INFORMATION ANALYSIS DIRECTORATE

Review of the Northern Ireland General Practice Prescribing Formula 2024/25

December 2024

Project Support Analysis Branch

Department of Health NI

Ref: PFR2024_12

Department of Health
An Roinn Sláinte
Männystrie O Poustie
www.health-ni.gov.uk

CONTENTS

Published Papers:

The following papers are published online alongside this final report of the Review of the Northern Ireland General Practice Prescribing Formula 2024-25 (PFR2024_12):

PFR2024_01 Age-Gender Adjustment (datafile PFR2024_01 accompanies this paper)

PFR2024_02 STAR-PU (datafile PFR2024_02 accompanies this paper)

PFR2024_03 Care Home Adjustment (datafile PFR2024_03 accompanies this paper)

PFR2024_04 Replication of the Current Needs Model

PFR2024_05 Additional Needs Modelling Strategy

PFR2024_06 Current Prescribing Formula

PFR2024_07 Population Base

PFR2024_08 Additional Needs Modelling Results (datafile PFR2024_08 accompanies this paper)

PFR2024_09 Application of the Formula at LCG and General Practice Level

PFR2024_10 Equality Impact Assessment

PFR2024_11 Glossary of Terms

KEY RECOMMENDATIONS

Population Base

- A constrained registered population should be used as the population base for setting Local Commissioning Group (LCG) allocations.
- For LCG allocations, the population should be the latest available General Practice registered population from NHAIS, constrained to the latest available NISRA mid-year estimate of population adjusted for the latest available number of cross-border workers as recorded on NHAIS.
- The constraining method for LCG allocations should assume that list discrepancy is uniform across areas and only varies with age; list deflators should therefore only be applied to each age-gender group.
- For General Practice allocations, the population should be the latest available General Practice registered population from NHAIS.

Age-Gender Adjustment (NI-PU)

- It is recommended that the NI-PU 2015 be updated to NI-PU 2023. The NI-PU 2023 should be adopted from April 2025 as the cost weightings within the 2025/26 prescribing formula allocations and adopted from that time within COMPASS reporting, as the new prescribing measure for making General Practice/area comparisons.

STAR-PU

- It is recommended that the STAR-PU 2015 be updated to STAR-PU 2023. STAR-PU 2023 should be adopted from April 2025 within COMPASS reporting, as the new therapeutic-specific prescribing measures for making practice/area comparisons.

Care Home Adjustment

- It is recommended that the weights for patients in care homes be 3 times the value of the corresponding patients living in their own homes. It is recommended that the care home adjustment is incorporated within the age-gender weighting in setting both LCG and General Practice allocations.

- An additional adjustment for those in Supported Living is deemed unnecessary and these patients should not be captured within the care home adjustment.
- After consideration of the peer review feedback and additional analysis, it was agreed that the recommendation on SLU should include the following:
  "These patients can bring extra burden on a small number of specific General Practices but given the negligible effect on allocations overall, any adjustment or additional resource should be considered by SPPG as a local adjustment rather than be dealt with as a weighting within the formula."

Additional Needs Adjustment

- The preferred simplified 2-stage additive stepwise model should be adopted as the additional needs adjustment within the General Practice Weighted Capitation Prescribing Formula, for setting allocations at both LCG level and General Practice level.
- The supply variables within the model should be retained but sterilised, that is, fixed at the average value for Northern Ireland.

1. Introduction

1.1 Expenditure on General Practice prescribing covers the costs incurred by General Practices in prescribing medication, which is subsequently dispensed in the community to their patients. In Northern Ireland, in 2023/24 there were over 45m items dispensed in the community, with an ingredient cost of over £501.3m.

1.2 The mechanism for allocation is a weighted capitation formula. The concept is such that resources are distributed based on the needs of the population, rather than on a purely per capita basis. Needs arise from (i) age & gender, (ii) higher prescribing needs for those in care homes and (iii) additional need arising from socio-economic factors, morbidity and deprivation.

1.3 The weighted capitation formula is used to set annual indicative prescribing amounts (IPAs) for Local Commissioning Groups, GP Federations and General Practices. It is vital that these IPAs are accurate as out-turn against allocation is continuously monitored to assess the performance of General Practices, GP Federations and LCGs in effective prescribing. The overall NI budget for General Practice prescribing is a devolved responsibility of the Strategic Planning & Performance Group (SPPG*) of the Department of Health (DoH).

*The regional Health and Social Care Board (HSCB) officially closed on 31 March 2022; responsibility for its functions transferred to the Strategic Planning & Performance Group (SPPG), Department of Health (DoH).

1.4 The concept of a weighted capitation formula to allocate General Practice prescribing allocations was first introduced in Northern Ireland in 1998/99; a detailed research programme then led to a full Northern Ireland-specific formula from 2000/01. In 2003, the formula was subjected to an equality impact assessment, public consultation and external peer review. Since then, the formula has undergone 2 full formula reviews; the latest being implemented and in operation for the allocation of 2016/17 IPAs. This is the weighted capitation formula still in operation today.

1.5 The weighted capitation formula should be considered one tool in setting indicative allocations at each level of administration; as responsibility rests with the SPPG, they can and should employ other mechanisms as means of budgetary control. Currently, 2 such mechanisms are in place: (i) a capping mechanism and (ii) top-slicing.

1.6 The capping mechanism is such that, General Practices with under-spend at year-end of more than a specified amount have their allocation capped at the previous year's allocation level. In addition, where a practice has under-spend of more than a specified amount, but their previous year's allocation was higher than the current year's proposed allocation, they receive the lower allocation, that is, the current year's proposed allocation.

1.7 Top slicing arrangements are in place for out-of-hours, nurse and non-medical prescribing; the top-slice being based on the previous year spend. With regard to expensive drugs, a list is determined at the start of the financial year, and this remains static for the next 12-month financial period. By holding this top slice centrally, General Practices are relieved of the financial responsibility of dealing with low numbers of very high-cost patients.

The current General Practice prescribing formula is outlined in detail in Paper PFR2024_06.

2. Rationale for the 2024/25 General Practice Prescribing Formula Review

2.1 There were a number of reasons for reviewing the NI prescribing formula at this time:

- All resource allocation formulae should be reviewed regularly to ensure that the applied weightings are up-to-date and reflect current population needs. The formula was last reviewed in 2016 and so is now due for review under our normal review process. Note, the timing of this review was postponed, allowing Census 2021 data to be analysed when building regression models to develop the additional needs adjustment.

- LCGs and GP Federations come under scrutiny with regard to reducing prescribing spend and enabling effective prescribing. Pharmacy advisers have a close on-the-ground role to promote the safe, clinically effective and cost-effective use of medicines within general practices; part of that advisory role is to scrutinise prescribing patterns and spend. In a time of financial pressure, it is vital that the formula is as robust as possible when monitoring out-turn against allocation, to assess the performance of General Practices, GP Federations and LCGs in effective prescribing. An out-of-date formula, which could be considered to be no longer robust or accurate, could be challenged by any of these parties and those that represent them, such as the General Practitioners' Committee and Local Medical Committees.

- The need to derive the age weightings from more up-to-date data. The current age cost curve is derived from dispensing data 2013/14 and population profiles as of October 2013. The weightings must reflect current population needs in terms of the age-gender profile of General Practices, GP Federations and LCGs.

- The need to devise updated age weights for specific therapeutic groups (STAR-PU). Again, these weightings should reflect current population profiles. These comparative measures are used by COMPASS, who provide General Practices with feedback on their prescribing. As well as being a useful comparative prescribing tool, the derivation of STAR-PU allowed additional needs models to be tested based on separate therapeutic groups.

- The need to update the care home adjustment. This adjustment is currently derived from dispensing data 2013/14 and the population profile of care home residents as of October 2013. The weightings must reflect current needs and profiles.

- The need to remodel the additional needs index. The models use costs at General Practice level as the dependent variable and aims to explain the best predictors in prescribing cost variation. The current model is derived from 2013/14 cost data and a dataset of needs variables including Census 2011 data, disease prevalence 2009/10 to 2013/14 and administrative data from 2013/14. This was the opportune time to remodel now that Census 2021 data was available.

- The need to continue to monitor differential list discrepancy across LCGs.

- The need to monitor equality impacts with more up-to-date data sources. As with all elements of the current formula, the equality impact assessments were based on 2013/14 data sources. Release of Census 2021 data allowed more up-to-date equality impacts to be assessed.

3. Process for the Prescribing Formula Review 2024/25

3.1 Review of the NI Prescribing Formula falls under the responsibility of the Department of Health (NI), as the DoH retains ownership of the formula, its development and enhancement. As the budget holder, the Strategic Planning & Performance Group (SPGG) is the other main party on behalf of which the work was taken forward. The project was led by statisticians in Project Support Analysis Branch, Information & Analysis Directorate, DoH on behalf of the DoH Chief Pharmaceutical Officer and Medicines Policy Branch, DoH. Reporting arrangements took place via the IPA Management Group, SPPG.

3.2 Reporting to the IPA Management Group, SPPG took place at each milestone, e.g. after developing the age cost curve, deriving the care home adjustment and the additional needs modelling. Departmental customers were briefed in parallel.

4. Peer Review Process for the Prescribing Formula Review 2024/25

4.1 A tendering process resulted in engaging Dr Daniel Butler (General Practitioner and Postgraduate Researcher with School of Medicine Dentistry & Biomedical Sciences, Queen's University Belfast) as peer reviewer. The peer reviewer signed up to clear Terms of Reference and timescales and worked collaboratively with the IAD in-house statistical team. This collaborative working throughout development of the new formula was invaluable, as this approach allowed issues or suggestions to be addressed on an ongoing basis; each paper and analysis involved liaison between the peer reviewer and statistical team until both parties were content to sign off on that particular element. At that stage, SPPG and DoH were informed of the agreed status of that component.

4.2 Peer review allowed the formula to be scrutinised by an independent expert, allowing weaknesses to be identified, the formula to be improved upon and ultimately, allowing the formula to be declared 'fit for purpose'. Peer review should assure all parties (DoH, SPPG and GPCNI) that the proposed new formula is robust for its intended purpose. Previous peer review has concentrated on the statistical methods employed, especially with regard to the additional needs modelling; for this review, not only were the analytical aspects considered again, but Dr Butler was able to bring his clinical experience to the process and this proved extremely useful in the overall scrutiny of the work.

5. Components of the Weighted Capitation Formula

5.1 The current weighted capitation formula comprises:

- A constrained registered general practice list as the population base to take account of population size. The major determinant of an area or general practice's level of need is the size of the population for which it is responsible.
- An age-gender adjustment (or index) to take account of needs arising from age-gender profiles which are different from the Northern Ireland average. This index also incorporates an adjustment to take account of the relative costs of those patients residing in care homes.
- An additional need adjustment to reflect the relative need for prescribing resources over and above those due to population size and age-gender profile.

This latest Formula Review provides for updates as follows:

- **Update of the age-gender weighting NI-PU 2015 to NI-PU 2023**
- **Revision of the weighting for care home patients from 2.5 to 3.0**
- **A new additional needs adjustment**

6. Population Base

6.1 Central to any capitation-based allocation mechanism is an accurate count of the population to which the resources are being allocated. Differential changes in the population will have an impact on the allocation of resources.

6.2 As General Practice prescribing allocations are intended to cover the costs incurred by General Practices in prescribing drugs to their patients, it is important that practices receive an allocation for the relative proportion of patients registered with them. This means that the starting population point for allocations must be to count patients registered with General Practices and in turn attribute these patients to the LCG that manages the practice, irrespective of whether the patient is resident in that particular LCG.

6.3 The current data source is the National Health Applications and Infrastructure Services (NHAIS) System, maintained by the Business Services Organisation (BSO), which is a record of everyone registered with a General Practice in Northern Ireland. The NHAIS System also includes registration of cross border workers; although living in another jurisdiction, due to working in NI, they are entitled to a medical card/treatment on the same basis as NI residents.

Population Base for Local Commissioning Groups (LCGs)

6.4 There are a number of technical difficulties in constructing an appropriate population base when allocating primary care prescribing resources to LCGs. General Practice registered populations cannot be used directly, since they are distorted by variable list discrepancy, where the number of persons on General Practice lists on NHAIS exceeds the NISRA official resident mid-year population estimate (MYE). This list discrepancy differs in size by age, by geographical area and from General Practice to General Practice. The discrepancy is due in part to delays in removing patients from practice lists who no longer avail of services, e.g. due to death or having moved

away and delays in registering babies. The issue in NI is further compounded by users from the Republic of Ireland (ROI) using addresses of convenience. The number of General Practice registered patients at April 2024 was 7.5% higher than the NI mid-year estimate of population at June 2022 (plus cross-border workers at April 2024).

6.5 NISRA resident population estimates cannot be used solely either, due to problems with cross boundary flows; that is, patients who are resident in one LCG area but are registered with a General Practice in a different LCG. As at April 2024, 5.53% of patients were registered with a General Practice outside the LCG in which they live. Ideally, we require a population base which is free of the effects of list discrepancy, but which still takes account of cross boundary flow. The population base for General Practice prescribing to LCGs is therefore the constrained registered list. The constraining methodology takes the registered General Practice population as its start point and scales it back to match the NISRA resident MYE population plus a count of cross-border workers entitled to a medical card/treatment on the same basis as NI residents.

The issues of constructing a population base for LCG allocations, taking account of cross-boundary flows and list discrepancy and the constraining procedure for LCG allocations is described in detail in Paper PFR2024_07 (Population Base).

Population Base for General Practices (& GP Federations)

6.6 As General Practice allocations are intended to cover costs incurred by GPs in prescribing drugs to their patients, it is important that General Practices (and subsequently GP Federations) receive an allocation for the proportion of patients registered with them, irrespective of whether those patients reside in that particular LCG area. For General Practice allocations, the population should be the latest available General Practice registered population from NHAIS; this will include registration of cross border workers who are entitled to medical treatment whilst in Northern Ireland, on the same basis as residents.

7. Age-Gender Weights

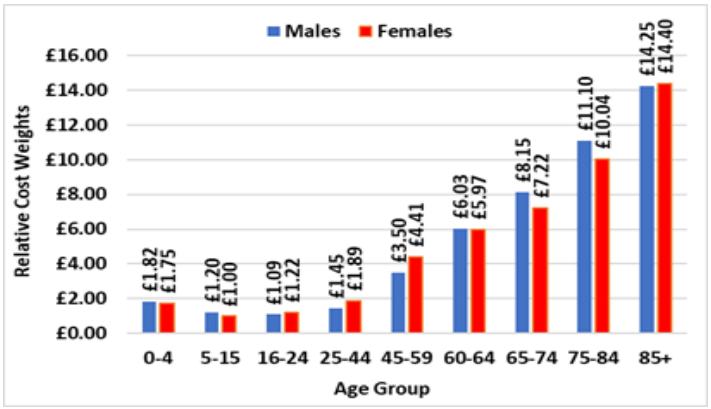
7.1 After population size, the next significant consideration in a weighted capitation formula is to account for needs which arise from having a population age and/or gender structure which is different from the Northern Ireland average. Different age-gender groups place different demands on our health service. It is logical that older people will require more prescribing resources than younger people and should therefore attract higher weightings within the formula adjustment.

7.2 The formula takes account of demographic need by applying an age-gender cost curve. The weights were developed using dispensing data 2022/23 for each age-gender group divided by patients registered with General Practices during the same period for the same age-gender groups. This creates costs per head for each age-gender group; these are then standardised around the minimum cost per head to produce relative cost weights. These relative cost weightings are commonly referred to as Northern Ireland Prescribing Units (NI-PU); those from this latest Formula Review will be known as NI-PU 2023 (see Table 7.1 and Figure 7.1). The interpretation of the relative age-gender weights is that an elderly woman aged 85 and over is expected to cost 14.4 times more than a female aged 5-15.

7.3 During the previous full Formula Review in 2015/16, the peer reviewer raised the issue of an ageing population and whether it would be more appropriate to split the 75+ age band into 75-84 and 85+. With this 2023 Formula review, analysis has been carried out using an 85+ age band, as per this recommendation; this demonstrated that relatively higher costs in the 85+ age group are masked when subsumed into the 75+ age band. The recommendation from this latest Formula Review is therefore to adopt a split of the oldest age group into 75-84 and 85+. Analysis using the 75+ age band was also carried out to allow comparison with the previous review.

Table 7.1 & Figure 7.1: Relative Cost Weights – NI-PU 2023

Age Group	Males	Females
0-4	£1.82	£1.75
5-15	£1.20	£1.00
16-24	£1.09	£1.22
25-44	£1.45	£1.89
45-59	£3.50	£4.41
60-64	£6.03	£5.97
65-74	£8.15	£7.22
75-84	£11.10	£10.04
85+	£14.25	£14.40



7.4 Compared to NI-PU 2015, the weights have changed little for the age groups up to 25-44. From the 45-59 age group upwards, the latest weights have decreased from the NI-PU 2015 weights; this results in a less steep curve for both males and females (see Figure 11.1 later in this report). This is in line with the trend that, despite increasing volumes of items prescribed (which reflect a steadily growing older population), prescribing costs have been decreasing in recent years. This is due to a number of factors including implementation of a Pharmaceutical Clinical Effectiveness Programme, the role of Pharmacy Advisers, increased generic prescribing and the introduction of a NI Formulary. However, disaggregation of the 75+ age group into 75-84 and 85+ resulted in a much higher weighting for those aged 85+, providing evidence of the masking effect if those aged 85+ are aggregated with those aged 75-84 and substantiating the recommendation to split the older age group.

7.5 In the case of LCG allocations, the weights are applied to the constrained registered population to produce an age-gender weighted population for each LCG area. Application of the weights essentially converts the population into prescribing units. The relative effect is then presented as an index around 1.0, (NI = 1.0). An LCG with an index less than 1.0 has less age-related need than the NI average, that is, a younger age profile. Likewise, an LCG with an index greater than 1.0 has higher relative need due to having an older age profile.

7.6 In the case of General Practice populations, the weights are applied to the General Practice registered lists to produce an age-weighted population for each General Practice. Again, General Practice indices are anchored around the NI average of 1.0, having relative need either greater than or less than the NI average.

7.7 As well as an adjustment within the allocation formula, the NI-PU can be used to make comparisons more valid between General Practices or between geographical areas. The NI-PU is currently used within the COMPASS reporting system[1]. The updated NI-PU 2023 should

be adopted from April 2025 within COMPASS reporting, as the new prescribing measure for making General Practice/area comparisons.

A full explanation of the analysis and derivation of the NI-PU 2023 is available in Paper PFR2024_01. Published alongside the Paper is a Data File (PFR2024_01).

[1]COMPASS is a prescribing information system developed to provide General Practices with feedback on their prescribing and how they compare both locally and regionally.

8. STAR-PU

8.1 There are differences in the age and gender profiles of patients who are prescribed drugs in specific therapeutic groups. For example, drugs for dementia are generally prescribed for older people. STAR-PU (Specific Therapeutic Group Age-Gender Related Prescribing Unit) has been developed to allow more accurate comparisons within a specific therapeutic group by taking into account the types of people who receive that medication.

8.2 STAR-PU weightings have been developed in Northern Ireland for the leading 10 therapeutic groups which account for 93% of items dispensed in 2022/23 (and 83% of total gross ingredient cost in 2022/23). STAR-PU has also been developed for a number of specific drugs (specific British National Formulary (BNF) chapters, sections and paragraphs). The methodology is principally the same as for NI-PU but based on costs within individual therapeutic groups rather than all prescribed medicines.

8.3 The weights have been derived by dividing the total gross ingredient cost in each age-gender group for the specific BNF chapter (or section and/or paragraph if relevant) by the total number of registered patients in each age-gender group. This produces a BNF-specific cost per capita for each age-gender group. The exception is anti-bacterials/antibiotics (BNF Chapter 5), which are item based; as most of these are prescribed as short courses, volume is more appropriate as a prescribing measure. The costs (or items) per capita are not standardised; the weights are presented as costs/items per head, this is where the methodology diverges from the NI-PU methodology.

8.4 Table 8.1 and Figure 8.1 (also available in Data File PFR2024_02) show STAR-PU weightings for the leading 10 therapeutic groups. Not surprisingly, the STAR-PU weightings differ greatly for different therapeutic groups, reflecting the demographics of the population being prescribed certain medicines.

8.5 It is recommended that STAR-PU be adopted as the prescribing measure when analysing a particular drug, BNF chapter, section or paragraph. Note, STAR-PU is not adopted within the weighted capitation formula; STAR-PU was developed as a supplementary prescribing tool. However, as part of the development of an updated additional needs adjustment, regression models to predict variation in prescribing costs across General Practices were constructed for the leading 6 therapeutic groups (accounting for 80% of items and 75% of cost).

Table 8.1: STAR-PU 2023 Non-standardised weights: Top 10 BNF Chapters by Ingredient Cost*

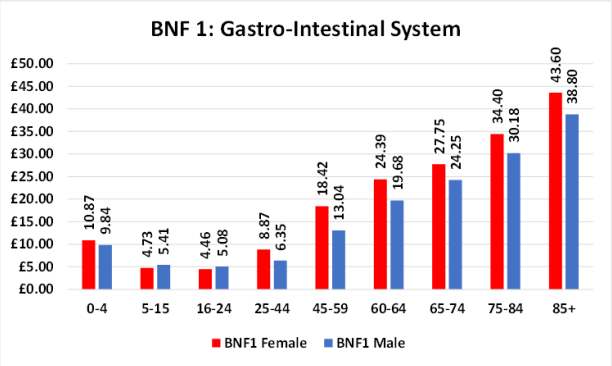
Age Group	BNF Chapter 1 Gastro-intestinal System		BNF Chapter 2 Cardiovascular System		BNF Chapter 3 Respiratory System		BNF Chapter 4 Central Nervous System		BNF Chapter 5 Infections (Item Based)*	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
0-4	£10.87	£9.84	£1.39	£1.21	£4.87	£5.97	£3.02	£2.82	1.23	1.18
5-15	£4.73	£5.41	£0.89	£0.85	£7.40	£11.61	£6.31	£7.99	0.59	0.48
16-24	£4.46	£5.08	£1.35	£0.87	£7.32	£8.96	£11.34	£11.46	0.74	0.40
25-44	£8.87	£6.35	£4.50	£3.95	£11.12	£9.09	£26.96	£23.20	0.88	0.36
45-59	£18.42	£13.04	£17.04	£25.16	£27.27	£19.80	£62.53	£45.39	1.06	0.53
60-64	£24.39	£19.68	£34.76	£60.84	£43.28	£34.54	£76.28	£59.22	1.37	0.78
65-74	£27.75	£24.25	£63.96	£106.97	£53.35	£46.71	£75.51	£61.68	1.61	1.03
75-84	£34.40	£30.18	£127.94	£179.10	£53.50	£57.17	£93.96	£64.00	2.15	1.44
85+	£43.60	£38.80	£187.94	£234.61	£40.59	£55.44	£138.37	£80.89	2.88	2.06

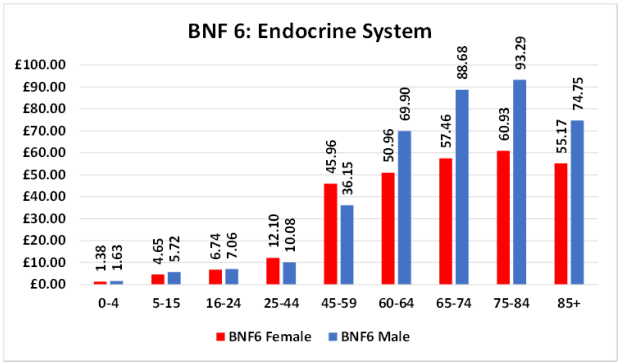
Age Group	BNF Chapter 6 Endocrine System		BNF Chapter 7 Obs, Gynae & UT Disorders		BNF Chapter 9 Nutrition & Blood		BNF Chapter 10 Musculoskeletal & Joint Diseases		BNF Chapter 13 Skin Diseases	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
0-4	£1.38	£1.63	£0.24	£0.13	£52.17	£53.86	£0.18	£0.19	£4.04	£4.47
5-15	£4.65	£5.72	£0.61	£0.26	£8.73	£10.23	£0.48	£0.20	£3.21	£2.83
16-24	£6.74	£7.06	£6.30	£0.12	£6.24	£5.74	£1.17	£0.32	£5.74	£4.87
25-44	£12.10	£10.08	£5.64	£0.36	£6.00	£4.29	£2.17	£1.15	£5.46	£4.65
45-59	£45.96	£36.15	£7.78	£1.62	£11.65	£9.02	£4.80	£3.23	£6.95	£6.45
60-64	£50.96	£69.90	£10.20	£4.37	£18.21	£16.95	£5.35	£4.53	£8.44	£8.36
65-74	£57.46	£88.68	£11.59	£8.67	£24.53	£24.35	£4.93	£4.61	£9.28	£10.41
75-84	£60.93	£93.29	£13.01	£15.14	£51.24	£46.08	£5.14	£4.81	£11.89	£13.90
85+	£55.17	£74.75	£11.58	£19.37	£134.01	£88.38	£5.70	£5.39	£18.73	£19.45

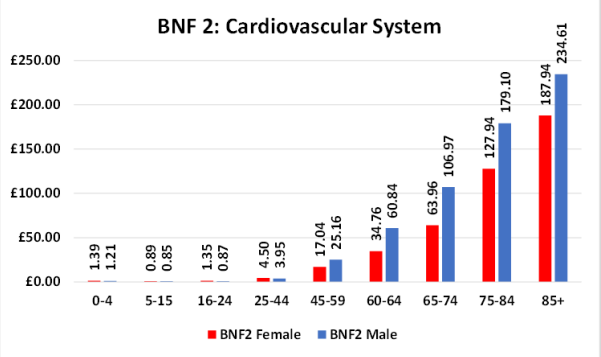
* The BNF5 weights are item-based; the majority of these products are prescribed as short courses; therefore, volume rather than cost is the more appropriate measure to use.

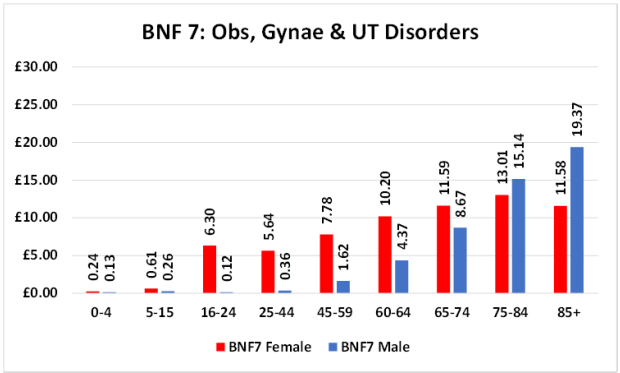
A full explanation of the analysis and derivation of the STAR-PU 2023 is available in Paper PFR2024_02. Published alongside the Paper is a Data File (PFR2024_02).

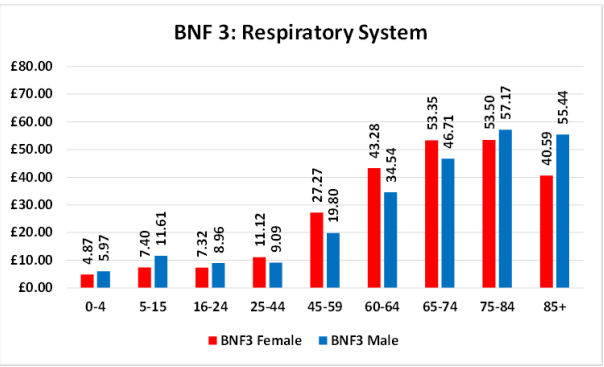
Figure 8.1: STAR-PU 2023

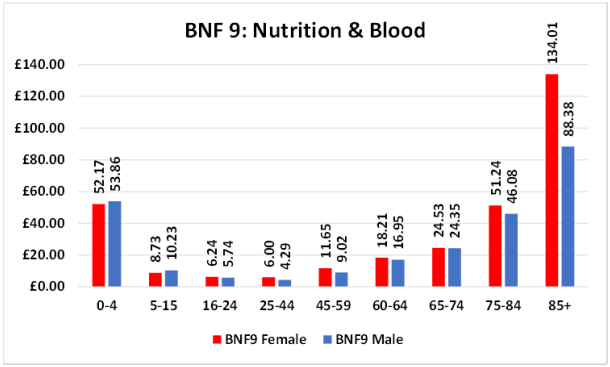


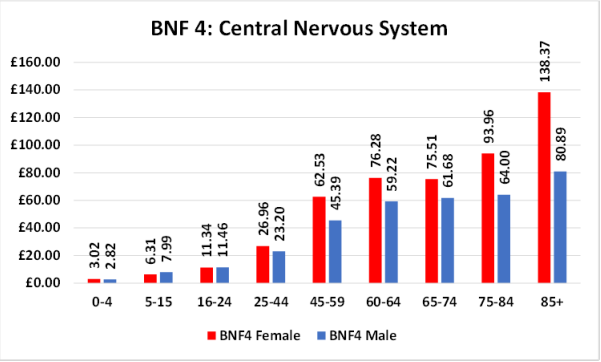


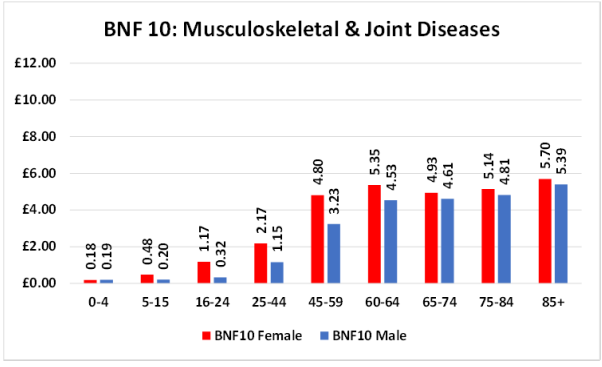


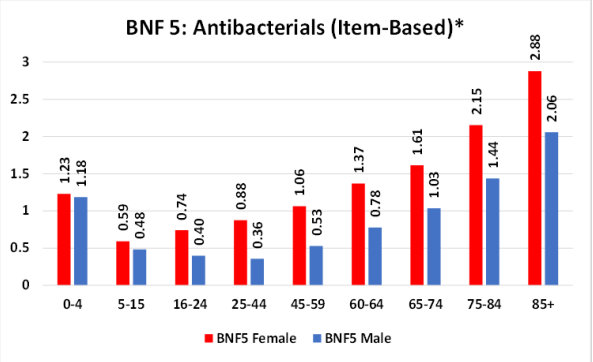


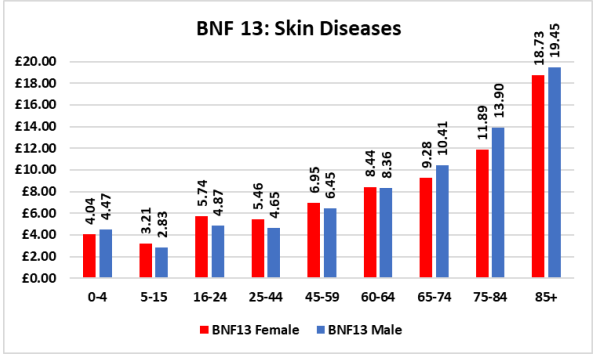












9. Care Home Adjustment

9.1 An establishment is a care home if it provides accommodation, together with nursing and personal care, for any of the following persons: persons who are or have been ill; persons who have or have had a mental disorder; persons who are disabled or infirm; persons who are or have been dependent on alcohol or drugs. Under the Care Standards Act 2000, the distinction between residential and nursing homes was abolished; they are all care homes now, regardless of what individual establishments call themselves.

9.2 An adjustment for care home patients was first introduced for the 2013/14 General Practice prescribing allocation round, when a weighting was incorporated within the NI-PU 2010 to account for the relative higher prescribing costs of those patients residing in care homes compared to patients living in the community in their own homes. When the care home adjustment was introduced, it was recommended that the NI-PU weights for patients in care homes should be 2.5 times the value of the corresponding patients living in the community. Analysis during the last Formula Review, implemented for the 2016/17 allocation round, confirmed that the care home weighting should be retained at 2.5. Analysis of prescribing costs for those in care homes was carried out again during this Formula Review; this concluded that the NI-PU weights for patients in care homes should be 3.0 times the value of the corresponding patients living in the community. The weights in Table 7.1 (NI-PU 2023) above are applied to care home patients in exactly the same manner as all other patients; this allows prescribing units to be calculated for care home patients, which are then multiplied by 3.0 to arrive at prescribing units for care home patients. These care home prescribing units are then added to the remaining prescribing units for those patients not in care homes to arrive at total prescribing units.

9.3 Analysis involved an examination of the age and gender distribution of the care home population in NI compared with that of the population living in the community. As expected, patients in care homes were predominantly elderly and, compared to those in the community, there were a higher percentage of females (67% of patients in care homes were females compared to 50% of the community population). The distribution of age and gender for care home patients is expected to have a large impact on volume, types of medication prescribed and subsequent prescribing costs.

9.4 The next part of the analysis looked at prescribing costs per capita for a set of age-gender groups and then standardisation of these costs to produce relative prescribing costs (i.e. the same principle as the calculation of NI-PUs). Prescribing costs for those living in the community were isolated from those residing in care homes to provide numerators for each group separately. These costs were divided by the relevant population denominator, that is, registered patients living in the community and registered patients residing in care homes respectively. This produced costs per head per age-gender group and once standardised, resulted in the relative prescribing costs shown in Figures 9.1a & b.

Figure 9.1a: Non-Care Home Patients Relative Prescribing Costs

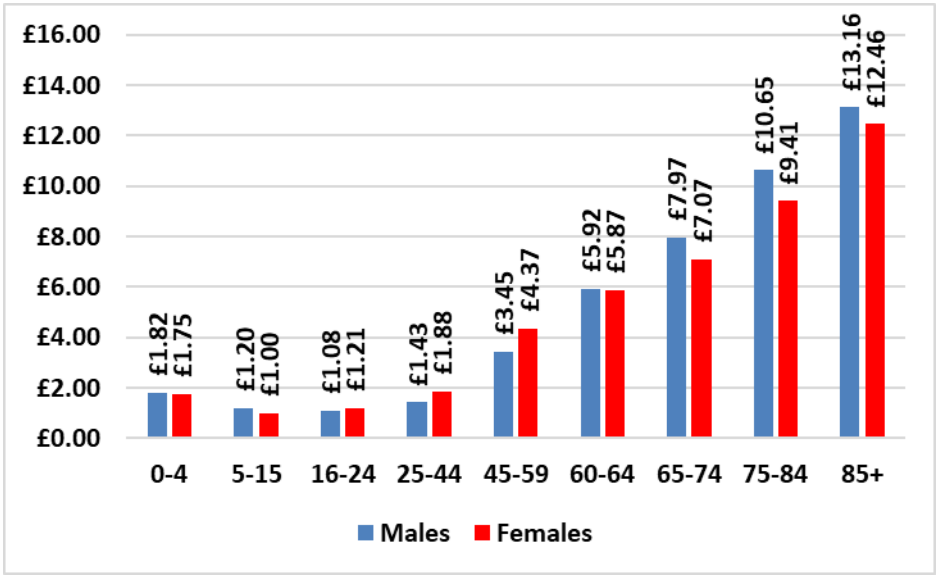
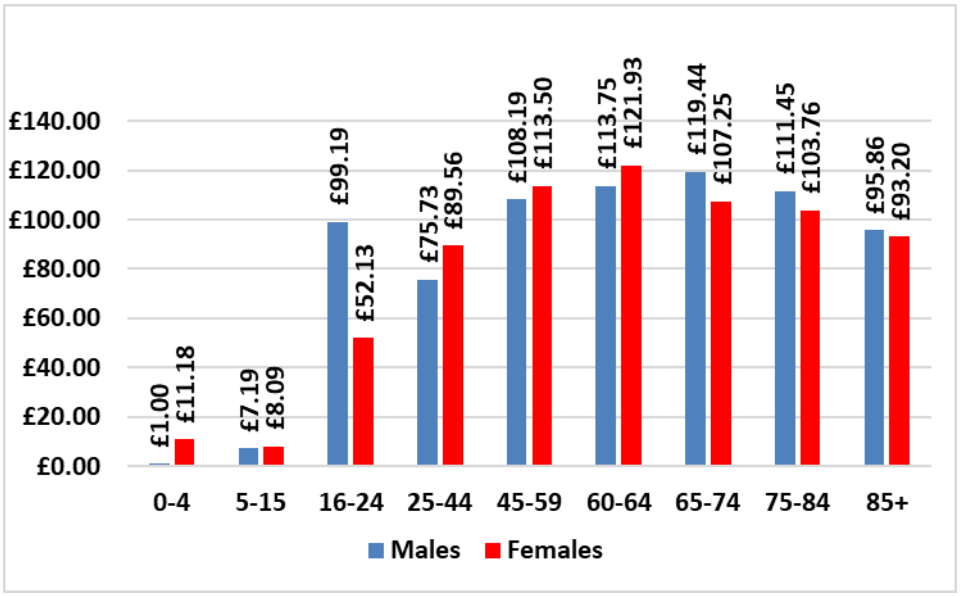


Figure 9.1b: Care Home Patients Relative Prescribing Costs

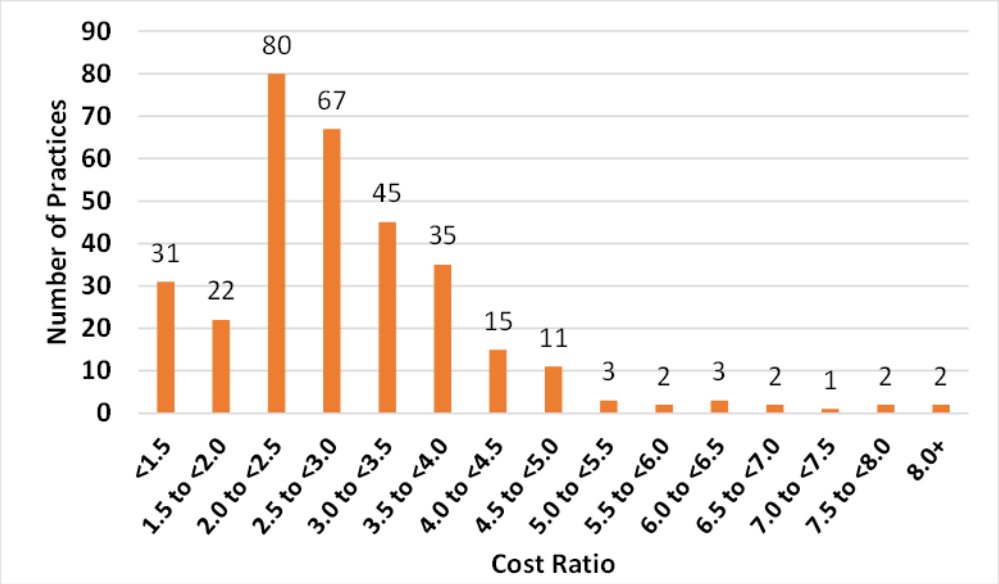


Footnote: When comparing Figure 9.1a and Figure 9.1b, note the different axes.

9.5 The relative costs of those in care homes are much higher overall in each age-gender group than those living in the community. Interestingly, the profile of the relative prescribing costs of those in care homes does not follow the same distribution as the non-care home population; there is much less association with age. Rather than increase with age, in the care home population from age 25+, the costs tend to plateau rather than increase. This suggests that the age-gender profile of the population is less important than the fact that the patient is resident in a care home, where their complex medical and clinical needs are the main driver for their prescribing needs and subsequently higher costs, rather than their age.

9.6 Ultimately, it was possible to calculate cost per prescribing unit (using NI-PU 2023) for care home patients and other patients and take a ratio; the distribution of these ratios by General Practice allowed us to recommend a weighting for care home patients. The cost per PU for patients in care homes was £155.46, while the cost for the remaining patients was £52.90, leading to a ratio of 2.94. Individually, however, practices had ratios that varied considerably, from a maximum cost ratio of 29.73 to a minimum of 0.17 (see Figure 9.2). Given the distribution, it is recommended that the weights for patients in care homes be 3.0 times the value of the patients living in their own homes.

Figure 9.2: Distribution of Ratio of Cost per PU: Care Home Patients v Non-Care Home Patients



9.7 It is recommended that the care home adjustment is incorporated within the age-gender weighting in setting both LCG and General Practice allocations.

Supported Living Units (SLU)

9.8 Supported living is the term used to encompass a range of services designed to help disabled citizens retain their independence in their local community. Analysis confirmed that patients living in Supported Living Units (SLU) had costs more similar to those living in the community than to those living in care homes.

9.9 It is therefore recommended that patients living in supported living units do not require an additional weighting in the prescribing budget formula and that these patients should not be captured within the care home adjustment.

9.10 After consideration of the peer review feedback and additional analysis, it was agreed that the recommendation on SLU should include the following:

"These patients can bring extra burden on a small number of specific General Practices but given the negligible effect on allocations overall, any adjustment or additional resource should be considered by SPPG as a local adjustment rather than be dealt with as a weighting within the formula."

A full explanation of the analysis and derivation of the care home adjustment is available in Paper PFR2024_03. Published alongside the Paper is a Data File (PFR2024_03).

10. Additional Needs Adjustment

Modelling Strategy & Aims

10.1 The aim of this adjustment is to take account of needs for prescribing resources over and above that demanded by population size and age-gender structure. These tend to be needs arising from differing levels of deprivation, morbidity and socio-economic circumstances. Modelling was carried out in-house by Project Support Analysis Branch (PSAB) in DoH to investigate the relationship between prescribing utilisation, needs indicators and the supply of health services. Prescribing utilisation was measured in the form of costs per capita adjusted for age while needs were measured using a range of morbidity, socio-economic factors and deprivation measures. Utilisation of healthcare does not only depend on patient need and demand but supply also has an influence. Supply was measured in the form of General Practice characteristics and distance variables created through spatial modelling to measure access to healthcare facilities.

10.2 It was agreed that a 2-stage additive model, 1-stage stratified models and BNF-specific models would be tested. The 2-stage approach adjusts for differences in the age-gender structure of the population using the age-gender cost curve, so that in the second stage the utilisation data are standardised to control for the effect of age and gender. The 1-stage stratified model stratifies the utilisation cost data into age-gender groups and requires a separate regression model to be estimated for each. The BNF-specific models stratify the utilisation cost data into therapeutic groups and require a separate regression model for each BNF chapter; BNF models were constructed for the leading 6 therapeutic groups.

The additional needs modelling strategy including consideration of modelling approaches and the functional form of the model, level of data analysis, construction of the dataset and the modelling steps are detailed in Paper PFR2024_05.

Replication of the Current Additional Needs Adjustment

10.3 During this latest Formula Review, we have replicated the current General Practice prescribing formula additional needs model using updated data. The regression model was replicated using cost weighted prescribing activity for the financial year 2022/23, indirectly standardised using the new age cost curve devised during this current review (NI-PU 2023). The current additional needs adjustment was constructed using prescribing activity 2013/14, indirectly standardised using the NI-PU 2015.

10.4 The additional needs variables in the current General Practice Prescribing Formula were:

- Age standardised prevalence of coronary heart disease per 1,000 General Practice registered population *(+ve association, increased prevalence is associated with increased prescribing costs).*

- Age standardised prevalence of diabetes per 1,000 General Practice registered population aged 17+ *(+ve association, increased prevalence is associated with increased prescribing costs).*

- Age standardised prevalence of mental health per 1,000 General Practice registered population *(+ve association, increased prevalence is associated with increased prescribing costs).*

- Age standardised prevalence of epilepsy per 1,000 General Practice registered population aged 16+ *(+ve association, increased prevalence is associated with increased prescribing costs).*

- Percentage of those unemployed who are aged 16-24 *(+ve association, increased levels are associated with increased prescribing costs).*

10.5 The regression analysis using updated data explained a higher proportion of variation in cost weighted activity than in the original model (73.0% compared to 66.1%). However, explanatory power of the model could not be considered in isolation; examination of the coefficients, including their relationship with cost weighted activity and their magnitude also needed consideration and whether individual variables were no longer significant. The replication using updated data was also not as well specified as the original model.

10.6 With respect to the supply variables, all continued to exhibit the same relationship with cost weighted activity and 4 of these supply variables had coefficients of similar magnitude to the original model. However, although generic prescribing rates still exhibited the same relationship, the coefficient was half the size of the coefficient in the current model. Examination of the descriptive statistics for generic prescribing rates at April 2014 and March 2023 showed less variation across General Practices (the range and standard deviation have both become smaller) which is why the coefficient has gone down. The distribution has become more skewed, and the mean rate has increased from 71% to 77%; a larger proportion of practices now have higher rates of generic prescribing, the level of generic prescribing varying less now across General Practices.

10.7 In terms of the needs variables, the 4 prevalence variables continued to exhibit positive relationships with cost weighted activity, however the magnitude of the coefficients had changed. Originally CHD was the largest contributor to the needs model, however its coefficient has decreased, and diabetes would now be the main driver using updated data. The mental health coefficient has also decreased by nearly a half. The epilepsy coefficient has actually increased, but given that the data is out-of-date, cannot be re-modelled with updated data and cannot be updated annually with the current allocation setting process, there is no rationale to retain a model containing this variable. Of particular note is that the unemployment variable (% of unemployed, aged 16-24) has become not significant.

10.8 Further analysis was carried out to explore the impact of removing the non-significant variable (% unemployed aged 16-24) and the epilepsy variable (which cannot be updated for modelling). This simplified model was better specified, and the explanatory power was considered comparable with the current model.

10.9 Model replication indicates that the prevalence needs indicators still reflect current levels of need, albeit the change in coefficients suggests the relationship may have changed, with diabetes now being the main driver of prescribing costs. While it is encouraging that the current model stands up to interrogation when replicated with updated data, given the changes in coefficients and the possibility that other needs indicators may now more strongly reflect current levels of need, it is important that the model fully reflects current need, hence the importance of developing an updated additional needs adjustment.

A full explanation of the analysis and replication of the current additional needs regression model with updated data is available in Paper PFR2024_04.

Results of Regression Modelling for Current Formula Review

10.10 Extensive statistical modelling resulted in a preferred model which was then subjected to vigorous sensitivity testing. The preferred model for application within the allocation formula is based on a simplified 2-stage additive stepwise regression model. The final preferred model explained 69.0% of the variation in prescribing expenditure across General Practices and passed the appropriate specification tests. Of the variables tested during this modelling, the following were found to be significant and the best at explaining variation in prescribing utilisation over and above age & gender. The final preferred model is presented in Table 10.1.

- Age standardised prevalence of coronary heart disease per 1,000 General Practice registered population *(+ve association, increased prevalence is associated with increased prescribing costs).*
- Age standardised prevalence of diabetes per 1,000 General Practice registered population aged 17+ *(+ve association, increased prevalence is associated with increased prescribing costs).*
- Age standardised prevalence of dementia per 1,000 General Practice registered population *(+ve association, increased prevalence is associated with increased prescribing costs).*
- Proportion of households deprived in 4 dimensions *(+ve association, increased levels are associated with increased prescribing costs).* This variable is based on 4 selected household characteristics which classify deprivation in relation to education, health, housing and employment. A full definition is provided at Appendix A.
- Proportion of households with no unpaid carers aged 5 and above (-ve association, increased levels are associated with decreased prescribing costs).

10.11 The prevalence variables were derived from General Practice disease registers, which are an integral part of the Quality & Outcomes Framework. Disease prevalence was available at General Practice level; the variables were constructed as age standardised 5-year averages covering the period 2018/19 to 2022/23. The other 2 variables were derived from Census 2021 data; the data was available at Super Data Zone (SDZ) and attributed to General Practice for modelling. Definitions and data sources are outlined at Appendix A. The attribution process is detailed at Appendix B.

Table 10.1: Simplified 2-Stage Additive Model (Stepwise) – Final Preferred Model

	Standardised Coefficients	t-value	Significance
(Constant)		3.208	0.001
Local Commissioning Groups			
Belfast	-0.015	-0.324	0.746
Northern (excluded as comparator)	-	-	-
South Eastern	-0.044	-1.049	0.295
Southern	-0.039	-0.766	0.444
Western	-0.006	-0.086	0.932
Predicted List Discrepancy	-0.115	-1.778	0.076
Supply Variables			
Number of GPs	-0.798	-8.565	<0.0001
GPs per 1,000 Registered List	0.392	6.838	<0.0001
Average Monthly Items	0.748	8.615	<0.0001
Generic Dispensing Rate %	-0.118	-3.080	0.002
Practice Scan Rate %	0.478	13.928	<0.0001
Needs Variables			
Prevalence of Coronary Heart Disease	0.148	3.870	<0.0001
Prevalence of Diabetes (aged 17+)	0.253	6.239	<0.0001
Prevalence of Dementia (aged 18+)	0.159	4.042	<0.0001
Proportion of Households Deprived in 4 Dimensions	0.274	5.719	<0.0001
Proportion of households with no unpaid carers (aged 5 and above)	-0.153	-4.045	<0.0001

Number of General Practices/Observations	309
R^2 Adjusted	69.0%
RESET Test: t-Statistic	-0.288
RESET Test: p-value	0.773

Footnote: Full definitions and data sources for the supply & needs variables are provided at Appendix A.

Sensitivity Testing & Simplification of Model

10.12 Sensitivity testing included the testing of excluding small General Practices, excluding the LCG policy effects, excluding the practice supply characteristics and testing the inclusion of all practice and area supply variables irrespective of their significance or expected relationship with prescribing expenditure. Sensitivity analysis was reassuring, in that models remained specified, and the explanatory power remained consistent under the various scenarios, with the exception of exclusion of practice supply characteristics, where the adjusted R^2 fell considerably. This was as expected, given that their very reason for inclusion in the modelling is that they help to explain variation in prescribing costs across General Practices. Initially, the preferred model contained a variable for *the proportion of General Practice registered list that*

are aged under 1 (babies); however, this variable exhibited instability under sensitivity testing and was removed under simplification testing. The model remained well specified with good explanatory power and therefore there was rationale to proceed, omitting this variable.

Rationale for Preferred Model

10.13 Although extensive modelling was carried out to develop 1-stage stratified models and BNF-specific models, the 2-stage additive model is more easily understood and more transparent. The simplicity of the 2-stage additive model versus the complexity of the 1-stage stratified models or the BNF models makes it more preferable. Consistency between the BNF models and the 2-stage additive model has provided supporting evidence that prevalence of diabetes and CHD and, to a lesser extent, prevalence of dementia are consistent predictors of prescribing cost variations. These predictors can be achieved in the 2-stage additive model without the complication involved in the BNF model implementation.

10.14 There were no outstanding reasons for or advantages in implementing the 1-stage stratified models or the BNF models over the simpler 2-stage additive model. An aim of utilisation-based modelling is in general to find as parsimonious a model as possible, that is, a model with the least number of variables which sensibly captures variations in prescribing cost utilisation. The 2-stage additive model achieved this without the complications involved in applying 18 stratified models or 5 BNF models.

Treatment of Supply

10.15 It is recognised that the supply of services can influence demand. However, the aim of the modelling should be to isolate the effect of need and explain only utilisation that is a response to need and not that created due to extra supply. Resources should be allocated on the basis of legitimate need only; therefore, for allocation purposes, the supply variables will be retained in the model but sterilised (fixed) at the average value for NI.

The results of the additional needs modelling including rationale for the preferred model, specification testing, sensitivity testing and simplification to arrive at a final model are detailed in Paper PFR2024_08. Published alongside the Paper is a Data File (PFR2024_08).

11. Application of the New Formula at Local Commissioning Group (LCG)

Update of the Age-Gender Component (NI-PU) at LCG Level

11.1 Table 11.1 compares the age-gender index and % shares at LCG under the proposed new formula versus the current formula. The comparisons are made on a consistent population base, that is, April 2024 constrained to the NISRA resident mid-year population estimate at June 2022 plus cross-border workers at April 2024.

Table 11.1 Comparison of the New Age Index (NI-PU 2023) with the Old Age Index (NI-PU 2015) Applied to LCG Constrained Registered Populations

	Belfast	Northern	S Eastern	Southern	Western
New Age-Gender Index	0.9577	1.0359	1.0923	0.9435	0.9833
Old Age-Gender Index	0.9577	1.0346	1.0891	0.9449	0.9866
New Age-Gender % Shares	20.84%	24.59%	18.28%	20.07%	16.21%
Old Age-Gender % Shares	20.84%	24.56%	18.23%	20.11%	16.27%
Change in % Shares	-0.00%	+0.03%	+0.05%	-0.03%	-0.05%

Note: The age-gender index incorporates the additional weighting for care home residents

11.2 South Eastern LCG continues to have the highest age-gender index reflecting its higher proportion of elderly patients; likewise Northern LCG has an age index greater than 1.0. Belfast, Southern and Western LCGs all have age-gender indices less than 1.00, reflecting their lower proportion of elderly people and therefore less than average burden compared to NI average on prescribing costs. The updated LCG age indices in Table 11.1 reflect the demographic structure of the LCGs as shown in Table 11.2. The LCG population structure takes account of cross-boundary flow (patients registered with a General Practice outside the LCG in which they reside) and list discrepancy.

Table 11.2 Age Structure of the 5 LCGs at April 2024

Age	Belfast	Northern	S Eastern	Southern	Western	N Ireland
0-15	19.39%	20.09%	19.55%	22.15%	20.57%	20.36%
16-64	65.03%	61.08%	59.45%	62.06%	62.36%	62.09%
65+	15.58%	18.83%	21.00%	15.79%	17.07%	17.55%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: April 2024 General Practice registered lists, constrained to the 2022 mid-year estimate, adjusted for cross-border workers at April 2024

11.3 The age-gender index under the proposed new formula is more redistributive (+/-2.40%) compared to the current formula (+/-2.31%). The proposed new age-gender curve is actually less steep under the new adjustment (see Figure 11.1 – note to be able to present a direct comparison with NI-PU 2015, NI-PU 2023 is presented here for the 75+ age group). However, the care home component has been revised from 2.5 to 3.0 and it is this additional weighting that makes the overall age component (once the care home adjustment has been incorporated) more redistributive under the proposed new formula.

Figure 11.1 Comparison of Age Cost Curve NI-PU 2023 with NI-PU 2015

Figure 11.1a NI-PU 2023

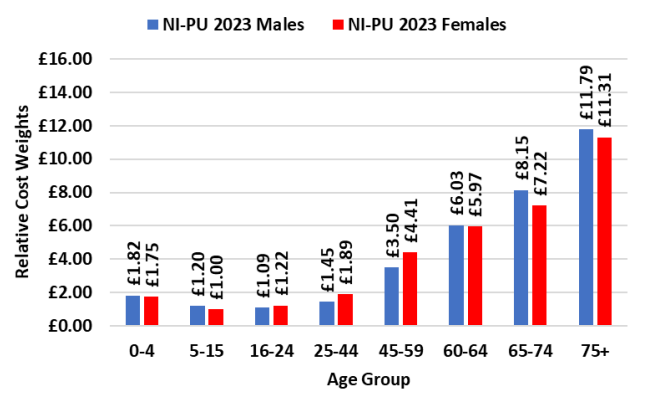
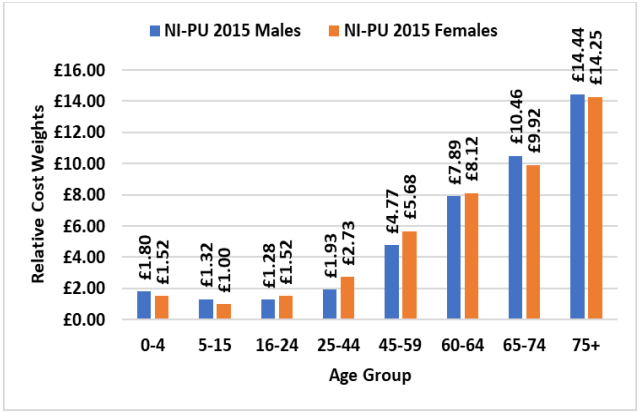


Figure 11.1b NI-PU 2015



11.4 Northern and South Eastern LCGs have higher proportions of patients in care homes (see Table 11.3) compared to the NI average and the other LCGs. Both Northern and South Eastern LCGs have older age profiles as seen by their age index before incorporating any weighting for care home patients (see Table 11.4). This older age profile coupled with higher proportions of care home patients, which now attract a higher weighting (3.0 compared to 2.5 previously) under the proposed new formula, results in Northern and South Eastern LCGs gaining in terms of age-gender.

Table 11.3 Percentage of the General Practice Registered Population in Care Homes at April 2024 by LCG

LCG	Males	Females	Persons
Belfast	0.37%	0.68%	0.53%
Northern	0.41%	0.73%	0.57%
S Eastern	0.49%	0.87%	0.68%
Southern	0.27%	0.49%	0.38%
Western	0.34%	0.55%	0.44%
NI	0.38%	0.66%	0.52%

Table 11.4 Impact of Incorporating the Care Home Adjustment within the Weighted Capitation GP Prescribing Formula at LCG Level

	Belfast	Northern	South Eastern	Southern	Western
Constrained Registered Population % Shares	21.76%	23.74%	16.74%	21.28%	16.49%
Age Index **Without** CH Adj	0.9565	1.0282	1.0703	0.9585	0.9991
Age Index **With** CH Adj	0.9577	1.0359	1.0923	0.9435	0.9833
Age Weighted Population Shares	20.81%	24.41%	17.91%	20.39%	16.47%
Age Weighted Population Shares (With Care Home Adj)	20.84%	24.59%	18.28%	20.07%	16.21%
CARE HOME INDEX	1.0013	1.0075	1.0206	0.9844	0.9842

11.5 Note, overall, the change in index and subsequently the change in age-related % shares for each LCG are very small when updated using the new NI-PU 2023 (see Table 11.1). Northern and South Eastern LCGs gain slightly at the expense of Southern and Western LCGs, with Belfast seeing no change in % shares.

Update of the Additional Needs Component (NI-PU) at LCG Level

11.6 The update of the additional needs index (Table 11.5) sees Belfast LCG continuing to have an index greater than the NI average of 1.0 and Western LCG now also has an index greater than 1.0. South Eastern and Southern LCGs continue to have indices less than 1.0, with Northern LCG moving from an index just over 1.0 to now below the NI average of 1.0. However, it should be noted that, overall, the changes are small for each LCG.

Table 11.5 Comparison of the New Additional Needs Index with the Old Additional Needs Index

	Belfast	Northern	S Eastern	Southern	Western
New Needs Index	1.0417	0.9843	0.9920	0.9792	1.0116
Old Needs Index	1.0539	1.0058	0.9851	0.9788	0.9833
New Needs % Shares	22.63%	23.33%	16.58%	20.80%	16.65%
Old Needs % Shares	22.85%	23.80%	16.43%	20.76%	16.16%
Change in % Shares	-0.22%	-0.47%	+0.15%	+0.05%	+0.50%

11.7 The additional needs index under the new formula is less redistributive; the range of the additional needs index across LCGs is narrower under the new formula. The new additional needs index across the 5 LCGs ranges from 0.9792 to 1.0417 (a range of 0.0625) whereas the formula currently in operation has an additional needs index ranging from 0.9788 to 1.0539 (a range of 0.0751) across the 5 LCGs (see Table 11.5).

11.8 Profiles of the LCGs, in terms of the individual needs indicators, were analysed to explore the plausibility of the resultant LCG overall indices (See Table 11.6). The 3 disease prevalence variables have been age standardised and therefore there are no age effects in the results. The results for the individual indicators have been presented as indices around NI being 1.0; this means LCGs are presented relative to each other, rather than absolute values. LCGs with the highest index for an indicator have been highlighted in red, those with the lowest index are highlighted in blue.

Table 11.6 LCG Profiles (variables expressed as ratios around the NI Average of 1.0)

LCG	Households Deprived in 4 Dimensions	CHD Prevalence	Diabetes Prevalence (17+)	Dementia Prevalence	No Unpaid Carers
BELFAST	**1.4136**	**1.0454**	1.0354	1.0923	**1.0146**
NORTHERN	**0.7947**	0.9954	**1.0470**	**0.8432**	0.9997
S EASTERN	0.8861	1.0060	0.9722	0.9557	0.9996
SOUTHERN	0.8631	0.9811	0.9676	0.9255	**0.9847**
WESTERN	1.0997	**0.9661**	**0.9543**	**1.2970**	1.0011

11.9 Belfast LCG has indices for all 5 needs indicators greater than the NI average of 1.0 and for 3 of the variables, it has the highest index; of note is the very high index for *the proportion of households deprived in 4 dimensions*. It is these profiles that lead to Belfast LCG having the highest overall additional needs index. Although Western LCG has the lowest index for both CHD and diabetes prevalence, it has an index greater than 1.0 for the other 3 variables and again note the very high index for dementia prevalence; these profiles result in an overall additional needs index greater than 1.0. Southern LCG continues to have the lowest overall needs index; the index for all 5 indicators is less than 1.0, resulting in an overall index less than the NI average. As suspected, due to all the indicators having an index lower than or around one, South Eastern LCG has a low additional needs index. Northern is the only LCG to move from an old index greater than 1.0 to a new index below 1.0; only 1 indicator has an index slightly above 1.0, the other 4 are below 1.0 and indeed, relative to the other LCGs, it has low dementia prevalence and very low household deprivation.

Application of the New Formula at LCG Level

11.10 Table 11.7 compares the overall index and overall final % shares at LCG level under the proposed new formula and the current formula. Belfast LCG sees little change in terms of the age-gender index but it has a reduced share due to additional needs, resulting overall in a decrease in percentage share. Northern LCG sees a small gain in terms of age-gender, however their share is reduced due to additional need resulting in an overall decrease of share when both types of need are captured. South Eastern LCG is the only LCG to gain in terms of both age-gender related need and additional need. Southern and Western LCGs both reduce their share in terms of age-gender, however, both LCGs gain in terms of additional needs; overall Southern LCG's final total shares remain relatively unchanged with update of the formula, whereas Western LCG sees a substantial gain in overall total % share due to its gain from the new additional needs index. Overall, moving to the proposed new formula from the current formula would redistribute +/-0.64% which equates to +/-£2.684m based on a NI allocation of £420m.

Table 11.7 Comparison of the New Total Index with the Current Total Index (& % Shares)

	Belfast	Northern	S Eastern	Southern	Western
New Total Index	0.9905	1.0204	1.0845	0.9246	0.9947
Current Total Index	0.9993	1.0393	1.0725	0.9240	0.9689
New Total % Shares	21.55%	24.23%	18.15%	19.67%	16.40%
Current Total % Shares	21.74%	24.67%	17.95%	19.66%	15.97%
Change in % Shares	-0.19%	-0.45%	0.20%	0.01%	0.42%

11.11 Table 11.8 details the population component of the new formula as at April 2024 and then application of the weightings within the formula. Note the population base is unchanged as a result of the Formula Review. The recommended population base remains the NHAIS General Practice registered lists at April of the year in question for allocations, constrained to the latest NISRA resident mid-year population estimate at June plus cross-border workers at April of the same year as the NHAIS registered lists.

Table 11.8 Application of the Full Formula with New Weightings & Adjustments at LCG Level

Table 11.8(a): Population Component

	BELFAST	NORTHERN	S EASTERN	SOUTHERN	WESTERN	NI
GP Registered Population at April 2024	448,595	487,270	343,140	437,158	338,755	2,054,918
% Shares	21.83%	23.71%	16.70%	21.27%	16.49%	100.00%
Resident GP Population at April 2024	391,237	506,315	387,278	432,407	337,681	2,054,918
% Shares	19.04%	24.64%	18.85%	21.04%	16.43%	100.00%
Resident 2022 MYE + Cross-Border Workers	*Unavailable by LCG*					1,912,278
Constrained Registered Population	416,073	453,991	320,088	406,885	315,241	1,912,278
Population % Shares	**21.76%**	**23.74%**	**16.74%**	**21.28%**	**16.49%**	**100.00%**

Table 11.8(b): Application of Weightings within Formula

Age Index Incorporating Care Home Weighting	0.9577	1.0359	1.0923	0.9435	0.9833	1.0000
Age-Wgt Population (Inc. Care Home Adjustment)	398,455	470,308	349,646	383,888	309,981	1,912,278
Age-Weighted % Shares	20.84%	24.59%	18.28%	20.07%	16.21%	100.00%
Age Weighting Impact	**-0.92%**	**0.85%**	**1.55%**	**-1.20%**	**-0.28%**	**+/- 2.40%**
Needs Index	1.0417	0.9843	0.9920	0.9792	1.0116	1.0000
Need-Weighted Popn	432,787	446,193	317,052	397,824	318,422	1,912,278
Need-Weighted % Shares	22.63%	23.33%	16.58%	20.80%	16.65%	100.00%
Need Weighting Impact	**0.87%**	**-0.41%**	**-0.16%**	**-0.47%**	**0.17%**	**+/- 1.04%**
Total Index	0.9905	1.0204	1.0845	0.9246	0.9947	1.0000
Age-Need Wgt Popn	412,103	463,260	347,119	376,223	313,573	1,912,278
Age-Need Wgt % Shares	21.55%	24.23%	18.15%	19.67%	16.40%	100.00%
Age-Need Impact	**-0.21%**	**0.48%**	**1.41%**	**-1.60%**	**-0.09%**	**+/- 1.90%**

Redistributive Effect of the New Formula at LCG Level

11.12 Table 11.9 details the effect of applying the new formula at LCG level compared with the formula currently in operation. The redistribution refers to moving from a crude population share (that is, the constrained registered population as at April 2024) to a % share weighted by the age-gender and additional needs components separately and then redistribution having applied both components simultaneously. Monetary swings have been shown based on applying the redistribution to an overall NI allocation of £420m (in 2023/24, the NI Indicative Prescribing Amount (IPA) was just over £420m).

Table 11.9 Redistribution of Resources at LCG Level

Formula Component	Proposed New Formula	Current Formula
Age-Gender Index incorporating Care Home	+/-2.40% (£10.076m)	+/-2.31% (£9.713m)
Additional Needs Index	+/-1.04% (£4.369m)	+/-1.16% (£4.852m)
Total Index	+/-1.90% (£7.973m)	+/-2.15% (£9.011m)

11.13 The new formula can be viewed as having an overall swing of +/-1.90% (which equates to +/-£7.973m on a NI IPA of £420m) compared to a swing of +/-2.15% (which equates to +/-£9.011m) under the current formula (see Table 11.9). However, in each LCG these redistributions can work in opposing directions; for example, Northern LCG needs relatively more resources due to age but needs less resources due to additional need. Southern and Western LCGs see redistributions in the opposite direction with both having relatively less need for resources due to age factors but the need for more resources due to additional needs. In Belfast and South Eastern LCGs, the redistributions do not work in opposing directions. Instead, more resources are skewed to South Eastern LCG on the basis of both age and additional need factors. In terms of Belfast LCG, technically less resources are redistributed to this LCG due to both age and additional need (however, the redistribution due to age is negligible at a change of -0.0004%).

A full explanation of the analysis and testing application of the new formula at Local Commissioning Group (LCG) level is available in Paper PFR2024_09.

12. Small Area Mapping of the New Additional Needs Indicators

12.1 Thematic maps were created at small area, that is the 850 Super Data Zones (SDZs) constructed to support dissemination of Census 2021 results. This aimed to demonstrate profiles at small area level which can be masked at LCG level. Note, SDZs are not coterminous with health geographies, that is, LCGs. Maps for each of the individual 5 indicators which comprise the new additional needs index are provided below and in datafile PFR2024_08 which accompanies Paper PFR2024_08.

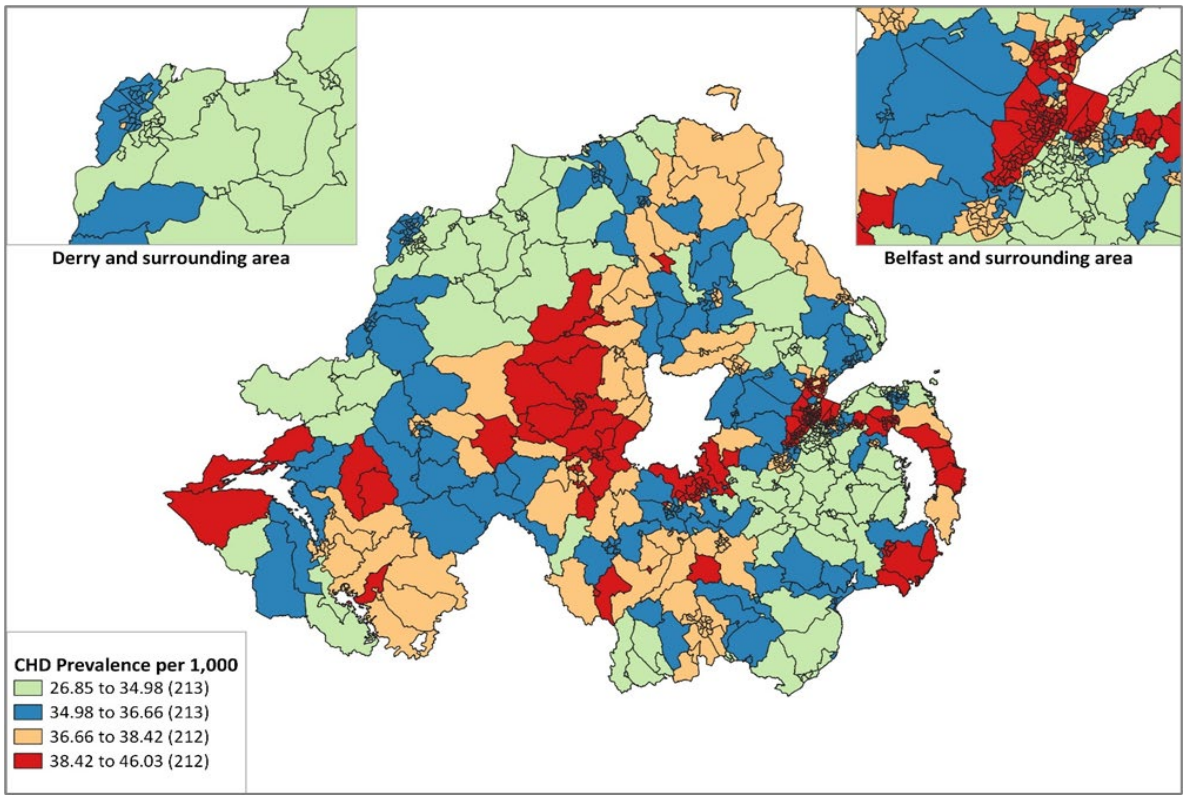
12.2 The 3 disease prevalence variables have been age standardised and therefore there are no age effects being picked up in the maps. It was also necessary to attribute the disease prevalence data from General Practice to SDZ; this process is outlined at Appendix B of this paper. The household deprivation and households with no carers variables were constructed at SDZ level from Census 2021 data. The thematic maps re-enforce the LCG profiles presented in Table 11.6.

12.3 At small area, the pattern across NI is very different depending on which individual needs indicator is being examined. The thematic maps provide a good visual impression of the individual indicators within the additional needs index and how the composite of the individual indicators results in the overall needs index at LCG level.

Prevalence of Coronary Heart Disease per 1,000 General Practice population

This map shows a high level of CHD prevalence in Belfast, but with also a north-west versus south-east split in the Belfast area (prevalence being high in north and west Belfast and low in south and east Belfast). CHD prevalence is also high in the central areas Cookstown, Magherafelt, Dungannon and Craigavon. Prevalence is generally lower in Western areas although there are some small pockets of higher prevalence in Fermanagh. There are also some pockets of higher prevalence in Down and on the Ards peninsula. The small area mapping confirms the resulting LCG indices, where Belfast LCG has the highest ratio of CHD prevalence (compared to NI = 1.0) and Western LCG has the lowest ratio compared to NI.

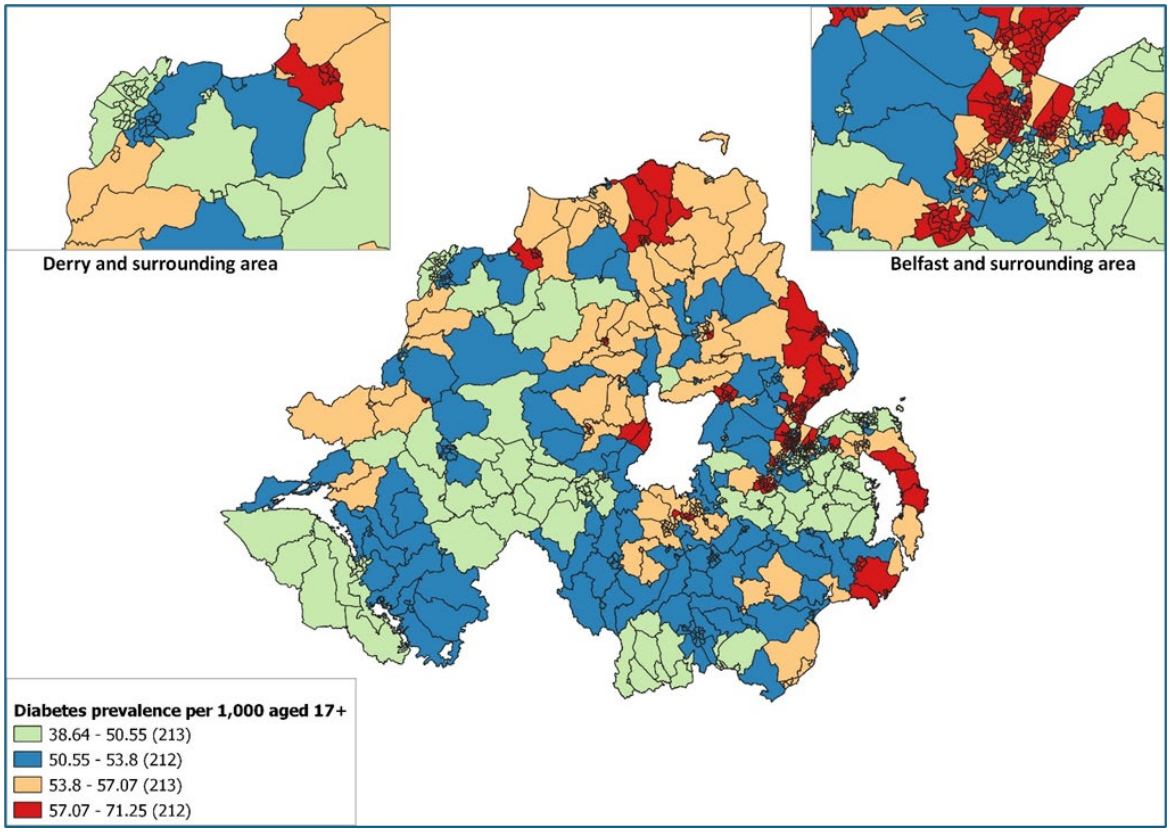
Map 12.1: Prevalence of Coronary Heart Disease per 1,000 General Practice population at Small Area



Prevalence of Diabetes per 1,000 General Practice population aged 17+

The map of diabetes prevalence shows a very different pattern to that of CHD, with high prevalence around Coleraine and the Antrim Glens. There are pockets of higher prevalence in Down and the Ards peninsula and again in Belfast; the north-west versus south-east split in Belfast is again apparent although not as pronounced as it was for CHD prevalence. Diabetes prevalence is very low across both Western and Southern LCGs. Again, the small area mapping helps to explain the LCG results; Northern LCG has the highest ratio of diabetes prevalence (compared to NI = 1.0) and Western LCG has the lowest, with Southern LCG the second lowest compared to NI.

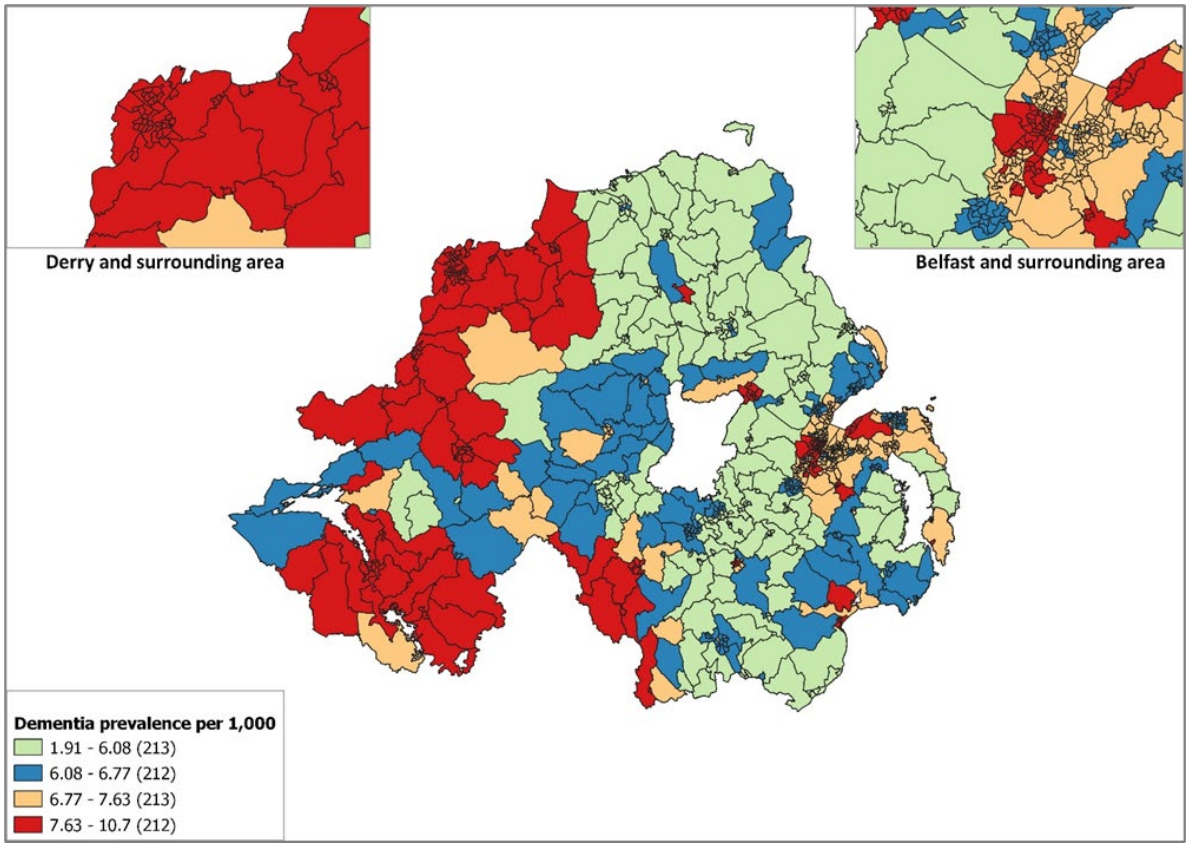
Map 12.2: Prevalence of Diabetes per 1,000 General Practice population aged 17+ at Small Area



Prevalence of Dementia per 1,000 General Practice population

The map of dementia prevalence shows a very distinct pattern; prevalence being very high in western areas and lower in eastern areas across NI, with the exception of Belfast where dementia prevalence is again high. All of the areas within Northern LCG have very low prevalence. The resulting LCG ratios are in keeping with the small area mapping; Western has the highest ratio of dementia prevalence (compared to NI = 1.0) and Northern LCG has the lowest ratio compared to NI.

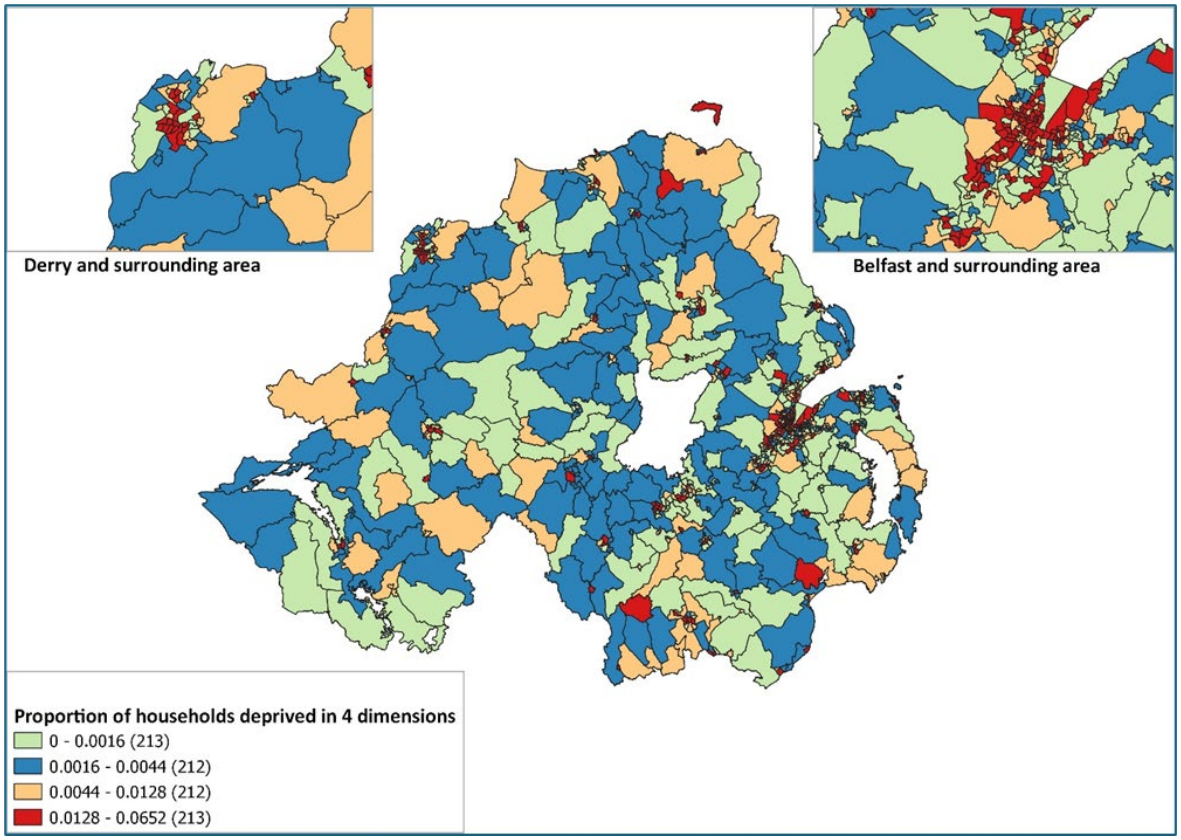
Map 12.3: Prevalence of Dementia per 1,000 General Practice population at Small Area



Proportion of households deprived in 4 dimensions

The map of household deprivation has much less of a distinct pattern compared to those presenting disease prevalence. The definition of household deprivation is given in the footnote at Appendix A of this paper. There are small pockets of higher deprivation scattered across NI and then a concentration of higher deprivation in the Belfast area. The concentration of higher household derivation in Belfast leads to Belfast LCG having the highest ratio compared to NI, Northern LCG having the lowest ratio.

Map 12.4: Proportion of households deprived in 4 dimensions# at Small Area

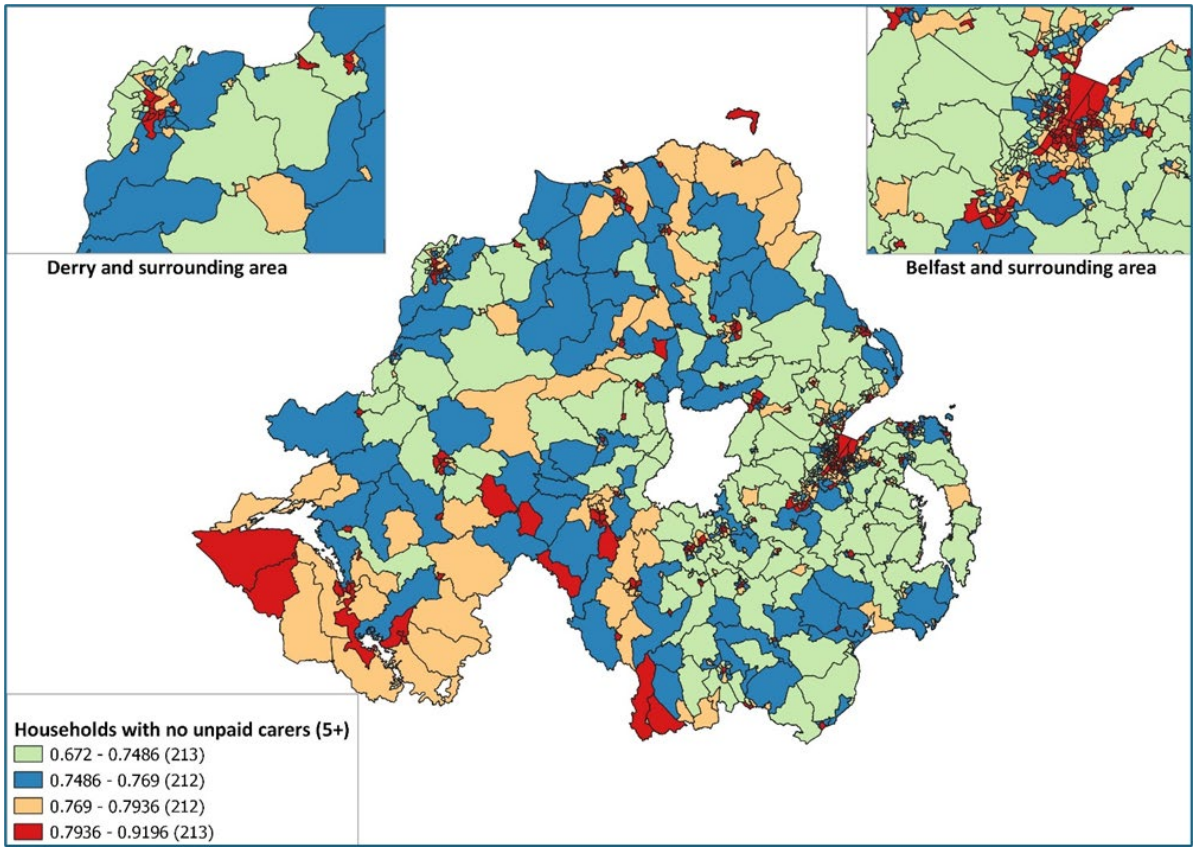


The dimensions of deprivation used to classify households are indicators based on four selected household characteristics - see definitions at Appendix A.

Proportion of households with no unpaid carers (aged 5 and above)

The map showing the proportion of households with no unpaid carers has again a very different pattern to those of disease prevalence and household deprivation. The proportion of households with no unpaid carers is highest in the Fermanagh, Moyle, mid-Ulster areas and then again in Belfast, but with pockets of higher levels in South Tyrone and South Armagh. Note this variable has a negative association with prescribing costs in that, as the proportion of households with no unpaid carers increases, prescribing costs decrease. Resources will be skewed away from those areas with higher proportions of no unpaid carers.

Map 12.5: Proportion of households with no unpaid carers (aged 5 and above) at Small Area



A full explanation of the small area mapping of the new additional needs indicators is available in Paper PFR2024_08.

13. Sensitivity of the Formula to Targeting Deprivation & Small Area Analysis

13.1 One of the characteristics of an effective weighted capitation formula is to effectively channel or skew resources towards people, groups and areas in greatest need. It is important to note that any analysis examining whether the formula effectively skews resources in response to need can only focus on needs which are currently being met; this is because the formula has been developed using a utilisation-based approach and no account is taken of any differential unmet need which may exist between areas.

13.2 Sensitivity of the prescribing formula to additional needs can be masked at LCG level; this is because the different needs of affluent and deprived sub-populations which make up LCGs can, to a large extent, cancel each other out. That is why, at LCG level, it is population size which is the major determinant of need rather than socio-economic profile. The age-gender structure of the LCG population has a larger impact than additional need but is still dwarfed by population size. The differences in socio-economic conditions and deprivation between areas are much more apparent at small area level than LCG level.

13.3 Table 13.1 shows the top and bottom 10 Super Data Zones (out of the 850 SDZs that cover Northern Ireland) ranked from highest (1.0) to lowest (850) in terms of the age-gender index, additional needs index and overall total index. An age-gender ranking of 1.0 means the SDZ with the oldest age profile whereas an additional needs ranking of 1.0 indicates the SDZ with the highest needs due to additional need. This ranking is also represented geographically in Figures 13.1 to 13.3. It should be noted that, although the areas of SDZs vary significantly, they have approximately equivalent populations (the average size is 2,240 persons and 900 households).

13.4 The tables and maps highlight that the ranking of SDZs is very different depending on whether we are considering additional need as opposed to need arising from age-gender structure. This is as expected, as deprived areas tend to consist of relatively younger populations whereas more affluent areas tend to have more elderly populations; these are of course generalisations and there will always be deviations from this general perception. The interaction between both types of need is captured in the total needs index. Consider these examples below:

Example 1: Older Age Profile with Less Additional Needs

A good example of a less deprived/more affluent area with an elderly population is "Holywood_and_Clandeboye_B" SDZ in Ards & North Down LGD. This SDZ has the highest age index at 2.1131 and therefore ranks as 1 according to age-gender. However, this SDZ has low additional need, with an index of 0.8433 and ranks in position 832 in terms of additional need. Given the very high age-gender index, it being over 2 times that of the NI average of 1.0, the effect of age outweighs the low additional needs and the SDZ has a resulting high overall total needs index of 1.7872 (ranked in position 2 overall).

Example 2: Younger Age Profile with High Additional Needs

SDZ "The Moor_B" in Derry LGD has a very young age profile resulting in an age-gender index of 0.7207 (ranked 826 in terms of age-gender). However, this SDZ has very high additional need, with an index of 1.1539 and ranks in position 88 in terms of additional need. Given the very high additional needs index, the effect of additional need outweighs the young age profile and the SDZ has a resulting high overall total needs index of 1.2224 (ranked at position 103 overall).

Example 3: Both a Young Age Profile & Less Additional Needs

A good example of an area with both a young age profile but also low additional needs is "Botanic_Q" SDZ in Belfast LGD. With an age-gender index of 0.6495, the SDZ is placed at rank 841; however, the very low additional needs index of 0.7558 means it actually ranks lowest across all SDZs at rank 850. Overall, given both the young profile and low additional needs, the SDZ has a very low total index of 0.4923 (ranked in position 848 overall).

Example 4: Both an Older Age Profile & High Additional Needs

SDZ "Portadown_P" in Armagh City, Banbridge and Craigavon LGD has both an older age profile (age-gender index of 1.2769 and a rank of 65 in terms of age-gender) but also has high additional needs (an index of 1.1222 and a rank of 108). Capturing high need due to both age-gender and additional needs results in the SDZ being ranked in position 21 overall (a total needs index of 1.4370).

13.5 Table 13.1 and the Figure 13.2 have good face validity in relation to the additional needs index where the results match well with perceptions of which SDZs would be considered more affluent and those that would be considered less affluent or more deprived in terms of need for resources. Table 13.1 only shows the extreme top and bottom SDZs; Table 13.2 summarises the overall picture for each Local Government District (LGD) in terms of quintiles of deprivation derived from the additional need index. The table details the percentage of SDZs within each LGD which fall within each additional needs quintile, quintile 1 being the "most needy".

13.6 Although the SDZ quintile analysis cannot be carried out to present information for LCGs, LGD level analysis can provide a good guide if we consider the general alignment of LGD geographies to that of LCGs. Table 13.2 and Figure 13.2 show a very distinct pattern from application of the new additional needs adjustment. 43% of Belfast SDZs are in the most deprived quintile with 60% of Belfast small areas falling into quintile 1 and 2. Worth noting from Figure 4.2 is the distinct split in Belfast LGD between north-west and south-east; north-west SDZs having high additional needs versus south-east having low additional needs.

Table 13.2 Profiles of Local Government Districts in terms of SDZ Additional Need Quintiles

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Antrim and Newtownabbey	24%	24%	21%	22%	9%
Ards and North Down	16%	23%	14%	18%	30%
Armagh City, Banbridge and	13%	22%	22%	28%	16%
Belfast	43%	17%	10%	11%	19%
Causeway Coast and Glens	11%	10%	21%	23%	34%
Derry City and Strabane	26%	28%	34%	11%	2%
Fermanagh and Omagh	6%	16%	20%	27%	31%
Lisburn and Castlereagh	11%	10%	23%	20%	36%
Mid and East Antrim	12%	31%	22%	26%	9%
Mid Ulster	0%	19%	26%	26%	28%
Newry, Mourne and Down	14%	23%	26%	23%	13%

Footnote: SDZs are not coterminous with health geographies, that is, they do not nest within the LCGs. Analysis has therefore been carried out at LGD level. Note that the new 11 LGDs are also not coterminous with LCG health geographies.

13.7 Although only 26% of Derry City and Strabane's small areas are in the most deprived quintile, if we include the 2 most deprived quintiles (quintile 1 + 2), this percentage reaches 54%. At the other extreme, Mid-Ulster has no small areas in the most deprived quintile, 19% of Mid-Ulster SDZs being in the second most deprived quintile. Lisburn and Castlereagh have the highest percentage of small areas within the least deprived quintile (36% of their SDZs are in quintile 5). When we consider the top 2 least deprived quintiles (quintile 4 + 5), 2 LGDs see 57% of their small areas in these quintiles; that is, Causeway Coast & Glens and Fermanagh & Omagh.

Table 13.1 Highest and Lowest 10 Super Data Zones Ranked by (i) Age-Gender Index; (ii) Additional Needs Index & (iii) Total Index

Ranked by Age-Gender Index (includes Care Home Weighting)				Ranked by Additional Needs Index			Ranked by Total Needs Index		
Rank	SDZ Name	LGD	Age Index	SDZ Name	LGD	Needs Index	SDZ Name	LGD	Total Index
1	Holywood_and_Clandeboye_B	Ards and North Down	2.1131	Collin_K	Belfast	1.6411	Lisburn_North_A	Lisburn and Castlereagh	2.1986
2	Lisburn_North_A	Lisburn and Castlereagh	1.8816	Court_C	Belfast	1.4548	Holywood_and_Clandeboye_B	Ards and North Down	1.7872
3	Ballymena_F	Mid and East Antrim	1.7134	Court_S	Belfast	1.4457	Carrick_Castle_G	Mid and East Antrim	1.7510
4	Limavady_A	Causeway Coast and Glens	1.6949	Collin_C	Belfast	1.4356	Limavady_A	Causeway Coast and Glens	1.7140
5	Ormiston_N	Belfast	1.6681	The_Moor_C	Derry City and Strabane	1.4211	Omagh_D	Fermanagh and Omagh	1.6776
6	Bangor_East_and_Donaghadee_E	Ards and North Down	1.6574	Court_U	Belfast	1.3939	The_Moor_C	Derry City and Strabane	1.6425
7	Bangor_West_C	Ards and North Down	1.5951	Omagh_B	Fermanagh and Omagh	1.3768	Court_B	Belfast	1.5973
8	Carrick_Castle_G	Mid and East Antrim	1.5556	Court_Q	Belfast	1.3594	Ormiston_N	Belfast	1.5637
9	Larne_Lough_J	Mid and East Antrim	1.5060	Court_W	Belfast	1.3437	Bangor_East_and_Donaghadee_E	Ards and North Down	1.5558
10	Causeway_B	Causeway Coast and Glens	1.4870	Court_R	Belfast	1.3386	Balmoral_H	Belfast	1.5549
841	Botanic_Q	Belfast	0.6495	Lisnasharragh_Q	Belfast	0.8270	Ballyarnett_B	Derry City and Strabane	0.5598
842	Botanic_L	Belfast	0.6317	Botanic_U	Belfast	0.8213	Craigavon_F	Armagh City, Banbridge and Craigavon	0.5595
843	Ballyarnett_E	Derry City and Strabane	0.6316	Bann_F	Causeway Coast and Glens	0.8173	Airport_E	Antrim and Newtownabbey	0.5588
844	Collin_L	Belfast	0.6217	Botanic_W	Belfast	0.8152	Botanic_N	Belfast	0.5578
845	Airport_E	Antrim and Newtownabbey	0.6078	Botanic_P	Belfast	0.7961	Botanic_K	Belfast	0.5574
846	Botanic_J	Belfast	0.6003	Botanic_S	Belfast	0.7952	Botanic_J	Belfast	0.5274
847	Botanic_H	Belfast	0.5964	Botanic_X	Belfast	0.7862	Botanic_A	Belfast	0.5126
848	Ballyarnett_B	Derry City and Strabane	0.5828	Botanic_L	Belfast	0.7710	Botanic_Q	Belfast	0.4923
849	Castle_Q	Belfast	0.5654	Castle_Q	Belfast	0.7671	Botanic_L	Belfast	0.4884
850	Botanic_A	Belfast	0.5611	Botanic_Q	Belfast	0.7558	Castle_Q	Belfast	0.4350

Note: Super Data Zones have been ranked highest to lowest from 1 to 850.

In terms of the age-gender index, rank 1 = oldest age profile compared to NI having an age-gender index of 1.0

In terms of the additional need index, rank 1 = most deprived compared to NI having an additional needs index of 1.0

In terms of the total index, this simultaneously captures need arising due to both age-gender and additional need.

Rank 1 when considering the total index = most deprived/in need of prescribing resources compared to NI having a total index of 1.0

Figure 13.1: Age Gender Index at Small Area Level (Super Data Zones)

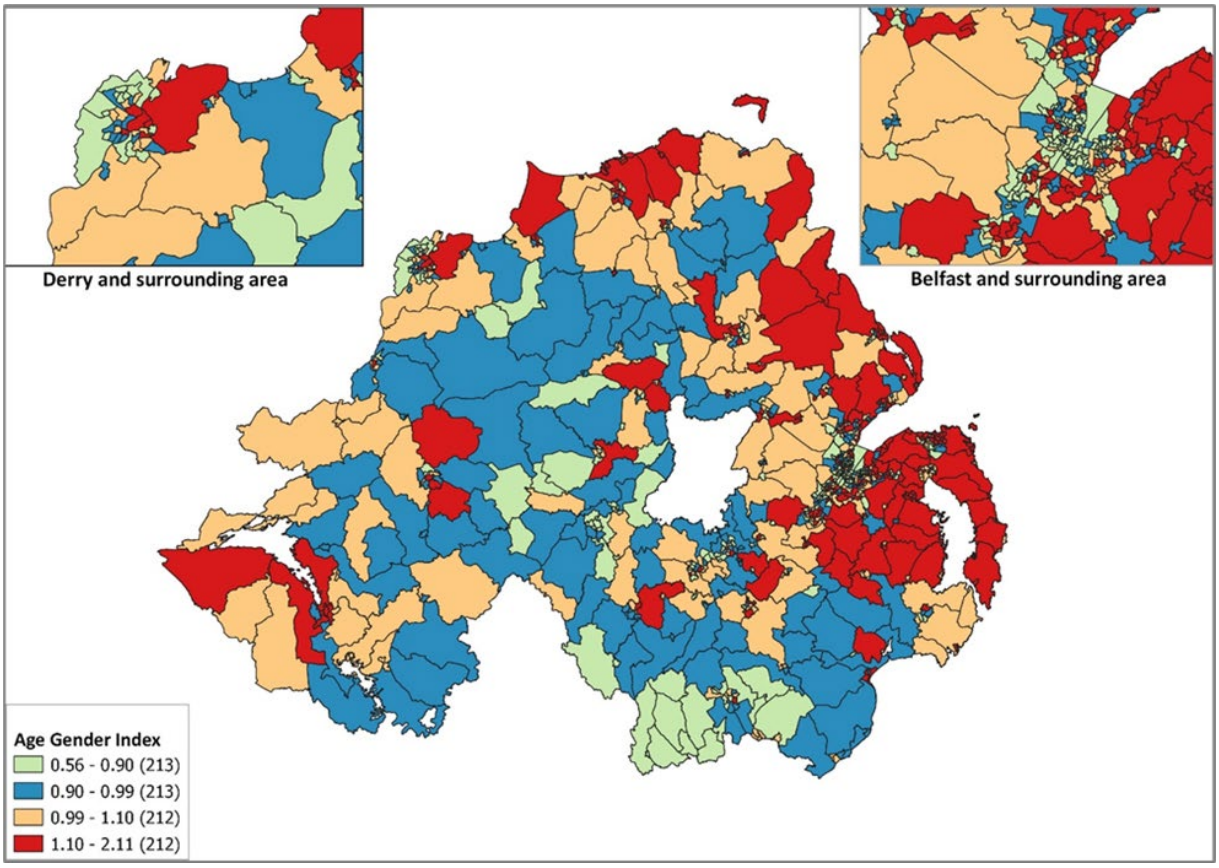


Figure 13.2: Additional Needs Index at Small Area Level (Super Data Zones)

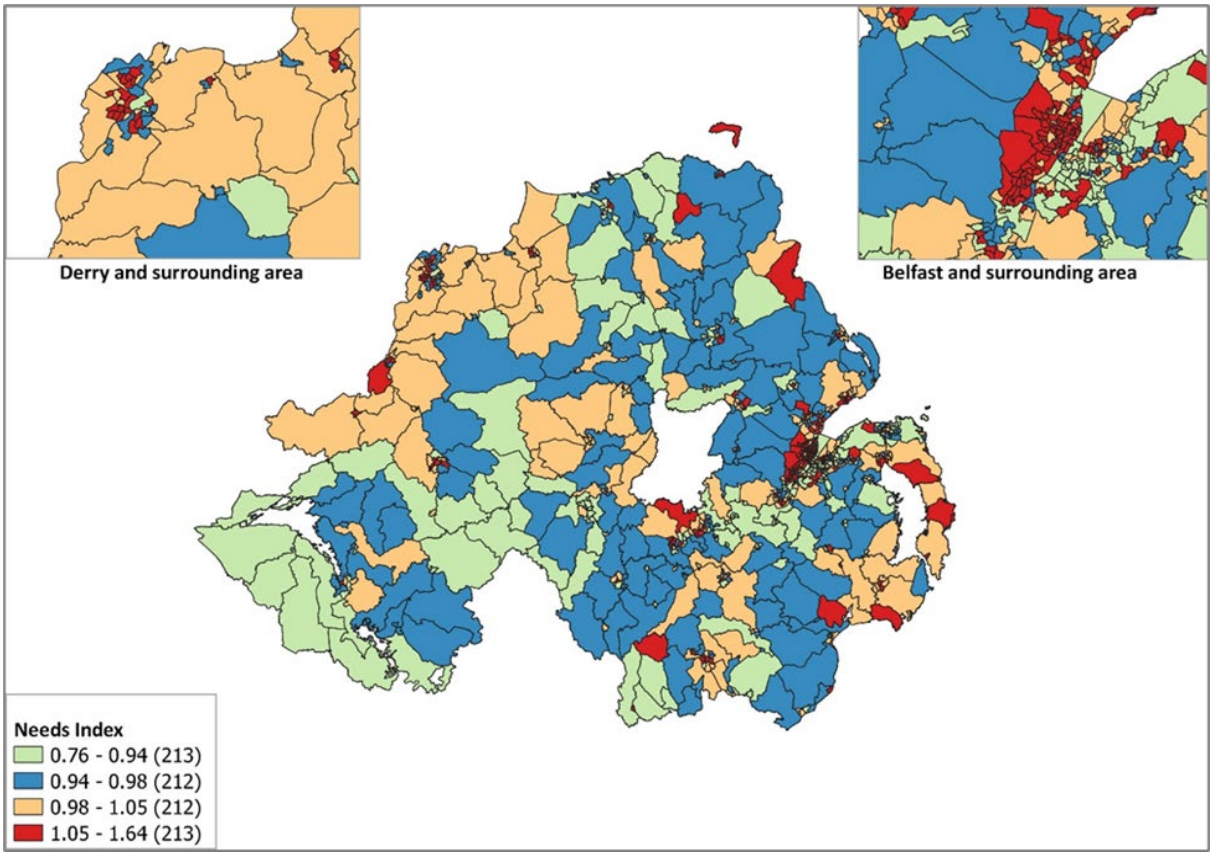
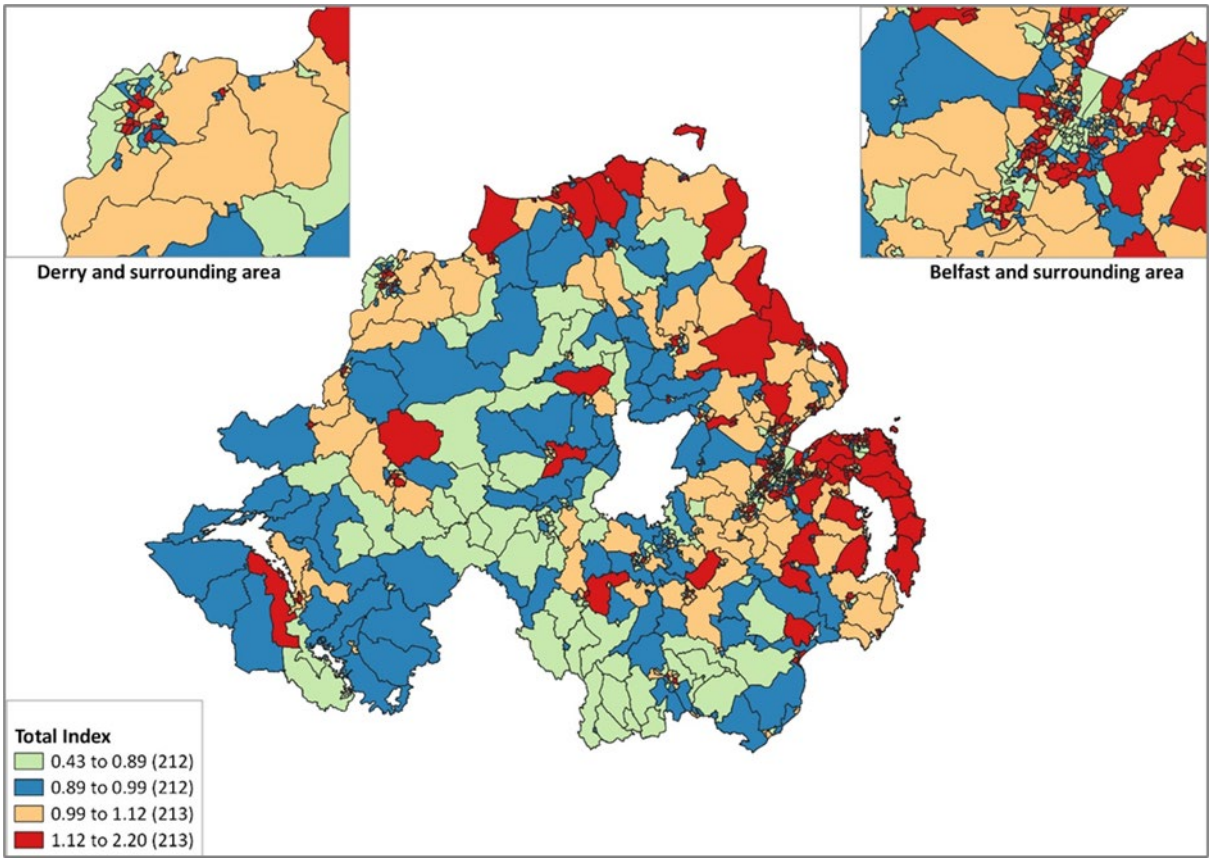


Figure 13.3: Total Needs Index at Small Area Level (Super Data Zones)



A full explanation of the testing the new formula in terms of **sensitivity to targeting deprivation & small area analysis** ***is available in Paper PFR2024_09.***

Sensitivity of the Additional Needs Weighting to Deprivation-Related Measures

13.8 As a final test of the sensitivity of the additional needs index to deprivation-related need, we correlated the additional needs index at SDZ level with other recognised measures of deprivation and morbidity (see Table 13.3). The correlations are moderate to high, which is encouraging as it demonstrates that other widely accepted indicators of deprivation and morbidity validate the ordering of SDZs in terms of their relative deprivation/affluence. It should be noted that the additional needs index is concerned with measuring need for prescribing resources which may arise from deprivation and other socio-economic factors, rather than measuring deprivation per se. The correlation coefficients are in line with these different measurements, in that we do not expect a perfect fit but at least a moderate association. To carry out SDZ analysis, it was necessary to attribute 3 of the needs variables (the QOF disease prevalence variables) from General Practice to SDZ; however, the measures of deprivation and morbidity were available directly from Census 2021 at SDZ level.

Table 13.3 Correlation at SDZ Level of the Additional Needs Index with Deprivation & General Morbidity Measures

Indicator	Correlation Coefficient
Age-gender Standardised LLTI - Activities limited a lot[1]	0.7699
Age-gender Standardised General Health: Very bad health[2]	0.7277
Proportion of households where 2 or more people have a limiting long-term health problem or disability[3]	0.5245
Proportion of households deprived in 2 dimensions[4]	0.6646
Proportion of households deprived in 3 dimensions[4]	0.7571
Proportion of households deprived in 4 dimensions[4]	0.8433

Footnotes:

1. Standardised limiting long-term illness is derived from the Census 2021. This question asks if an individual's day-to-day activities are limited because of a health problem or disability which has lasted or is expected to last at least 12 months.
2. Standardised general health is derived from the Census 2021. It is a self-assessment of a person's general health. This assessment is not based on a person's health over any specified period of time.
3. Derived from the Census 2021. This is defined as the number of people in a household who assessed their day-to-day activities as limited by a health problem or disability which has lasted, or is expected to last, at least 12 months.
4. Derived from the Census 2021. The dimensions of deprivation used to classify households are indicators based on four selected household characteristics:
   - Education - A household is classified as deprived in the education dimension if no one has at least level 2 education and no one aged 16 to 18 years is a full-time student.
   - Employment - A household is classified as deprived in the employment dimension if any member, not a full-time student, is either unemployed or economically inactive due to long-term sickness or disability.
   - Health - A household is classified as deprived in the health dimension if any person in the household has a health problem or disability lasting or expected to last 12 months or more that reduces their ability to carry out day to day activities and/or who has general health that is bad or very bad.
   - Housing - A household is classified as deprived in the housing dimension if the household's accommodation is either overcrowded or has no central heating.

14. Application of the Proposed New Formula at General Practice Level

14.1 Indicative prescribing amounts (IPAs) are also calculated at General Practice level using the same weighted capitation formula as that applied at LCG level. The formula is less robust at General Practice level, something which we will examine in detail in this section. The Strategic Planning & Performance Group (SPPG) are therefore encouraged to use the General Practice Indicative Prescribing Amounts (IPAs) as a guideline in conjunction with local knowledge when setting final General Practice allocations. Certain General Practices may have situations unique to themselves which cannot be dealt with through the capitation formula, for example, high numbers of temporary residents for those General Practices in predominantly tourist locations.

14.2 During this Formula Review, consideration was given to those patients living in Supported Living Units (SLU); analysis was carried out to establish if those patients required any additional weighting within the formula. This concluded that an additional adjustment for those in Supported Living is deemed unnecessary and these patients should not be captured within the care home adjustment. SPPG may again wish, when arriving at final allocations, to use local knowledge regarding General Practices which may have high numbers of patients in SLU. The SPPG may also need to deal with practice reconfigurations mid-year, for example, practice mergers or closures and the subsequent dispersal of patients to surrounding General Practices.

Population Base

14.3 The population base for setting General Practice indicative prescribing amounts is the General Practice registered list as recorded on the National Health Applications and Infrastructure Services (NHAIS) System, maintained by the Business Services Organisation (BSO). NHAIS also includes registration of cross border workers who are entitled to medical treatment whilst in Northern Ireland, on the same basis as residents. The latest available list at the time of calculations should be used; each General Practice should therefore receive an allocation for the proportion of patients on their registered list (adjusted for age-gender and additional need) of the overall LCG share, constrained to the LCG mid-year estimate of population.

Age-Gender Adjustment

14.4 The NI-PU 2023 age-gender weightings are then applied to the General Practice list populations, broken down by the same age-gender groups, to produce General Practice age-weighted populations. This calculation is carried out on the 2 population subsets of those residing in care homes and those living in their own home. Having applied the NI-PU 2023 weightings to both population subsets to produce prescribing units, the prescribing units for those in care homes are then multiplied by a further 3.0 before being added to the prescribing units for those not living in care homes.

14.5 The Pharmaceutical Family Practitioners Payment System (PFPPS), which resides within Family Practitioner Services (FPS) at the BSO, would make it possible to update the age-gender weightings annually. However, the NI-PU 2023 age cost curve has been used within the additional needs modelling to age standardise the dependent variable; it would be incorrect to update the age-gender adjustment within the formula without recalibration of the additional needs index. Essentially, update of the age cost curve would change the coefficients of the age weightings, but the additional need model has used a dependent variable standardised using specific age-gender weightings.

Additional Needs Weighting

14.6 The construction of needs indices is not straightforward for General Practices, where both the population and their need are defined in terms of General Practice registered lists. Three of the 5 additional needs indicators are available on a General Practice basis (CHD, diabetes, and dementia prevalence) but the other needs indicators (proportion of households deprived in 4 dimensions and the proportion of households with no unpaid carers aged 5 and above) were available on an area basis only (Super Data Zones). These variables had to be attributed from SDZ to General Practice populations (the attribution process is outlined at Appendix B). A detailed description of the 5 additional needs variables is given at Appendix A.

14.7 The main principle behind attribution is that each person on a General Practice list is given the indicator value of the SDZ in which they reside. This is an approximation and raises the issue of ecological fallacy, that is, service users may not be typical of the area in which they live. The extent to which they are not typical is known as attribution error. Research has shown that the accuracy of attribution increases with practice list size; the error falls markedly when moving from a practice list size of 10,000 to practice groupings with combined lists of 50,000. This should be kept in mind when considering General Practice level allocations.

14.8 Generally, it is not advisable to change coefficients in a partial way without a corresponding recalibration of the full additional needs model. However, it can be possible to update individual needs variables base data, to which the weighting coefficients are applied, without re-estimating the coefficients of all the variables, if we accept the underlying relationship has not changed. The disease prevalence variables derived from QOF should be updated using the latest 5-year average each year, assuming that these 3 diseases remain as registers within the QOF framework. At General Practice level, it is recommended that variables are re-attributed where they can be, to reflect the updated underlying population. Within the new additional needs index, 2 variables are not updateable as they were derived from Census 2021 data; the proportion of households deprived in 4 dimensions and the proportion of households with no unpaid carers aged 5 and above. They should, however, be re-attributed each year using the latest NHAIS registered list. If we accept that the underlying relationship between need and the variables remains the same, then the values for each General Practice (and indeed LCG) could be updated with no changes to the coefficients being applied. Should any of the base data to populate the needs indicators appear to change substantially, it is recommended that the regression model for the 2-stage additive model is re-run to check the coefficients and ensure the underlying relationship has not changed.

Calculation of General Practice % Shares

14.9 Each of the adjustments generates a separate General Practice index, comparing the General Practice score on the adjustment to the NI average. The indices are then applied simultaneously to the General Practice list to give a weighted population for each practice. Fair shares can then be calculated for each practice across NI, with each practice being relative to every other practice. However, current allocation arrangements are such that the formula is first implemented at LCG level to allow for the constraining process to deal with list discrepancy and also to minimise the error that occurs with attribution as population size decreases, that is, allocations are robust at LCG level. Therefore, each General Practice instead needs to receive its fair share of its LCG allocation rather than a share of the overall NI allocation. This is achieved by applying each General Practice's individual indices simultaneously to give a

weighted population per practice. The practice's fair share is then their relative share calculated across their respective LCG only. Each practice therefore receives their relative share of their LCG's allocation, which has already been calculated at LCG level and taken account of list discrepancy.

Confidence Intervals around the Additional Needs Index at General Practice Level

14.10 Applying a needs formula to resource allocation effectively means using expected or predicted levels of utilisation as a basis for setting budgets. However, for most individuals, the use made of health care in any given year will be determined not only by illness but also to an extent by unpredictable random incidents. As our regression modelling has shown, it is possible to identify the important explanatory variables that influence prescribing, and we treat the remaining variation as inherently random. This error will increase as the population to which the weighting is applied decreases, because of the increased relative impact of random fluctuations in small populations. In aggregating small area budgets into larger populations, any such random variations tend to cancel each other out and average spending requirements can be predicted with greater confidence. The decreasing accuracy of statistically derived formulae with population size does not necessarily prevent budgets being set at smaller populations such as General Practice level, but a risk management strategy is advisable to deal with fluctuations. As the budget holder, it is the responsibility of the SPPG to effectively manage General Practice expenditure; they currently do this through such mechanisms as capping and top slicing for expensive patients and drugs, but also through the deployment of Pharmacy Advisers who seek to influence the prescribing behaviour of GPs. The SPPG should also consider local knowledge that they have of General Practices and use this knowledge to adjust for situations that cannot be adequately dealt with via a capitation formula.

14.11 We have constructed a confidence interval (or error range) within which one can expect 95% of all results to fall. This provides a means of assessing how accurate an area/General Practice's allocation will be. The relationship between the errors associated with the prescribing additional needs weighting and population size are given in Table 15.1. The strong relationship between the size of the confidence interval and the population is clear. The results show that the total allocation to an LCG (populations in the range of 350,000 to 480,000) could be over or under-estimated in any one year by between 2.8% and 3.3%. But note that the total allocation for an average General Practice with a list size of 6,500 could be over or under-estimated by between 20-30%; the largest General Practice could have their allocation over/under-estimated by between 14-16%, with small practices being over/under-estimated by up to over 40%.

14.12 These confidence intervals are likely to overestimate the impact of variations in the use of prescribing resources because not all of the unexplained variation is completely random; the intervals are likely to be tighter than those presented in Table 14.1. However, the marked rise in the interval as population decreases cannot be ignored and therefore allocations to LCGs should be considered robust but allocations to General Practices will not be robust, especially for smaller practices. It is vital, then, that the SPPG have in place risk management strategies including their current capping mechanism to deal with the uncertainty inherent in General Practice allocations.

Table 14.1 95% Confidence Intervals Related to the Additional Needs Index

Population Size	Confidence Interval (+/- %)
2,000	43.8
5,000	27.7
10,000	19.6
15,000	16.0
20,000	13.8
50,000	8.8
75,000	7.1
100,000	6.2
150,000	5.1
200,000	4.4
300,000	3.6
350,000	3.3
400,000	3.1
450,000	2.9
480,000	2.8

Table 14.2 Redistribution of Resources at General Practice Level

Formula Component	Proposed New Formula	Current Formula
Age-Gender Index incorporating Care Home	+/-4.15% (£17.446m)	+/-3.96% (£16.640m)
Additional Needs Index	+/-3.16% (£13.282m)	+/-3.00% (£12.606m)
Total Index	+/-4.32% (£18.160m)	+/-4.30% (£18.053m)

Redistributive Effect of the New Formula at General Practice Level

14.13 Table 14.2 details the effect of applying the new formula at General Practice level compared with the formula currently in operation. The redistribution refers to moving from a crude population share (that is, SDZ population based on residency of patients on NHAIS as at April 2024) to a % share weighted by the age-gender and additional needs components separately and then redistribution having applied both components simultaneously. Monetary swings have been shown based on applying the redistribution to an overall NI allocation of £420m (in 2023/24, the NI Indicative Prescribing Amount (IPA) was just over £420m).

14.14 Both the age-gender and additional needs indices under the proposed new formulae are more redistributive than under the current formula. The age-gender adjustment redistributes more resources as expected (at both LCG and General Practice level) due to the additional weighting now given to patients in care homes (that weighting factor having increased from 2.5 to 3.0 for each care home patient in addition to the weighting they attract for age-gender via the age cost curve).

14.15 As expected at General Practice level, the formula redistributes more resources than it does at LCG level; overall at LCG level the new formula would redistribute +/-1.90% (which equates to +/-£7.973m based on a NI IPA of £420m) compared to +/-4.32% at General Practice level (which

equates to +/-£18.160m based on a NI IPA of £420m). This is again related to that masking effect at LCG level, where small areas of high or low need reflected by disease prevalence and socio-economic factors cancel each other out; differences are more apparent at smaller administrative areas such as General Practices.

Distribution of General Practice Allocations: Current Formula versus Proposed New Formula

14.16 Tables 14.3 to 14.5 consider the pattern and distribution of General Practice indices and allocations under application of the full formula, comparing the current formula and the proposed new formula. Table 14.3 indicates that the age-gender adjustment is more redistributive using the new weightings (NI-PU 2023 plus a weighting of 3.0 for care home patients) compared to the current age-gender adjustment (using NI-PU 2015 plus a weighting of 2.5 for care home patients). The range of the age index is higher across General Practices, the 25th percentile is lower with both the 75th and 95th percentiles being higher, again indicating more spread across the practices and the standard deviation is higher indicating more variability across practices. This is as expected, given the higher weighting now being given to care home patients.

14.17 Table 14.4 indicates that the proposed new additional needs index is also more redistributive than the current additional needs component. The range of the additional needs index is higher across General Practices, the 25th percentile is lower with both the 75th and 95th percentiles being higher, again indicating more spread across the practices. The standard deviation for distribution of allocations is similar between the current and proposed new formula, suggesting that the variability across practices is similar under both needs components.

14.18 Given the distribution of both the age and additional needs indices under the proposed new formula being more redistributive, subsequently the distribution of the total index and resulting General Practice allocations are also more redistributive. It should be noted however, that the overall redistributive change with introduction of a new formula is very small. The additional needs modelling has reinforced that disease prevalence of CHD and diabetes remain the main drivers of variation in prescribing costs across General Practices. The addition of dementia prevalence (which could not previously be modelled in the last Formula Review) as a driver of prescribing costs is a welcome inclusion. Likewise, households deprived in 4 dimensions (education, employment, housing and health) proved to be an intuitive and stable predictor of costs. For the most part, the slightly increased redistributive impact will be due to the increased weighting for care home patients; the evidence to support this change was well made during the care home analysis.

14.19 Due to confidentiality reasons, it is not possible to present % shares or allocations at General Practice level (as was presented at LCG). However, it is useful to make some overall observations. Overall, moving to the proposed new formula from the current formula would redistribute +/-1.74%, which equates to +/-£7.290m, based on a NI allocation of £420m. As expected, move to the new formula redistributes more at General Practice level than at LCG level, again because there are more differences between General Practices than there are between LCGs in terms of their age-gender and need profiles.

14.20 49% of General Practices would see a gain in their final % share (with 51% seeing a decrease in their % share). For 51.3% of General Practices, their allocation under the new formula would be within +/-3% of their allocation under the current formula and for 72.8% of General Practices, their new allocation would be +/-5% of their allocation under the old formula. A small number of General Practices would see changes over +/-10% (5 gaining +10% and 3 decreasing their allocation by -10%). Given that the majority of General Practices would experience small changes to allocations, those impacted to a greater extent could be managed locally by the SPPG. Consideration of the changes in allocations at General Practice level indicates that the main driver for this is the inclusion of dementia within the new needs index and mental health no longer being a factor within the adjustment. General Practices gaining in % shares tend to have lower levels of mental health prevalence but have high levels of dementia prevalence. The reverse of this is also seen, in that those General Practices with high mental health prevalence tend to have low levels of dementia prevalence and therefore decrease their % share.

14.21 Table 14.6 presents the top and bottom 10 General Practices (anonymised) out of 312 General Practices as of April 2024 in Northern Ireland, ranked from highest to lowest in terms of the age-gender index, additional needs index and total index (which captures age-gender and additional need simultaneously). For confidentiality purposes, the General Practices have been anonymised and only the LGD in which they are located and their LCG of management have been provided. Note that the new LGD boundaries do not align to health geographies. The key point is that 7 of the top 10 General Practices in terms of age-gender are located in Ards and North Down LGD and managed by South Eastern LCG; indeed 8 of the top 10 are in South Eastern LCG. This reinforces the LCG results where South Eastern LCG has the highest age-gender index. The other key point is that the top 10 General Practices in terms of highest additional need are all located in Belfast LGD; again, this reinforces the LCG results where Belfast LCG has the highest additional needs index.

Table 14.3 Distribution of Age Index: Current v Proposed Adjustment

Statistic	Current Age Index (with care home adjustment)	New Age Index (with care home adjustment)
Minimum	0.5012	0.4879
Maximum	1.2931	1.3237
Range	0.7919	0.8358
5th Percentile	0.8402	0.8447
25th Percentile	0.9302	0.9250
Mean	0.9974	0.9972
Median	0.9935	0.9947
75th Percentile	1.0622	1.0700
95th Percentile	1.1635	1.1757
Standard Deviation	0.1033	0.1078
Redistribution	+/- 3.96% (+/-£16.640m)	+/- 4.15% (+/- £17.446m)

Table 14.4 Distribution of Needs Index: Current v Proposed Adjustment

Statistic	Current Needs Index	New Needs Index
Minimum	0.7360	0.7378
Maximum	1.2688	1.2781
Range	0.5328	0.5403
5th Percentile	0.8662	0.8827
25th Percentile	0.9542	0.9460
Mean	1.0057	1.0037
Median	0.9979	0.9906
75th Percentile	1.0539	1.0565
95th Percentile	1.1619	1.1664
Standard Deviation	0.0871	0.0867
Redistribution	+/- 3.00% (+/- £12.606m)	+/- 3.16% (+/- £13.282m)

Table 14.5 Distribution of Practice Allocations: Current v Proposed Formula

Statistic	Current Total Index	New Total Index
Minimum	0.3695	0.3607
Maximum	1.3566	1.3751
Range	0.9871	1.0145
5th Percentile	0.8293	0.8220
25th Percentile	0.9312	0.9273
Mean	1.0027	1.0006
Median	1.0087	1.0016
75th Percentile	1.0730	1.0704
95th Percentile	1.1770	1.1829
Standard Deviation	0.1158	0.1168
Redistribution	+/- 4.30% (+/- £18.053m)	+/- 4.32% (+/- £18.160m)

Table 14.6 Highest and Lowest 10 General Practices Ranked by (i) Age-Gender Index; (ii) Additional Needs Index & (iii) Total Index

Rank	LCG	LGD	Age/Sex Index (With Care Home Adj)	LCG	LGD	Needs Index	LCG	LGD	Total Index
1	SOUTH EASTERN	Ards and North Down	1.3237	BELFAST	Belfast	1.2781	BELFAST	Belfast	1.3751
2	SOUTH EASTERN	Ards and North Down	1.2854	BELFAST	Belfast	1.2749	BELFAST	Belfast	1.3127
3	SOUTH EASTERN	Newry, Mourne and Down	1.2569	BELFAST	Belfast	1.2663	SOUTH EASTERN	Ards and North Down	1.3069
4	SOUTH EASTERN	Ards and North Down	1.2402	BELFAST	Belfast	1.2627	BELFAST	Belfast	1.2959
5	NORTHERN	Causeway Coast and Glens	1.2360	SOUTH EASTERN	Belfast	1.2343	SOUTH EASTERN	Ards and North Down	1.2776
6	SOUTH EASTERN	Ards and North Down	1.2332	BELFAST	Belfast	1.2195	SOUTH EASTERN	Newry, Mourne and Down	1.2372
7	BELFAST	Belfast	1.2299	BELFAST	Belfast	1.2130	BELFAST	Belfast	1.2241
8	SOUTH EASTERN	Ards and North Down	1.2246	BELFAST	Belfast	1.2070	SOUTH EASTERN	Ards and North Down	1.2120
9	SOUTH EASTERN	Ards and North Down	1.2235	BELFAST	Belfast	1.2017	NORTHERN	Antrim and Newtownabbey	1.2057
10	SOUTH EASTERN	Ards and North Down	1.2188	BELFAST	Belfast	1.2012	SOUTH EASTERN	Ards and North Down	1.2005
303	BELFAST	Belfast	0.8144	WESTERN	Fermanagh and Omagh	0.8606	BELFAST	Belfast	0.7870
304	SOUTH EASTERN	Ards and North Down	0.8116	NORTHERN	Causeway Coast and Glens	0.8597	WESTERN	Causeway Coast and Glens	0.7775
305	SOUTHERN	Armagh City, Banbridge and Craigavon	0.8052	NORTHERN	Causeway Coast and Glens	0.8584	SOUTHERN	Mid Ulster	0.7751
306	SOUTHERN	Armagh City, Banbridge and Craigavon	0.8049	WESTERN	Fermanagh and Omagh	0.8556	SOUTHERN	Newry, Mourne and Down	0.7745
307	BELFAST	Belfast	0.7977	SOUTH EASTERN	Ards and North Down	0.8520	BELFAST	Belfast	0.7728
308	BELFAST	Belfast	0.7915	BELFAST	Belfast	0.8437	BELFAST	Belfast	0.7546
309	SOUTHERN	Newry, Mourne and Down	0.7856	BELFAST	Belfast	0.8394	SOUTHERN	Mid Ulster	0.7459
310	SOUTH EASTERN	Belfast	0.7548	SOUTH EASTERN	Lisburn and Castlereagh	0.8229	SOUTHERN	Newry, Mourne and Down	0.7389
311	BELFAST	Belfast	0.7106	BELFAST	Belfast	0.7662	BELFAST	Belfast	0.6475
312	BELFAST	Belfast	0.4879	BELFAST	Belfast	0.7378	BELFAST	Belfast	0.3607

Note: General Practices have been ranked highest to lowest from 1 to 312.

In terms of the age-gender index, rank 1 = oldest age profile compared to NI having an age-gender index of 1.0

In terms of the additional need index, rank 1 = most deprived compared to NI having an additional needs index of 1.0

In terms of the total index, this simultaneously captures need arising due to both age-gender and additional need.

Rank 1 when considering the total index = most deprived/in need of prescribing resources compared to NI having a total index of 1.0

14.22 As a final test of the sensitivity of the additional needs index to deprivation-related need, we correlated the additional needs index at General Practice level with other recognised measures of deprivation and morbidity (see Table 14.7). The correlations are moderate to high and are in general higher at General Practice level than they were at SDZ level. These high correlations are very encouraging, as this demonstrates that other accepted measures of deprivation and morbidity help to validate the additional needs index at General Practice level.

Table 14.7 Correlation at General Practice Level of the Additional Needs Index with Deprivation & General Morbidity Measures

Indicator	Correlation Coefficient
Age-gender Standardised LLTI - Activities limited a lot[1]	0.8438
Age-gender Standardised General Health: Very bad health[2]	0.8157
Proportion of households where 2 or more people have a limiting long-term health problem or disability[3]	0.6098
Proportion of households deprived in 2 dimensions[4]	0.7167
Proportion of households deprived in 3 dimensions[4]	0.8001
Proportion of households deprived in 4 dimensions[4]	0.7937

Footnotes:

1. Standardised limiting long-term illness is derived from the Census 2021. This question asks if an individual's day-to-day activities are limited because of a health problem or disability which has lasted or is expected to last at least 12 months.
2. Standardised general health is derived from the Census 2021. It is a self-assessment of a person's general health. This assessment is not based on a person's health over any specified period of time.
3. Derived from the Census 2021. This is defined as the number of people in a household who assessed their day-to-day activities as limited by a health problem or disability which has lasted, or is expected to last, at least 12 months.
4. Derived from the Census 2021. The dimensions of deprivation used to classify households are indicators based on four selected household characteristics:
   - Education - A household is classified as deprived in the education dimension if no one has at least level 2 education and no one aged 16 to 18 years is a full-time student.
   - Employment - A household is classified as deprived in the employment dimension if any member, not a full-time student, is either unemployed or economically inactive due to long-term sickness or disability.
   - Health - A household is classified as deprived in the health dimension if any person in the household has a health problem or disability lasting or expected to last 12 months or more that reduces their ability to carry out day to day activities and/or who has general health that is bad or very bad.
   - Housing - A household is classified as deprived in the housing dimension if the household's accommodation is either overcrowded or has no central heating.

A full explanation of the analysis and testing application of the new formula at General Practice level is available in Paper PFR2024_09.

15. Equality Impact Assessment

15.1 Section 75 of the Northern Ireland Act 1998 requires public authorities, in carrying out their functions, to have due regard to the need to promote equality of opportunity between:

- Persons of different religious belief, political opinion, racial group, age, marital status or sexual orientation.
- Men and women generally.
- Persons with a disability and persons without; and
- Persons with dependants and persons without.

An additional objective is to have regard to the desirability of promoting good relations between persons of different religious belief, political opinion or racial group

15.2 Analysis was undertaken to examine the potential impact of the proposed new formula on the above equality categories at a Northern Ireland level. It is important to note that the analysis assesses the effect on each equality category as a whole; it does not assess geographic distribution of people in each category or effects on pockets of certain groups in particular areas. In order to better detect any differential impacts, analysis was carried out at small area level. Data was obtained for 7 of the 9 equality groups at Super Data Zone (SDZ). However, data was not available on sexual orientation. Data on voting patterns was only available at constituency level and were therefore attributed to SDZ level.

15.3 The formula consists of 3 indices: the age-gender structure is taken account of using an age-gender index and the additional need adjustment comprises an additional need index. The simultaneous application of these 2 indices captures "total need". These indices were calculated at Super Data Zone (SDZ) level and, having assembled the equality categories data at SDZ level, the separate indices for age-gender, additional need and total need were applied to each equality category to create a weighted population. Comparison of the weighted population with the crude population for each category allowed a ratio or index to be calculated separately for each equality category. Figures 15.1 to 15.3 show these indices in terms of application of each element of the formula. The indices are based around Northern Ireland being 1.0. An index greater than 1.0 indicates that the formula element (age-gender, additional need or total need) is skewing resources towards that equality group; likewise, an index less than 1.0 indicates that resources are being skewed away from that equality group.

Equality Impact Assessment Results

15.4 There are no differential impacts between males and females in terms of either of the formula components (age-gender and additional needs); all indices are around 1.0.

15.5 In terms of the age-gender index, the elderly (classed as aged 65+) are needier, having an index of 1.053 compared to an index of 0.994 for those aged 18 to 64 and an index of 0.984 for children. This is not only as expected but also as desired by the allocation formula, in that the age-gender adjustment should skew resources towards older age groups (weights within the age-gender adjustment increase with age). The elderly tend to live in areas with lower

additional need (index of 0.994); however, there are no differential impacts as the indices for all age categories are around the NI of 1.0. Total need skews resources towards the elderly; this is a function of the age-gender index and is again as expected. The differential impact due to age is justified and acceptable.

15.6 As expected, single people tend to be younger (index of 0.979), with resources being skewed to people who are married or divorced/separated/widowed (although both are very close to the NI average of 1.0). These indices are simply a reflection of age structure and therefore there are no differential impacts in terms of the formula age adjustment with regard to marital status groups. Those married tend to live in areas with less additional need (index of 0.983), although again indices for all categories are close to 1.0. The differential impact due to age is justified and acceptable.

15.7 In terms of racial group, non-whites tend to be younger (index of 0.934) but there are no differences in terms of additional need; both whites and non-whites have need around the NI average level. There are no differential impacts for these equality groups, the small skew of resources to whites is simply a function of age structure. The differential impact due to age is justified and acceptable.

15.8 Those without dependent children have slightly greater need when total need is captured (index of 1.017) but this appears to be because they are slightly older (age index of 1.015). In application of the current formula, skewing due to age was also observed, although those without dependent children were actually younger then (an age index of 0.988 compared to 1.022 for those with dependent children). Again, any differential impact due to age is justified and acceptable. There was no difference between either group in terms of additional need; the additional need indices for both categories are very close to the NI average of 1.0.

15.9 Those with limiting long-term illness are very slightly older (index of 1.008) and live in areas with slightly greater need (index of 1.016) resulting in a total need index of 1.024. Those without a long-term illness have age, additional and total need close to the NI average of 1.0. Given that the additional needs index comprises 3 variables which are disease prevalence of long-term conditions (CHD, diabetes and dementia), this skewing of resources is as expected.

15.10 In terms of religion, Protestants tend to be older (an age-gender index of 1.043) and tend to live in areas of less additional needs (an additional needs index of 0.987), resulting in a total index of 1.029. Catholics are younger (an age-gender index of 0.962) and have additional needs close to the NI average of 1.0 (additional needs index of 1.009) with a total index of 0.972. This total index less than 1.0 is a function of their younger age profile; it would be considered that skewing of resources due to age is justified and therefore there are no differential impacts on these equality categories.

15.11 As expected, the pattern for political opinion follows closely that observed for religion. Unionists tend to be older (an age-gender index of 1.010) and tend to live in areas of less additional needs (an additional needs index of 0.992) with a total index of 1.003. Nationalists are younger (an age-gender index of 0.971) and have additional needs close to the NI average of 1.0 (additional needs index of 1.006) with a total index of 0.978. This total index less than 1.0 is a function of their younger age profile; it would be considered that skewing of resources

due to age is justified and therefore there are no differential impacts on these equality categories.

Conclusions of the Equality Impact Assessment

15.12 The analysis suggests that the proposed new formula would not significantly redirect large amounts of resources away from the section 75 groups. The differential impact in favour of skewing resources towards the elderly is as expected in a weighted capitation formula which weights elderly age groups more heavily than the younger. Where resources are skewed in some of the other equality groups, it can be concluded that this is due to the underlying age structure of the equality groups being examined, for example, those people with a long-term illness tend to be older and Catholics tend to be younger. Based on this equality impact analysis, it can be concluded that the new formula would not create any adverse impacts on any of the equality categories.

A full explanation of the analysis and the results of the Equality Impact Assessment are available in Paper PFR2024_10.

Figure 15.1: Average Age-Gender Index for each Equality Category (NI = 1.0)

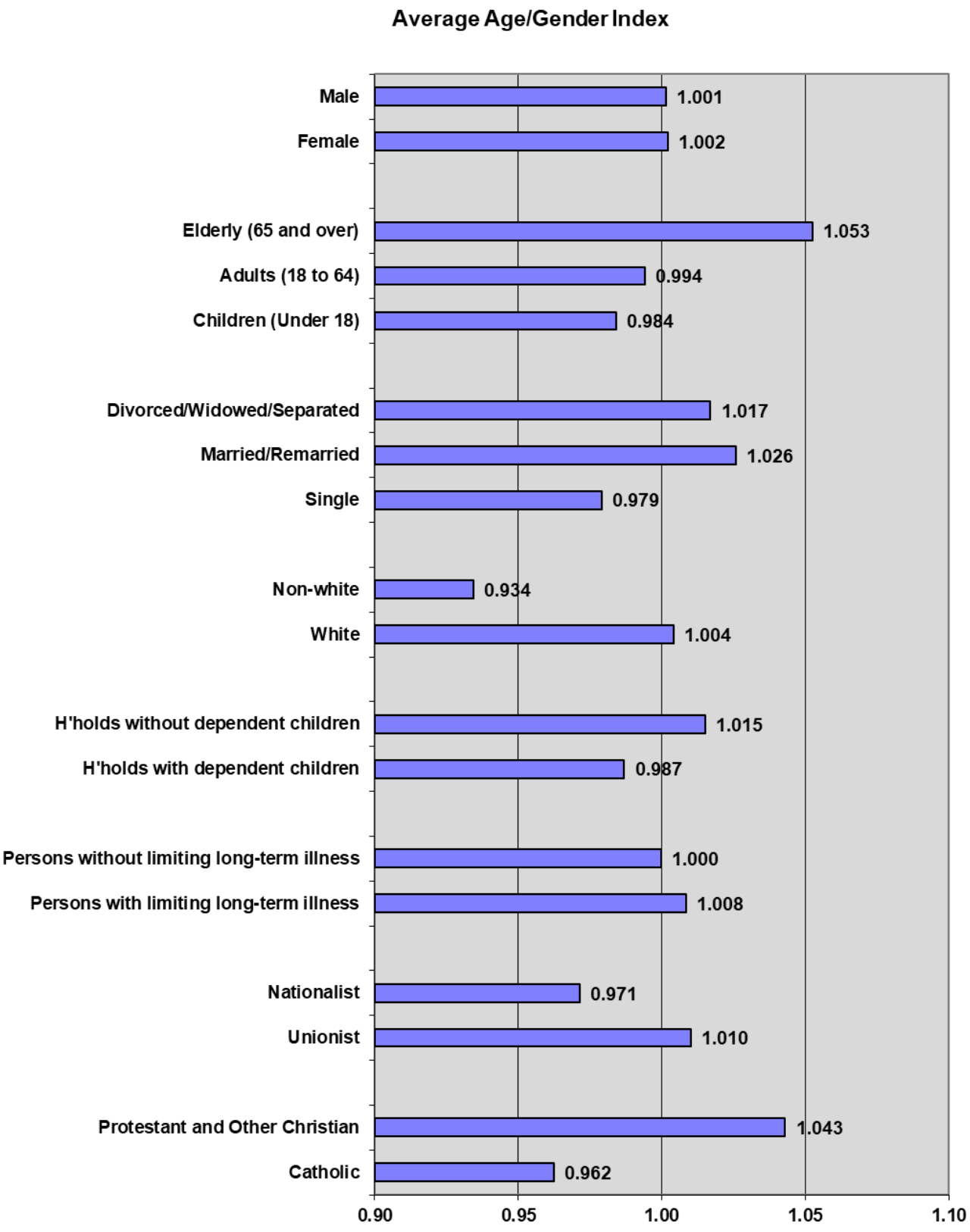


Figure 15.2 Average Additional Needs Index for each Equality Category (NI = 1.0)

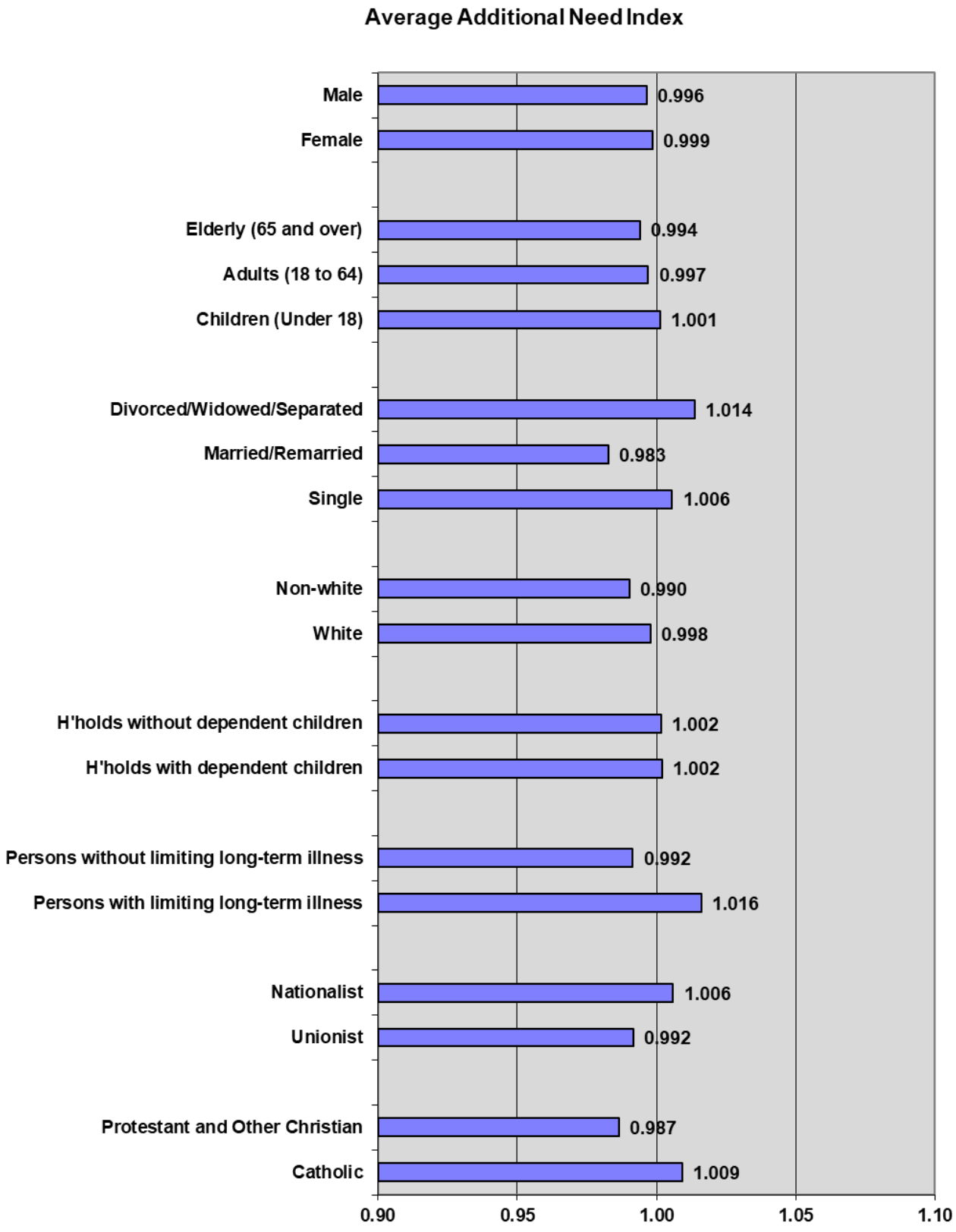
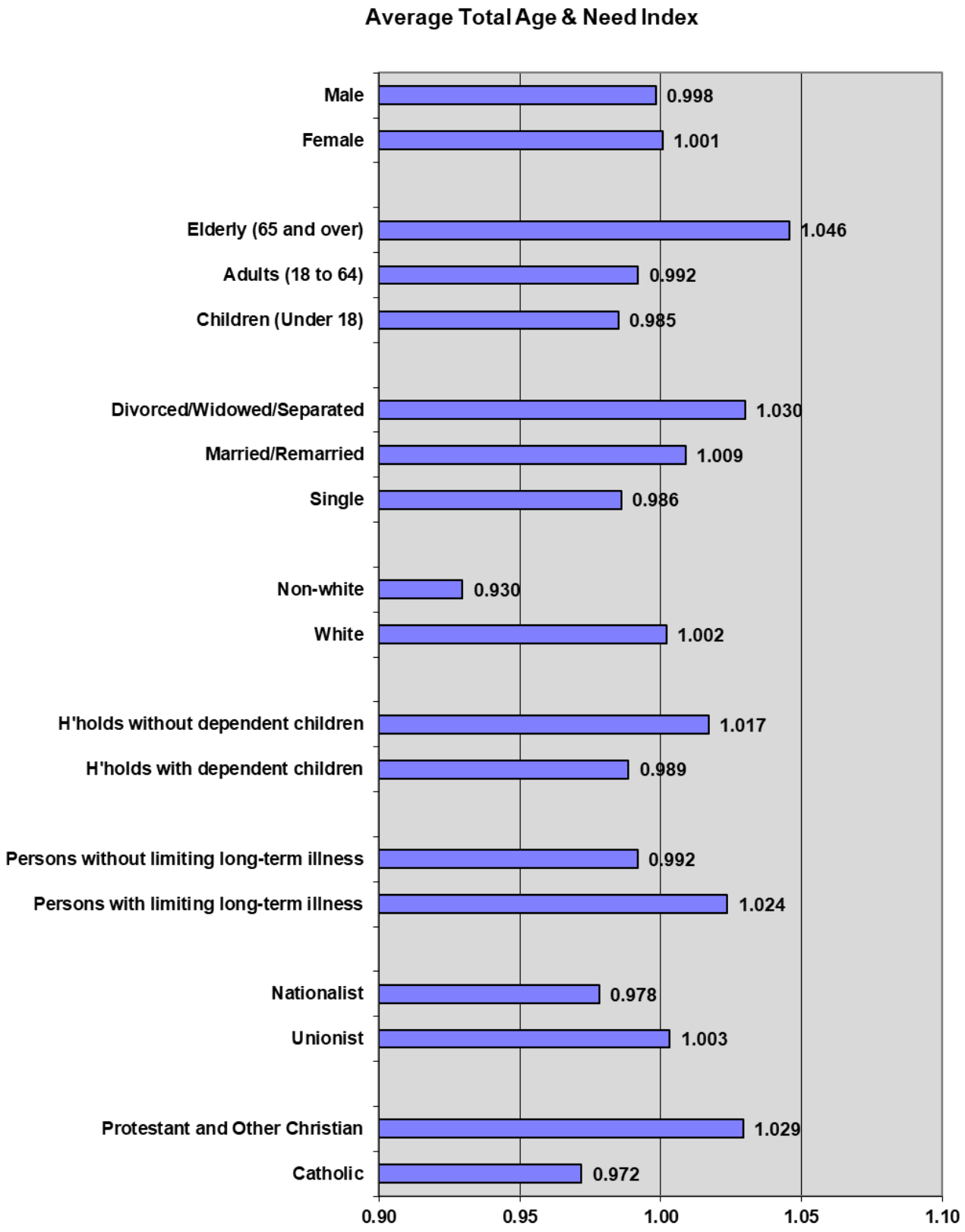


Figure 15.3 Average Total Index (captures Age-Gender & Additional Needs) for each Equality Category (NI = 1.0)



16. Conclusions & Key Recommendations

Conclusions

16.1 Extensive analytical work has been undertaken in-house by Information & Analysis (IAD) statisticians, Department of Health (DoH) to develop updated components of the weighted capitation formula for allocating prescribing resources to Local Commissioning Group (LCGs) and General Practices. The following conclusions should be noted:

- The population base and constraining methodology at LCG level has been reviewed. The constrained General Practice registered population, which takes account of cross-boundary flows and list discrepancy, continues to be considered the most accurate and appropriate population base for LCG allocations. The General Practice registered population should be retained as the population base for General Practice allocations.

- Development of an updated age cost curve; this has used the most up-to-date cost data available at the time of modelling. Of note is the enhancement to apply separate weights to the 75-84 and 85+ age groups (previously combined as the 75+ age group); this better reflects the higher prescribing costs of those aged 85+.

- Development of an updated adjustment for care home patients; this has used the most up-to-date cost data available at the time of modelling. Of note is the revised weighting to be applied to care home patients; the recommendation being to increase the weighting from 2.5 to 3.0; this better reflects the higher prescribing costs associated with these patients.

- Development of updated therapeutic specific age weights (STAR-PU); this has used the most up-to-date cost data available at the time of modelling. Updated STAR-PU will allow much more accurate prescribing comparisons, within therapeutic groups, between areas or General Practices; this will be especially useful within COMPASS Reporting.

- A comprehensive regression modelling exercise has been undertaken to develop the updated additional needs index; this has used the most up-to-date cost, needs and supply data available at the time of modelling. The modelling has been subjected to vigorous sensitivity testing and clear rationale has resulted in a robust final model.

- Robustness of the new formula has been tested at both (LCG) and General Practice level.

- The new formula has also been tested at small area level (Super Data Zone) and General Practice level in terms of sensitivity to targeting deprivation.

- Each component of the new formula has been tested against NI equality legislation and analysis demonstrated that the new formula would not create any adverse impacts on any of the equality categories. Resources are skewed towards the elderly; however, this is both expected and desirable for any allocation formula. Resources are skewed towards those with a limiting long-term illness; given that the additional needs adjustment comprises 3 long-term chronic conditions, this is as expected and desirable. Skewing in any of the other

equality groupings can be concluded to be due to the underlying age structure of these groups; these impacts are justifiable.

Final % Shares & Impact of New Formula Introduction

16.2 Table 16.1 presents the final fair shares at LCG level resulting from application of the proposed new formula compared to the % shares from application of the current formula. Comparison is on a consistent basis; the population constraining methodology and application of the formula components have been applied to General Practice registered lists at April 2024. Overall, moving to the proposed new formula from the current formula would redistribute +/-0.64% which equates to +/-£2.684m based on a NI allocation of £420m. Due to confidentiality reasons, it is not possible to present % shares at General Practice level. However, overall, moving to the proposed new formula from the current formula would redistribute +/-1.74%, which equates to +/-£7.290m, based again on a NI allocation of £420m.

Table 16.1 % Shares at April 2024 Comparison of the Proposed New Formula versus the Current Formula

	Belfast	Northern	S Eastern	Southern	Western	Redistributive Effect
New Total % Shares	21.55%	24.23%	18.15%	19.67%	16.40%	
Current Total % Shares	21.74%	24.67%	17.95%	19.66%	15.97%	
Change in % Shares	-0.19%	-0.45%	0.20%	0.01%	0.42%	+/- 0.64%

16.3 The limitations of any budgetary formula are likely to mean that there will be some variation from fair shares, even after variations in clinical practice have been accounted for. It is therefore advisable that any system for allocating to General Practices should be indicative and advisory, and risk management strategies implemented to lessen some of the consequences. Top-slicing arrangements and capping mechanisms, as currently in place, are still very advisable

Outcome of the Peer Review

16.4 All research and analysis have been subjected to external scrutiny by an independent peer reviewer. This was conducted as a collaborative exercise. Working throughout development of the new formula was invaluable, as this approach allowed issues or suggestions to be addressed on an ongoing basis. Each paper and analysis involved liaison between the peer reviewer and statistical team until both parties were content to sign off on that particular element. The peer reviewer has endorsed all updated components. The peer reviewer's feedback and the statistical team response to this feedback has been incorporated into the detailed development papers (PFR2024_01 to PFR2024_10).

Key Recommendations

16.5 It is recommended that the weighted capitation formula should continue to be used to allocate prescribing resources to LCGs and should be used as an indicative tool in subsequently informing allocations to General Practices. The following specific recommendations relate to development of the updated formula:

Population Base

- A constrained registered population should be used as the population base for setting Local Commissioning Group (LCG) allocations.
- For LCG allocations, the population should be the latest available General Practice registered population from NHAIS, constrained to the latest available NISRA mid-year estimate of population adjusted for the latest available number of cross-border workers as recorded on NHAIS.
- The constraining method for LCG allocations should assume that list discrepancy is uniform across areas and only varies with age; list deflators should therefore only be applied to each age-gender group.
- For General Practice allocations, the population should be the latest available General Practice registered population from NHAIS.

Age-Gender Adjustment (NI-PU)

- It is recommended that the NI-PU 2015 be updated to NI-PU 2023. The NI-PU 2023 should be adopted from April 2025 as the cost weightings within the 2025/26 prescribing formula allocations and adopted from that time within COMPASS reporting, as the new prescribing measure for making General Practice/area comparisons.

STAR-PU

- It is recommended that the STAR-PU 2015 be updated to STAR-PU 2023. STAR-PU 2023 should be adopted from April 2025 within COMPASS reporting, as the new therapeutic-specific prescribing measures for making practice/area comparisons**.**

Care Home Adjustment

- It is recommended that the weights for patients in care homes be 3 times the value of the corresponding patients living in their own homes. It is recommended that the care home adjustment is incorporated within the age-gender weighting in setting both LCG and General Practice allocations.
- An additional adjustment for those in Supported Living is deemed unnecessary and these patients should not be captured within the care home adjustment.

- After consideration of the peer review feedback and additional analysis, it was agreed that the recommendation on SLU should include the following:

"These patients can bring extra burden on a small number of specific General Practices but given the negligible effect on allocations overall, any adjustment or additional resource should be considered by SPPG as a local adjustment rather than be dealt with as a weighting within the formula."

Additional Needs Adjustment

- The preferred simplified 2-stage additive stepwise model should be adopted as the additional needs adjustment within the General Practice Weighted Capitation Prescribing Formula, for setting allocations at both LCG level and General Practice level.

- The supply variables within the model should be retained but sterilised, that is, fixed at the average value for Northern Ireland.

17. Next Steps

17.1 This full General Practice Prescribing Formula Review will now be subjected to a public consultation exercise. This final report, detailed papers and accompanying data files will be made available on the DoH website as an e-consultation, inviting comments and views on all aspects of the Formula Review.

17.2 Following consideration of the consultation responses, Ministerial approval will be sought on implementation of the updated formula for setting the 2025/26 indicative prescribing allocations for LCGs, GP Federations and General Practices.

Appendix A: Definitions & Data Sources for the Supply & Needs Variables in the Final Preferred Model

Variable Name	Variable Description	Data Source
Supply Variables		
no_gps	Number of GPs in each practice at 31st March 2023.	Business Services Organisation
gps_per_thousand_list	Number of GPs at 31st March 2023 per 1,000 list population during 2022/23.	Business Services Organisation
av_monthly_items	Average number of monthly items (generics plus proprietaries) at 31st March 2023.	Business Services Organisation
gen_rate	Proportion of monthly items that were generic at 31st March 2023.	Business Services Organisation
prac_scan_rate	Rate of successful scanning of scripts at 31st March 2023.	Business Services Organisation
Needs Variables		
CHD	Coronary Heart Disease - Prevalence per 1,000 Population (age standardised 5-year average)	DoH Raw Disease Prevalence Data 2018-19 to 2022-23
DM	Diabetes (specified as Type 1 or Type 2) - Prevalence per 1,000 Population aged 17+ (age standardised 5-year average)	DoH Raw Disease Prevalence Data 2018-19 to 2022-23
DEM	Dementia - Prevalence per 1,000 Population aged 18+ (age standardised 5-year average). Dementia diagnosed directly by GP or via referral to secondary care.	DoH Raw Disease Prevalence Data 2018-19 to 2022-23
households_4_dimension[#]	Proportion of households deprived in 4 dimensions	Census 2021
unpaid_care_non_hhold	Proportion of households with no unpaid carers (aged 5 and above)	Census 2021

The dimensions of deprivation used to classify households are indicators based on four selected household characteristics:

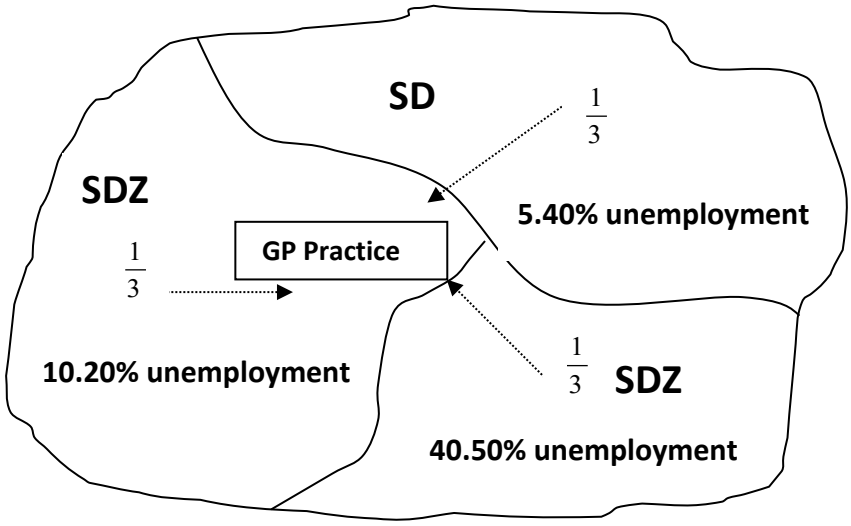
Education - A household is classified as deprived in the education dimension if no one has at least level 2 education and no one aged 16 to 18 years is a full-time student.
Employment - A household is classified as deprived in the employment dimension if any member, not a full-time student, is either unemployed or economically inactive due to long-term sickness or disability.
Health - A household is classified as deprived in the health dimension if any person in the household has a health problem or disability lasting or expected to last 12 months or more that reduces their ability to carry out day to day activities and/or who has general health that is bad or very bad.

Housing - A household is classified as deprived in the housing dimension if the household's accommodation is either overcrowded or has no central heating.

Appendix B: Attribution Process

B.1 The standard unit of analysis from the Census, the General Registrar Office, social security systems and other sources used to construct the needs variables is area-based (that is, data is available at Super Data Zone (SDZ) level). However, the additional needs modelling is undertaken at General Practice analysis. It is therefore necessary to create General Practice level variables from these area-based variables, through "attributing" the characteristics of the area from which each General Practice list was drawn to the practice (with the exception of QOF prevalence data which is collected at General Practice level).

B.2 Attribution is made possible because the NHAIS System contains a unique identifier for each General Practice and the postcode of each patient's home address, to which area of residency can be attached. The method assumes that each individual on a General Practice list is randomly selected from the area in which he/she lives. The characteristics of the area to which that person belongs are then attributed to the individual. Consider the hypothetical General Practice in the diagram below; each individual on the General Practice list takes on the unemployment rate for the SDZ as a whole.



B.3 Giving the General Practice the unemployment value for the SDZ in which it is based would be inaccurate, as the practice draws patients from more than one SDZ. It is more accurate to compute values based on the place of residence of the practice population. The practice unemployment rate can then be computed by calculating the population-weighted average of the SDZ unemployment rates of all the patients on each General Practice list.

B.4 In the example above, the General Practice unemployment rate would be:

$$\left(\frac{1}{3} * 40.50\%\right) + \left(\frac{1}{3} * 5.40\%\right) + \left(\frac{1}{3} * 10.20\%\right) \cong 18.70\%$$

B.5 The above example sets out the process of attributing from SDZ to General Practice. Where data was only available at LGD or SOA level, the same attribution process was employed. Note, where variables were only available at General Practice level (that is, the QOF disease prevalence data) the same attribution process was employed to create SDZ level data from General Practice data.

For further information, contact:

Information & Analysis Directorate,
Department of Health,
Annexe 2, Castle Buildings,
Stormont Estate, Belfast, BT4 3SQ

Responsible Statistician: **Penny Murray**
Telephone: **028 9052 2700**
E-mail: **qofdataenquiries@health-ni.gov.uk**