Evaluating General Practice Capacity in England: A Data-Driven Approach to NHS Resource Management

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LSE DA201- Data Analytics using Python - P2 2024

INTRODUCTION

> *" While it is frustrating when patients do not attend, the reasons why this happens should be investigated rather than simply resorting to punishing them. Financially penalising patients inevitably impact the poorest and most vulnerable in the community."*
>
> **The British Medical Association (BMA) Chair : Professor Philip Barnfield – On GP Practice News : 2022**

The National Health Service (NHS) in England faces the risk of significant, yet avoidable, financial losses due to missed general practitioner (GP) appointments - a problem aggravated by a limited understanding of the underlying causes, as highlighted by the BMA. To meet this challenge, the NHS aims to expand its infrastructure and resources in line with a growing population, ensure proper budgeting, and comprehend utilisation trends across its network.

OBJECTIVES OF THE ANALYSIS

- To assess opportunities for optimising GP appointment availability.
- To evaluate the utilisation of NHS GP resources

QUESTIONS ASKED

1) What are the seasonal trends in appointment bookings, waiting times, and attendance across GP settings and regions?
2) How does the use of healthcare professionals affect GP services?
3) Which consultation methods show consistent usage, and how can this inform resource allocation?
4) Did the NHS meet its daily appointment targets from 2020 to 2022?
5) What are the top NHS hashtags on X, and how can they improve the service?

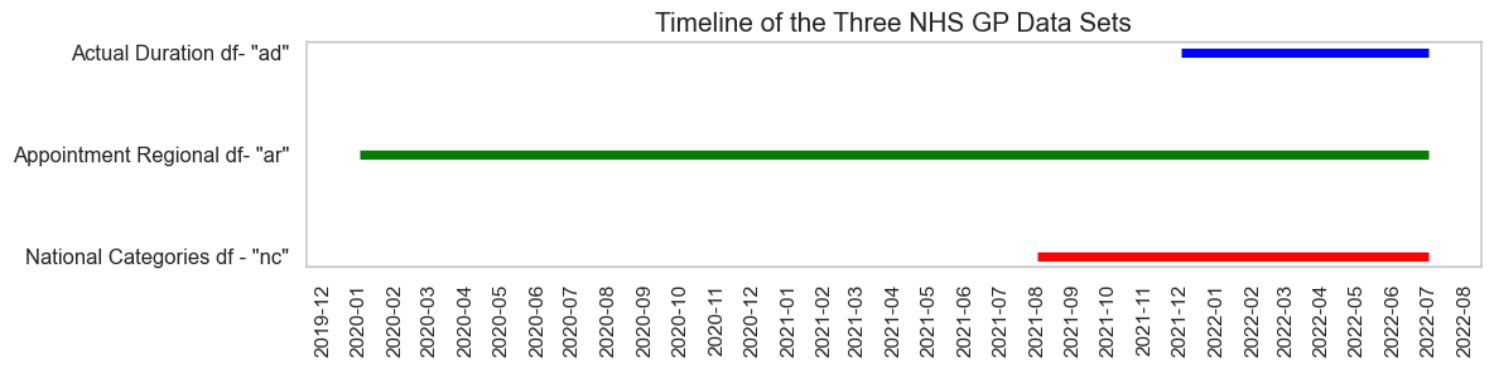
LIMITATIONS AND ASSUMPTIONS

1) Misalignment of time in data sets.
2) Lack of information provided in metadata.
3) Inconsistency of data collection / interpretation/ entry methods at the source.

Due to the global COVID-19 pandemic, the UK implemented varying levels of lockdown restrictions that continued intermittently from March 2020 until their complete removal in July 2021. It is assumed that the disruption caused by the pandemic had somewhat contributed to the inconsistencies and gaps in the provided data.

ANALYTICAL APPROACH

Three historical data sets (do) collected from NHS GP practices across England, spanning across 30 months (01/01/2020 to 30/06/2022) and healthcare related social media information from X (formerly Twitter) covering an unspecified period were used for this analysis.



Pre-Analytical Steps

- Timelines were aligned with the data frame content for accurate diagnostics. Specific time frames are detailed in each section.

- NHS England region names and codes were sourced from the UK Government Geoportal (https://geoportal.statistics.gov.uk/). This data was used to create the NHS Regional code file (*nhs_regions.csv*), which was merged with *'actual_duration.csv*' to enhance geographic analysis (*ad_regions.csv*)

- Duplicates and gaps were analysed across all data frames. A total of 21,604 duplicates were removed from 'Appointment Regional Data Frame' (*ar_df*), resulting in the cleaned data frame *'ar_clean_df'* for analysis.

DATA ANALYSIS

Analytical tools

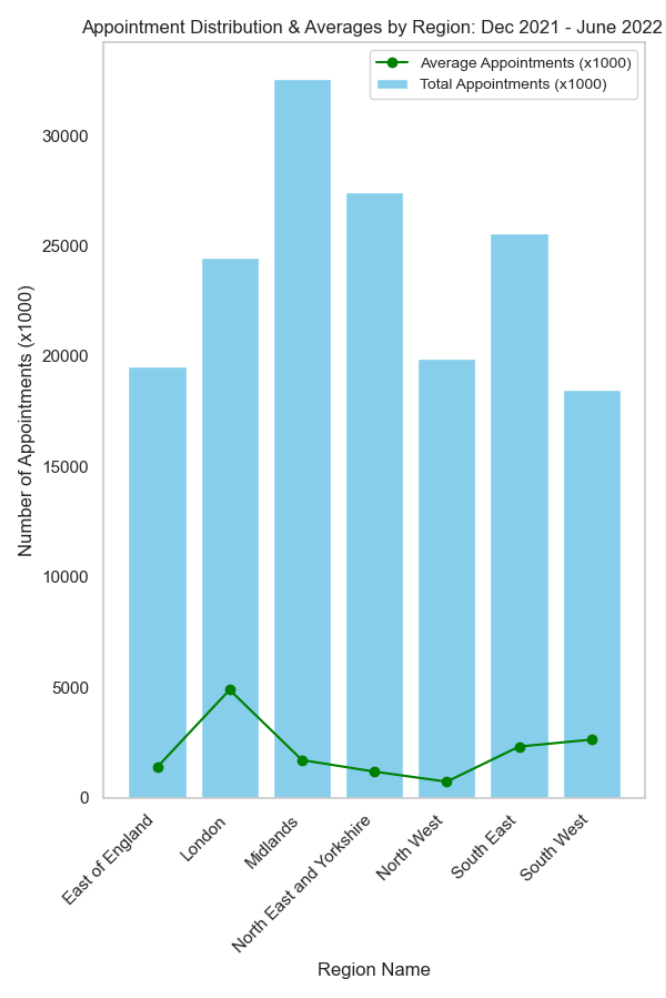
- Python with essential libraries and modules
- Python, Matplotlib/Seaborn documentation
- Stack Overflow and ChatGPT

Regional Data

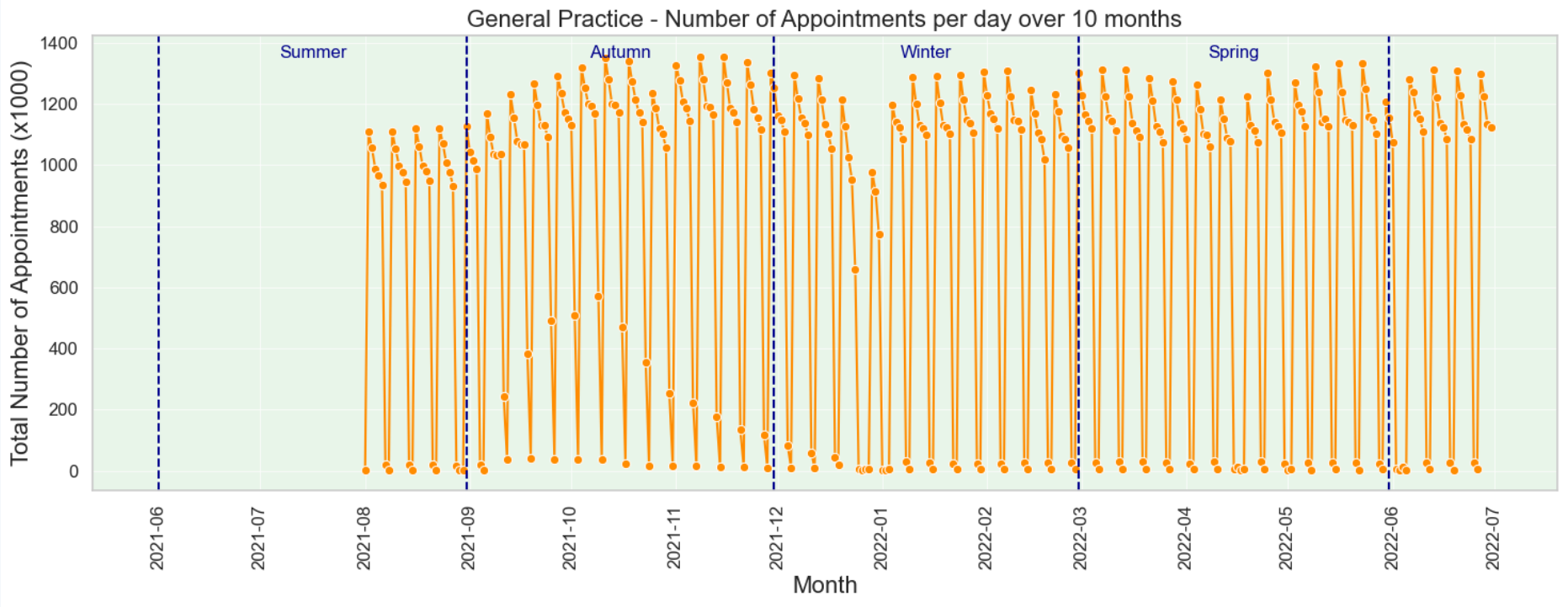
NHS England is divided into 7 regions, which are further subdivided into 42 Integrated Care Boards (ICBs) and 106 Sub-ICBs. Between December 2021 and June 2022, a total of 167,980,692 GP appointments were reported.

- London had the highest average GP appointments. Midlands recorded the highest total. This indicates that the Midlands may have a larger population and more service points, driving the overall appointment numbers.

- This also suggests differences in regional demand, infrastructure, and resource allocation. Seasonal factors and possible data inconsistencies may have also influenced these patterns.

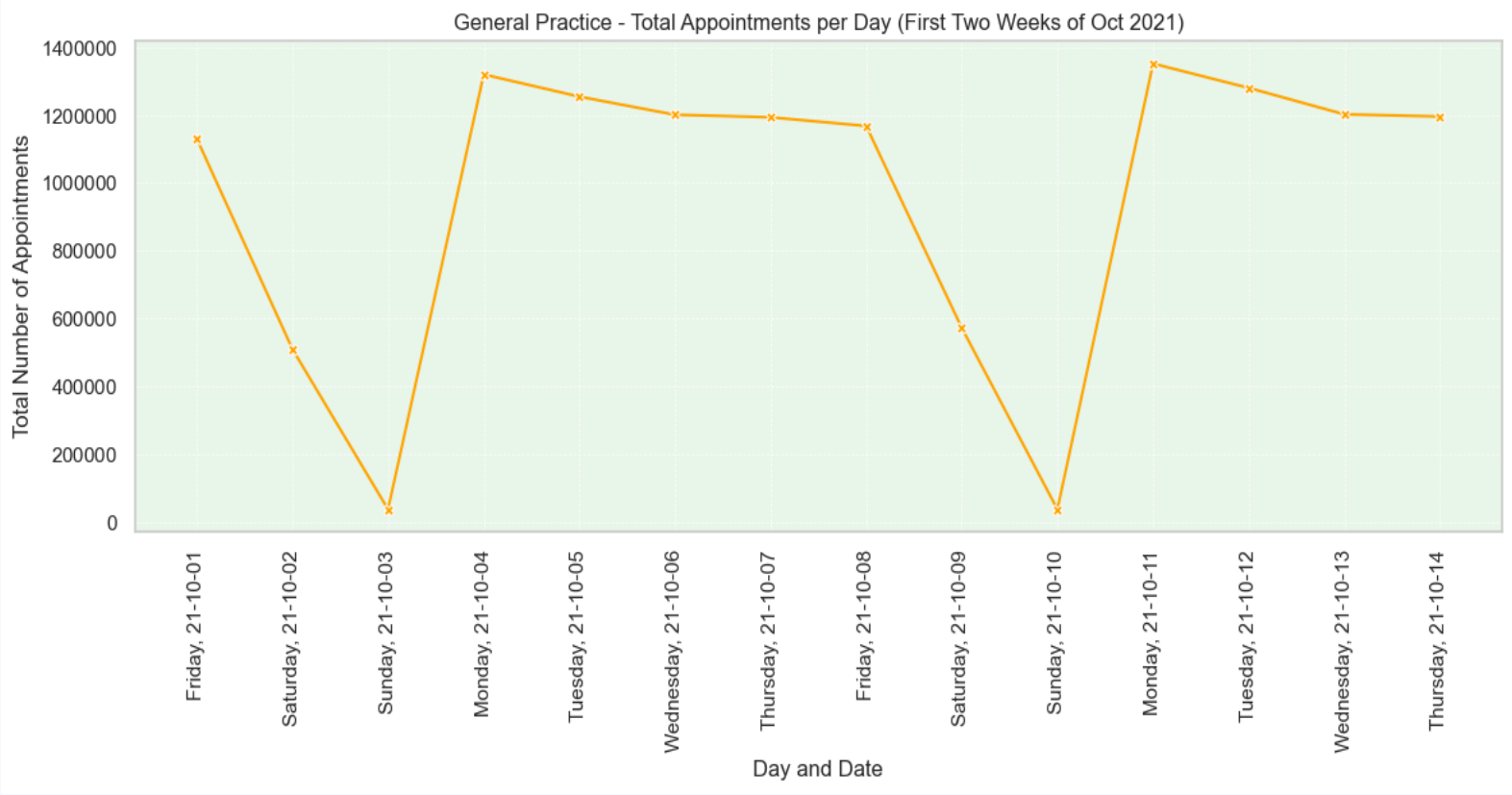


Seasonal Trend



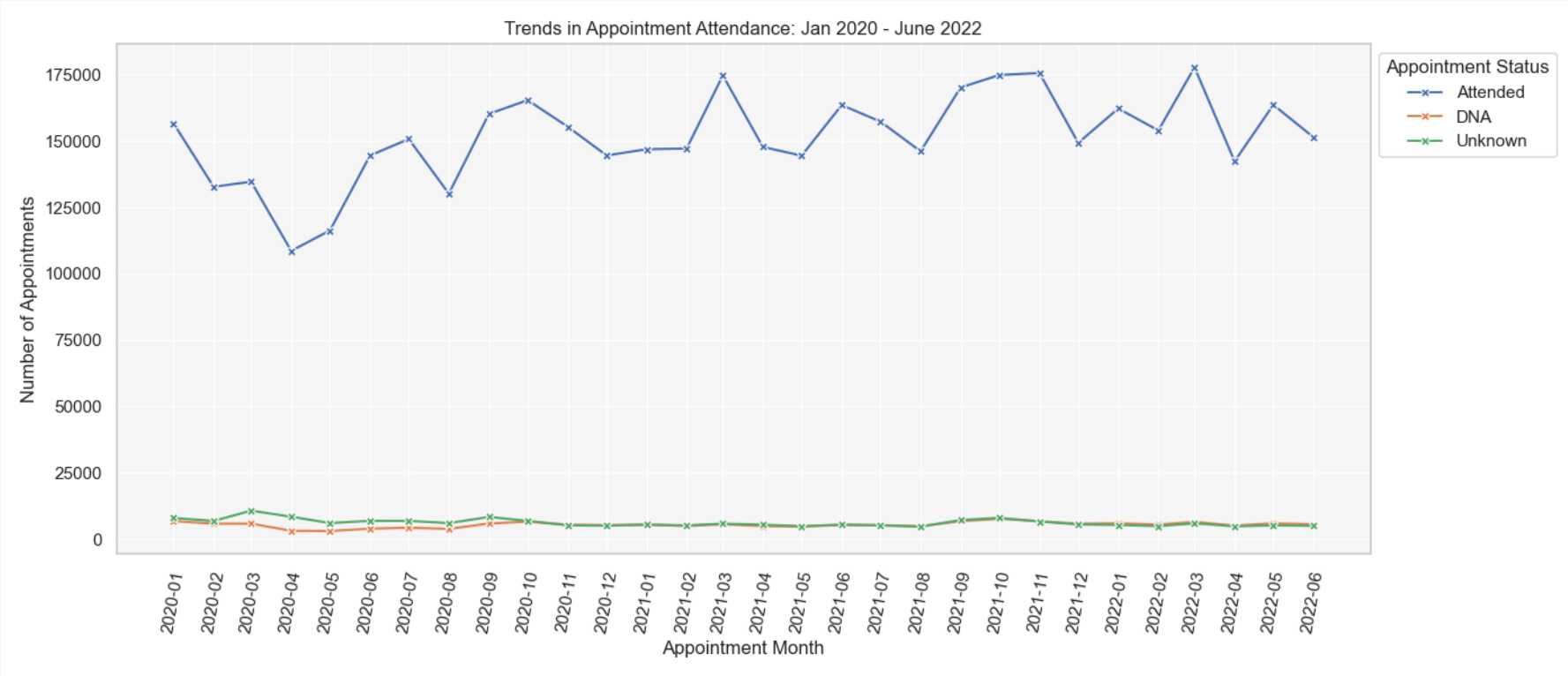
- Approximately 300 million GP appointments were made in the above time frame.
- Slight increase in appointments during autumn compared to late summer, likely due to rising healthcare needs as colder months begin.
- Consistent weekly drops in appointments observed.
- Noticeable decline in mid-winter appointments, likely due to the holiday season and reduced GP hours.
- English GP practices are managing a high volume of appointments, while addressing COVID 19 backlog, with steady demand throughout the year except during holidays.

Weekend Analysis

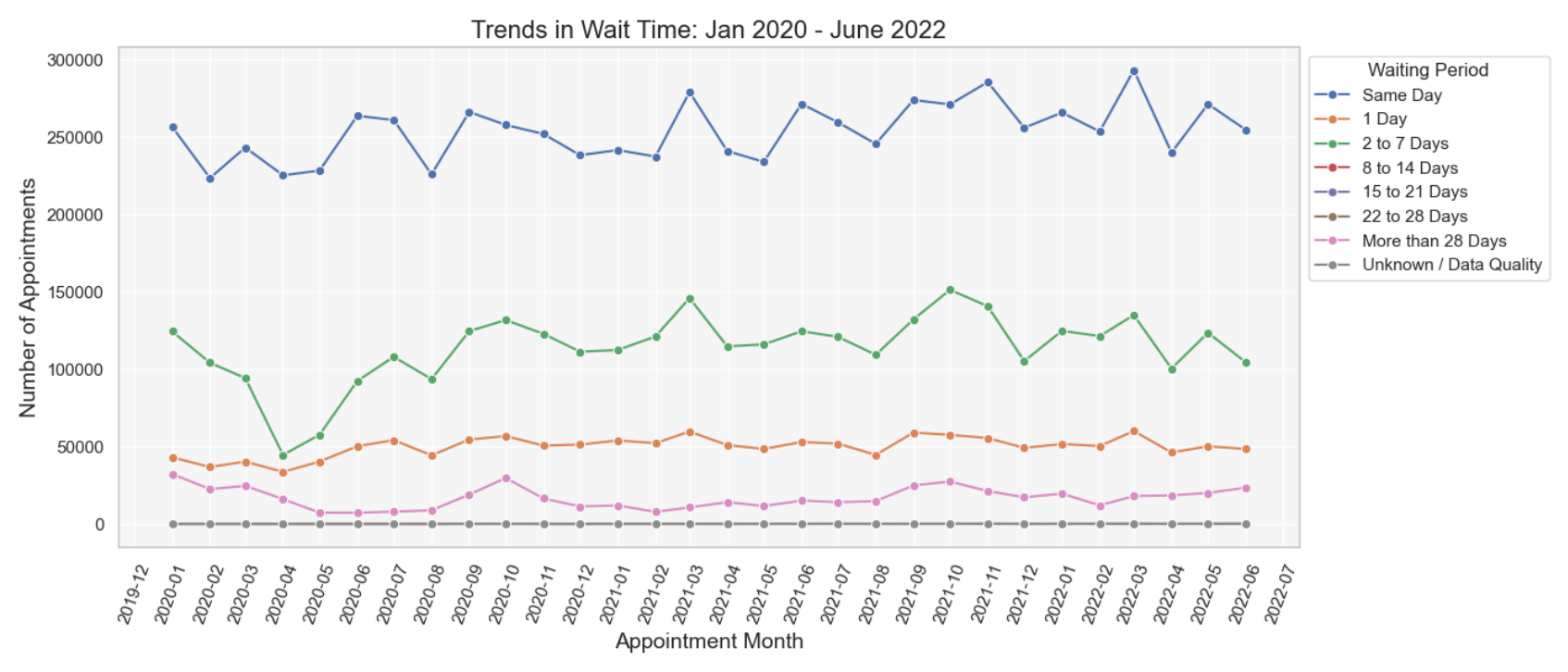


- Significant drop-in GP appointments observed over the weekends, indicating reduced availability or patient visits.
- Appointment numbers increase during weekdays, suggesting higher demand or availability of services.
- Mondays consistently show the highest number of appointments, potentially reflecting a backlog from the weekend or a GPs' working preference.

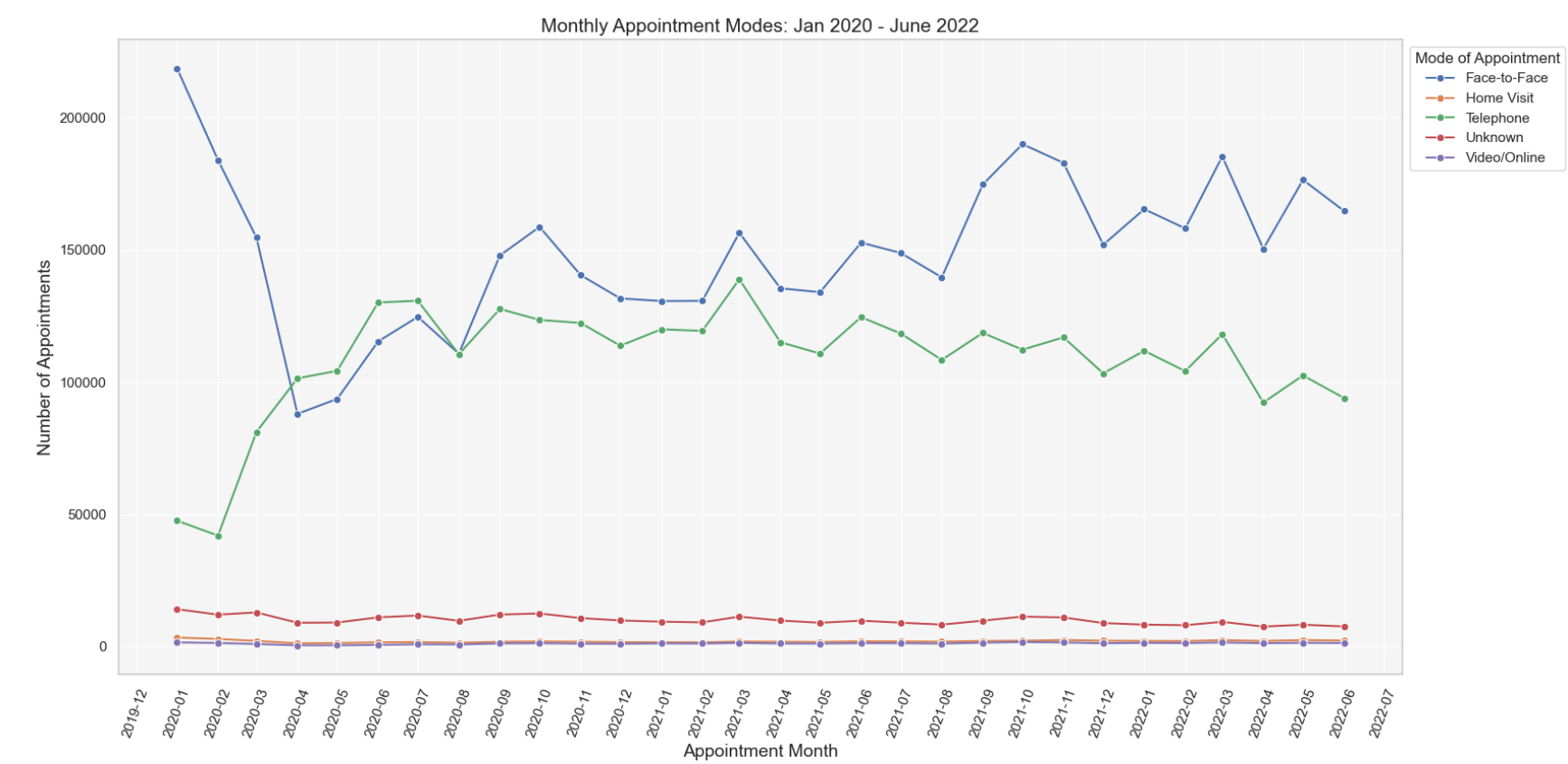
Appointment Attendance and Waiting Times



- Attendance dropped sharply at the start of 2020, probably because of COVID-19 restrictions.
- Recovery began in mid-2021, despite fluctuations, with a general trend of increasing attendance.
- Attended appointments consistently outnumbered Did Not Attends (DNA)s, indicating most scheduled appointments were fulfilled.

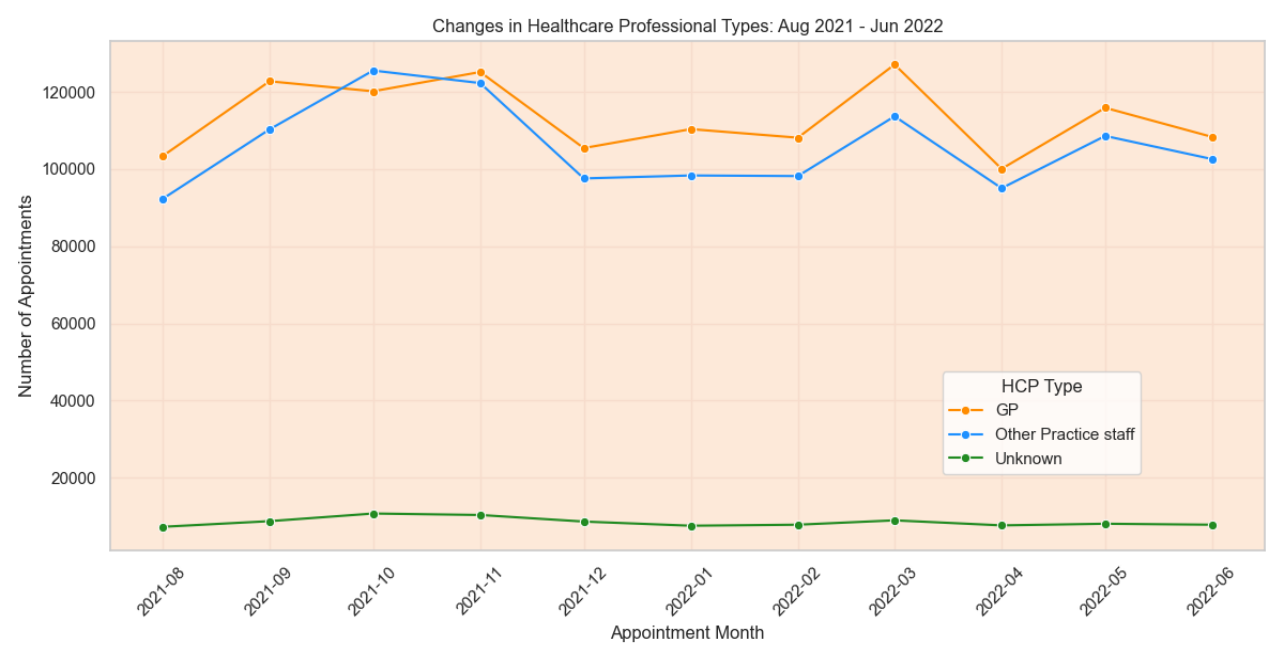


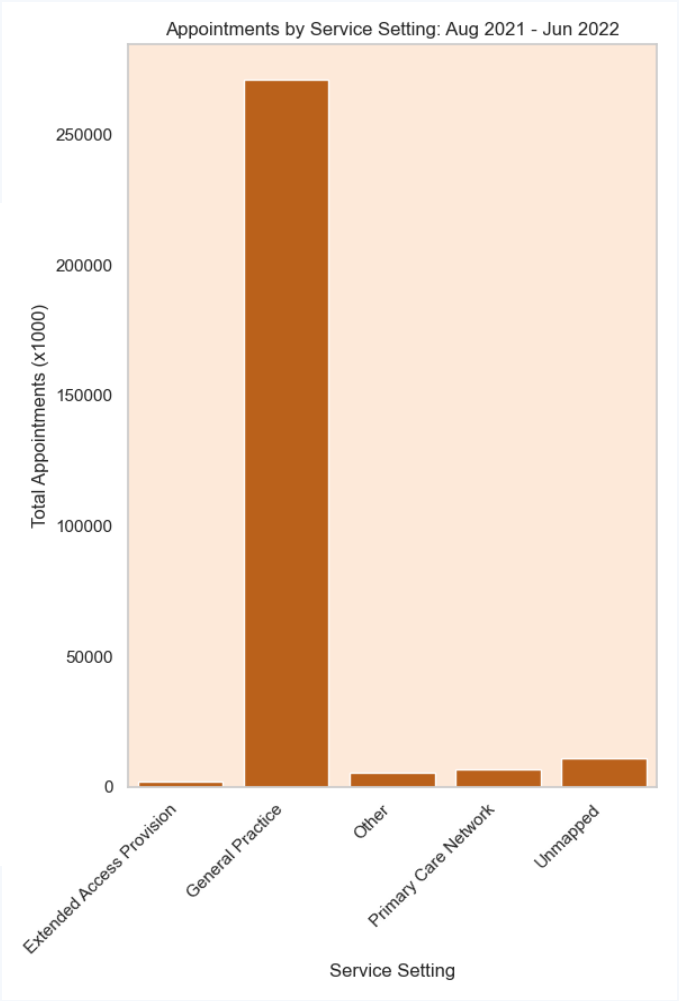
- Despite fewer appointments in 2020, GP practices maintained a high level of same-day appointments, showing their adaptability during the pandemic.
- When same-day slots were unavailable, patients usually waited 2 to 7 days. The data suggests that next-day appointments were rare, indicating increased pressure on the NHS.



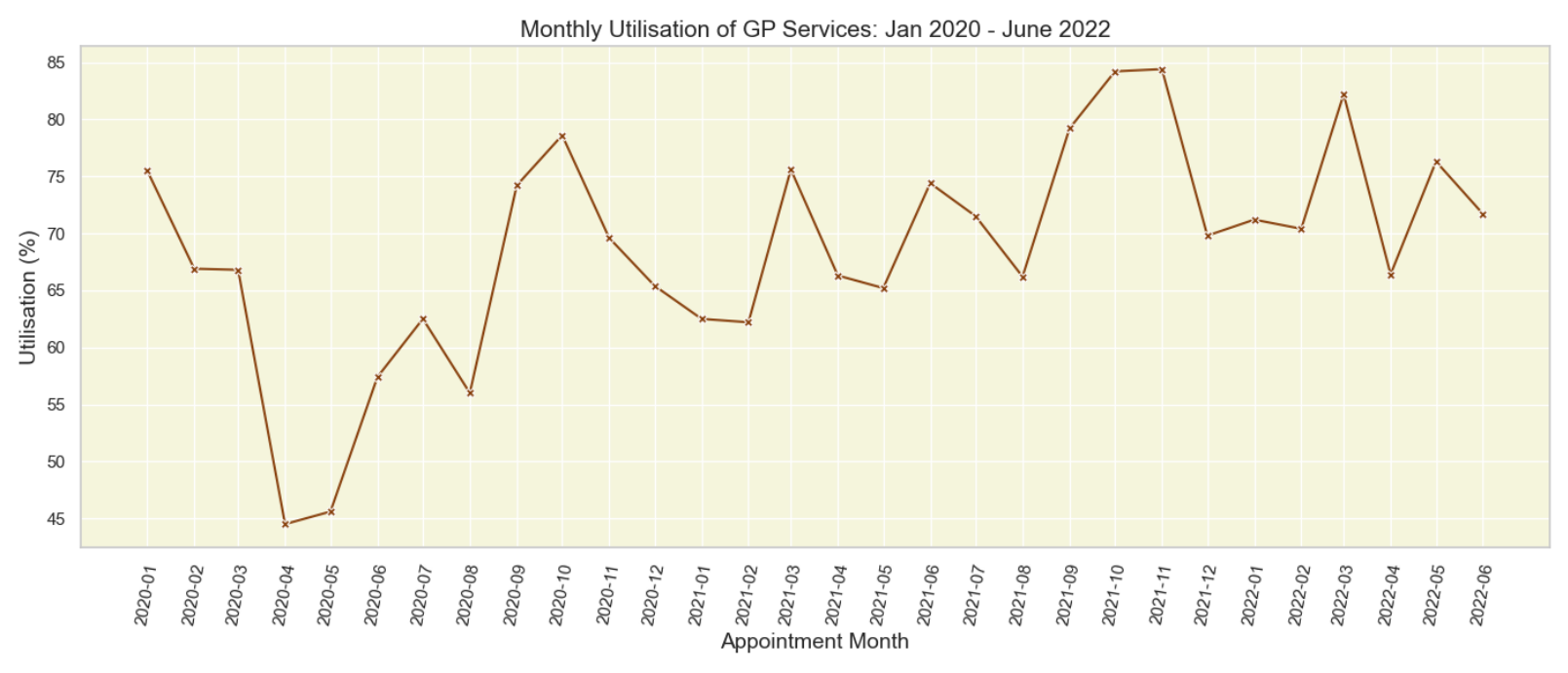
- COVID-19 restrictions led to a sharp drop in face-to-face consultations and a rise in telephone consultations due to ‘Social Distancing’.
- While face-to-face appointments increased by late 2020, they hadn't returned to pre-pandemic levels by early summer 2022.
- From April to July 2020, telephone consultations briefly surpassed face-to-face ones. After June 2020, face-to-face consultations regained the lead, with telephone consultations remaining the second most common mode.

Resource Utilisation



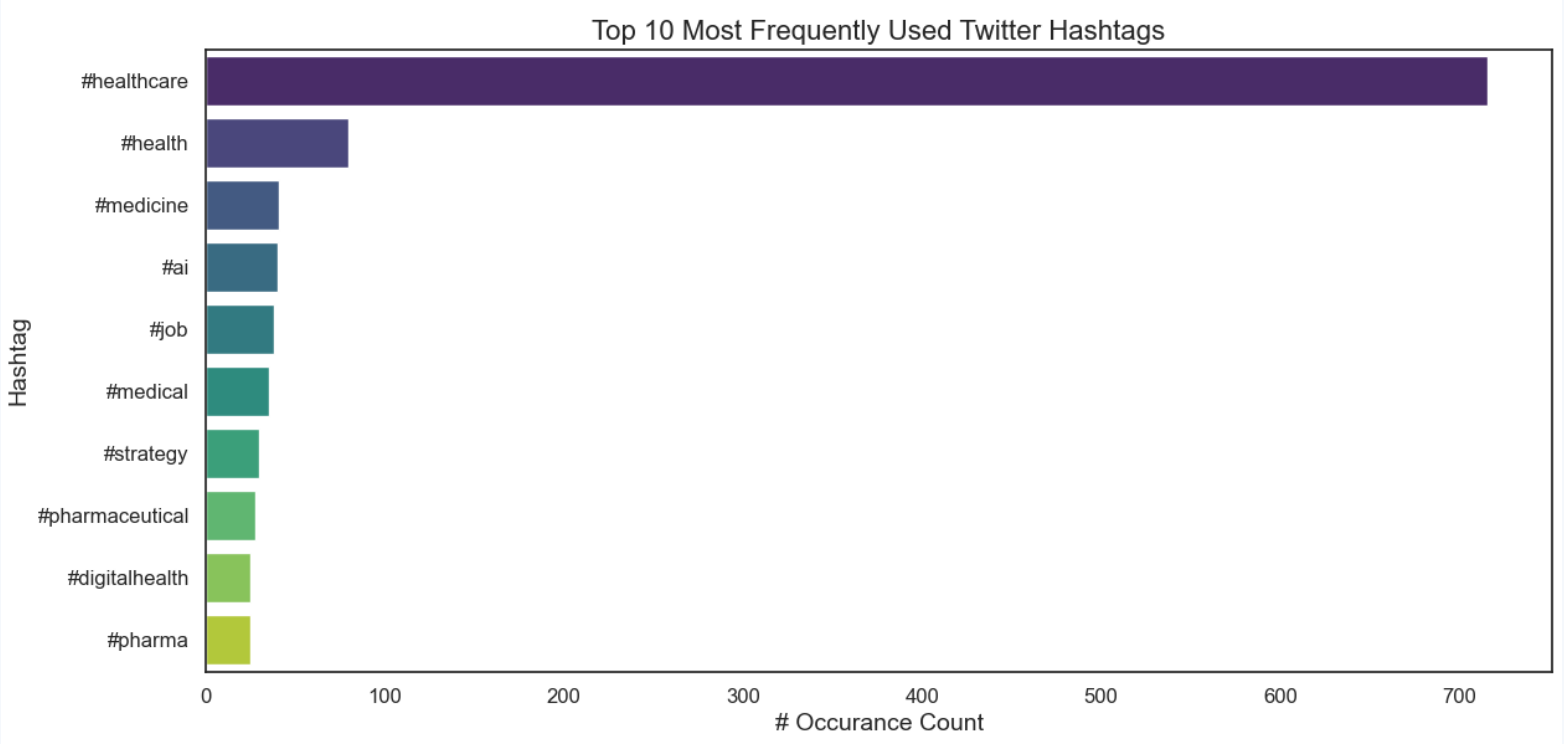


- General Practice is the primary healthcare provider, with appointment numbers nearly 25 times higher than those in Primary Care Networks (PCNs) and Extended Access Provisions, highlighting the essential role of GPs and the need for continued investment to maintain efficiency and capacity.
- GPs and 'Other Practice Staff' manage most consultations. In early Autumn 2021, 'Other Practice Staff' briefly handled more appointments than GPs, suggesting their increased use during peak periods could help manage demand.
- Underutilisation of PCNs and Extended Access Provisions presents an opportunity to ease pressure on General Practice during high-demand periods.



- A significant drop in GP services occurred in April and May 2020, with utilisation rates falling to 44-46%.
- From August 2020, a slow recovery in utilisation rates showed the system's adaptation to the pandemic, gradual return to normalcy and rising demand for GP services.
- With the NHS planning for 1.2 million appointments per day, future utilisation rates could fluctuate around 80-85%, especially during peak months. Rising demand might push these rates higher, straining the system.

Insights from Twitter Data



- The absence of NHS or GP-related hashtags in the top 10 emphasises the need for more focused social media strategies.
- Further, favourited #healthcare twitter content analysis did not suggest NHS related issues being highlighted.
- It is essential to identify and use hashtags that directly align with specific goals, such as improving public engagement with NHS services.

RECOMMENDATIONS

1. Distribute appointments more evenly throughout the week to reduce Monday demand and increase weekend availability, benefiting patients, attracting staff, and establishing better shift patterns.
2. As per NHS England guidelines, Enhanced Access appointments are commissioned by Primary Care Networks (PCNs) during evenings and weekends. This can be used to increase the number of appointments over the weekend via PCNs.
3. Expand consultation options by involving other qualified HCPs, like practice nurses, to ease the GP workload.
4. Investigate the post-pandemic decline in telephone appointments to determine if it's due to GP availability or patient preference and explore video consultations for those needing virtual care.
5. Effectively use social media, including trending hashtags, to raise NHS awareness and assess public sentiment. Promote hashtags like #NHS, #NHScareers, #GPappointment, and #WeekendGP.
6. Analyse pre-COVID and more recent / current data to assess progress and recovery from the backlog and preparedness for future events.
7. Refine data collection, recording and maintenance methods with national guidelines and staff training to reduce unknown or uncounted data entries.

FURTHER EXPLORATION

- Analyse GP appointment times (morning, afternoon, evening) to better allocate staff based on patient demand.
- Investigate the reasons for missed appointments (Although patients' "Did Not Attend" levels were relatively low), using regional data, patient surveys, reminders, and flexible cancellation options (e.g. text/online).

CONCLUSION

This report identifies key challenges in optimising NHS GP appointments and resource use across England, particularly highlighted by regional and seasonal variations in demand. The COVID-19 pandemic significantly impacted attendance and consultation methods, with a notable shift to telephone consultations. The NHS can enhance service delivery by redistributing appointments more evenly across the week, increasing weekend availability, and involving other healthcare professionals to reduce GP workloads. Improved social media strategies could also increase public engagement. Additionally, addressing inconsistencies in data collection and interpretation is crucial for better analysis and future preparedness. By refining these areas, the NHS can more effectively manage its resources and meet the growing healthcare demands.

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