New York Minute

Evaluating Emergency Response Across Boroughs

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1.0 MOTIVATION AND IMPORTANCE OF ANALYSIS

Our analysis focuses on emergency response data and calls for service data, aiming to uncover insights about public safety and emergency services in different boroughs.

1.1 Motivating Question: Does the borough you live in affect your longevity?

Our focus is to identify whether there is a significant difference in life expectancy or emergency response outcomes based on the borough. This involves correlating emergency response efficiency and incidents with 911 calls for service.

1.2 Importance of Analysis

This analysis will provide valuable insights into the frequency, efficiency and effectiveness of emergency response services across different boroughs. By addressing the motivating questions, the project aims to contribute to better resource allocation, improved public safety, and informed policy decisions.
By analyzing the emergency response data, authorities can identify areas with higher incident rates, allowing them to allocate resources more efficiently. Understanding which boroughs have the most incidents can help in proactive measures to reduce these incidents.
Analyzing emergency response times can help in assessing the efficiency of emergency services. Boroughs with longer response times might need improvements in infrastructure or an increase in the number of response units. Data-driven insights can assist policymakers in making informed decisions regarding urban planning and development, focusing on enhancing emergency services in underserved areas.

2.0 How the analyses help address our motivating question

1. Which borough is reporting most incidents?
    - To figure out which borough has the highest frequency of incidents. This involves counting the incidents per borough and analyzing trends over time.

2. Which borough has the least emergency response time taken?
    - Measure and compare the average response times for emergency services across different boroughs. Identify which borough has the most efficient emergency response service.

3. Is there a correlation between number of incidents and emergency response time?
    - Examine the relationship between the number of incidents in each borough and the corresponding response times.

By conducting these specific analyses, we can address the motivating questions comprehensively. Understanding which boroughs report the most incidents, have the least

response times, and how these factors correlate provides a foundation for assessing the impact of borough-specific characteristics on longevity. By combining insights from the specific analyses, we can build a comprehensive understanding of how the borough of residence influences emergency service effectiveness and public safety, which are critical factors in determining longevity. This approach also contributes to broader insights into public health and safety, informing better resource allocation and policy decisions.

3.0 The used and its limitations

For this analysis, two primary datasets were utilized: Emergency Response data and 911 Calls for Service Data. Here's a detailed breakdown of these datasets:

Dataset	Columns	Source	Purpose
Emergency Response Data	incident type, location, borough, date, response time, and other relevant details.	NYC Open Data Link to dataset	To figure out which borough has the highest amount of incidents.
Calls for Service/911 Data	incident date, type, borough, and other relevant columns	NYC Open Data Link to dataset	To analyze the details and efficiency of emergency responses, including the timings of 911 calls.

3.1 Challenges faced

1. Data Volume:
   - Initial dataset contained 40.7 million rows, which was too large for practical analysis.
   - Solution:
     - Filtering to focus only on the year 2023, reducing the dataset to a manageable size (1-2 million rows per borough).

2. Data Quality:
   - Original dataset contained various issues such as null values, typos in the records, and inconsistent formats that could affect the accuracy of the analysis.
   - Solution:
     - Rigorous data cleaning process via R Markdown coding structures. Reformatting of columns and data types was also needed.

3. Geospatial Limitations:
Location data might be imprecise or incomplete.This can affect the accuracy of geospatial analysis, such as mapping incidents and response times.

The choice of datasets for this analysis was driven by the need to understand emergency incidents and response efficiencies across different boroughs. Despite the challenges and limitations, these datasets provide a robust foundation for addressing the motivating questions. Careful data cleaning, validation, and appropriate analytical techniques are essential to derive meaningful insights and ensure the reliability of the conclusions drawn.

4.0 Visualizations

Upon conducting visual analysis of the total number of incidents reported in each borough using the Emergency Report Dataset, we created a bar chart (Figure 2) to represent the incident frequency across boroughs. This chart revealed Manhattan as the borough with the highest number of incidents, while Staten Island recorded the lowest. Despite the original data's irregularities, this visualization offered a clear comparative view of incident frequency, aligning with our goal of addressing the motivating question regarding emergency response outcomes across boroughs.

Interestingly, our exploratory data analysis of the second dataset Calls for Service/911 Data, focusing on entries into the NYPD 911 system, revealed a similar trend. Although Manhattan was placed second in terms of aggregated reports compared to other boroughs, it still exhibited a relatively high incidence rate. This consistency between the bar plots generated from the exploratory analysis performed on both of our sources underscores the robustness of our findings and highlights Manhattan's significance in terms of emergency incidents. By using insights from multiple data sources, we reinforce our understanding of emergency response dynamics and advance towards addressing our research objectives effectively.

4.1 Overall key findings

1. Manhattan has the highest number of incidents reported.
2. The average response time for the authorities takes about 40 minutes which is consistent for all five boroughs.
3. The monthly reported calls for both Manhattan and Brooklyn were somewhat similar during the months of June, July, and August
4. The majority of the calls that were reported for all five boroughs were NON-CIP related incidents, which means that the incidents were reported after it happened.
5. The incidents reported and the calls for service data are partially correlated by Manhattan and Brooklyn boroughs.
6. The incidents that were reported occurred during the daytime making Brooklyn the highest number of incidents reported.

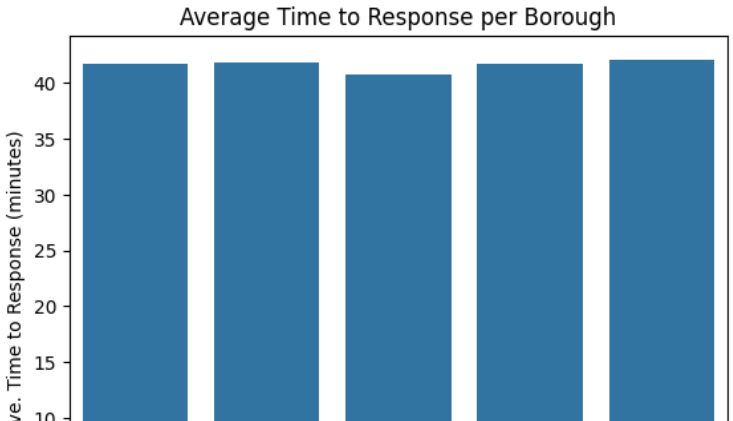

Figure 2:

Figure 1 The plot displaying the average response for all five boroughs

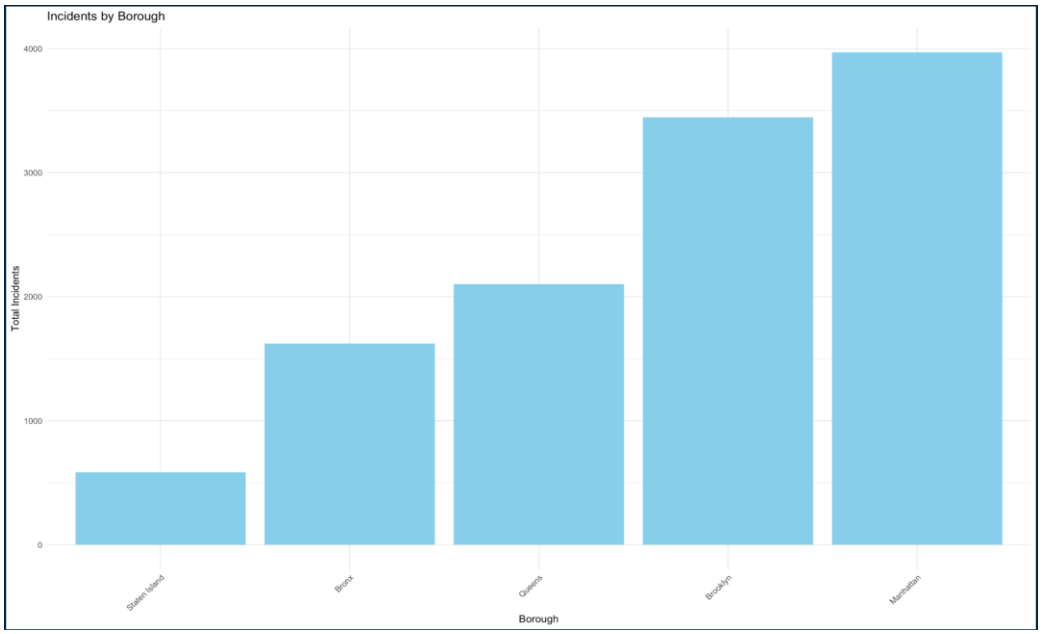

Figure 2 The total number of incidents in each borough in 2023, unnormalized.

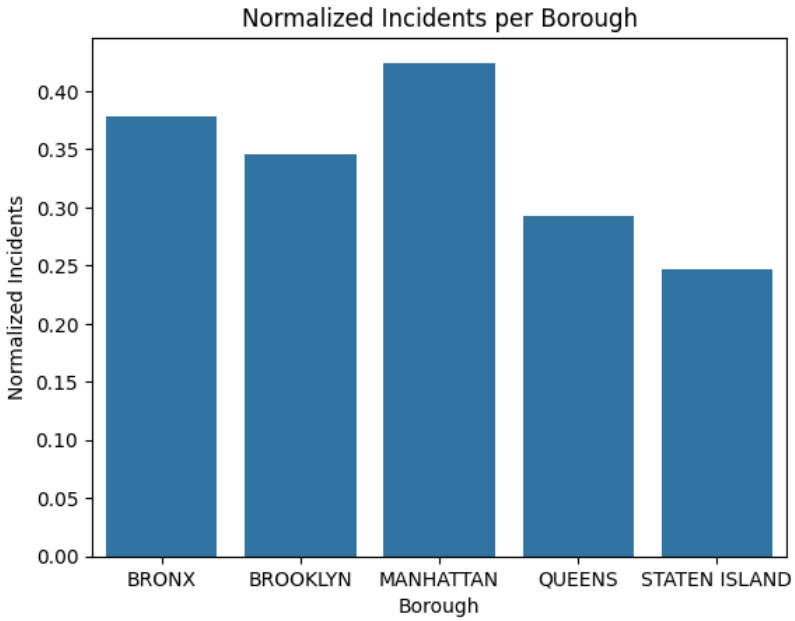

Figure 3 The number of incidents in each borough in 2023 after normalized by the population of each respective borough.

5.0 Conclusion and next steps

In continuation of this report, further steps could involve a deeper analysis of the factors influencing emergency response times and incident frequency across boroughs. Exploring socio-economic variables such as population density, income levels, and infrastructure quality could provide valuable insights into disparities in emergency service outcomes. Additionally, incorporating spatial analysis techniques to identify hotspots of incidents and response inefficiencies within each borough can inform targeted interventions and resource allocation strategies.

Furthermore, this analysis can serve as a blueprint for future studies in the realm of public safety and emergency services. By expanding the scope to include additional datasets and employing advanced analytical methodologies, researchers can gain a more nuanced understanding of the dynamics shaping emergency response systems. Moreover, leveraging emerging technologies such as machine learning and predictive modeling can enable proactive decision-making and enhance the effectiveness of emergency services in mitigating risks and saving lives. Overall, this report lays the groundwork for ongoing exploration and improvement in emergency response strategies, with the ultimate goal of ensuring the safety and well-being of communities across diverse urban landscapes.