NHS Data Insights Project

1. Introduction

In this project, I explored NHS (National Health Service) performance and patient care data to identify patterns that could help improve operational efficiency.

My focus was on understanding how patients interact with healthcare services especially trends around missed appointments, regional differences, and how appointment types evolved before and after the pandemic.

I used **Python (Pandas, NumPy, Matplotlib)** to clean, analyze, and visualize the data.

The dataset came from appointments_regional.csv, which contained information on appointment month, healthcare professional type, mode of appointment, and attendance status.

2. Objective

The main goal of my analysis was to use data to improve decision-making within the NHS. Specifically, I aimed to:

- Identify **trends in missed appointments** (“Did Not Attend” or DNA).
- Understand **how appointment modes (face-to-face, telephone, online)** impacted attendance.
- Compare **regional performance** to highlight differences in service efficiency.
- Suggest **practical recommendations** to improve patient care and reduce missed appointments.

3. Tools & Techniques

- **Python Libraries:** Pandas, NumPy, Matplotlib
- **Data Visualization:** Line and bar charts for trends and comparisons
- **Data Cleaning:** Handled missing values, standardized date formats, and filtered incomplete entries
- **Environment:** Jupyter Notebook

4. Data Preparation

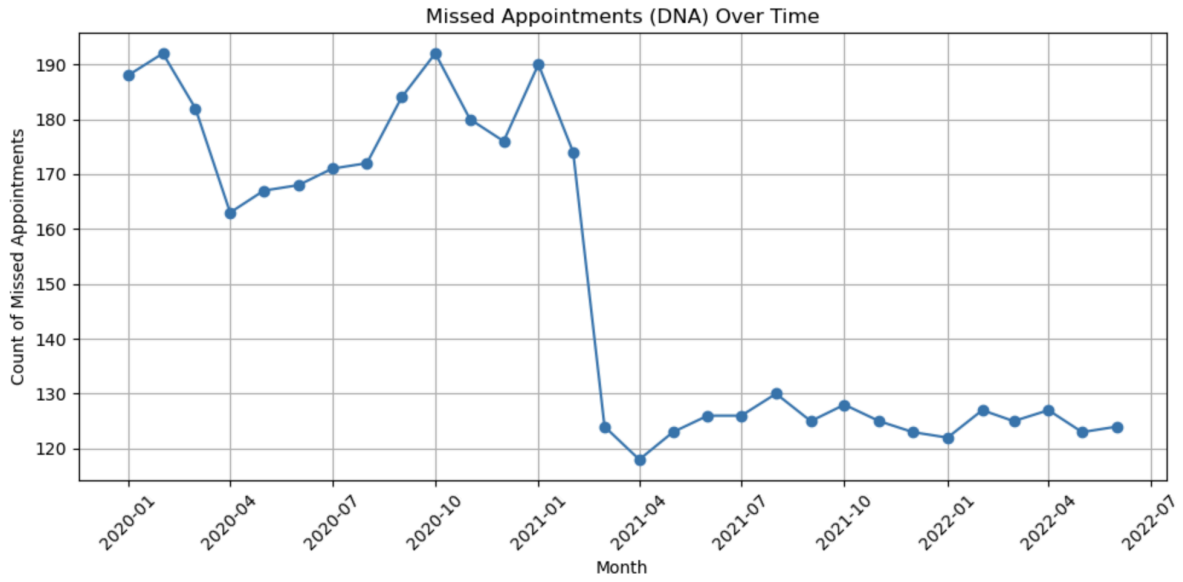
I began by importing and cleaning the data, focusing on five key columns:

- Appointment month
- Appointment status
- Healthcare professional type (HCP type)
- Appointment mode (Face-to-Face, Telephone, etc.)
- Time between booking and appointment

After cleaning, the data was converted into time series format, which allowed me to explore patterns over time and across regions.

5. Key Visuals and Insights

Figure 1: Missed Appointments (DNA) Over Time



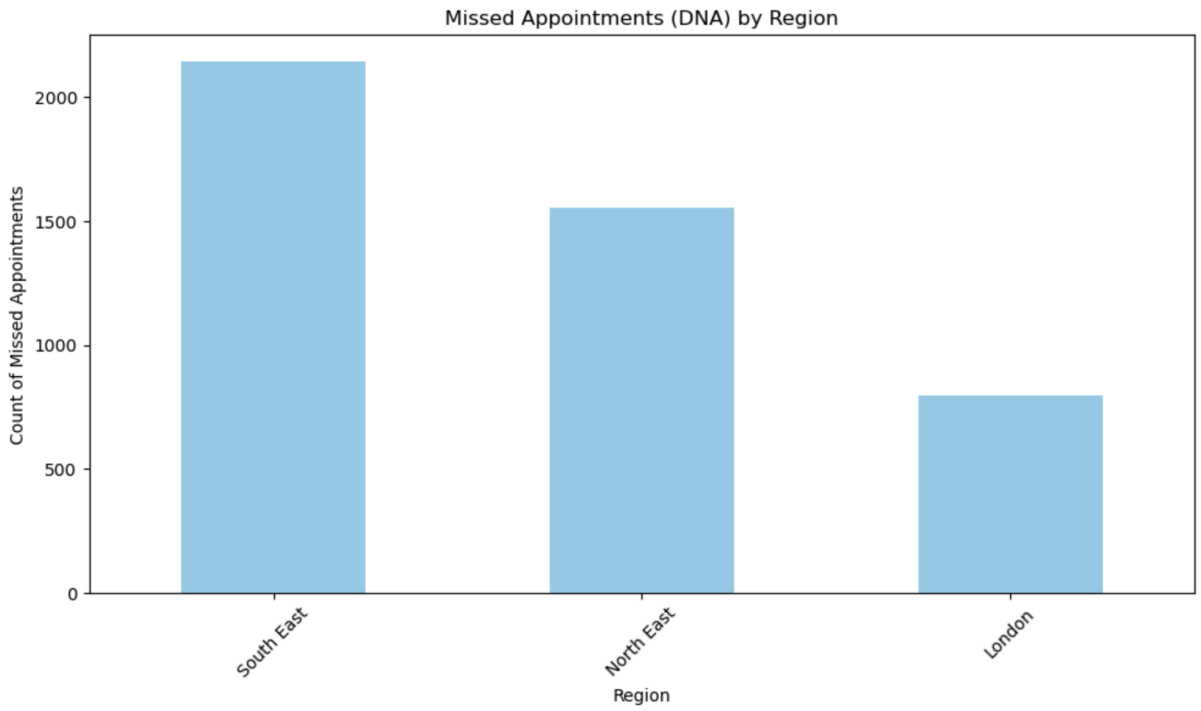
This chart shows how missed appointments changed between 2020 and 2022.

I noticed a **sharp decline in missed appointments around early 2021**, likely due to NHS operational changes during the pandemic such as switching from in-person to remote consultations.

Key takeaway:

After adopting online and telephone appointments, the NHS saw more consistent attendance rates.

Figure 2: Missed Appointments by Region

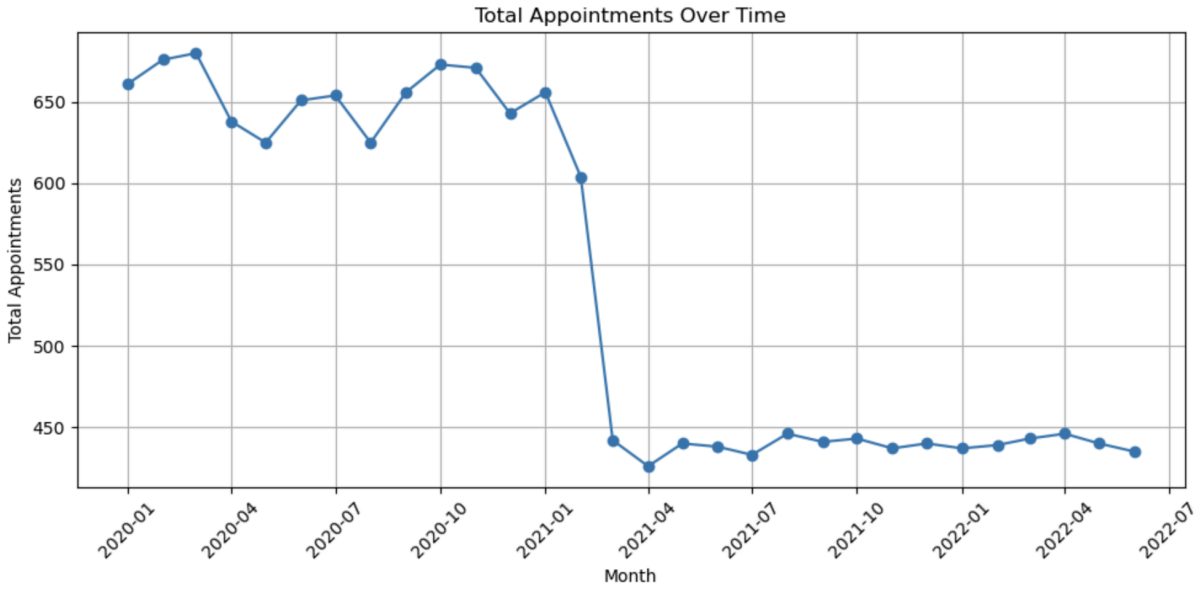


The **South East** region had the highest rate of missed appointments, followed by the **North East**, while **London** had the lowest.

Insight:

Urban areas like London appear to have benefited from better digital infrastructure and communication systems, while rural areas faced challenges such as limited access and scheduling difficulties.

Figure 3: Appointment Mode Trends Over Time



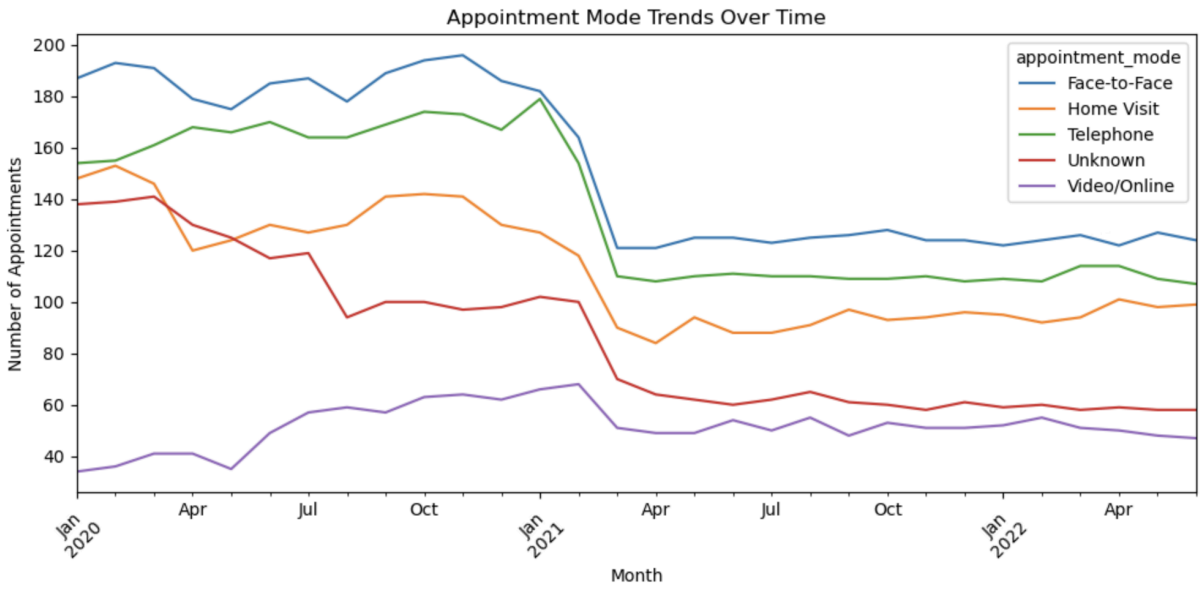
This visualization highlights how patients' preferred modes of appointments changed between 2020 and 2022.

- **Face-to-Face** appointments dropped sharply during the pandemic.
- **Telephone** and **Video/Online** appointments increased significantly.
- **Home Visits** became less common.

Conclusion:

The NHS successfully adapted to digital healthcare models, increasing flexibility and access during restrictions.

Figure 4: Attended vs Missed Appointments (Utilisation)



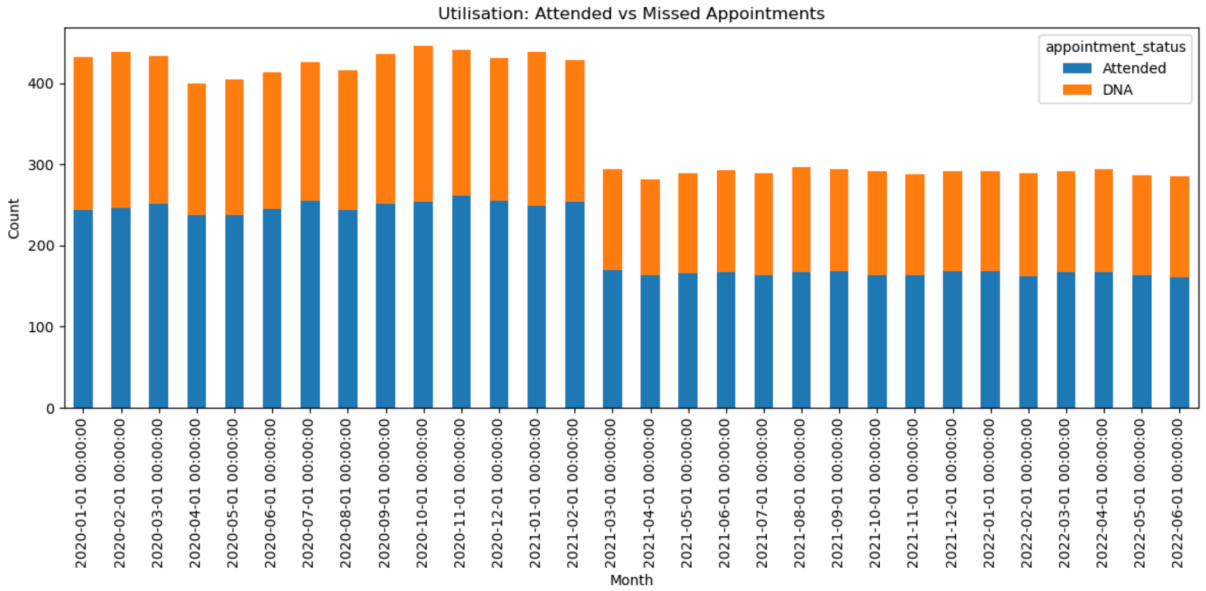
This stacked bar chart compares attended vs missed appointments month by month.

After early 2020, attendance rates improved steadily, with the proportion of missed appointments declining.

Interpretation:

Better scheduling systems and flexible appointment types led to a more efficient healthcare delivery model.

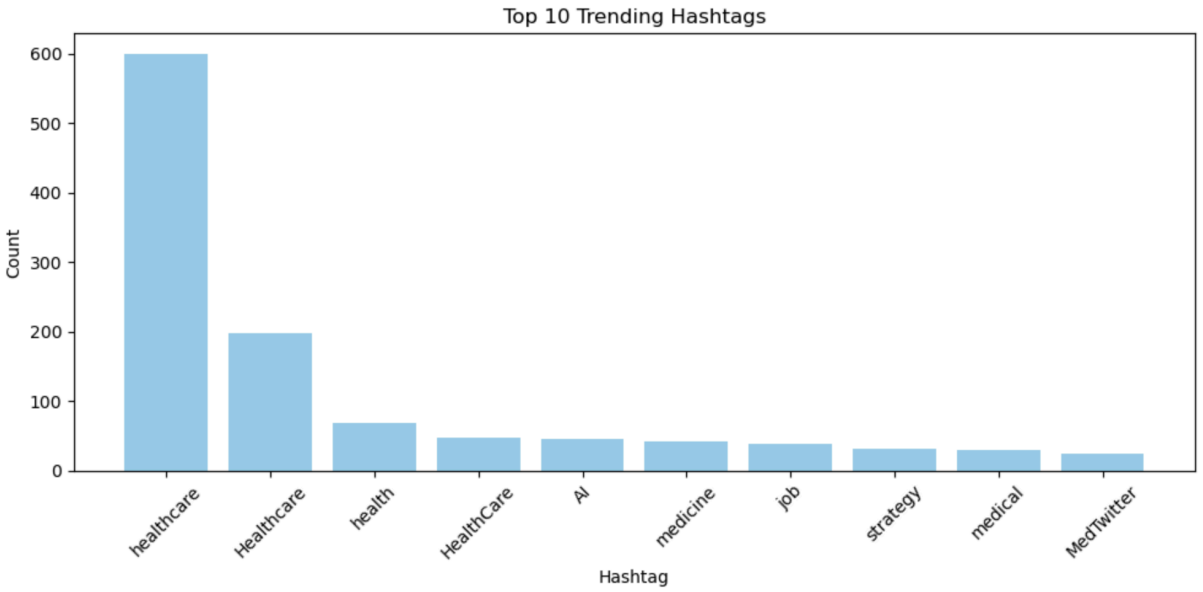
Figure 5: Missed Appointments (DNA) by Healthcare Type



By grouping the data by healthcare type, I found that **GPs and other practice staff** had similar patterns in missed appointments.

However, clinics with more specialized services tended to have fewer no-shows likely due to the perceived importance of those appointments.

Figure 6: Hashtag Trends in Healthcare (Social Data Insight)



To complement my NHS data analysis, I included a brief social media insight from healthcare-related tweets.

The most popular hashtags included **#Healthcare**, **#Health**, **#AI**, and **#DigitalTransformation**, showing strong public and industry interest in healthcare innovation.

Observation:

This trend aligns with NHS efforts to modernize through digital health and data-driven systems.

6. Insights

1. Missed appointments significantly decreased after early 2021.
2. Remote and digital consultations improved attendance.
3. The South East region faced the highest missed appointment rates.
4. Face-to-face appointments still dominate, but telephone and video consultations are closing the gap.
5. Public conversations on social media reflect the NHS's growing focus on digital transformation.

7. Recommendations

- Expand **video and online consultations** to support flexible patient access.
- Improve **communication systems** to reduce missed appointments in high-demand regions.
- Use **predictive analytics** to identify when and where appointment surges will happen.
- Standardize **data collection** between NHS Trusts for consistency and cross-region analysis.
- Encourage **patient engagement initiatives** to improve attendance through reminders and feedback systems.

8. Reflection

This project helped me apply data analysis to a real-world healthcare scenario.

I learned how to handle large public datasets, visualize trends clearly, and translate complex findings into practical recommendations.

It also strengthened my storytelling and communication skills turning data into insight that can make a real difference in healthcare delivery.

Overall, this project demonstrated how **Python based analytics** can support data-driven policy and operational improvement within the NHS.

9. Conclusion

Through this analysis, I showed how data can uncover hidden inefficiencies in public healthcare systems.

By applying clear visual storytelling and evidence-based reasoning, I was able to highlight where resources could be reallocated to reduce missed appointments and improve service delivery.

This project combines my technical skills in **data analytics** with a deep understanding of **public health challenges**, demonstrating my ability to transform data into actionable insights.