



2015-2020

ATLANTA CRIME ANALYSIS REPORT

PRESENTED TO
Analytics Extra Mentorship Program

PRESENTED BY
AEM 9

INTRODUCTION

This report presents a detailed analysis of crime data from the Atlanta Police Department, focusing on crime trends over time, the impact of external factors like the COVID-19 lockdown, and crime distribution across neighborhoods. The analysis was conducted using Power BI, with key measures created using DAX (Data Analysis Expressions). The dataset includes various dimensions such as crime types, occurrences by time of day, population data, and race and ethnicity demographics. Extensive data preparation, cleaning, and modeling were performed to ensure accurate and meaningful insights.

The data cleaning process involved addressing missing values, removing duplicates, and standardizing fields such as date and time formats. A dimensional model was developed, establishing relationships between the crime, population, and race/ethnicity tables, allowing for a flexible yet robust analysis. Key DAX measures were created to compute crime counts, crime rates, trends, and rankings, along with additional columns to categorize crimes by lockdown periods and crime occurrence.

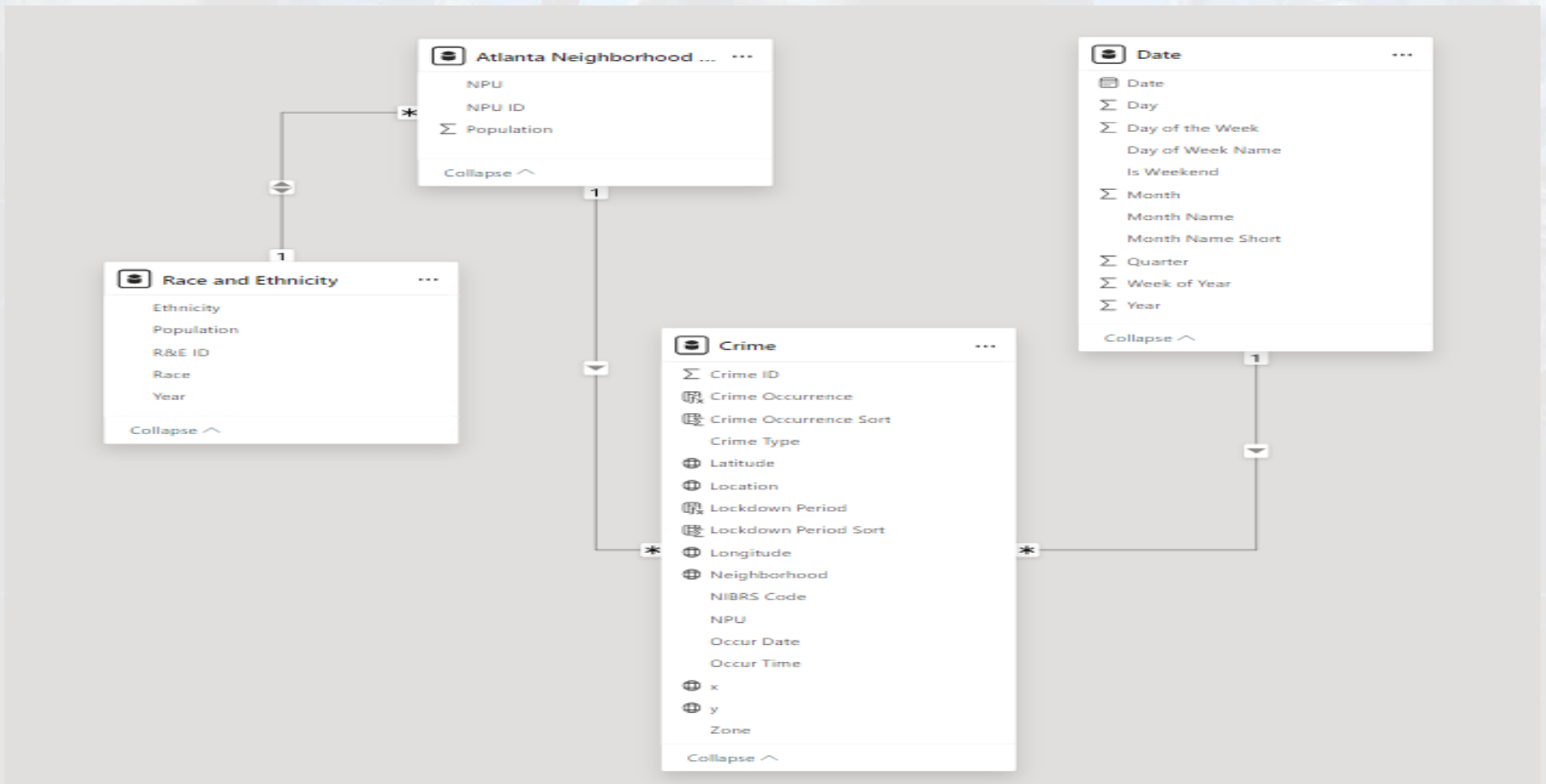
DATA MODELING

Schema Overview

The data model follows a **Star Schema** structure. This is a common and efficient design used for reporting and data analytics, where a central **fact table** (Crime table) is linked to various **dimension tables** (Race and Ethnicity, Atlanta Population, Date). The star schema allows for faster query performance, simplifying the process of aggregating and analyzing data from multiple sources.

Relationship Structure and Rationale

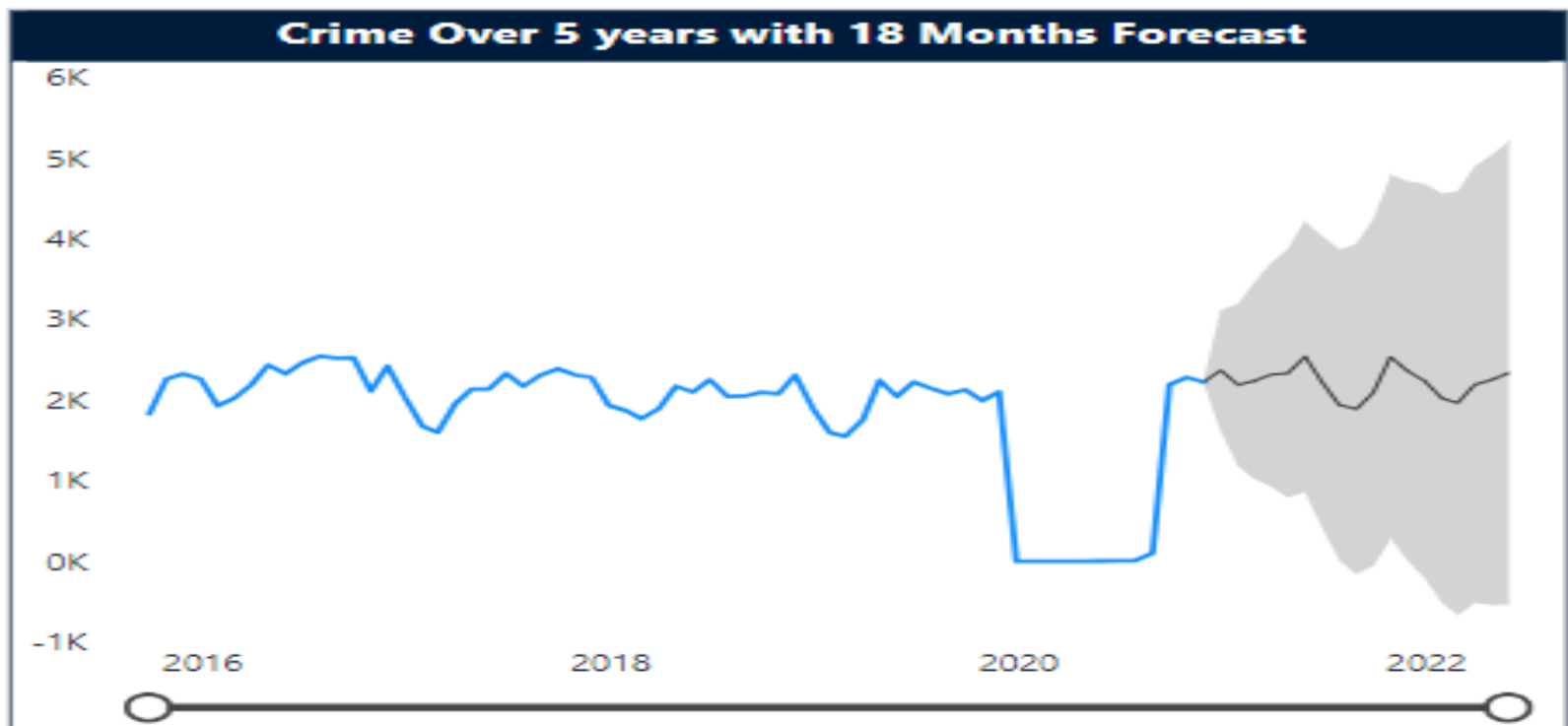
- 1. Race and Ethnicity Table & Atlanta Population Table:** One-to-many relationship was used to generate primary key in both tables with bidirectional cross-filtering.
- 2. Atlanta Population Table & Crime Table:** Many-to-one relationship was created between tables with single cross-filtering.
- 3. Date Table & Crime Table:** Many-to-one relationship was established between tables, with single cross-filtering.



Analysis Questions and Insights

Question 1:

Provide a view of crime over 5 years for Atlanta and forecast the next 18 months of crime within the same chart:



Measure Used:

Crime Count = `COUNT('Crime'[Crime ID])`

Insights

The chart shows a significant drop in crime at the beginning of 2020, which aligns with the COVID-19 lockdown period. Crime rates plummeted to near zero during this time, reflecting the impact of restricted movement and stay-at-home orders. As the lockdown eased, crime levels began to recover, but the rebound was gradual, not reaching pre-lockdown levels immediately. The forecast for the next 18 months suggests a moderate fluctuation in crime rates, with the projection indicating potential stabilization but with some uncertainty, as shown by the shaded region in the forecast area. This indicates that post-lockdown conditions may lead to ongoing variability in crime trends.

Analysis Questions and Insights

Question 2:

Provide a breakdown of the number of crimes by different crime types:

YTD Change			
Crime Type	Current YTD	Last YTD	YTD % Change
Homicide	43	97	▲ 9.73%
Larceny-From Vehicle	3192	9,149	▲ 6.75%
Aggravated Assault	636	1,911	▲ 6.59%
Auto Theft	1086	2,814	▲ 6.52%
Robbery	268	966	▲ 3.70%
Larceny-Non Vehicle	1149	6,187	▲ 3.63%
Burglary	466	2,682	▲ 2.66%

Measures Used:

- Current YTD = `CALCULATE('YTD Crime Dax'[YTD Crime], 'Date'[Year] = 2020)`
- Last YTD = `CALCULATE('YTD Crime Dax'[YTD Crime], DATEADD('Date'[Date], -1, YEAR))`
- YTD % Change = `DIVIDE([Crime Count] - [Previous Crime], [Previous Crime])`

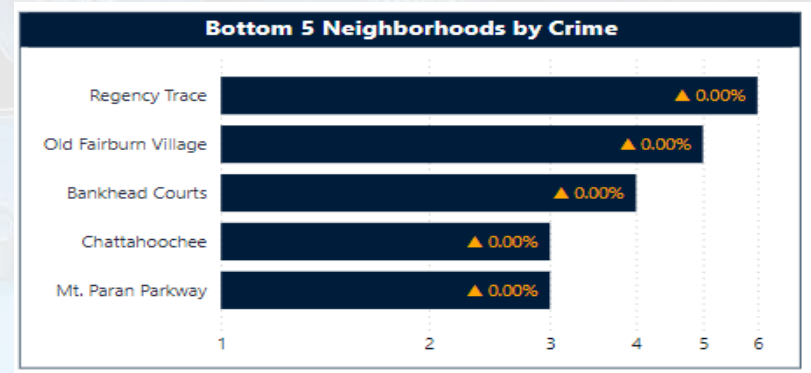
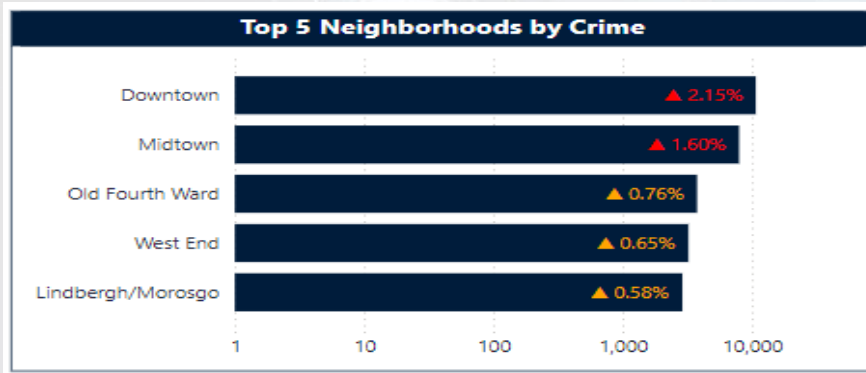
Insights

The chart shows year-to-date (YTD) changes in crime, with homicide seeing the largest increase at 9.73%, despite lower overall incident numbers. Larceny-from-vehicle, aggravated assault, and auto theft have also risen by 6.75%, 6.59%, and 6.52%, respectively, indicating significant concerns. Robbery, larceny-non vehicle, and burglary show smaller increases, ranging from 2.66% to 3.70%. These trends suggest a notable rise in violent and property crimes, with homicides standing out as the most critical area for intervention.

Analysis Questions and Insights

Question 3:

Rank each of the neighborhood / Zone by the crime rate (number of crimes / population)



Measures Used:

- Crime Rate = $\text{DIVIDE}(\text{[Crime Count]}, \text{[Total Population]})$
- Rank Neighborhood =
`VAR_topNeighborhood =`
`IF(ISINSCOPE(Crime[Neighborhood]),`
`RANKX(ALL(Crime[Neighborhood]), [Crime Count], , DESC))`
`VAR_bottomNeighborhood=`
`IF(ISINSCOPE(Crime[Neighborhood]),`
`RANKX(ALL(Crime[Neighborhood]), [Crime Count], , ASC))`
`VAR_ranking =`
`IF(SELECTEDVALUE(TopBottom[Value]) = "Top",`
`_topNeighborhood,`
`_bottomNeighborhood)`
`RETURN`
`IF(_ranking <= 'TOP N Neighbor'[TOP N Parameter Value],[Crime Count])`

Insight

This chart comparison highlights a stark contrast between the neighborhoods with the highest and lowest crime rates. Downtown and Midtown show the most significant crime increases, with rates rising by 2.15% and 1.60%, respectively, signaling the need for urgent crime prevention measures. In contrast, Regency Trace, Old Fairburn Village, and Bankhead Courts report a 0.00% crime rate, suggesting they are the least affected by crime.

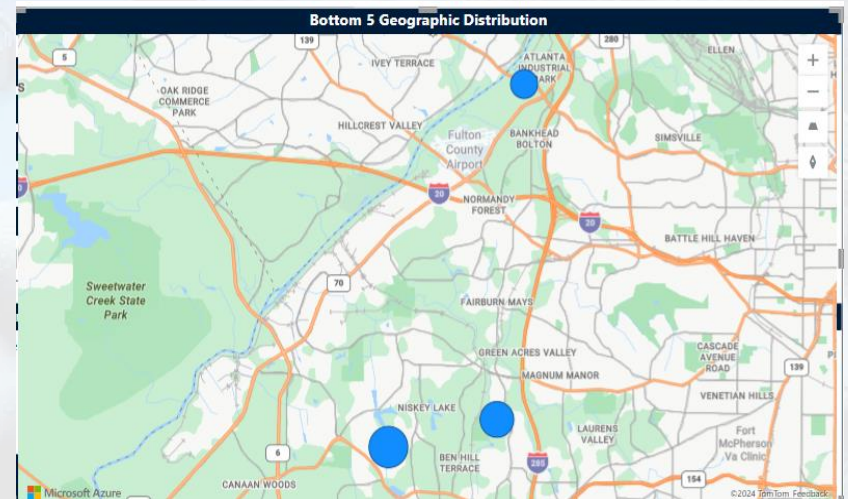
Analysis Questions and Insights

Question 4:

Show crimes on a map with a drilldown from Neighborhood to crime location level

Solution:

The use of ranking and a numerical value parameter was employed to address this question of displaying crimes on a map with a drilldown from neighborhood to crime location level, allowing for the visualization of both top and bottom crime occurrences, with a minimum of 0, an increment of 1, and a maximum of 20.



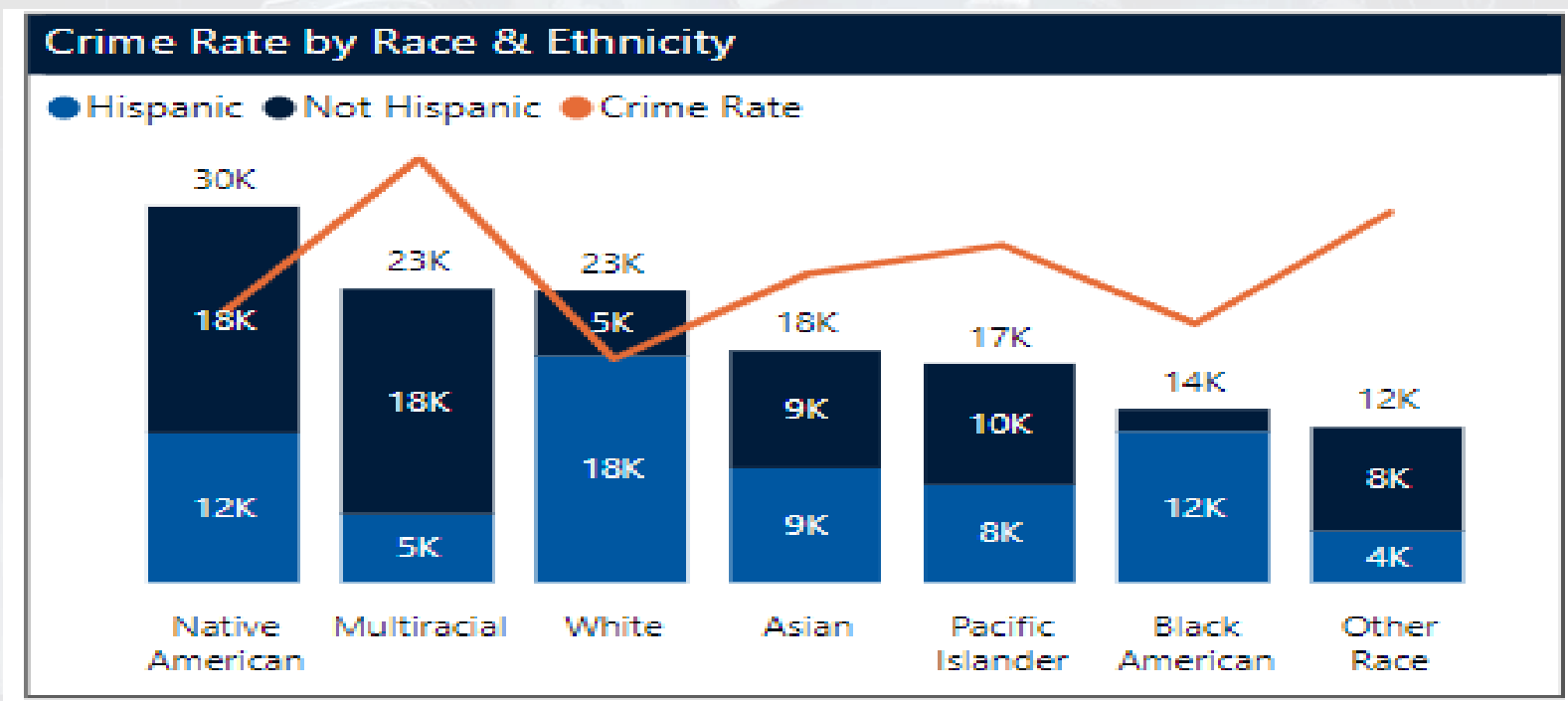
Measures Used:

- Crime Count = `COUNT('Crime'[Crime ID])`
- Rank Neighborhood =
`VAR _topNeighborhood =`
`IF(ISINSCOPE(Crime[Neighborhood]),`
`RANKX(ALL(Crime[Neighborhood]), [Crime Count], , DESC))`
`VAR _bottomNeighborhood=`
`IF(ISINSCOPE(Crime[Neighborhood]),`
`RANKX(ALL(Crime[Neighborhood]), [Crime Count], , ASC))`
`VAR _ranking =`
`IF(SELECTEDVALUE(TopBottom[Value]) = "Top",`
`_topNeighborhood,`
`_bottomNeighborhood)`
`RETURN`
`IF(_ranking <= 'TOP N Neighbor'[TOP N Parameter Value],[Crime Count])`

Analysis Questions and Insights

Question 5:

Show crime rate based on Race and Ethnicity Diversity Populations in Atlanta



Measures Used:

- Crime Count = `COUNT('Crime'[Crime ID])`
- Crime Rate = `DIVIDE([Crime Count],[Total Population])`

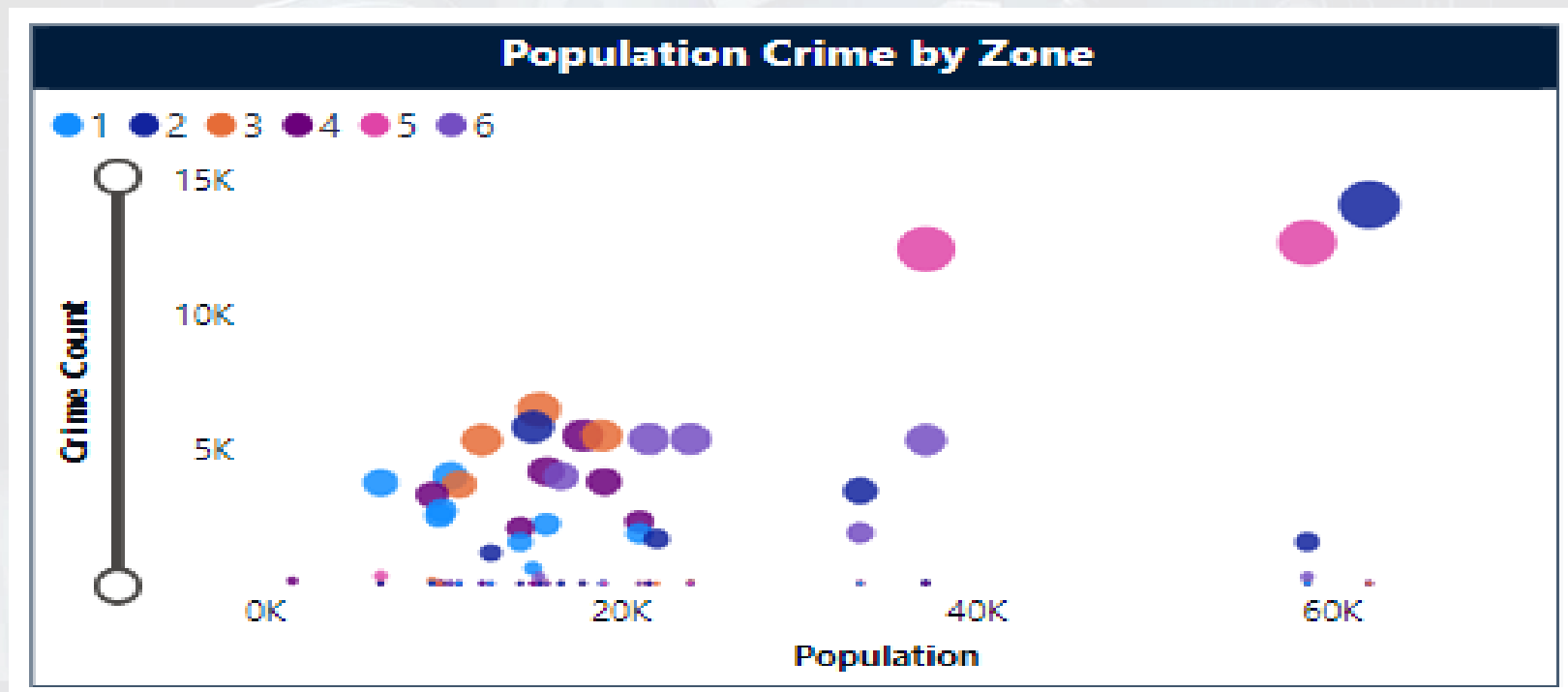
Insight

This chart reveals significant disparities in crime rates among different racial and ethnic groups. Notably, the Hispanic population shows lower crime rates across most racial categories compared to their Not Hispanic counterparts. The Black and Multiracial groups exhibit higher crime rates, with the Not Hispanic Black group having the highest rate overall, independently.

Analysis Questions and Insights

Question 6:

Show whether the population has had an impact on crime within areas



Measure Used:

- Crime Count = `COUNT('Crime'[Crime ID])`

Insight

This chart illustrates a general trend where crime count increases with population size. However, the relationship is not uniform across all zones, as indicated by the spread and color variation of data points. Some zones with smaller populations exhibit higher crime counts compared to those with larger populations. This suggests that factors other than population size, such as socioeconomic conditions or law enforcement effectiveness, might influence crime rates in different zones. This insight can be valuable for urban planning and resource allocation for law enforcement.

Analysis Questions and Insights

Question 7:

Show whether Lockdown / Work from home affect Crime rate.

Lockdown Period		
Pre-Lockdown	Lockdown	Post-Lockdown
130K	11	6,824

Measure Used:

Lockdown Period =

```
VAR LockdownStart = DATE(2020, 3, 23)
```

```
VAR LockdownEnd = DATE(2020, 7, 4)
```

```
VAR CurrentDate = 'Crime'[Occur Date]
```

```
RETURN
```

```
    IF(CurrentDate < LockdownStart, "Pre-Lockdown",  
        IF(CurrentDate >= LockdownStart && CurrentDate <= LockdownEnd,  
            "Lockdown",  
            "Post-Lockdown"))
```

Insight

The chart highlights a significant drop in activity during the lockdown period compared to pre-lockdown and post-lockdown phases. Prior to the lockdown, there were 130K recorded incidents or actions, which drastically fell to 11 during the lockdown, likely due to restrictions. Post-lockdown, the number rebounded to 6,824, indicating a recovery but still well below pre-lockdown levels. This data illustrates the profound impact of the lockdown on reducing activity, followed by a partial return to normalcy after restrictions were lifted.

CONCLUSION

The analysis reveals critical insights into Atlanta's crime trends and the influence of population density, race, and ethnicity on crime distribution. The results indicate that certain neighborhoods experience disproportionately higher crime rates, often linked to population size and demographic factors. The impact of the COVID-19 lockdown was also evident, with crime patterns fluctuating significantly during and after the lockdown period. Furthermore, the breakdown of crime occurrences by time of day highlighted peak crime times, aiding law enforcement in strategic resource allocation.

The data preparation, modeling, and advanced DAX measures allowed for the creation of interactive dashboards that highlight crime distribution, identify high-risk areas, and forecast future trends. These dashboards provide actionable insights for stakeholders, including law enforcement agencies, policymakers, and the general public.

RECOMMENDATIONS

1.Targeted Resource Allocation: Based on the neighborhood rankings and population-adjusted crime rates, it is recommended that law enforcement agencies allocate resources strategically to high-crime areas. Crime prevention strategies should focus on the neighborhoods identified as top-ranked for crime incidence.

2.Focus on Peak Crime Hours: The analysis of crime occurrences by time of day revealed that crime rates tend to spike in the late evening and night hours. A recommendation would be to increase patrols and security measures during these high-crime periods to deter criminal activity.

3.Surveillance of High-Risk Areas: While the lockdown period saw minimal crime, the gradual increase post-lockdown indicates that some neighborhoods may be reverting to previous crime patterns. Continuous monitoring should focus on these neighborhoods to identify emerging hotspots and assess factors contributing to the increase in crime.

4.Data-Driven Community Engagement: With the insights derived from demographic factors such as race and ethnicity, community-based crime prevention programs could be developed in collaboration with local leaders and residents to address specific issues contributing to crime in their neighborhoods.