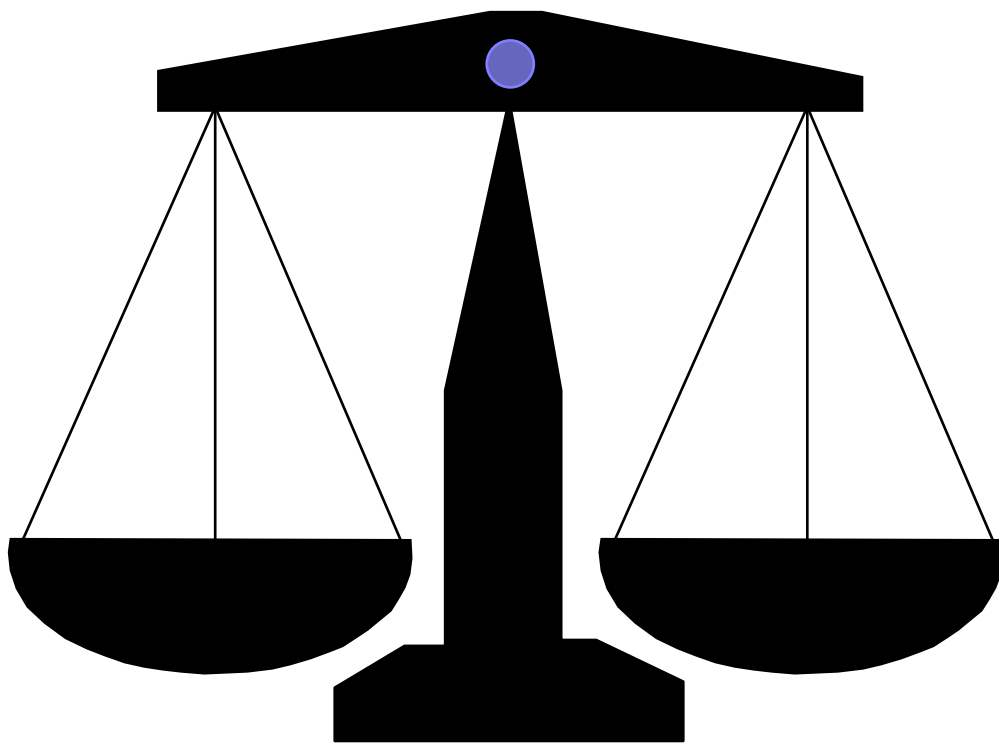


**ALLOCATING RESOURCES TO HEALTH AND SOCIAL
SERVICES BOARDS: PROPOSED CHANGES TO THE
WEIGHTED CAPITATION FORMULA**

**A FOURTH REPORT FROM THE
CAPITATION FORMULA
REVIEW GROUP**



July 2004

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1 INTRODUCTION

The Work of the Capitation Formula Review Group (CFRG)

- 1.1 The CFRG is a multi-disciplinary group drawn from both the Department of Health, Social Services and Public Safety (DHSSPS) and Health and Social Services (HSS) Boards which has been tasked with reviewing the methodology for allocating Hospital, Community Health and Personal Social Services (HCHPSS) revenue resources to HSS Boards (see Annex 1 for details of Group membership).
- 1.2 The Group was originally established in 1994 and published ‘Allocation of Resources for the NI HPSS – A Report by the Capitation Formula Review Group (First Report) in October 1995. In order to address a range of then still outstanding issues, it was re-established in March 1996 with the following Terms of Reference:

The Group shall develop a work programme to address, as far as possible, the limitations identified in the Group’s previous Report and by the external Quality Assurance of that Report, to ensure that the resource allocation formula, for use in the distribution of resources to Board level, provides the best measure of the relative need for health and social care in NI.

- 1.3 The next report, ‘Allocation of Resources for the NI HPSS – A Second Report by the Capitation Formula Review Group’ (Second Report) was published in September 1997. The proposals, which it contained, were used to inform the 1998/99 to 2000/2001 allocations to HSS Boards.

- 1.4 In October 2000, the '3rd Report from the Capitation Formula Review Group' was published. The 3rd Report from the CFRG, whilst 'standalone' in nature, essentially built on the work previously described in the first two reports. The proposals contained in it were used to inform the 2001/02 to 2004/05 allocations to HSS Boards. In addition, the 3rd Report from the CFRG recommended further research in a number of areas. The outcome of this work is presented in this Fourth Report. This Report, whilst again 'standalone' in nature, continues to build on the work described in previous reports. In order to gain a full picture of the review process it is important to consult all four reports.
- 1.5 In order to make the report accessible to a non-specialist audience, the findings of the various commissioned research projects have been presented in a relatively non-technical way. Often the modelling described is extremely complex, and 'cutting edge' in approach. For full details of the modelling, upon which various strands of the formula are based, readers are referred to reports of the research teams who undertook the work. Full copies of these reports are available upon request (for contact details, see inside front cover).

Description of Current Formula

- 1.6 The aim of the regional allocation formula is to determine each HSS Board's fair share of available resources based on its population size, the age/gender and additional needs profile of that population, and other factors such as the extra cost of providing services due to sparsity of population (i.e. the rural cost adjustment) and the different levels of income collected by providers in each HSS Board area from clients in the residential and nursing home sector.

- 1.7 The Second Report recommended that a Programme of Care (PoC) approach should be adopted in the allocation formula as such a model offered the greatest opportunity to explicitly address the specific needs of individual client groups. There are nine PoCs, as listed below:

PoC1 – Acute Services

PoC2 – Maternity and Child Health

PoC3 – Family and Child Care

PoC4 – Elderly Care

PoC5 – Mental Health

PoC6 – Learning Disability

PoC7 – Physical and Sensory Disability

PoC8 – Health Promotion & Disease Prevention

PoC9 – Primary Health and Adult Community

- 1.8 Each PoC formula comprises a relevant population, an age/gender weighting and an additional needs weighting. The relevant population refers to the client group on which the PoC is based, for example, all persons aged 65+ in respect of the Elderly PoC. The rationale for then applying an age/gender weighting is that two populations of the same size could have a different need for health and personal social services due to differing age /gender structures of those populations. Even within the Elderly PoC, clients aged 75 and over generally require more services than those aged 65-74. Of great importance here are the findings from the 2001 Census. These, and associated population issues, are discussed in Chapter 2.

- 1.9 An additional needs weighting is then required as two populations of the same size and structure could still have a differential need for services due to a differing underlying morbidity associated with, for example, deprivation. (For the method and background to the statistical modelling of this, please refer to Chapter 21, “Technical Considerations”) The age/gender and additional needs

weighted populations in each PoC are then combined in order to produce a single composite weighted population share for each HSS Board.

HSS Board Purchasing Power

- 1.10 The final step is to make an adjustment for differential purchasing power. To date the Group has recognised the need to make two adjustments to take account of differential purchasing power. The first of these relates to the differential costs associated with the provision of services in rural areas. This largely relates to the costs of travel, including professional time, and takes account of the generally longer distances to be travelled in rural areas. Specific research was commissioned by the Group to obtain an accurate assessment of the different costs associated with these issues across the four HSS Boards, and the results of this research were reported in Chapter 12 of the 3rd Report from the CFRG. More recently, this work has been updated and the results of this exercise are reported in Chapter 15.
- 1.11 The second adjustment that has been effected to date relates to the income collected from the residents of residential and nursing homes. The aim of this technical adjustment, modified in light of a recommendation made in the 3rd CFRG Report, is to attempt to equalise the income collected across the four HSS Boards. It is applied directly to the Elderly PoC and is based on information produced as part of HPSS organisation's financial accounts processes.

Scope of Work – the 4th Work Programme

- 1.12 The Group's work programme for this Report (the 4th Work Programme) was based around the issues identified in the 3rd Report from the CFRG. It was also informed by issues raised during public consultation and which emerged in the course of the Equality Impact Assessment carried out in 2000. In addition, the work programme also took account of issues which have emerged more recently, for example new developments in methodology.
- 1.13 The work of the 4th Work Programme was carried out in a variety of ways. Some projects were carried out by specialist sub-groups of the Group, while larger scale research projects were commissioned from external consultants expert in the relevant fields. For all consultant-led research, a steering group comprising the researchers, Board representatives, and Government Statisticians supervised the work on a day-to-day basis. This oversight extended to a full quality assurance process at the end of the research. Quality assurance involved a thorough examination of all data used and validation of the statistical modelling produced by the researchers. In addition, all of the research projects carried out by external organisations were independently peer reviewed by experts of international and local expertise selected by the Group for their specific knowledge in this field.

The larger scale research projects, which have been completed during the 4th Work Programme, are introduced in Paragraphs 1.16 to 1.24.

Issues Identified in the 3rd Report from the CFRG

- 1.14 Due to the large number of recommendations proposed in the 3rd Report from the CFRG (74 in total), components of the 4th Work Programme were prioritised in order to keep the Work Programme manageable within a three-year timeframe. The order of prioritisation was informed by consultation, by

the findings of the Equality Impact Assessment and by CFRG Board Members.

- 1.15 Figure 1.1 lists all work completed within the 4th Work Programme. In addition, routine adjustments to the models (such as updating demographic and financial information) were undertaken.

Figure 1.1 Research Completed Under the 4th Work Programme

Programme of Care	Research Project Completed
Acute Services	Review of funding and/or charging of A&E services
Family & Child Care	Review of additional needs index when 2001 Census data becomes available
Elderly Care	Update of technical adjustment in Elderly PoC based on latest FR31 Financial Return and up-to-date estimates of Preserved Rights cases as recorded in HSS Board residential/nursing home surveys
Mental Health	Commission further modelling work to update interim needs formula
Learning Disability	Commission scoping study to ascertain whether a prevalence study across all four HSS Boards is feasible
	Develop research based needs weightings (the consideration of equality issues in Chapter 19 of the Third Report emphasised the priority of this work)
Physical & Sensory Disability	Commission research to construct up-to-date age/gender weightings and additional needs weightings (the consideration of equality issues in Chapter 19 of the Third Report emphasised the priority of this work)
Cross-Cutting Issues	<p>The implications of unmet need for health and social services (the consideration of equality issues in Chapter 19 of the Third Report emphasised the priority of this work)</p> <p>Further research, using a non-utilisation based approach, to be carried out into the issue of rural needs</p> <p>Detailed research to be undertaken which establishes the impact of economies/ diseconomies of scale on the cost of providing hospital, community and personal social services in urban and rural areas</p>
Other Issues Identified	<p>Cross Border Population Flows: consider how best to deal with the issue of persons from the Republic of Ireland who avail of services in N Ireland by using an 'address of convenience'</p> <p>Cost of the Troubles: re-examine available research</p>

Summary of Research Undertaken in 4th Work Programme

1.16 This report sets out details of the Group's findings, including any remaining limitations, and conclusions in relation to each of the issues listed above. The conclusions presented in this report should be seen in this context of continuous improvement, i.e. they are based on the latest available knowledge rather than being regarded as the definitive answer to equitable resource allocation. The CFRG continually keeps itself informed of new research in the field of health care resource allocation, and as ever more sophisticated statistical methods are developed, the formula will be subject to review. To that extent the capitation formula emerging from this programme of research should not be regarded as a final product.

1.17 All needs weightings in the current formula are based on the results of NI specific research or a NI based default. This is a significant improvement over the situation prior to October 2000, where all of the needs weightings in the formula with the exception of the Acute PoC weightings were based mainly on research carried out in England and Scotland. By October 2000, needs weightings for the following PoCs had been constructed using NI data:

- Acute Services;
- Maternity and Child Health;
- Family and Child Care;
- Elderly Care; and
- Mental Health.

For the remaining PoCs, needs weightings were based generally on Standardised Mortality Ratio (SMR).

1.18 Other research, PoC specific in nature, has been carried out since the publication of the 3rd Report from the CFRG. The additional needs index for the Family and Child Care PoC has been revised to take account of changes in

social work, client patterns and the availability of new Census and cost data. This research is described in Chapter 5.

- 1.19 The additional needs index for the Mental Health PoC has also been revised. At the time of the 3rd Report from the CFRG, the additional needs formula was regarded by the Group as an interim measure because there was incomplete coverage of good quality residential and social services data and its construction used a weight of 0.5 (which was estimated) to reflect the lower cost of continuing care for long-stay inpatients. All examinations of inpatient costs subsequently suggested that the cost of long-stays did not, in fact, tail-off significantly as length of stay increased, and that the ratio of costs for short stay to long stay was closer to 1: 0.9. For this work, long-stay was defined as a hospital stay of more than 35 days. The Mental Health model was therefore re-estimated using a weighting of 0.9. This work is reported in Chapter 7.
- 1.20 An important study into the prevalence of Learning Disability in N Ireland and implications for resource allocation was commissioned in early 2002. This evidence based work represents a significant improvement on the interim needs weighting used at the time of the 3rd Report from the CFRG which was based on the ‘under 75’ SMR in respect of inpatient services and the numbers of Learning Disability clients who had at least one contact with providers in respect of non-hospital services. This option was chosen because, at the point in time at which it was calculated, it most closely represented the perceived correct re-distribution between HSS Boards. The new work on Learning Disability is described in Chapter 8.
- 1.21 Development of an additional needs index for the Physical & Sensory Disability PoC was also carried out since the publication of the 3rd Report. Previously, an interim weighting based on the ‘under 75’ SMR was used in this PoC. Development of the new needs weighting is discussed in Chapter 9.
- 1.22 Research was also commissioned into ‘unmet need’ in Health and Personal Social Services in NI in order to, firstly, establish whether it is present, and, secondly, to assess the implications of ‘unmet need’ for resource allocation

and for addressing health and social care inequalities in NI. This research is described more fully in Chapter 13.

1.23 A specific study was also undertaken to identify the existence and nature of any economy of scale effects on the cost of providing hospital and community health services and social services between the four HSS Boards in NI. This research developed and deployed investigative methods necessary to isolate and quantify economy of scale effects in Acute hospital services (under a range of configurations) and a range of community services (again under a range of configurations). This innovative work is described in detail in Chapter 16.

1.24 Other research was carried out or commissioned by the Group since the 3rd Report of the CFRG, and the findings included in this report are:

- A review of funding mechanisms in respect of Accident and Emergency services;
- A review of the funding of cross-border treatment including an investigation into the level of use of health and social services by Republic of Ireland citizens in N Ireland and vice-versa;
- Updating of population bases in light of the 2001 Census;
- Implications of applying the allocation formula at sub-Board level;
- A review of issues arising in relation to the income adjustment, including consideration of extending the adjustment to other PoCs in addition to the Elderly PoC;
- Investigating the implications of using the Strategic Resource Framework to weight PoCs; and

- Measurement of confidence intervals and analysis of systematic error.

1.25 A spreadsheet model providing details of the application of the allocation formula is available from Project Support Analysis Branch of the DHSSPS upon request.

2 POPULATION AND CENSUS ISSUES

Introduction

- 2.1 In the next decade the biggest impact on resource allocation will result from differential changes in the population of different Board Areas. This chapter explains the central role of population data in the capitation formula, and discusses the implications of the 2001 Census results.

The Use of Population Data in the Capitation Formula

- 2.2 Financial allocations to the HSS Boards are based on a measure known as weighted population. Each Board's weighted population is computed by weighting the actual population (the civilian population mid-year estimate plus frontier workers), for its age/gender structure (older age groups generally attract higher weightings because empirical evidence shows more resources are required to treat these groups), and for differential health and social care needs (the extent of which are estimated by statistical modelling of health, socio-economic and healthcare supply measures).
- 2.3 The weighted populations of the four HSS Boards combined equals the N Ireland civilian population mid-year estimate (MYE) plus the few hundred frontier workers registered in N Ireland (i.e. the actual population entitled to avail of HPSS). Table 2.1 shows the weighted populations, which informed the 2004/05 allocations (based on the 3rd Report from the CFRG) and the actual populations for each HSS Board.

Table 2.1 Weighted Population and Actual Population (Civilian), 2002 – Situation at Time of 3rd Report

	Weighted Population [Weighted for age/gender and additional need]	%	Actual Population	%
EHSSB	694,066	41.12	661,968	39.21
NHSSB	405,373	24.01	428,339	25.37
SHSSB	303,937	18.00	313,652	18.58
WHSSB	284,706	16.87	284,123	16.83
N Ireland	1,688,082	100.00	1,688,082	100.00

Actual population (civilian) is the 2002 civilian population mid-year estimate plus the number of registered frontier workers. Frontier workers were recorded thus: EHSSB 3, NHSSB 2, SHSSB 113, and WHSSB 660.

- 2.4 Each HSS Board's weighted population is made up of separate weighted populations for each PoC. For example, each HSS Board has a weighted population for the Elderly PoC, for the Family and Child Care PoC, etc. These examples are shown in Table 2.2. The method of calculation is shown in Chapter 22.

Table 2.2 Weighted Populations for Elderly and Family and Child Care PoCs (based on 2002 population) - Situation at Time of 3rd Report

	Elderly PoC Weighted Population %	F&CC Weighted Population %	Actual Population %
EHSSB	44.97	41.57	39.21
NHSSB	24.37	19.21	25.37
SHSSB	16.37	16.81	18.58
WHSSB	14.30	22.42	16.83
N Ireland	100.00	100.00	100.00

The information in the above table indicates, for example, that EHSSB has greater than average need for Elderly PoC resources while WHSSB has greater than average need for Family and Child Care PoC resources.

- 2.5 Of the various components contributing to weighted population, at HSS Board level the size of the actual population is by far the most influential. This is because the greatest difference between HSS Boards relates to difference in population size (as opposed to differences in terms of age/gender structure or differences in socio-economic profile). It is also important to recognise that the influence of a HSS Board's population can be magnified when high weightings are applied to the older population age groups. As elderly people generally have the greatest requirements for health and social care resources, a Board with a relatively high proportion of elderly people will require relatively more resources and this need will be reflected in a relatively higher overall weighted population.
- 2.6 In order to illustrate the influence of elderly people on Board capitation shares, it is helpful to consider an example. The relevant population for the Elderly PoC is all persons aged 65 and over. In N Ireland, according to the 2002 population MYE, there are 227,349 such persons. Expenditure on the Programme amounts to approximately £393 million. The allocation per capita

for this PoC is therefore approximately £1,729, i.e. the average cost per person aged over 65 incurred in responding to non-acute health and social care needs under the Elderly PoC. This is, however, an average cost. Actual costs incurred in the programme vary widely between the over 85 age group and the under 75s. The formula is also sensitive to this issue. For example, females aged 85+ are allocated on average £7,040 per capita under the Elderly PoC whereas females aged 65-74 are allocated on average £673 per capita (figures based on internal analysis of 2003/04 allocation).

- 2.7 The above figures show that even relatively small changes in population numbers, and in the numbers of elderly people in particular, can have significant implications for HSS Boards' share of resources. This stresses the importance of having available accurate population estimates by age group.

Position at the Time of the 3rd Report

- 2.8 In July 1999, a review conducted by the Northern Ireland Statistics & Research Agency (NISRA) into the calculation of population estimates was concluded and the figures were revised from 1991 to 1997. While ultimately based on the 1991 Census, this revision made use of a variety of data sources including social security and administrative databases, and, for the first time, estimates at local government district (LGD) level broken down by age/gender were produced. In addition, 1998 Mid Year Estimates (MYEs) were produced, and subsequently 1999 and 2000 MYEs were also added to the series using the usual method of adjusting for births, deaths and migration. The 2000 MYEs were used to inform the 2002/03 allocation of the HPSS budget, while the 2003/04 allocation was informed by 2001 MYEs based on the 2001 Census. Using MYEs, which, were based on a new Census resulted in a relatively large year-on-year change in estimated population.
- 2.9 Despite the improvement in accuracy brought about by the NISRA review, the accuracy of the MYE progressively deteriorates the further we move from the Census base year, chiefly as a result of the difficulty in accurately measuring

both internal and external migration flows. What happens, therefore, when MYEs are based on a new Census (as in the case of 2001), is that a ‘correction’ in the time-series occurs which manifests itself as a larger than usual annual population change.

Position following 2001 Census

2.10 In order to demonstrate the scale of this ‘correction’, Table 2.3 compares the Board level MYEs for 2000 with those for 2001. This demonstrates that despite the improvements initiated with regard to MYEs based on the 1991 Census, the 2001 Census enumeration identified significant changes in Board populations.

Table 2.3 % Change in Mid-Year Estimates (Civilian)

	2000 MYE	2001 MYE	VARIANCE	% CHANGE
EHSSB	670,029	663,099	(6930)	-1.03
NHSSB	428,134	426,121	(2013)	-0.47
SHSSB	311,213	310,121	(1092)	-0.35
WHSSB	280,012	280,578	566	+0.20
N Ireland	1,689,388	1,679,919	(9469)	-0.56

For 3 of the 4 Boards the latest estimates show the population to be smaller than that previously estimated – the EHSSB by over 1%.

These global percentage changes mask more significant change for individual age groups. Table 2.4 shows the changes by age group. These indicate that the 2000 MYEs:

- Overestimated the number of 0-15 year olds in the population. Again the biggest difference was seen in the EHSSB where the change in estimated population for this cohort was -4.34% between 2000 and 2001. It should be noted, however, that not all of this -4.34% is due to error in the 2000 population MYE: part of the -4.34% will be due to actual population change between the two years.
- Understated the numbers of the elderly population in the NHSSB, SHSSB and WHSSB. The SHSSB estimated population of elderly people rose by 5.65% (again some of this will be due to error in the 2000 MYE and some due to actual population change), whereas the EHSSB number of elderly people had previously been overstated.

Given the relationship between age and need for health care investment these changes, and those likely to emerge in the future, have a significant impact on Board target shares of total health and social care resources.

Table 2.4 % Change 2000-01 in Mid-Year Estimate (Civilian) by Age and HSS Board

	Percentage change between 2000 and 2001 MYEs			
	0-15	16-64	65+	Total
EHSSB	-4.34%	0.38%	-1.83%	-1.03%
NHSSB	-1.31%	-0.84%	2.84%	-0.47%
SHSSB	-0.88%	-1.25%	5.65%	-0.35%
WHSSB	-2.86%	0.93%	3.56%	0.20%
N Ireland	-2.65%	-0.14%	1.31%	-0.56%

Population Projections

- 2.11 NISRA/GAD produced 2002 based population projections in late 2003. These indicate that by 2027, the N Ireland population is expected to increase by 8%. Significantly for resource allocation, this increase is expected to be greatest in the older age groups. For example, it is predicted that the number of children aged under 16 will fall by around 13% while the number of elderly people will increase by around 64% by 2027.
- 2.12 The Group continually keeps itself informed of what the official population projections are predicting and await with interest the release of 2002 based projections disaggregated to HSS Board level. Analysis of these figures (due in Autumn 2004) will reveal in more detail what the longer-term resource allocation implications for HSS Boards will be. However, internal analysis of projections based on the 2000 population MYE suggest that by 2010, all HSS Boards will have reductions in the numbers of children (ranging from -9% in SHSSB to -15% in EHSSB), and large increases in the number of elderly people (ranging from +8% in EHSSB to +20% in NHSSB). The changing relativities in terms of population numbers and age profile between Boards over this period will be difficult to manage from a resource allocation perspective. More importantly, the increasing numbers of elderly people in the population signal a substantial increase in need which must be matched by a more than commensurate increase in resources if these are to be appropriately met.
- 2.13 Further consideration needs to be given to whether population projections, rather than population mid-year estimates (MYEs), might be appropriate in the calculation of capitation shares. The timetable for the production of MYE means that they are always two years behind the year for which resources are allocated (for example, the 2003/04 allocation is based on the 2001 MYE). This is a clear weakness in the current approach because if a HSS Board has population growth, which exceeds that of the other HSS Boards, its share of resources will lag behind current needs. Using projections should remove this problem. However, one disadvantage of projections is that an additional

source of error can arise because of difficulties in predicting future birth and death trends and, particularly, migration patterns. This may mean that for a future allocation year a population MYE, even lagging 2 years behind, can in fact give a truer reflection of the population in the allocation year than the projected population for that year. During the course of the next work programme, the Group will be monitoring and comparing the performance of population mid-year estimates and population projections at a number of geographies (From N Ireland level, through to HSS Board and sub-board level) This exercise will help the Group to decide on whether population projections might have a useful role in resource allocation.

Other Implications of the 2001 Census

- 2.14 In addition to enabling improvements to be made to the accuracy of population mid-year estimates, the 2001 Census has also provided an opportunity to review and update the dataset of needs variables many of which are calculated from 1991 Census data. This was done and 2001 Census data has been used in 'new' research quoted in this Report. However, the 2001 Census used a different set of electoral wards to the 1991 Census. The resultant ward needs indices are therefore based on this new geography and this new geography is not compatible with needs indices calculated before the 2001 Census. It is not straightforward to accurately map the 'old' needs indices to the 'new' set of electoral wards.
- 2.15 A further implication of the 2001 Census is that definitions of some variables changed (for example the definition of limiting long-term illness between the 1991 and 2001 Censuses is different). This means that variables, which are in existing needs formulae but were calculated, using 1991 Census values (for example, in the Acute PoC needs formula), cannot be legitimately updated using the 2001 values.

- 2.16 Having carried out some analysis to investigate the old/new ward boundary issue, the Group concluded that existing needs variables could not be accurately translated to the new Census geography. It was therefore agreed that all new research commissioned after the release of the 2001 Census results would use 2001 Census data and definitions, and that the statistical modelling aspect of this research would use small areas defined by the electoral ward boundaries as used in the 2001 Census. In the short-term, this will mean that the Board allocation model will contain some allocation formulae based on the old electoral ward geography, and some allocation formulae based on the new electoral ward geography, with a progressive movement on a PoC by PoC basis towards the latter as the next work programme progresses.

The Accuracy of Population Figures

- 2.17 A central theme of this chapter has been that population mid-year estimates tend to be less accurate the further away in time one moves from the Census benchmark. Some implications of this were shown in Para 2.10.
- 2.18 It is interesting to note that when one compares the difference between the 2000 MYE rolled forward from the 1991 Census and the 2000 MYE derived from the 2001 Census, there was a difference of -0.87% (equivalent to 15,000 people) between the two estimates. Furthermore, the difference between estimates has been found to be greater in certain areas. While for most Local Government Districts differences between estimates were under 1%, in nine LGDs, the difference was over 2% (the maximum was 4%.)
- 2.19 It should be pointed out that even the Census could contain a small degree of error. Despite making every effort to ensure that everyone was counted in the 2001 Census, the Census Office for N Ireland acknowledge that no enumeration will ever count everyone. Soon after the Census was conducted, the Census Office for N Ireland conducted a Census Coverage Survey to estimate the number of households and people not counted in the Census. It

was estimated that 95.2% of the N Ireland population responded to the Census. Households and persons estimated to have been missed by the Census were imputed to produce a fully adjusted Census database. Due to the fact that the Census database contains an element of estimation, there is an associated error with Census data. The size of the error in the Census count was estimated to be +/- 0.7% (or 12,000 people).

- 2.20 The relative or proportionate size of errors in population estimates increases as one goes down the geographical scale. Therefore, for example, the proportionate size of error at HSS Board level will generally be larger than that at N Ireland level. Estimates of these inherent errors are complex and are available only at Census Estimation Area level, i.e. for Belfast LGD, East of N Ireland, and West of N Ireland. The likely amount of error for these areas is, respectively, +/- 2.3%, +/-0.9%, and +/- 1.2% (figures supplied by NISRA).
- 2.21 Although the official MYE will always provide the best estimate of the population for N Ireland as a whole and for Board and sub Board populations this inherent error rate needs to be borne in mind in resource allocation decisions.
- 2.22 One final population related issue concerns that of people resident in long stay provision, e.g. residential/nursing homes. Current payment arrangements - where a person's original Trust of residence makes payment to the provider hosting the person in care - can be out of line with current funding flows which are based on the Census (which records residents of residential and nursing homes against the population of the area in which the home is located). This is a complex issue, which requires further consideration.

Recommendations

- 2.23 The Group recommends that:

- all future research commissioned continues to use data at small area level defined by the electoral ward boundaries as used in the 2001 Census;
- further consideration is given to the adoption of population projections for resource allocation purposes rather than mid year estimates. The Group awaits release of the 2002 based population projections at HSS Board level (available in Autumn 2004) in order that any decision can also be informed by the latest Census data;
- the inherent error rates in the estimates of Boards and sub Board populations are borne in mind in resource allocation decisions;
- consideration be given to harmonisation in how people in residential/nursing homes are treated in the allocation process. This will involve consideration of how they are enumerated in the Census, how they are enumerated in additional needs modelling, and how they are actually paid for in cases where they currently reside in a Board outside their Board of origin; and
- the impact of the latest population projections on the medium term application of the formula at Board and locality level be considered and a strategy developed for dealing with the consequences of these changes.

3 ACUTE SERVICES

Introduction

3.1 This PoC includes all activity, and resources used, by any health professional, relating to an inpatient episode where the consultant in charge of the patient is a specialist in an Acute specialty. Acute specialties cover all hospital specialties with the following exceptions:

- Geriatric Medicine;
- Obstetrics;
- Obstetrics (Ante Natal);
- Obstetrics (Post Natal);
- Well Babies (Obstetrics);
- Well Babies (Paediatrics);
- GP Maternity;
- Psychiatric Specialties; and
- Learning Disability.

Special Care Baby Units are also included as part of the Acute PoC.

This programme also includes all activity, and resources used, by a hospital consultant in an Acute specialty in relation to an outpatient episode, day case, regular day admission, regular night admission or day care.

Accident and Emergency (A&E) services and the Emergency Ambulance service are also included in the Acute PoC.

3.2 Expenditure on the Acute Services PoC, £682.7m, was 41.14% of the total N Ireland HSS Board expenditure in 2002-03.
(excludes expenditure on capital charges and medical negligence)

Description of Formula

- 3.3 As reported in the 3rd CFRG Report, Health and Social Care Research Unit (HSCRU), Queen's University of Belfast (QUB) were commissioned in 1996 to replicate the methodology previously developed by York University for the Department of Health in England in 1994, and to improve it where possible. (Technical details of this work can be found in the researchers' report "A study to devise a formula to assist in allocating resources for acute hospital services within N Ireland" (1997)).
- 3.4 The key outputs of the QUB/York analysis were an age/gender cost relationship for the utilisation of inpatient services in N Ireland (Table 3.1), and an N Ireland index of additional need for HPSS inpatient services. The index is calculated as the product of the five needs variables weighted exponentially by (raised to the power of) the coefficients and is shown in Table 3.2.

Table 3.1 Acute Age/Gender Relative Costs

Age/Gender Relative Costs									
Age	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44
Male	270.4	79.1	70.2	79.0	88.0	98.2	102.3	109.6	120.6
Female	205.4	63.7	61.1	78.1	93.0	113.2	122.8	125.9	139.1
Age	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
Male	153.0	202.2	261.9	350.3	456.4	525.4	602.2	684.1	831.6
Female	156.9	185.1	217.8	260.5	324.8	389.0	448.5	517.5	568.9

Table 3.2 Variables & Coefficients in Acute Needs Index

Acute Health Care Needs Variables	Coefficients
Over 75 Living Alone	0.1076
Family Credit (Not)*	-2.1947
Income Support	0.0788
SMR (All Ages)	0.2712
Low Birth Weight	0.0513

*The variable had to be created as people not obtaining Family Credit, as the proportion getting Family Credit in some electoral wards was zero and caused technical difficulties.

- 3.5 The above work was subject to peer review and consultation for the 2nd Report from the CFRG. At the time, the Group concluded that the HSCRU report provided a sounder basis for resource allocation in NI than had previously been possible. It was agreed, therefore, to continue to use the HSCRU model, with the Standardised Mortality Ratio (SMR) calculated over the most recently available 5 year period, as the interim needs weighting until such times as further re-modelling work could be commissioned. This was recommended to Minister for approval, and the needs index was implemented in 2001/02.
- 3.6 The work programme of the Group for this 4th Report did not include a review of the age/gender cost relationship and the above needs weightings. The Group is however very much aware that the data used in the research to determine the age cost relationships and needs weightings is likely to be out of date, and that the previous index was recognised as an ‘interim model’, pending further work. In the intervening period there has been major change in the profile of services, clinical practice and in population demographics. Given the fact that the formula is applied to approximately 40% of total HPSS funding, the Group believes a priority should now be given to reviewing the formula.
- 3.7 In accordance with the recommendations of the 3rd Report of the CFRG, the Group considered the way emergency ambulance (EA) services and A&E

services were funded, and the findings and conclusions of the Group are set out below.

Emergency Ambulance (EA) Services

- 3.8 Resources in respect of EA services are currently allocated to HSS Boards through the capitation formula, as part of the Acute PoC allocation. Expenditure on this service was £23m in 2001/02, and this is currently funded through a joint commissioning process, which exists between the four HSS Boards. Boards contribute their capitation share of service development funding to this total. This will continue to be the case until any further changes are recommended through any review of the entire Acute formula.

Funding of Accident and Emergency (A&E) Services

Background

- 3.9 In 2001/02 the cost of A&E services amounted to some £42.7m. Under the current funding arrangements HSS Boards are required to carry the full costs of the provision of A&E facilities within their geographic area irrespective of the Board of Residence of patients presenting. The Department does not prescribe the level of A&E service that should be provided in each Board area and current service levels reflect historic local decisions regarding the level and nature of services deemed necessary to meet demands. Such services include a range of primary, local and secondary care services as follows:

- GP Treatment Room;
- GP Out of Hours;
- Hospital Minor Injuries Units;
- Local Hospital A&E Units (restricted hours); and
- Major A&E Units (24 hour provision).

- 3.10 HSS Boards receive funding from the Department for A&E services through the Acute PoC section of the capitation formula. Boards have responsibility for assessing their population's needs and consequently how they allocate resources between services. Boards can therefore spend more or less than their capitation share on providing A&E services.
- 3.11 Table 3.3 shows how expenditure in 2001/02 on A&E hospital services was distributed by HSS Board area and how this compares with the target capitation shares.

Table 3.3 Comparisons of Funding and Expenditure for Hospital A&E Services

	EHSSB	NHSSB	SHSSB	WHSSB	NI
Actual Expenditure Share	53.2%	19.4%	15.4%	11.9%	100.0%
Weighted Capitation Share (Acute PoC)	40.3%	24.9%	18.4%	16.5%	100.0%
Actual Expenditure	£22.7m	£8.3m	£6.6m	£5.1m	£42.7m
Weighted Capitation Share of Expenditure	£17.2m	£10.6m	£7.9m	£7.0m	£42.7m
No. of Hospital A&E Units in Board Area	7	4	2	3	16
No. of Minor Injury Units in Board Area	2	0	2	0	4

- 3.12 Table 3.3 clearly demonstrates that the actual expenditure incurred by individual Boards is not in line with their weighted capitation shares of the total NI expenditure. This is particularly so for the Eastern Health and Social Services Board. The figures do not indicate however whether the Eastern

Board is funding the treatment of people resident in other Boards, or whether the population living in the Eastern Board area makes greater use of A&E services, or some combination of both these reasons.

3.13 The 3rd Report from the CFRG concluded that the Department should consider reviewing the funding of A&E services. Consequently a CFRG working group was established to consider the various alternatives available for the funding of A&E services across the region.

CFRG Considerations

3.14 In taking forward its deliberations, the sub-group was concerned to address a number of issues:

- Whether existing funding arrangements, including their direct application at sub-board level should continue, or whether;
- Funding at Board and sub-board level should be based on service utilisation providing for cross-boundary usage to be reflected in service level agreements with Trusts or for financial adjustments to be made between Boards;
- Whether such adjustments should be made at full cost or marginal cost basis;
- Whether funding of A&E services should be on a capitation basis; and
- How funding arrangements should be applied to local health and social care groups.

3.15 In giving due regard to each of these issues, the sub-group was conscious of the need:

- To ensure that any proposed adjustments to the current funding arrangements were based on evidence;
- To take into account whether an element of A&E services could be defined as regional;
- To ensure that the funding arrangements at Board and local level were as equitable as possible; and
- To allow Boards at a local level to determine patterns of A&E provision which best met local needs.

3.16 The findings of the sub-group on each of these issues are discussed.

Analysis of Evidence

3.17 The sub-group sought information on the utilisation of A&E services on the basis of Board of residence. 7 of the 20 units were able to provide some relevant information, but 6 of these were in the EHSSB area. Consequently the information could not be deemed to offer a representative sample of activity across the region on which to draw firm conclusions. Although the information did identify cross-boundary flows into EHSSB facilities, there was not equivalent information available to determine the extent to which this was balanced or partially offset by flows in other directions. There were also concerns about the quality of the data that was available with differences noted dependent on data sources. In addition there were differences in the type of activity included in A&E situations. For example, in situations where there was no direct ward access, all admissions went through A&E, and Boards contended that the costs of such activity should be properly reflected in individual specialty costs rather than be treated as an A&E activity. It was

also noted that policies regarding ambulance transport of accident victims may differ across Boards.

- 3.18 As a result of these various factors the Group concluded that it would be extremely difficult to sustain an evidence-based adjustment to the current system. Time would be required to ensure appropriate information systems were put into place to sustain activity based funding arrangements should such adjustments be deemed necessary on grounds of materiality and equity.

Regional Element to A&E Services

- 3.19 The sub-group acknowledged that, notwithstanding the fact that activity systems to support cross-boundary charging for A&E services were not universally available across the region, if a case for regional A&E services could be demonstrated, then there was a sustainable argument to apply separate funding arrangements to such services. To support such an approach a paper was produced by the Royal Victoria Hospital (RVH) but the findings and conclusions were not shared by A&E Consultants elsewhere, and there were difficulties in distinguishing between inpatient services which were covered by service level agreements and 'core' A&E services.
- 3.20 In the event therefore, the case for regional A&E services was in the view of the Group unproven and separate funding arrangements in such circumstances for these services were not considered appropriate.

Equity Associated with Current Funding Arrangements

- 3.21 In determining whether the current arrangements provided for equity in resource allocation across the four Boards the Group noted that:
- The current arrangements were based on UK wide policy that host health authorities (Boards) were responsible for funding A&E

services in their areas, and that provision for non-resident users as provided on a knock-for-knock basis;

- Underpinning these arrangements there was not likely to be a material differential factor leading to greater or lesser use of A&E services beyond weightings already applied to population for age, gender and deprivation; however the Group also noted that there were a range of other local factors which could influence the level and cost of A&E services in particular areas. These could range from ‘internal’ issues such as the priority attached by local populations to local access and decisions regarding opening hours of local units, to ‘external’ issues regarding Royal College attitudes to consultant rotas and cover for 24 hour units;
- The degree of equity achieved in ‘Host Board’ funding arrangements depended on there being commensurate cross boundary flows between Board areas. Although the information base regarding this was not complete, there did however appear to be a material difference in inward flows across Boards in Northern Ireland and this raised questions concerning the degree of equity achieved in the current arrangements; and
- Irrespective of cross boundary flows, each board had to provide a 24 hour A&E service for its geographical area.

3.22 The Group was also aware that achieving equity across local sub-board populations provided a further complication in the funding of A&E services. A number of population groups have no major unit in their population locality, whereas the units in those that did have one also provide A&E services to those who resided well beyond the boundaries of the local population. Clearly a funding arrangement in which the local population bore the full costs of such service provision (a direct read across from the Board arrangements) would be

inequitable, and could only be achieved at the expense of other priority services in the area.

3.23 Boards themselves have recognised this point in costing investment by PoC at local level as part of their work on the Strategic Resource Framework (a budgetary analysis by PoC, key service area and locality) and have separately identified the costs of A&E services rather than attribute them to host localities. And in England where funding is now made available directly to Primary Care Trusts by the Department of Health (rather than through Health Authorities) Primary Care Trusts have come together to identify more appropriate funding arrangements than simply allowing the host locality to finance the service for all users.

3.24 Group members recognised the need for Boards to reach their own decisions, taking account of the views of local users, on the detailed profile of local A&E services. In such circumstances direction over these services needed to be accompanied with budgetary responsibility and the funding arrangements needed to avoid creating perverse incentives for the passing of at least a proportion of the costs involved to other populations.

The Way Forward

3.25 Essentially, as paragraph 3.14 indicated, the Group identified 3 core options for the funding of A&E services:

- The status quo;
- Funding based on agreed service plans; and
- Funding based on utilisation (with derivatives regarding full and marginal costs for cross-boundaries flow).

Status Quo

- 3.26 One of the views expressed by the Group was that the current arrangements should remain, under which the host Board was responsible for the full costs of A&E services in its area. The arrangements were simple to implement, left considerable discretion to Boards to ‘control’ the level of A&E services in their specific areas, and although differential cross boundary flows were likely to exist (but which could not be fully supported by evidence), the actual differential costs borne were not deemed material.
- 3.27 Another view expressed by Group members was to recognise that differential cross boundary flows did provide for, *prima facie*, inequities in the funding arrangements between Boards. The general view however was that this should not be addressed by changes to the formula, but in service level agreement arrangements between commissioners and providers or in funding adjustments at commissioner level.
- 3.28 The Group were united in the view that ‘host’ area funding arrangements should not be applied to local populations and that Boards should fund these services directly before distributing commissioning resources to local populations.

Funding Based on Agreed Service Plans

- 3.29 The Group also considered whether A&E services should be funded through a top-slicing or capitation based arrangement. (Top-slicing has the equivalent impact of introducing funding arrangements based on capitation shares, as the opportunity cost to each Board of the top-sliced fund would be their capitation share of those funds). The argument for top-sliced capitation based funding rests with the fact that under Developing Better Services the Department has given a clear steer on the future profile of general/regional hospital services including A&E services and that consequently this should be directly funded as little local discretion over such services will exist.

3.30 The Group however took the view that its remit was to devise approaches, which provided for the equitable funding of Boards. The introduction of top-slicing for A&E services (albeit on a capitation basis) was a major step back towards the direct funding of services and as such would represent a significant change in policy which was well beyond its remit.

3.31 The Group did acknowledge however that in due course, should the existence of clearly defined regional A&E services be demonstrated by evidence, capitation based funding arrangements may offer an appropriate funding mechanism for such services.

An Utilisation Based Approach

3.32 CFRG recognised that a funding mechanism based on the utilisation of services potentially offered a more equitable way forward than the current arrangements. This view was not universally shared by all members and was subject to a number of qualifications:

- There needed to be recognition of the fact that all Boards had to offer a 24-hour service to its population irrespective of utilisation;
- As GP services, minor injury units and A&E services in local hospitals were typically the result of local negotiations, it followed that the commissioners responsible for determining the profile of such services should assume full funding responsibility for their delivery rather than seek to offset the costs of such services on other users;
- Any new arrangements should avoid costly ‘transaction’ costs/cost per care funding arrangements and that ideally equity would be achieved through transfers of funds between Boards; and

- Time would be needed to implement the necessary information systems and that no charge should be considered until such systems were available.

Conclusions

3.33 The Group took the view that the funding of A&E services was essentially a matter of government policy rather than an issue associated with the validity of the re-distributive effect of the Acute needs index. In considering the way forward the Review Group recommends that the Department:

- Considers the various factors associated with funding arrangements of the A&E services as outlined above; and
- Determines the way forward using an evidenced based approach, which has minimal transaction costs.

Recommendations

3.34 The Group recommends:

- that the entire Acute formula should be considered as a matter of priority in any future programme of work developed after the 4th Report from the CFRG;
- evidence should be gathered, including information on the locality of the patient, in order that any future work on A&E funding can be evidence-based; and
- the Department, following consultation, makes a policy determination with regard to the provision and associated funding of A&E services which is based on evidence and has minimum transaction costs.

4 MATERNITY AND CHILD HEALTH

Introduction

4.1 The Maternity and Child Health PoC includes all activity, and resources used, by any health professionals relating to an inpatient episode where the consultant in charge of the patient is a specialist in one of the following specialties:

- Obstetrics;
- GP Maternity;
- Well Babies (Obstetrics);
- Well Babies (Paediatrics);
- Obstetrics (Ante-Natal); and
- Obstetrics (Post-Natal).

This programme also includes all activity, and resources used, by a hospital consultant in one of the above specialties in relation to an outpatient episode, day case, regular day admission, regular night admission or day care. All community contacts by any health professional, where the primary reason for the contact was for maternity or child health reasons, are also included. Expenditure on Special Care Baby Units (SCBU) is included in Acute Services.

4.2 Expenditure on the Maternity and Child Health PoC, £92.6m, represented some 5.58% of the total N Ireland HSS Board expenditure in 2002-03. (excludes expenditure on capital charges and medical negligence)

Description

4.3 As reported in the 3rd Report from the CFRG, York Health Economics Consortium (YHEC) and Morgan Spollen Associates (MSA) were

commissioned to research the possibility of developing an additional needs index for the Maternity and Child Health PoC. After a scoping study was carried out, the Group decided that further investigation should take place into the influence of certain variables, such as maternal age, parity and low birth weight, on the intensity of antenatal and postnatal care, with a view to possible incorporation into a needs index. (Full details of the scoping study can be found in the consultants' report "Development of Health & Social Care Needs indicators for the HPSS Capitation Formula" (1998)).

- 4.4 The approach recommended in the 3rd Report from the CFRG was based on an analysis of utilisation data from the Child Health System (CHS) and Patient Administration System (PAS). This was supplemented by an analysis of available community contacts data. The modelling was conducted at small area level using the standard York approach (see 3rd Report of the CFRG for further details) and also at individual patient level in respect of the inpatient model. (Full technical details of the work undertaken are contained in the consultants' report, "A Revised Capitation Funding Formula for maternity and Child Health Services in NI" (1999)). The variables used in the needs weighting, and their coefficients, are shown in Table 4.1.

Table 4.1 Variables and Coefficients in Maternity Inpatient Model

Maternity Inpatient Model Variables (Unweighted Bed-Days)	Coefficients
Constant	3.517
Age 25-29	0.312
Age 30-34	0.609
Age 35-39	0.898
Age 40+	0.973
Low Birthweight baby (Yes or No)	7.152
Previous Births (Yes or No)	-1.477
Multiple Birth (Yes or No)	1.891

- 4.5 With regard to antenatal care, the Group agreed to allocate resources for this service on the same basis as resources for inpatient maternity services, as an interim measure. The researchers did not feel that they could recommend a model for the child health programme, and the Group agreed to use “under 75” Standardised Mortality Ratio (SMR) as an interim needs indicator. The above work was subject to peer review and consultation for the 3rd Report from CFRG. The Group recommended this work to the Minister for approval, and the resultant needs index was implemented in 2001/02.
- 4.6 No further research was conducted into the Needs Index for Maternity and Child Health services as part of the work programme for this Report.

Recommendations

- 4.7 The Group recommends that the needs index set out at Paragraph 4.5 continues to apply to the Maternity and Child Health Programme.

5 FAMILY AND CHILD CARE

Definition

5.1 This Programme of Care is concerned mainly with activity and resources relating to the provision of Social Services support for families and/or children.

5.2 This includes the following:

- Adoption;
- Child Protection;
- Children in Need;
- Children Looked After;
- Day Care;
- Family Centres; and
- Fostering.

5.3 Expenditure on the Family and Child Care Programme of Care of £111.1m represented 6.7% of total N Ireland HSS Board expenditure in 2002/03.
(excludes expenditure on capital charges and medical negligence)

Background

5.4 For their 3rd Report in 2000, CFRG commissioned the then Centre for Childcare Research and the Health and Social Care Research Unit (HSCRU) at Queen's University of Belfast to devise a Family and Child Care relevant needs formula. This additional needs index was to cover all aspects of Family Support Services in line with the guiding principles of the Children Order (1995).

5.5 However, when the results of the research were presented CFRG had concerns about a number of issues. The proposed index was noted to be significantly

more re-distributive than indices applied in other programmes. It was noted also that the Belfast and Derry Local Government Districts had extremely strong needs indices, whereas the level of need in less densely populated areas did not always attract a weighting in line with general socio-economic factors.

- 5.6 CFRG agreed that the index generated by the research should be applied in the formula but should be reviewed when 2001 Census data became available. It was also recognised that the impact of the formula would have to be considered within the context of the planned implementation of the Department's Residential Child Care Strategy. In addition, it was recommended that the issue of rural needs be further researched using a non-utilisation based approach.

Approach

- 5.7 In October 2002, CFRG commissioned MSA Ferndale to carry out research, to address a number of issues, which had emerged concerning the current formula. The aim was to produce a revised formula to provide the basis of equitable allocation of resources between Boards.
- 5.8 This study included:
- Updating activity data and finance data;
 - Construction of an updated cost dependent variable using the above data and the workload estimates from the survey that generated the current model;
 - Development of access related supply variables;
 - Construction of new needs variables using the 2001 Census and updated administrative sources; and
 - Applying any unmet need corrections as appropriate.
- 5.9 The activity data for the study was obtained from SOS CARE and consisted of snapshots of activity for all clients with open cases and all pending clients on two dates: 31/03/02 and 30/09/02. The minimum data requirement in order to

replicate the analysis that generated the current formula was to have sufficient information on the type of care to be able to assign each individual client to one of five groups. These groups had been chosen for the earlier Northern Ireland study and for the model that is currently used in England. The five client groups used in the analyses are as below and the percentage of clients in each group is shown in Table 5.1:

- Resid - in residential care;
- Foster – in foster care;
- Other BLA – Other Being Looked After - in other forms of care (such as being placed back with families or relatives under supervision);
- CPR not BLA - on the Child Protection Register but not in care; and
- Other – all other clients.

Table 5.1 Family and Child Care Client Groups by Trust, 2002

	Percent of clients in each of these groups					Total number of clients* (=100%)
	Resid	Foster	Other BLA	CPR Not BLA	Other	
S & E Belfast	3.35	11.60	6.35	9.70	69.00	2897
N & W Belfast	2.91	9.21	6.11	10.56	71.20	3778
Down & Lisburn	2.80	8.97	4.21	8.33	75.68	2496
North Down & Ards	2.13	10.83	4.61	10.42	72.01	1929
Causeway	1.46	15.28	6.87	7.38	69.01	1165
Homefirst	1.71	10.84	4.12	7.02	76.30	4899
Armagh & Dungannon	0.68	6.39	4.54	3.27	85.11	2049
Newry & Mourne	2.12	9.42	2.65	14.60	71.22	945
Craigavon & Banbridge	1.44	7.59	3.32	4.64	83.00	1594
Foyle	2.12	8.20	5.72	7.28	76.68	4339
Sperrin Lakeland	0.87	5.42	1.64	5.78	86.29	2750
All N Ireland	2.05	9.26	4.70	7.88	76.10	28841

* this is double the usual number of clients as it represents 2 data snapshots

5.10 An initial problem with these data was the poor quality of postcode information, which was required to assign clients to their original ward of residence (for clients in care, the client ward code was replaced by the next of kin ward code). The data were therefore subjected to a two-stage postcode cleaning exercise, which reduced the overall proportion of missing postcodes to 9%. However, because next of kin address details were poorly completed on a number of Trust databases, it did not prove possible to reduce the level of non-coding of clients in care to below 31%. In order to lessen the impact of cases excluded because they had no ward of origin, the dataset was weighted up (by Trust and client group) to the original 28,841 cases. Subsequent checks revealed that this procedure did not materially alter the age-sex distribution of the original data.

5.11 The research, which was overseen by a CFRG steering group, was completed in May 2004. Full details of the work undertaken are contained in the Consultants' report – "Additional Needs Analysis for the Family and Child Care Programme of Care" (2004).

Results

Age/Gender Relationship

5.12 Using the approach outlined in Annex 2, a needs index was developed. However, it is necessary to standardise the activity data before analysis in order to remove any potential age/gender effects. This process generates a set of age/gender weights which can then be applied to population data using the standard weighted capitation approach, before application of the statistically derived 'additional needs' index. The Family and Child Care age/gender weights are shown in Table 5.2 (i) and 5.2 (ii) - the two variations depending on whether client numbers only are used or client numbers weighted by cost. (Note: - whilst the Family and Child Care PoC definition covers all those aged 0-44, activity in respect of those aged 20-44 is very small in relative cost terms).

Table 5.2 (i) Family and Child Care Age/Gender Weights – Client Numbers Only

Age Bands	0 – 4	5 – 9	10 - 14	15 - 19
Male	27.6	33.0	33.2	24.2
Female	24.8	30.2	29.1	27.8

Table 5.2 (ii) Family and Child Care Age/Gender Weights – Costed Client Numbers

Age Bands	0 - 4	5 - 9	10 - 14	15 - 19
Male	47.9	60.1	95.0	71.8
Female	42.7	51.9	76.3	73.8

Needs Variables

- 5.13 The research involved mapping the data down to electoral ward level and then statistically selecting those morbidity, socio-economic or other needs variables which best predict activity levels across N Ireland. Impacts on activity, such as supply of services and other policy effects, are taken account of in the modelling process. It should be noted that a new needs dataset was constructed using the 2001 Census and up-to-date Social Security Benefits. This replaced the dataset which had been constructed for the 3rd CFRG Report.
- 5.14 One ‘supply’ variable was found to be sufficiently robust and intuitively credible to include in the modelling - ‘Distance to nearest Family and Child Care Social Worker Base’. The inclusion of this variable represented an improvement on the original 3rd Report study (note that in the 3rd Report study, based on advice received at the time that their impact was likely to be minimal, access related supply issues were not considered). It should be noted that as the supply variable was found to be endogenous, two-stage least squares regression was used to develop the model (this transpired following initial peer review – see Paragraph 5.28).
- 5.15 The researchers devised two models based on the combinations of data reflected in Tables 5.2 (i) and (ii) all of which were robust and passed the standard statistical tests. Both models contained the same four variables but each with different coefficients. However, there was a major difference in the explanatory power of the models with the uncosted performing much better with an R-squared of 62% compared to 49% for the costed model. Even

allowing for part of this difference being attributable to policy effects, there is still around a 6% difference explainable by needs factors alone.

- 5.16 There was considerable debate within CFRG surrounding which of the two models should be adopted. In general, a costed model is superior to an uncosted model because the former is able to take better account of different levels of need between clients drawn from different groups. However, a range of problems were encountered by the researchers when developing the unit costs to be used in the study and it would appear that there could still be unresolved inconsistencies in the costing methodologies employed across Trusts. This can cause problems for the modelling if a certain category of client is systematically costed at a higher or lower cost than is really the case and, particularly so, if such clients are more prevalent in either deprived or affluent areas.
- 5.17 The difficulty in developing a robust costing mechanism is further exacerbated by the reliance of the costing methodology on a survey of social worker time, which dates back to 1999. This survey is used to apportion social worker time between the various client groups but, with the growing emphasis on family support type services arising from the Children Order (1995), it is unlikely to reflect current working patterns.
- 5.18 Whilst it is fair to say that other CFRG studies also have their limitations, the majority of members had particular concerns regarding the highly redistributive impact of the costed model. It was suggested that the costing in this particular study may have skewed a disproportionate amount of need to a small number of inner city wards which was not warranted. Most members of the Group felt that wards with the most need for Family and Child Care resources were unlikely to be found only in Belfast. In addition, the much higher explanatory power of the uncosted model implied that it better fitted the existing pattern of affluence/deprivation across N Ireland (as measured by the current variable set) than did the costed equivalent. This was cited as evidence that the uncosted version more likely represented reality.

- 5.19 Balanced against this was a strong view that considerable effort had been devoted to the development of the unit costs weights and that their application within the formula would provide for a more accurate weighting of relative need within the Family and Child Care PoC, and that this was necessary to ensure that resources were equitably distributed in line with need. In order to test this, the Department carried out some further analysis of the impact of the formula at small area level. This analysis revealed that the ranking of electoral wards from least to most needy was extremely similar under the two models and that, of the two, the uncosted model had a slightly better correlation with the Noble Multiple Deprivation Index. The analysis also revealed that the main reason for the allocational difference between the two models was that the costed model gave rise to a number of extreme outlier wards in Belfast which were not apparent in the uncosted model.
- 5.20 The decision to adopt the costed or uncosted model was finely balanced. On the one hand there was a very strong argument that the use of a costed model was most in keeping with CFRG principles, as this allows for the fact that not every service user requires equal amounts of service. On the other hand there were concerns about the consistency and accuracy of the costings which could skew the results in an inappropriate way. On balance, the general consensus of the Group was to adopt the uncosted model as the interim needs index until such times that the costing methodology could be thoroughly reviewed and a robust costed model developed. This position was influenced by the better correlation of the uncosted model with the Noble Multiple Deprivation index, but was not universally shared across the Group.
- 5.21 The uncosted model explained 62.0% of the difference in activity across wards and contained four variables. The variables and their coefficients are shown in Table 5.3.

Table 5.3 Recommended Model -Variables and Coefficients

Variable	Coefficient
Proportion of Children in Income Support Households	0.3127
Proportion of 16-18 Year Olds not in Full-Time Education	0.1985
Noble Social Environment Score	0.1361
Proportion of Children in Owner Occupied Housing	- 0.1511

5.22 The model is log-log (base 10) in form, which means that the needs index is calculated, as the product of 10 to the power of the value of each needs variable further weighted by the power of its coefficient.

Unmet Need

5.23 The standard Unmet Needs tests (as described in Chapter 13) were applied in the course of finalising models. The researchers could not find any strong evidence of unmet need related to deprivation or of any obvious need to correct for non-linearity in the model.

Quality Assurance

5.24 The research was peer reviewed by Dr Stephen Morris (Tanaka Business School, Imperial College London). A comprehensive review was conducted on all aspects of the research from data collection through to suitability of final models.

5.25 A number of queries sought clarification due to a lack of detail in the draft report (e.g. in respect of endogeneity testing) or a lack of understanding of how resource allocation modelling is applied in Northern Ireland (e.g. the use of dummy variables instead of multi-level modelling to remove policy effects or using the traditional York approach to deal with access related supply effects). Whilst more detail on methodology and testing will be included in

- final research reports, supply and other technical issues are better considered as part of a more fundamental review of the overall formula rather than on a PoC specific basis.
- 5.26 The reviewer flagged-up the potential danger of extreme unit cost values based on small numbers of cases in some Trusts distorting the analysis. However, the unit costs are calculated at N Ireland level, thus minimising any distorting influence, and Trust values are shown in the report only for presentational purposes.
- 5.27 The reviewer questioned the modelling strategy of rejecting variables with counter-intuitive signs on the basis that these could be picking up on unmet need effects. However, unmet need is investigated as a separate part of the research and if detected is controlled for in line with the reviewers suggestion (i.e., retaining negatively signed unmet needs variables in the formula but then excluding their effects from the allocations). In Northern Ireland, unmet need was examined along the dimensions of rurality and deprivation as previous research had indicated that this is where such effects are likely to be most prevalent.
- 5.28 It should be noted that following the initial peer review, further testing (based on a review recommendation made in respect of the Physical and Sensory Disability PoC) revealed that a two-stage least squares regression modelling approach should have been employed. This resulted in different costed and uncosted models being identified as optimum. However, Dr Morris confirmed that the new models did not materially alter his initial comments and represented an improvement over the existing Family and Child Care model.
- 5.29 In summary, the reviewer makes some useful suggestions for improving future modelling but does not highlight anything which would prevent implementation of the new recommended model (as per Table 5.3). The reviewer's suggestion that a simpler one-variable model might be preferable is discounted on the grounds that it would be highly mis-specified.

Limitations

- 5.30 Reliance on an uncosted client numbers model is sub-optimal, as it takes no account of the differential need between different categories of client.
- 5.31 The poor quality of address information in respect of clients in care remains a source of concern. Whilst datasets have been weighted up to take account of missing cases this assumes that such cases follow a similar geographical distribution to the known cases of the same client type within each Trust.
- 5.32 The cost apportionment mechanism is reliant on a survey of social worker time, which is now out-of-date. Whilst this does not affect the uncosted model, it needs to be addressed in any future research.

Recommendations

- 5.33 The CFRG recommends that:
- the funding for this programme be based on population aged 0-44, weighted separately for males and females based on the age/gender weights set out in Table 5.2 (i) for those aged 0-19 and a nominal weighting for those aged 20-44, informed by the existing age/gender weights;
 - the additional needs formula set out in Table 5.3 should be adopted as the new needs index;
 - due to the wide variations in recording of financial and activity data, highlighted above, further work by both Board and Trust finance and information staff is carried out to clarify that data is collected and used in a consistent manner across all Trusts; and
 - when resources permit, a new survey of social work time is carried out as part of a further attempt to develop a robust costed needs model.

6 ELDERLY CARE

Introduction

- 6.1 The Elderly PoC includes all community health and social services for those aged 65 and over (except where the reason for the services is because of mental illness or learning disability) and residential and nursing home care.
- 6.2 The programme also includes all activity, and resources used, by any health professional, relating to an inpatient episode where the consultant in charge of the patient is a specialist in Geriatric Medicine or Old Age Psychiatry.
- 6.3 The programme also includes all activity, and resources used, by a hospital consultant in one of the above specialties, in relation to an outpatient episode, day case, regular day admission, regular night admission or day care.
- 6.4 Where a ward, clinic or unit in the specialty of General Medicine is concerned solely with elderly patients (i.e. over 65) then the activity and associated resources is also included in the Elderly PoC.
- 6.5 Expenditure on the Elderly Programme of Care, £393.2m, was 23.69% of total HSS Board expenditure in 2002-03. (excludes expenditure on capital charges and medical negligence)

Description of Formula

- 6.6 As reported in the 3rd Report from the CFRG, the Group, in 1998, commissioned a consortium led by the Health & Social Care Research Unit (HSCRU), Queen's University of Belfast, to research the possibility of developing a formula which would take account of local data on age and gender and differential need. The study proceeded in two stages with the scoping stage reviewing the literature, assessing the quality and coverage of available data and evaluating possible research methodologies. (Full details of

the scoping study can be found in the consultants' report "Development of Needs Indicators for the Elderly Programme of Care in N Ireland Stage 1" (1998)).

Age/Gender Cost Relationship

6.7 Age/Gender cost relationships were developed by each HSS Board, and were merged into a single cost relationship to be applied to all four Boards. The weighted costs were merged for the four HSS Boards to produce the age/gender ratio shown in Table 6.1.

Table 6.1 Elderly Care Age/Gender Relative Costs

Age Band	65 – 74	75 - 84	85 +
Males	1.0	3.4	8.4
Females	1.1	4.5	11.5

Note: The above ratio includes the residential care costs of care managed and preserved rights clients but not self-funders in order to ensure consistency with the needs formula (see next section).

Additional Needs Weighting

6.8 Arising from the HSCRU scoping study, it was recognised that the full needs research should focus on the three broad components within the Elderly PoC as follows:

- Hospital based services;
- Nursing and residential homes; and
- Domiciliary care.

6.9 The approach taken, and subsequent results, for each of these components can be found in the relevant chapter of the 3rd Report of the CFRG. A

recommended needs formula was developed, and the variables and coefficients, which constitute this formula, are shown in Table 6.2. (Technical details of the modelling work can be found in the consultants' report "Development of Needs Indicators for the Elderly PoC in N Ireland – Stage 2" (2000)).

Table 6.2 Variables and Coefficients in Elderly Care Needs Index

Elderly Needs Variables	Coefficients
Standardised mortality ratio less than 65	0.152
Standardised mortality ratio 65 to 74	0.292
Standardised limiting long-term illness aged 75+	0.252
Proportion of pensioners aged 85+	-0.210

- 6.10 The index is calculated as the product of the four needs variables weighted exponentially by (i.e. raised to the power of) the coefficients shown in Table 6.2. The HSS Board needs index is calculated by aggregating the needs of individual SEWs to HSS Board level.
- 6.11 In the 3rd CFRG Report a number of important limitations were highlighted regarding: the inadequacy and inconsistency of data coverage for the programme; the plausibility of the needs index; and technical issues regarding the construction of the model. In its conclusion to the 3rd Report CFRG accepted the current model as a default position until additional work could be carried out at the earliest opportunity to address issues raised in quality assurance and peer review. The above work was subject to consultation for the 3rd Report from the CFRG. This model was recommended to the Minister for approval, and the needs index was implemented in 2001/02.
- 6.12 No further research was conducted in the age/gender and needs weightings for care of the elderly services as part of the work programme for this report, because the Group was aware of a number of factors associated with the funding and delivery of services within this programme which could have an

impact on the validity of the age and needs weights currently applied, and these needed time to bed down. These issues are discussed further below.

Factors impacting on current formula

6.13 Since the previous research into this programme a number of changes have been introduced in the funding arrangements of services associated with this programme:

- Residential Care Allowance, previously available to individuals in the independent residential and nursing home sector, has been withdrawn. This means that the income collected from residents will reduce (i.e. the net costs of care will increase to the HPSS). The additional costs of care that now fall on the HPSS have been funded by a transfer of resources from the Department for Social Development to DHSSPS. This change has an impact on the net/gross cost of care ratio and may have ramifications for weightings within the needs index of the current formula.
- The introduction of Free Nursing Care, under which everyone receives £100 weekly contribution to the costs of their care in nursing homes.
- A cohort of new clients has been introduced to the HPSS since the previous research into needs weightings was undertaken. In April 2002 the HPSS assumed formal responsibility for individuals whose care had prior to this been financed via the Social Security system. The funding available to support such people is subject to annual reduction until 2005-06 when the residual level becomes recurrently available to finance replacement packages as required.

6.14 Finally, over the last few years significant additional funding has been made available to the HPSS. This has been directed across all PoCs. However, given the high levels of utilisation by the elderly population, a substantial proportion of these resources may well have been directed towards the needs

of the over 65s. This may mean that the current age weightings associated with the elderly relative to other age groups, and those associated with the very elderly in particular, may not fully reflect their actual utilisation of services and consequently need to be reviewed.

Recommendation

- 6.15 The Group recommends that a review of the Elderly PoC, is undertaken as soon as possible, to reflect changing circumstances such as the introduction of Free Nursing Care and changes in Residential Care Allowance. This review will take account of all issues raised at the time of the 3rd Report.

MENTAL HEALTH

Definition

- 7.1 This Programme of Care includes all community services where the primary reason for the service is due to mental illness.
- 7.2 The Programme includes all activity and resources used by any health professional relating to an inpatient episode where the consultant in charge of the patient is a specialist in one of the following specialties:
- Mental illness
 - Child and adolescent psychiatry
 - Forensic psychiatry
 - Psychotherapy.
- 7.3 This Programme also includes all activity and resources used by a hospital consultant in one of the above specialties in relation to an outpatient episode, day case, regular day admission, regular night admission, or day care.
- 7.4 The Mental Health PoC specifically excludes dementia which is included in the Elderly PoC.
- 7.5 Expenditure on the Mental Health PoC, £127.8m, was 7.70% of total HSS Board expenditure in 2002/03. (excludes expenditure on capital charges and medical negligence)

Background

- 7.6 The current method for allocating resources for ‘additional need’ in this PoC is based on the findings contained in the research report, “A Revised Capitation Funding Formula for Mental Health Services in NI, May 2000”.
- 7.7 The salient features of the current allocation model are summarised below.

The following age/gender relative costs are used:

Table 7.1 Mental Health Age/Gender Relative Costs

Age band	0-4	5-14	15-44	45-64	65-74	75-84	85+
Male	0.0	0.2	1.0	1.5	1.6	1.6	1.4
Female	0.0	0.2	0.9	1.3	1.6	1.8	2.1

The following variables and coefficients are used in the additional needs adjustment:

Table 7.2 Current Mental Health Additional Need Model Variables and Coefficients

Variable	Coefficient
Age-standardised sickness ratio	0.350
Proportion of households without 2 cars	1.229
Proportion of working age pop. who are students	0.227
Proportion of families not in receipt of Family Credit	-1.110

- 7.8 One feature of the current model is that regarding inpatient utilisation data, bed days are weighted to reflect expected differences in costs at different stages in the episode. The following weightings are applied:

For episodes of less than 365 days

First 35 days – weighting of 1.0

Days 36-364 – weighting of 0.5

For episodes lasting 365 days in the year

All days – weighting of 0.5

- 7.9 The above research report recommended ‘that further work should be commissioned to quantify the relationship between resource costs and diagnosis and/or length of inpatient stay, with a view to refining the resource allocation formula over the next 2-3 years’. Notwithstanding this, the above model and resulting needs index was accepted by the Group as an interim model until further work could be carried out.

Approach

- 7.10 As part of the 4th Work Programme, the Group further investigated the availability of costing data by diagnosis and by length of stay. No costing data was available by diagnosis. However, Boards were able to provide data on the cost of long stay (>35 days) and short stay (< 35 days) inpatient episodes by Trust. From this data a weighting of 0.9 was calculated as the ratio between costs of short stay and long stay episodes. A sub-group of the Psychiatric Standing Advisory Committee (N Ireland Section) were consulted about the proposed weighting. They expressed the view that it would have been better to apply a differential cost based on ward type, i.e. ‘acute’ versus ‘continuing care’ wards but acknowledged that ward type was not captured in central information systems. In the absence of this information, it was agreed to use the short – versus long-stay split for ward type and that the 0.9 weighting in

respect of long-stay cases was a better estimate than the previous 0.5 weighting. The Group accepted this view.

- 7.11 In October 2002, York Health Economics Consortium was commissioned to recalculate the dependent variable for the model using a weighting of 0.9 in relation to the cost of long stay/short stay inpatient episodes.
- 7.12 Project Support Analysis Branch of the DHSSPS used the newly calculated dependent variable and the original needs dataset to create a new Mental Health needs formula. The variables and coefficients of the new Mental Health needs formula are summarised in Table 7.3:

Table 7.3 New Mental Health Additional Need Model Variables and Coefficients

Variable	Coefficient
Proportion of 16-64 year olds on Income Support	0.365
Proportion of dependents not in single carer households	-1.393
Proportion of persons in households with head in manual class	0.340
Proportion of working age pop. who are students	0.250
Standardised mortality ratio 65-74 years of age	0.268

- 7.13 Full details of the new model are contained in the research report, “A Revision of the Mental Health Funding Formula for Mental Health Services in N Ireland, August 2003”. The new model has an adjusted R-squared of 59% (which is an improvement on the explanatory power of the previous model’s R-squared of 56.5%), and diagnostic tests show the new model to be statistically sound. It should be noted that increasing the weighting given to lengths of stay of more than 35 days does not disadvantage those Boards/Trusts that have an accelerated policy of resettling inpatients in the

community. This is because such policy differences are controlled in the modelling through the use of dummy variables at Trust level. What is important is the distribution of long-stay inpatients between deprived and affluent areas *within* Boards/Trusts rather than the difference in numbers *between* Boards/Trusts.

- 7.14 The needs index is calculated as the product of the five needs variables weighted exponentially by (raised to the power of) the coefficients shown in Table 7.3. The HSS Board needs index is calculated by aggregating the needs of individual synthetic electoral wards to HSS Board level.

Unmet Need

- 7.15 Deloitte & Touche were commissioned to apply the Unmet Need tests (see Chapter 13 of this Report for details of these tests) to the new Mental Health model. The results of these tests are documented in the report, “A Revision of the Mental Health Funding Formula for Mental Health Services in N Ireland, August 2003”. In short, there is no requirement for an unmet need adjustment in the new Mental Health model.

Quality Assurance

- 7.16 The DHSSPS Project Support Analysis Branch have replicated York Health Economics Consortium’s calculation of the new dependent variable, thus confirming the methodology to be correct.
- 7.17 The new model produced by Project Support Analysis Branch was quality assured by an independent Statistician from the Department of Epidemiology & Public Health, Queen’s University of Belfast. He was satisfied that the correct modelling methodology had been employed and that the resulting model was statistically sound.

- 7.18 The new model was further quality assured by Professor Peter Smith of the Centre for Health Economics, University of York. He confirmed that the new model conforms to the usual characteristics of well-constructed funding formulae, including being well specified.

Limitations

- 7.19 The utilisation data used in the statistical modelling dates from 1997/98 whilst much of the set of needs variables is constructed from 1991 Census data. Information on contacts with community mental health services was not available for one Board, and throughout N Ireland, little information was available on the distribution of social services activity. In addition, information on residential care was incomplete.
- 7.20 It is still not possible to differentially cost inpatient episodes according to diagnosis or to identify centrally held inpatient episodes by hospital ward type.
- 7.21 The age/gender cost structure of the data used in the modelling previously has been found to be different from the age/gender structure implied by the HSS Board produced age/gender weights (see discussion in “A 3rd Report From the Capitation Formula Review Group, October 2000”, p65).
- 7.22 As the formula is not composed entirely of updateable variables, it is unresponsive to changing needs.
- 7.23 No satisfactory data source is currently available to quantify differential need for child and adolescent psychiatry/addictions services relating to drug abuse.

Recommendations

- 7.24 The Group recommends that:

- the current model be replaced by the new model with a 0.9 weighting in respect of long stay: short stay inpatient episodes which contains the variables and coefficients depicted in Table 7.3;
- information on contacts with community mental health services for all Boards should be made available for any future mental health modelling;
- the relationship between resource costs and diagnosis is explored, and if this cannot be done due to unavailability of relevant data, consideration be given to routinely recording such data. Consideration also be given to recording ward type on central information systems;
- the relationship between resource costs and length of inpatient stay be periodically reviewed; and
- work should commence to improve the coverage and quality of data on the provision of residential care for mental health clients so that in future it might be possible to improve the estimation of needs indicators for this service.

8 LEARNING DISABILITY

Definition

- 8.1 The Learning Disability Programme of Care (PoC) includes all activity and resources used by any professional relating to an inpatient episode where the consultant in charge of the patient has Learning Disability as a main specialty. It also includes all activity and resources used by a hospital consultant in this specialty in relation to an outpatient episode, day case, regular day admission, regular night admission or day care. In addition all community contacts where the primary reason for the contact was due to learning disability regardless of age are also included.
- 8.2 Expenditure on the Learning Disability programme of care of £116.2m, was 7% of the total HSS Board expenditure in 2002/03. (excludes expenditure on capital charges and medical negligence)

Background

- 8.3 The current method for allocating resources in this PoC uses a needs weighting based on the 'under 75' SMR in respect of inpatient services. Non-hospital services use the numbers of Learning Disability clients who had at least one contact with Providers. This option was chosen because, at the point in time at which it was calculated, it most closely represented the perceived correct re-distribution between HSS Boards.
- 8.4 In the CFRG's 3rd Report, the Health & Social Care Research Unit (HSCRU) of QUB were commissioned to identify an appropriate additional needs formula. However, having reviewed the range of survey and utilisation data then available, they concluded that they could not sustain the development of a robust formula. Whilst the existing default index was again retained as an interim measure, CFRG recommended that the feasibility of carrying out a prevalence study should be investigated as a matter of priority. The need for

an evidence based needs formula for this programme was further highlighted during the consideration of equality issues in respect of the 3rd Report.

Approach

8.5 In December 2001, the University of Ulster in association with MSA Ferndale, were commissioned by CFRG to undertake a study into the prevalence of learning disability in N Ireland and the implications for resource allocation. In view of concerns about the availability of data of sufficient quality and scope, a two-phase approach was adopted.

Phase 1 - involved a short scoping study to determine whether data available on the learning disabled population was sufficient to inform a prevalence study and subsequent development of a needs index. The results of this exercise are reported in “Study on the Prevalence of Learning Disability in Northern Ireland – Scoping Study” (2002).

Phase 2 - involved the collection and collation of individual learning disability data from a range of robust and common information systems across Trusts. These data were subjected to detailed statistical analysis in order to develop the final needs index.

8.6 The research, which was overseen by a CFRG steering group, was completed in February 2004. Full details of the work undertaken are contained in two reports produced by the consultants – “Administrative Prevalence of Learning Disability in Northern Ireland” (2003) and “Modelling the Distribution of Services for People with Learning Disabilities in Northern Ireland” (2004).

8.7 The overall aims of the researchers were to:

- Collect information on the administrative prevalence of learning disabilities in Northern Ireland;

- Use the prevalence information to establish unit costs of providing services to people of different ages and levels of severity of learning disability. From the costed prevalence data a resource allocation model was to be developed.

Administrative Prevalence Study

8.8 The first step was to collect information from existing databases on client numbers. After reviewing the data sets available it was agreed that the primary sources to be accessed should be:

- Soscare and the Child Health System (Module V);
- Social Security data; and
- Supplementary information on people in hospital and residential care from hospital in-patient records, trusts and HSS Boards.

8.9 Once the data was obtained it was analysed into three sub-populations outlined below:

- Those with an address in a long stay hospital;
- Those with an address in a registered residential care or nursing home; and
- Those living in community settings.

The data in all of the sub-populations were checked for duplicates.

8.10 Further work was carried out by the researchers in order to group those people in the three sub-populations listed above by age and by severity of disability. In the event, only those clients with a moderate, severe or profound learning

disability were included in the prevalence study as they were thought to make the most use of learning disabled services. The total numbers of persons identified are shown in Table 8.1 (the numbers in brackets are the rate per 10,000 Trust population).

Table 8.1 Numbers of clients in different types of care (by Trust)

Trust	Numbers of LD Clients In:			TOTAL
	Hospital	Residential	Community	
Down & Lisburn	41 (2.37)	129 (7.47)	1,647 (95.47)	1,817 (105.32)
N&W Belfast	76 (5.29)	135 (9.40)	1,487 (103.60)	1,698 (118.30)
NDown & Ards	9 (0.60)	184 (12.30)	1,171 (78.29)	1,364 (91.20)
S&E Belfast	25 (1.24)	267 (13.32)	1,349 (67.33)	1,641 (81.91)
Causeway	13 (1.12)	141 (12.25)	927 (93.50)	1,081 (93.94)
Homefirst	56 (1.71)	241 (7.35)	2,813 (85.81)	3,110 (94.87)
Armagh & Dungannon	74 (7.26)	81 (7.94)	821 (80.49)	976 (95.69)
Craigavon & Banbridge	42 (3.34)	120 (9.83)	1,041 (86.93)	1,203 (98.56)
Newry & Mourne	13 (1.49)	152 (17.46)	812 (90.86)	977 (112.22)
Foyle	24 (1.48)	113 (6.97)	1,276 (78.64)	1,413 (87.20)
Sperrin Lakeland	17 (1.43)	140 (11.74)	929 (78.10)	1,086 (91.12)
TOTAL	390* (2.35)	1,703 (10.10)	14,273 (84.69)	16,366 (97.11)

* These records were weighted up in the modelling to a total of 467 cases which were identified in the Mental Health/Learning Disability Census.

Costing and Modelling the Distribution of Services

8.11 Once the prevalence data had been collected, the aim was to use these data to model levels of service activity against the socio-economic characteristics of the areas from which the recipients of the services originate. This modelling

was considered necessary as it was realized that not all persons with a learning disability would be recorded on the information systems selected for the study. In addition, the researchers had highlighted a problem of consistency in the definition of severity of condition across Trusts. Such gaps in activity and differences in definition could only be properly corrected by statistical modelling.

- 8.12 A unique feature of this study was the development of a set of consensus age/severity weights with which to apply to the learning disability data. These weights were constructed with the input of various professionals at a specially convened workshop. The approach represented a way of giving a higher weighting to older and more severely disabled clients in the modelling (it did not prove possible to obtain detailed information on the cost of services consumed by clients of varying levels of disability in order to construct weightings in the more usual way).

Results

Age/Gender Relationship

- 8.13 Using the approach outlined in Annex 2, a needs index was developed based on the administrative prevalence data. However, it is necessary to standardise the prevalence data before analysis in order to remove any potential age/gender effects. This process generates a set of age/gender weights which can then be applied to population data using the standard weighted capitation approach, before application of the statistically derived 'additional needs' index. The Learning Disability age/gender weights are shown in Table 8.2 (i) to 8.2 (iv) below - the four variations depending on whether the data is community only versus community/residential/hospital combined, and whether it is weighted for severity or left unweighted.

**Table 8.2 (i) Learning Disability Age/Gender Weights – Community
Unweighted Version**

Age Bands	0 - 19	20 - 34	35 - 49	50+
Male	20.79	10.44	4.97	2.88
Female	10.28	6.59	4.23	2.22

**Table 8.2 (ii) Learning Disability Age/Gender Weights – Community
Severity Weighted Version**

Age Bands	0 - 19	20 - 34	35 - 49	50+
Male	19.81	27.74	19.48	9.92
Female	10.43	17.80	15.93	7.37

**Table 8.2 (iii) Learning Disability Age/Gender Weights – All Sectors
Combined Unweighted Version**

Age Bands	0 - 19	20 - 34	35 - 49	50+
Male	21.10	11.69	7.34	5.02
Female	12.08	8.15	6.03	4.16

**Table 8.2 (iv) Learning Disability Age/Gender Weights – All Sectors
Combined Severity Weighted Version**

Age Bands	0 - 19	20 - 34	35 - 49	50+
Male	23.35	36.21	33.27	19.49
Female	14.33	25.71	27.06	15.86

Needs Variables

- 8.14 The research involved mapping the prevalence data down to electoral ward level, and then statistically selecting those morbidity, socio-economic or other needs variables which best predict activity levels across N Ireland. Impacts on activity, such as supply of services and other policy effects, are taken into account in the modelling process. It should be noted that a new needs dataset was constructed using the 2001 Census and up-to-date social security benefits. This replaced the dataset which had been constructed for the 3rd CFRG Report.
- 8.15 The researchers devised four models based on the combinations of data reflected in Tables 8.2 (i) – (iv) all of which were robust and passed the standard statistical tests.
- 8.16 Whilst all of the recommended models had the potential to be used by CFRG, and had reasonably similar allocational implications, the Group had a preference for the two ‘Combined’ versions of the models. The researchers had a similar view in this regard. The key factor was the difference in age profile between the community sector clients and those in residential/hospital care, with the latter having a much older age profile. A ‘Community Only’ model would not therefore fit the totality of the Learning Disability population in terms of age. However, the main drawback with the ‘Combined’ models was a concern over whether they adequately reflected the high cost of clients cared for in a residential or long-stay hospital setting. This concern is mitigated, to a certain extent, by the application of the age/gender severity weights, which will give a higher, cost to residential and hospital clients but there still remains an issue over whether this is sufficient. On balance, the Group decided to accept the researchers’ advice that if the derivation of the age/severity weights was not felt to be a major concern, then the ‘Combined Weighted’ model represented the best overall option.
- 8.17 The recommended model explained 42% of the difference in activity across wards and contained 5 variables. The variables and their coefficients are shown in Table 8.3.

Table 8.3 Recommended model -Variables and Coefficients

Variable	Coefficient
Proportion of Persons in No Carer Households (where at least one person has a self-reported long-standing illness)	0.745
Proportion of Children in Job Seekers Allowance Households	1.452
Proportion of Persons Aged 16 – 64 With No Qualifications	0.587
Proportion of Persons Aged 18 – 64 in Households Without Central Heating	0.914
Proportion of Children in Disability Living Allowance Households	2.671
Constant	- 0.649

8.18 The model is log-linear in form which means that the needs index is calculated by multiplying the value of each variable by its coefficient, then adding it to the next multiplied variable and so on until finally adding the constant. The final step is to re-transform the product of the calculation (from its base 10 log).

Unmet Need

8.19 The standard unmet needs tests as described in Chapter 13 was applied in the course of finalising the models. Whilst a degree of non-linearity (and hence assumed unmet need) was detected in the top 5% of deprived wards associated with the educational qualifications variable, sensitivity testing revealed that the allocational implications were not material across Boards and only marginally within a single Board.

Quality Assurance

- 8.20 The research was peer reviewed by Matt Sutton (Senior Research Fellow – General Practice & Primary Care Community Based Sciences, University of Glasgow and Healthcare Information Group, Information Services Division, NHS, Scotland). His overall view was that the work represents a good practical application of statistical techniques to the problems posed by resource allocation and he was particularly impressed by the researcher's efforts to construct as comprehensive a dataset as possible. The point was also made that as resource allocation methodologies are under constant development there are various alternative methods that could usefully be explored in future work.
- 8.21 A number of the reviewer's specific points are presentational in nature and have been passed to the researcher to consider for inclusion in the final research report. It is encouraging that the reviewer, in line with the CFRG view, supports the adoption of a severity weighted combined model, although he also expresses a preference for the version which adjusts for unmet need. However, as outlined in Para 8.19 above, this model had previously been rejected by the Group on materiality grounds.
- 8.22 In relation to longer term methodological issues, the reviewer urges caution in excluding counter-intuitive variables from final models as it is possible that they could be picking up on unmet need. However, unmet need was tested for separately by the researcher using relevant deprivation and rurality variables. He also makes a technical point about the difficulties associated with deriving allocations from transformed models but further analysis revealed that correcting for the transformation had a negligible impact on the formula need indices.
- 8.23 The reviewer concludes that the recommended model is superior to the current default and is likely to be superior to any of the practical alternatives.

Limitations

8.24 As this is the first N Ireland administrative prevalence study conducted on the numbers of Learning Disabled clients, it provides very useful information for Boards and Trusts. However, there is likely to be some error in the counting of the learning disabled population due to:

- data sources used in the prevalence study capturing only those persons in receipt of HSS services;
- only data sources common to all Trusts were used in the prevalence study, other systems may be used to record learning disabled clients;
- current data systems did not contain any usable data on the originating address for learning disability clients in hospital or residential care. In the statistical modelling, it had to be assumed that the originating addresses of these people had a similar distribution to the addresses of community clients;
- the imprecise definition associated with learning disabled and severity of condition;
- Boards require different criteria to be met before access to services is granted;
- recorded activity in one area of Northern Ireland was distinctively lower than elsewhere after taking account of socio-economic factors and age; and
- cost weights for different types of services were based on professional consensus rather than empirical evidence.

8.25 Whilst the modelling process adopted will help alleviate the impact of the above problems, a number of limitations remain:

- the high cost of hospital and residential/nursing home care may not be adequately reflected in the age/severity weightings; and
- activity in residential/nursing homes and long-stay hospitals could not be accurately identified to ward of residence and had to be apportioned based on the age, gender and severity profile of community activity.

Recommendations

8.26 The CFRG recommends that:

- the funding for this programme be based on total population weighted separately for males and females based on the age/gender weights set out in Table 8.2 (iv);
- the additional needs formula set out in Table 8.3 should be adopted as the new needs index;
- when resources permit, further work is commissioned to refine the cost weightings associated with residential/nursing home and long-stay hospital learning disability patients; and
- further investigation as to why activity varies between areas, after taking account of socio-economic conditions and age.