

Crime Patterns Across the North East

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Executive Summary

This project analyses 12 months of recorded crime data across Northumbria, Durham, and Cleveland using population and area adjusted metrics. Geographic and population context prevent misleading conclusions based on raw totals alone.

Violence Against the Person is the most prevalent and seasonally significant crime type across all three constabularies. Understanding this pattern and its drivers is critical for safeguarding and workforce planning.

Violence Against the Person is driven largely by violence and sexual offences, which consistently represent the largest sub-category. The absence of victim-level detail in this dataset limits the ability to assess risk or target safeguarding activity within this analysis.

Project Overview

This project analyses crime patterns across the Northumbria, Durham, and Cleveland police constabulary areas, examining how geographic context, population distribution, and seasonal variation influence recorded crime.

The analysis focuses on identifying high-harm crime types, understanding seasonal demand, and ensuring that crime levels are interpreted within their geographic and demographic context.

A key objective of the project is to develop and demonstrate Tableau skills by applying real-world crime data to create interactive visualisations that support systematic exploration and generate evidence-based insights.

Dataset Overview

The primary dataset consists of recorded crime data obtained from the UK Police open data portal (data.police.uk). The data were downloaded in CSV format, with each police force and month provided as a separate file. The original data include individual-level crime records with information on offence type, location, and reporting force.

To support comparative analysis across police constabularies, the monthly CSV files were merged into a single consolidated dataset prior to being uploaded into Tableau. Population and geographic context were added through a manually compiled supplementary table containing police force population estimates and surface-area figures. Population data were sourced from the Home Office police force area population dataset, providing a consistent and comparable basis across forces. Area figures were drawn from HMICFRS and official police force publications, as no single unified geographic dataset exists.

The combined dataset enables analysis of total crime volume, crime per population, and crime per square mile across the Northumbria, Durham, and Cleveland police force areas. This approach ensures that differences in recorded crime are interpreted within their geographic and demographic context, supporting fair comparison and operationally relevant insights rather than headline-driven conclusions.

Dataset Structure

The original crime data include the following key fields: Crime ID, Month, Reported by, Falls within, Longitude, Latitude, Location, LSOA code, LSOA name, Crime type, and Last outcome category. The data were provided at a monthly level, with the date recorded only as month and year.

For analytical purposes, the data were summarised by crime type prior to uploading into Tableau. An additional date field was created to convert the month–year value into a fully recognised date format, ensuring compatibility with Tableau’s time-series functionality and preventing inconsistencies across records.

The final dataset is structured in a long (tidy) format, where each row represents the count of a specific crime type for a given month and police constabulary. A grouped crime category was also created for targeted analysis of theft-related offences, allowing multiple theft sub-types to be examined both individually and collectively. This structure supports efficient aggregation, filtering, and interactive visualisation within Tableau.

Identified Problems or Challenges in Dataset

Fragmented Source Files

Crime data are published as separate CSV files for each police force and month, requiring manual merging prior to analysis. This increases the risk of inconsistencies if files are missing or misaligned.

Date Format Limitations

The original date field records only month and year, which does not always convert reliably into a recognised date format within Tableau. This required the creation of an additional date column to ensure accurate time-series analysis.

Crime Classification and Grouping

Some offence categories, particularly theft-related crimes, are distributed across multiple sub-types. Grouping these categories was necessary to enable meaningful analysis but introduces an element of analytical judgement that may influence interpretation.

Exploratory Data Analysis

Northumbria and Durham cover extensive rural areas, whereas Cleveland is more urban and densely populated. While Northumbria records the highest total number of crimes, Cleveland experiences the highest crime density per square mile, reflecting the concentration of offences in urban environments.

When adjusted for population, crime rates are broadly similar across all three constabularies, indicating that recorded crime is largely proportional to population size rather than geography alone. This highlights why raw crime totals alone are insufficient for decision-making without geographic and population context.

Analysis by crime type shows that Violence Against the Person is the most prevalent category and demonstrates a clear seasonal pattern, peaking during the summer months. Crimes Against Property display more variable seasonal trends; notably, shoplifting peaks in October before declining towards December, which is unexpected given typical pre-Christmas patterns

Crime Overview by Constabulary Area

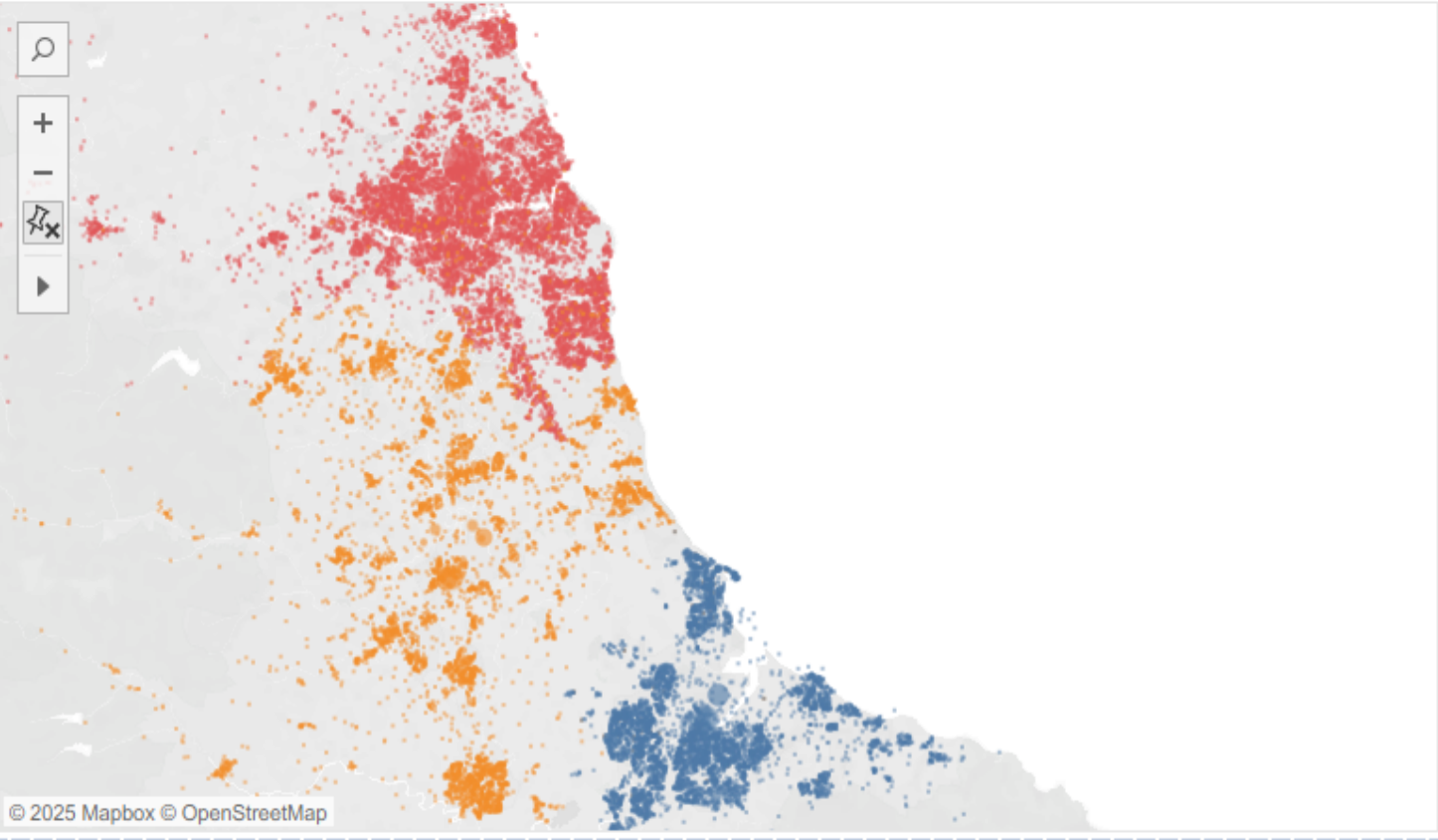
Constabulary Name

Cleveland Police

Durham Constabulary

Northumbria Police

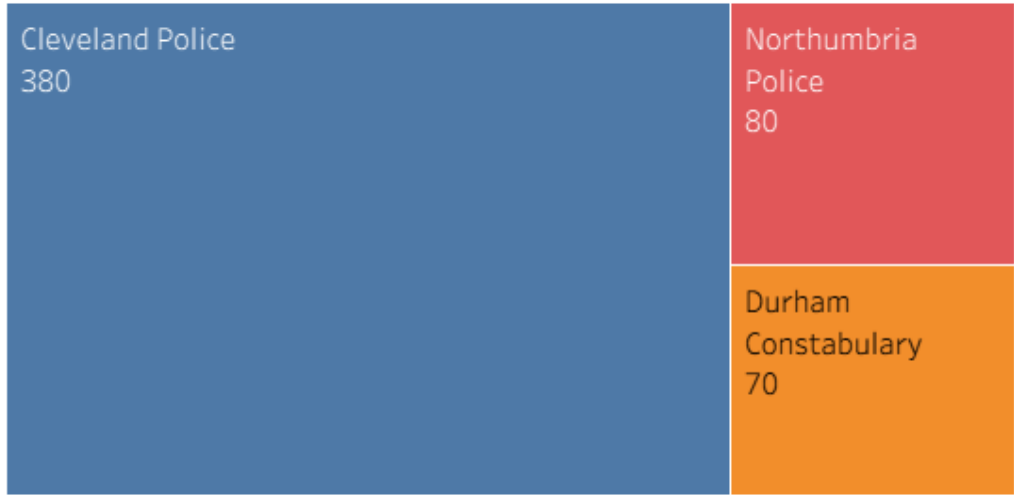
Crime Incident Density Across the North East Region



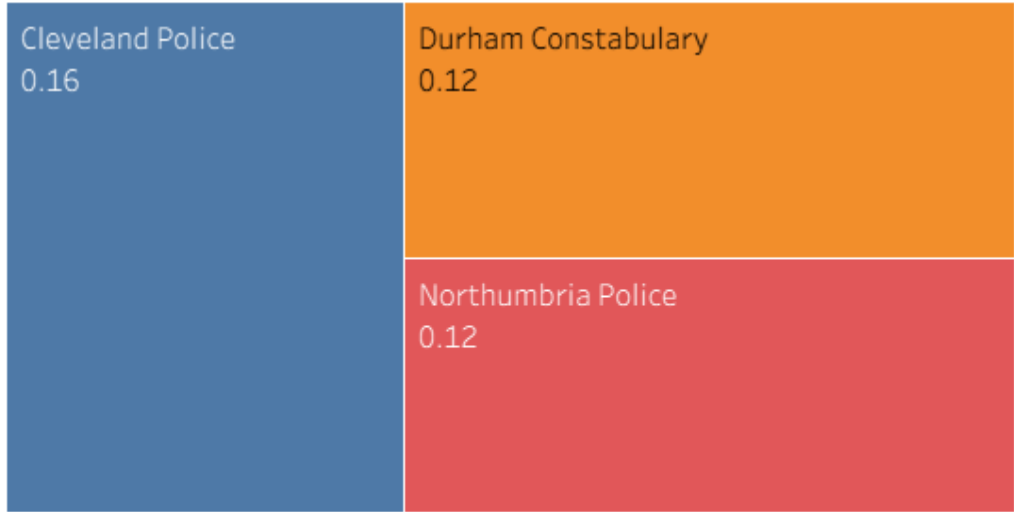
Crime Stats by Constabulary

Constabulary	% Total Crimes	Total Crimes
Cleveland Police	26.44%	87,833
Durham Constabulary	22.15%	73,573
Northumbria Police	51.41%	170,748

Crime Rate by Area (sq miles)



Crime Rate by Population



Crime Overview by Constabulary Area - Insights

The map indicates that Northumbria Police and Durham Constabulary cover the largest geographic areas. In terms of total recorded crime, Northumbria Police accounts for a significantly higher number of offences overall. However, when crime is adjusted for land area, Cleveland Police shows a notably higher crime rate per square mile. This is not unexpected, as both Northumbria and County Durham contain extensive rural areas where crime is more spatially dispersed; this pattern is particularly clear for County Durham on the map.

When crime is adjusted for population, the differences between the three constabularies become far less pronounced. The crime rate per population is relatively evenly distributed across all regions, suggesting that although the Cleveland Police area is more densely populated, the number of crimes recorded is broadly proportional to its population size.

Crime Overview by Constabulary Area - Insights

These differences suggest varying policing challenges. Rural forces such as Durham and Northumbria may face issues related to coverage and response times over large areas, while Cleveland Police may need to focus resources on high-density urban hotspots.

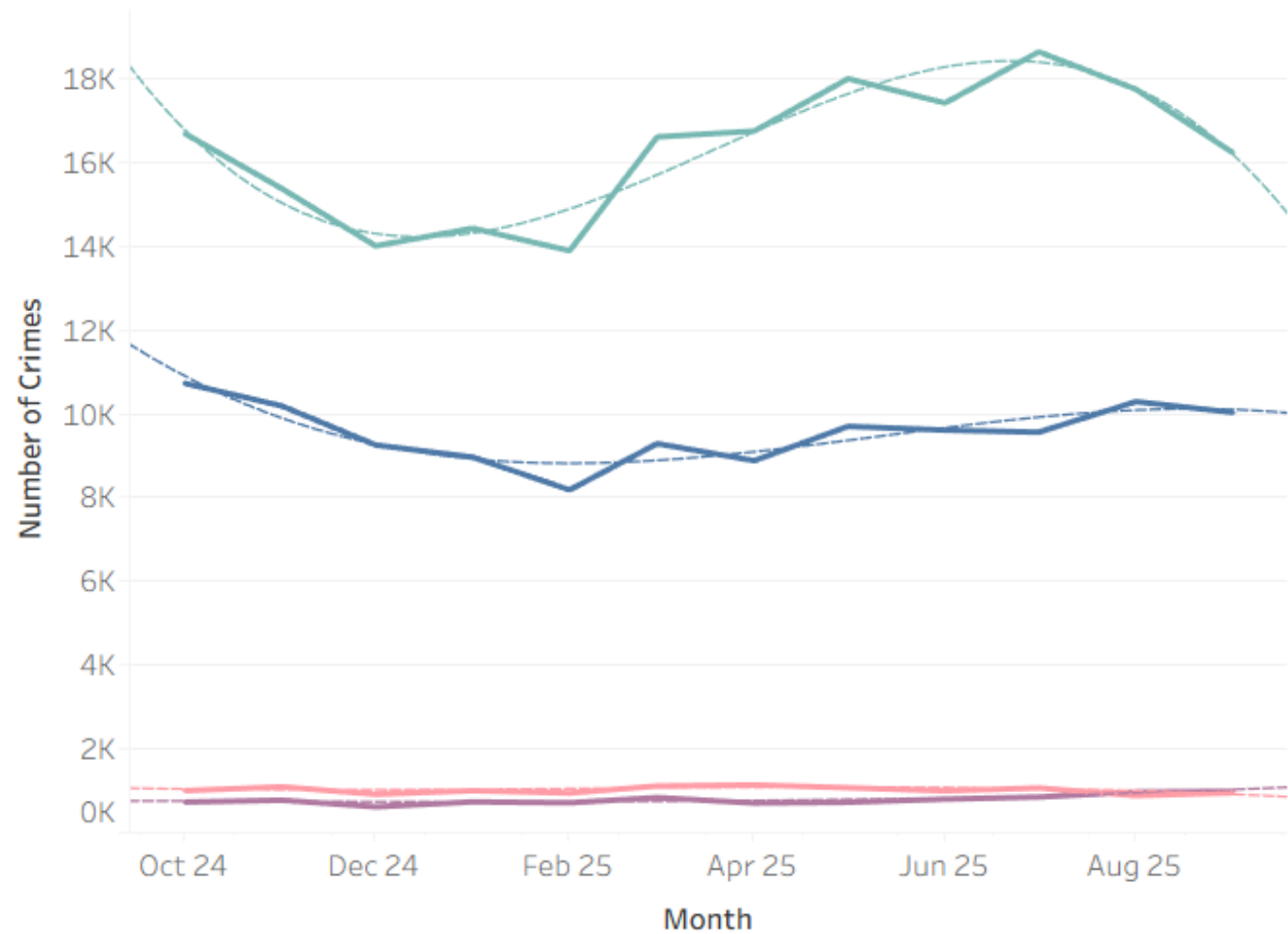
Using multiple metrics, total crime, crime per square mile, and crime per population, provides a more balanced and meaningful comparison of police force areas than relying on a single measure alone.

Crime Patterns by Type Over Time

Crime Type Category

- Crimes against property
- Drug and weapon offences
- Other crime
- Violence Against the Person

Crime Types Category over Time (October 2024 to September 2025)



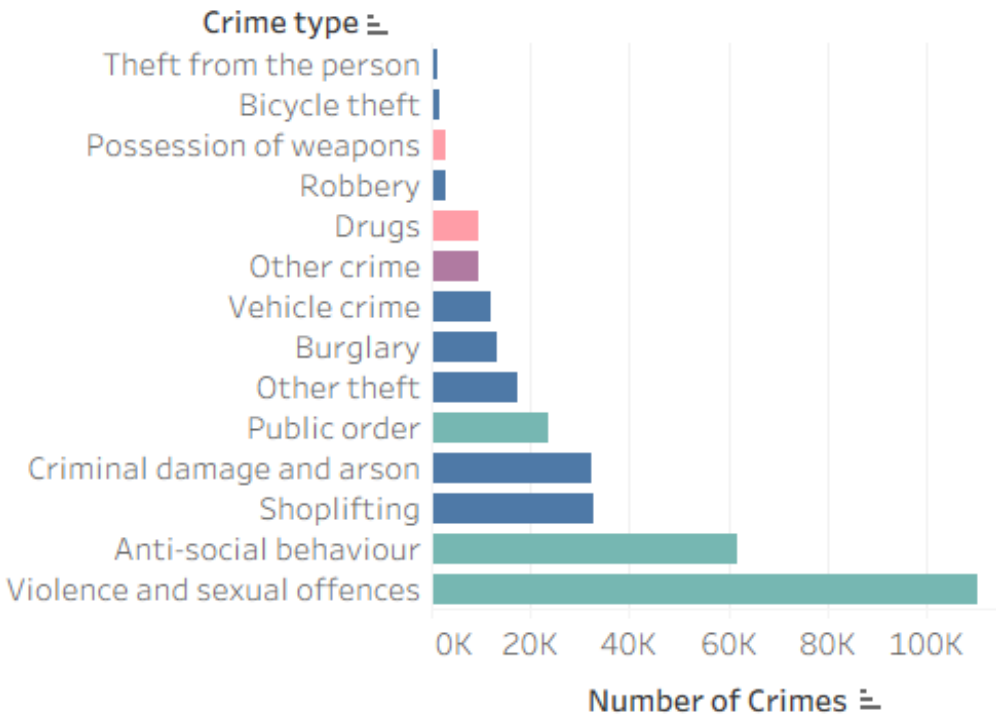
Crime Type Category

(All)

Month of Date

(All)

Breakdown of Crime Types into Subcategories



Crime Patterns by Type Over Time - Insights

Analysis of crime types over time shows that Violence Against the Person is consistently the most prevalent category and displays a clear seasonal pattern. Incidents rise steadily from spring, peak during July, and decline through autumn into winter, reaching their lowest point in February. This seasonal effect is statistically significant ($p = 0.0003$), meaning it is extremely unlikely to be due to chance and can be treated as a reliable pattern rather than random fluctuations. This pattern aligns with well-established criminological evidence that violence increases during warmer months, potentially due to increased social interaction and outdoor activity.

Crimes Against Property represent the second most prevalent crime type and show a statistically significant trend over time ($p = 0.0027$), although the seasonal pattern is less pronounced than that observed for Violence Against the Person. Incidents peak later in the year, particularly in October, before declining towards February. No major incidents or events were identified that would explain the reduction observed in February 2025 for both crime types. This suggests the decrease is more likely attributable to normal seasonal patterns. Comparing these trends across multiple years would help determine whether this represents a recurring seasonal trend.

Crime Patterns by Type Over Time - Insights

To support deeper exploration, a horizontal bar chart was added to the dashboard showing sub-categories within each crime type. Interactive filters allow users to select crime type and month, and selections made on the time-series graph dynamically update the bar chart. This interactivity enables more granular investigation of the underlying drivers behind the observed trends.

Further breakdown shows that Violence Against the Person is largely driven by violence and sexual offences, which are consistently the most frequently reported sub-category. This is a concerning finding, particularly given increased national attention on violence against women and girls. While this dataset captures recorded offence categories, it does not include victim-level detail. This limits the ability to draw more target conclusions and should be interpreted alongside wider safeguarding intelligence.

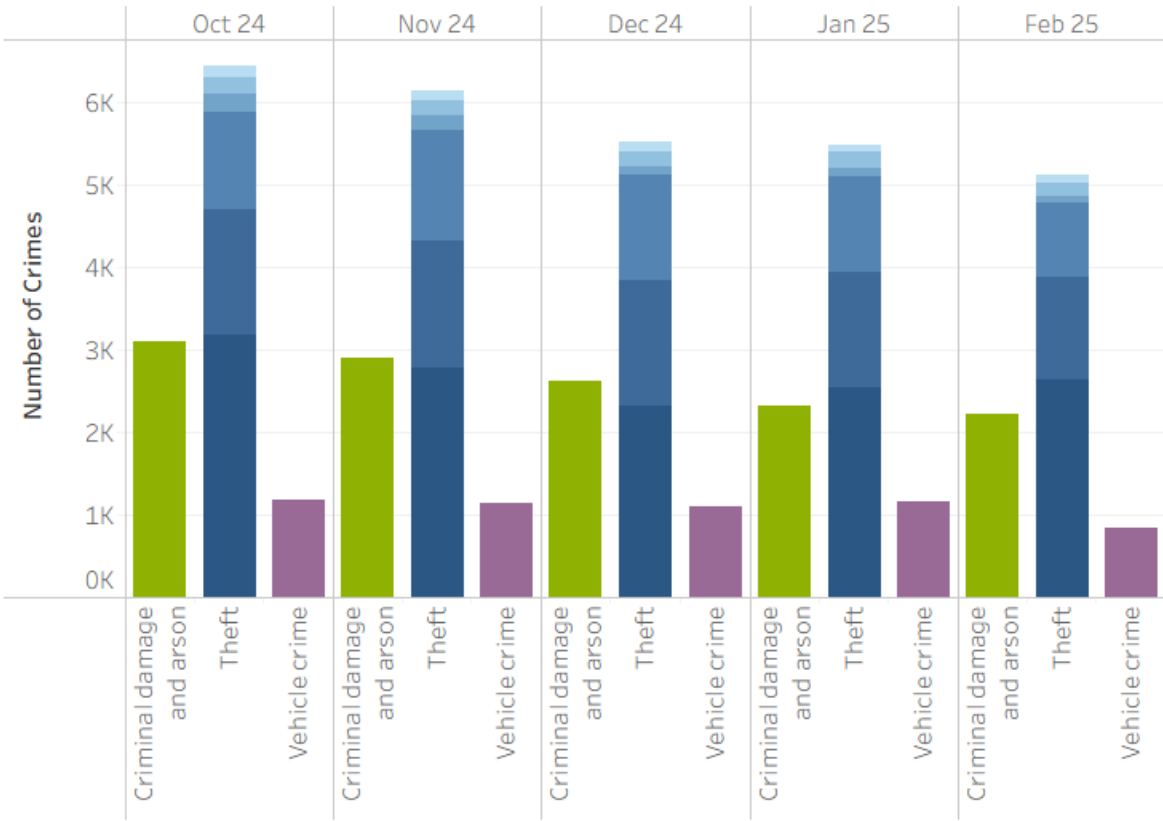
Within Crimes Against Property, the most common sub-categories are criminal damage and shoplifting. Shoplifting peaks in October but declines in November and December, during which criminal damage and arson become more prevalent. This shift is unexpected, as theft-related offences would typically be expected to increase in the run-up to Christmas. However, shoplifting represents only one of several theft-related sub-categories, and this apparent contradiction may reflect changes in offence classification or reporting patterns. This relationship is explored further in subsequent analysis.

Crime Against Property: Monthly and Subcategory Dynamics

Month of Date

(Multiple values)

Crimes Against Property Trends Over Time



Crime type

Thrift from the person

Robbery

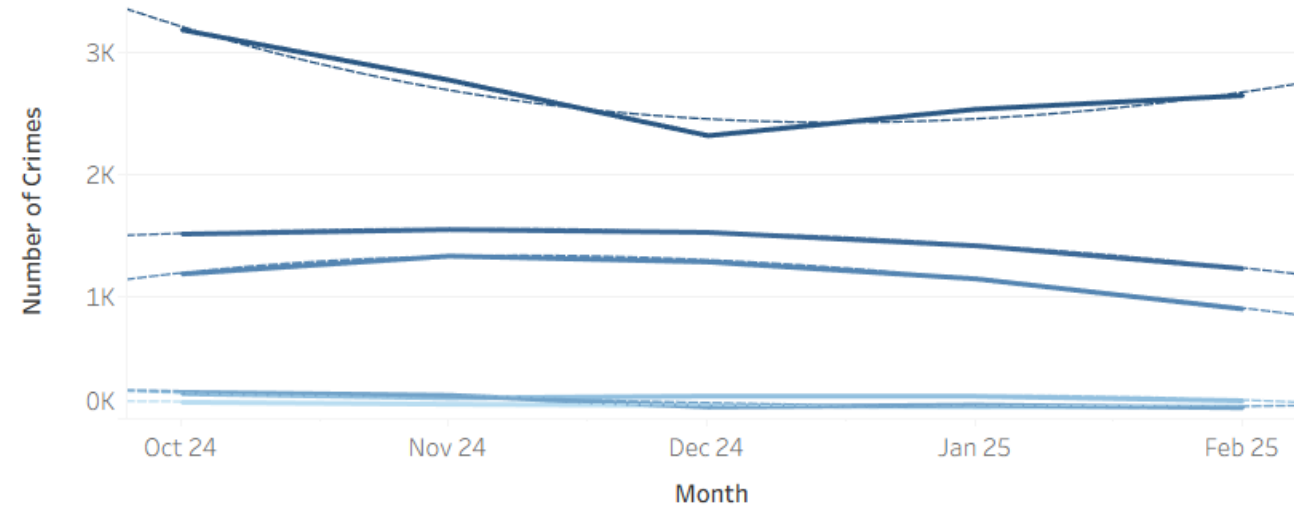
Bicycle theft

Burglary

Other theft

Shoplifting

Theft Category over Time (October 2024 to September 2025)



Monthly Percentage Share of Theft Subcategories

Crime type	Oct 24	Nov 24	Dec 24	Jan 25	Feb 25
Shoplifting	23.66%	20.61%	17.23%	18.83%	19.67%
Other theft	20.90%	21.41%	21.09%	19.59%	17.01%
Burglary	20.28%	22.78%	21.96%	19.60%	15.38%
Bicycle theft	30.52%	27.14%	13.64%	15.89%	12.80%
Robbery	22.97%	19.06%	20.74%	20.62%	16.61%
Theft from the person	24.16%	21.31%	19.54%	17.23%	17.76%

Crimes Against Property - Insights

Applying a month filter enables focused analysis of individual months or seasonal trends. For this review, the period from October 2024 to February 2025 was examined to further investigate the previously observed shoplifting trend.

Criminal damage and arson remain consistently high throughout the period, though they show a slight decline from October to February. Vehicle crime appears relatively stable, with only minor fluctuations.

To better understand theft trends, the different subcategories of theft were grouped. This helps assess whether total theft increases toward Christmas, even if the types of theft shift. Contrary to expectations, total theft actually decreases from October to December.

The October peak followed by a decline toward December is counterintuitive. Possible explanations include shifts toward online fraud not captured in this dataset, or changes in police recording practices during peak trading periods. Without complementary retail or fraud data, these explanations cannot be tested here, but they highlight important avenues for future investigation.

Recommendations

Operational Activity:

Cleveland Police: Focus resources on high-density urban areas where crime per square mile is highest.

Northumbria and Durham: Use mobile or targeted patrols in rural areas to address dispersed crime patterns efficiently.

Incorporating population-adjusted crime rates into operational planning can reduce bias introduced by raw crime totals and support fairer, more effective resource deployment.

Crime Classification & Data Integrity:

- Refining the classification of violent and sexual offenses, including assault, domestic violence, and various types of sexual crimes, will enhance the understanding of their severity and impact. This will allow more effective responses and interventions.
- Ensuring accurate classification of crimes is essential. Similar types of theft or high-volume periods may lead to misallocation between categories.
- Regular audits and clear guidelines improve data reliability, which supports better decision-making.

Recommendations

Seasonality & Workforce Planning:

Crime trends, especially violence against the person, are seasonal. These findings have direct implications for the deployment of resources.

Workforce planning must balance peak crime periods with staff holiday requests.

A fair, transparent system for holiday allocation helps maintain operational coverage and staff satisfaction.

Conclusion

Accurate crime categorization + understanding seasonal trends = more efficient resource deployment.

Proactively planning for seasonal spikes reduces strain on teams and ensures public safety is maintained.

Limitations of the Analysis

Scope:

- The analysis only covers a 12-month period. Year-on-year trends and long-term changes in crime patterns are not captured, limiting the ability to identify whether observed differences are consistent over time. Extending the analysis across multiple years would provide a more robust understanding of trends and seasonal fluctuations.

Data Completeness and Accuracy:

- Crime records rely on reported incidents; unreported crimes are not captured, potentially underestimating true crime levels.
- Variations in reporting standards or practices between constabularies can affect comparability.

Analytical Assumptions:

- While crime per square mile or per population provides useful comparisons, these measures assume uniform risk across areas and do not account for demographic factors, socio-economic conditions, or localized “hotspots.” Consequently, important nuances may be overlooked when planning resource allocation or policing strategies.