

# Design a model for Community pharmacy workforce with open source data

Prepared by Chaeyoon Kim

Data Scientist, Workforce Training and Education – Data and Analytics  
NHS England

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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?

	A	B	C	D
1	<u>Prescribers on the GPhC register (August 2025)</u>			
2				
3	<b>Total prescribers</b>			
4	Type of prescriber	No of pharmacists	% of pharmacists	
5	Independent prescriber	23,471	35.2%	
6	Supplementary prescriber only	201	0.3%	
7	Pharmacists with no annotations	43,025	64.5%	
8	<b>TOTAL prescribers</b>	<b>23,672</b>	<b>35.5%</b>	
9	<b>TOTAL pharmacists</b>	<b>66,697</b>	<b>100%</b>	

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

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

PROG

Type of prescriber  
Independent  
Supplementar  
Pharmacists

what does this mean?

Show thinking

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.

PROG

Type of prescriber  
Independent  
Supplementar  
Pharmacists

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

Show thinking

This image refers to different types of GPhC-registered pharmacists in the UK, distinguished by their prescribing rights.

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.

3

# 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](#)

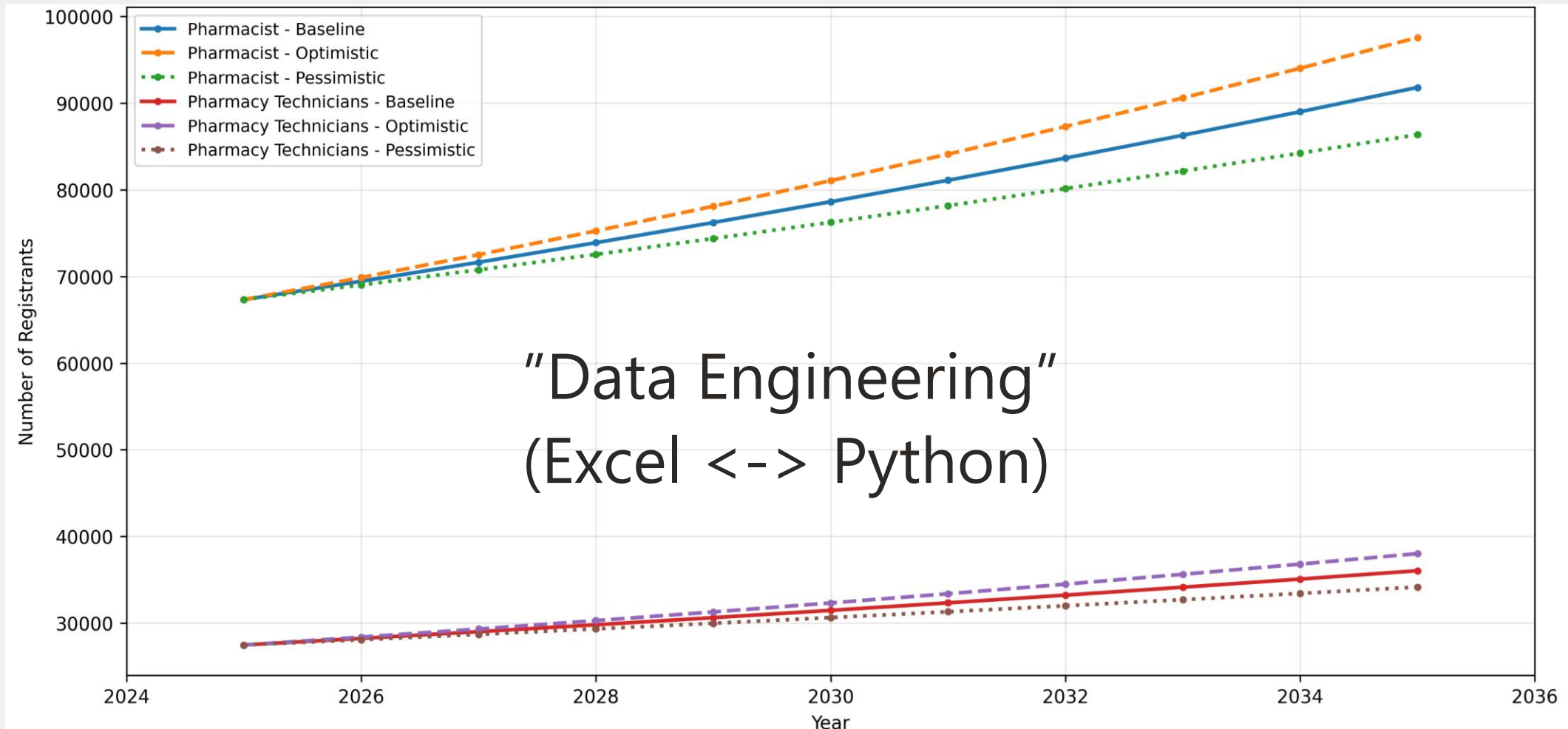
In future sessions:

[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](#)

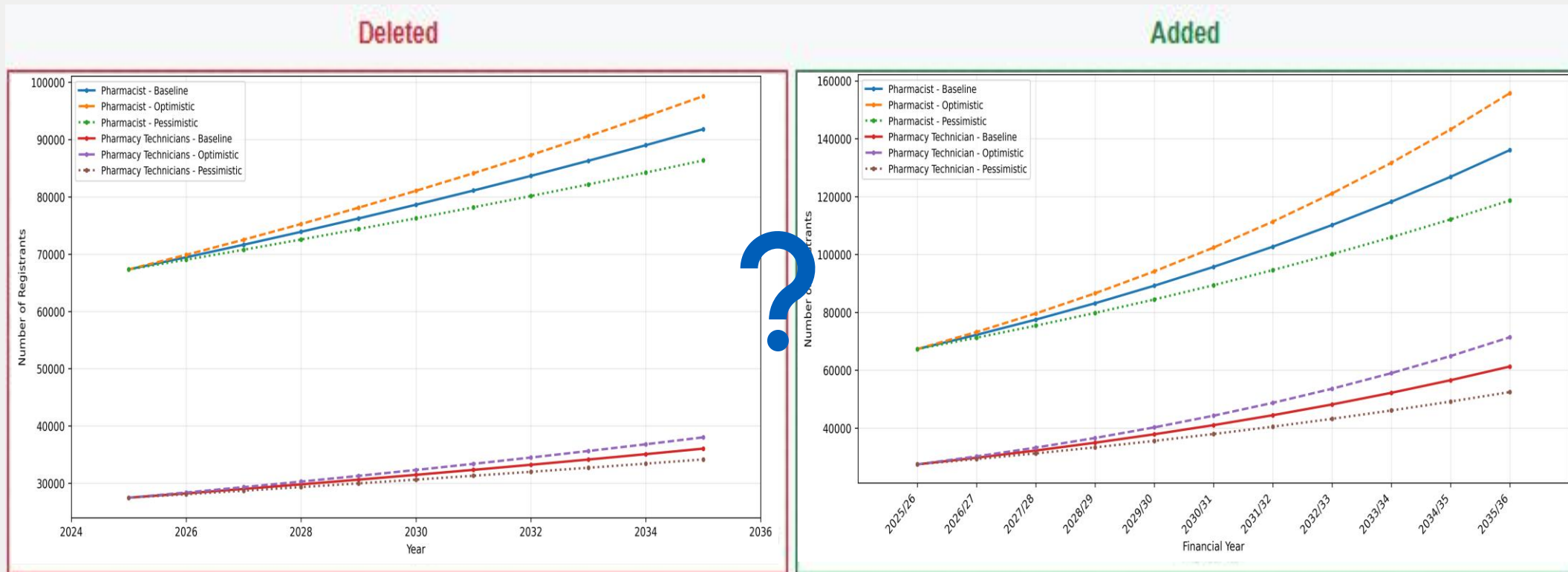
# Initial workforce model – based on Sep25 actuals

[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)

## Baseline and Annual Growth Rates (CAGR)

Growth Rate Calculation Period: 7 year(s) (2018-2025)

Projection Period: 10 years

Note: Annual Growth Rate = Compound Annual Growth Rate (CAGR)

### Pharmacist:

Baseline: 18,926.58922

CAGR (Average Annual Growth Rate): 2.80%

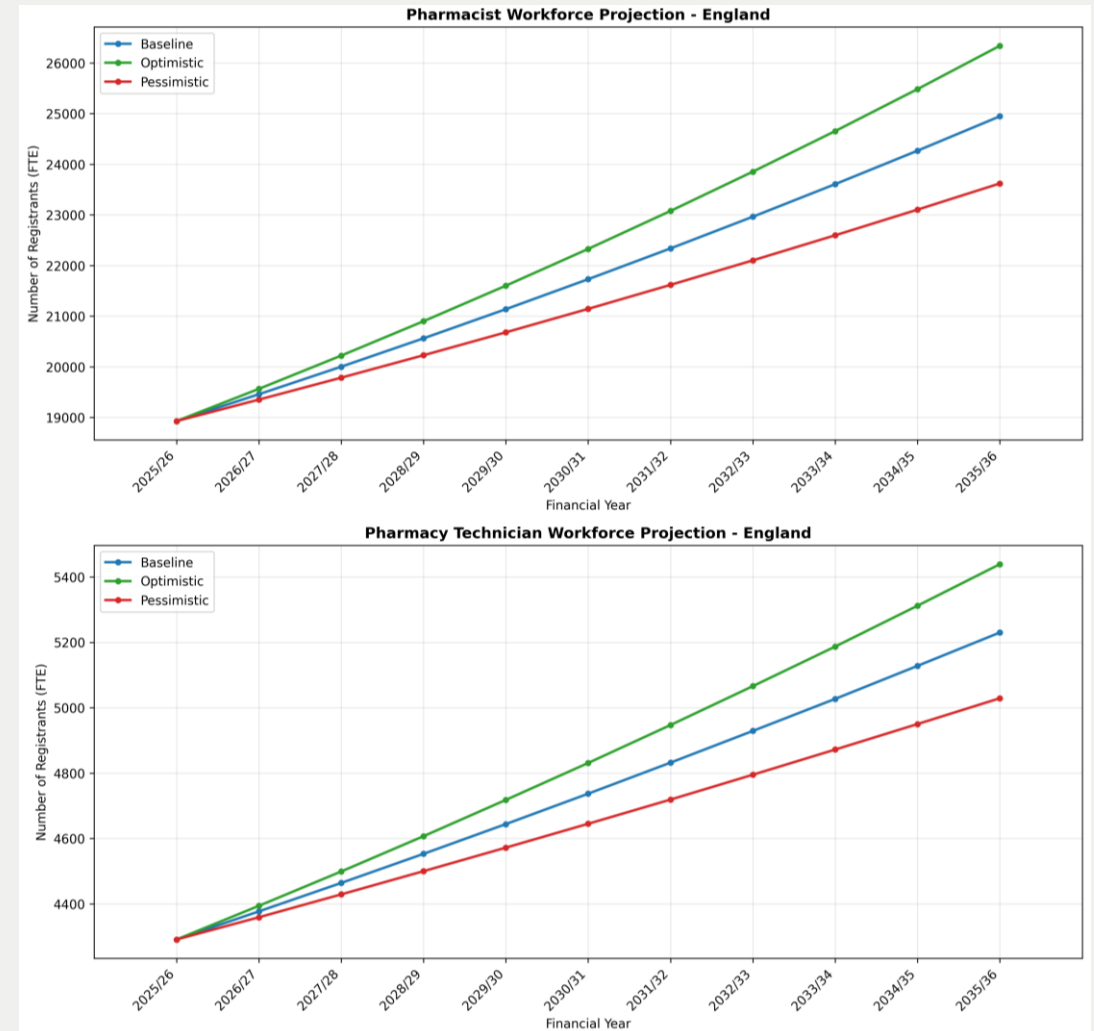
Annual Change Estimate: 1,399 registrants/year

### Pharmacy Technician:

Baseline: 4,290.735455

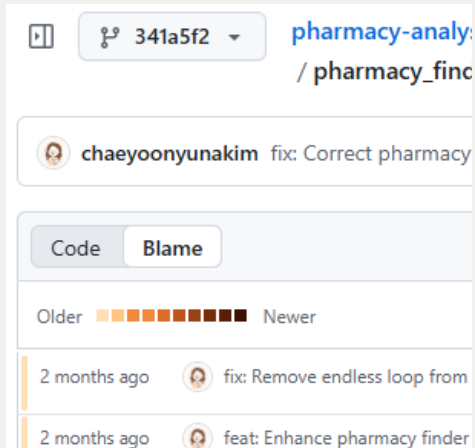
CAGR (Average Annual Growth Rate): 2.00%

Annual Change Estimate: 414 registrants/year

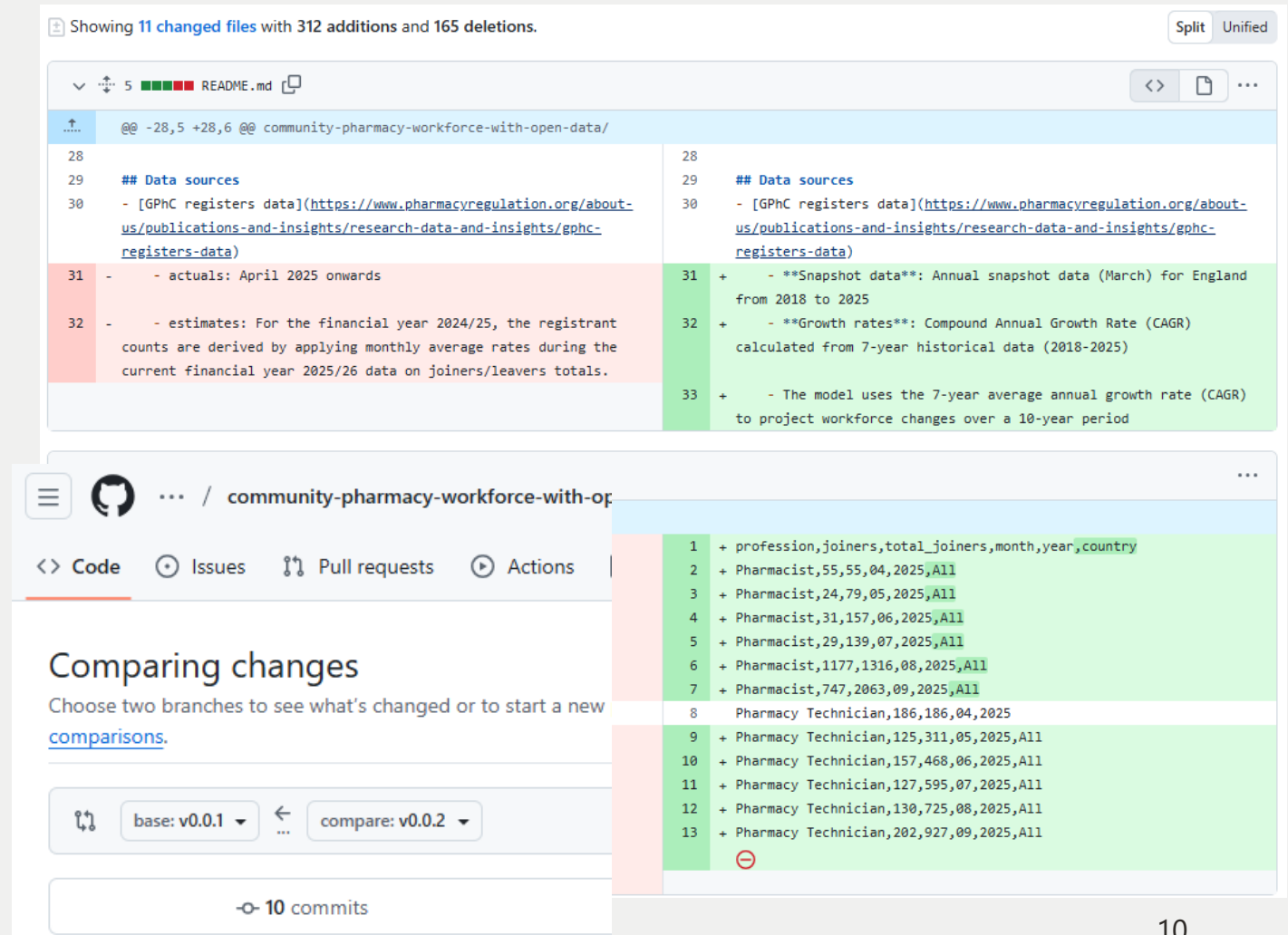


# Advantages of working on GitHub

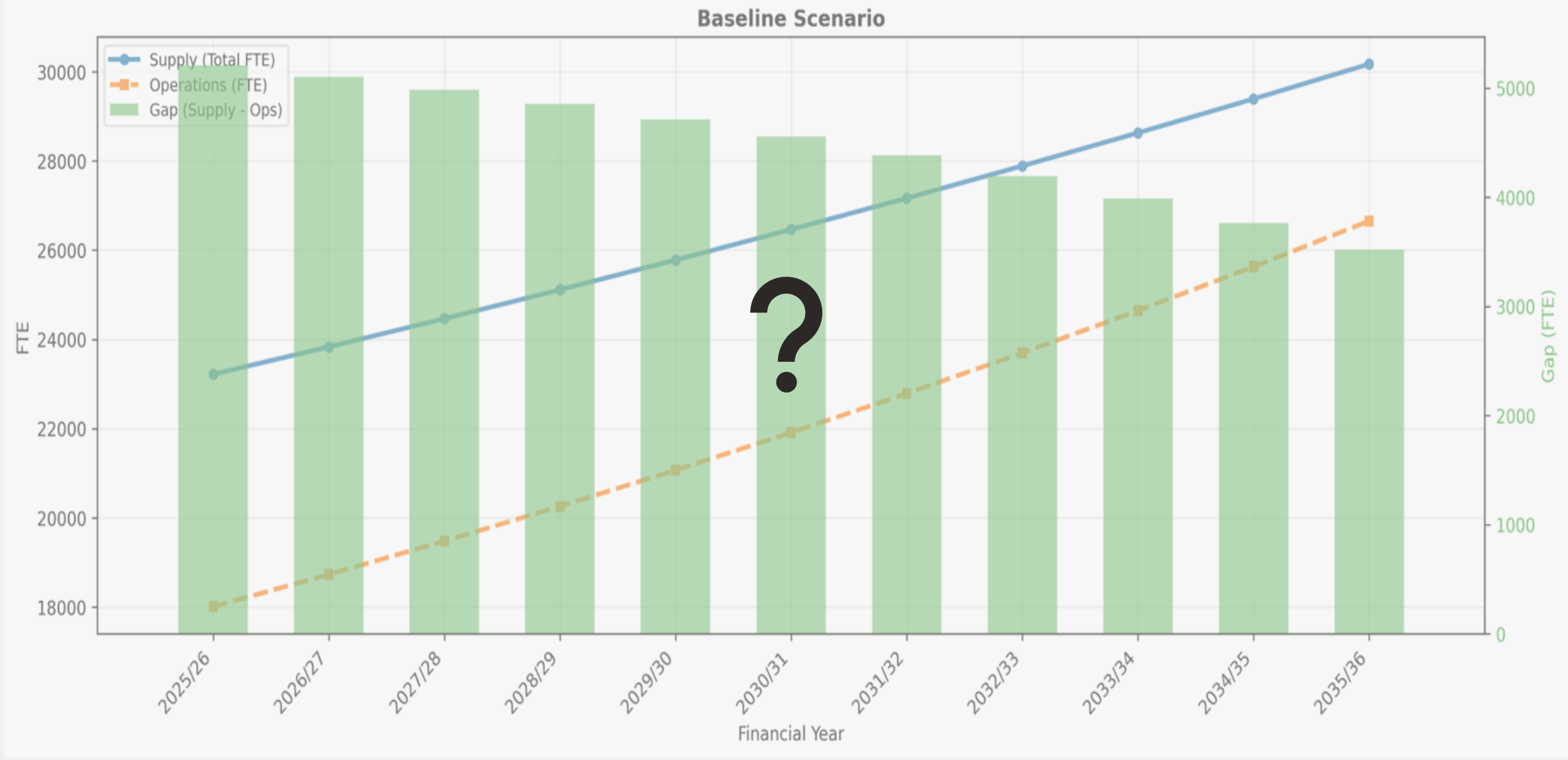
- Essential for version history



- 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](#))

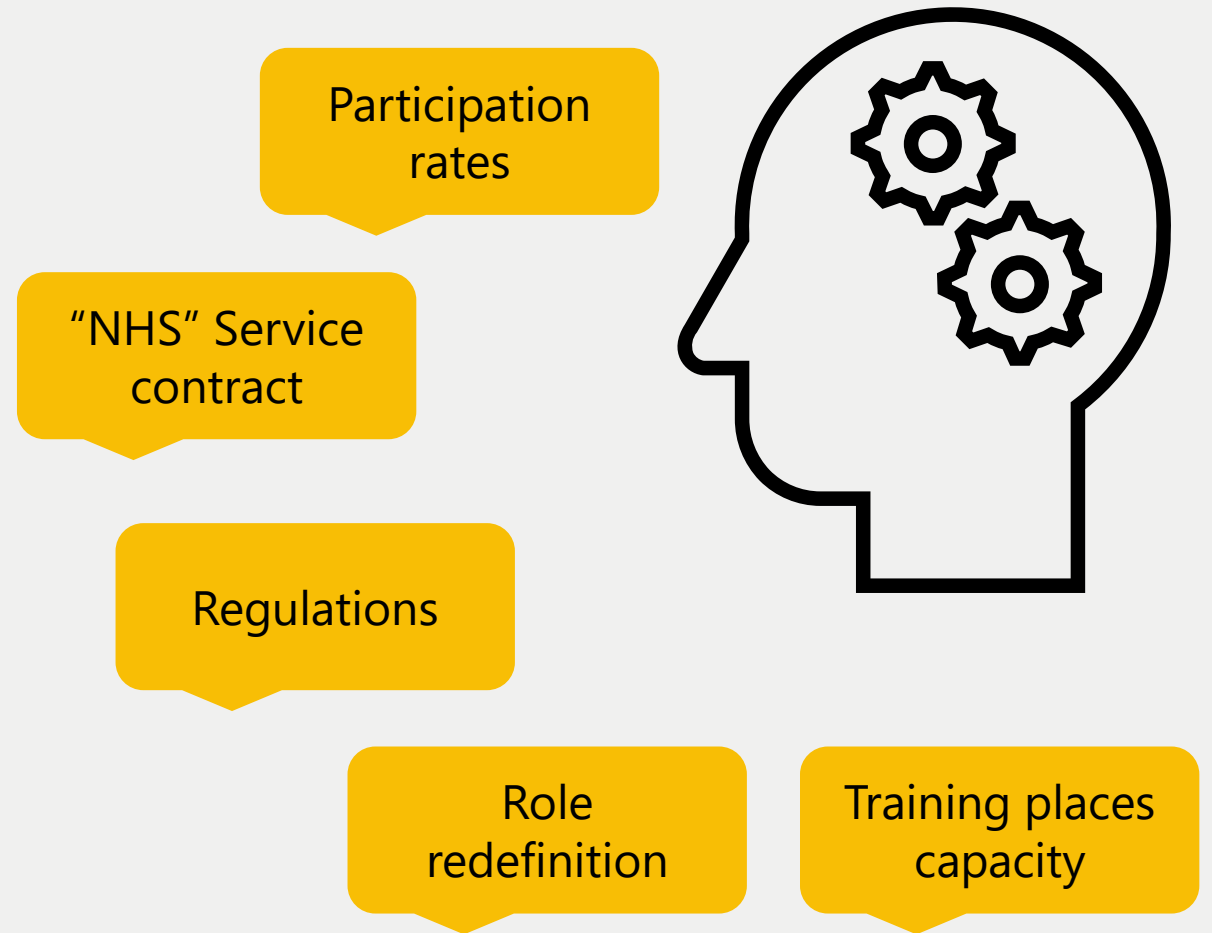


# Comparing projections – supply validation




# 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](#)



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Home / Themes / Dispensing Contractors / Consolidated Pharmaceutical List / CONSOL PHARMACY LIST\_202526Q1FINAL

Consolidated Pharmaceutical List - 2025-26 Quarter 1

DownloadData API

Report an issue

Data Explorer

Add Filter

Grid10522 records1 - 100Data Explorer options

PHARM...	HEALTH...	PHARM...	ORGANI...	ADDRE...	ADDRE...	ADDRE...	ADDRE...	POST_C...	PHARM...	MON_T...	PHAF
FP773	MANCH...	BOOTS	BOOTS ...	TERMIN...	MANCH...	MANCH...		M90 3HG	04:00-17...	13	04:1
FMX53	WEST S...	BOOTS	BOOTS ...	UNIT 5	ARRIVA...	GATWIC...	WEST S...	RH6 0NN	05:00-21...	16	05:1
FXP23	HILLING...	BOOTS	BOOTS ...	TERMIN...	HEATHR...	HOUNS...	MIDDLE...	TW6 1QG	05:30-21...	16	05:1
FKT19	HILLING...	BOOTS	BOOTS ...	UNIT 24 ...	TERMIN...	HEATHR...	MIDDLE...	TW6 2RQ	05:30-22...	16.5	05:1
FV462	BURY	ASDA P...	ASDA S...	SPRING...		BURY	LANCAS...	BL9 0RN	06:00-21...	15	06:1
FEX27	MANCH...	BOOTS	BOOTS ...	UNIT 5	PICCADI...	MANCH...		M1 2BN	06:00-21...	15.5	06:1
FQE18	LANCAS...	ACCRIN...	ACCRIN...	188 BLA...		ACCRIN...		BB5 0AQ	06:00-23...	17	06:1
FGJ61	ST HEL...	FOUR A...	ST HEL...	1&2 FO...	FOUR A...	ST HEL...		WA9 4BZ	06:00-23...	17.9833...	06:1
FKK25	ST HEL...	TESCO I...	TESCO ...	ST HEL...		ST HEL...	MERSE...	WA9 3AL	08:00-22...	14.5	06:1
FP793	WARRIN...	TESCO I...	TESCO ...	WINWIC...		WARRIN...	CHESHI...	WA2 7NE	08:00-22...	14.5	06:1
FXN75	UNVER...	TESCO I...	TESCO ...	TESCO ...	DARK B...	UNVER...	MERSE...	LA 4VE	08:00-22...	14.5	06:1

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_
```

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

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

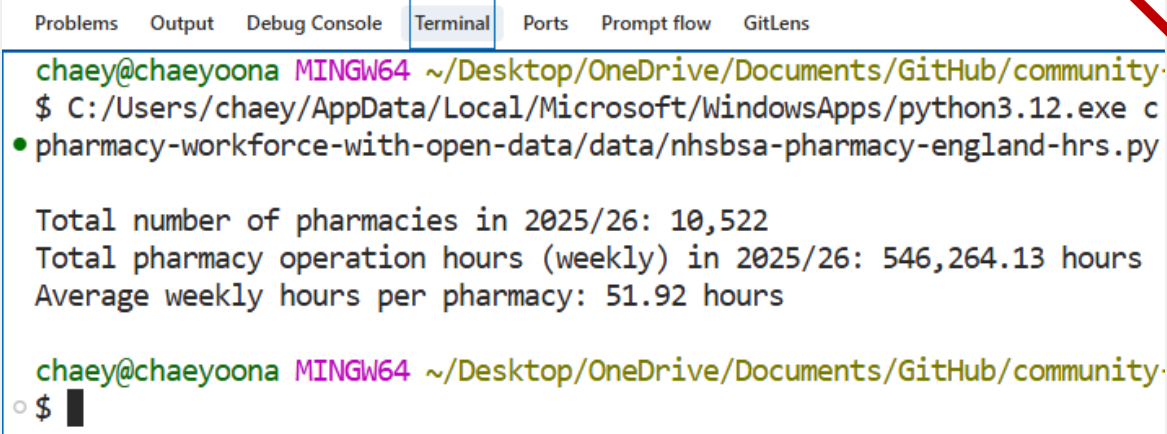
```
Code Blame
1  """
2  NHS Business Services Authority (NHSBSA) Consolidated Pharmaceutical List Data Extraction.
3
4  This module automates the extraction of pharmacy data in England using the NHSBSA Open Data Portal API.
5  It retrieves the total number of pharmacies and calculates total pharmacy 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:,}")
print(f"Average weekly hours per pharmacy: {average_weekly_hours:.2f} hours")
```



```
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

Email:

[chaeyoon.kim@nhs.net](mailto:chaeyoon.kim@nhs.net)

GitHub repository:

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

**Thank you, NHS England**



**Chaeyoon Kim**

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

