MILLIMAN WHITE PAPER

How is the English NHS prescription drugs budget spent?

2019

20 May 2019

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Executive summary

In the financial year (FY) 2017/18, NHS England (NHSE) spent £8.2 billion on prescription drugs prescribed by general practitioners (GPs) to their patients. This level of expenditure has decreased by nearly 1.0% from FY 2016/17.

In this actuarial report, we investigate the drivers of this trend at a drug class and regional level using actuarial principles. The data and findings are interesting and certainly invite additional research into issues such as how different population risk profiles in different regions are expected to affect prescription drug costs as well as how we can expect these costs to change over time, given expected changes in the population size and structure.

These insights can help stakeholders with experience analysis and planning by identifying cost and utilisation drivers on a population risk-adjusted basis as well as having a view of how demand may develop over the projection period.

WHAT IS DRIVING THE DOWNWARD TREND?

The reduction in prescription drug expenditure is driven by a combination of lower average costs and lower levels of activity. The average cost per item has decreased by 0.80% while items per 1,000 lives has decreased by 0.85%. Decreases in these components are slightly offset by the 0.76% increase in the English population size and our analysis focuses on trends per person per month (PPPM) to standardise for population size changes between the comparison years.

The majority of primary prescription drug spend in FY 2017/18—over 60%—has been spent on treating central nervous system, endocrine, cardiovascular and respiratory conditions. The PPPM costs for central nervous system, endocrine and respiratory conditions have decreased and this is largely driven by a reduction in the average cost per item. The PPPM cost for cardiovascular conditions has increased by 9.6% and this is driven by a 10.0% increase in the average cost per item, with “anticoagulants and protamine” being the main drug type driving the upward PPPM trend.

We have analysed cost and activity by Sustainability and Transformation Partnership (STP) areas to understand trends at a regional level and to reflect the regional level at which planning decisions are going to be made moving forward. Most STPs have experienced PPPM decreases or slight increases, except for Lancashire and South Cumbria STP, which has experienced a significant increase in PPPM of 7.7%. This is driven by a 10.5% increase in the items per 1,000 lives and is offset by a decrease of 2.5% in the cost per item.

RISK PROFILE ADJUSTMENT AND PROJECTIONS

To enhance our trend analysis, we calculated risk-adjusted PPPMs for each STP to determine what PPPM we ‘expect’ based on each STP’s risk profile compared to the English average. This insight allows us to identify STPs with lower/higher-risk profiles compared to the average population and to identify STPs with lower or higher actual PPPM costs than expected based on the risk adjustment.

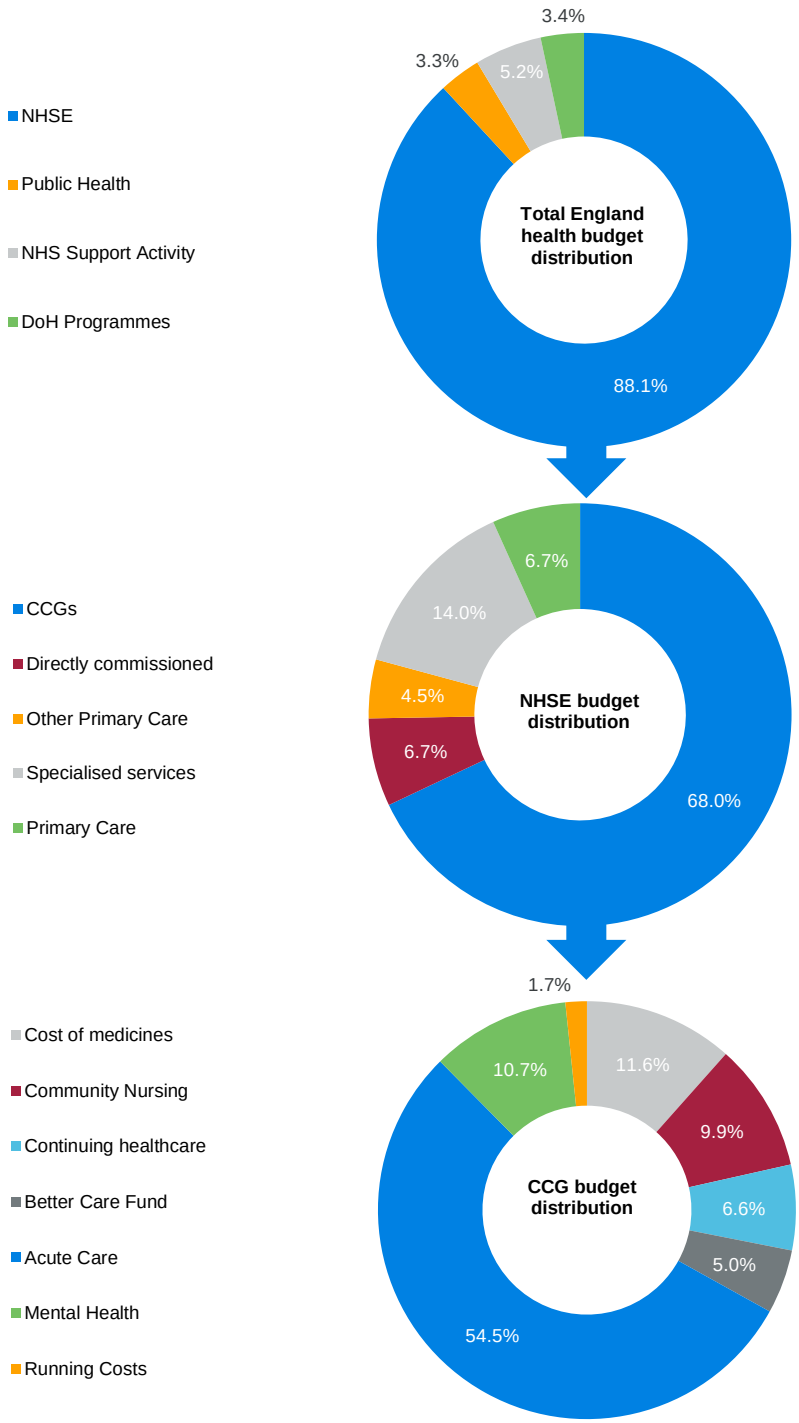
Finally, using all of the above, we projected total and PPPM prescription drug costs over a five-year period under various trend scenarios to illustrate how changes in these trends and the population size and structure may change this area of NHS spend compared to the current experience.

Introduction

In the financial year (FY) 2017/18, the total healthcare budget for England was £116 billion. The majority of the budget for health, approximately 88.1%, is distributed to NHS England (NHSE) to deliver healthcare services across the population. NHSE allocates approximately 68.0% of its budget to clinical commissioning groups (CCGs), and, of this, 11.6% is spent on medicines prescribed by GPs to their patients. This represents 7.9% of the total NHSE budget and 6.9% of the total Department of Health (DoH) budget.

Total primary care prescription drug cost for FY 2017/18 has decreased by nearly 1.0% from £8.3 billion in FY 2016/17 to £8.2 billion in FY 2017/18.

FIGURE 1: BUDGET FOR HEALTHCARE IN ENGLAND



1. Glossary of terms

FIGURE 2: GLOSSARY OF TERMS

TERM	DESCRIPTION
BNF	British National Formulary, the standard list of medicine codes used by the NHS.
CCG	Clinical commissioning group.
FY	Financial year.
Items	A single supply of medicine, e.g., three items will be recorded for a prescription form with three medicine items.
NHS BSA	NHS Business Services Authority.
NHSE	National Health Service England.
NIC	Net ingredient cost. This is the list price excluding VAT that can be found in the National Drug Tariff.
PCO	Primary care organisation.
PPPM	Per person per month cost.
RA	Risk-adjusted.
STP	Sustainability and Transformation Partnership.
Total cost	Represents the true price paid by the NHS. Total cost = NIC – (discounts) + (payment for consumables, container and out-of-pocket expenses)

2. Underlying data and limitations

Data has been extracted from the publicly available prescription drugs data[1] published by the NHS Business Services Authority (BSA) for FY 2016/17 and FY 2017/18. This data includes the number of prescription items and associated costs that are prescribed and dispensed for each GP practice in England on a monthly basis by British National Formulary (BNF) code for drugs. The data excludes high-cost drugs, drugs dispensed in a hospital setting, drugs prescribed in hospital and dispensed in the community, private prescriptions, over-the-counter (OTC) drugs and dispensing costs. For the purposes of our analysis, we have only included data where the primary care organisation (PCO) name within the data relates to a CCG. Excluded PCOs[2] account for 0.5% of total cost and 0.9% of total activity in FY 2017/18.

Population risk-adjustment factors used in our analysis have been calibrated using the prescribing needs factors[3] published by NHSE. The prescribing needs factors are used by NHSE to allocate financial resources to CCGs based on local healthcare needs.

Population figures and projections by CCG have been extracted from the Office for National Statistics (ONS) data set 'Population projections for clinical commissioning groups and NHS regions.'[4]

In carrying out our analysis and producing this paper, we relied on the data and information obtained from the sources described above. We have not audited or verified this data or other information. If the underlying data or information is inaccurate or incomplete, the results of our analysis may likewise be inaccurate or incomplete. We performed a limited review of the data used directly in our analysis for reasonability and consistency, and we have not found any material defects in the data.

This paper is intended solely for education purposes and presents information of a general nature.

The underlying data and analysis have been reviewed on this basis. This paper is not intended to guide or determine any specific individual situation and readers should consult qualified professionals before taking specific actions.

[1] NHS BSA. Prescription Data. Retrieved 17 May 2019 from https://www.nhsbsa.nhs.uk/prescription-data.

[2] Excluded PCOs include organisations such as community hospitals and clinics, rehabilitation and dental centres and nursing services.

[3] NHSE. Allocations. Retrieved 17 May 2019 from https://www.england.nhs.uk/allocations/.

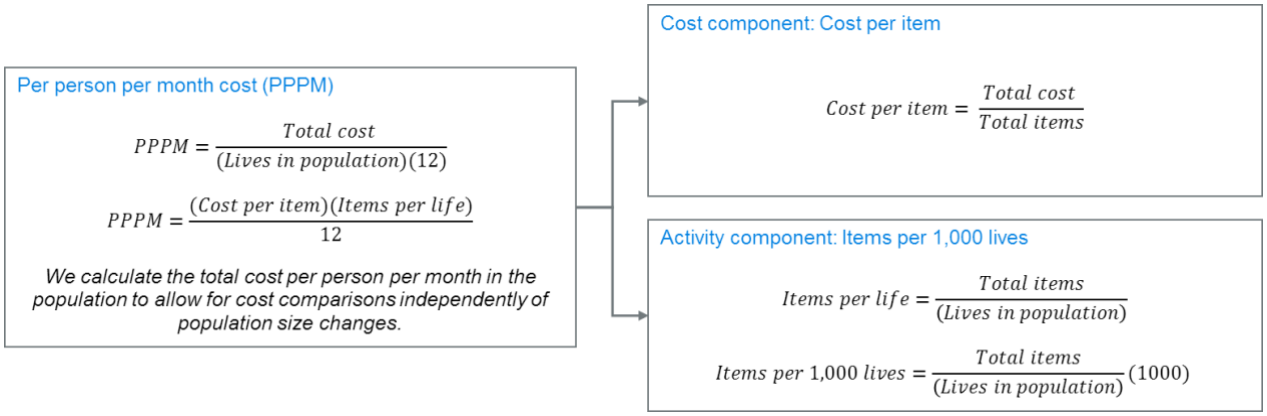
[4] ONS. Data set: Population Projections for Clinical Commissioning Groups and NHS regions: Table 3. Retrieved 17 May 2019 from https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/clinicalcommissioninggroupsinenglandtable3.

Differences between our projections and actual amounts depend on the extent to which future experience conforms to the assumptions made for this analysis. It is certain that actual experience will not conform exactly to the assumptions used in this analysis. Actual amounts will differ from projected amounts to the extent that actual experience deviates from expected experience.

3. Cost and activity overview

To understand how total prescription drug cost has changed from one financial year to the next, we use a per person per month (PPPM) measure and decompose it into cost per item and items per 1,000 lives to identify trend drivers, as shown in Figure 3.

FIGURE 3: DECOMPOSITION OF PPPM INTO COST AND ACTIVITY COMPONENTS



The total spend on prescription drugs decreased by almost 1.0% from FY 2016/17 to FY 2017/18. This is driven by a 1.65% decrease in PPPM costs and offset by an increase of 0.76% in the total entitled population. The total cost PPPM trend is driven almost equally by a 0.85% decrease in activity (items per 1,000 lives) and a 0.80% decrease in total cost per item.

FIGURE 4: OVERVIEW OF COST AND ACTIVITY, FY 2016/17 VS. FY 2017/18

COST/ACTIVITY COMPONENT	FY 2016/17	FY 2017/18	TREND
TOTAL FIGURES			
Total cost (£'millions)	8,283.8	8,209.5	-0.90%
Total lives (millions)	55.3	55.7	0.76%
Total cost PPPM (£)	12.48	12.27	-1.65%
NIC cost PPPM (£)	13.41	13.19	-1.65%
COST			
Total cost per item (£)	7.58	7.52	-0.80%
NIC cost per item (£)	8.14	8.08	-0.80%
ACTIVITY			
Items per 1,000 lives	19,760	19,591	-0.85%

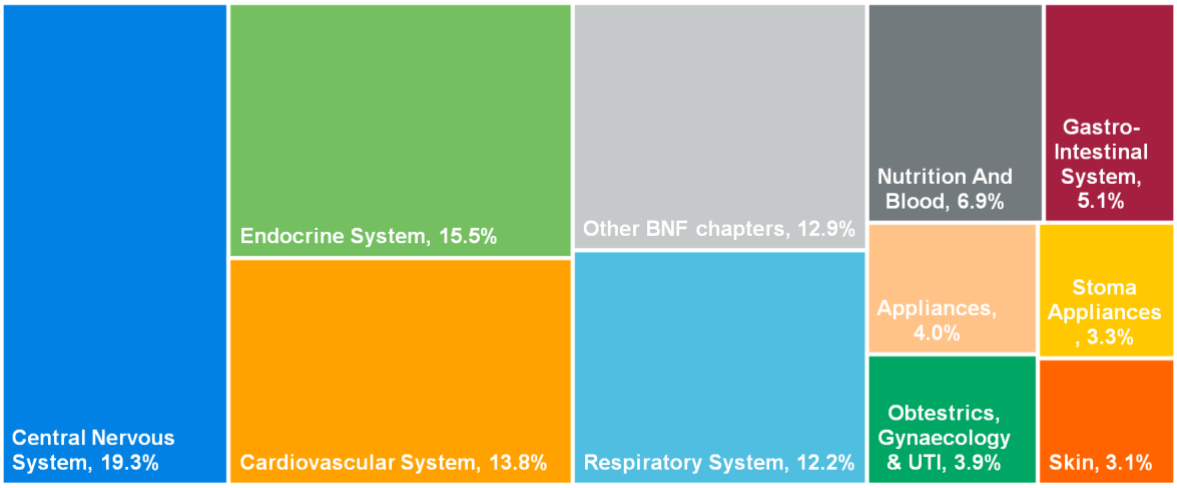
4. BNF chapters driving trend

Over 60% of the total cost in FY 2017/18 is attributed to the Central Nervous System, Endocrine, Cardiovascular and Respiratory BNF chapters. Within these four major chapters, over 80% of costs are due to the types of drugs shown in Figure 5.

FIGURE 5: MAJOR BNF SECTIONS WITHIN TOP FOUR BNF CHAPTERS BY TOTAL COST, FY 2017/18

BNF CHAPTER AND SECTION	PROPORTION OF TOTAL COST WITHIN CHAPTER
CENTRAL NERVOUS SYSTEM	
Analgesics	29.1%
Anti-epileptic drugs	25.9%
Anti-depressant drugs	13.1%
Drugs used in psychoses and related disorders	12.1%
Total within BNF chapter	80.20%
ENDOCRINE	
Drugs used in diabetes	73.5%
Thyroid and anti-thyroid drugs	9.6%
Total within BNF chapter	83.10%
CARDIOVASCULAR	
Anticoagulants and protamine	35.1%
Lipid regulating drugs	17.7%
Anti-anginal drugs	16.9%
Hypertension and heart failure drugs	13.6%
Total within BNF chapter	83.30%
RESPIRATORY	
Corticosteroids	61.6%
Bronchodilators	30.1%
Total within BNF chapter	91.70%

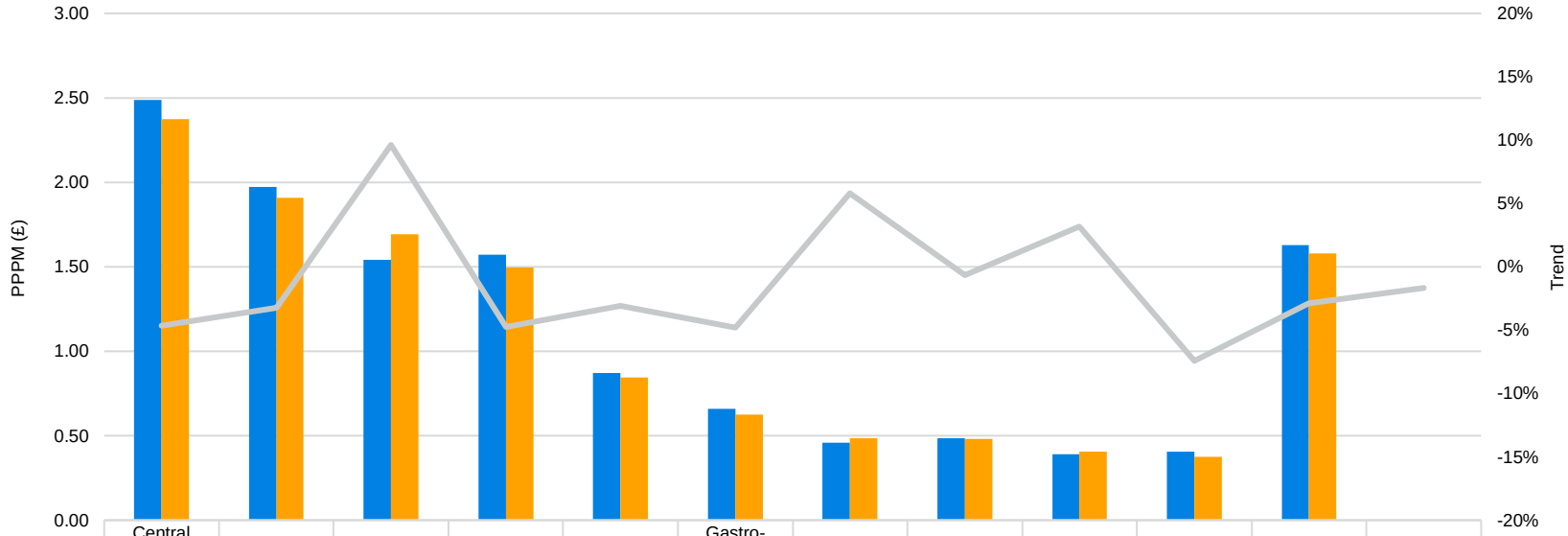
FIGURE 6: DISTRIBUTION OF TOTAL COST BY BNF CHAPTER, FY 2017/18



Cardiovascular system drugs have experienced a 9.6% PPPM increase, driven by a 10.0% increase in cost per item. 'Anticoagulants and protamine' is the main BNF section driving the cardiovascular PPPM trend, with an increase of 32.6%.

All other BNF chapters (amongst the top 10 chapters) have experienced PPPM decreases (apart from Appliances and Stoma Appliances), driven by a combination of decreases in cost per item and items per 1,000 lives.

FIGURE 7: COMPONENTS OF TOTAL PPPM TREND BY BNF CHAPTER; FY 2016/17 VS. FY 2017/18



	Central Nervous System	Endocrine System	Cardio system	Respiratory System	Nutrition And Blood	Gastro-Intestinal System	Appliances	Obtestrics, Gynae & UTI	Stoma Appliances	Skin	Other BNF chapters	All BNF Chapters
FY 2016/17 PPPM (£)	2.49	1.97	1.54	1.57	0.87	0.66	0.46	0.49	0.39	0.41	1.63	12.48
FY 2017/18 PPPM (£)	2.37	1.91	1.69	1.50	0.85	0.63	0.49	0.48	0.40	0.38	1.58	12.27
FY 2017/18 Cost per item (£)	7.76	11.70	3.52	13.93	9.65	4.24	12.11	10.78	47.19	7.49	8.05	7.52
FY 2017/18 Items / 1,000 lives	3,669	1,957	5,770	1,289	1,052	1,774	482	537	103	601	2,355	19,591
Cost per item trend	-4.4%	-4.2%	10.0%	-3.6%	-3.4%	-4.6%	0.0%	-1.5%	0.9%	2.6%	1.7%	-0.8%
Items / 1,000 lives trend	-0.3%	1.0%	-0.3%	-1.3%	0.3%	-0.2%	5.8%	0.8%	2.2%	-9.8%	-4.5%	-0.9%
PPPM trend	-4.6%	-3.2%	9.6%	-4.8%	-3.1%	-4.8%	5.8%	-0.7%	3.2%	-7.4%	-2.9%	-1.6%

5. STPs driving trend

SUSTAINABILITY AND TRANSFORMATION PARTNERSHIPS (STPS)

Sustainability and transformation partnerships have been established as part of the NHS's five-year forward view. Local NHS organisations and councils have drawn up shared proposals to improve health and care in the areas they serve, with the long-term needs of local communities in mind. Each STP comprises an assembly of CCGs, local councils and providers.

In order to understand the distribution of cost and activity and associated trends for prescription drugs at a regional level, we have grouped the experience by CCG into the respective STPs. STP boundaries are shown in Figure 8.

FIGURE 8: STP BOUNDARIES AND LABELS, FY 2017/18

NO.	STP	NO.	STP	NO.	STP
1	Cumbria and North East	15	Birmingham and Solihull	29	Frimley Health
2	Lancashire and South Cumbria	16	Coventry and Warwickshire	30	Surrey Heartlands
3	West Yorkshire	17	Northamptonshire	31	North West London
4	Humber, Coast and Vale	18	Cambridgeshire and Peterborough	32	North Central London
5	Greater Manchester	19	Norfolk and Waveney	33	South West London
6	South Yorkshire and Bassetlaw	20	Herefordshire and Worcestershire	34	South East London
7	Cheshire and Merseyside	21	Gloucestershire	35	North East London
8	Derbyshire	22	Buckinghamshire, Oxfordshire and Berkshire West	36	Mid and South Essex
9	Nottinghamshire	23	Milton Keynes, Bedfordshire and Luton	37	Cornwall and the Isles of Scilly
10	Lincolnshire	24	Hertfordshire and West Essex	38	Devon
11	Staffordshire	25	Suffolk and North East Essex	39	Somerset
12	Leicester, Leicestershire and Rutland	26	Bristol, North Somerset and South Gloucestershire	40	Dorset
13	Shropshire and Telford and Wrekin	27	Bath, Swindon and Wiltshire	41	Sussex and East Surrey
14	The Black Country	28	Hampshire and the Isle of Wight	42	Kent and Medway

TREND DRIVERS

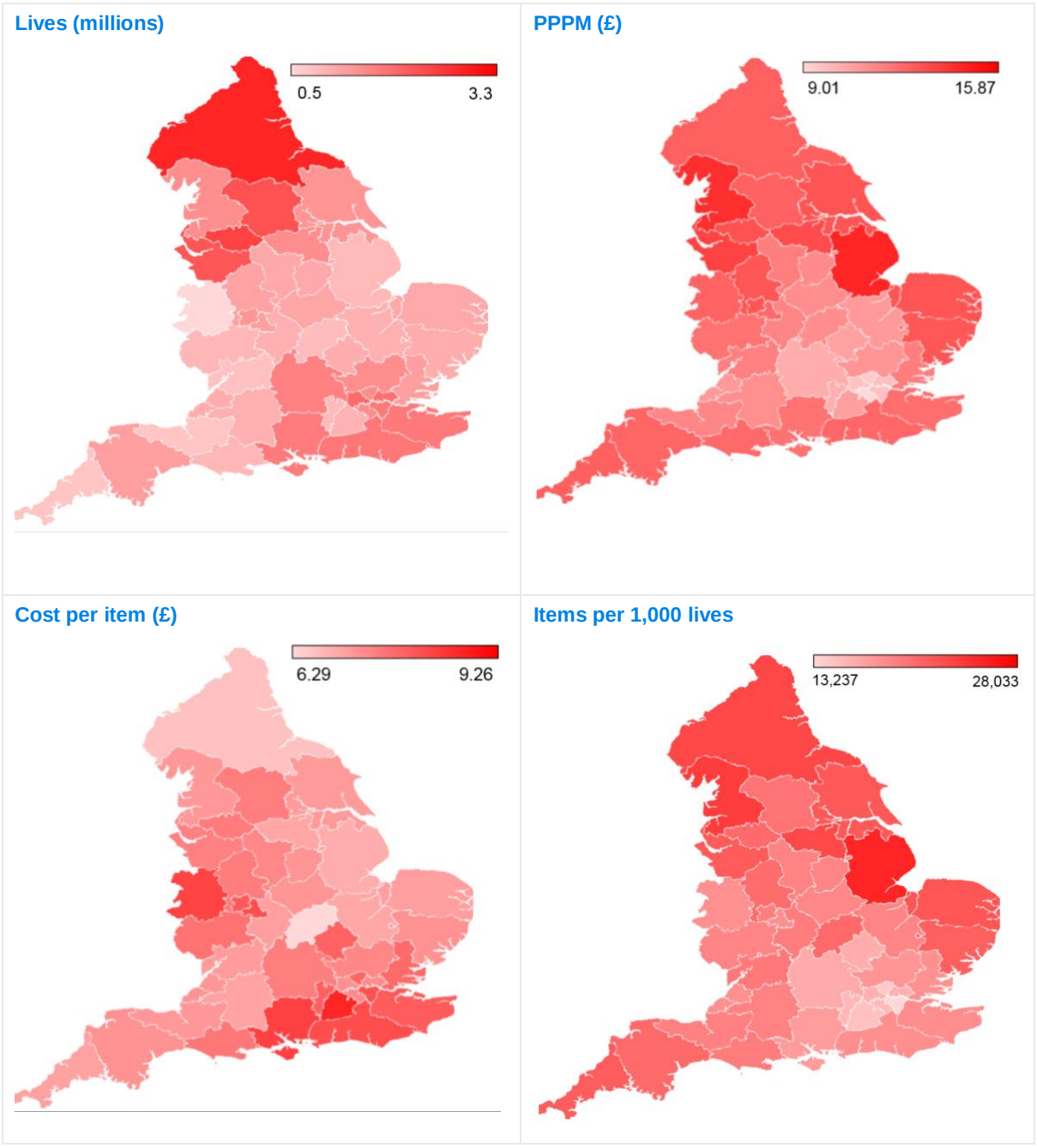
Figure 9 shows the drivers of PPPM trend for the top 20 STPs by total cost in FY 2017/18. Of the top 20 STPs, Cumbria and North East STP has the highest total cost in FY 2017/18 and has experienced the largest decrease in PPPM (8.7%). This decrease is driven by a 4.0% decrease in cost per item and a 4.8% decrease in items per 1,000 lives. Most of the other STPs have experienced PPPM decreases between 0.3% and 4.5% or slight increases, except for Lancashire and South Cumbria STP, which has experienced a significant increase in PPPM of 7.7%. This is driven by a 10.5% increase in the items per 1,000 lives and is offset by a decrease of 2.5% in the cost per item.

The heat maps in Figure 10 help us to visually identify if high/low PPPM STPs have a high/low cost per item and/or items per 1,000 lives. For example, we can see that the high PPPM in Lincolnshire is driven by a high number of items per 1,000 lives rather than cost per item. This could in turn be driven by a difference in the mix of prescription drugs being dispensed in Lincolnshire compared to the rest of England. For example, there could be an increased volume of lower-cost drugs replacing the use of more expensive ones.

FIGURE 9: COMPONENTS OF PPPM TREND BY STP FY 2016/17 VS. FY 2017/18

STP No.	STP	FY 2017/18 Lives (millions)	PPPM (£) FY 2016/17	PPPM (£) FY 2017/18	PPPM (£) Trend	Cost per item (£) FY 2016/17	Cost per item (£) FY 2017/18	Cost per item (£) Trend	Items per 1,000 lives FY 2016/17	Items per 1,000 lives FY 2017/18	Items per 1,000 lives Trend
1	Cumbria and North East	3.30	14.67	13.39	-8.7%	6.71	6.44	-4.0%	26,246	24,950	-4.9%
5	Greater Manchester	2.83	14.24	13.96	-1.9%	7.77	7.68	-1.1%	22,000	21,808	-0.9%
7	Cheshire and Merseyside	2.46	14.86	14.62	-1.6%	7.65	7.59	-0.8%	23,301	23,117	-0.8%
3	West Yorkshire	2.52	13.73	13.33	-2.9%	7.74	7.66	-1.1%	21,280	20,889	-1.8%
41	Sussex and East Surrey	1.87	13.20	13.07	-1.0%	8.50	8.53	0.3%	18,632	18,389	-1.3%
42	Kent and Medway	1.84	12.96	12.77	-1.5%	8.28	8.25	-0.4%	18,788	18,572	-1.2%
2	Lancashire and South Cumbria	1.48	14.40	15.50	7.7%	7.36	7.18	-2.5%	23,466	25,924	10.5%
28	Hampshire and the Isle of Wight	1.81	12.61	12.63	0.2%	8.71	8.76	0.6%	17,366	17,299	-0.4%
6	South Yorkshire and Bassetlaw	1.50	14.88	14.26	-4.2%	7.17	6.90	-3.8%	24,898	24,800	-0.4%
31	North West London	2.13	9.37	9.31	-0.6%	7.34	7.31	-0.3%	15,326	15,279	-0.3%
4	Humber, Coast and Vale	1.38	14.00	13.88	-0.9%	7.25	7.13	-1.6%	23,191	23,354	0.7%
35	North East London	2.01	9.71	9.44	-2.7%	7.46	7.39	-0.8%	15,621	15,325	-1.9%
14	The Black Country	1.35	14.07	13.84	-1.6%	8.26	8.29	0.3%	20,426	20,036	-1.9%
22	Buckinghamshire, Oxfordshire and Berkshire West	1.70	10.10	10.12	0.2%	7.61	7.64	0.4%	15,931	15,904	-0.2%
34	South East London	1.83	9.54	9.33	-2.2%	8.45	8.46	0.1%	13,539	13,237	-2.2%
24	Hertfordshire and West Essex	1.48	11.22	11.19	-0.3%	7.49	7.49	0.0%	17,978	17,921	-0.3%
38	Devon	1.18	13.39	13.17	-1.6%	7.31	7.27	-0.6%	21,974	21,746	-1.0%
11	Staffordshire	1.12	13.89	13.79	-0.7%	7.67	7.66	-0.1%	21,728	21,596	-0.6%
15	Birmingham and Solihull	1.17	13.02	13.04	0.2%	8.45	8.54	1.0%	18,482	18,330	-0.8%
36	Mid and South Essex	1.18	12.27	12.17	-0.8%	8.00	8.00	0.1%	18,421	18,254	-0.9%
	Other STPs	19.59	11.75	11.61	-1.2%	7.42	7.38	-0.5%	19,004	18,864	-0.7%
	Total	**55.75**	**12.48**	**12.27**	**-1.6%**	**7.58**	**7.52**	**-0.8%**	**19,760**	**19,591**	**-0.9%**

FIGURE 10: COMPONENTS OF PPPM TREND BY STP, FY 2017/18



6. Risk adjustment

Each CCG (and by extension each STP) has a different population size and risk profile and consequently a different cost and activity profile for prescription drugs. We standardise for differences in population size by reporting cost and activity at per person per month, cost per item and items per 1,000 lives levels. To standardise for differences in risk profile, we use the prescribing factors that have been developed by NHSE.

NHSE PRESCRIBING FACTORS

The allocation of financial resources from NHSE to each CCG is determined using a statistical formula.[5] The formula takes into account various demand and supply factors. The aim is to make the geographical distribution of funds fair and objective while reflecting local healthcare needs and reducing inequalities.

The funding allocation formula for CCGs considers prescribing, mental health and maternity services separately from other healthcare services. As such, we have used the prescribing factors as part of our risk adjustment methodology. The prescribing factors incorporate adjustments for the following:

1. Distribution of registered patients by age band and sex
2. Other factors:
   - Proportion of registered patients aged over 85
   - Proportion of registered patients aged over 70 and claiming Disability Living Allowance
   - Standardised mortality ratio for all ages
   - Fertility rate
   - Practices with the largest proportion of registered patients aged 20 to 24
   - Index of Multiple Deprivation (IMD) overall score[6]
   - Proportion of registered patients with activity-limiting health conditions, age/sex-standardised
   - Proportion of registered patients in social housing
   - Ethnicity, age/sex-standardised

In order to use these factors in our modelling, we have considered them in two major categories: 'age/sex' and 'other' factors. We have normalised the factors based on the population size and age/sex distribution of the population for each CCG for each financial year included in the analysis. For each CCG, we expect the age/sex factor to change from one year to the next as the mix in lives changes. For the 'other' factors, there is no published change at a CCG level from one year to the next. At an STP level, there is a change in both groups of factors based on how the mix in lives changes within the CCGs that are allocated to each STP.

RISK-ADJUSTED PRESCRIBING PPPMS

After calculating the total prescribing 'age/sex' and 'other' factors, we calculate a risk-adjusted PPPM cost for each STP. The risk adjustment factor for each STP represents how different we expect the PPPM for a particular STP to be, compared to the average PPPM across all STPs, given the risk profile of registered patients within the STP. Consequently, the risk-adjusted PPPM is the PPPM we *expect* based on the average across the country and the STP's risk profile.

For example, for an STP with a risk adjustment factor of 1.03 relative to the average, we expect a PPPM 3% higher than the average PPPM, i.e., if the average PPPM is £100, the risk-adjusted PPPM is £103. If the STP has an actual PPPM of £105, the actual versus risk-adjusted value is 1.02 (£105/£103). The STP has a PPPM that is 5.0% higher than the average PPPM but, after adjusting for the STP's risk profile, we see that the difference between the STP's risk-adjusted PPPM and the average PPPM is 2.0%.

By comparing the actual and risk-adjusted PPPMs, we are able to:

- Identify STPs with lower-risk and higher-risk profiles compared to the average population
- Identify STPs with lower and higher actual PPPM costs than expected based on their risk-adjusted PPPMs

[5] Additional detail on the funding allocation formula can be found here: https://www.england.nhs.uk/wp-content/uploads/2016/04/1-allctins-16-17-tech-guid-formulae-v1.pdf.

[6] The indices of deprivation measure relative levels of deprivation in small areas/neighbourhoods in England.

The total risk adjustment factors by STP have negligible changes between FY 2016/17 and FY 2017/18. Consequently, differences in risk-adjusted PPPM costs and risk-adjusted versus actual PPPM costs are due to changes in experience for reasons other than changes in risk profile.

The higher-than-average PPPM for Cumbria and North East STP is explained by the higher-risk profile in this region. Although Cumbria and North East appears to be a high PPPM STP, after adjusting for its risk profile, the PPPM is 4% lower than the average PPPM. Conversely, Hertfordshire and West Essex appears to have a low PPPM cost compared to the average PPPM but, on a risk-adjusted basis, the actual PPPM is in line with expected.

FIGURE 11: RISK-ADJUSTED PPPM COSTS BY STP, FY 2017/18

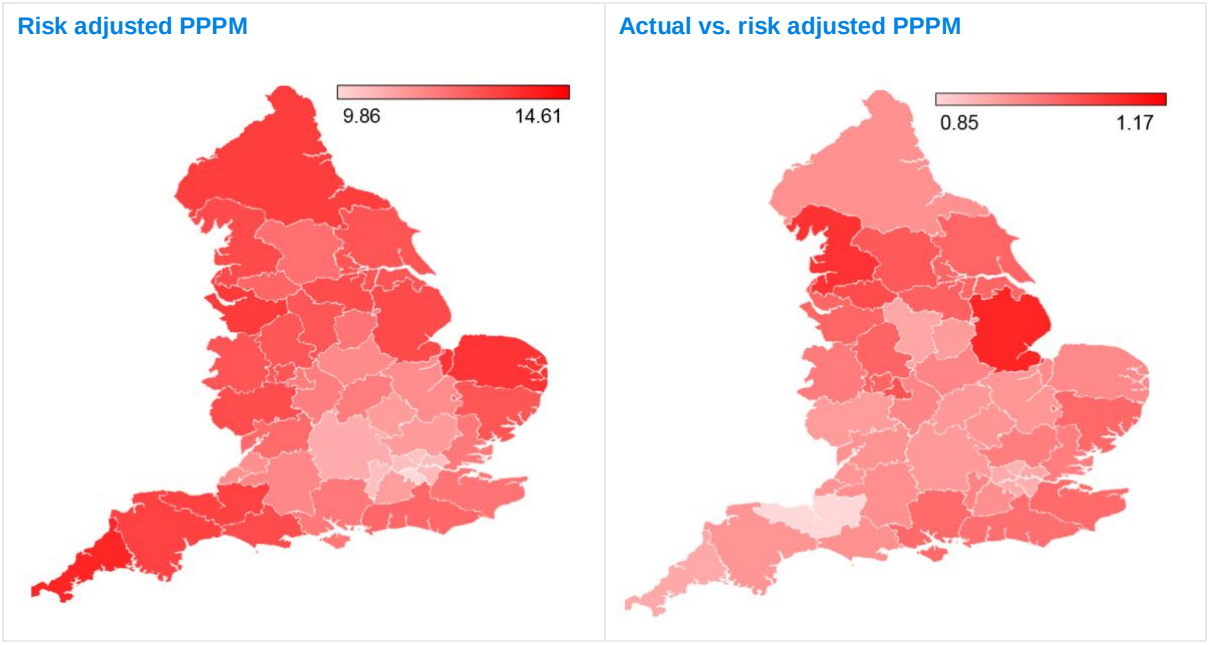
STP NO.	STP	Actual PPPM (£) (A)	Risk adjustment factor relative to average (B)	Risk adjusted PPPM (£) (C) = (A_{Total})*(B)	Actual vs. risk adjusted PPPM (D) = (A)/(C)
1	Cumbria and North East	13.39	1.13	13.90	0.96
5	Greater Manchester	13.96	1.04	12.73	1.10
7	Cheshire and Merseyside	14.62	1.14	13.97	1.05
3	West Yorkshire	13.33	1.01	12.44	1.07
41	Sussex and East Surrey	13.07	1.03	12.69	1.03
42	Kent and Medway	12.77	1.00	12.32	1.04
2	Lancashire and South Cumbria	15.50	1.10	13.52	1.15
28	Hampshire and the Isle of Wight	12.63	0.99	12.18	1.04
6	South Yorkshire and Bassetlaw	14.26	1.10	13.48	1.06
31	North West London	9.31	0.83	10.19	0.91
4	Humber, Coast and Vale	13.88	1.08	13.25	1.05
35	North East London	9.44	0.83	10.21	0.92
14	The Black Country	13.84	1.07	13.18	1.05
22	Buckinghamshire, Oxfordshire and Berkshire West	10.12	0.87	10.71	0.95
34	South East London	9.33	0.84	10.32	0.90
24	Hertfordshire and West Essex	11.19	0.91	11.19	1.00
38	Devon	13.17	1.12	13.80	0.95
11	Staffordshire	13.79	1.07	13.15	1.05
15	Birmingham and Solihull	13.04	0.98	12.02	1.08
36	Mid and South Essex	12.17	0.99	12.17	1.00
	Other STPs	11.61	0.98	12.06	0.96
	Total	**12.27**	**1.00**	**12.27**	**1.00**

Differences between risk-adjusted PPPMs and actual and risk-adjusted PPPM costs are highlighted in the heat maps below. The risk-adjusted PPPM map shows how risk profiles vary by STP, with darker areas having higher-risk profiles. The actual versus risk-adjusted PPPM map shows how different STPs are spending less money (lighter areas) or more money (darker areas) than their risk profiles would suggest. STPs in the north, southwest and east of the country appear to have higher-risk profiles and, consequently, higher risk-adjusted PPPMs than central regions.

Larger differences between actual and risk-adjusted PPPMs are observed in the north of the country as well as in the southeast.

Lincolnshire has the highest PPPM of all STPs in FY 2017/18 as well as the largest difference between the actual and risk-adjusted PPPMs, i.e., after standardizing for the higher-risk profile in Lincolnshire, it still has a higher average PPPM than other STPs. The differences between actual and risk-adjusted PPPMs may indicate that the funding allocation formula is not accurately capturing the risk profile within the CCGs or STPs, which may signal that the factors used could benefit from being updated to reflect current risk profiles.

FIGURE 12: RISK-ADJUSTED PPPM AND ACTUAL VS. RISK-ADJUSTED PPPM BY STP, FY 2017/18



7. Projections

So far, we have focused on historical data for two financial years but it is also possible to project how we may expect prescription drug total cost PPPMs and total costs to change over the next five years. These projections are based on how we expect the population size and structure to change, along with various scenarios for PPPM cost trends.

In order to determine how the population size and structure may change over the projection period, we have used ONS population projections by age-band, sex and CCG.

We have defined various PPPM trend scenarios to give an idea of how prescription drug PPPMs and total costs may develop over the projection period. The historical trend has been calculated as the PPPM trend from FY 2016/17 and FY 2017/18, after removing the effects of age/sex and other prescribing factors. This is approximately equal to -2.0% per year.

All scenarios include demographic trends which adjust the total costs and PPPM projections for the projected effects of age/sex and other prescribing factors, as well as projected changes in the population size.

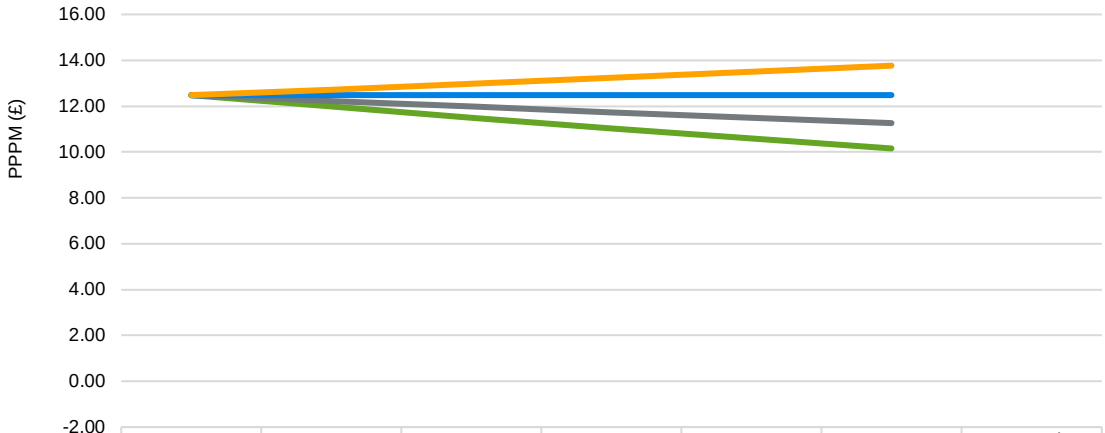
FIGURE 13: DESCRIPTION OF PROJECTION SCENARIOS

Scenario	Trends used
Low	PPPM trend of -4.0% for all projection years
Historical	PPPM trend of -2.0% for all projection years
Zero	PPPM trend of 0.0% for all projection years
High	PPPM trend of 2.0% for all projection years

Because the historical PPPM trend from FY 2016/17 to FY 2017/18 is negative, total and PPPM costs under the 'low' and 'historical' scenarios are projected to decrease. The 'zero' trend scenario shows the expected effect of changes in age/sex and other factors without any assumed cost or activity per person trend. The 'high' trend scenario illustrates how total cost and PPPM costs may change if PPPM costs increase by 2.0% per year.

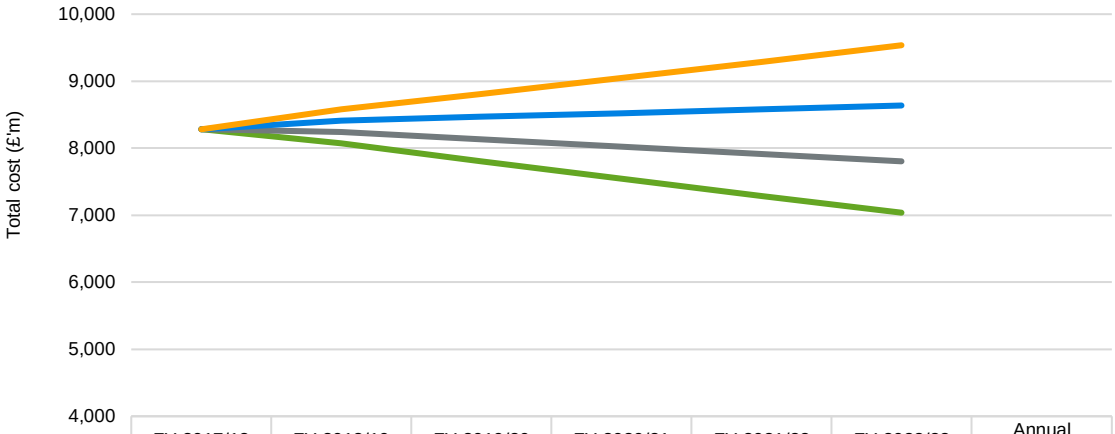
Unlike the PPPM projection, the total cost projection reflects expected changes in the population size. We observe that the annual average trend for the total prescribing costs for the 'zero' trend scenario is 0.8%, which reflects the impact of demographic changes in the projection period.

FIGURE 14: PROJECTED PPPM PRESCRIBING COSTS (USING ACTUAL FY 2017/18 FIGURES)



	FY 2017/18	FY 2018/19	FY 2019/20	FY 2020/21	FY 2021/22	FY 2022/23	Annual average trend
Low	12.48	11.98	11.50	11.03	10.59	10.17	-4.0%
Historical	12.48	12.23	11.98	11.74	11.50	11.27	-2.0%
Zero	12.48	12.47	12.47	12.47	12.47	12.47	0.0%
High	12.48	12.72	12.98	13.23	13.50	13.77	2.0%

FIGURE 15: PROJECTED TOTAL PRESCRIBING COSTS (USING ACTUAL FY 2017/18 FIGURES)



	FY 2017/18	FY 2018/19	FY 2019/20	FY 2020/21	FY 2021/22	FY 2022/23	Annual average trend
Low	8,284	8,071	7,803	7,542	7,288	7,043	-3.2%
Historical	8,284	8,239	8,131	8,023	7,915	7,807	-1.2%
Zero	8,284	8,407	8,467	8,524	8,581	8,637	0.8%
High	8,284	8,576	8,809	9,046	9,288	9,536	2.9%

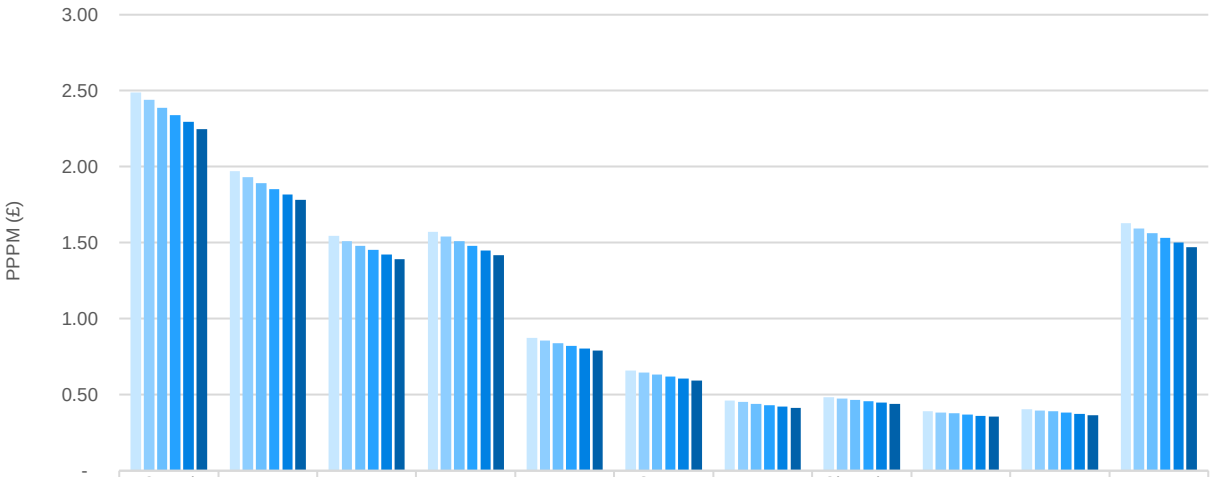
Applying the historical trend scenario by STP, we are able to calculate the projected PPPM for each projection year. The projected PPPMs observed below are driven by a combination of the demographic factor changes and the PPPM trend that has been applied.

FIGURE 16: PROJECTED PPPM PRESCRIBING COSTS FOR TOP 20 STPS (USING ACTUAL FY 2017/18 FIGURES)

		PPPM (£)					
STP No.	STP	FY 2017/18	FY 2018/19	FY 2019/20	FY 2020/21	FY 2021/22	FY 2022/23
1	Cumbria and North East	14.67	14.38	14.09	13.81	13.53	13.26
5	Greater Manchester	14.24	13.95	13.67	13.39	13.12	12.85
7	Cheshire and Merseyside	14.86	14.56	14.26	13.97	13.69	13.41
3	West Yorkshire	13.73	13.45	13.18	12.91	12.65	12.39
41	Sussex and East Surrey	13.20	12.94	12.68	12.42	12.17	11.93
42	Kent and Medway	12.96	12.70	12.44	12.19	11.95	11.71
2	Lancashire and South Cumbria	14.40	14.10	13.82	13.54	13.26	12.99
28	Hampshire and the Isle of Wight	12.61	12.35	12.11	11.86	11.62	11.39
6	South Yorkshire and Bassetlaw	14.88	14.58	14.29	14.00	13.71	13.44
31	North West London	9.37	9.18	8.99	8.81	8.64	8.46
4	Humber, Coast and Vale	14.00	13.72	13.44	13.16	12.90	12.64
35	North East London	9.71	9.50	9.31	9.12	8.94	8.76
14	The Black Country	14.07	13.78	13.50	13.23	12.97	12.70
22	Buckinghamshire, Oxfordshire and Berkshire West	10.10	9.90	9.70	9.50	9.31	9.12
34	South East London	9.54	9.34	9.16	8.97	8.79	8.62
24	Hertfordshire and West Essex	11.22	11.00	10.77	10.56	10.34	10.14
38	Devon	13.39	13.12	12.85	12.59	12.34	12.09
11	Staffordshire	13.89	13.61	13.33	13.07	12.80	12.54
15	Birmingham and Solihull	13.02	12.75	12.50	12.25	12.00	11.76
36	Mid and South Essex	12.27	12.02	11.78	11.54	11.31	11.08
	Other STPs	11.75	11.54	11.32	11.10	10.89	10.68
	Total	**12.48**	**12.23**	**11.98**	**11.74**	**11.50**	**11.27**
	Total lives (millions)	**55.3**	**56.2**	**56.6**	**57.0**	**57.3**	**57.7**
	Total cost (£'millions)	**8,283.8**	**8,239.3**	**8,131.4**	**8,023.1**	**7,914.8**	**7,807.5**

Figure 17 illustrates projected PPPM costs over the projection period using the historical trend scenario. With the data available, it is not possible to isolate the impact of changing age/sex and other factors at a BNF chapter level and, as such, the same historical trend and age/sex and other factors have been applied across all BNF chapters.

FIGURE 17: PROJECTED PPPM PRESCRIBING COSTS FOR TOP 10 BNF CHAPTERS (USING ACTUAL FY 2017/18 FIGURES)



	Central Nervous System	Endocrine System	Cardio system	Respiratory System	Nutrition And Blood	Gastro-Intestinal System	Appliances	Obtestrics, Gynae & UTI	Stoma Appliances	Skin	Other BNF chapters
FY 2017/18	2.49	1.97	1.54	1.57	0.87	0.66	0.46	0.49	0.39	0.41	1.63
FY 2018/19	2.44	1.93	1.51	1.54	0.86	0.65	0.45	0.48	0.38	0.40	1.60
FY 2019/20	2.39	1.89	1.48	1.51	0.84	0.63	0.44	0.47	0.38	0.39	1.56
FY 2020/21	2.34	1.85	1.45	1.48	0.82	0.62	0.43	0.46	0.37	0.38	1.53
FY 2021/22	2.29	1.82	1.42	1.45	0.80	0.61	0.42	0.45	0.36	0.37	1.50
FY 2022/23	2.25	1.78	1.39	1.42	0.79	0.59	0.42	0.44	0.35	0.37	1.47

Conclusion

In this paper, we provide a snapshot of the GP prescription cost and activity as well as driving trends for FY 2016/17 and FY 2017/18 in England. In addition to the actual position, we also discuss the cost and activity in FY 2017/18 if they are risk-adjusted for demographic factors. Finally, we provide a five-year projection of prescription cost (on a total and PPPM basis).

We observe that the population size of NHS England has increased by 0.76% (55.3 million to 55.7 million) and the total cost PPPM has decreased by 1.65% (£12.48 to £12.27) from FY 2016/17 to FY 2017/18. Hence, the net effect is the decrease of total cost of almost 1.0% from FY 2016/17 to FY 2017/18. The decrease in total cost PPPM is driven almost equally by its constituting units of activity levels and the total cost per item.

Of the 21 BNF chapters, the following four comprise over 60% of total cost: Central Nervous, Endocrine, Cardiovascular and Respiratory BNF chapters. We observe that the total PPPM cost decreases for most of the top 10 BNF chapters (by cost for FY 2017/18), except for Cardiovascular, Appliances and Stoma Appliances, which experienced PPPM increases.

We have compared the demographic distribution, prescription cost per item and activity levels of England's STPs for FY 2017/18. From this analysis, we observe that areas of high concentration for each parameter lie in different STPs. For FY 2017/18, for example, the highest distribution of lives is present in Cumbria and North East, the highest cost per item is for Surrey Heartlands and the highest activity level per 1,000 lives is in Lincolnshire (as illustrated in the relevant heat maps above). We have observed that there are no significant differences in the relative STP distribution of cost and activity levels between FY 2016/17 and FY 2017/18. Hence, the mix of cost by STP has remained steady over the two financial years.

We risk-adjusted the FY 2017/18 prescription cost of each STP (using demographic variables of age, gender and other factors) to obtain a more comparable view of cost by STPs. Overall, after risk adjustment, we observe a more consistent spread of total PPPM costs across England. Broadly, in FY 2017/18 the STPs in the north, east and southwest of England seem to have higher risk-adjusted total cost PPPMs as compared to central and southern regions.

We also provide a five-year projection based on the total cost PPPM of FY 2017/18 and the population size projections. We use various scenarios to understand the impact of demographic and cost trends on the total cost. In the case of 'historical' and 'low' total cost PPPM trend scenarios, we observe that total costs decrease by approximately 1.2% and 3.2% per year, respectively. For the 'zero' trend total cost PPPM scenario, we observe the pure impact of the age/sex and other factors, which is about 0.8% per year. In the 'high' total cost PPPM trend scenario, the total cost increases by approximately 2.9% per year.

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