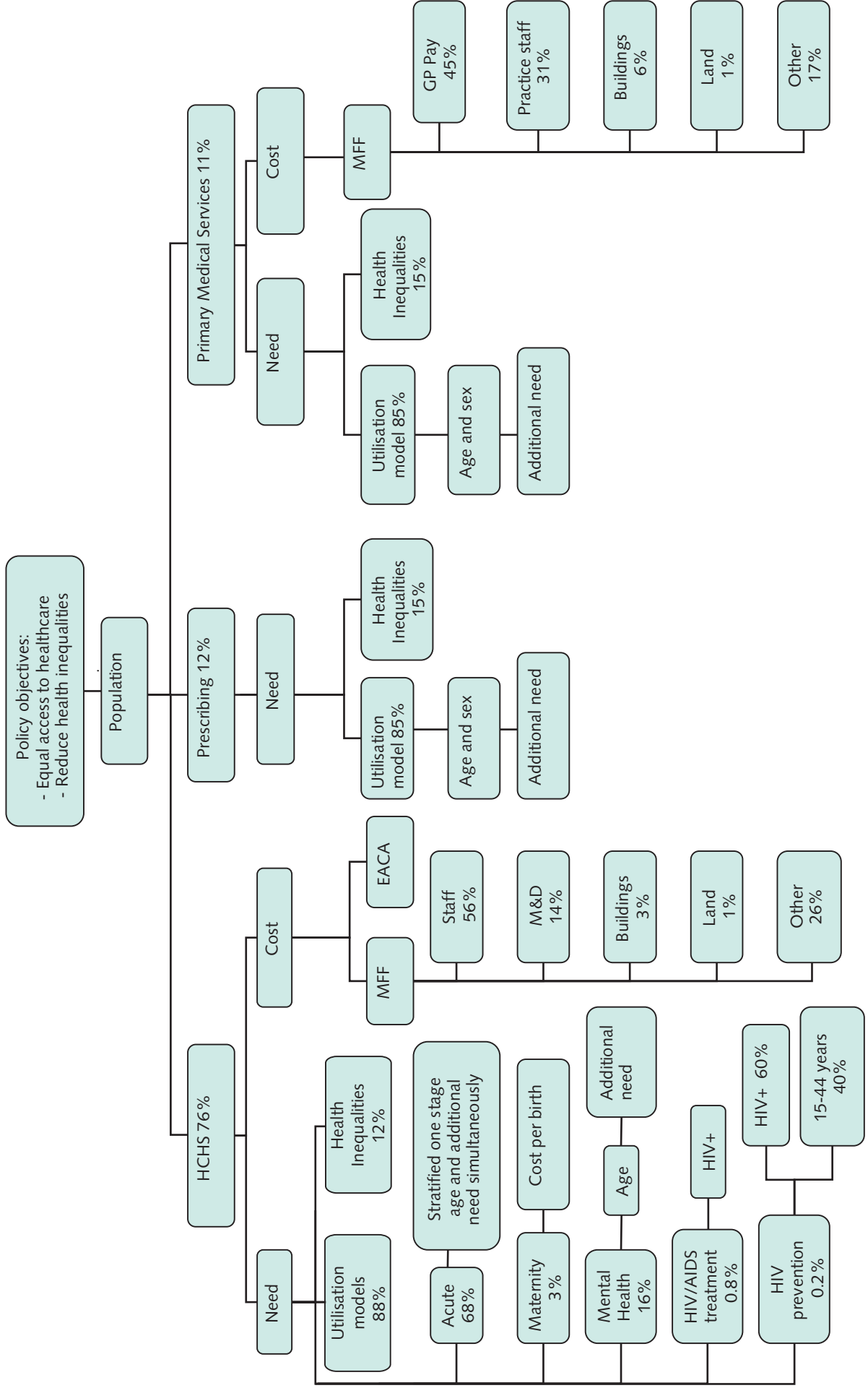
Appendix 2:
Resource Allocation
Research Papers

Number	Title	Date of publication	Authors
RARP 1	Sharing Resources for Health in England Report of the Resource Allocation Working Party	1976	DHSS
RARP 2	Report of the Advisory Group on Resource Allocation	1980	DHSS
RARP 3	Geographic Variations in the Cost of Health Service Inputs Government Economic Service Working Paper No.35	October 1980	DHSS
RARP 4	Review of the Resource Allocation Working Party Formula (Interim report)	1986	DHSS/NHS Management Board
RARP 5	Review of the Resource Allocation Working Party Formula (Final report)	1988	DHSS/NHS Management Board
RARP 6	National Average Cost Weights by Specialty Group	June 1993	East Cheshire Statistical Analysis Consultancy
RARP 7	A Formula for Distributing NHS Revenues Based on Small Area Use of Hospital Beds	September 1994	University of York
RARP 8	The Resource Allocation Consequences of the New NHS Needs Formula	May 1995	University of York
RARP 9	Report of the Prescribing Allocations Group	November 1995	NHS Executive
RARP 10	A Literature Review of Local Variation in the Needs of People with a Learning Disability for Health Service Input	July 1996	Norah Fry Research Centre University of Bristol
RARP 11	Interim Needs Indicators for Community Health Services	September 1996	Universities of Kent and Plymouth
RARP 12	Labour Market Forces and NHS Provider Costs Final Report	September 1996	University of Warwick
RARP 13	No Need to Weight Community Health Programmes for Resource Allocation?	1996	University of York

Number	Title	Date of publication	Authors
RARP 14	Study of Costs of Providing Health Services In Rural Areas Progress Report to Resource Allocation Group – Volumes 1 and 2	June and September 1997	MHA/ Operational Research in Health Ltd
RARP 15	Measuring Need for People with Learning Disabilities – Report for the Department of Health Resource Allocation Group	September 1997	Nuffield Institute for Health (University of Leeds)
RARP 16	The Unavoidable Costs of Ethnicity A Review for the NHS Executive	January 1998	University of Warwick
RARP 17	Equity of Access to Healthcare	March 1998	University of York
RARP 18	National Average Specialty Treatment and Hotel Costs	March 1998	MHA
RARP 19	The Role of Private Healthcare in the York Indices of Healthcare Needs	April 1998	University of York
RARP 20	Assessment of the Costs to the NHS Arising from the Need for Interpreter, Advocacy and Translation (IAT) services	July 1998	University of Warwick
RARP 21	Towards Locally Based Resource Allocation in the NHS	August 1998	University of York
RARP 22	Derivation of a Needs Based Capitation Formula for Allocating Prescribing Budgets	January 1999	University of York and Prescribing Support Unit
RARP 23	Review of Drugs Misuse Allocation Formula	September 2000	University of York
RARP 24	A GMS Needs Measure Based on the GHS	May 2001	University of York
RARP 25	Spatial Variations in Labour Costs – 2001 Review of the Staff Market Forces Factor	March 2002	University of Warwick
RARP 26	Allocation of Resources to English Areas	December 2002	Sutton et al.
RARP 27	GMS Contract: Workload Formula	October 2008	University of York
RARP 28	An Analysis of the Factors Predicting GP Consultations: a Small Area Analysis Using Health Survey for England Data	October 2008	Morris et al.
RARP 29	Review of Population Base for PCT Allocation Post 2008	December 2008	Prescribing Support Unit

Number	Title	Date of publication	Authors
RARP 30	Combining Age Related and Additional Needs (CARAN) Report	December 2008	Morris et al.
RARP 31	Review of Specific Cost Approach to Market Forces Factor	December 2008	Crystal Blue Consulting Ltd
RARP 32	Review of the Market Forces Factor Following the Introduction of Payment by Results (2005): Exploring the General Labour Market Method	December 2008	Health Economics Research Unit
RARP 33	Review of the Weighted Capitation Formula	December 2008	Gwyn Bevan

Appendix 3:
Resource Allocation
Working Papers

Number	Title
RAWP 1	History of Staff Market Forces Factor
RAWP 2	Population Data For Allocations
RAWP 3	The Exeter Data Set and Attribution Part 1 – Use of the Exeter Practice Registration Data Base Part 2 – Exeter Attribution Project – Progress Report Part 3 – Attribution Accuracy For GP Practices and PCGs
RAWP 4	A Brief History of Resource Allocation in the NHS 1948-98
RAWP 5	A History of GP Distribution
RAWP 6	The Years of Life Lost Index and Health Inequalities Adjustment

Appendix 4:
Data used in Formulas and Sources

Variable	Description
HCHS acute (RARP 30, p143, Table 14.5)	
deathrat	Death rates 2001-2005 by 18 5-year age groups ONS
idincch	Income deprivation affecting children ID2004
stnoquals	Standardised proportion aged 16-74 with no qualifications 2001 Census
pr_lbw	Proportion of births that are low birth weight ONS 2001-05
dlav2	Proportion under 16 claiming Disability Living Allowance 2005
educv1	Percentage of young people not staying in education ID2004
llti	Standardised limiting long-term illness 2001 Census
dlav1	Proportion claiming Disability Living Allowance claimants 2005
newdv1	Proportion claiming New Deal for Young People 2004
ibsdav1	Proportion claiming Incapacity Benefit/Severe Disability Allowance 2005
pencrv1	Proportion aged over 60 claiming Pension Credit 2005
dlav8	Proportion over 60 claiming Disability Living Allowance 2005
HCHS maternity (RARP 30, p184, Table 17.5, Model 2)	
BFY200708	Counts of births ONS 2007 and 2008
pr_lbw	Proportion of births that are low birth weight 2001-05
housprv2	Mean house price for all dwellings 2005
HCHS mental health (RARP26, p140, Table 8.4.2)	
CMF64	Comparative Mortality Factor 0-64 year olds ONS 2000.
isc_ov60	Income support claimants over 60 years ID2000
scorehou	Housing domain score ID2000
ratpre2	Psycho-social morbidity index
HCHS HIV/AIDS	
2007 SOPHID	2006 Survey of Prevalent HIV Infections that are Diagnosed

Variable	Description
Prescribing (RARP 30, p152, Table 15.4, Model b)	
lliv1	Percentage with limiting long-term illness 2001 Census
dlav1	Proportion claiming Disability Living Allowance claimants 2005
lisi0708	Low income scheme index 2007-08
pr_lbw	Proportion of births that are low birth weight ONS 2001-05
Primary medical services (RARP 28, p18, Table 3.10, Model 13.1)	
llti	Standardised limiting long-term illness 2001 Census
smr<65	Standardised Mortality Ratio 0-64 year olds ONS 2004-06

Appendix 5:
PCTs in Growth Areas and New Growth Points

Growth areas

Ashford		
Q37	5QA	Eastern and Coastal Kent PCT

London Stansted Cambridge Peterborough		
Q36	5A9	Barnet PCT
Q36	5K5	Brent Teaching PCT
Q36	5K9	Croydon PCT
Q35	5PP	Cambridgeshire PCT
Q36	5C3	City and Hackney Teaching PCT
Q35	5P3	East and North Hertfordshire PCT
Q36	5C1	Enfield PCT
Q36	5C9	Haringey Teaching PCT
Q36	5K8	Islington PCT
Q35	5PX	Mid Essex PCT
Q35	5PN	Peterborough PCT
Q36	5NA	Redbridge PCT
Q35	5PT	Suffolk PCT
Q36	5NC	Waltham Forest PCT
Q35	5PV	West Essex PCT
Q35	5P4	West Hertfordshire PCT

Milton Keynes and South Midlands		
Q35	5P2	Bedfordshire PCT
Q38	5QD	Buckinghamshire PCT
Q35	5GC	Luton PCT
Q38	5CQ	Milton Keynes PCT
Q33	5PD	Northamptonshire Teaching PCT

Thames Gateway			
Q36	5C2	Barking and Dagenham PCT	
Q36	TAK	Bexley Care Trust	
Q37	5QA	Eastern and Coastal Kent PCT	
Q36	5A8	Greenwich Teaching PCT	
Q36	5A4	Havering PCT	
Q36	5LF	Lewisham PCT	
Q37	5L3	Medway PCT	
Q36	5C5	Newham PCT	
Q35	5P1	South East Essex PCT	
Q35	5PY	South West Essex PCT	
Q36	5C4	Tower Hamlets PCT	
Q37	5P9	West Kent PCT	

First round Growth Points

3 Cities & 3 Counties			
Q33	5N7	Derby City PCT	
Q33	5N6	Derbyshire County PCT	
Q33	5PC	Leicester City PCT	
Q33	5PA	Leicestershire County and Rutland PCT	
Q33	5N8	Nottinghamshire County Teaching PCT	

Basingstoke			
Q38	5QC	Hampshire PCT	

Birmingham & Solihull			
Q34	5PG	Birmingham East and North PCT	
Q34	5MX	Heart of Birmingham Teaching PCT	
Q34	TAM	Solihull Care Trust	
Q34	5M1	South Birmingham PCT	

Coventry		
Q34	5MD	Coventry Teaching PCT

Didcot		
Q38	5QD	Buckinghamshire PCT
Q38	5QE	Oxfordshire PCT

East Staffordshire – Burton-upon-Trent		
Q34	5PK	South Staffordshire PCT

Exeter and East Devon		
Q39	5QQ	Devon PCT

Grantham		
Q33	5N9	Lincolnshire Teaching PCT

Haven Gateway		
Q35	5PW	North East Essex PCT
Q35	5PT	Suffolk PCT

Hereford		
Q34	5CN	Herefordshire PCT
Q33	5N9	Lincolnshire Teaching PCT

Maidstone		
Q37	5P9	West Kent PCT

Newark on Trent		
Q33	5N8	Nottinghamshire County Teaching PCT

Norfolk		
Q35	5PQ	Norfolk PCT

Norwich		
Q35	5PQ	Norfolk PCT

Oxford		
Q38	5QE	Oxfordshire PCT

Partnership for Urban South Hampshire		
Q38	5QC	Hampshire PCT
Q38	5FE	Portsmouth City Teaching PCT
Q38	5L1	Southampton City PCT

Plymouth		
Q39	5F1	Plymouth Teaching PCT

Poole		
Q39	5QN	Bournemouth and Poole Teaching PCT

Reading		
Q38	5QF	Berkshire West PCT

Reigate & Banstead		
Q37	5P5	Surrey PCT

Shrewsbury & Atcham		
Q34	5M2	Shropshire County PCT

Swindon		
Q39	5K3	Swindon PCT

Taunton		
Q39	5QL	Somerset PCT

Telford		
Q34	5MK	Telford and Wrekin PCT

Thetford		
Q35	5PQ	Norfolk PCT

Torbay		
Q39	TAL	Torbay Care Trust

Truro		
Q39	5QP	Cornwall and Isles Of Scilly PCT

West of England		
Q39	5FL	Bath and North East Somerset PCT
Q39	5QJ	Bristol PCT
Q39	5M8	North Somerset PCT
Q39	5A3	South Gloucestershire PCT

Worcester		
Q34	5PL	Worcestershire PCT

Second round Growth Points

Black Country – Sandwell		
Q34	5PE	Dudley PCT
Q34	5PF	Sandwell PCT
Q34	5M3	Walsall Teaching PCT
Q34	5MV	Wolverhampton City PCT

Carlisle		
Q31	5NE	Cumbria Teaching PCT

Central Lancashire		
Q31	5HP	Blackpool PCT
Q31	5NG	Central Lancashire PCT

Dover		
Q37	5QA	Eastern and Coastal Kent PCT

Gainsborough		
Q33	5N9	Lincolnshire Teaching PCT

Greater Manchester		
Q31	5HQ	Bolton PCT
Q31	5NT	Manchester PCT
Q31	5F5	Salford PCT
Q31	5NR	Trafford PCT

Halton, Warrington and St Helens		
Q31	5NM	Halton and St Helens PCT
Q31	5J2	Warrington PCT

Kerrier and Restormel		
Q39	5QP	Cornwall and Isles Of Scilly PCT

King's Lynn		
Q35	5PQ	Norfolk PCT

Leeds City Region		
Q32	5JE	Barnsley PCT
Q32	5J6	Calderdale PCT
Q32	5N3	Wakefield District PCT

Newcastle Gateshead		
Q30	5KF	Gateshead PCT
Q30	5D7	Newcastle PCT

North Tyneside		
Q30	5D8	North Tyneside PCT

Shoreham		
Q37	5LQ	Brighton and Hove City PCT
Q37	5P6	West Sussex PCT

South East Durham

Q30	5ND	County Durham PCT

South East Northumberland

Q30	TAC	Northumberland Care Trust

South Yorkshire and Doncaster

Q32	5JE	Barnsley PCT
Q32	5N5	Doncaster PCT
Q32	5H8	Rotherham PCT
Q32	5N4	Sheffield PCT

Stafford

Q34	5PK	South Staffordshire PCT

Tees Valley

Q30	5J9	Darlington PCT
Q30	5D9	Hartlepool PCT
Q30	5KM	Middlesbrough PCT
Q30	5QR	Redcar and Cleveland PCT
Q30	5E1	Stockton-on-Tees Teaching PCT

Teignbridge

Q39	5QQ	Devon PCT

West Cheshire

Q31	5NP	Central and Eastern Cheshire PCT
Q31	5NN	Western Cheshire PCT

Wirral and Mersey Heartlands

Q31	5NL	Liverpool PCT
Q31	5NK	Wirral PCT

Appendix 6: Worked Example of PCT Target Calculations

HCHS COMPONENT

Table 1: HCHS crude population by age group

	A	B	C	D	E	F	G	H	I
	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44
PCT A	19	16	14	16	21	21	15	13	13
PCT B	15	12	13	18	26	22	15	16	16
PCT C	17	12	10	11	20	34	31	24	21
PCT D	12	15	17	19	18	16	14	18	21
Total	63	55	54	64	85	93	75	71	71

Table 1 continued

	J	K	L	M	N	O	P	Q	R	S
	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85+	Total
										Sum A to R
PCT A	11	9	7	6	6	5	4	2	2	200
PCT B	17	16	14	13	10	10	8	5	4	250
PCT C	16	12	9	9	7	6	5	3	3	250
PCT D	21	20	20	23	18	15	13	10	10	300
Total	65	57	50	51	41	36	30	20	19	1,000

Table 2: HCHS acute need variables and coefficients by age group

	A	B	C	D	E	F	G	H	I	J
	0–4	0–4	0–4	0–4	5–9	5–9	5–9	10–14	10–14	10–14
	202.49	13.70	9.47	5.39	541.50	11.94	10.41	494.51	13.02	6.23
	Death rates 2001-2005	Income deprivation affecting children ID2004	St. proportion aged 16-74 with no qualifications 2001 Census	Proportion of births that are low birthweight 2001-05	Death rates 2001-2005	St. proportion aged 16-74 with no qualifications 2001 Census	Income deprivation affecting children ID2004	Death rates 2001-2005	Proportion under 16 claiming Disability living allowance 2005	St. proportion aged 16-74 with no qualifications 2001 Census
	deathrat	idincch	stnoqual	pr–lbw	deathrat	stnoqual	idincch	deathrat	dlav2	stnoqual
PCT A	-0.26	1.53	2.07	1.78	-0.36	2.06	1.47	-0.36	0.65	1.98
PCT B	-0.31	1.69	1.09	0.56	-0.36	1.06	1.60	-0.36	0.76	1.04
PCT C	-0.30	1.85	0.13	0.35	-0.36	0.18	1.89	-0.36	0.27	0.18
PCT D	**-0.33**	**-0.31**	**-0.38**	**-0.43**	**-0.36**	**-0.42**	**-0.35**	**-0.36**	**-0.06**	**-0.42**

Table 2 continued

	K	L	M	N	O	P	Q	R	S	T
	15–19	15–19	15–19	20–24	20–24	20–24	25–29	25–29	25–29	25–29
	465.66	13.72	12.13	883.08	20.61	14.51	209.54	23.61	16.25	8.54
	Death rates 2001-2005	Percentage of young people not staying in education ID2004	St. limiting long-term illness 2001 Census	Death rates 2001-2005	Percentage of young people not staying in education ID2004	St. limiting long-term illness 2001 Census	Death rates 2001-2005	St. proportion aged 16-74 with no qualifications 2001 Census	Proportion claiming Disability living allowance 2005	Proportion claiming New Deal for Young People 2004
	deathrat	educv1	llti	deathrat	educv1	llti	deathrat	stnoqual	dlav1	newdv1
PCT A	-0.35	-0.55	1.42	-0.35	-0.49	1.46	-0.34	1.89	0.53	1.50
PCT B	-0.35	0.43	1.77	-0.35	0.47	1.86	-0.33	0.98	2.28	0.88
PCT C	-0.35	-0.06	0.98	-0.35	-0.07	0.96	-0.35	0.06	0.34	1.30
PCT D	-0.35	-0.09	-0.40	-0.35	-0.24	-0.35	-0.34	-0.39	-0.23	-0.49

Table 2 continued

	U	V	W	X	Y	Z	AA	AB	AC	AD
	30–34	30–34	30–34	30–34	35–39	35–39	35–39	35–39	40–44	40–44
	316.48	21.46	15.89	6.49	344.91	24.49	23.93	7.13	418.03	27.58
	Death rates 2001-2005	St. proportion aged 16-74 with no qualifications 2001 Census	Proportion claiming Disability living allowance 2005	Proportion claiming New Deal for Young People 2004	Death rates 2001-2005	Proportion claiming Incapacity Benefit/ Severe Disability living allowance 2005	St. limiting long-term illness 2001 Census	Percentage of young people not staying in education ID2004	Death rates 2001-2005	St. limiting long-term illness 2001 Census
	deathrat	stnoqual	dlav1	newdv1	deathrat	ibsdav1	llti	educv1	deathrat	llti
PCT A	-0.33	1.91	0.54	1.52	-0.32	0.66	1.38	-0.57	-0.28	1.32
PCT B	-0.32	1.00	2.36	0.96	-0.31	1.90	1.81	0.50	-0.27	1.75
PCT C	-0.33	0.04	0.32	1.31	-0.31	0.59	0.90	-0.11	-0.29	0.92
PCT D	-0.33	-0.38	-0.24	-0.47	-0.33	-0.17	-0.37	0.01	-0.32	-0.40

Table 2 continued

	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
	40–44	40–44	45–49	45–49	45–49	45–49	50–54	50–54	50–54	50–54
	22.37	15.65	292.18	32.28	27.36	18.70	285.59	32.80	31.02	25.10
	St. proportion aged 16-74 with no qualifications 2001 Census	Proportion claiming Incapacity Benefit/ Severe Disability living allowance 2005	Death rates 2001-2005	St. limiting long-term illness 2001 Census	St. proportion aged 16-74 with no qualifications 2001 Census	Proportion aged over 60 claiming Pension Credit 2005	Death rates 2001-2005	St. limiting long-term illness 2001 Census	St. proportion aged 16-74 with no qualifications 2001 Census	Proportion aged over 60 claiming Pension Credit 2005
	stnoqual	ibsdav1	deathrat	llti	stnoqual	pencrv1	deathrat	llti	stnoqual	pencrv1
PCT A	1.75	0.63	-0.22	1.27	1.69	2.05	-0.15	1.26	1.70	2.04
PCT B	0.96	1.86	-0.24	1.69	0.93	1.31	-0.15	1.67	0.90	1.29
PCT C	0.07	0.61	-0.22	0.91	0.07	1.47	-0.15	0.90	0.06	1.46
PCT D	-0.43	-0.19	-0.29	-0.41	-0.45	-0.48	-0.24	-0.43	-0.47	-0.51

Table 2 continued

	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
	55–59	55–59	55–59	55–59	60–64	60–64	60–64	60–64	65–69	65–69
	294.12	42.30	33.30	23.86	173.50	48.09	33.47	20.01	211.90	65.46
	Death rates 2001-2005	St. limiting long-term illness 2001 Census	Proportion aged over 60 claiming Pension Credit 2005	St. proportion aged 16-74 with no qualifications 2001 Census	Death rates 2001-2005	Proportion aged over 60 claiming Pension Credit 2005	St. limiting long-term illness 2001 Census	St. proportion aged 16-74 with no qualifications 2001 Census	Death rates 2001-2005	Proportion aged over 60 claiming Pension Credit 2005
	deathrat	llti	pencrv1	stnoqual	deathrat	pencrv1	llti	stnoqual	deathrat	pencrv1
PCT A	-0.01	1.23	2.00	1.67	0.15	1.89	1.16	1.58	0.44	1.96
PCT B	-0.04	1.67	1.28	0.89	0.17	1.26	1.66	0.89	0.49	1.29
PCT C	-0.08	0.89	1.44	0.04	0.14	1.44	0.87	0.04	0.42	1.45
PCT D	-0.19	-0.44	-0.53	-0.49	-0.09	-0.56	-0.46	-0.51	0.10	-0.56

Table 2 continued

	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH
	65–69	70–74	70–74	70–74	75–79	75–79	75–79	80–84	80–84	80–84
	36.34	180.17	62.14	57.50	148.77	44.55	38.19	117.46	33.28	28.36
	Proportion over 60 claiming Disability living allowance 2005	Death rates 2001-2005	Proportion over 60 claiming Disability living allowance 2005	Proportion aged over 60 claiming Pension Credit 2005	Death rates 2001-2005	Proportion aged over 60 claiming Pension Credit 2005	St. proportion aged 16-74 with no qualifications 2001 Census	Death rates 2001-2005	Proportion aged over 60 claiming Pension Credit 2005	St. proportion aged 16-74 with no qualifications 2001 Census
	dlav8	deathrat	dlav8	pencrv1	deathrat	pencrv1	stnoqual	deathrat	pencrv1	stnoqual
PCT A	1.04	0.92	1.11	2.07	1.59	2.07	1.73	2.33	1.96	1.61
PCT B	2.60	0.98	2.57	1.26	1.82	1.21	0.87	3.02	1.18	0.83
PCT C	0.75	0.88	0.76	1.47	1.58	1.48	0.12	2.47	1.47	0.13
PCT D	-0.75	0.46	-0.76	-0.56	1.06	-0.55	-0.50	1.97	-0.54	-0.50

Table 2 continued

	BI	BJ	BK
	85+	85+	85+
	258.24	124.14	21.82
	Proportion over 60 claiming Disability living allowance 2005	Proportion aged over 60 claiming Pension Credit 2005	Death rates 2001-2005
	dlav8	pencrv1	deathrat
PCT A	0.99	1.89	5.53
PCT B	2.37	1.20	6.68
PCT C	0.75	1.48	5.78
PCT D	-0.76	-0.52	5.66

Table 3: HCHS acute need constant terms

	A	B	C	D	E	F	G	H	I
Age band	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44
Constant	317.61	401.54	378.88	216.02	536.03	328.48	378.33	413.84	476.93

Table 3 continued

	A	B	C	D	E	F	G	H	I
Age band	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85+
Constant	492.38	554.04	657.95	818.41	985.20	1,211.18	1,423.89	1,616.52	2,704.96

Table 4: Calculate HCHS acute weighted population

	A	B	C	D	E	F	G	H	I
	average cost per person								
	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44
	317.61 + 202.49 deathrat + 13.70 idincch + 9.47 stnoqual + 5.39 pr–lbw	401.54 + 541.50 deathrat + 11.94 stnoqual + 10.41 idincch	378.88 + 494.51 deathrat + 13.02 dlav2 +6.23 stnoqual	216.02 + 465.66 deathrat + 13.72 educv1 + 12.13 llti	536.03 + 883.08 deathrat + 20.61 educv1 + 14.51 llti	328.48 + 209.54 deathrat + 23.61 stnoqual + 16.25 dlav1 + 8.54 newdv1	378.33 + 316.48 deathrat + 21.46 stnoqual + 15.89 dlav1 + 6.49 newdv1	413.84 + 344.91 deathrat + 24.49 ibsdav1 + 23.93 llti + 7.13 educv1	476.93 + 418.03 deathrat + 27.58 llti + 22.37 stnoqual + 15.65 ibsdav1
PCT A	315.26	247.95	221.92	61.97	242.30	323.35	332.87	349.91	445.04
PCT B	291.58	235.55	218.05	80.41	262.53	326.07	341.33	401.33	461.59
PCT C	285.55	228.22	207.39	64.27	242.55	274.05	287.17	340.81	392.54
PCT D	240.64	197.55	197.26	46.85	218.21	239.68	257.49	286.14	321.16

Table 4 continued

	J	K	L	M	N	O
	average cost per person					
	45–49	50–54	55–59	60–64	65–69	70–74
	492.38 + 292.18 deathrat + 32.28 llti + 27.36 stnoqual + 18.70 pencrv1	554.04 + 285.59 deathrat + 32.80 llti + 31.02 stnoqual + pencrv1	657.95 + 294.12 deathrat + 42.30 llti + 33.30 pencrv1 + 23.86 stnoqual	818.41 + 173.50 deathrat + 48.09 pencrv1 + 33.47 llti + 20.01 stnoqual	985.20 + 211.90 deathrat + 65.46 pencrv1 + 36.34 dlav8	1211.18 + 180.17 deathrat + 62.14 dlav8 + 57.50 pencrv1
PCT A	554.48	655.25	814.36	1,006.47	1,244.37	1,564.58
PCT B	527.40	626.77	779.61	981.54	1,267.25	1,619.75
PCT C	487.01	578.99	721.05	941.76	1,195.68	1,500.76
PCT D	374.00	444.55	553.17	750.92	941.05	1,215.57
Total						

Table 4 continued

	P	Q	R	S	T
	average cost per person				
	75–79	80–84	85+	Total cost	Acute weighted population
	1423.89 + 148.77 deathrat + 44.55 pencrv1 + 38.19 stnoqual	1616.52 + 117.46 deathrat + 33.28 pencrv1 + 28.36 stnoqual	2704.96 + 258.24 dlav8 + 124.14 pencrv1 + 21.82 deathrat	Sum product of Table 1 cols A to R and Table 4 cols A to R	S normalised to Table 1 col S
PCT A	1,819.17	2,001.42	3,316.67	98,199	178
PCT B	1,782.29	2,034.20	3,610.72	154,820	281
PCT C	1,729.18	1,959.00	3,206.89	121,091	220
PCT D	1,538.28	1,816.44	2,569.27	177,463	322
Total				551,573	1,000

Table 5: Calculate HCHS maternity need weighted population

	A	B	C	D	E	F
	ONS birth registrations 2006	Low birth weight births	Mean house price	Average cost of birth	Total cost of births	Maternity need weighted population
		pr–lbwm	housprv2			
		24.66	-96.06	2308.81 + 24.66 pr–lbwm -96.06 housprv2	A * D	E normalised to Table 1 col S
PCT A	4	1.73	-0.69	2,418	8,947	293
PCT B	3	0.50	-0.81	2,399	7,437	243
PCT C	4	0.31	1.44	2,178	8,058	263
PCT D	3	-0.46	0.24	2,274	6,141	201
Total	13				30,583	1,000

Table 6: HCHS mental health age weights

	A	B	C	D	E	F	G	H	I
Age band	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44
Relative age weight	0.0032	0.0281	0.1655	0.5952	1.0908	1.1674	1.1448	1.1182	1.0419

Table 6 continued

	J	K	L	M	N	O	P	Q	R
Age band	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85+
Relative age weight	0.9951	0.8867	0.9258	1.0043	1.2047	1.6138	2.4244	3.1792	3.2985

Table 7: Calculate HCHS mental health age index

	A	B	C
	Crude population * age weights	Mental health age weighted population	Mental health age index
	Sum product of Table 1 cols A to R and Table 6 cols A to R	A normalised to Table 1 col S	B / Table 1 col S
PCT A	174	173	0.86
PCT B	253	251	1.00
PCT C	248	246	0.98
PCT D	333	331	1.10
Total	1,009	1,000	1.00

Table 8: Calculate HCHS mental health additional need index

	A	B	C	D	E	F	G
	Comparative Mortality Factor <65	Income support > 60	Housing domain	Psychiatric morbidity	Crude population * needs model	Mental health weighted population	Mental health additional need index
	cmf64	isc–ov60	scorehou	ratppre2			
	0.3578	0.3377	0.0343	0.6361	Table 1 col S * (0.384636 + 0.3578 cmf64 + 0.3377 isc–ov60 + 0.0343 scorehou + 0.6361 + ratppre2)	E normalised to Table 1 col S	F / Table 1 col S
PCT A	0.31	1.41	1.73	1.30	371	263	1.31
PCT B	0.49	0.87	0.41	1.20	408	289	1.15
PCT C	0.29	0.78	1.44	1.15	383	271	1.08
PCT D	-0.17	-0.23	-0.31	0.95	251	178	0.59
Total					1,414	1,000	1.00

Table 9: HCHS mental health weighted population

	A	B	C	D
	Mental health age index	Mental health additional need index	Crude population * age index * additional need index	Mental health weighted population
	Table 7 col C	Table 8 * col G	Table 1 col S * B * C	C normalised to Table 1 col S
PCT A	0.86	1.31	227	232
PCT B	1.00	1.15	289	296
PCT C	0.98	1.08	267	272
PCT D	1.10	0.59	196	200
Total	1.00	1.00	979	1,000

Table 10: Calculate HIV/AIDS treatment and care weighted population

	A	B
	2007 SOPHID	HIV/AIDS treatment and care
		A normalised to Table 1 col S
PCT A	1	143
PCT B	1	143
PCT C	5	714
PCT D	0	0
Total	7	1,000

Table 11: Calculate HIV prevention weighted population

	2007 SOPHID	15-44 year olds	HIV prevention
		Sum Table 1 cols D to I	B normalised to Table 1 col S * 0.4 + C normalised to Table 1 cols S * 0.6
PCT A	1	99	187
PCT B	1	113	205
PCT C	5	141	470
PCT D	0	106	139
Total	7	459	1,000

Table 12: Calculate health inequalities weighted population

	A	B	C	D
	Disability free life expectancy (DFLE) 2005	DFLE from 70 years	DFLE * crude population	Health inequalities weighted population
		70 – A	B * Table 1 col S	C normalised to Table 1 col S
PCT A	59.9	10.1	2,017	210
PCT B	55.8	14.2	3,551	369
PCT C	59.2	10.8	2,703	281
PCT D	65.5	4.5	1,351	140
Total			9,622	1,000

Table 13: Calculate HCHS need index

	A	B	C	D	E	F	G	H
	Acute need	Maternity need	Mental health need	HIV/AIDS treatment and care	HIV prevention	Health inequalities	Need weighted population	Need index
	67.5%	2.9%	16.1%	0.8%	0.2%	12.4%	100.0%	
	Table 4 col T	Table 5 col F	Table 9 col D	Table 10 col B	Table 11 col C	Table 12 col D	67.5% A + 2.9% B + 16.1% C + 0.8% D + 0.2% E + 12.4% F	G / Table 1 col S
PCT A	178	293	232	143	187	210	194	0.97
PCT B	281	243	296	143	205	369	292	1.17
PCT C	220	263	272	714	470	281	242	0.97
PCT D	322	201	200	0	139	140	273	0.91
Total	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1.00

Table 14: Non host market forces factor (MFF) indices from purchaser provider matrix

	A	B	C	D
	Staff MFF	Medical and dental (M&D) MFF	Land MFF	Building MFF
PCT A	0.95	1.00	1.00	0.95
PCT B	0.95	1.00	0.71	0.93
PCT C	1.19	1.02	8.11	1.19
PCT D	0.91	1.00	1.00	0.96

Table 15: Host MFFs

	A	B	C	D
	Staff MFF	M&D MFF	Land MFF	Building MFF
PCT A	0.96	1.00	1.15	0.95
PCT B	0.95	1.00	0.74	0.93
PCT C	1.24	1.00	4.87	1.17
PCT D	0.90	1.00	0.75	0.96

Table 16: PCT MFFs

	A	B	C	D
	Staff MFF	M&D MFF	Land MFF	Building MFF
	83.6% Table 14 col A + 16.4% Table 15 col A	83.6% Table 14 col B + 16.4% Table 15 col B	83.6% Table 14 col C + 16.4% Table 15 col C	83.6% Table 14 col D + 16.4% Table 15 col D
PCT A	0.95	1.00	1.03	0.95
PCT B	0.95	1.00	0.71	0.93
PCT C	1.20	1.02	7.58	1.18
PCT D	0.91	1.00	0.96	0.96

Table 17: Calculate HCHS MFF index

	A	B	C	D	E	F	G
	Staff weighted population	M&D weighted population	Land weighted population	Building weighted population	Other weighted population	MFF weighted population	MFF index
	56.1%	13.8%	0.6%	3.0%	26.5%	100.0%	
	Table 1 col S * Table 16 col A normalised to Table 1 col S	Table 1 col S * Table 16 col B normalised to Table 1 col S	Table 1 col S * Table 16 col C normalised to Table 1 col S	Table 1 col S * Table 16 col D normalised to Table 1 col S	Table 1 col S	56.1% A + 13.8% B + 0.6% C + 3.0% D + 26.5% E	F / Table 1 col S
PCT A	190	199	80	188	200	193	0.97
PCT B	237	249	69	231	250	241	0.96
PCT C	301	254	738	294	250	283	1.13
PCT D	272	299	113	287	300	283	0.94
Total	1,000	1,000	1,000	1,000	1,000	1,000	1.00

Table 18: Calculate the emergency ambulance cost adjustment (EACA)

	A	B	C
	EACA need factor	EACA weighted population	EACA index
		1.8% * A * Table 1 col S normalised to Table 1 col S + 98.2% Table 1 col S	B / Table 1 col S
PCT A	0.04	199	1.00
PCT B	0.06	250	1.00
PCT C	0.06	250	1.00
PCT D	0.07	301	1.00
Total		1,000	1.00

Table 19: Calculate HCHS weighted population

	A	B	C	D	E	F
	Crude population	Need index	MFF index	EACA index	Crude population * indices	HCHS weighted population
	Table 1 col S	Table 13 col H	Table 17 col G	Table 18 col C	A * B * C * D	E normalised to A
PCT A	200	0.97	0.97	1.00	186	186
PCT B	250	1.17	0.96	1.00	281	281
PCT C	250	0.97	1.13	1.00	273	274
PCT D	300	0.91	0.94	1.00	258	259
Total	1,000	1.00	1.00	1.00	999	1,000

PRESCRIBING COMPONENT

Table 20: Prescribing male crude population

	A	B	C	D	E	F	G	H	I	J
	0-4	5-9	15-24	25-34	35-44	45-54	55-64	65-74	75+	Male population Sum A to I
PCT A	10	15	19	19	14	11	7	5	4	104
PCT B	8	13	22	20	16	16	13	10	7	125
PCT C	9	11	15	32	24	14	8	6	4	123
PCT D	6	17	19	15	19	20	21	16	13	146
Total	33	56	75	86	73	61	49	37	28	498

Table 21: Prescribing female crude population

	A	B	C	D	E	F	G	H	I	J
	0-4	5-9	15-24	25-34	35-44	45-54	55-64	65-74	75+	Female population Sum A to I
PCT A	9	15	18	17	12	9	6	6	4	96
PCT B	7	12	22	17	16	17	14	10	10	125
PCT C	8	11	16	33	21	14	10	7	7	127
PCT D	6	15	18	15	20	21	22	17	20	154
Total	30	53	74	82	69	61	52	40	41	502

Table 22: ASTRO(97)PUs

	A	B	C	D	E	F	G	H	I
	0-4	5-9	15-24	25-34	35-44	45-54	55-64	65-74	75+
Male	1.0	1.4	1.7	2.0	2.8	4.4	7.6	10.1	11.8
Female	0.8	1.2	2.1	2.4	3.2	5.4	7.2	9.6	10.6

Table 23: Calculate prescribing age index

	A	B	C	D
	Crude population	Crude population * ASTRO(97)PUs	Age weighted population	Age index
	Table 20 col J + Table 21 col J	Sum product Tables 20 and 22 + sum product Tables 21 and 22	B normalised to A	C / A
PCT A	200	674	163	0.81
PCT B	250	1,054	254	1.02
PCT C	250	900	217	0.87
PCT D	300	1,516	366	1.22
Total	1,000	4,143	1,000	1.00

Table 24: Calculate prescribing additional need index

	A	B	C	D	E	F	G
	% Limiting long-term illness	Disability living allowance claimants	Low-income scheme index	Low birthweight births	Population * needs model	Additional need weighted population	Additional need index
	lliv1	dlav1	lisi0708	pr–lbw			
	0.0436	0.0498	0.0059	0.0074	0.9967		
					Table 23 col A * (0.9967 + 0.0436 lliv1 + 0.0498 + 0.0059 lisi0708 + 0.0074 pr–lbw)	E normalised to Table 23 col A	F / Table 23 col A
PCT A	0.34	0.61	1.79	2.38	214	200	1.00
PCT B	1.79	2.70	1.31	0.67	305	285	1.14
PCT C	-0.05	0.41	0.99	0.41	256	239	0.96
PCT D	0.31	-0.36	-0.44	-0.66	295	276	0.92
Total					1,071	1,000	1.00

Table 25: Calculate prescribing need weighted population

	A	B	C	D	E
	Crude population	Age index	Additional need index	Crude population * age index * need index	Prescribing need weighted population
	Table 23 col A			A * B * C	D normalised to A
PCT A	200	0.81	1.00	163	163
PCT B	250	1.02	1.14	290	291
PCT C	250	0.87	0.96	208	208
PCT D	300	1.22	0.92	336	337
Total	1,000	1.00	1.00	997	1,000

Table 26: Calculate prescribing health inequalities weighted population

	A	B	C
	DFLE from 70	Population * DFLE	Health inequalities weighted population
	Table 12 col B	Table 23 * A	B normalised to Table 23 col A
PCT A	10.1	2,017	210
PCT B	14.2	3,551	369
PCT C	10.8	2,703	281
PCT D	4.5	1,351	140
Total		9,622	1,000

Table 27: Calculate prescribing weighted population

	A	B	C
	Prescribing need weighted population	Health inequalities weighted population	Prescribing weighted population
	85%	15%	
	Table 25 col E	Table 26 col C	85% A + 15% B
PCT A	163	210	170
PCT B	291	369	303
PCT C	208	281	219
PCT D	337	140	308
Total	1,000	1,000	1,000

PRIMARY MEDICAL SERVICES COMPONENT

Table 28: Primary medical services male crude population

	A	B	C	D	E	F	G	H
	0-4	5-14	15-44	45-64	65-74	75-84	85+	Male population
PCT A	10	15	52	18	5	3	1	104
PCT B	8	13	58	29	10	6	1	125
PCT C	9	11	71	22	6	3	1	123
PCT D	6	17	53	41	16	10	3	146
Total	33	56	234	110	37	22	6	498

Table 29: Primary medical services female crude population

	A	B	C	D	E	F	G	H
	0-4	5-14	15-44	45-64	65-74	75-84	85+	Female population
PCT A	9	15	47	15	6	3	1	96
PCT B	7	12	55	31	10	7	3	125
PCT C	8	11	70	24	7	5	2	127
PCT D	6	15	53	43	17	13	7	154
Total	30	53	225	113	40	28	13	502

Table 30: Primary medical services age sex weights

	A	B	C	D	E	F	G
Age band	0-4	5-14	15-44	45-64	65-74	75-84	85+
Male	3.97	1.00	1.02	2.16	4.23	6.01	7.22
Female	3.64	1.04	2.20	3.37	4.95	6.95	8.85

Table 31: Calculate primary medical services age sex index

	A	B	C	D
	Crude population	Crude population * age sex weights	Age weighted population	Age Index
	Table 28 col H + Table 29 col H	Sum product Tables 28 and 30 + sum product Tables 29 and 30	B normalised to A	C / A
PCT A	200	455	179	0.89
PCT B	250	640	252	1.01
PCT C	250	580	228	0.91
PCT D	300	868	341	1.14
Total	1,000	2,543	1,000	1.00

Table 32: Calculate primary medical services additional need index

	A	B	C	D
	Limiting long term illness	Standardised mortality ratio under 65	Additional needs weighted population	Additional need index
	llti	smr64		
	0.26	0.24	Table 31 col A * (48.12 + 0.26 llti + 0.24 smr64) normalised to Table 31 col S	C / Table 31 col A
PCT A	133.59	155.09	218	1.09
PCT B	144.11	147.94	275	1.10
PCT C	121.51	136.51	256	1.02
PCT D	89.73	84.66	251	0.84
Total			1,000	1.00

Table 33: Calculate primary medical services need weighted population

	A	B	C	D	E
	Crude population	Age index	Additional need Index	Crude population * age index * need index	Need weighted population
	Table 31 col A	Table 31 col D	Table 32 col E	A * B * C	D normalised to A
PCT A	200	0.89	1.09	195	197
PCT B	250	1.01	1.10	277	280
PCT C	250	0.91	1.02	233	235
PCT D	300	1.14	0.84	285	288
Total	1,000	1.00	1.00	991	1,000

Table 34: Calculate primary medical services health inequalities weighted population

	A	B	C	D
	Crude population	DFLE from 70	Crude population * DFLE	Health inequalities weighted population
	Table 31 col A	Table 12 col B	A * B	B normalised to A
PCT A	200	10.1	2,017	210
PCT B	250	14.2	3,551	369
PCT C	250	10.8	2,703	281
PCT D	300	4.5	1,351	140
Total	1,000		9,622	1,000

Table 35: Calculate primary medical services need and health inequalities index

	A	B	C	D	E
	Crude population	Need weighted population	Health inequalities weighted population	Need and health inequalities weighted population	Need and health inequalities index
		85%	15%		
	Table 31 col A	Table 33 col E	Table 34 col D	85% B + 15% C	D / A
PCT A	200	197	210	199	0.99
PCT B	250	280	369	293	1.17
PCT C	250	235	281	242	0.97
PCT D	300	288	140	266	0.89
Total	1,000	1,000	1,000	1,000	1.00

Table 36: Primary medical services MFF indices

	A	B	C	D
	GP pay index	Practice staff index	Land index	Buildings index
		Table 15 col A		Table 15 col D
PCT A	1.12	0.96	0.56	0.95
PCT B	1.11	0.95	0.49	0.93
PCT C	1.09	1.24	2.61	1.17
PCT D	1.01	0.90	0.59	0.96

Table 37: Calculate primary medical services MFF index

	A	B	C	D	E	F	G	H
	Crude population	GP pay weighted population	Practice staff weighted population	Land weighted population	Buildings weighted population	Other weighted population	Population weighted for MFF	MFF Index
		44.9%	30.7%	1.2%	5.8%	17.5%		
	Table 31 col A	A * Table 36 col A normalised to A	A * Table 36 col B normalised to A	A * Table 36 col C normalised to A	A * Table 36 col D normalised to A	A	44.9% B + 30.7% C + 1.2% D + 5.8% E + 17.5% F	G / A
PCT A	200	207	189	105	190	200	198	0.99
PCT B	250	258	235	116	232	250	246	0.99
PCT C	250	252	308	614	291	250	275	1.10
PCT D	300	283	268	166	287	300	280	0.93
Total	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1.00

Table 38: Calculate primary medical services weighted population

	A	B	C	D	
	Crude population	Need and health inequalities index	MFF Index	Crude population * indices	Primary medical services weighted population
	Table 31 col A	Table 35 col E	Table 37 col H	A * B * C	D normalised to A
PCT A	200	0.99	0.99	195	197
PCT B	250	1.17	0.99	277	289
PCT C	250	0.97	1.10	233	266
PCT D	300	0.89	0.93	285	248
Total	1,000	1.00	1.00	991	1,000

WEIGHTED POPULATIONS, GROWTH AREA ADJUSTMENT, WEIGHTED CAPITATION TARGETS AND DISTANCES FROM TARGETS (DFTS)

Table 39: Calculate weighted populations, growth area adjustment, weighted capitation targets and distances from targets (DFTs)

	A	B	C	D	E	F	G	H	I	J
	HCHS weighted population	Prescribing weighted population	Primary medical services weighted population	Unified weighted population	Growth area variant populations	Growth area adjustment to target £	2009-10 opening baseline £	2009-10 opening target £	2009-10 opening DFT £	2009-10 opening DFT %
	76.3%	12.4%	11.3%	100.0%						
	Table 19 col F	Table 27 col C	Table 38 col D	76.3% A + 12.4% B + 11.3% C		E * £1,000		D normalised to (G – F) + F	G – H	I / H
PCT A	186	170	197	185	0	0	200,000	184,566	15,434	8.4%
PCT B	281	303	289	285	0	0	250,000	283,420	-33,420	-11.8%
PCT C	274	219	266	266	5	5,000	300,000	269,849	30,151	11.2%
PCT D	259	308	248	263	0	0	250,000	262,165	-12,165	-4.6%
Total	1,000	1,000	1,000	1,000	5	5,000	1,000,000	1,000,000	-0	-0.0%