

Prescription Cost Analysis

Introduction:

For the Capstone Project the analyst has chosen data from Prescription Cost Analysis (PCA) for the month of April 2025 and for the month-to-month comparison the author has also chosen the data for the month of March 2025. This data is collected by the National Health Service Business Service Authority (NHSBSA) and it contains the monthly administrative data. The PCA data holds evidence on all prescription's items dispensed in the community in England monthly and submitted to the NHSBSA for repayment. PCA delivers information of the costs and volumes of all prescriptions dispensed at the community in England.

Background:

This data reflects the methodology used in the PCA annual national statistics publication. PCA demonstrates the total volume and cost for drugs, dressings, appliances, and medical devices that have been dispensed in the community in England. These statistics are created to assemble the total number of prescription items and spend for any individual product, at any level of the British National Formulary (BNF) hierarchy, e.g. for Paracetamol 500mg tablets, or collections of products such as antibacterial drugs, antidepressant drugs, or dressings.

Prescription data is collected by the NHS Business Services Authority (NHSBSA) for the operational drive of recompensing dispensing contractors for the costs of supplying drugs and devices, and providing essential and advanced services, to NHS patients in different Integrated Care Board (ICB) or region. This data is used to monitor medicine uptake, to allow public scrutiny of prescribing habits, to inform local and national policy, and in academic research.

Data is collected from the submission of prescriptions by dispensing contractors to the NHSBSA. These prescriptions are issued by GPs and other authorised prescribers such as nurses, dentists, and allied health professionals. Prescriptions that are issued by hospitals can also be dispensed in the community and submitted for reimbursement. Prescriptions that are issued in hospitals and fulfilled by the hospital pharmacy or dispensary are not included in this data.

The dataset contains prescription records, with fields such as:

- Date (Year, Month)
- Region (Region Name, ICB-Name)
- Practice type (Dispenser, account, Type)
- Drug details (chemical/substance name, strength, formulation)
- Supplier
- BNF (classification: therapeutic category hierarchy)

Aim and Objectives:

The aim of the project is the better understanding of the PCA data and to understand the data subsequent objectives will be followed:

- Identifying the most frequently prescribed medications in each Integrated Care Board (ICB) or region.
- How does prescription frequency change from March 2025 to April 2025?
- How often are generics used instead of brand names? Are some Integrated Care Board (ICBs) better at switching to generics?
- Are some medications more prescribed in certain regions despite similar demographics?

Methods:

Data is gathered from the open data source and the weblink is: <https://opendata.nhsbsa.net/dataset/prescription-cost-analysis-pca-monthly-data> Cost Analysis (PCA) Monthly Administrative Data - Datasets - Open Data Portal. The analyst has also gathered the data for the month of March. For the Data analysis mostly software tool Jupyter Notebook was mostly used. The data analysis 'ipynb' files will also be uploaded to have a clear understanding of the readers. The project will also be uploaded in GitHub for wider audience accessibility. The GitHub file will also include the used codes in Jupyter Notebook. Link for the GitHub access is [Sauda-parvin/Git-Pharma-Giggles: Prescription Cost Analysis \(PCA\) London](#).

Useful tools for the analysis:

- Jupyter Notebooks (Pandas, Seaborn, Plotly, Scikit-learn)
- Excel (for the data only)

Following are the project concepts and data analysis objectives for the better understanding for the data:

1. Top Prescribed Drugs by Region

- Goal: Identifying the most frequently prescribed medications in each Integrated Care Board (ICB) or region.
- Insights: Top 5 prescribed medications in different parts of England
- Tools: Jupyter Notebook
- Techniques: Grouping, Aggregation, Visualization (bar plots, maps)

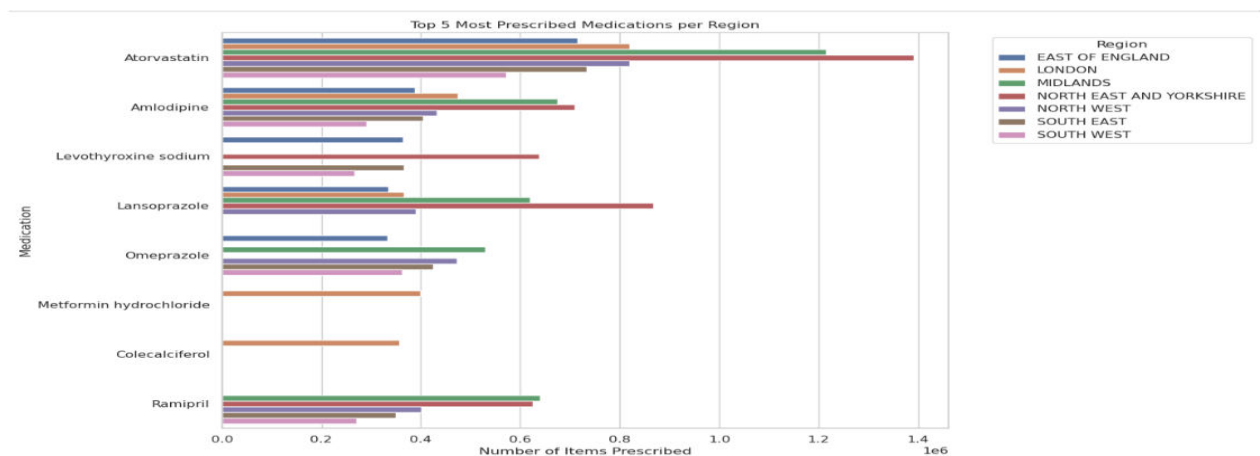


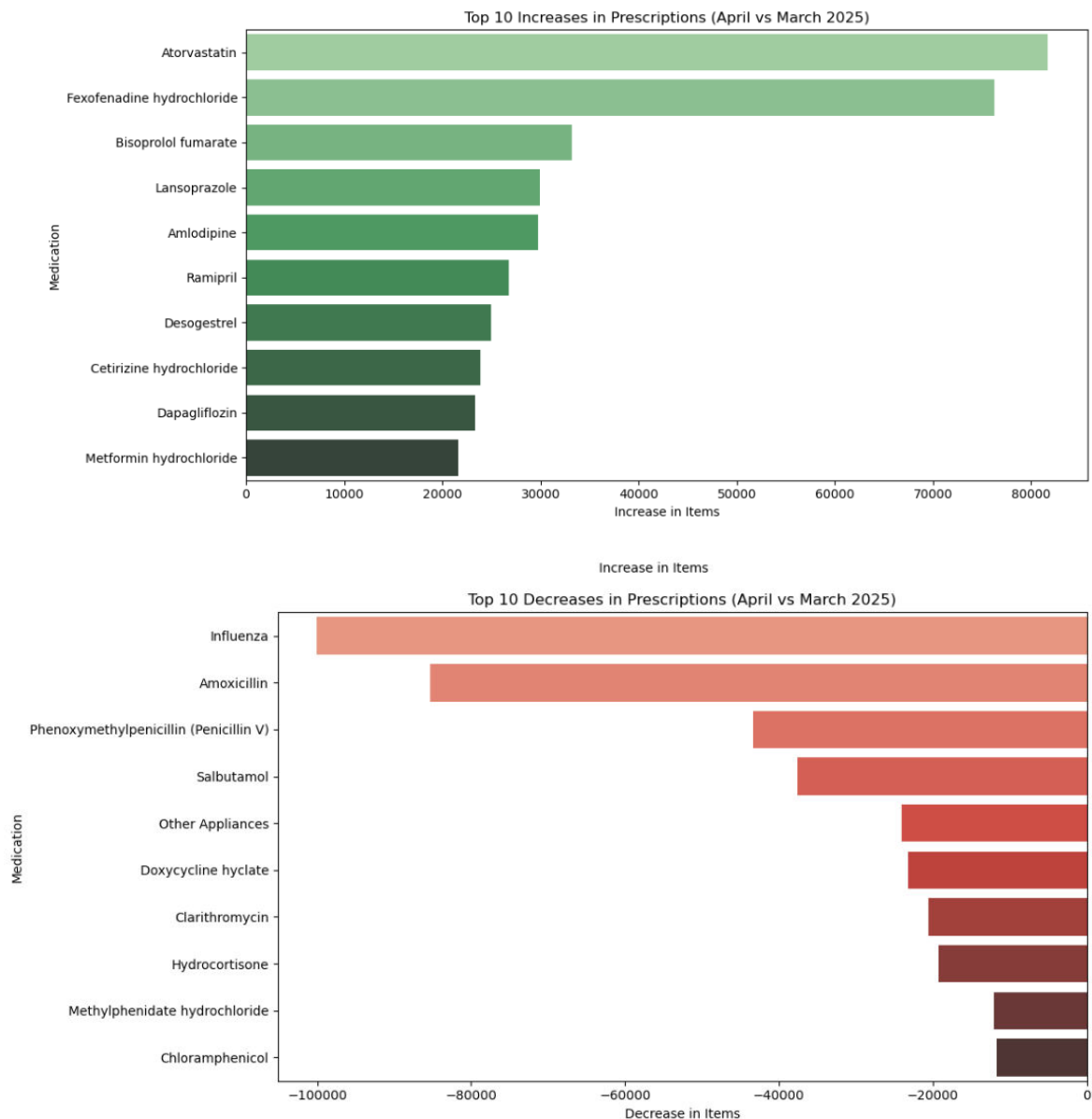
Table Interpretation of the bar chart:

REGION_NAME	BNF_CHEMICAL_SUBSTANCE	ITEMS
EAST OF ENGLAND	Atorvastatin	715563
EAST OF ENGLAND	Amlodipine	388108
EAST OF ENGLAND	Levothyroxine sodium	365127
EAST OF ENGLAND	Lansoprazole	334619
EAST OF ENGLAND	Omeprazole	333471

Interpretation: According to the bar chart and the table above Atorvastatin, Amlodipine, Levothyroxine, Lansoprazole and Omeprazole are the five most prescribed medicine and are mostly prescribed in East of England region followed by London, Midlands, North East and Yorkshire, North West, South East, South West.

2. Trend Analysis Over Time

- Goal: How does prescription frequency change from March 2025 to April 2025?
- Insights: Exact number of items prescribed in each month, absolute and percentage change, visualisation of trends.
- Tool: Jupyter Note Book
- Techniques: Line charts, time series forecasting



Interpretation: The green Bar Chart represents that the prescription of medications such as Atorvastatin, Bisoprolol, Lansoprazole and amlodipine has increased in the month of April compared to March. On the contrary the red Bar Chart represents that the prescription of medicines such as Amoxicillin, Clarithromycin, Salbutamol and Chloramphenicol has gone down in April compared to March.

3. Generic vs Branded Drug Usage

- Goal: How often are generics used instead of brand names? Are some Integrated Care Board (ICBs) better at switching to generics?
- Insights: which ICBs prescribe generics >90% of the time, which ICBs lag behind (<60%)?, opportunities to improve prescribing efficiency and reduce costs.
- Techniques: Data cleaning (matching generic/branded codes), ratios, charts

Top 10 ICBs using generics most often:

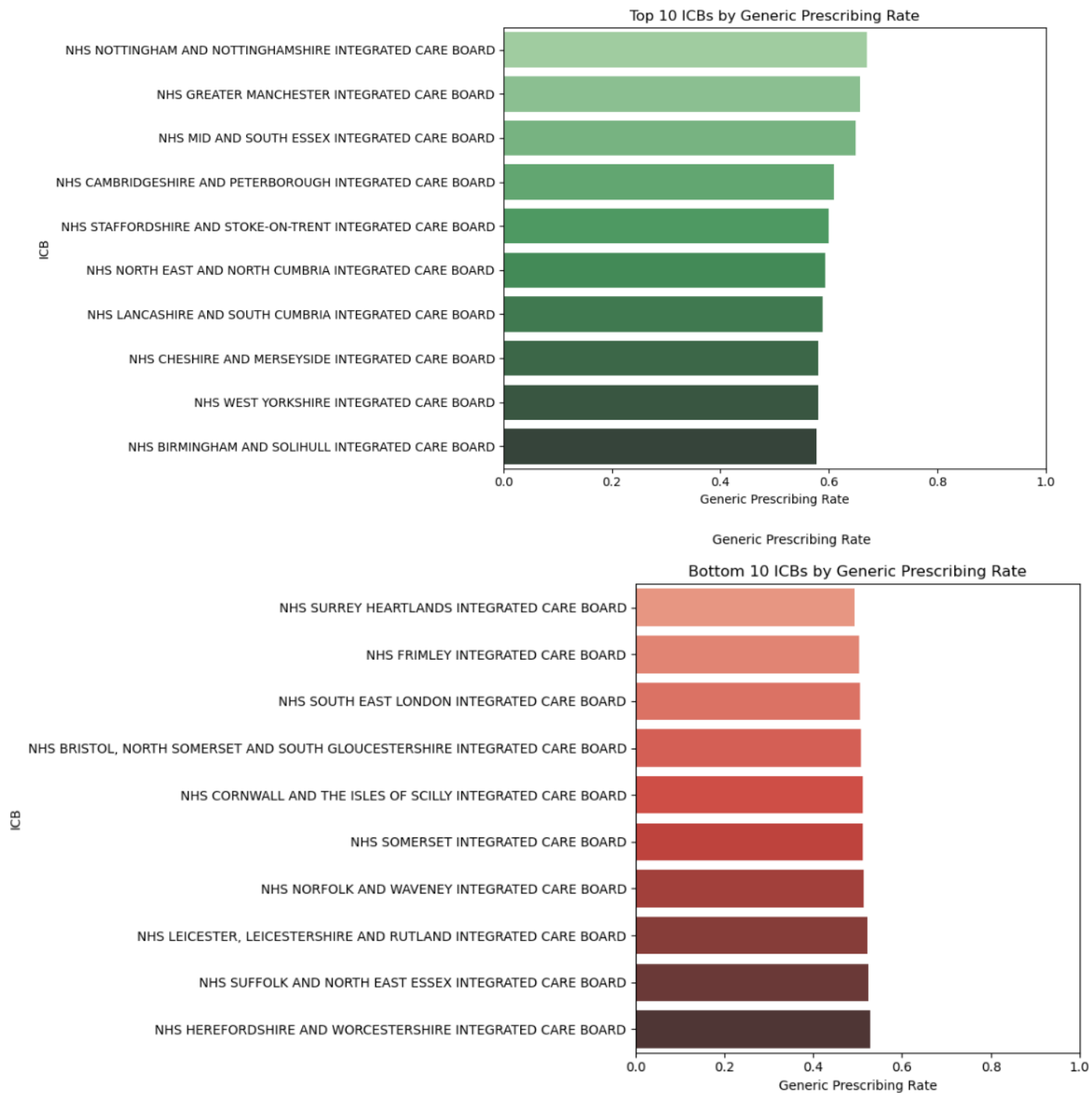
	ICB_NAME	TOTAL_PRESCRIPTIONS	\
31	NHS NOTTINGHAM AND NOTTINGHAMSHIRE INTEGRATED ...	17936	
15	NHS GREATER MANCHESTER INTEGRATED CARE BOARD	17743	
24	NHS MID AND SOUTH ESSEX INTEGRATED CARE BOARD	18058	
6	NHS CAMBRIDGESHIRE AND PETERBOROUGH INTEGRATED...	17454	
37	NHS STAFFORDSHIRE AND STOKE-ON-TRENT INTEGRATE...	15799	
27	NHS NORTH EAST AND NORTH CUMBRIA INTEGRATED CA...	18601	
21	NHS LANCASHIRE AND SOUTH CUMBRIA INTEGRATED CA...	16770	
7	NHS CHESHIRE AND MERSEYSIDE INTEGRATED CARE BOARD	17282	
41	NHS WEST YORKSHIRE INTEGRATED CARE BOARD	17084	
2	NHS BIRMINGHAM AND SOLIHULL INTEGRATED CARE BOARD	11229	

	GENERIC_PRESCRIPTIONS	GENERIC_RATE
31	12024	0.670384
15	11665	0.657442
24	11729	0.649518
6	10623	0.608628
37	9465	0.599089
27	11022	0.592549
21	9875	0.588849
7	10039	0.580893
41	9910	0.580075
2	6472	0.576365

Bottom 10 ICBs (lowest use of generics):

	ICB_NAME	TOTAL_PRESCRIPTIONS	\
39	NHS SURREY HEARTLANDS INTEGRATED CARE BOARD	9856	
13	NHS FRIMLEY INTEGRATED CARE BOARD	8424	
34	NHS SOUTH EAST LONDON INTEGRATED CARE BOARD	9110	
4	NHS BRISTOL, NORTH SOMERSET AND SOUTH GLOUCEST...	9754	
8	NHS CORNWALL AND THE ISLES OF SCILLY INTEGRATE...	11823	
33	NHS SOMERSET INTEGRATED CARE BOARD	11166	
25	NHS NORFOLK AND WAVENEY INTEGRATED CARE BOARD	14184	
22	NHS LEICESTER, LEICESTERSHIRE AND RUTLAND INTE...	12818	
38	NHS SUFFOLK AND NORTH EAST ESSEX INTEGRATED CA...	14621	
17	NHS HEREFORDSHIRE AND WORCESTERSHIRE INTEGRATE...	12358	

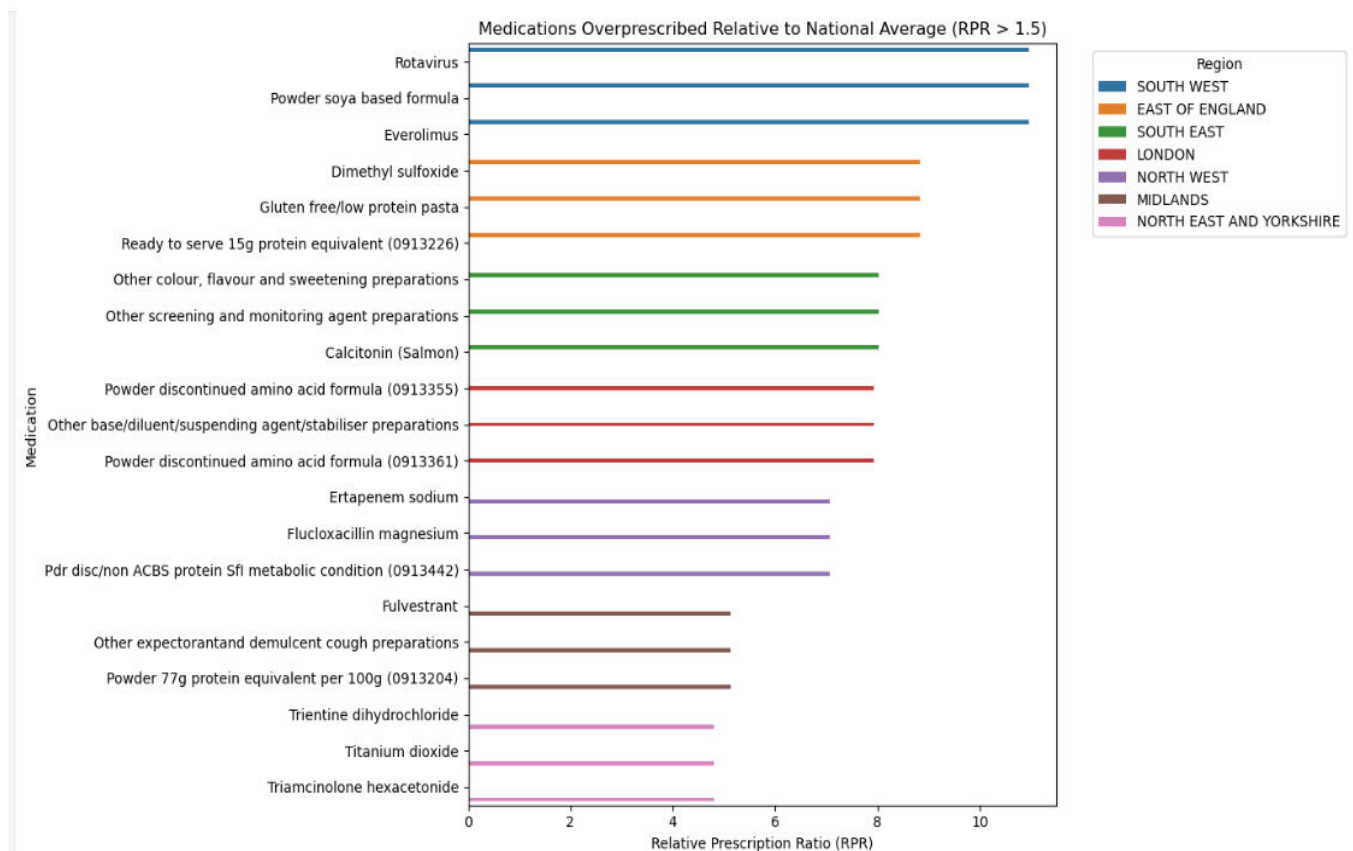
	GENERIC_PRESCRIPTIONS	GENERIC_RATE
39	4867	0.493811
13	4242	0.503561
34	4613	0.506367
4	4950	0.507484
8	6047	0.511461
33	5725	0.512717
25	7283	0.513466
22	6703	0.522936
38	7672	0.524725



Interpretation: According to the above green bar chart, Integrated Care Board (ICB) or regions such as Nottinghamshire, Manchester, South Essex uses more generic brands compared to Surrey, Firmley, East London and other ICBs in the Red bar chart. This interpretation represents that ICBs in red bar chart can improve their prescribing efficiency and reduce costs.

4. Regional Inequalities in Prescribing

- Goal: Are some medications more prescribed in certain regions despite similar demographics?
- Insights: Regional prescriber habits, local policy influence, formulary preference, unmet demand or misalignment with population needs
- Techniques: Ratios, Charts



Interpretation: The bar chart Above represents that South West East of England, South East England, and London, North West, Midlands, North East and Yorkshire has almost similar ratio of prescription exhibited and has a Relative Prescription Ratio (RPR) greater than 1.5 which is above the national average, representing people on those regions have more physical health issues compared to other parts of England.

Conclusion: This project aimed to explore, analyse, and visualise NHS prescription patterns across regions and Integrated Care Boards (ICBs) in England. Using detailed monthly data, several key insights were uncovered regarding medication usage, regional spending, prescribing behaviours.