NHS Capacity & Utilisation Analysis

Data-Driven Insights & Recommendations

Original business questions

- What was the actual utilisation of resources?
- Has there been adequate staff and capacity in the networks?

Defining the Problem

UTILISATION

APPOINTMENT OUTPUT PERFORMANCE AGAINST EXPECTED MEASURE

STAFFING

HOW DID STAFF COPE WITH THE APPOINTMENT LOADS

CLEAR OBJECTIVE

OUR KEY FIGURE WAS 1.2M APPOINTMENTS PER DAY

Background / Context

- Analysis commissioned to address NHS capacity and utilisation concerns.
- Primary questions: Adequacy of staff and capacity; actual utilisation of resources.
- Data sources: Actual Duration, Appointments Regional, National Categories.
- Focus: Post-pandemic recovery, regional variation, appointment mode trends, and DNA rates.

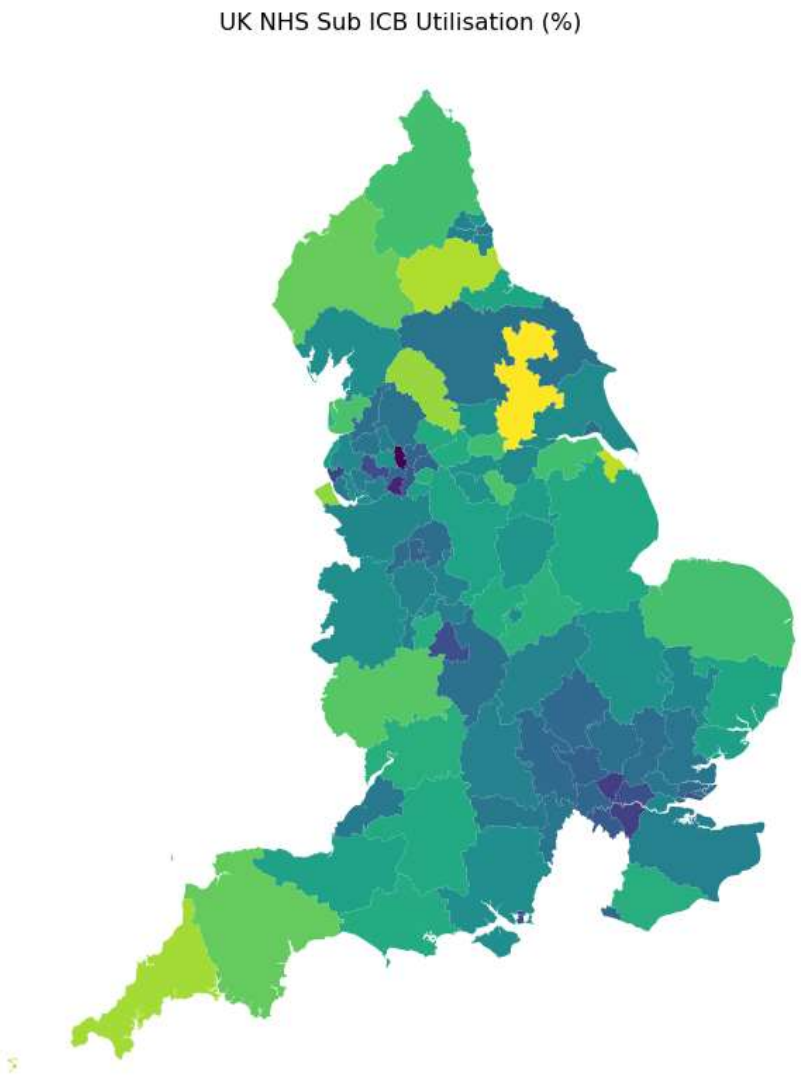
Analytical Approach

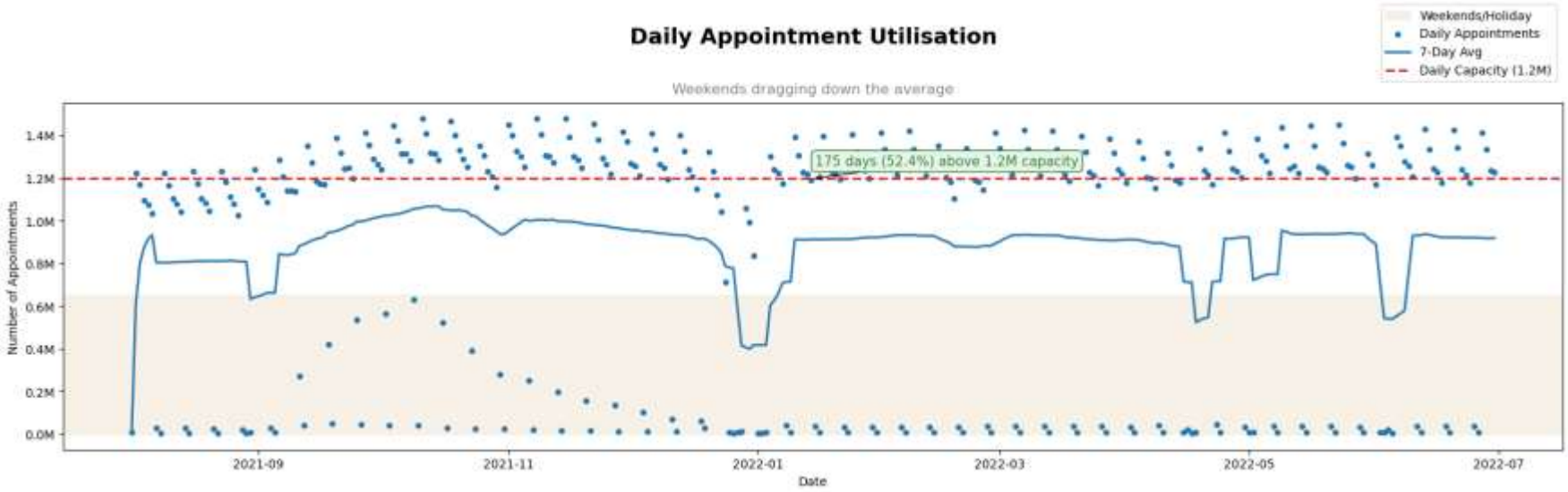
- Data cleaning: format checks, null handling, type optimisation.
- Feature engineering: month/day_of_week for trend analysis.
- KPIs: Average daily appointments, peak capacity, utilisation %, DNA rates.
- Merged datasets only where needed to answer multi-dimensional questions.
- Visualisation tools: matplotlib, seaborn, plotly.

Capacity & Utilisation Insights

Regional breakdown

- Average utilisation across Sub ICBs: 72.91%.
- Top: Humber & North Yorkshire ICB – 101.19%; Lowest: Greater Manchester ICB – 46.24%.
- 23/104 regions at or above 80% utilisation – operating near capacity.
- 19/104 regions at or below 65% – unused capacity or constraints.



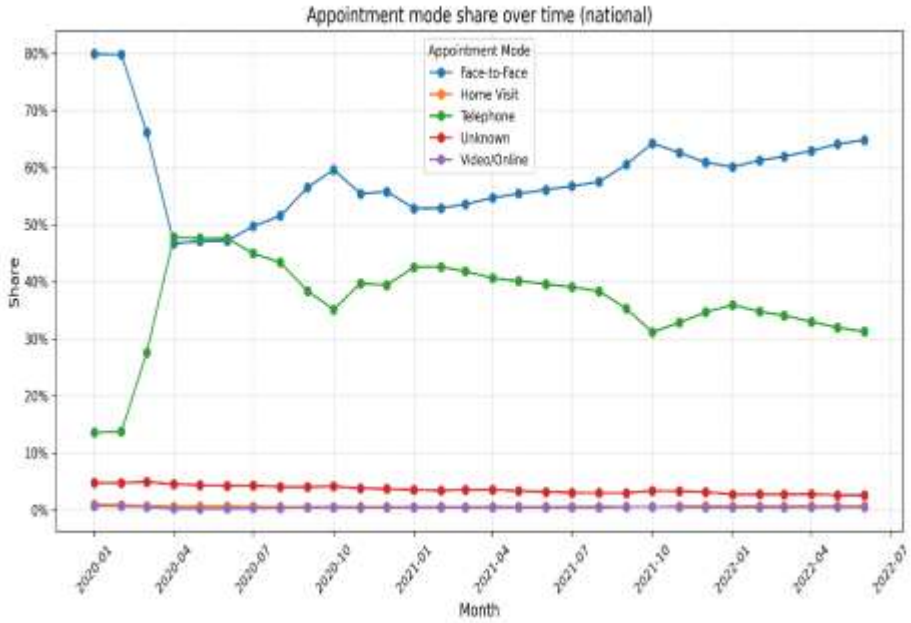


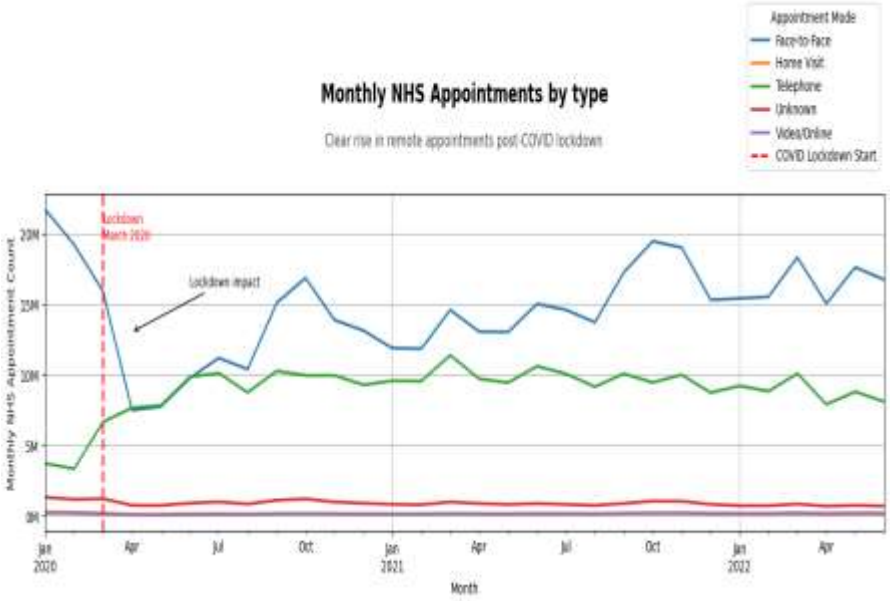
Daily breakdown

- 🔍 **What This Tells Us**
- - **Consistent over-capacity demand**: More than half of all days saw appointment counts above the set capacity limit.
- - **Weekend & holiday dips**: The shaded zones show recurring lower volumes that drag down the 7-day rolling average.
- - **Sustained high-activity streaks**: Peaks cluster in weekday periods, with multiple stretches where demand was continuously above 1.2M.
- - **Seasonal variance possible**: Visible gaps and dips (e.g., late December, early January) likely align with holiday closures or reduced services.

Appointment Mode Trends

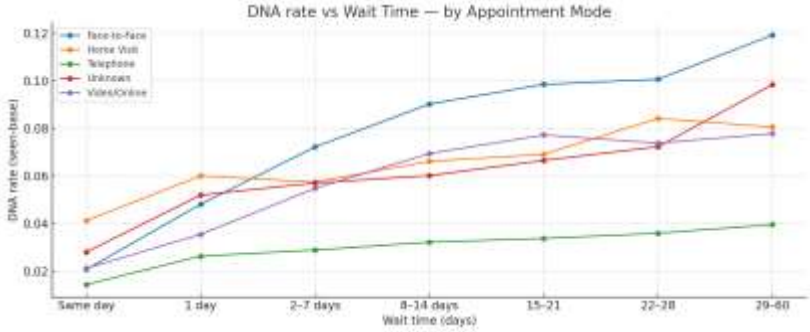
- Early 2020: Face-to-Face ~80%, Telephone ~15%, then into a rapid pandemic shift.
- Mid-2020: Face-to-Face fell to ~47%, Telephone grew by ~300%.
- By mid-2022: Face-to-Face recovered to ~65%, Telephone dropped to ~32%.
- Video/Online & Home Visit modes remained <3% share nationally.

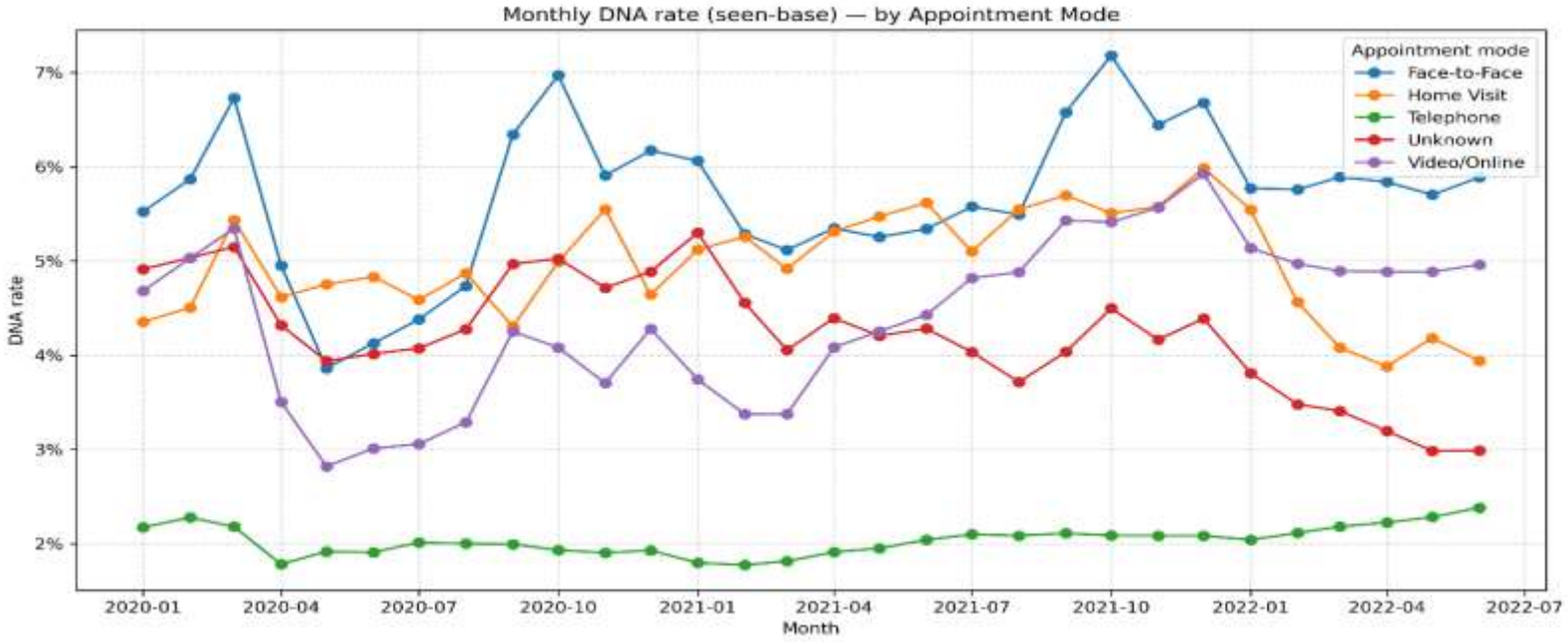




DNA Rate Insights

- Face-to-Face: Highest DNA (~5–7%).
- Telephone: Lowest DNA (~1.8–2.3%).
- Video appointments seem to follow the same trend as face to face appointments, suggesting seasonal issues.
- Possible causes: travel barriers, convenience factors, digital adoption rates.





Observed Patterns

SEASONAL PEAKS: MARCH, MAY, OCTOBER; DIPS: AUGUST, DECEMBER.

HIGHEST LOAD DAYS: TUESDAYS & WEDNESDAYS; WEEKENDS CONSISTENTLY LOW.

URBAN VS RURAL DISPARITY: HIGHER THROUGHPUT IN CITIES, SLOWER IN RURAL REGIONS.

SPECIALTY DEMAND: DIAGNOSTICS SHOW SCHEDULING INEFFICIENCIES.

Recommendations

DYNAMIC CAPACITY ALLOCATION: SEASONAL STAFFING, CROSS-SITE RESOURCE SHARING.

DAY-SPECIFIC LOAD BALANCING: TARGET UNDERUSED MONDAYS & FRIDAYS.

EFFICIENCY IMPROVEMENTS: SCHEDULING OPTIMISATION, DIGITAL TRIAGE FOR DIAGNOSTICS.

DATA-DRIVEN REGIONAL STRATEGY: TELEMEDICINE EXPANSION IN RURAL AREAS.

PREDICTIVE MONITORING: DASHBOARDS TO PREEMPT CAPACITY BREACHES.

Twitter analysis

- dataset only has **3 tweets** that explicitly reference the NHS or UK healthcare context:
- **Recruitment-focused** tweets — 2 of them are about NHS job fairs/events in Exeter.
- **Healthcare leadership** post — mentions “HLA Scholar” with #Healthcare but not really a service feedback tweet.
- That means this dataset is **not representative** for NHS sentiment analysis — you could still:
- Mention in your project that **external data coverage was sparse for the NHS specifically**.
- Show the **volume gap** visually (e.g., “only 3/1,174 tweets were NHS-specific — suggesting limited UK social data in this sample”).
- Pivot to analysing **#Healthcare** tweets more broadly while noting the limitation.

Conclusion

Capacity is strong overall, but regional and temporal imbalances exist.

Midweek peaks, seasonal dips, and DNA trends require strategic action.

Building a digital data stream to stay ahead of any demand shocks and future proof care.


Thank you for listening