

Design a model for Community pharmacy workforce with open source data

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Introduction – Today's session

This session outlines a simplified python model of the community pharmacy workforce supply.

- 1) Some practical guidance pointing what publicly available sources are.
- 2) How to construct a python data pipeline with several datasets directly from publicly available sources.
- 3) It includes AI generated codes (human in the loop).

Clarification – human in the {AI} loop?

Type of prescriber	No of pharmacists	% of pharmacists
Independent prescriber	23,471	35.2%
Supplementary prescriber only	201	0.3%
Pharmacists with no annotations	43,025	64.5%
TOTAL prescribers	23,672	35.5%
TOTAL pharmacists	66,697	100%

[GPhC registers data](#) (Register data professionals – August 2025)

A *human* who understands the distinctions between contextual and context-free processing can effectively govern AI.

This image is breaking down pharmacists into categories based on their legal qualifications to prescribe medication.

These are advanced roles that require extra training and registration (with the GPhC, from your previous images):

- **Independent Prescriber:** This is a pharmacist who can assess a patient, make a diagnosis, and prescribe any medicine needed for that condition (within their personal area of expertise). They take full responsibility for the prescription, similar to a doctor.
- **Supplementary Prescriber:** This is a pharmacist who prescribes in partnership with a doctor or other independent prescriber. They work from a specific, pre-arranged Clinical Management Plan (CMP) for an individual patient. The independent prescriber makes the initial diagnosis, and the supplementary prescriber helps manage the condition.

So, this is likely the header for a table showing how many pharmacists have these specific advanced qualifications.

what does this mean?

what does this mean? in the UK, regulated under GPhC

Show thinking ▾

Show thinking ▾

All individuals in these categories are fully qualified pharmacists. The terms "Independent" and "Supplementary" refer to **additional qualifications** that allow them to prescribe medicines, a role traditionally held by doctors.

Here is a simple breakdown:

- **Independent Prescriber (IP):** This is a pharmacist who has completed an additional, accredited qualification. They can **autonomously assess, diagnose, and prescribe** for patients with a wide range of conditions, similar to a doctor. They are fully responsible for the prescription.
- **Supplementary Prescriber (SP):** This is a pharmacist who has also completed a prescribing qualification. They prescribe in **partnership with a doctor or dentist**. A doctor first makes a diagnosis and sets up a Clinical Management Plan (CMP) for a specific patient. The supplementary prescriber can then prescribe any medicines listed within that plan. This is common for managing long-term conditions.
- **Pharmacists:** In this context, "Pharmacists" likely refers to the main group of GPhC-registered pharmacists who **do not hold** either the Independent or Supplementary prescribing qualification. Their primary roles include dispensing medicines, reviewing prescriptions for safety, providing clinical advice, and offering public health services.

Community pharmacy workforce modelling

- Excel <-> Python
- The model was built to inform workforce planning for NHS services delivered in high-street pharmacy premises,
- Focusing on two key professions regulated by the General Pharmaceutical Council (GPhC); pharmacists and pharmacy technicians.

Limitation

This session introduces:

- 1) General Pharmaceutical Council (GPhC) registers data
- 2) Community Pharmacy Workforce Survey (CPWS) data
- 3) Consolidated Pharmaceutical List

NB – This session does not cover the full scope of NHS long term workforce planning.

List of data

For today's session:

General Pharmaceutical Council (GPhC) registers data

Community Pharmacy Workforce Survey (CPWS)

NHSBSA Consolidated Pharmaceutical List

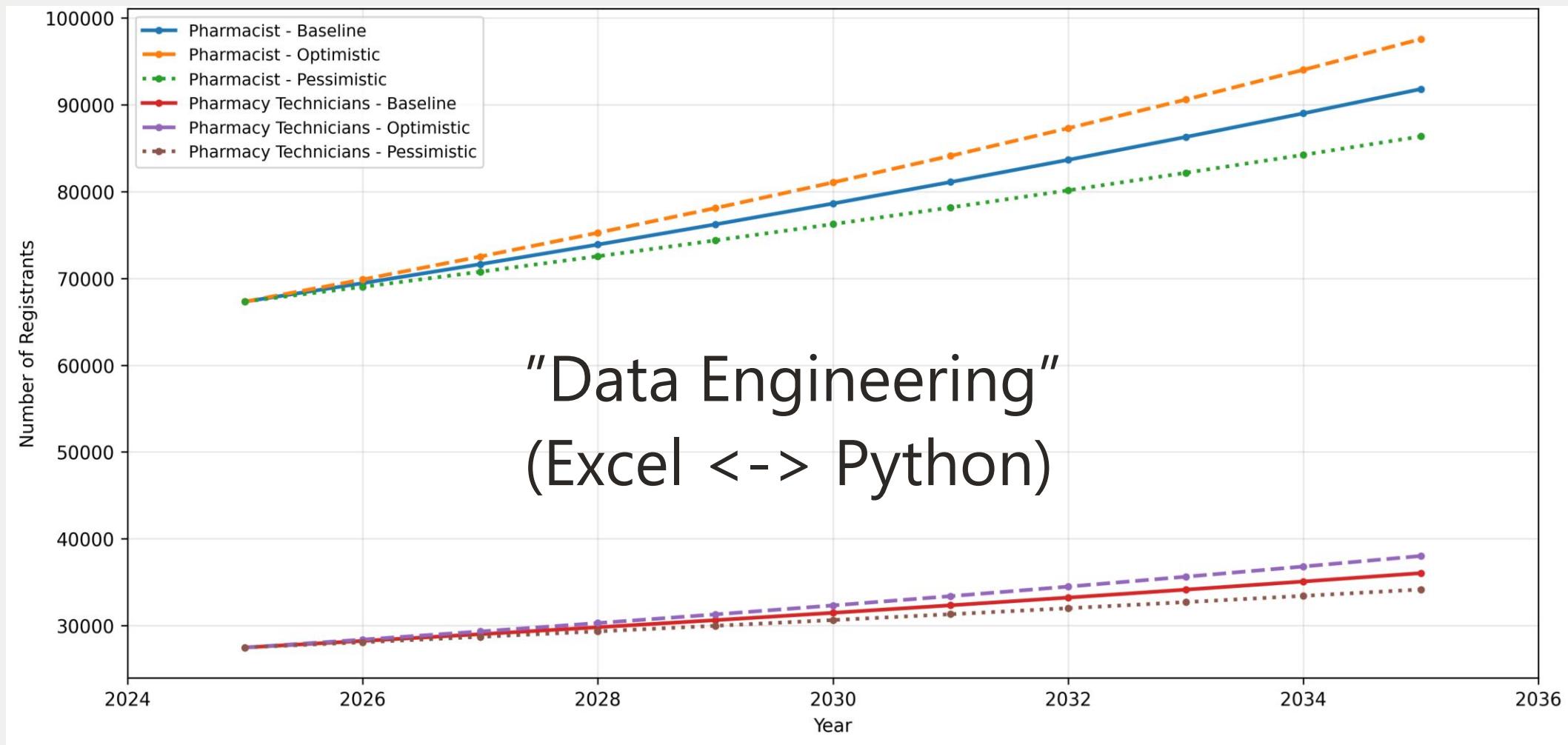
In future sessions:

NHSBSA Hospital Prescribing Dispensed in the Community

ONS nomis - Census 2021 estimates that classify usual residents in England and Wales by single year of age

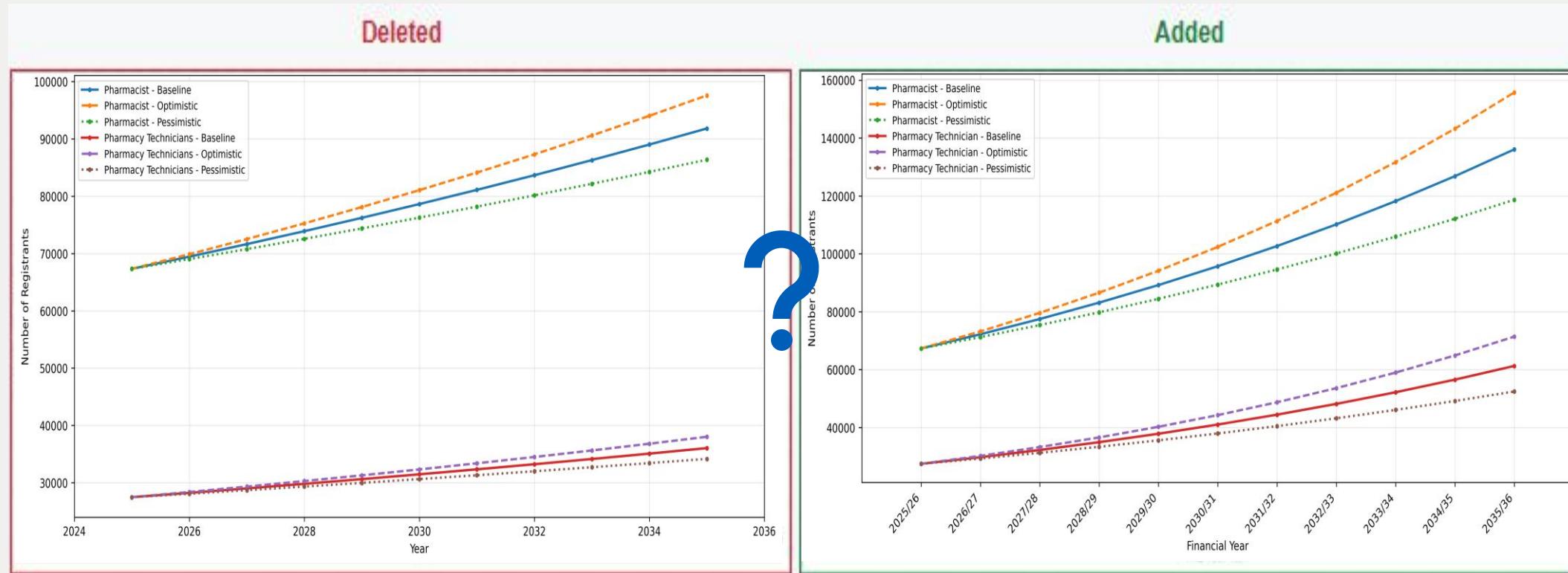
Initial workforce model – based on Sep25 actuale

Source: General Pharmaceutical Council



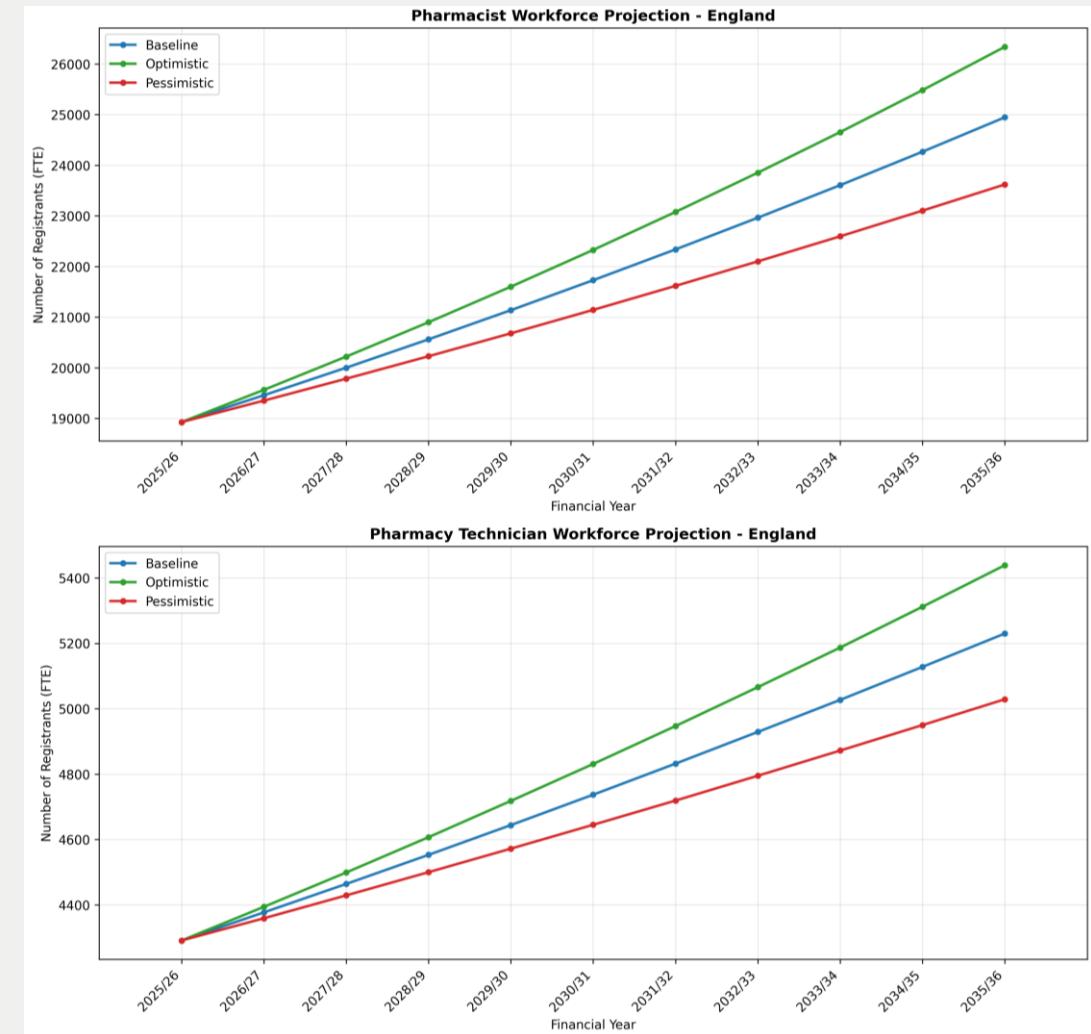
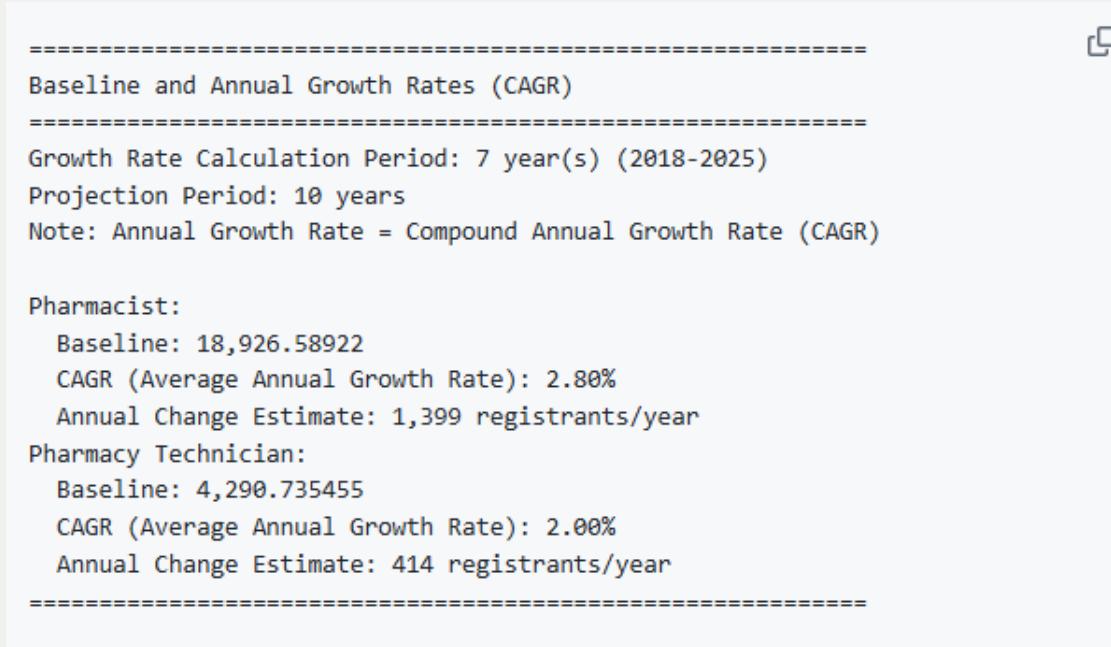
Initial workforce model – based on Apr25 actuals

Forecasts dynamically adjust to new historical actual data, with fixed growth rates.



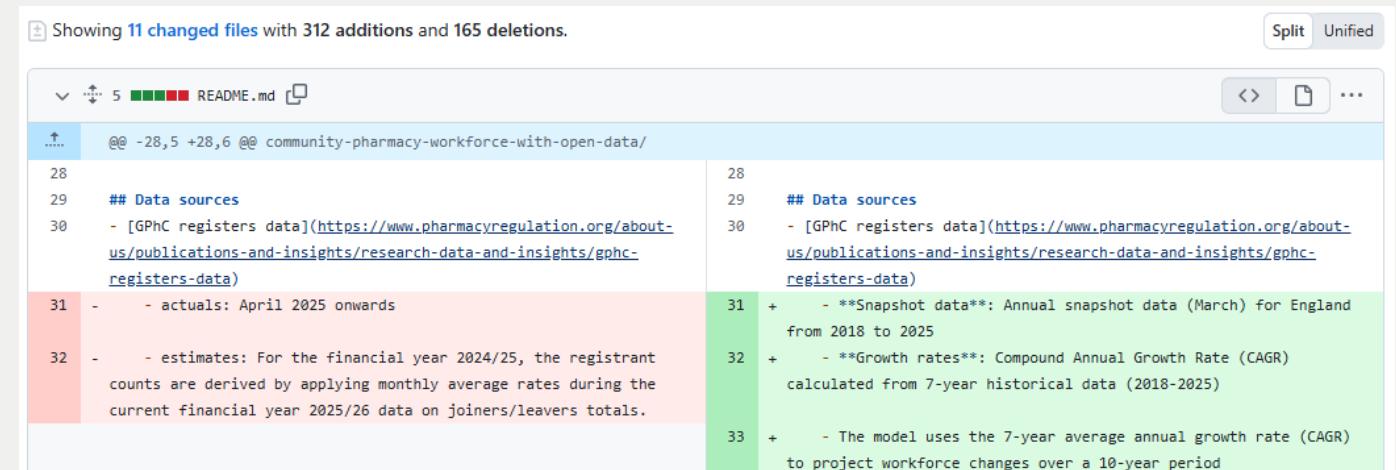
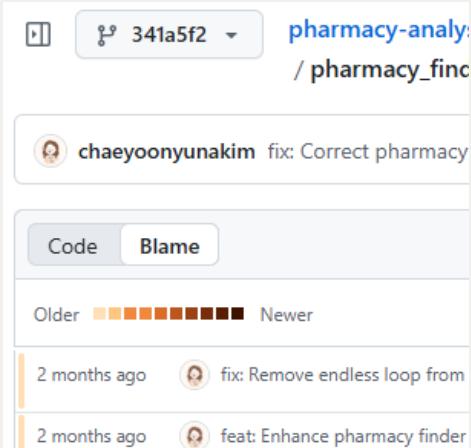
Setting the baseline (starting point for projection)

- England
- Community pharmacy workforce
- Full-Time Equivalent (FTE)



Advantages of working on GitHub

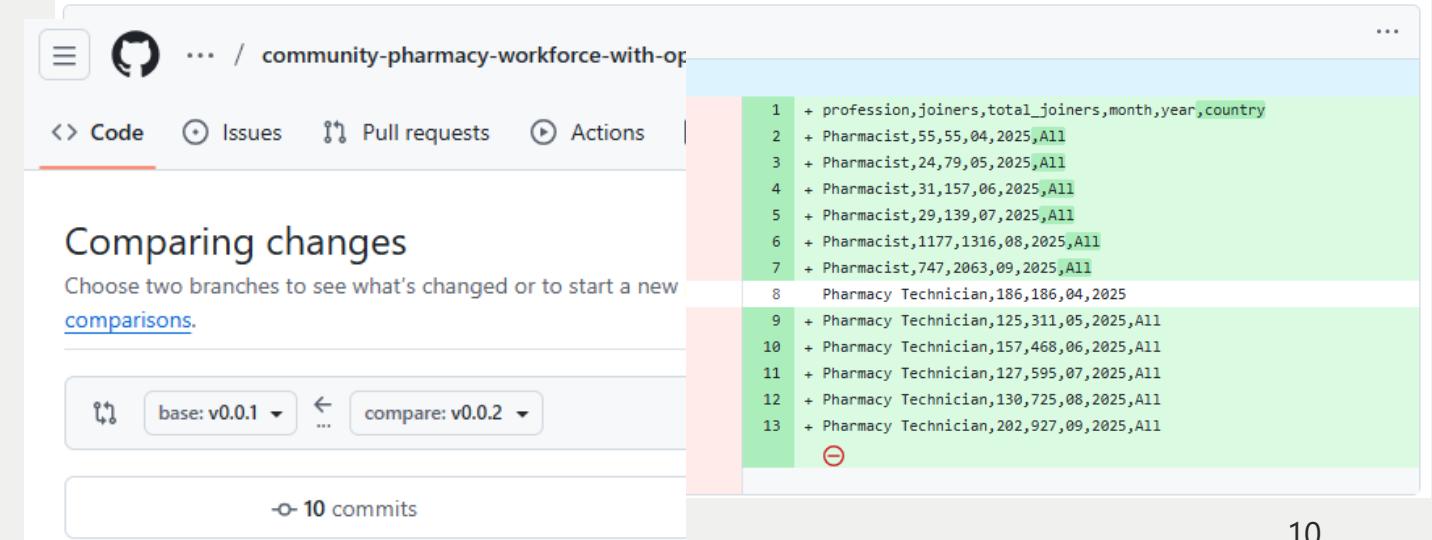
- Essential for version history



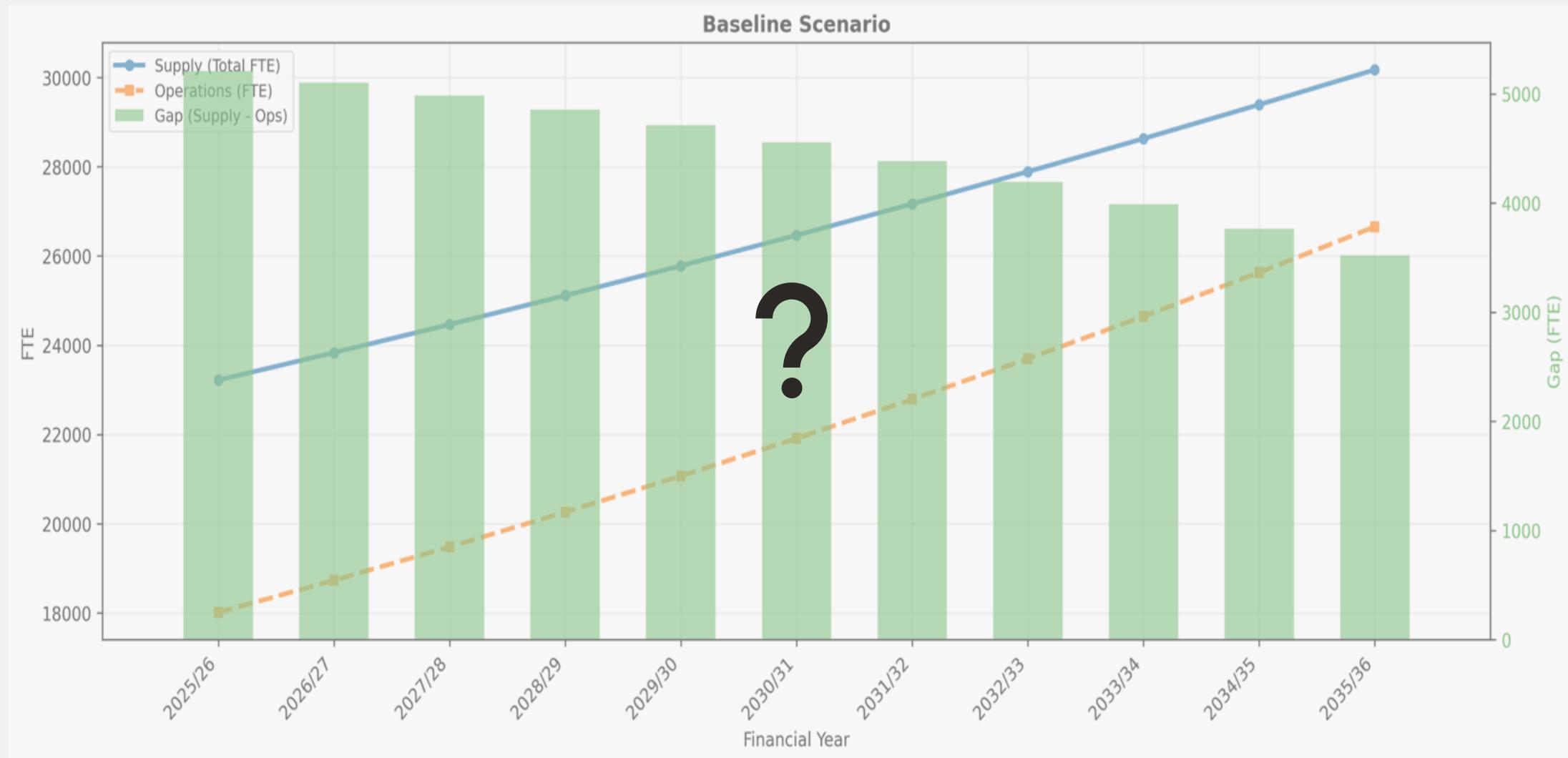
- Using GitHub Release Tags

(e.g., v0.0.1, v0.0.2)

GitHub automatically provide
Full Changelog in between
(e.g., [v0.0.1](#) and [v0.0.2](#))

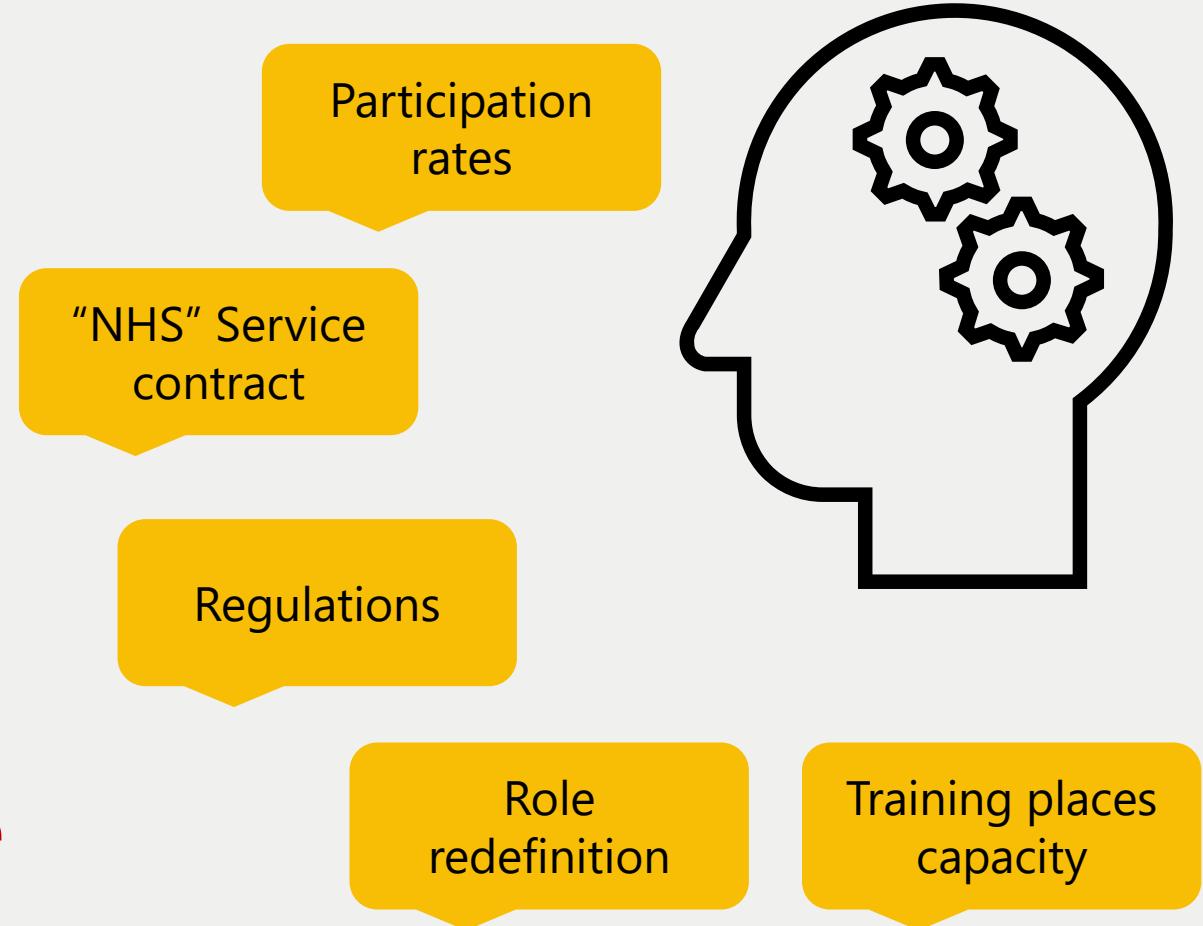


Comparing projections – supply validation



Reminder – human in the {modelling} loop!

A *human* who understands the distinctions between **contextual** and **context-free** processing can effectively govern *modelling*.



Useful Data API for scalable analysis with Python

Source: NHSBSA Consolidated Pharmaceutical List

The screenshot shows the NHS Business Services Authority Open Data Portal. At the top, there's a navigation bar with links for Home, Data, FOI Responses, News, Documentation, About, and Log in. Below the navigation, a breadcrumb trail shows the path: Home / Themes / Dispensing Contractors / Consolidated Pharmaceutical List / CONSOL_PHARMACY_LIST_202526Q1FINAL. The main content area is titled "Consolidated Pharmaceutical List - 2025-26 Quarter 1". It features a "Download" button, a "Data API" button, and a "Report an issue" link. A "Data Explorer" button is also present. The data is presented in a grid format with 10522 records. A red box highlights the "POST_C..." column header. The grid includes various columns such as PHARMACY_ID, HEALTHCARE_ID, PHARMACY_NAME, ORGANISATION_NAME, ADDRESS1, ADDRESS2, ADDRESS3, ADDRESS4, ADDRESS5, POST_CODE, PHARMACY_TYPE, MONITORING_TYPE, and WED_TOTAL. The "WED_TOTAL" column is highlighted with a red box.

A simple request to the data API using Python.

```
import urllib.request
import json

url = 'https://opendata.nhsbsa.net/api/3/action/datastore_search?resource_id=CONSOL_PHARMACY_LIST_202526Q1FINAL&limit=5'

with urllib.request.urlopen(url) as response:
    data = response.read().decode('utf-8')
    result = json.loads(data)
    print(json.dumps(result, indent=2))
```

Query example (first 5 results)	https://opendata.nhsbsa.net/api/3/action/datastore_search? resource_id=CONSOL_PHARMACY_LIST_202526Q1FINAL&limit=5
Query example (results with the 'WED_TOTAL' field contains the letter "a")	https://opendata.nhsbsa.net/api/3/action/datastore_search? resource_id=CONSOL_PHARMACY_LIST_202526Q1FINAL&q=%7B%22WED_TOTAL%22%22a%22%7D
Query example (via SQL statement)	https://opendata.nhsbsa.net/api/3/action/datastore_search_sql? resource_id=CONSOL_PHARMACY_LIST_202526Q1FINAL&sql=SELECT * from `CONSOL_PHARMACY_LIST_202526Q1FINAL` limit 5

Using the API with this Web Browser »

Getting Started with the NHSBSA API

1. Visit the dataset page
2. Browse available resources (quarters) and note the resource_id
3. Update the resource_id variable in this example script ([line 236](#)) to match your desired quarter
4. Run the script: [nhsbsa-pharmacy-england-hrs.py](#)
5. The script automatically handles pagination to retrieve all records

```
Code Blame 
```

```
1 """
2 NHS Business Services Authority (NHSBSA) Consolidated Pharmaceutical List Data Extraction.
3
4 This module automates the extraction of pharmacy data in England using the NHSBSA Open Data Portal API.
5 It retrieves the total number of pharmacies and calculates total pharmacy operation hours (open to close)
6 for all pharmacies in a specified financial year quarter.
7
8 The Consolidated Pharmaceutical List includes NHS pharmacies, appliance contractors, and Local
9 Pharmaceutical Services (LPS) contractors registered in England.
10
11 Data Source:
12 Consolidated Pharmaceutical List
13 https://opendata.nhsbsa.net/dataset/consolidated-pharmaceutical-list
14
15 API Documentation:
16 https://opendata.nhsbsa.net/pages/api
17
18 Usage:
19     This script queries the NHSBSA Open Data Portal API to retrieve pharmacy data including
20     opening hours for a specified financial year quarter. The resource_id should be updated
21     to reflect the desired quarter (e.g., 'CONSOL_PHARMACY_LIST_202526Q1FINAL').
22
23 Note:
24     The resource_id format follows: 'CONSOL_PHARMACY_LIST_YYYYQQ' or
25     'CONSOL_PHARMACY_LIST_YYYYQQFINAL' where:
26     - YYYY: Financial year start (e.g., 2025 for 2025/26)
27     - QQ: Quarter identifier (Q1, Q2, Q3, Q4)
28     - FINAL: Optional suffix indicating finalised data (e.g., 'CONSOL_PHARMACY_LIST_202526Q1FINAL')
29
30     Resource ID name variations exist - some datasets include the 'FINAL' suffix
31     while others do not. Both formats are valid and should be checked in the
32     NHSBSA Open Data Portal for the specific dataset version.
33 """
34
35 import json
36 import sys
37 import re
38 from pathlib import Path
39 import urllib.request
40
```

Example output and sample python function

Demo use only

- Results are printed to console

```
print(f"\nTotal number of pharmacies in {financial_year}: {total_pharmacies},")  
print(f"Total pharmacy operation hours (weekly) in {financial_year}: {total_weekly_hours} hours")  
print(f"Average weekly hours per pharmacy: {average_weekly_hours:.2f} hours")
```

The screenshot shows a terminal window with the following content:

```
Problems Output Debug Console Terminal Ports Prompt flow GitLens  
chaey@chaeyoona MINGW64 ~/Desktop/OneDrive/Documents/GitHub/community  
$ C:/Users/chaey/AppData/Local/Microsoft/WindowsApps/python3.12.exe c  
● pharmacy-workforce-with-open-data/data/nhsbsa-pharmacy-england-hrs.py  
  
Total number of pharmacies in 2025/26: 10,522  
Total pharmacy operation hours (weekly) in 2025/26: 546,264.13 hours  
Average weekly hours per pharmacy: 51.92 hours  
  
chaey@chaeyoona MINGW64 ~/Desktop/OneDrive/Documents/GitHub/community  
$
```

- The output can serve as the required input in subsequent modelling stages

```
376 def calculate_workforce_ops_fte(average_weekly_hours, total_pharmacies,  
377 fte_weekly_hours=config.FTE_WEEKLY_HOURS,  
378 utilisation_rate=config.UTILISATION_RATE):  
379     """  
380     Calculate total workforce operation FTE based on pharmacy operation hours.  
381     """  
382     Calculates the total Full-Time Equivalent (FTE) workforce required for operations  
383     to cover all pharmacy operation hours across all pharmacies. This represents  
384     the minimum workforce needed to keep pharmacies operational during opening hours.  
385  
386     Formula: Workforce Ops FTE = FTE_per_pharmacy * total_pharmacies  
387     Where: FTE_per_pharmacy = average_weekly_hours / (fte_weekly_hours * utilisation_rate)  
388  
389     Args:  
390         average_weekly_hours: Average weekly operation hours per pharmacy (from NHSBSA data)  
391         total_pharmacies: Total number of pharmacies (from NHSBSA data)  
392         fte_weekly_hours: Standard FTE working hours per week (default: config.FTE_WEEKLY_HOURS)  
393         utilisation_rate: Workforce utilisation rate (default: config.UTILISATION_RATE)  
394  
395     Returns:  
396         dict: Workforce operation calculation with keys:  
397             - 'fte_per_pharmacy': float - FTE required per pharmacy  
398             - 'workforce_ops_fte': float - Total workforce operation FTE across all pharmacies  
399         """  
400  
401     # Calculate effective FTE working hours per week (accounting for utilisation)  
402     effective_weekly_hours = fte_weekly_hours * utilisation_rate  
403  
404     # Calculate FTE per pharmacy  
405     fte_per_pharmacy = average_weekly_hours / effective_weekly_hours  
406  
407     # Calculate total workforce operation FTE across all pharmacies  
408     workforce_ops_fte = fte_per_pharmacy * total_pharmacies  
409  
410     return workforce_ops_fte
```

(e.g, 10522 if querying API 2025/26 1Q)

List of data

Essential

General Pharmaceutical Council (GPhC) registers data

Community Pharmacy Workforce Survey (CPWS)

NHSBSA Consolidated Pharmaceutical List

Potential

NHSBSA Hospital Prescribing Dispensed in the Community

ONS nomis - Census 2021 estimates that classify usual residents in England and Wales by single year of age

Q&A

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GitHub repository:

[https://github.com/chaeyoonyunakim
/community-pharmacy-workforce-
with-open-data](https://github.com/chaeyoonyunakim/community-pharmacy-workforce-with-open-data)



Chaeyoon Kim

Data Scientist | Python/PySpark, Tableau |
Building communities for knowledge sharing



Thank you, NHS England