TECHNICAL REPORT: NHS APPOINTMENT ANALYSIS

TABLE OF CONTENTS

1. INTRODUCTION

This report presents a concise analysis of National Health Service (NHS) appointment data, aiming to identify trends, utilization patterns, and potential areas for improvement. The analysis focused on understanding service utilization, missed appointments, and potential insights from various factors such as location, service setting, appointment mode, appointment duration, and national service categories.

2. DATA SOURCES

The analysis utilized three primary datasets:

- **actual_duration.csv**: Provided insights into the actual duration of attended appointments.
- **appointments_regional.csv**: Offered aggregated appointment counts by region, healthcare professional type, appointment status, appointment mode, and time between booking and appointment.
- **national_categories.xlsx**: Categorized appointments by national service categories.

3. DATA EXPLORATION AND CLEANING

Initial data inspection revealed no missing values, ensuring data integrity. Data types were validated and corrected where necessary. Descriptive statistics were calculated to understand data distribution and range. The following exclusions were made while analysing the trends

- “Unknown/Data Quality” from Actual Duration under actual_duration
- “Unmapped” from National Category under context_type, service_setting and national_category

4. KEY FINDINGS

HIGH-DEMAND LOCATIONS AND SERVICE SETTINGS:

- Analysis identified the top 5 locations with the highest appointment volume, indicating areas with potentially higher demand for healthcare services.

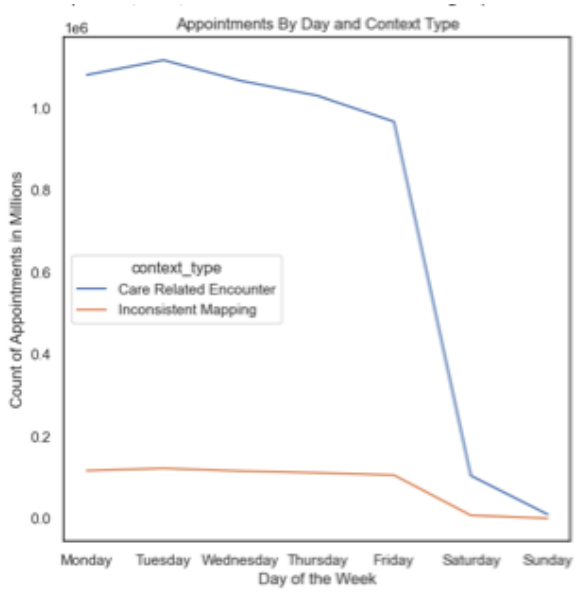
sub_icb_location_name	total_appts
NHS North West London ICB - W2U3Z	12142390
NHS North East London ICB - A3A8R	9588891
NHS Kent and Medway ICB - 91Q	9286167
NHS Hampshire and Isle Of Wight ICB - D9Y0V	8288102
NHS South East London ICB - 72Q	7850170

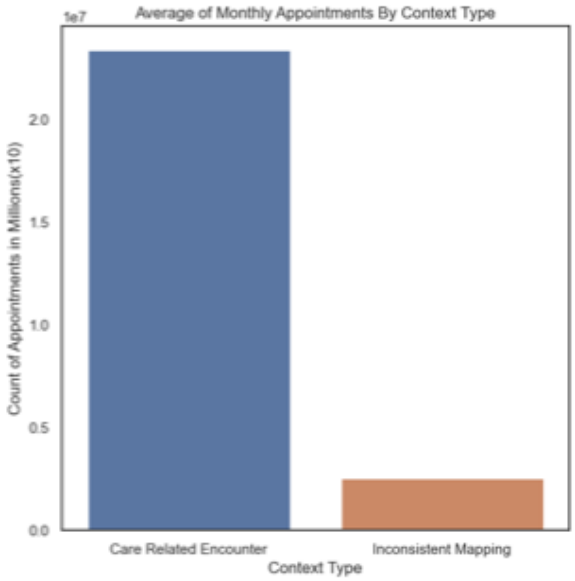
- General Practice emerged as the most frequently used service setting, highlighting the crucial role of primary care in the NHS.

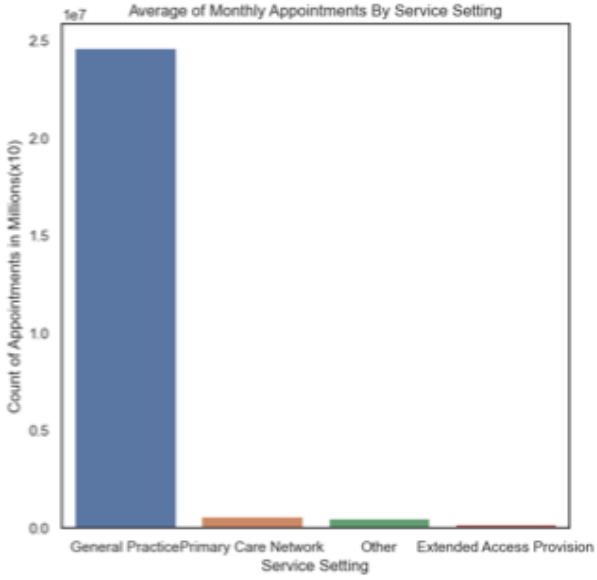
service_setting	total_appts
General Practice	270811691
Unmapped	11080810
Primary Care Network	6557386
Other	5420076
Extended Access Provision	2176807

APPOINTMENT TRENDS AND FLUCTUATIONS:

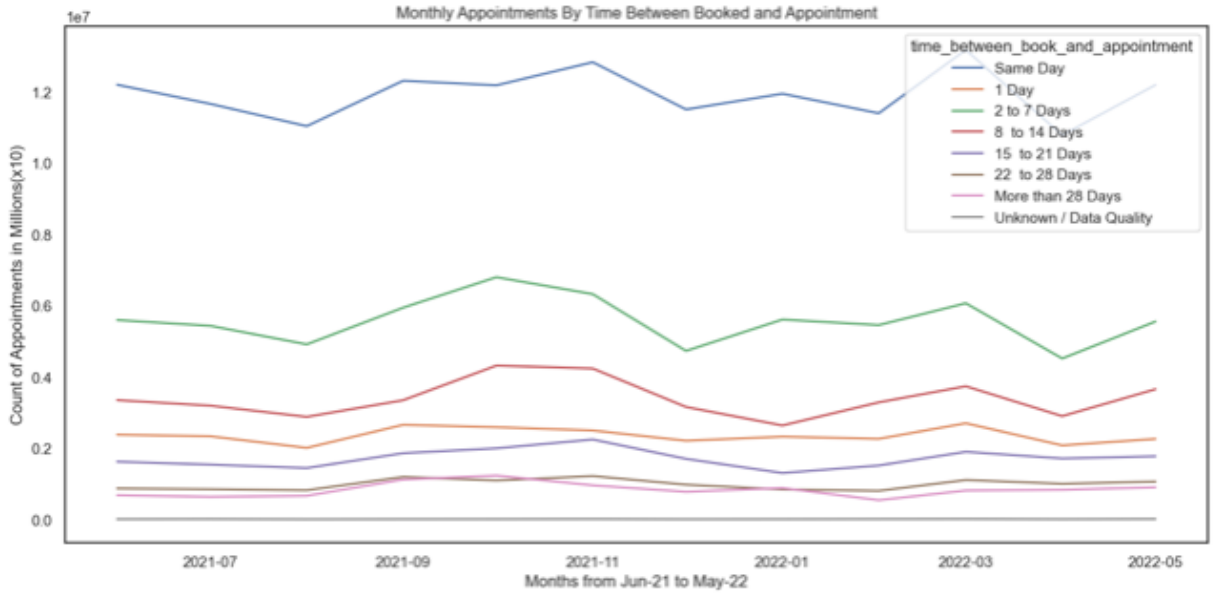
- Daily fluctuations were observed in appointment volume, with specific patterns for service settings, context types, and national categories. GP visits remained consistently high across all periods.

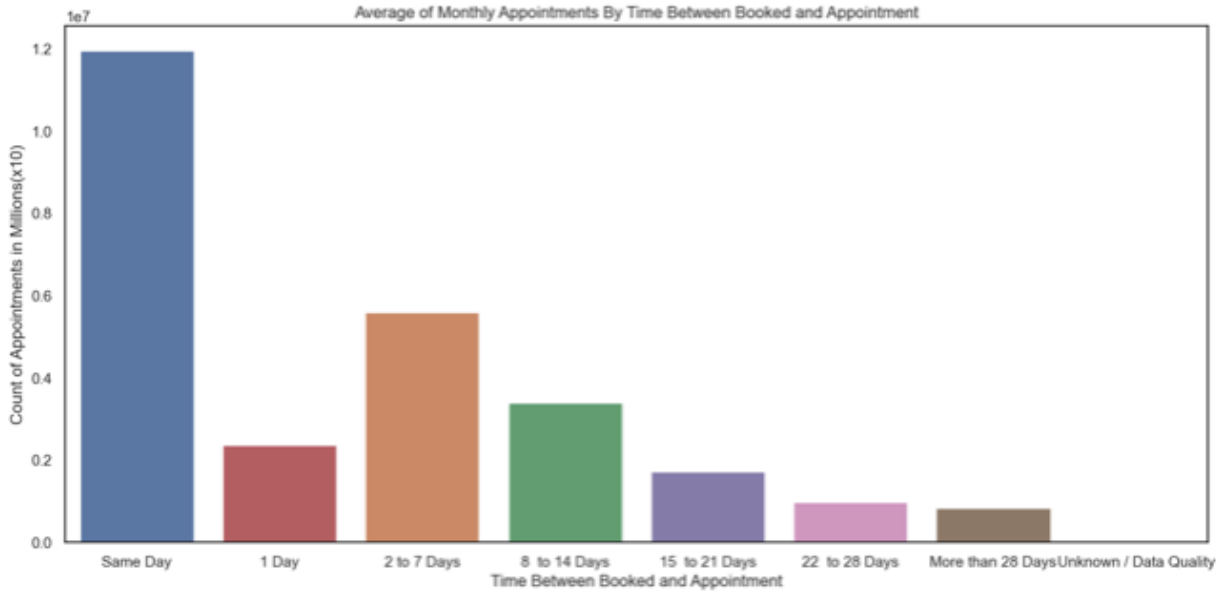






- Distinct trends were observed in the time between booking and appointment (TBBNA), indicating potential bottlenecks and areas for improvement in appointment scheduling processes.





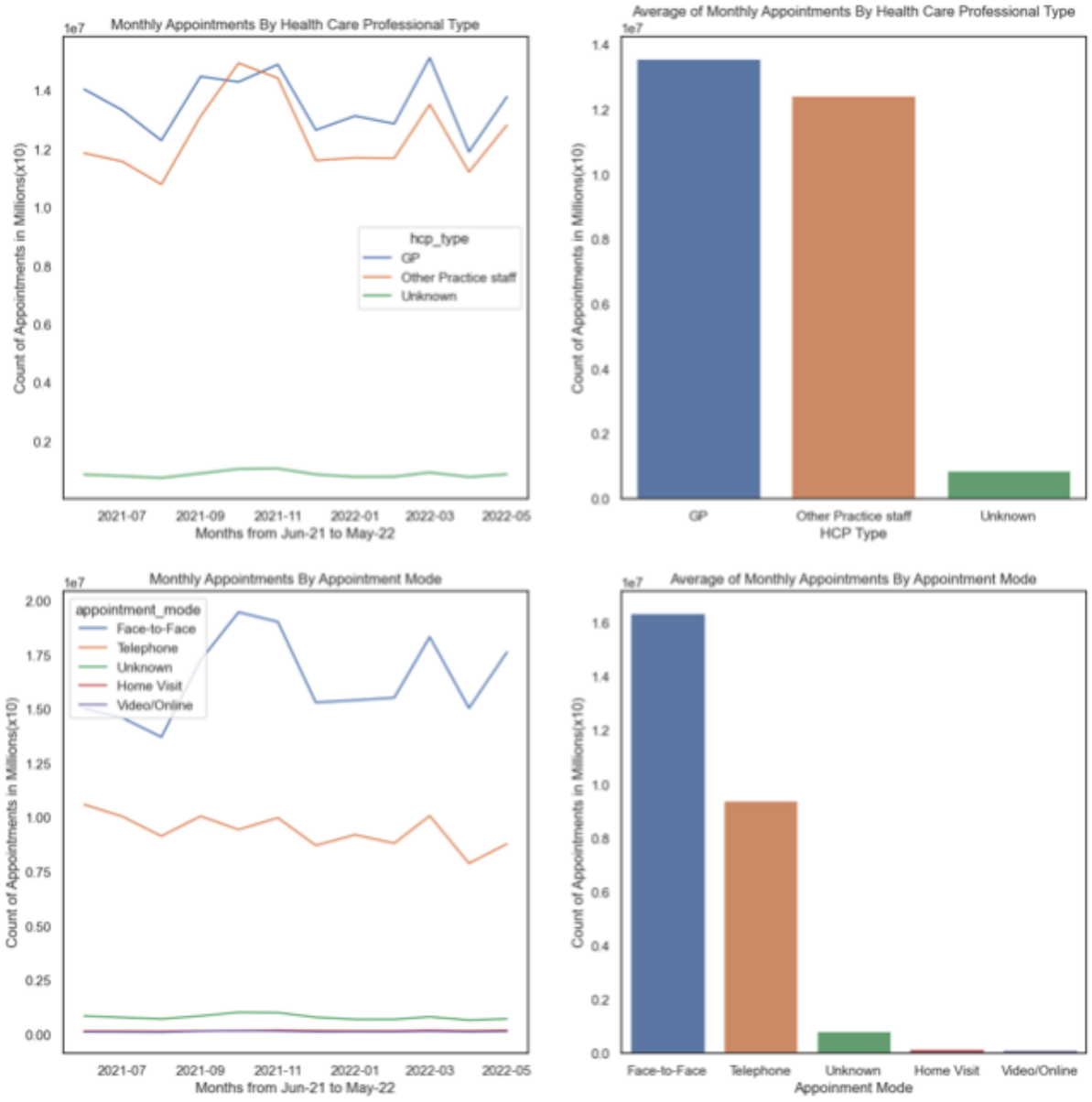
- **Dominant TBBNA Categories:** The plot highlighted the most common appointment booking lead times, revealing the dominant TBBNA categories. These categories, such as "Same Day," "1-7 Days," and "8-14 Days," indicated the typical wait times patients experienced when scheduling appointments.

- **Potential Bottlenecks:** If certain TBBNA categories showed consistently high appointment counts or increasing trends, it might indicate potential bottlenecks in the system, leading to longer wait times for patients. For example, if a large proportion of appointments are booked for "Same Day" or "1-7 Days," it might suggest limited availability of appointments in the near term, resulting in longer wait times for patients who can plan their appointments in advance. Addressing these bottlenecks through process improvements or resource adjustments can enhance service efficiency and reduce patient wait times.

- **Impact on Patient Access and Experience:**TBBNA significantly impacts patient access and experience. Longer wait times can lead to patient dissatisfaction, delays in receiving necessary care, and potential adverse health outcomes. Optimizing appointment scheduling processes to reduce TBBNA can improve patient access, enhance their experience with healthcare services, and promote better health outcomes.

WORKFORCE DYNAMICS AND SERVICE DELIVERY:

- The distribution of healthcare professional types (HCP types) involved in appointments changed over time, reflecting workforce dynamics and potential staffing needs.
- The analysis revealed trends in appointment types (appointment modes), highlighting patient preferences for face-to-face, telephone, and other modes of service delivery.



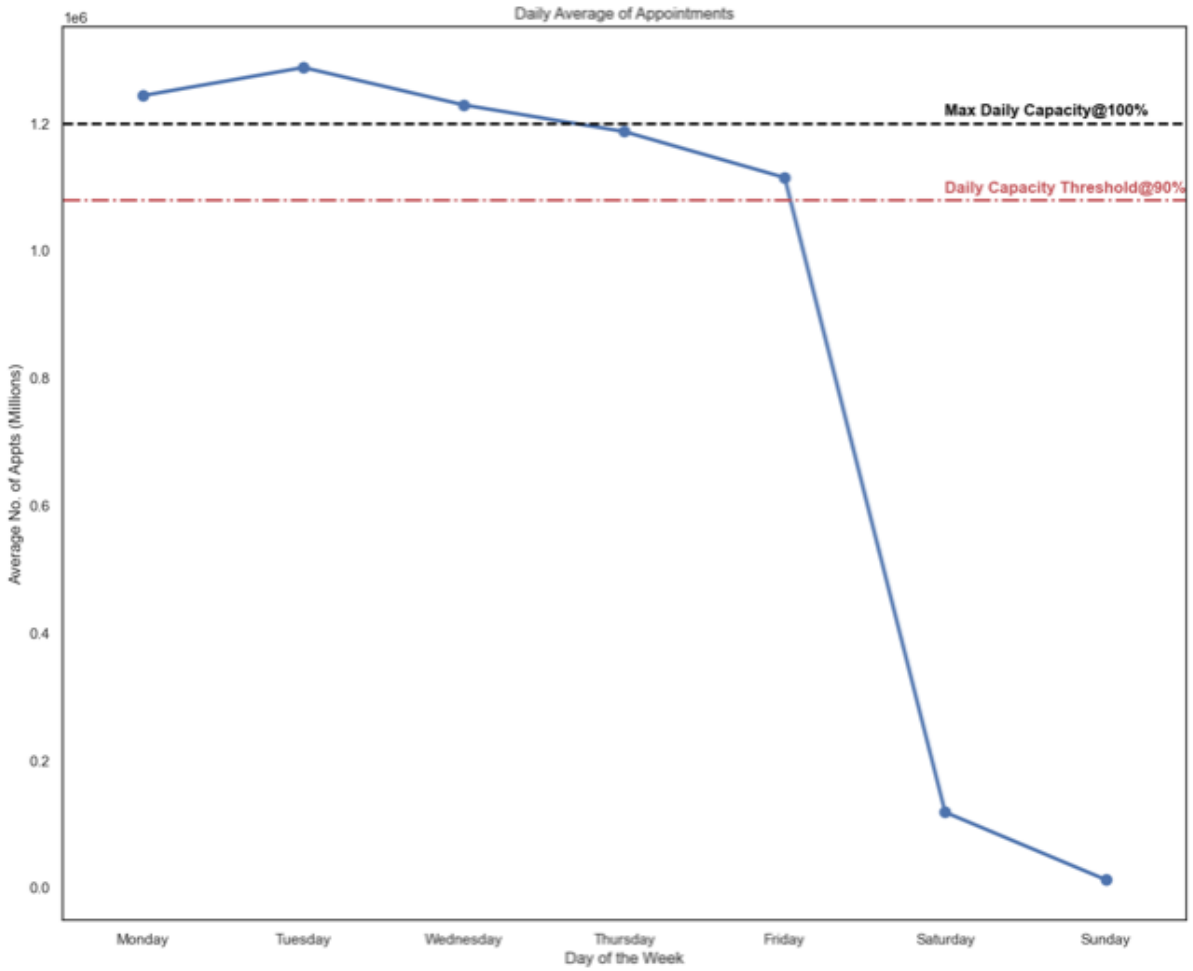
- **Dominant Appointment Modes:** The plot highlighted the dominance of certain appointment modes, such as 'Face-to-Face' and 'Telephone', indicating patient preferences for traditional

and remote service delivery methods. This information can guide decisions regarding resource allocation and service delivery optimization.

- **Shifting Preferences:** Analysing the trends over time, some appointment modes experienced increasing utilization, while others showed decreases. This might reflect changing patient preferences or the adoption of new technologies, such as telehealth. The NHS can adapt its service offerings to align with these evolving preferences.
- **Service Setting Considerations:** Exploring appointment mode trends within different service settings can provide further insights. For example, face-to-face consultations might be more common in hospital settings for specialized care, while telephone consultations might be more prevalent in primary care settings for routine check-ups or follow-ups. This can guide service delivery optimization within specific service areas.
- **Flexibility and Access:** Offering a diverse range of appointment modes can enhance patient access and flexibility. The NHS can consider expanding telehealth services, promoting online booking systems, and offering alternative appointment scheduling options to cater to diverse patient needs and preferences.

SERVICE EFFICIENCY AND CAPACITY:

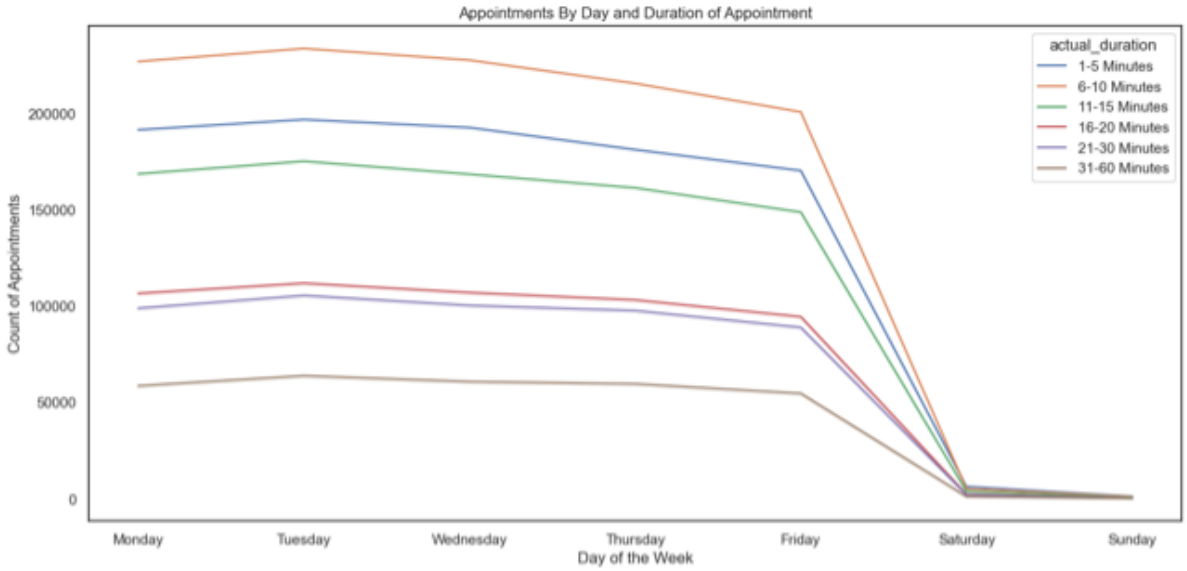
- Comparisons across different service settings revealed significant variations in appointment volume and utilization patterns, suggesting the need for tailored strategies for each service setting.
- Daily capacity utilization was assessed, revealing potential areas for resource optimization to ensure efficient service delivery without exceeding capacity limits.

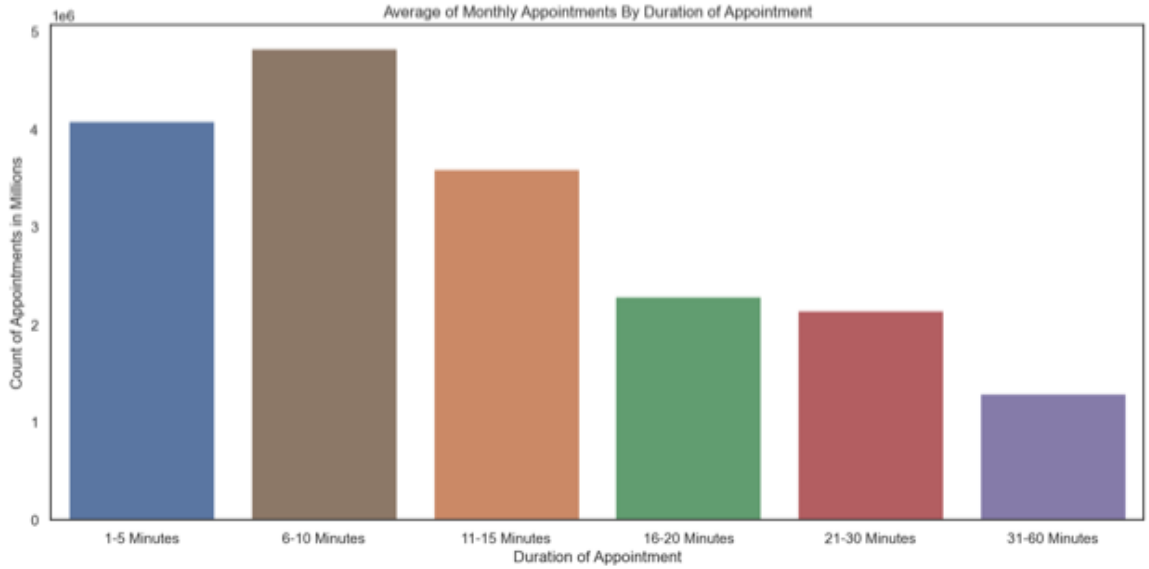


- **Demand Pressure and Resource Strain:** Daily capacity utilization was assessed, revealing periods of high demand and potential strain on resources. This analysis highlighted the need for strategies to optimize capacity and manage demand fluctuations to ensure efficient service delivery without compromising patient access.
- **Peak Demand Periods:** Further investigation revealed specific days or times when capacity utilization exceeded optimal levels, indicating potential bottlenecks or periods of peak demand. For example, certain weekdays or specific times of day might consistently experience higher demand, leading to longer wait times and potential delays in service delivery. Understanding these patterns can inform strategies for adjusting staffing levels, scheduling protocols, or service delivery models to better manage peak demand and reduce wait times.
- **Impact on Patient Access and Wait Times:**Capacity utilization directly impacts patient access and wait times. When capacity is exceeded, patients might experience longer wait times for appointments or delays in receiving necessary care. Optimizing capacity utilization can help improve patient access, reduce wait times, and enhance patient satisfaction.

APPOINTMENT DURATION AND PATIENT FLOW:

- The actual duration of appointments varied significantly, with some appointments lasting considerably longer than the average. This variability highlighted potential impacts on patient flow and service capacity.





- **Distribution and Central Tendency:** Plots typically revealed a right-skewed distribution of appointment durations, indicating that most appointments were relatively short, while a smaller proportion of appointments had longer durations. The average or median appointment duration, as indicated by the plot, provided a benchmark for service efficiency and could be used to compare against expected or planned durations.

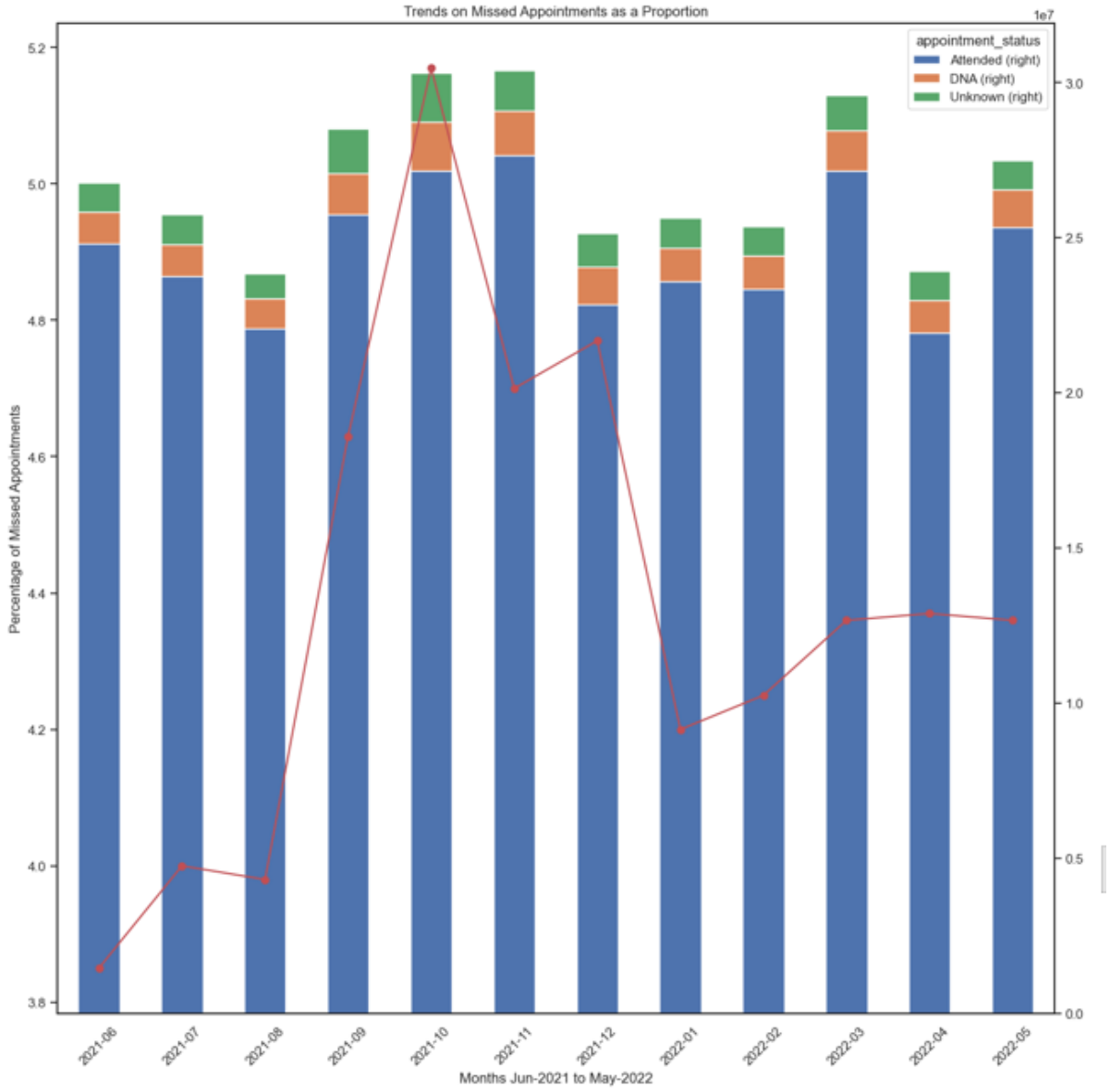
- **Variability and Outliers:** Plots often illustrated significant variability in appointment durations, with some appointments lasting considerably longer than the average or median. Outlier analysis, often facilitated by box plots, identified a small number of appointments with extremely long or short durations, warranting further investigation to understand potential contributing factors or exceptional cases. This variability highlighted the need for flexibility in scheduling and resource allocation to accommodate the range of appointment lengths.

- **Impact on Patient Flow and Capacity:** The observed variability in appointment durations, as visualized in the plots, highlighted the potential impact on patient flow and service capacity. Longer appointment durations can lead to increased wait times for other patients and potential delays in service delivery. Optimizing appointment durations can improve patient flow, enhance service efficiency, and potentially increase service capacity.

- **Potential for Process Improvement:** Plots often identified a significant proportion of appointments with durations exceeding the average or median, suggesting potential opportunities for process improvement to reduce appointment lengths and enhance service efficiency. This might involve strategies such as streamlining workflows, standardizing protocols, or leveraging technology to automate tasks. By identifying and addressing these areas for improvement, the NHS can potentially reduce patient wait times and improve overall service delivery.

MISSED APPOINTMENTS AND ATTENDANCE:

- Significant changes were observed in appointment attendance rates, highlighting the need for strategies to reduce missed appointments and optimize service utilization.

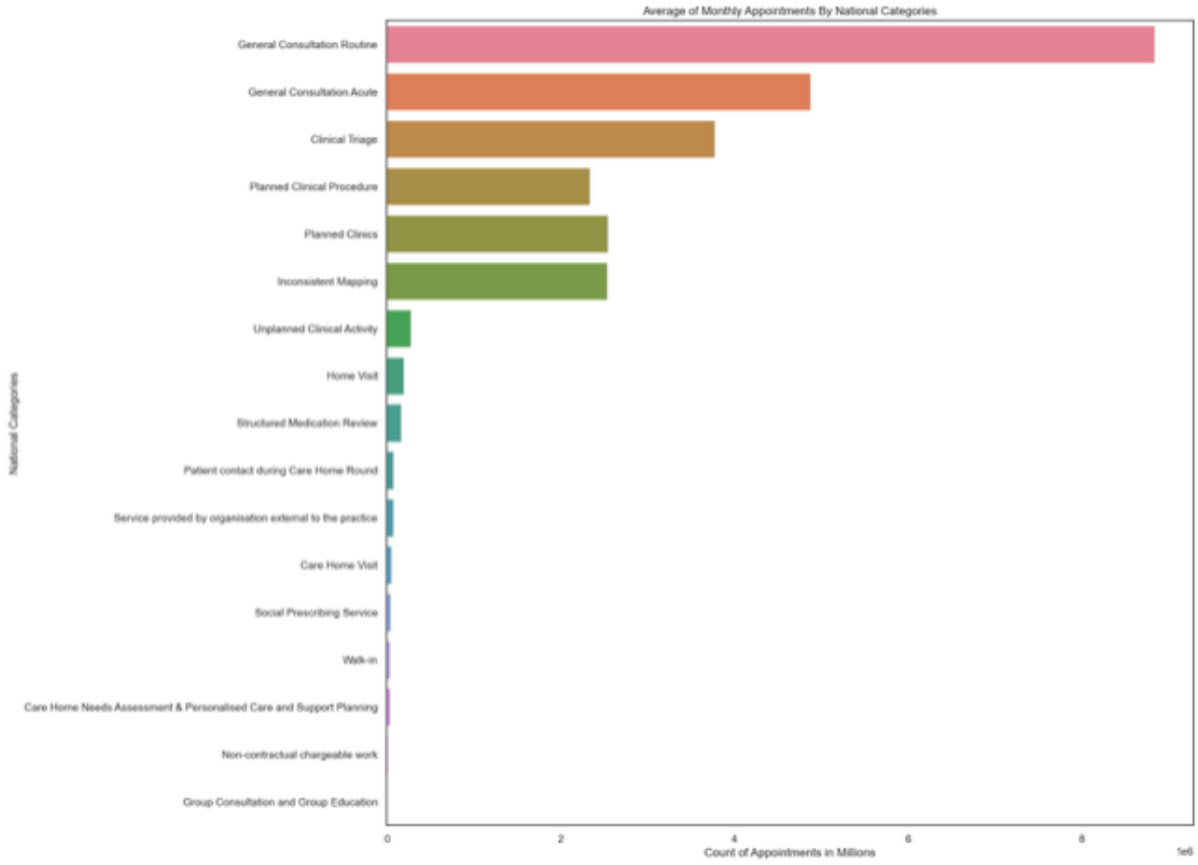


- **Monthly Variations:** DNA rates showed monthly variations, indicating potential seasonal or cyclical patterns. Understanding these variations can help the NHS anticipate and proactively manage periods of higher DNA rates.

- **Potential Areas for Improvement:** Analysis of DNA rates identified potential areas for improvement, such as investigating the underlying reasons for missed appointments, implementing strategies to reduce DNAs, and promoting greater accessibility and service utilization.

NATIONAL CATEGORIES AND SERVICE UTILIZATION:

- Analysis of national service categories revealed variations in appointment volume across different healthcare domains.
- This information can be used to identify areas with high demand for specific services and guide resource allocation decisions.
- For example, categories related to chronic disease management or mental health services might show high appointment volumes, indicating potential areas for targeted interventions or service expansion.



5. RECOMMENDATIONS

- **Staffing and Workforce Planning:**
  - Consider increasing staff levels in high-demand areas and for HCP types with increasing workloads.
  - Use workforce data to inform recruitment and training strategies.
- **Appointment Scheduling and Access:**
  - Optimize scheduling strategies for different service settings, considering patient preferences, appointment modes, and TBBNA trends.
  - Implement strategies to reduce missed appointments and improve service utilization.
- **Service Delivery Optimization:**
  - Align service delivery methods with specific service area needs and demand patterns.
  - Explore alternative service delivery models and technologies to enhance efficiency and access.
  - Consider the insights from national category analysis when optimizing service delivery models, ensuring service offerings are aligned with the specific needs and demands of different healthcare domains.
- **Resource Allocation and Capacity Management:**
  - Ensure sufficient resources are allocated to high-demand service settings.
  - Optimize daily capacity utilization to manage demand and ensure efficient service delivery.
- **Continuous Monitoring and Improvement:**
  - Regularly monitor appointment data and trends to identify areas for improvement.
  - Implement data-driven strategies to enhance service efficiency, patient access, and overall healthcare delivery.