NHS England

Technical Guide to Allocation Formulae and Pace of Change

For 2016-17 to 2020-21 revenue allocations to Clinical Commissioning Groups and commissioning areas

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Technical Guide to Allocation Formulae and Pace of Change

For 2016-17 to 2020-21 revenue allocations to Clinical Commissioning Groups and commissioning areas

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Promoting equality and addressing health inequalities are at the heart of NHS England's values. Throughout the development of the policies and processes cited in this document, we have:

Given due regards to the need to eliminate discrimination, harassment and victimisation, to advance equality of opportunity, and to foster good relations between people who share a relevant protected characteristic (as cited under the Equality Act 2010) and those who do not share it;

Given regard to the need to reduce inequalities between patients in access to, and outcomes from, healthcare services and in securing that services are provided in an integrated way where this might reduce health inequalities.

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1 Executive summary

1.1 Scope of this guide

1.1.1 Funding streams covered

Allocations for 2016-17 to 2020-21 were published on 8 January 2016. The NHS England Board meeting on 17 December 2015 agreed the principles and parameters for these allocations.

These allocations were for Clinical Commissioning Group (CCG) areas for:

- core CCG allocations;
- specialised services allocations;
- primary medical care allocations; and
- total allocations (the sum of the core CCG, specialised and primary medical care).

1.1.2 Calculation of allocations

This guide provides an overview of the calculation of these allocations. It covers:

- the formulae for core CCG, specialised and primary medical care target allocations;
- pace of change policy;
- contributions to the Better Care Fund (BCF); and
- CCG running cost allowances.

1.1.3 Other documentation

The Technical Guide includes this document and a set of spreadsheets that show the calculation of target and actual allocations for each of: core CCG responsibilities, specialised services, primary medical care and commissioning areas. This document also provides a brief guide to the spreadsheets.

This guide should be read in conjunction with the following policy documents relating to allocations for 2016-17 to 2020-21:

- the NHS England Board paper *Allocation of resources to NHS England and the commissioning sector for 2016/17 to 2020/21;*
- *Delivering the Forward View: NHS planning guidance 2016/17 – 2020/21*; and
- *Financial Allocations 2016/17 to 2020/21*.

We welcome comments on the formulae[1].

[1] mailto:england.finance@nhs.net

1.2 Steps in setting allocations

Once the national budgets are known, there are four steps in the calculation of actual allocations:

- determine target allocations based on relative need and relative unavoidable costs;
- establish baselines (the previous year's allocations plus any adjustments);
- calculate opening distances from target (baseline minus target); and
- determine pace of change policy, that is how far CCG areas are moved closer to their target allocation each year through differential growth. Pace of change policy balances providing stability in funding for all organisations with moving those furthest under target closer towards their target.

The approach for calculating contributions to the Better Care Fund and running costs allowances is necessarily different.

1.3 Target formula

The target formula estimates the relative need and relative unavoidable costs between CCG areas for healthcare services.

1.3.1 Formula Components

There are separate formulae for target allocations for each of core CCG responsibilities, specialised services and primary medical care. Each formula is based on the size of the population of each CCG and adjustments, or weights, per head for relative need for health care services and unavoidable costs between CCGs. The weights per head are based on the following, though the actual values will differ between the three formulae.

- Need due to age (typically, the more elderly the population, the higher the need per head, all else being equal).
- Additional need over and above that due to age (this includes measures of health status and a number of proxies for health status such as deprivation).
- An adjustment for unmet need and health inequalities.
- Unavoidable higher costs of delivering health care due to location alone, known as the Market Forces Factor (this reflects that staff, land and building costs are higher in for example London than other parts of the country).
- In the core CCG formula, an adjustment for the higher costs of providing emergency ambulance services in sparsely populated areas, and an adjustment for the higher costs of unavoidably small hospitals with 24 hour accident and emergency services in remote areas.

1.3.2 Statistical Modelling

Statistical modelling is used to develop the formulae to identify the drivers of need per head for the three services and the relative size of the different drivers. Nearly all of these formulae have been refreshed by re-running the modelling using the latest data available at the time. A formula for specialised services has been developed for the first time.

The adjustment for the higher costs of providing emergency ambulance services has also been refreshed by running new statistical models.

An adjustment for the higher costs of providing unavoidably small hospitals with 24 hour A&E services in remote areas has been introduced for the first time, and is based on new data and analysis.

The unmet need and health inequalities adjustment is based on an element of judgement rather than a statistical formula due to the lack of data. This adjustment has been refined for 2016-17 to 2020-21 allocations. Updated market forces factors were not available.

1.3.3 CCG level weights

The weights per head from the formulae have been multiplied by the number of registrations with GP practices in each CCG as at October 2015. These were the latest data on GP practice registered lists available prior to the December 2015 NHS England Board meeting. This gave the weighted populations for each CCG area. The weighted populations were projected forward to 2020-21 based on Office for National Statistics projections for each year for resident populations in each CCG area.

1.4 Pace of Change

1.4.1 Minimum Growth

Actual allocations are derived from target allocations through pace of change policy. This sets a minimum growth in allocations for core CCG allocations and higher growth in allocations for the CCGs furthest under target. Pace of change for primary medical care allocations also sets a minimum rate of growth and higher growth for those furthest under target. For specialised services, all CCG areas received the same per head uplift.

1.4.2 Distribution of remaining funds

The remaining funding available was then used for pace of change for the place-based allocation (the sum of CCG core, specialised and primary medical care allocations). Any additional funding that a CCG area accrued under place-based pace of change was then redistributed back to the allocations for the CCG and primary medical care commissioning streams.

1.4.3 Furthest under target

Pace of change policy has ensured no CCG is further than 5% under target in 2016-17 for its core allocations. No CCG area is further than 5% under target for primary medical services by 2018-19, and no place-based allocation is further than 5% under target by 2016-17 and no further than 2.5% under target by 2020-21.

2 Introduction

2.1 How allocations were set

2.1.1 NHS England Board

The NHS England Board meeting on 17 December 2015 agreed the principles and parameters for funding allocations for the years 2016-17 to 2020-21. The first three years, 2016-17 to 2018-19, are firm allocations[2] and the final two years, 2019-20 and 2020-21 are indicative allocations.

The decisions taken by the NHS England Board were founded on the Mandate to NHS England, which requires a transparent allocations process based on the objective of equal opportunity of access for equal need. The NHS England Board also took into account its legal duty to have regard to the need to reduce inequalities between patients in access to, and outcomes from, healthcare services.

2.1.2 Advisory Committee on Resource Allocation (ACRA)

ACRA is an independent, expert, technical committee which makes recommendations to NHS England on the target formula for NHS allocations and to the Department of Health on the target formula for public health allocations. ACRA's remit does not include pace of change policy, which is set by NHS England for NHS allocations. ACRA's membership includes academics, GPs, NHS managers and public health experts.

The latest recommendations by ACRA for the formulae for NHS allocations are published alongside this technical guide and were fully accepted by the NHS England Board. The formulae recommended by ACRA are based on research, and references to the research and other relevant publications are provided in Annexes 2 and 3.

ACRA was established in 1997 as a successor to the different committees that over time have provided advice on NHS allocations formulae, starting with the Resource Allocation Working Party of 1976.

2.1.3 Steps in setting allocations

Once the national budgets have been set, there are four steps in the calculation of actual allocations:

- determine target allocations based on relative need and relative unavoidable costs;
- establish baselines (the previous year's allocations plus any adjustments);
- calculate opening distances from target (baseline minus target); and
- determine pace of change policy, that is how far CCG areas are moved closer to their target allocation each year through differential growth. Pace of change policy balances providing stability in funding for all organisations with moving those furthest under target closer towards their target.

[2] Subject to NHS England's right to change firm allocations under the specific circumstances set out in the Board paper.

The approach for calculating contributions to the Better Care Fund and running costs allowances is necessarily different.

2.1.4 Announced allocations for 2016-17 to 2020-21

The allocations were published on 8 January 2016 for:

- core CCG allocations;
- specialised services allocations;
- primary medical care allocations; and
- total allocations (the sum of the core, specialised and primary medical care).

This guide should be read in conjunction with the following policy documents relating to allocations for 2016-17 to 2020-21:

- the NHS England Board paper *Allocation of resources to NHS England and the commissioning sector for 2016/17 to 2020/21;*
- *Delivering the Forward View: NHS planning guidance 2016/17 – 2020/21;* and
- *Financial Allocations 2016/17 to 2020/21*.

Financial Allocations 2016/17 to 2020/21 includes sections on the policy statement, allocation rules, pace of change, next steps and circumstances for review of the allocations for 2016-17 to 2018-19.

2.2 Scope of the Technical Guide

2.2.1 Funding streams covered

This guide provides an overview of the calculation of the allocations announced on 8 January 2016 for the years 2016-17 to 2020-21. It covers:

- the formulae for core CCG, specialised and primary medical care target allocations;
- pace of change policy;
- contributions to the Better Care Fund (BCF); and
- CCG running cost allowances.

2.2.2 Allocations spreadsheets

The Technical Guide includes this document and a set of spreadsheets which show the calculation of target and actual allocations for each of core CCG responsibilities, specialised services, primary medical care and commissioning areas. This document also provides a brief guide to the spreadsheets. The spreadsheets include detailed notes on data sources and the calculations.

Due to the large size of many of the spreadsheets, many values have been hard coded rather than driven by Excel formulae. Where this is the case, the notes in the files explain the relationship between the columns in the spreadsheets. The calculations have also been set out over a number of separate files rather than two or

three files, again for reasons of size. A list of the accompanying spreadsheets is at Annex 3.

2.2.3 Weighted capitation formulae

Target allocations are based on the weighted capitation formulae recommended by ACRA. There are separate formulae for CCGs' core responsibilities, specialised services and primary medical care. For each of these, weighted populations are calculated for each CCG area, and each CCG area's monetary target allocation is the CCG area's share of the total weighted population for England multiplied by the national budget for the relevant funding stream.

An overview of the weighted capitation formulae immediately follows. The subsequent sections provide more detail on the formulae and pace of change policy.

It is not possible in the Technical Guide to give full details of the modelling. However, references to the research and modelling are provided in Annexes 2 and 3.

2.3 Overview of methodology for the weighted capitation formula

2.3.1 Methodology

An overview of the approach for calculating weighted populations is set out below. The detailed differences in the calculations for CCG core responsibilities, specialised services and primary medical care are not set out here, but in the subsequent sections and spreadsheets.

2.3.2 Weighted populations

The weighted population for each CCG area is based on:

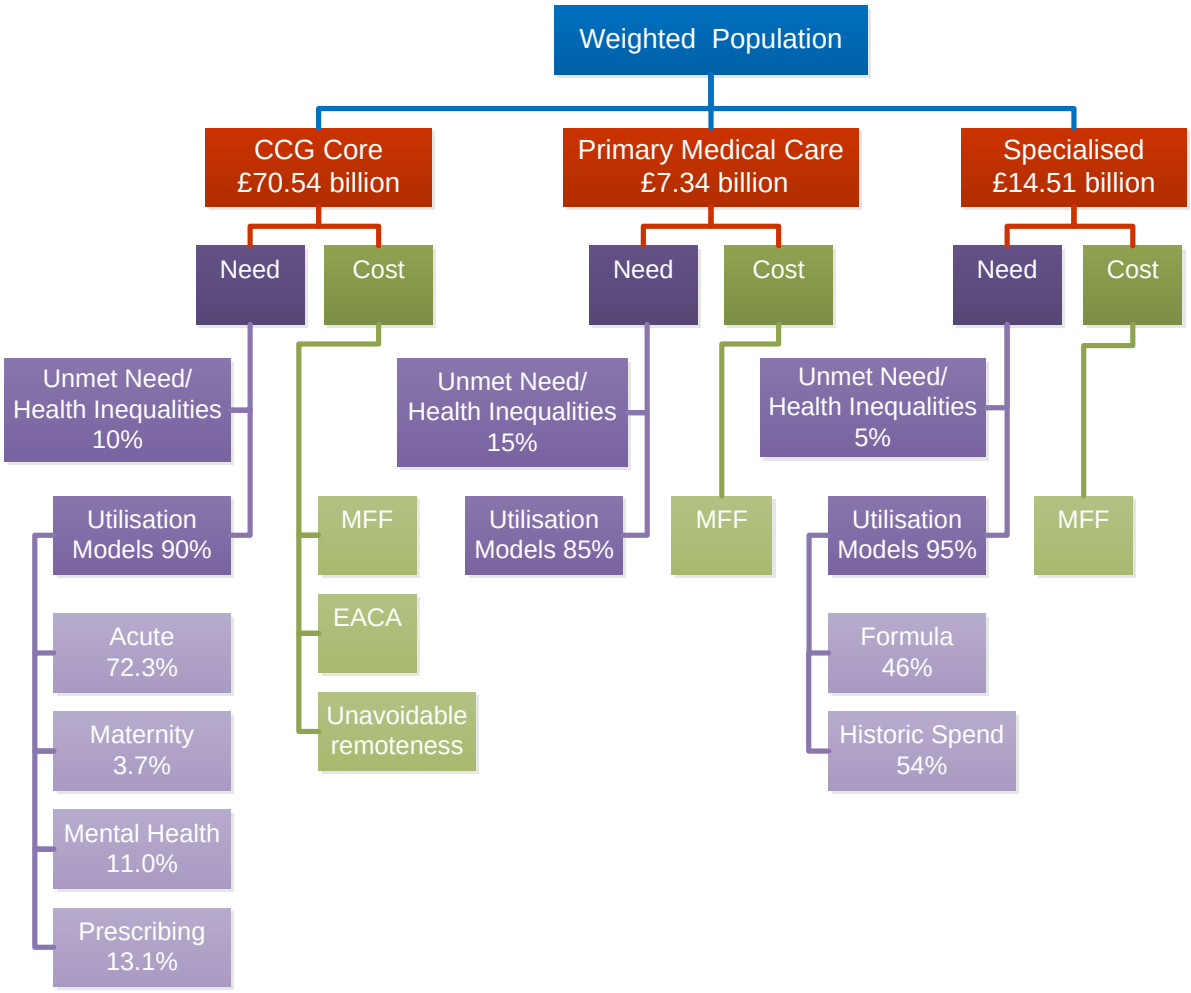
- the size of each CCG area's population;
- a weight, or adjustment, per head for need for health care services related to age (all else being equal, areas with older populations typically have a higher need per head);
- a weight, or adjustment, per head for need over and above that due to age (all else being equal, areas with poorer health have a higher need per head);
- a weight, or adjustment, per head for unmet need and health inequalities;
- a weight, or adjustment, per head for unavoidably higher costs of delivering health care due to location alone, known as the Market Forces Factor (this reflects that unit staff, land and building input costs are higher in for example London than the rest of the country); and
- in the core CCG formula, an adjustment for the higher costs of providing emergency ambulance services in sparsely populated areas, and an adjustment for the higher costs of unavoidably small hospitals with 24 hour accident and emergency services in remote areas.

As the need for different types of health services varies across the country, there are separate formulae for each of CCG core responsibilities, specialised services and primary medical care. Within each of these, there are separate formulae and

adjustments – for example the distribution of need for CCG core responsibilities is different between general and acute, mental health and maternity services.

The different formulae and adjustments for unavoidable costs are summarised in Figure 2.1 and more details on each are provided in the relevant sections of this document.

Figure 2.1: Summary of CCG formula and adjustments



1. There are separate weighted populations for CCG core responsibilities, primary medical care services and specialised services. The total 2016-17 allocations for CCG areas are shown for each in billions of pounds[3].
2. There are both need and cost adjustments for the weighted populations.
3. The figure shows for need, the shares based on utilisation and the shares based on the unmet need and health inequalities adjustment.
4. For CCG core and specialised services allocations, the utilisation component is built up from a number of components. The share of each component is shown in the figure.

[3] These are different from the high level allocations in the December Board paper for two reasons. First, only part of the specialised services monies are allocated to CCG geographies, the balance being managed nationally to commission, for instance, highly specialised services. Second, the complex set of pace of change rules make it impossible to exactly match the distribution of resources at CCG geographies back to the totals set in the high level allocations. They are however within acceptable tolerances.

2.3.3 Fair shares formula

The weighted capitation formula estimates the need per head of each CCG's population relative to other CCGs and is also known as the fair shares formula. It does not seek to measure an absolute level of need for each area, only relative need (and relative unavoidable costs) between areas.

2.3.4 Population base

The populations used in the formula for each CCG are the total registered lists of all their GP practice members as at October 2015. These are then projected forward at CCG level for each year 2016-17 to 2020-21, based on Office for National Statistics' population projections.

2.3.5 Variation in need related to age and sex

People do not have identical needs for health care services. A key difference is that need varies according to age and sex, and in particular the very young and elderly, whose populations are not evenly distributed across the country, have a higher need for health services than the rest of the population. The weighted capitation formula therefore takes into account the relative need per head of different age-sex groups and the different age-sex profiles of local populations.

2.3.6 Variation in need over and above that related to age and sex

Even when differences due to age and sex are accounted for, populations with the same age-sex profiles display different levels of need. An additional adjustment to reflect the relative need for health services over and above that due to age and sex is therefore necessary.

2.3.7 Utilisation approach

Observing need per head directly has not proved possible to date. Instead statistical modelling has examined the relationship between the utilisation of health services on the one hand, and the characteristics of individual patients and the areas where they live on the other hand. These models have been used to decide which factors to include in the formula to predict future need per head and the relative weight on each of the factors.

Typically the models estimate need related to age and sex and additional need over and above that due to age and sex as a single set of weights rather than separate weights for age and additional need. This is because additional need varies by age group.

2.3.8 Supply side variables

The statistical models also include 'supply' variables to take account of the greater availability of health care services generally leading to higher use. As utilisation driven by available capacity is not a reflection of need, while the supply variables are included in the models, they are set to the national average when calculating weighted populations. This means areas are not penalised in the formula for lower utilisation due to relatively lower capacity.

2.3.9 Market Forces Factor (MFF)

The costs of providing health care unavoidably vary across the country due to different unit input costs, in particular staff costs and the costs of land and buildings. The weighted capitation formula includes an adjustment for these unavoidable costs, known as the Market Forces Factor (MFF). These costs are due to location alone, not need.

2.3.10 Emergency ambulance cost adjustment

The emergency ambulance cost adjustment (EACA) adjusts for unavoidable differences in the costs of providing these services across the country, particularly in sparsely populated areas due to for example the longer distances to incidents and conveying patients to hospitals. The EACA is included only in the formula for CCG core allocations.

2.3.11 Costs of unavoidable smallness

In the formula for CCG core allocations there is an adjustment for the higher costs of running unavoidably small hospitals with 24 hour A&E departments in remote areas. These hospitals are typically unable to achieve the same economies of scale as other hospitals.

The adjustment is based on modelling the costs at site level for all hospitals to give a ‘cost-curve’, showing the estimated relationship between the size of hospitals and costs. Criteria were developed to identify the hospitals that were unavoidably small due to remoteness. These were based on the size of the population served being relatively small, and travel times to other hospitals being relatively long. The ‘cost-curve’ gave the estimated higher costs for the remote hospital sites.

The EACA and the adjustment for the costs of unavoidable smallness due to remoteness capture higher costs over and above those covered by the MFF.

2.3.12 Unmet need and health inequalities adjustment

The models typically assess need as it is currently met by NHS services and therefore may not capture unmet need or inappropriately met need. NHS England also has a duty to reduce health inequalities.

There is therefore an adjustment for unmet/inappropriately met need and health inequalities, based on a measure of population health (the standardised mortality ratio for those under 75 years of age (SMR<75)). This adjustment is calculated for the population of each small area and then aggregated to CCG level. Applying the measure at the small area level takes into account unmet need/health inequalities within as well as between CCGs.

ACRA’s recommendations are principally based on research and modelling. However, due to the lack of robust quantitative evidence which is comprehensive and consistent between services and across the country, ACRA’s recommended measure to be used for the unmet need adjustment was largely pragmatic and based on judgement.

2.3.13 Measures for the unmet need/health inequalities adjustment

ACRA considered a range of measures of population health for the adjustment for unmet need and health inequalities. These were found to be highly correlated with each other. The SMR<75 has the advantage that it can be updated regularly at small

area level, while other measures can typically only be updated at small area level using data from the 10-yearly Census. The SMR<75 was recommended as an indicator of the health of the whole population of areas, including morbidity and all age groups. The use of the SMR<75 was an interim recommendation and ACRA wishes to undertake further work in the area of unmet need.

ACRA was unable to recommend the share of the overall weighted capitation formula that should be based on the unmet need adjustment. The NHS England Board meeting of 17 December 2015 determined the share should be 10% for the core CCG formula, 15% for primary medical care, and 5% for specialised services.

2.4 Main changes to the weighted capitation formulae

The main changes to the formulae compared with those used for 2014-15 and 2015-16 allocations are set out below. The formulae used for 2014-15 and 2015-16 allocations are described in the *Technical Guide to the formulae for 2014-15 and 2015-16 revenue allocations to Clinical Commissioning Groups and Area Teams*.

a) The need formulae for general and acute services, maternity services and the costs of medicines prescribed in primary care have been refreshed by re-running the modelling using the latest data available at the time.

b) A formula for specialised services has been developed for the first time.

c) The adjustment for the higher costs of providing emergency ambulance services has been refreshed by running new statistical models.

d) An adjustment for the higher costs of providing unavoidably small hospitals with 24 hour A&E services in remote areas has been introduced for the first time.

e) The unmet need and health inequalities adjustment continues to be based on the standardised mortality ratio for those aged 75 years (SMR<75). The latest data on the SMR<75 has been used and the adjustment refined to give a higher weight per head to the areas with the worst SMR<75 and to be based on the size of each CCG's registered lists in place of ONS populations.

f) Updated market forces factors for providers were not available, but the purchaser-provider matrix has been updated. The purchaser-provider matrix is the estimated spend by each CCG on each provider, and is used for the weights to calculate the MFF for CCGs from the average of the MFFs of the providers their patients use.

g) The primary medical care formula is based on new estimates of workload per patient in place of those in the Carr-Hill formula.

h) The population base is the number of registrations with GP practices in each CCG in October 2015. The weighted populations have been projected forward from October 2015 to 2020-21 based on Office for National Statistics projections for each year for resident populations in each CCG area.

3 Population base

3.1 Calculating CCG estimated registrations

3.1.1 GP registered lists

The starting point for the weighted capitation formulae is each CCG's population. The populations used are the registered lists of all member GP practices of the CCG.

The weighted capitation formulae are based on October 2015 registered lists (by age-sex group) as published on 15 October 2015 by the Health and Social Care Information Centre.

Registered lists are used irrespective of the patients' place of residence or where they use NHS services. This follows the guidance '*Who pays? Determining responsibility for payments for providers'* (NHS England 2013).

3.1.2 Projected weighted populations

The weighted populations for 2015 are projected forward to give weighted populations for each year 2016-17 to 2020-21. This is undertaken by estimating the percentage growth in each CCG's registered list from 2015 to each year between 2016 and 2020, and applying the same percentage growth in CCGs' registrations to CCGs' weighted populations.

2015 weighted populations uplifted by the percentage growth in registrations give a slightly different total for England than unweighted registrations. Each CCG's weighted population for 2016 and 2020 is scaled by the same percentage so that the England totals for weighted and unweighted registrations are equal. This leaves each CCG's share of England weighted registrations unchanged.

3.1.3 Projected registered lists

Registered lists for October 2015 are projected forward to give estimated registered lists for each year 2016 to 2020. They are projected forward using ONS's projections for resident populations for CCGs. The percentage growth in CCGs' registrations is taken to be same as its projected percentage growth in its resident population.

The ONS projected populations for CCGs are the 2012 based Subnational Population Projections (SNPPs). These projections start with the 2011 Census populations which are rolled forward to 2012 by adding the number of births and net migration and subtracting the number of deaths. Trends for the fertility rates, death rates and net migration are used by ONS to project forward from 2012.

The sizes of CCGs' registered lists differ from the sizes of the ONS resident populations. This is for a number of reasons, the largest of which is cross-boundary flows. These are people who are registered with one CCG and reside in a different CCG. Other reasons include people who are entitled to register with a GP Practice but are excluded from ONS populations because they have not yet been resident in the UK for 12 months, unregistered patients who are included in ONS populations, and patients for whom there is a delay in removal from registered lists following for example a move abroad.

For the calculation of 2014-15 and 2015-16 allocations, ONS population projections for local authorities were mapped to CCGs, as at that time ONS did not publish

population projections for CCGs. ONS now publish population projections directly for CCGs' geographical areas.

3.1.4 Unregistered populations

It is recognised that using registered lists does not take into account people who are not registered with a GP practice. ACRA in 2013 considered whether an adjustment should be made to the formula for unregistered populations, but due to the absence of reliable data being available on the size of the unregistered population by area and their healthcare needs, concluded it is not presently possible to do so.

A - Registrations by GP practice and CCG - October 2015 (Excel file)

This gives the number of registrations by GP practice and CCG, broken down by age-sex group in October 2015 used for the CCG weighted capitation formula.

B – Calculation of CCG estimated registrations 2016-2020 (Excel file)

This shows the calculation of the percentage growth rates in CCG registered lists.

4 Clinical Commissioning Group core allocations

4.1 Introduction

There are three steps in calculating weighted populations for target allocations for CCG core responsibilities. The first is to weight, or adjust, registered populations for relative need, the second is to adjust for unmet need/health inequalities, and the third is to weight or adjust for unavoidable differences in cost due to location.

This section covers the first and second, the weights per head for need and the unmet need adjustment. There are separate weights per head for need for general and acute, mental health and maternity services and prescribing as the distribution of need across the country is different for each.

Section 3 has described the population base, section 5 describes the adjustments for unavoidable costs, and section 6 describes how the need-weighted populations for general and acute, mental health, maternity, and prescribing are combined into a single need-weighted population. Section 6 also describes how the need-weighted populations are combined with the unmet need adjustment and the adjustments for unavoidable costs to give a single unified weighted population for each CCG for its core allocations.

The basic approach in calculating need-weighted populations for CCGs is to multiply the population for each age-sex group for each GP practice by the relative need per head estimated from research. The products for each age-sex group are summed to give the relative need-weighted population for each GP practice. The weighted populations for GP practices are summed to give the relative need-weighted populations for each CCG.

4.2 General and acute

4.2.1 Refreshing the Nuffield formula

The relative need per head for general and acute for 2014-15 and 2015-16 allocations was estimated by the Nuffield Trust using a person-based approach, building on the research for the former practice based commissioning toolkit. The person-based approach uses data at the individual level (anonymised) to provide accurate estimates of need for small and atypical populations.

The Nuffield Trust research estimated jointly need related to age and additional need over and above that due to age.

NHS England Analytical Services has refreshed the Nuffield research using more recent data and re-estimating the models to produce updated weights for different drivers of need. Data for 2011-12 to 2013-14 were used, compared with 2007-08 to 2009-10 used by the Nuffield Trust. The same approach and methodology as the Nuffield Trust were followed.

4.2.2 Services covered

The refreshed general and acute model covers inpatient spells, outpatient attendances, accident and emergency attendances and critical care. Mental health and maternity services were excluded as they are covered by separate formulae.

Specialised services were also excluded as they are not commissioned by CCGs. A new, separate formula for specialised services was developed for the purpose of assessing the total resources available for the CCG area.

The Prescribed Specialised Services (PSS) 2014/15 Identification Tool was used to identify the specialised services to exclude.

4.2.3 Need estimated from past healthcare use

Relative need is estimated from past patterns of utilisation of health services. Costs per head in 2013-14 were calculated for each individual by applying a cost to each inpatient spell, outpatient attendance, A&E attendance and critical care day. The costs used were payment by results national tariffs where available, and otherwise reference costs. In a small minority of cases, the specialty average was used in the absence of tariffs and reference costs.

Statistical modelling was used to select the 'best fit' drivers of relative costs at the person level and the relative weights for each driver. The quantified relationships found were taken to be predictors of relative future, cost weighted need for health care services, with the exception of the supply variables.

The modelling tested from a wide range of potential variables to select those which were the best in statistical terms, and which were also plausible indicators of need, to be included in the final model. It was found that morbidity (previous diagnoses) and age were the most important variables in the model.

4.2.4 Explanatory variables

A wide range of data were collected to test as possible explanatory variables in the modelling.

The model includes anonymised data on the diagnoses for each patient admitted to hospital in 2011-12 and 2012-13 as indicators of morbidity, their age and sex.

Other data tested for inclusion in the model were from the population census and 'attributed' to individuals based on their place of residence - these are data only available for small geographical areas (LSOAs) rather than for each individual, so each individual is attributed with the same value for their small area. They include data such as the proportion of people from black and minority ethnic groups, and the proportion of people aged 16-74 who have never worked.

The numbers of registrations (anonymised) by age-sex group were also obtained for each GP practice to provide information on the proportions of a GP practice's list using, and not using, health care in 2011-12 to 2013-14.

4.2.5 Supply variables

The utilisation of health care may also be affected by the relative availability of health care services. Variables were tested in the modelling to adjust for this, known as supply variables. These variables included for example waiting times and distances to hospitals. While these variables were included in the models as they affected utilisation, they were not included in the formula to calculate weighted populations; instead their value for each area was set to the national average. This means if an area has lower use of health care services because of lower capacity or longer distance, this is corrected for in the formula.

4.2.6 Implementing the models

The refresh modelled cost weighted need in 2013-14 for those registered with a GP practice in April 2013 using values of the explanatory variables in 2011-12 and 2012-13.

In implementing the model, the coefficients were applied to values of the explanatory variables in 2012-13 and 2013-14 for those registered with a GP practice in April 2014. This is illustrated in Figure 4.1 and Figure 4.2.

Figure 4.1: Summary of modelling approach

Figure 4.2: Summary of applying the models

A small number of GP practices have opened or been newly formed since April 2014. The average need per head by age-sex group for the relevant CCG was used for these GP practices.

The data used for the modelling excluded treatments received in hospitals in Wales by those registered with an England GP practice. NHS Wales Information Services provided counts of activity data for those registered with a GP practice in each of NHS Shropshire CCG, NHS Herefordshire CCG, NHS West Cheshire CCG and NHS Gloucestershire CCG.

The estimated total cost of the activity was £5.6 million. This sum was added to the predicted costs from the model to take into account the costs borne by these CCGs for hospital treatments received in Wales by their registered populations.

4.2.7 Data held by NHS England

NHS England does not hold the person-level data used for the refresh. Access to the data was provided by the Health and Social Information Centre at a secure data facility. Linked person level data were anonymised before we were provided access to the data, and person level data could not be taken away from the secure data facility.

NHS England do not have access to the person-level data used by the Nuffield Trust, and therefore it is not possible to drill down and fully explain the changes from the Nuffield Trust's work, or to set out the impact of each explanatory variable for each CCG.

C – General and Acute need per head 2016-17 (Excel file)

This shows the need per head for each age-sex group for each GP practice from the refresh of the Nuffield Trust model It also shows where the CCG average need per head by age-sex group was used for new practices.

The file shows also each GP practice and CCG's registrations weighted for need (general and acute), and the variables included in the refreshed model and their coefficients.

4.3 Mental health

4.3.1 Approach

The formula for need per head for specialist mental health services has not been refreshed.

The mental health formula was estimated by a team led by Manchester University and followed a similar person-level, utilisation based approach to the Nuffield Trust. It is known as the *Person-based Resource Allocation for Mental Health* (*PRAMH*) formula. Similarly to Nuffield, it jointly estimated need related to age and additional need over and above that due to age.

As a relatively small percentage of the population use mental health services in a year, the researchers adopted a two-stage approach. The first stage models the proportion of individuals who use mental health services, and the second stage models the cost weighted need for the service-using population. Additional data on patient characteristics were available for the second stage. The units for the modelling for both stages were each age-sex group for each GP practice, that is an aggregation of the person level data.

There were separate models for males aged 20-64, females aged 20-64 and those aged 65 and over. This is because relative need differs between these groups, the latter being heavily influenced by dementia and related illnesses.

The Manchester team estimated 2010-11 cost weighted need per head.

4.3.2 Data

The PRAMH model is based on analysis of the then Mental Health Minimum Dataset (MHMDS) over the period 2008-09 to 2010-11. The MHMDS covers specialist mental health services within hospitals, outpatient clinics and the community. Very specialised mental health services, which are not commissioned by CCGs but by NHS England, were excluded from the research.

4.3.3 Explanatory Variables

A wide range of data were tested as possible variables in the models.

The explanatory variables in the final models include, for example, age, psychiatric diagnosis, severe mental illness prevalence from the quality and outcomes framework (QoF), categories of condition of mental health severity, the proportion who are single, and ethnicity.

4.3.4 Supply variables

As for general and acute, supply variables were included in the model but set to the national average in the calculation of weighted populations. The supply variables included, for example, the existence of a nearby mental health provider and distance to mental health team base.

4.3.5 Implementing the models

The research team provided need per head values for each age-sex group for each GP practice directly to NHS England. NHS England did not perform (nor does it hold) the underlying calculation of applying the need variables to each individual due to the large size of the data set and to protect the anonymity of individuals' data. The need per head estimates have been applied to the October 2015 GP registered lists.

The available data for the research did not cover those aged under 20 and so an alternative method was used by NHS England for calculating mental health need per head for the four age bands under 20. The method used bed days and outpatient data with mental health diagnostic codes from HES to estimate the national hospital cost per head by age-group. The costs for the four age-groups up to the age of 19 years were expressed as a percentage of those aged 20-24. These national percentages were applied to the need per head from the PRAMH project for those aged 20-24 for each GP practice as estimates of the need per head for the age-groups aged under 20. As the use of mental health services by those aged under 20 is relatively low, it is unlikely this approach significantly affects the overall mental health weighted populations.

A small number of GP practices have been newly opened or formed since the PRAMH research was undertaken. NHS England used the average need per head by age-sex group for the relevant CCG these GP practices.

It was identified last year that two providers were under-reporting some of the voluntary fields in the MHMDS used for the modelling and this was having a significant impact on the target allocations for the CCGs using these providers. A correction for this was introduced in the weighted populations for 2016-17 by setting the need index for the affected CCGs to the average of ten similar CCGs that were not affected. The need index is the mental health weighted population divided by the unweighted population. The ten similar CCGs were taken from the Commissioning for Value packs and tool.

The key fields from MHMDS that were used in estimating the weights can be found in the *Person-based Resource Allocation for Mental Health* (*PRAMH*) report.

D – Mental Health need per head 2016-17 (Excel file)

This shows the need per head for each age-sex group for each GP practice provided by the PRAMH research team and the estimates for those aged under 20 as described above. The file shows also where the need per head was not available from the PRAMH research for new practices, and the average need per head by age-sex group in the CCG has been used.

The file also shows each GP practice and CCG's registrations weighted for need (mental health), plus the variables included in the PRAMH model and their coefficients.

4.4 Maternity

4.4.1 Approach

The maternity model is based on the number of births and the need- weighted cost per birth. The approach was developed in *Combining Age Related and Additional Need* (*CARAN*) report.

The maternity model has been refreshed for 2016-17 allocations by NHS England Analytical Services. The refreshed model of the cost per birth uses person-based data rather than the small area data (MSOA) used in CARAN.

The refreshed model estimates cost per birth in 2013-14.

4.4.2 Data

The same data set was used as for the refresh of the refresh of the general and acute model. This included diagnoses in previous years and a wide range of data from for example the population census.

A number of new variables were created for the refresh of the maternity formula, including the proportion of births that were low birth weight births and the number of births by the mother in the period 2010-11 to 2013-14.

4.4.3 Final model

A smaller set of variables were tested for inclusion in the model than for general and acute, based on the plausibility of relevance for maternity services. For example, the proportion of those aged over 65 in the small area claiming state benefits was not tested.

Age and some morbidity markers (previous diagnoses) were found to be important determinants of predicted costs per birth.

4.4.4 Implementing the model

The refreshed formula provided estimated cost per birth by GP practice in 2013-14. Supply variables were included in the model but set to the national average in the calculation of weighted populations.

The costs per birth were applied to the number of birth registrations with GP practices in 2014-15. For practices which opened since the end of 2013-14 (and for which there is not a cost per birth available from the formula), the average cost per birth for the relevant CCG was used. Practices which closed between April 2014 and October 2015 were included to ensure the number of births is not under estimated.

E – Maternity need 2016-17 (Excel file)

This shows the number of new registrations for births, the estimated cost per birth, and the variables in the maternity model and their coefficients

The file also shows each GP practice and CCG's registrations weighted for maternity need.

4.5 Prescribing

4.5.1 Approach

The prescribing component covers the costs of medicines prescribed in primary care and actually dispensed. It does not cover the costs of dispensing the prescriptions as these are not funded by CCGs.

The prescribing formula used for allocations in 2014-15 and 2015-16 was from the *Report of the Resource Allocation for Mental Health and Prescribing* (*RAMP*) project.

The formula has been refreshed by NHS England Analytical Services following the same methodology and approach as RAMP but using more recent data.

The model has two stages; the first weights for need related to age and sex, and the second stage weights for additional need over and above that related to age and sex. The unit for analysis in the models is GP practices.

The refreshed model is based on the cost of prescriptions by GP practice in 2013-14.

4.5.2 Weights for age and sex

The adjustment for age and sex applies the weights developed by the Health and Social Care Information Centre known as ASTRO(13)-PUs. This is an index of the national average costs of prescriptions by age-sex group.

4.5.3 Weights for additional need

The model for additional need includes both need and supply variables as for the other components. A wide range of data were collected and tested as potential variables in the refreshed model.

The set of variables in the final model were determined by statistical goodness of fit and plausibility as indicators of need. The need variables in the final model include for example the Index of Multiple Deprivation and the proportion of those aged 70 years and over claiming disability living allowance (DLA).

4.5.4 Implementing the model

ASTRO(13)-PUs and refreshed additional need estimates were applied to each GP practice and the GP practice weighted populations summed to give the CCG weighted populations. Supply variables were included in the model but set to the national average in the calculation of weighted populations.

A small number of GP practices have been newly opened or formed between 2013-14 and October 2015. NHS England used the average additional need values for the relevant CCG for these GP practices.

F – Prescribing need 2016-17 (Excel file)

This shows the calculation of registrations weighted for age, sex and additional need for each GP practice and CCG. It shows also where the additional need variables were not available from the refreshed model for new practices, and the average CCG value was used.

The file also lists the coefficients and variables in the refreshed model.

4.6 Unmet need adjustment: SMR<75

4.6.1 Approach

In the absence of robust quantitative evidence which is comprehensive and consistent between services and across the country, ACRA's recommendation for the measure to be used for the unmet need/health inequalities adjustment was largely based on judgement. ACRA was unable to recommend the share of the overall weighted capitation formula that should be based on the unmet need/health inequalities adjustment. The NHS England Board meeting of 17 December 2015 determined the share for CCG core allocations should be 10%.

4.6.2 Standardised Mortality Ratio

The unmet need/health inequalities adjustment is based on the standardised mortality ratio for those under 75 years of age (SMR<75) applied at small area level to take account of inequality in health outcomes within as well as between CCGs.

The SMR<75 is a measure of how many more or fewer deaths there are in a local area compared with the national average, having adjusted for the differences between the age profiles of local areas compared with the national average. It is applied at small area level (middle layer super output area (MSOA)) and then aggregated to CCGs.

MSOA are small geographical areas designed by ONS for statistical reporting and analysis. MSOAs are designed to have similar population sizes.

ACRA considered earlier a range of measures of population health for the adjustment for unmet need. These were found to be highly correlated with each other. The SMR<75 has the advantage that it can be updated regularly at small area level, while other measures can only typically be updated at small area level using data from the 10 yearly Census. The SMR<75 was recommended as an indicator of the health of the whole population of areas, including morbidity and for all age groups.

4.6.3 Updated adjustment

The adjustment has been updated to use the latest available data for the SMR<75 (2008-12) and to use a wider range of weights per head than previously. The use of a wider range of weights per head was recommended by ACRA. The adjustment is now based on registered populations; it was previously based on ONS populations.

4.6.4 Weights per head

Each MSOA is assigned to one of sixteen groups based on its SMR<75 value, those with the lowest SMR<75 values are in group one, and those with the highest SMR<75 values are assigned to group sixteen. The groups have an equal span of SMR<75 values (subject to at least 30 MSOAs being in the group).

Each of the sixteen groups is given a weight per head, with the MSOAs in group 16 having a weight ten times higher than the MSOAs in group 1. The weight for the intermediate groups increases exponentially, so that group one has a weight of 1.00, group two a weight of 1.17, group three a weight of 1.36, up to group sixteen with a weight of 10.00. The exponential increase in the weights means the impact of the SMR<75 based adjustment between CCGs depends on how many of its MSOAs are in each of the 16 groups.

4.6.5 Implementation

Each MSOA's population is given a weight of between 1 to 10, and the MSOA weighted populations are then summed to CCG level using the number of the CCG's registrations resident in each MSOA.

G – SMR weighted populations (Excel file)

This shows the weights per head for each of the 16 groups, and the calculation of SMR<75 based weighted populations for MSOAs and CCGs.

5 Unavoidable costs

5.1 Introduction

There are adjustments for three types of unavoidable costs: the market forces factor (MFF); the emergency ambulance cost adjustment (EACA); and remoteness.

The adjustments are included in the weighted capitation formula to compensate commissioners for the higher costs of the services they commission.

5.2 Market forces factor (MFF)

5.2.1 Approach

The MFF adjusts for the unavoidable differences in unit input costs between areas due to their geographical location alone. For example it typically costs more to run a hospital in a city centre than in other areas due to higher staff, buildings and land costs. This adjustment is for higher, unavoidable input costs alone.

The MFF is calculated for providers and the MFF for CCGs is the average of the MFFs of providers from which they fund health care services.

The MFF currently used was calculated for providers in 2010 and the methodology is set out in *Resource Allocation: Weighted Capitation Formula, Seventh Edition*. NHS Improvement is initiating a project to update providers' MFFs.

There are four components to the MFF for providers, which are: unavoidable differences in costs across the country for each of medical and dental staff; other staff; land; and buildings. The data for each of the four components were for the period 2007-10, the exact years varying by component.

5.2.2 MFF Staff Component

The non-medical and dental staff component is based on the HERU research report *The Staff Market Forces Factor component of the weighted capitation formula: new estimates*. In the NHS, pay rates are determined by national pay structures and therefore differences across the country are relatively small. However, indirect staff costs faced by providers differ significantly across the country, such as vacancy rates, staff turnover rates and the use of agency staff. The indirect costs are typically higher in areas where the local going rate of pay is high and typically lower when the local going rate of pay is low.

Differences in the local going rate of pay were estimated by HERU from pay rates across the country in the private sector. The private sector pay rates were adjusted for differences across the country in the age, sex, occupation, industry and level of responsibility of the job of the employees. The differences in private sector pay rates were found to be highly correlated with the indirect staff costs faced by NHS providers.

Indirect staff costs for medical and dental staff were found not to differ across the country as they do for other staff. Instead the medical and dental component was based on the direct, higher costs of employing medical and dental staff in London, that is, on the London pay weighting.

5.2.3 MFF building and land components

The building component was based on relative location factors calculated by the Building Cost Information Service (BCIS) from an analysis of tender prices for public and private contracts at local authority level.

The land component was based on the land value per hectare calculated for each Trust. This used the net book value of land in providers' audited summarisation schedules and land areas reported in ERIC returns.

5.2.4 MFF index for CCGs

The MFF for each provider using the approach outlined above is the starting point for the calculation of MFFs for CCGs. The MFF for each CCG is calculated from the MFFs of providers where each member GP practice's patients received inpatient, outpatient and A&E treatment.

The CCG's MFF is the weighted average of providers' MFFs, where the weights are the spend by the CCG with each provider. The weights are often known as the purchaser-provider matrix, which has been updated for 2016-17 allocations.

The updated purchaser-provider matrix uses activity in 2013-14 (as recorded in the Secondary Uses Service Payment by Results (SUS PbR) data used for the refresh of the general and acute formula) and costed as described earlier for the refresh of the general and acute formula. Providers' MFFs for 2013-14 have been used, which are the same as providers' MFFs in 2014-15 and 2015-16 except where providers merged after 2013-14.

The CCGs' MFFs are expressed as an index, with the England average set to the value of 1.0.

The MFF index value is applied to the combined weighted populations for general and acute, mental health and maternity services.

The prescribing component is not adjusted by the MFF as the costs of prescribed medicines are the same throughout the country.

There are slightly different MFFs for CCG areas applied to the specialised services formula as the balance of providers used is different from that for general and acute services.

H – Market Forces Factor (Excel file)

This shows the percentage of each CCG's costed inpatient, outpatient and A&E activity with each provider, along with the 2013-14 to 2015-16 MFFs, plus the scaling to rebase CCGs' MFFs so that the England average equals 1.0

5.3 Emergency ambulance cost adjustment

5.3.1 Approach

The Emergency Ambulance Cost Adjustment (EACA) adjusts for unavoidable variations in the costs of providing emergency ambulance services in different geographical areas, and in particular sparsely populated areas. The EACA has been refreshed by NHS England Analytical Services.

5.3.2 Data

Data were provided by four ambulance trusts on times to incidents, times at incidents, times to convey to hospitals, and turnaround times at hospitals. All times were in minutes. The Trusts were the North East, South West, London and East Midlands.

To maintain patient confidentiality, average times were provided for each MSOA (middle layer super output area), which are small geographical areas designed by ONS for statistical reporting and analysis. They have similar population sizes and there are 6,791 in England.

Data from other sources on the characteristics of MSOAs were collected by NHS England Analytical Services, including population density, distance to A&E departments, and age profiles.

5.3.3 Models

Separate models for times to see & treat and see & convey were developed. See & convey is where the patient is taken to a hospital in the emergency vehicle, and see & treat is where the patient is treated at the scene (such as in the patient's home) and is not transported to hospital.

Distance to A&E departments and population density were found to be important in the models.

The two models for see & treat and see & convey were combined to give average predicted times in minutes using the proportions of see & treat and see & convey cases in the dataset.

5.3.4 Implementation

The modelled times in minutes for MSOAs were summed to CCG level. The modelled times for CCGs were converted into an index, with the England average set to the value of 1.0.

The index from the previous step is applied to the proportion of national HCHS expenditure on ambulance services, to give the final overall EACA index. The same EACA index value is applied to the combined weighted populations for general and acute, mental health and maternity services.

I – Emergency Ambulance Cost Adjustment (Excel file)

This shows the calculation of the EACA index from the coefficients from the models.

5.4 Unavoidable costs of remoteness

5.4.1 Approach

The purpose of this new adjustment is to provide funding to CCGs to meet the unavoidably higher costs of remote hospital sites, where the costs are higher because the level of activity is too low for the hospital to operate at an efficient scale.

There are two steps in calculating the adjustment. The first is to define remote hospital sites, and the second is to estimate by how much their costs are unavoidably higher.

5.4.2 Identifying remote hospitals

The remoteness adjustment applies to hospitals providing Tier I A&E services. The criteria used to define remote hospitals are as follows.

There is a population of under 200,000 within a one-hour travel time of the site. A population served of 200,000 is the scale at which a hospital is taken as being able to achieve close to national efficiency levels. This is to avoid an adjustment being applied to larger remote hospitals for which costs should not be unavoidably high.

The next nearest provider (with tier 1 A&E services) is one hour or more away by normal road travel times (including ferry times where relevant), for at least 10% of the population served. One hour is taken to be the maximum travel time to hospitals for clinical safety reasons for emergency care. The proportion of the population served who are more than 60 minutes away from the next nearest hospital provides an indication of whether the hospital is serving a population of under 200,000 for reasons of remoteness or for other reasons. An adjustment to target allocations is only made when this percentage is 10% or higher. This avoids giving very small (immaterial) adjustments to very many providers.

Travel times were used rather than road distances or straight line distances. Travel time to the next nearest hospital is an indicator of whether or not consolidation of services onto fewer sites is feasible.

The criteria identified eight hospital sites as unavoidably small due to remoteness.

5.4.3 Higher costs due to smallness

A cost curve was estimated for all hospitals, which gave the estimated cost of sites by activity levels. The estimated relative costs were adjusted to remove the impact of differences in case mix and in costs that are already compensated through the market forces factor (that is unavoidable differences in unit input costs across the country).

Estimated costs for predicted activity for a hospital serving a population of 250,000 people, around the national average, were used as the reference point for deriving the size of estimated higher costs of remote sites. The cost curve gives the estimated higher costs above the reference point for each of the hospitals with predicted activity levels that correspond to the size of their population catchment area.

The adjustment reflects the expected higher costs based on the cost-curve, rather than the actual costs of the hospital, which may be affected by a number of factors unrelated to its scale. Predicted activity for a given population catchment area was

used for the remote hospitals instead of actual activity, as the latter may be affected by other factors such as patient choice.

5.4.4 Implementation

The total adjustment was £31 million covering six CCGs for eight hospital sites. These are shown in Table 5.1 Adjustment for unavoidable smallness: adjustment by site. How the adjustments for higher costs due to unavoidable smallness were included in weighted populations for CCGs is described in section 6.

Table 5.1 Adjustment for unavoidable smallness: adjustment by site

Hospital	Catchment area population	Adjustment £000s	Clinical Commissioning Group
Furness (University Hospitals of Morecambe Bay)	111,207	£5,755	NHS Cumbria CCG
West Cumberland (North Cumbria)	130,892	£5,123	NHS Cumbria CCG
St Mary's (Isle of Wight)	138,393	£4,867	NHS Isle of Wight CCG
North Devon (Northern Devon)	169,852	£3,651	NHS North, East, West Devon CCG
Cumberland	178,338	£3,297	NHS Cumbria CCG
Hereford (Wye Valley)	182,303	£3,129	NHS Herefordshire CCG
Pilgrim (United Lincolnshire)	190,677	£2,766	NHS Lincolnshire East CCG
Scarborough (York Teaching)	194,103	£2,615	NHS Scarborough and Ryedale CCG

6 Total weighted populations for core CCG allocations

6.1 Combining the formulae

6.1.1 Unified weighted populations for October 2015 registrations

As described earlier, there are separate weighted populations for need for general and acute services, mental health services, maternity services and prescribing, and additionally there are adjustments for unmet need and unavoidable costs.

These are combined into unified weighted populations for each CCG for core allocations in the following steps.

1. Combine the weighted populations for need for general and acute, mental health and maternity services, by using the 2014-15 national outturn expenditure on each for their relative shares in the overall HCHS need-weighted population.
2. Apply the indices for the market forces factor and emergency ambulance cost adjustment.
3. Combine the weighted populations for HCHS from steps 1 and 2 with the weighted populations for prescribing, by using 2014-15 national outturn expenditure on HCHS and prescribing for their relative shares. There is no adjustment for the MFF and EACA for prescribing.
4. Combine the outcome from step 3 with the unmet need/health inequalities adjustment. The latter is given a weight of 10% and the outcome from step 3 a weight of 90%.
5. Apply the adjustment for the costs of unavoidable smallness due to remoteness.

No formula is available for community health services and it is assumed that the general and acute and mental health formulae are also representative of community health services.

6.1.2 Unified weighted populations for 2016-17 to 2020-21

As described earlier, unified weighted populations for 2016-17 to 2020-21 are calculated by applying the same percentage growth to the October 2015 weighted populations as the projected growth in each CCG's resident population as projected by ONS.

The calculation of the unified populations is shown in Excel file J - Overall weighted populations CCGs 2016-17. This gives also a breakdown of the change in the distances from target for 2015-16 between those published in December 2014 and those following the refresh of the CCG formula. The breakdown shows the effect on distances from target from baseline changes, the refresh of each of the formulae and the changes in the adjustments for unavoidable costs.

J – Overall weighted populations CCGs 2016-17 (Excel file)

This shows the overall weighted population for each CCG for core allocations based on October 2015 registrations, and the weighted populations for HCHS, mental health, maternity, prescribing and the SMR<75.

The file also shows the core CCG weighted populations projected forward from October 2015 to 2016-17 to 2020-2021. It shows also the overall weighted population for each GP practice based on October 2015 registrations.

Finally, a breakdown is provided of the change in the distance from target for each CCG for 2015-16 between those published in December 2014 and those following the refresh of the CCG formula.

6.2 Overall impact of changes to the CCG formula

The impacts of the changes to the formulae are relatively small overall. Taking all of the refreshed formulae, data updates and methodological changes together, the resulting target allocations per head have the profile with respect to age and deprivation deciles shown in Table 6.1. Table 6.2 shows the targets per head by deciles for the formula for 2014-15 and 2015-16 allocations.

Both Table 6.1 and Table 6.2 have been calculated for October 2015 registrations and the same national budget to make them comparable.

Figure 6.1: CCG Cartogram showing target allocation per head

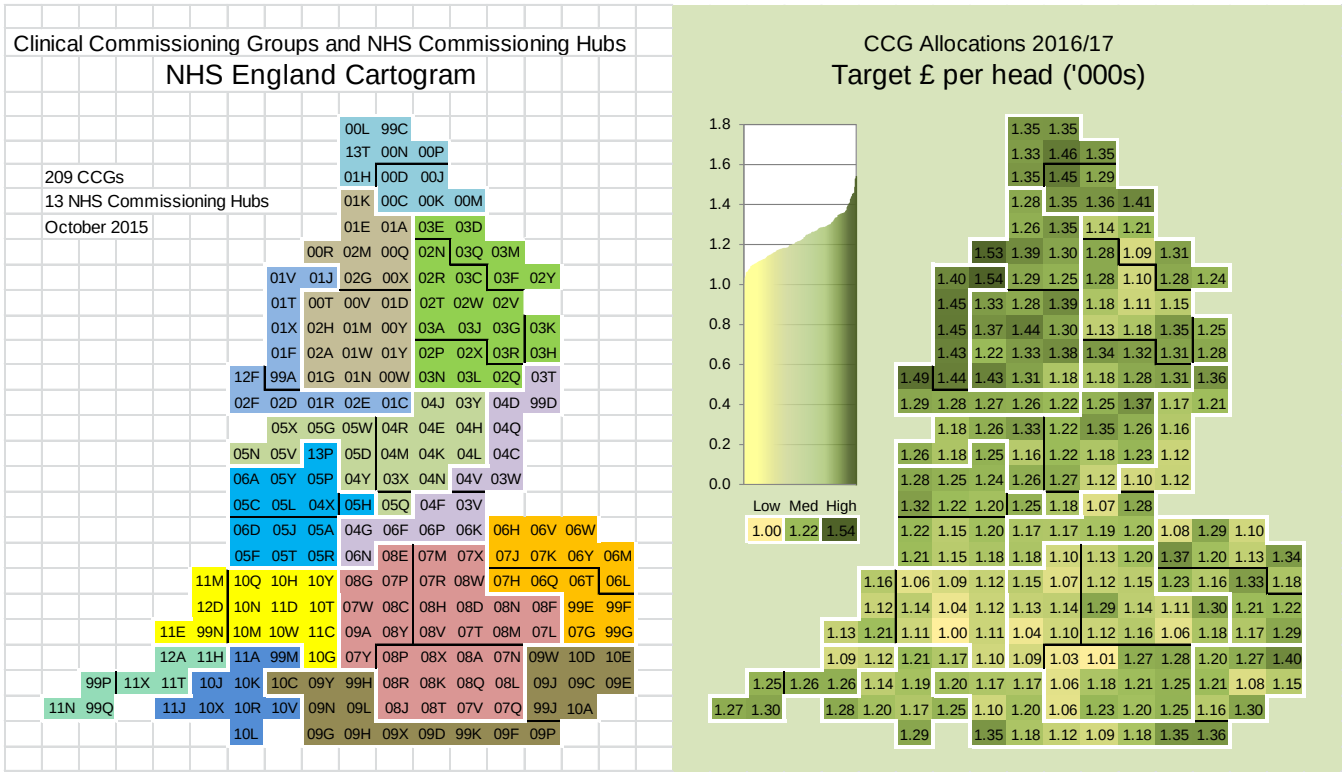


Table 6.1: Age and deprivation distribution of 2016-17 target model (new formula)

		Less deprived								More deprived		
new formula		D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	All deprivation
Younger	A1				1,012		1,068	1,151	1,158	1,172	1,159	1,147
	A2	1,066		1,070	1,152	1,117	1,102	1,149	1,172		1,251	1,173
	A3	1,067	1,165		1,126			1,164	1,181	1,342	1,353	1,266
	A4	1,134	1,070	1,144		1,159	1,202	1,193	1,295	1,437	1,293	1,203
	A5	1,153		1,256		1,243	1,292	1,188	1,366	1,262	1,418	1,245
	A6	1,119	1,113		1,235	1,287	1,225	1,379	1,312	1,364		1,261
	A7	1,156	1,135	1,229	1,260	1,307	1,321	1,361		1,410		1,254
	A8	1,127	1,208	1,167	1,219	1,288	1,308	1,376	1,497	1,463	1,538	1,277
Older	A9	1,206	1,210	1,262	1,210	1,308	1,307			1,411		1,264
	A10		1,223	1,306	1,308	1,299	1,290	1,306	1,345			1,304
	All ages	1,144	1,154	1,220	1,208	1,277	1,241	1,207	1,273	1,297	1,293	1,235

Table 6.2: Age and deprivation distribution of 2015-16 target model (old formula)

		Less deprived								More deprived		
old formula		D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	All deprivation
Younger	A1				1,036		1,122	1,179	1,168	1,199	1,173	1,171
	A2	1,075		1,086	1,153	1,129	1,174	1,177	1,166		1,244	1,180
	A3	1,091	1,176		1,151			1,147	1,189	1,337	1,345	1,263
	A4	1,154	1,064	1,157		1,132	1,196	1,152	1,296	1,475	1,272	1,203
	A5	1,123		1,276		1,258	1,298	1,197	1,352	1,262	1,390	1,234
	A6	1,099	1,115		1,212	1,275	1,269	1,378	1,301	1,387		1,264
	A7	1,128	1,143	1,230	1,307	1,306	1,325	1,351		1,405		1,253
	A8	1,134	1,195	1,186	1,217	1,269	1,297	1,373	1,455	1,458	1,447	1,267
Older	A9	1,160	1,211	1,263	1,200	1,285	1,307			1,407		1,246
	A10		1,248	1,322	1,312	1,279	1,263	1,285	1,328			1,302
	All ages	1,123	1,154	1,233	1,210	1,265	1,250	1,212	1,268	1,311	1,285	1,235

7 Primary medical care allocations

7.1 Introduction

The previous formula for primary medical care (GP services) allocations was based on the contractual formula that is at the heart of the General Medical Services (GMS) contract, usually referred to as the Carr-Hill formula. Detail on the previous primary care allocations formula can be found in the *Technical Guide to the formulae for 2014-15 and 2015-16 revenue allocations to Clinical Commissioning Groups and Area Teams*.

NHS England asked ACRA to advise on a new formula for primary medical care to be used to allocate budgets to CCG areas from 2016-17. The key change to the formula is new estimates of workload per patient by age-sex group, which are used as the relative weights per head for allocations.

ACRA has endorsed the new formula, while recognising it could be further developed. ACRA's recommendations on the workload formula are for allocations purposes only. ACRA's remit does not extend to recommendations on how GP practices are remunerated through the GMS contract.

The new formula is for CCG allocation purposes and does not in itself imply any adjustment to GP practice payments under the GMS contract.

Only primary medical care is included in the place-based commissioning allocations by CCG, as other areas of primary care (mainly community pharmacy, dentistry and optical services) are not currently within the scope of collaborative commissioning, and the allocation formulae are not sufficiently robust to use for individual CCG geographies.

7.2 Methodology

7.2.1 Data

The requirement was to measure general practice workload and consider how the attributes of practices and their patients influenced that workload. Therefore a dataset was needed that contained a proxy for workload and also included data on patient and practice characteristics.

The dataset selected was Clinical Practice Research Datalink (CPRD), which is an ongoing primary care database of anonymised medical records for a large number of general practitioners. It is broadly representative of the UK general population in terms of age, sex and ethnicity. For this work there were usable records from around 210 practices covering about two million patients.

Workload was measured by the number of minutes electronic files for patients were open, weighted by staff group.

The data used were for 2014. The data for the Carr-Hill formula were for 1999-2002.

7.2.2 Modelling approach

A linear fixed effects model was fitted to the CPRD data to estimate the effect of patient and practice characteristics on GP workload. The model is at the person level, and of the form:

Total file opening times (weighted by staff group) = Constant + Age-sex group + New registration + IMD decile + Practice ID

Age and sex are well known to affect workload; typically more elderly patients have more minutes of GP practice time than younger age groups.

Index of Multiple Deprivation (IMD) is a proxy for higher need in more deprived areas. IMD 2010 data were used as these data were in the CPRD dataset at the time of data extraction, even though IMD 2015 has since been released. IMD values were imputed for the individual patients who did not have associated IMD deciles in the dataset provided.

Being newly registered with the practice was found to be associated with higher workload.

The intercept (constant) represents the estimated average number of additional weighted contact minutes per year that a patient on the registration list at the start of the year with baseline characteristics has with their GP surgery. In the model that is a male patient, aged 0-5, in IMD decile 1.

The practice ID is treated as a supply variable, and not included in the weighted populations. This removes the impact on workload of differences between individual GP practices in their working practices.

ACRA considered whether rurality should be included as a factor in determining workload but advised that it should be excluded from the model. This was because of the uncertainty over whether it was reflective of additional workload or systematic behaviour in rural practice not arising from workload.

More information on the model can be found in the paper *Primary medical care – new workload formula for allocations to CCG areas*.

7.3 Implementation

The model's coefficients and constant term were applied to the latest available data on GP practice registered lists (October 2015). The GP practice MFF from the Carr-Hill formula was also applied. This gave GP practice weighted populations which were then aggregated to CCGs.

The NHS England Board decided that an unmet need and health inequalities adjustment should be applied using the SMR<75, and accounting for 15% of the overall primary medical care weighted population.

CCG weighted populations for October 2015 were uplifted to 2016-17 to 2020-21 by the projected percentage change in GP registered lists as described in section 3.

K1 – Primary Care (medical) (Excel file)

This shows the coefficients from the new primary medical services model and data at GP practice level.

The file also shows the calculation of weighted populations for primary medical services and how these are combined with the SMR<75 weighted populations to give overall weighted populations.

7.4 Other primary care

Other (non-medical) primary care services mainly comprise community pharmacy, dental and ophthalmic services but are not included in the place-based allocation as the separate formula for these services is not currently robust enough to use to for individual CCGs. Therefore the disaggregation to CCG level is indicative only and it is strongly advised that they are not used in isolation for CCG geographies.

The formula for other primary care services includes separate components for community pharmacy and dental services but there is not a component for ophthalmic services due to the lack of available data. Spend on ophthalmic services is relatively low compared with community pharmacy and dental services.

7.4.1 Dental services component

The dental services component uses national average costs by age, sex and IMD of patients' residence for those accessing NHS dental care. This is multiplied by the number of NHS patients seen (mapped to the CCG of the patient's dental practice) in 2014-15 by age-sex-IMD group.

Revenues from patient charges were deducted using the 2014-15 ratio of patient charges to the total value of dental contracts, mapped to CCG.

The costs net of patients charges were then scaled to October 2015 registrations to give weighted populations on a consistent basis with the other formulae.

7.4.2 Community pharmacy services component

The formula for pharmacy services for 2014-15 and 2015-16 allocations to Area Teams used the prescribing formula as a proxy for community pharmacy services. The prescribing formula, which is part of the CCG allocations formula, covers the cost of medicines prescribed in primary care and dispensed.

The prescribing formula has been updated for allocations from 2016-17 (see section 4.5) and still forms the basis of this component, but is now adjusted for dispensing cross-border flows. These are prescriptions issued in one CCG but dispensed in a different CCG.

For each CCG, data were obtained on the number of prescription items issued in 2013-14. Data were also obtained for each CCG on how many of their items were dispensed in the same CCG and every other CCG. Each CCG's weighted population from the prescribing formula was attributed proportionally to the CCGs where their prescription items were dispensed (the vast majority of items were dispensed in the same CCG where they were issued).

The final, cross-border, adjusted weighted populations for each CCG are the sum of the attributed weighted populations.

Since publishing the allocations we have identified an inconsistency in the treatment of dispensing doctors' fees; the target model treats them as part of the pharmacy services budget, while they are actually part of the primary medical care budget. This has had the effect of incorrectly increasing the distance from target for primary medical care in some areas, which may have reduced their allocations. We have estimated the impact of this and, for the most materially affected CCGs, will be making an additional allocation for 2016-17. The approach for later years will be confirmed in due course. Affected CCGs have already been informed and no CCG will receive a lower allocation than published in January as a result.

7.4.3 Overall weighted population

The individual weighted populations for dental and community pharmacy services were combined together in line with 2014-15 outturn spend on these services.

As with the primary medical care weighted population, an unmet need and health inequalities adjustment was applied using the SMR<75, and accounting for 15% of the overall weighted population. This gives indicative 2015-16 target weighted populations for other primary care services.

K2 – Primary Care (other) (Excel file)

This shows the calculation of weighted populations for dental and community pharmacy services and how these are combined with the SMR<75 weighted populations to give an overall target weighted population for CCGs.

8 Specialised services

8.1 Introduction

Weighted populations and target allocations for specialised services have been developed for the first time for CCG areas. The responsibility for commissioning specialised services, however, has not transferred to CCGs.

A new formula has been developed for specialised services that follows the same approach and is based on the same dataset as that for the refreshed formula for general and acute services.

The data set used for the modelling, however, had poor coverage of some specialised services. Therefore, the new formula was used for 46% of the overall weighted populations for specialised services - for those services where the coverage in the dataset was good. The other 54%, for those where coverage in the dataset was poor, were set in line with the historic pattern of spending as the best estimate of need for these other services. These services have a very “lumpy” geographical distribution and so a per capita approach would not have been suitable.

Expenditure of around £1 billion on very rare, high cost specialised services was not broken down by CCG areas and excluded from the weighted populations.

8.2 New formula

8.2.1 Services covered

The specialised services formula covers inpatient spells, outpatient attendances, accident and emergency attendances and critical care. Specialised mental health and maternity services are included.

The Prescribed Specialised Services (PSS) 2014/15 Identification Tool was used to identify specialised services in the wider dataset used for the modelling. The services poorly covered in the dataset, as defined below, were omitted from the models.

8.2.2 Need estimated from past healthcare use

Relative need is estimated from past patterns of utilisation of health services. Costs per head in 2013-14 were calculated for each individual by applying a cost to each inpatient spell, outpatient attendance, A&E attendance and critical care day. The costs used were payment by results national tariffs where available, and otherwise reference costs. In a small minority of cases, the specialty average was used in the absence of tariffs and reference costs.

Statistical models were used to select the ‘best fit’ drivers of relative costs at the person level and the relative weights for each driver. The quantified relationships found are taken to be predictors of relative future, cost weighted need for health care services, with the exception of the supply variables.

The modelling tested from a wide range of potential variables to select those which were the best in statistical terms, and were also plausible indicators of need, to be included in the final model. It was found that morbidity (previous diagnoses) and age were the most important variables in the model.

The numbers of registrations (anonymised) by age-sex group were also obtained for each GP practice to provide information on the proportions of a GP practice's list using, and not using, specialised services in 2011-12 to 2013-14.

8.2.3 Supply variables

A wide range of supply variables were tested for inclusion in the formula, but none were included in the final 'best 'fit' formula.

8.2.4 Unavoidable costs

The market forces factor was applied to the weighted populations from the formula. This adjusts for differences in unavoidable employment, land and building costs due to location alone.

The MFFs for CCG areas are slightly different than for core CCG allocations as specialised services are commissioned from a different mix of hospital trusts.

8.2.5 Unmet need and health inequalities adjustment

The NHS England Board determined that the unmet need and health inequalities adjustment should have a weight of 5%, and the utilisation formula should have a weight of 95% in the formula based weighted populations. The unmet need and health inequalities adjustment is described in section 4.

8.3 Historic spend

Weighted populations were based on 2014-15 spend, rather than the utilisation based formula, for clinical reference groups (CRGs) where the SUS PbR data covered under 40% of total spend, and in addition the whole of National Programme of Care (NPOC) E (Paediatrics, neo-natal, obstetrics and gynaecology).

The choice of a 40% threshold was informed by some limited engagement and was felt to strike a balance between maximising the range of the formula and avoiding those areas where the representativeness was in greatest doubt.

8.4 Implementation

The weights from the formula were applied to registrations for October 2015. These were combined with those based on historic spend to give overall weighted populations for specialised services. The formula has a share of 46% and historic spend a share of 54% in the overall weighted populations.

As described earlier, weighed populations for 2016-17 to 2020-21 were calculated by applying the same percentage growth to the October 2015 weighted populations as the projected growth in each CCG's resident population projected by ONS.

The calculation of the unified populations is shown in Excel file L – Specialised Services.

L – Specialised services (Excel file)

This shows the overall weighted population for each CCG area for specialised services based on October 2015 registrations.

The file also shows the specialised services weighted populations projected forward from October 2015 to 2016-17 to 2020-2021.

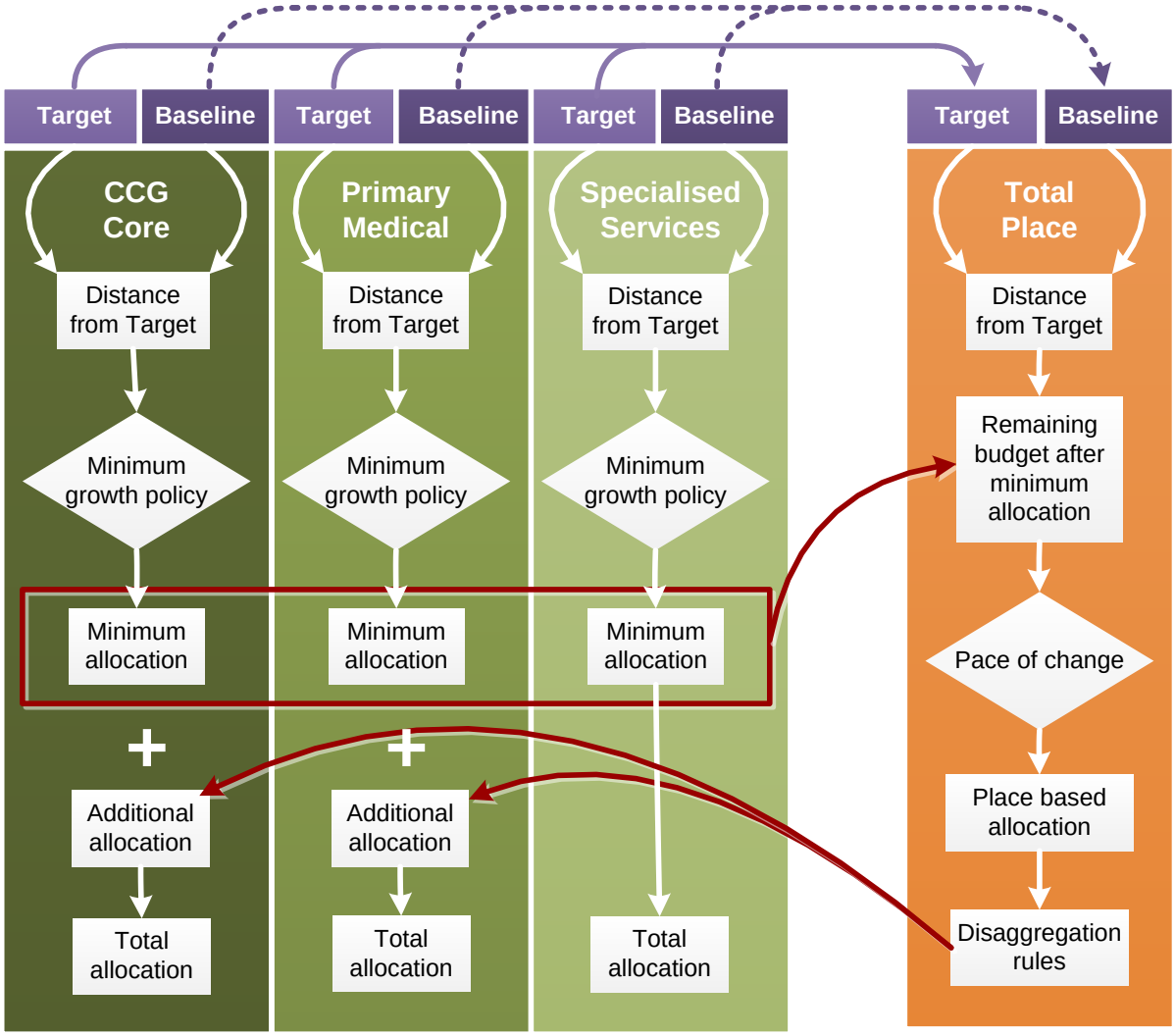
9 Pace of change

9.1 Principles of pace of change

It has long been the case that the move from the baseline towards target allocations is moderated through a pace of change policy. While ensuring the fastest growth is focused on those furthest below target, the moderation of the speed of movement towards target has a number of benefits:

- the maximum growth for the furthest below target is set at a level that can be efficiently used;
- the minimum growth for the furthest over target is set at a level that allows stability of services and creates confidence for medium term planning; and
- resources are distributed in a way that seeks to maintain each CCG's distance from target ranking, so that artificially lowering a baseline does not create an advantage in later years.

Figure 9.1: Outline of pace of change policy



9.1.1 Extending to place based budgets

One of the key aims for this allocations package is to support a place based approach as part of the co-commissioning policy. This acknowledges that a CCG area can better cope with being below target if some of the other streams are funded above target. It also minimises the risk of allocations being disrupted by changes in way services are commissioned, such as changes in identification rules.

To allow this interdependency a pace of change approach was developed with three separate steps.

i. For each group of services (primary medical care, CCG core services or specialised services) a minimum allocation was set that meets NHS England's policies, but does not necessarily fully commit the resources identified for that stream.

ii. A pace of change policy is then applied to the total resources available to the CCG population, based on the sum of the three service groups. This includes a requirement that the total resources available to each population at least meets the sum of the minimum allocations set in step i.

iii. Where the total allocation exceeds the minimum allocation the excess is disaggregated across the groups of services. This leads to the final allocation for each group of services and for each CCG population.

9.2 Setting the minimum allocation

9.2.1 CCG core services

The CCG core services minimum allocation is based on the following rules, which are applied sequentially.

i. A minimum per capita growth is applied. This is set at a level such that an area with average population growth would see its total allocation grow at a rate that matches the expected GDP deflator, a measure of inflation across the economy.

ii. Additional per capita growth is applied to those areas that are furthest below target. This is set at a level that ensures that no minimum allocation is more than 5% below target.

iii. Where the total allocation is growing by less than a specified threshold, the total allocation is increased to meet that threshold. The threshold is based on the GDP deflator plus agreed pressures that will need to be met from the CCG core services allocation.

iv. For those areas more than 10% above target their programme growth is capped at policy pressures only. This capping is introduced gradually from those who are 5% above target, where the capping is set at policy pressures plus the GDP deflator.

9.2.2 Primary medical care services

The rules for the primary medical services allocation are similar to those for core CCG services, except that additional growth available to the most under target areas aims to bring all areas to no more than 5% below target by 2018-19. Achieving this

more rapidly would have required growth rates that were considered likely to be inefficient.

9.2.3 Specialised services

This is the first time a target formula for specialised services has been used, and so it was decided not to use it stand-alone, for setting the minimum allocation. Instead, the minimum allocation is set by applying a uniform per capita uplift for all CCG populations, so that the quantum set for these services is fully deployed.

9.2.4 Setting the minimum growth

All CCGs have received at least a minimum level of allocation growth over the period for specific non-routine policy pressures. Table 9.1 and Table 9.2 below outline how this was calculated for core CCG and primary medical care allocations respectively.

Table 9.1: Non-routine policy pressures for core CCG allocations

CCG Programme Costs	2016-17	2017-18	2018-19	2019-20	2020-21	Notes
Additional CAMHS funding	119	140	170	190	229	Allocation of funding to CCGs to deliver CAMHS transformation plans
Transfer of GPIT	173	173	173	173	173	Transfer of funding to cover the cost of GPIT (previously held by NHS England)
Pensions/NI element of tariff inflation	652	652	652	652	652	Funding to cover increased tariff as a result of national insurance /pensions changes
Other policy pressures	-	94	105	99	1,157	Allocation of funding to CCGs for other policy pressures
Total	**944**	**1,059**	**1,100**	**1,114**	**2,211**	
In year additions	**944**	**115**	**41**	**14**	**1,097**	
Implied minimum uplift	**1.4%**	**0.2%**	**0.1%**	**0.0%**	**1.5%**	

Table 9.2: Non-routine policy pressures for primary medical care allocations

Primary Care (GP Services)	2016-17	2017-18	2018-19	2019-20	2020-21	Notes
CQC fees	32	32	32	32	32	Funding to cover increased CQC fees
Pensions/ NI element of tariff inflation	103	103	103	103	103	Funding to cover increased costs resulting from national insurance/ pensions changes
Total	**135**	**135**	**135**	**135**	**135**	
In year additions	**135**	**-**	**-**	**-**	**-**	
Implied minimum uplift	**1.9%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	

In addition to the above cost pressures, for which all CCGs received funding in the minimum growth calculation, the total CCG allocation quantum was also adjusted to reflect the pressures and savings as shown in Table 9.3.

Table 9.3: Other pressures adjusted for in setting the funding quanta but not included in estimate of minimum growth

Other cost pressures	2016-17	2017-18	2018-19	2019-20	2020-21	Notes
Potential cost pressure from Funded Nursing Care Review	120	120	170	120	120	Allowance for potential increased costs of funded nursing care as a result of NHS FNC review
NHS Property Services move to market rents	-	58	58	58	58	Funding to cover higher rents resulting from move to market rents
Shift of Enhanced Tariff Option funding into recurrent allocations	150	150	150	150	150	Enhanced Tariff Option funding allocated non-recurrently in 2015/16 shifted recurrently into overall CCG quantum
Savings from national initiatives	-	(27)	(378)	(630)	(631)	Further savings to be delivered through national initiatives

9.3 Setting the total allocation

The pace of change for the total or place-based allocation is similar to the process for setting the minimum allocation, although with some important additions.

i. A minimum allocation is set, equal to the sum of the minima for the service groups.

ii. If it is greater, a minimum per capita growth is applied. This is set at a level such that an area with average population growth would see its total allocation grow at a rate that matches the expected GDP deflator.

iii. Additional per capita growth is applied to those areas that are furthest below target. This is set at a level that ensures that no minimum allocation is more than 5% below target in 2016-17 and no area is more than 2.5% below target by 2020-21.

iv. Where the total allocation is growing by less than a specified threshold, the total allocation is increased to meet that threshold. The threshold is based on the GDP deflator plus agreed pressures that will need to be met from the CCG core services allocation.

v. For those areas more than 10% above target their programme growth is capped at policy pressures only. The capping is introduced gradually from those who are 5% above target, where the capping is set at policy pressures plus the GDP deflator, subject to the sum of the minima still being achieved.

vi. Where the total allocation was greater than -2.5% in the year before it is not allowed to close more than 2.5% below target in the current year.

vii. If following these rules does not lead to all available resources being deployed then the range of distance-from-target for which extra growth is available in step iii is extended to more positive values.

Table 9.4: Summary of pace of change decision rules by commissioning stream

	Decision rules
CCG	no CCG is more than 5% below target;
	all CCGs receive a minimum per capita growth that is equivalent to real terms cash growth at the average population growth (in 2016/17 this equates to 0.91%, being 1.66% GDP deflator less 0.75% average population growth);
	all CCGs receive a minimum cash growth equal to real terms growth plus specific non-routine policy pressures (predominantly relating to pensions and 7 day services); unless
	if a CCG is more than 10% above target, its cash growth is limited to the specific policy pressures. This cap is phased in between a DfT of +5% and +10%.
Primary medical care	a minimum allocation is set that ensures maximum progress is made towards ensuring no locality is more than 5% below target, constrained by allowing no CCG area more than 10% per head growth in this step of the process;
	all CCG areas receive a minimum per head growth that is equivalent to real terms cash growth at the average population growth (as defined above); and
	all CCG areas receive a minimum cash growth equal to real terms growth plus specific policy pressures; unless
	if a CCG area is more than 10% above target, its cash growth is limited to specific policy pressures plus 1%. This cap is phased in between a DfT of +5% and +10%.
Specialised	all CCG areas receive the same per head uplift that utilises all the resources allocated to this stream, ensuring that at a national level the allocated funds for NHS England specialised services are maintained and to mitigate any risks relating to the target formula as described above.

9.4 Disaggregation

If as a result of the place based pace of change an area is allocated more than the sum of the minima there is then the question of how the excess is distributed back to the individual groups of services.

Because of the caution in the use of the specialised services formula, the actual allocation for specialised services is set at the minimum value, set as described in section 9.2.3. This leaves any additional resources to be disaggregated between primary medical services and core CCG services.

If the minimum allocation for primary care services is below target, while that for core CCG services is above target, primary care services receives any additional allocation, or is taken to target, whichever is the lower shift. If core CCG services are below target while primary medical services are above the opposite applies.

If after this step some money remains, or if CCG core services and primary medical services minimum allocations are both above or below target then resources are distributed such that the two services move same amount towards or further above target.

M – Supporting information for pace-of-change (Excel file)

N – Min growth primary medical care (Excel file)

O – Min growth CCG core (Excel file)

P – Min growth specialised (Excel file)

Q – Total place based pace of change (Excel file)

10 Better Care Fund

10.1 Funding sources

The minimum contributions in 2016-17 to the Better Care Fund amount to £3,913 million. This comprises revenue funding of £3,519 million from CCGs and Disabilities Facilities Grant capital funding of £394 million.

Of the revenue funding from CCGs, £1,119 million is distributed between local authorities using the relative need formula (RNF) for social care services[4], and £2,400 million is distributed as a flat percentage of CCG 2016-17 allocations, after deducting contributions based on the RNF from CCG allocations.

10.2 Calculation of BCF contributions

The calculations of the contributions to the BCF are set out in the Excel file R - Better Care Fund. This file has previously been published as part of the guidance for planning the 2016-17 Better Care Funding[5].

The methodology is the same as for the calculation of revenue contributions in 2015-16. Changes in the value of the contributions between 2015-16 and 2016-17 are due to a combination of factors. These include:

- CCG baseline adjustments between 2013 when the contributions for 2015-16 were set and 2015 when the contributions for 2016-17 were set;
- differences in the growth of CCGs' allocations in 2015-16 (as revised in December 2014) and 2016-17;
- improved methodology for apportioning from CCGs to local authorities (this is now based on OPS mid-year population estimates for 2014); and
- the difference in growth in total contributions and total CCG allocations. Total contributions to the BCF in 2016-17 increased in line with the GDP deflator. Total CCG allocations in 2016-17 increased by more than the GDP deflator. Therefore, on average, contributions to the BCF are falling as a percentage of CCG allocations. Those CCGs receiving low growth in 2016-17 will have a fall in their share of the BCF contributions.

These factors combined lead to a small fall in cash terms in the BCF contribution for a few CCGs.

R – Better Care Fund (Excel file)

This shows the previously published BCF table for 2016-17.

[4] See Technical Guide to the Adults' Personal Social Services Formulae http://www.local.communities.gov.uk/finance/1314/methpssas.pdf

[5] https://www.england.nhs.uk/ourwork/part-rel/transformation-fund/bcf-plan/

11 Running cost allowances

11.1 Overall envelope and national per head figures

The overall envelope is £1,210,678k in each year 2016-17 to 2020-21. This is the same as in 2015-16.

As the population is increasing the national allocation per head each year is as given in Table 11.1.

Table 11.1: National allocation for running cost allowances per head each year

Year	Allocation per head
2016-17	£22.07
2017-18	£21.91
2018-19	£21.75
2019-20	£21.60 (indicative)
2020-21	£21.46 (indicative)

11.2 Calculation of running cost allowances

11.2.1 Approach

The same approach has been used as for the calculation of 2013-14 to 2015-16 RCAs. They are based on ONS populations adjusted for cross-boundary flows.

RCAs have been set on the basis of unweighted populations. There is unlikely to be a relationship between the items of expenditure covered by the allowance (i.e. the CCG's management costs and the costs of commissioning support) and the traditional determinants of population need (for example age, sex, deprivation) that form the basis of weighted populations.

11.2.2 Populations

The three populations used in the calculation are:

a. the number of registrations with CCGs' member GP practices as published by the Health and Social Care Information Centre for October 2015;

b. the latest Office of National Statistics' (ONS) population projections for 2016 to 2020 for CCGs; and

c. estimates of military personnel included in the ONS estimates.

ONS population data are based on place of residence. CCGs are responsible for patients registered with their member GP practices, irrespective of where the patients reside. There are significant net 'cross boundary patient flows'; patients registered with one CCG but residing in another CCG's geographical area. The starting point for the calculation of RCAs is therefore the number of registrations with CCG's member GP practices to ensure that the distribution of running costs takes account of cross-boundary patient flows.

The number of registered patients who are resident in each CCG, irrespective of where they are registered, is calculated. This is compared with the ONS projected population for the CCG, minus military personnel. Military personnel are omitted as

they are in ONS population projections but CCGs are not responsible for funding their health care services.

A scaling factor for each CCG area is calculated, which is the ONS projected population divided by the number of registered patients resident in the CCG. A scaling factor is calculated for each year 2016-17 to 2020-21, where the numerator is the ONS projected population for the relevant year. The denominator is the number of registered patients resident in October 2015. These scaling factors are then applied to each CCG's registrations resident in each CCG area to produce a constrained population for each CCG.

11.2.3 RCA

The national envelope divided by the sum of the populations constrained to ONS populations for all CCGs gives the RCA per head. The RCA per head is multiplied by the constrained population for each CCG and rounded to the nearest thousand pounds to give each CCG's RCA.

Unlike programme spend allocations, there is no pace of change for running cost allowances and so any changes in the population of a CCG are immediately reflected.

S – Running cost allowances (Excel file)

This shows the calculation of running cost allowances for 2016-17 to 2020-21.

Annex 1: Age-cost curves

Age-cost curves show the relative cost per head of providing NHS services to different age and sex groups, and are derived from the research to develop the formulae used to allocate resources to NHS organisations.

The age-cost curves are not used in the funding formula directly, but age and gender are taken into account in the formula in the modelling of the need for health care services at the person level or small area level.

The age-cost curves are included here as they are sometimes helpful for other analyses.

The age-cost curves are shown below. They are for different years, and some are total costs for each age-sex group and some are only the age-sex weights from the formula as additional need weights cannot be broken down by age-sex group. Some are actual costs from the data used for the modelling, some are predicted weights from the modelling.

General and Acute

Table A1 shows the predicted cost per head for 2013-14 from the refresh of the general and acute formula. They include inpatient, outpatient and A&E attendances.

They exclude mental health, maternity and specialised services. They also exclude the MFF, EACA and remoteness adjustment, as these cannot be broken down by age-sex group.

Table A1: General and acute age-cost curve

Age group	Males	Females
1-4	259	198
5-9	183	149
10-14	186	169
15-19	188	227
20-24	190	252
25-29	185	281
30-34	196	315
35-39	223	345
40-44	281	395
45-49	357	470
50-54	446	545
55-59	589	620
60-64	776	745
65-69	962	886
70-74	1,260	1,134
75-79	1,603	1,397
80-84	1,950	1,703
85+	2,350	2,008

Mental health

The mental health age-cost curve is given in Table A2.

The mental health age-cost curve is from the research outlined in section 4.3. The activity data were from the Mental Health Minimum Data Set (MHMDS) for 2008-09 and were costed using 2008-09 reference costs. MHMDS does not cover those aged under 16 so the groups 0-4 and 5-15 were estimated using 2008-09 HES data for children in these age groups admitted to hospital or treated as outpatients with a diagnosis code that the Programme Budgeting guidance stated should be treated as mental health.

The mental health age-cost curve is actual costs (minus the MFF) in the dataset, not predicted costs from the modelling.

The age-cost curve excludes specialised services.

Table A2: Mental health age-cost curve

Age group	Males	Females
0-4	0.1	0.1
5-15	46.5	46.5
16-19	44.9	38.2
20-24	101.8	60.0
25-29	131.1	79.0
30-34	134.1	87.9
35-39	135.4	93.9
40-44	125.2	93.9
45-49	111.3	97.5
50-54	96.4	87.7
55-59	83.9	83.7
60-64	78.1	78.8
65-69	83.0	89.4
70-74	97.7	115.8
75-79	134.0	154.5
80-84	166.0	183.7
85+	161.1	170.1

Prescribing

The prescribing age-cost curve is better known as Age, Sex and Temporary Resident Originated Prescribing Units (ASTRO-PUs) developed by the Health and Social Care Information Centre. The latest are for 2013, known as ASTRO(13)-PUs, and are shown in Table A3.

This weighting is designed to weight individual GP practice populations for age and sex to allow for better comparison of prescribing patterns. The number of temporary residents attending practices is no longer captured or included in funding allocations. The weightings are standardised (based on a male child under 4 years being 1.0) and are used in the prescribing resource allocation model to calculate the expected cost of drugs prescribed for each GP practice.

The ASTRO-PUs are based on actual costs rather than modelled costs.

Table A3: ASTRO(13)-PUs

Age group	Males	Females
0-4	1.0	0.9
5-14	0.9	0.7
15-24	1.2	1.4
25-34	1.3	1.8
35-44	1.8	2.6
45-54	3.1	3.7
55-64	5.3	5.4
65-74	8.7	7.6
75+	11.3	9.9

Primary Medical Care

The new Primary Medical Care allocation formula was based on a model that estimated the effects of patient and practice characteristics on GP practice workload (see section 7). The modelling produced age-sex coefficients that represent the estimated average number of additional weighted contact minutes that a patient in each age-sex group has with their GP surgery compared to the baseline, that is a male patient aged 0-4. These are given in Table A4.

The primary medical care age-cost curve is for modelled weights by age-sex group, not actual costs. The age-cost curve excludes need over and above that related to age and sex, and also differences in costs, such as the MFF, which cannot be broken down by age-sex group.

Table A4: Primary Medical Care age-gender workload coefficients

Age group	Males	Females
0-4	0.0	-3.2
5-14	-22.4	-20.9
15-44	-17.2	9.1
45-64	6.7	25.7
65-74	41.1	48.1
75-84	80.5	89.4
85+	116.7	123.5

Annex 2: References

Combining Age Related and Additional Needs (CARAN) report
http://webarchive.nationalarchives.gov.uk/20120503034600/http:/www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_093169.pdf

Department of Health, *Resource Allocation: Weighted Capitation Formula, 7th Edition*
http://webarchive.nationalarchives.gov.uk/20120503034600/http:/www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_124946

Health Economics Research Unit (HERU), *The Staff Market Forces Factor component of the resource allocation weighted capitation formula: new estimates*
http://webarchive.nationalarchives.gov.uk/20120503034600/http:/www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_122621.pdf

Health and Social Care Information Centre, October 2015 Registrations
http://www.hscic.gov.uk/catalogue/PUB18762

NHS England *Allocation of resources to NHS England and the commissioning sector for 2016/17 to 2020/21*, 17 December 2015 NHS England Board paper
https://www.england.nhs.uk/2015/12/15/board-meeting-17-nov-2015/

NHS England Financial Allocations 2016/17 to 2020/21 and the allocations published on 8 January 2016
https://www.england.nhs.uk/allocations/#announcements

NHS England *Delivering the Forward View: NHS planning guidance 2016/17 – 2020/21*
https://www.england.nhs.uk/ourwork/futurenhs/deliver-forward-view/

NHS England, Technical Guide to the formulae for 2014-15 and 2015-16 revenue allocations to Clinical Commissioning Groups and Area Teams
https://www.england.nhs.uk/allocations/#formulae

NHS England, Who pays? Determining responsibility for payments to providers, August 2013
https://www.england.nhs.uk/wp-content/uploads/2014/05/who-pays.pdf

Nuffield Trust *Person-based Resource Allocation Research Summary*
http://www.nuffieldtrust.org.uk/publications/person-based-resource-allocation-new-approaches-estimating-commissioning-budgets-gp-pra?gclid=CPfKgcHY-rgCFS3HtAod1zEAFg

ONS 2012 based Subnational Population Projections (SNPP) for CCGs (new site)
http://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/subnationalpopulationprojectionsforengland/2014-05-29

ONS 2012 based Subnational Population Projections (SNPP) for CCGs (archived)
http://webarchive.nationalarchives.gov.uk/20160105160709/http:/www.ons.gov.uk/ons/rel/snpp/sub-national-population-projections/2012-based-projections/index.html

Report of the Resource Allocation for Mental Health and Prescribing Project (RAMP)
http://webarchive.nationalarchives.gov.uk/20120503034600/http:/www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_122619.pdf

Sutton Matt, Soren Rud Kristensen, Yiu-Shing Lau, Gyles Glover, William Whittaker, John Wildman, Hugh Gravelle, Peter Smith Developing the Mental Health Funding Formula for Allocations to General Practices, Estimation of a formula for mental health services based on person-level data (PRAMH)
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/213333/ACRA201218A-Developing-the-Mental-Health-Funding-Formula-For-Allocations-to-General-Practices.pdf

Files - person based resource allocation for mental health report and Person based resource allocation for mental health tables
http://www.england.nhs.uk/2013/08/15/rev-all-wrkshp/

Note: Some links updated 05/12/2018

Annex 3: List of documents published alongside the technical guide

ACRA papers

	Letter of 15 December 2015 from the Chair of the Advisory Committee on Resource Allocation (ACRA) setting out the committee's latest recommendations for the formulae for NHS allocations
	Letter of 10 March 2016 from the Chair of the Advisory Committee on Resource Allocation (ACRA) on specialised services formula
ACRA(2015)36	Costs of unavoidable smallness due to remoteness
ACRA(2015)18A	Unavoidable smallness due to remoteness: Identifying remote hospitals
ACRA(2015)24B	Unavoidable smallness due to remoteness: Identifying remote hospitals
ACRA(2015)28R	Refreshing the CCG formula
ACRA(2015)35	Health inequalities adjustment (based on Ben Barr paper)
Public Health formula consultation[6]	The new SMR<75 16 groups, 10:1 weight are discussed in the paper 'Consultation document: public health grant - proposed target allocation formula for 2016/17' section 6, page 15

Research reports

Refreshing the Formulae for CCG Allocations for allocations to Clinical Commissioning Groups from 2016-17 - Report on the methods and modelling - NHS England Analytical Services (Finance)
Primary medical care – new workload formula for allocations to CCG areas
Specialised services formula

Spreadsheet files

A Registrations by GP practice and CCG - October 2015
B Calculation of CCG estimated registrations 2016-2020
C General and Acute need per head 2016-17
D Mental Health need per head 2016-17
E Maternity need 2016-17
F Prescribing need 2016-17
G SMR weighted populations
H Market Forces Factor
I Emergency Ambulance Cost Adjustment
J Overall weighted populations CCGs 2016-17
K1 Primary care (medical)
K2 Primary care (other)
L Specialised services
M Supporting information for pace of change
N Min growth primary medical care
O Min growth CCG core
P Min growth specialised
Q Total place based pace of change
R Better Care Fund
S Running cost allowances

Equality Analysis

Equality Analysis for 2016-17 to 2020-21 revenue allocations to Clinical Commissioning Groups and commissioning areas

[6] https://www.gov.uk/government/consultations/public-health-formula-for-local-authorities-from-april-2016