Introduction & Background

This report presents a comprehensive analysis of NHS GP appointments, exploring trends in capacity utilisation, seasonal variations, missed appointments, and digital healthcare adoption. By integrating findings from both operational data analysis and public sentiment insights, this report provides a well-rounded perspective on the challenges facing NHS England and offers recommendations for both short-term and long-term improvements.

The NHS incurs significant financial and social costs due to missed GP appointments. To tackle this issue, the NHS aims to develop a data-driven approach to:

- Assess capacity utilisation and resource planning
- Analyse if there's adequate staff and capacity in the networks.

This analysis is based on three NHS datasets containing appointment records from August 2021 to June 2022.

Analytical Approach

Three datasets were imported, cleaned, and analysed using Python. Each dataset contains information on NHS appointment volumes across various locations from 1 August 2021 to 30 June 2022. A descriptive analysis was conducted to validate the data, identify underlying trends, and assess its overall structure. This initial review focused on understanding the number of records, column structures, and data types within each file.

Key Findings from the Initial Analysis:

- 106 NHS locations were recorded, with six locations tied for the highest number of records (1,484 each).
- Five service settings were identified, listed in order of frequency: General Practice, Primary Care Network, Extended Access Provision, Other, and 'Unmapped'.
- 18 national categories were observed, with 'Inconsistent Mapping' being the most frequent.
- Three appointment statuses were recorded, ranked by frequency: Attended, Unknown, and DNA (Did Not Attend).
- November 2021 had the highest number of appointments across all locations.
- On average, 74,308 appointments were recorded per month.

Following this initial exploration, further analysis led to three key insights:

1) Unmapped Appointments

A significant number of 'Unmapped' appointments were identified across various service settings and context types. Additionally, the 'Inconsistent Mapping' national category appeared frequently, indicating potential data recording inconsistencies.

2) Seasonality Trends

Appointment volumes peaked between September and November 2021, with smaller peaks observed in March and May 2022. When categorized by season (Summer, Autumn, Winter, and Spring), General Practice remained the dominant service setting. However, ‘Unmapped’ appointments were most frequent in Summer and Autumn, suggesting that busier months may correspond to higher data classification inconsistencies.

3) Capacity Utilisation

Resource utilisation (total appointments per month divided by 30 days) closely mirrored seasonal demand but exceeded 100% in October and November 2021. This indicates that additional resources may be required during these peak periods to accommodate demand effectively.

Visualisation & Insights

To uncover meaningful patterns that could benefit the NHS, data was analysed at monthly, seasonal, and aggregate levels. Line plots were employed to visualize trends over time, allowing for a structured examination of key insights. This analysis was conducted in three phases, as outlined below.

1) Resource Utilisation & Staffing Needs

The first stage focused on evaluating actual resource utilisation to determine whether increasing staff levels could help manage patient demand. Appointment data from August 2021 to June 2022 revealed a clear peak between September and November, followed by a decline, with secondary peaks in March and May. A similar pattern was observed in resource utilisation (appointments divided by 30 days per month), which notably exceeded 100% in October and November. This suggests that workforce expansion during peak periods may help alleviate NHS capacity pressures.

2) Monthly Analysis of Service Settings & Data Inconsistencies

Appointments were examined on a month-by-month basis, with line plots highlighting trends in service settings, context types, and national categories. The most notable finding was the high frequency of 'Unmapped' appointments. While unmapped service settings remained stable throughout the period, unmapped context types surged between August and November, coinciding with the busiest months. Additionally, both 'Unmapped' and 'Inconsistent Mapping' categories appeared at steady levels year-round, indicating persistent data classification challenges.

3) Seasonal Trends & Consistency Across Time

In the final stage, data was categorized by season (Summer, Autumn, Winter, and Spring) to identify broader trends. A consistent seasonal pattern emerged, with General Practice appointments being the most common in all seasons. However, unmapped appointments were more prevalent in Summer and Autumn, before declining in Winter and Spring—a trend that mirrored earlier findings.

Key Takeaways from the Visual Analysis:

1) Data Capture Issues: The high volume of 'Unmapped' and 'Inconsistent Mapping' records suggests deficiencies in data entry processes, highlighting a need for improved administrative systems.
2) Seasonality Effects: The increase in unmapped appointments during peak months suggests that workload fluctuations may impact data accuracy, making seasonal resource adjustments necessary.
3) Capacity Constraints: Since demand exceeded available capacity in October and November, it is evident that NHS staffing and resource allocation need optimization during high-demand periods.

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4. Recommendations

Before proposing any recommendations, it is essential to acknowledge that correlation does not equate to causation. The findings of this analysis do not establish the root causes of the identified issues but instead provide insights into potential areas of concern. Based on the available data, the following three key recommendations are suggested:

1) Enhance Administrative Processes – The NHS should consider allocating resources to strengthen administrative systems and ensure that staff receive adequate training to accurately document appointment details (e.g., appointment types, reasons for cancellations, etc.). This is particularly crucial during peak periods when data recording accuracy may decline.

2) Anticipate Seasonal Fluctuations – Given the significant variation in appointment volumes across different times of the year, redistributing resources proactively could help reduce bottlenecks. Implementing a dynamic resource allocation model, where staff and resources are adjusted based on real-time demand rather than being concentrated in specific locations, may improve efficiency.

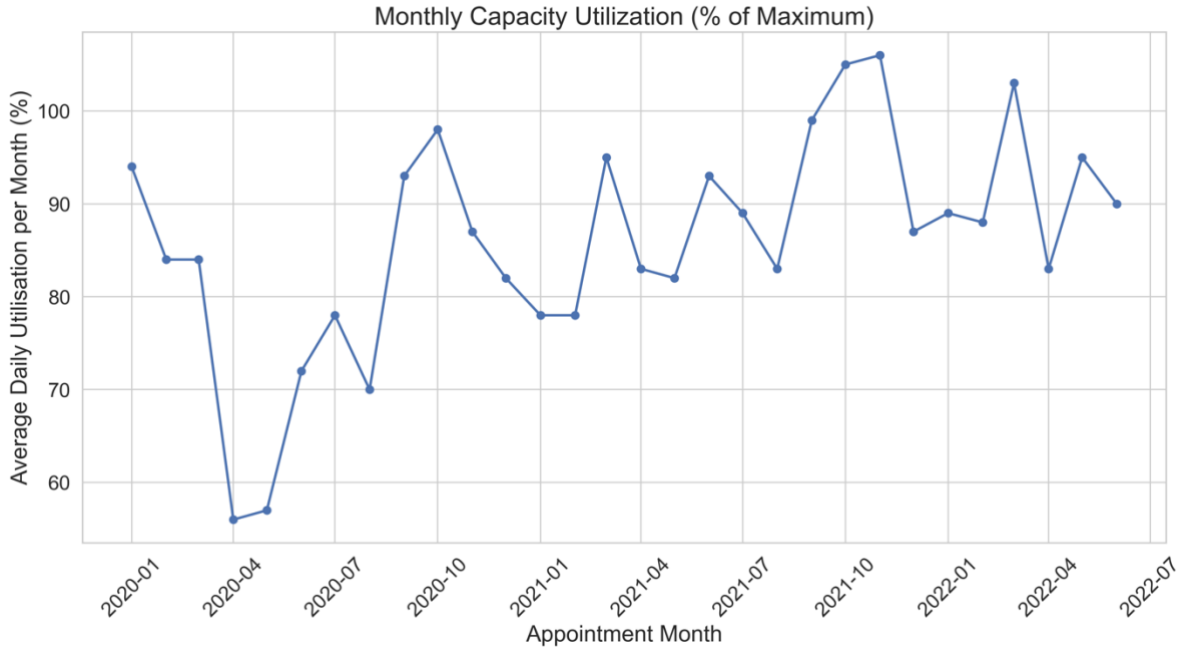
3) Expand Workforce Capacity – The NHS should evaluate options for increasing GP staffing levels to meet rising demand during peak months. Where direct recruitment is not feasible, redistributing qualified healthcare professionals to support GP services could help mitigate capacity constraints.

Resource Utilisation & Seasonal Patterns

The average utilisation rate between August 2021 and June 2022 was calculated by aggregating the total monthly appointments, dividing by 30 to obtain a daily average, and then normalizing against a baseline of 1,200,000.

As illustrated in the figure below, monthly utilisation rates increased significantly from 66% in August 2021 to 84% in November 2021, before stabilizing around 70% from December 2021 to February 2022.

This trend is in line with previous findings, which attribute higher appointment demand in late autumn and winter to seasonal illnesses such as flu and other winter viruses (NHS, 2022). The increased utilisation suggests that additional staff and resources are likely needed in these months to prevent operational strain.



Additionally, further investigation into unmapped appointments is recommended. Understanding what these appointments represent, why they occur, and why they peak during high-demand months would provide valuable insights for improving service efficiency and data accuracy.

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5. Conclusion

This analysis underscores key challenges faced by the NHS in capacity planning, data accuracy, and the evolving role of digital healthcare. While operational improvements can enhance short-term efficiency, a long-term strategy centred on digital transformation is crucial for ensuring sustainable and effective healthcare delivery.

By combining traditional data analysis with insights from public sentiment and telehealth trends, the NHS can adopt a more adaptive, data-driven approach to appointment scheduling and patient engagement.

Key Insights:

Resource Utilisation Strain – NHS capacity exceeds 100% during peak months, highlighting the need for strategic workforce adjustments.
Telehealth Growth – Increased adoption of remote consultations has improved attendance rates but requires further optimization and integration.

Patient Sentiment & Waiting Times – Long appointment wait times remain a major contributor to patient dissatisfaction, despite a largely neutral public sentiment.
Data Recording Inefficiencies – Gaps in data collection and classification require urgent intervention to enhance decision-making and resource allocation.

By addressing these areas and implementing targeted recommendations, the NHS can enhance service efficiency, improve patient experiences, and optimize resource distribution for long-term sustainability.