

# **Resilience in the Face of Adversity: Analyzing New York City's 311 Service Requests during Hurricane Sandy and the COVID-19 Pandemic**

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## **Introduction:**

This report presents an analysis of the 311 NYC data from two distinct perspectives: the impact of Hurricane Sandy and the impact of the COVID-19 pandemic on New York City. By examining trends in service requests, complaint types, and response times, we aim to understand the ways in which these events have affected the daily lives of New York City residents and the city's ability to address their concerns. Through this analysis, we hope to provide valuable insights into the challenges faced by the city during these unprecedented times and inform future emergency response and recovery efforts.

## **Part I: 311 NYC Data - the Hurricane Perspective:**

We initially started with the 311 NYC data provided with 815538 rows and 14 columns. The first step was to clean the data which led us to handling the missing values. Hence we dropped the missing fields from the raw dataset reducing its size to about 542022 rows. The clean dataset is still sizable enough to further infer results from and analyze.

Before dropping rows: (815538, 14)

After dropping rows: (542022, 14)

### **The impact of the hurricane on complaints:**

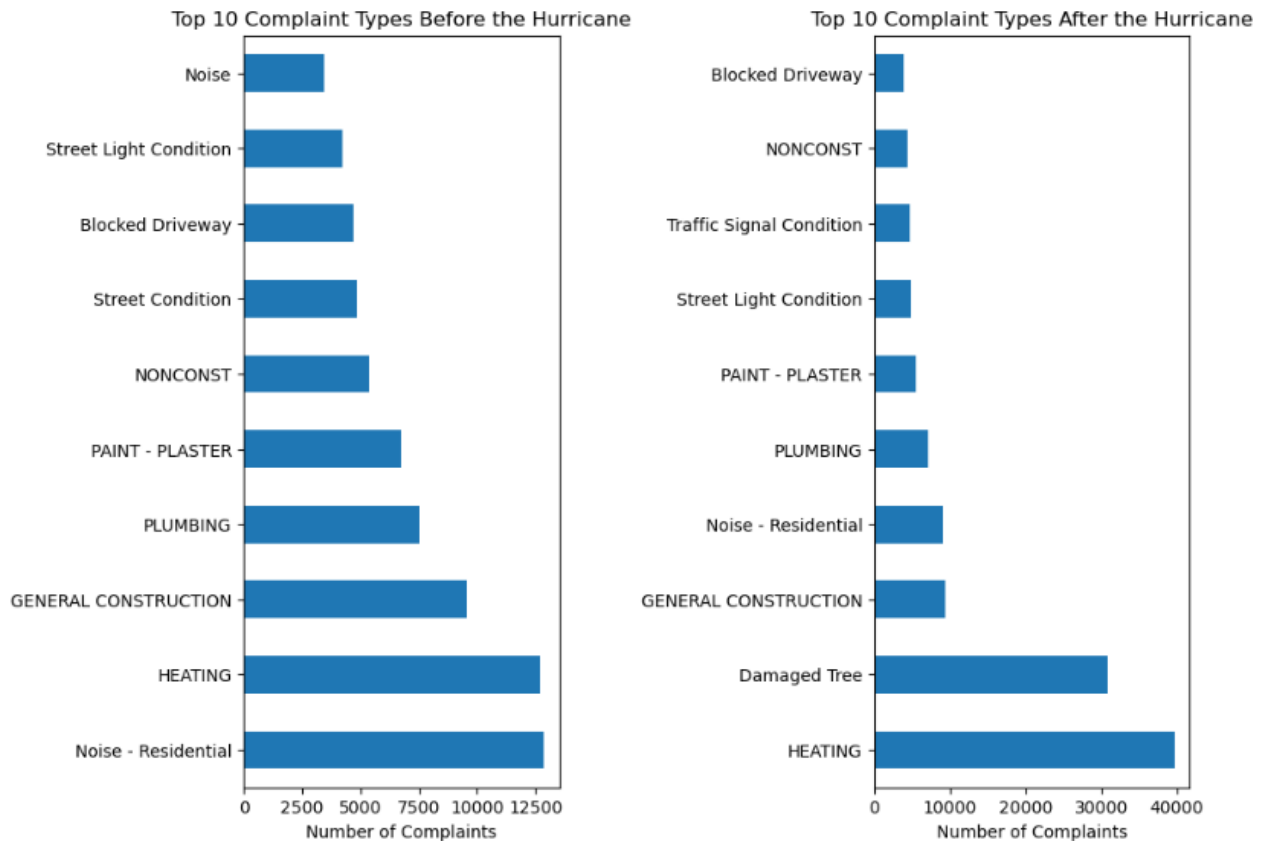
The analysis of the 311 NYC dataset provides valuable insights into the impact of Hurricane Sandy on New York City and the response efforts that followed. The result of the analysis shows that there was a significant increase in the total number of service requests after Hurricane Sandy. The total number of service requests for the year before the hurricane was 130,144 while the total number of service requests for the year after the hurricane was 164,637, which is an increase of 26.5%.

Total number of service requests before the hurricane: 130144

Total number of service requests after the hurricane: 164637

The result is expected since Hurricane Sandy was a major natural disaster that affected New York City and caused widespread damage to infrastructure, buildings, and public spaces. The increase in service requests after the hurricane could be attributed to the need for repairs, cleanup, and restoration of services that were disrupted or damaged by the storm.

### Highest complaint types before and after the hurricane:



The top complaint types before and after Hurricane Sandy in the 311 NYC dataset reveal some important trends and issues that emerged in the aftermath of the storm.

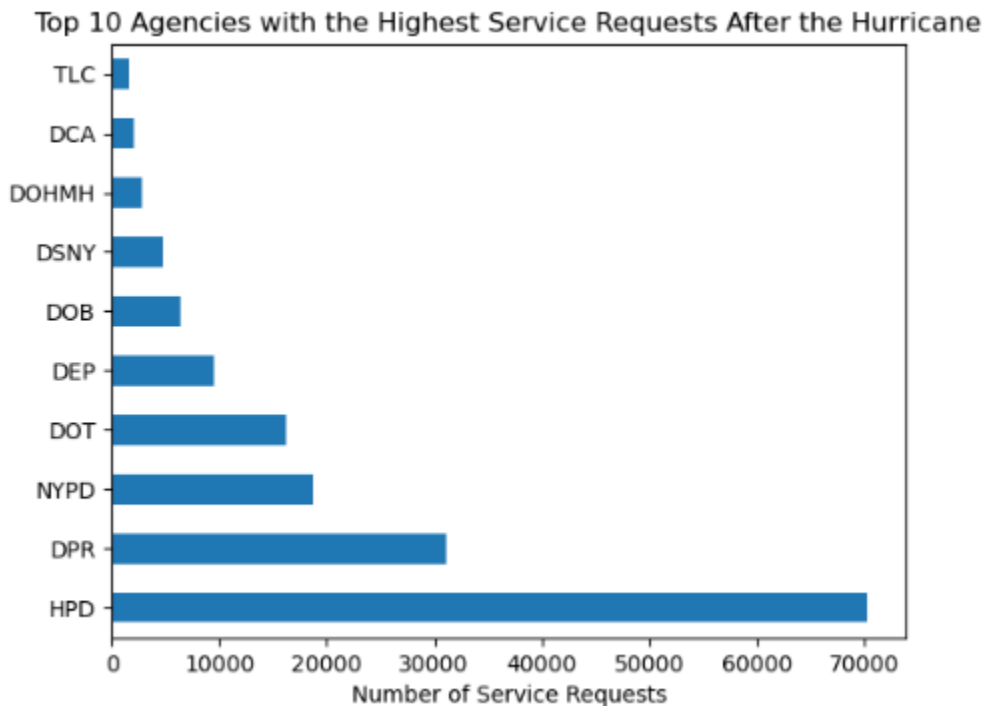
Before the hurricane, the top five complaint types were related to residential and construction issues such as noise, heating, and general construction complaints. Blocked driveways and street conditions were also common complaints. These types of complaints are typical for a large urban area like New York City, where construction and maintenance are ongoing, and noise and residential issues are common.

After the hurricane, the top complaint types changed, reflecting the impact of the storm on the city. The increase in complaints related to heating and damaged trees is particularly noteworthy, as it highlights the significant impact Hurricane Sandy had on the infrastructure and natural environment of New York City. Heating issues became the most common complaint type, likely due to the power outages and damage to heating systems caused by the hurricane. Damaged trees also became a major issue due to the significant damage caused by the hurricane to trees and other vegetation. Other common complaints after the hurricane included construction-related issues, noise complaints, and plumbing issues.

The damage caused by the storm led to a high number of service requests for repairs and restoration, reflecting the need for emergency response and recovery efforts in the aftermath of natural disasters.

The significant increase in service requests after the hurricane also highlights the importance of emergency response and recovery efforts in the aftermath of natural disasters. It is crucial to have efficient and effective systems in place to address the needs of the affected communities and ensure that services are restored as quickly as possible.

#### **Top 10 Agencies after the Hurricane:**



The top 10 agencies with the highest service requests after Hurricane Sandy are:

1. HPD (Department of Housing Preservation and Development) with 70345 service requests
2. DPR (Department of Parks and Recreation) with 31105 service requests
3. NYPD (New York City Police Department) with 18793 service requests
4. DOT (Department of Transportation) with 16245 service requests
5. DEP (Department of Environmental Protection) with 9548 service requests
6. DOB (Department of Buildings) with 6446 service requests
7. DSNY (Department of Sanitation) with 4779 service requests
8. DOHMH (Department of Health and Mental Hygiene) with 2848 service requests
9. DCA (Department of Consumer Affairs) with 2099 service requests
10. TLC (Taxi and Limousine Commission) with 1671 service requests

The reason for the high number of service requests for these agencies is likely due to the various damages and disruptions caused by the hurricane, including damage to buildings, infrastructure, and public spaces. For example, the Department of Housing Preservation and Development likely received a high volume of

service requests for repairs and maintenance of damaged buildings and housing units. Similarly, the Department of Parks and Recreation likely received a high volume of service requests for repairs and cleanup of damaged parks and other public spaces. The Department of Transportation likely received a high volume of service requests for repairs and maintenance of damaged roads and transportation infrastructure.

The high number of service requests for the NYPD suggests that there was an increased need for law enforcement and emergency response services in the aftermath of the hurricane. The Department of Environmental Protection likely received a high volume of service requests for repairs and maintenance of damaged water and sewage systems. The Department of Buildings likely received a high volume of service requests for inspections and repairs of damaged buildings and structures. The Department of Sanitation likely received a high volume of service requests for cleanup and removal of debris and other waste materials. Finally, the Department of Health and Mental Hygiene likely received a high volume of service requests for public health and safety concerns related to the hurricane.

## **Part II : 311 NYC Data - the Covid-19 Perspective**

The initial dataset was imported from the <https://opendata.cityofnewyork.us/> with only a required subset of the fields to reduce dimensionality. The attributes chosen are:

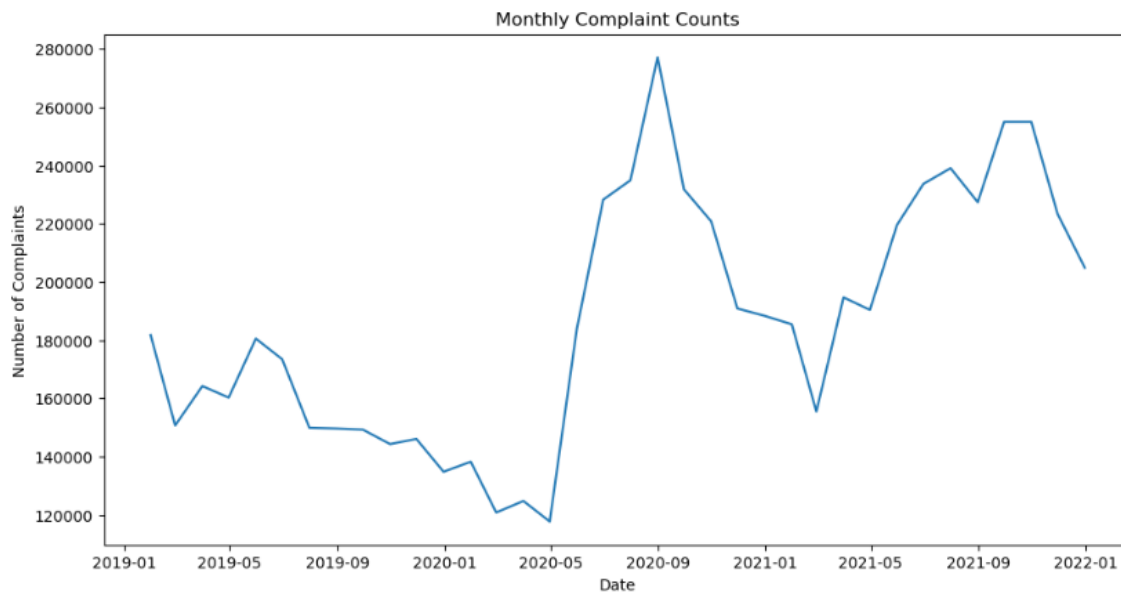
- **Created Date:** The date and time when the complaint was created.
- **Closed Date:** The date and time when the complaint was closed.
- **Agency:** The code for the city agency that responded to the complaint.
- **Agency Name:** The name of the city agency that responded to the complaint.
- **Complaint Type:** The broad category of the complaint.
- **Descriptor:** The more specific description of the complaint.
- **Location Type:** The type of location where the complaint was made (e.g. residential building, park, street).
- **Latitude:** The latitude of the location where the complaint was made.
- **Longitude:** The longitude of the location where the complaint was made.
- **Location:** The combination of latitude and longitude, presented as a string in the format (latitude, longitude).
- **Borough:** The borough where the complaint was made (e.g. Manhattan, Brooklyn, Queens).

We performed missing data handling by deleting any records that had null values. The operations were performed to produce higher quality data.

Before dropping rows: (8796425, 11)

After dropping rows: (6730437, 11)

## The trend of monthly complaints:



The data shows monthly counts of complaints from January 2019 to January 2022. The total number of complaints per month ranges from 120,817 in February 2020 to 277,167 in August 2020. There is a clear dip in the number of complaints during the height of the COVID-19 pandemic, particularly in April 2020, when the number of complaints dropped to 117,726. However, the number of complaints rebounded quickly, and by June 2020, the number of complaints surpassed pre-COVID levels.

The initial dip in the number of complaints around April 2020 could be attributed to several factors related to the COVID-19 pandemic. Firstly, the city was in the early stages of the pandemic, and many people were focused on immediate health and safety concerns. People may have been less likely to report non-urgent complaints during this time, given the uncertainty and anxiety surrounding the pandemic.

To infer the monthly counts of complaints before and after COVID, we can split the data into two groups: before and after March 2020, when the pandemic began to have a significant impact on New York City. Before March 2020, the average number of complaints per month was approximately 161,670. After March 2020, the average number of complaints per month was approximately 208,020, which represents an increase of approximately 29%. This increase could be due to a variety of factors, including changes in the way complaints are reported or changes in the types of complaints being reported.

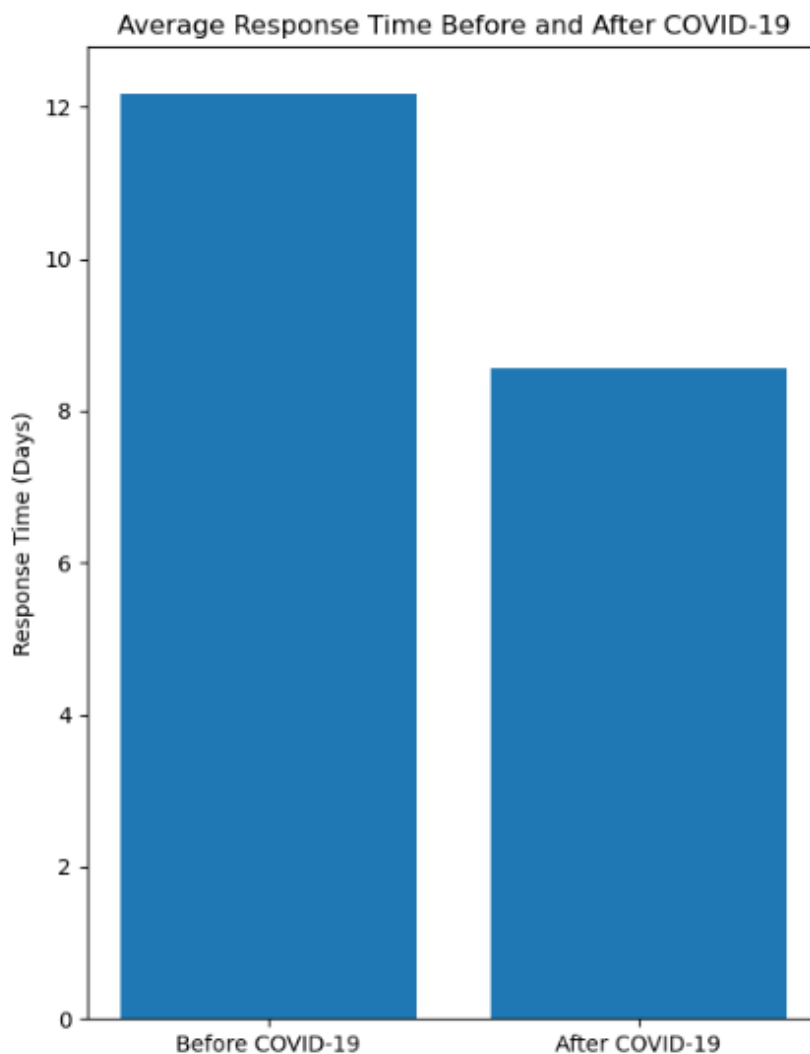
The analysis of the monthly counts of complaints before and after COVID provides insights into the impact of the pandemic on the number of complaints received by the city. While there was a brief dip in the number of complaints during the height of the pandemic, the number of complaints quickly rebounded, and the average number of complaints per month increased significantly after March 2020.

The significant increase in the average number of complaints per month after March 2020 could be attributed to several factors. First, the pandemic may have led to an increase in certain types of

complaints, such as those related to health and safety concerns, including COVID-19 violations and concerns related to social distancing measures. Additionally, the pandemic may have exacerbated pre-existing issues, such as noise complaints, due to more people being at home during the day.

Second, changes in reporting practices may have also contributed to the increase in the average number of complaints per month after March 2020. As more people were at home and had more time to observe their surroundings, they may have been more likely to report complaints. Additionally, changes in the way complaints were reported, such as the shift to online reporting, may have made it easier for people to submit complaints, leading to an increase in the overall number of complaints.

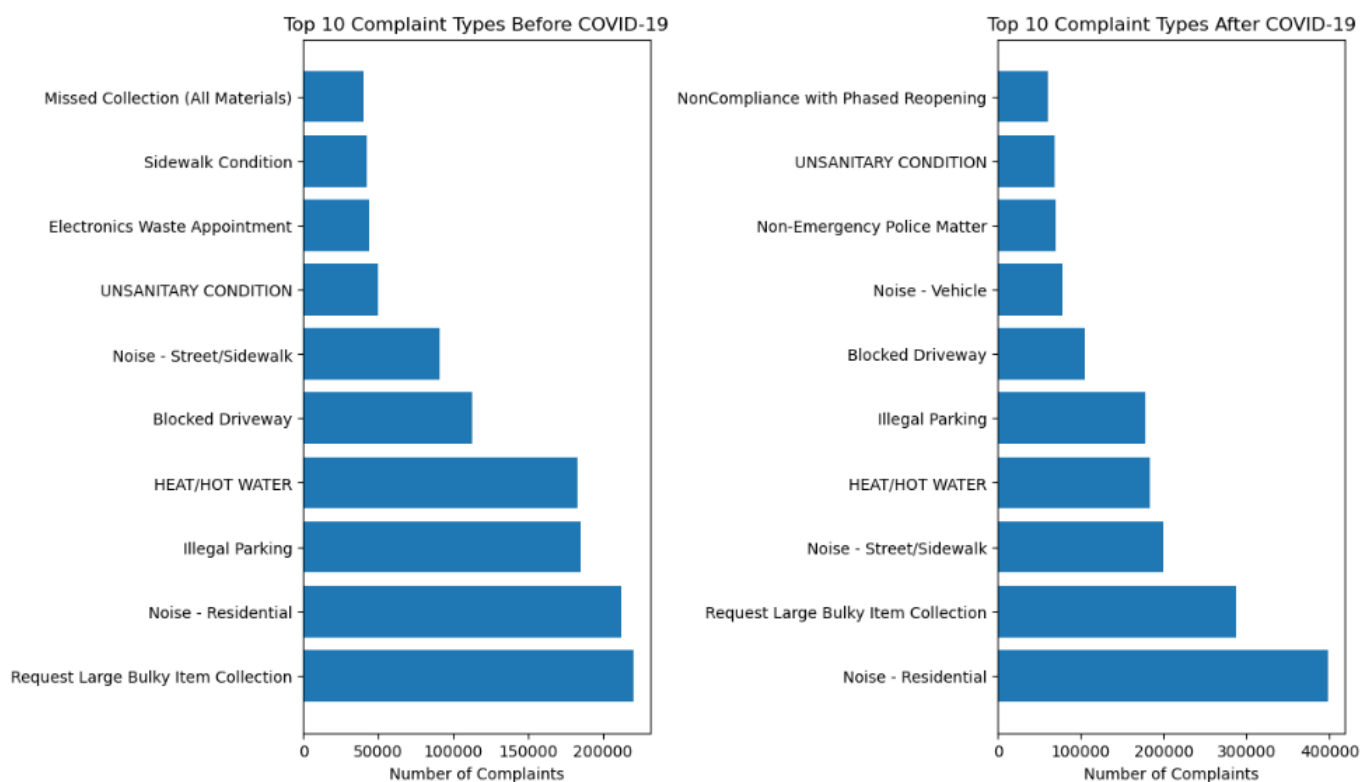
#### **Response time:**



The decrease in response time for complaints from an average of 12.18 days before COVID-19 to an average of 8.57 days after COVID-19 could be attributed to several factors. One possible reason for the decrease in response time is that the city may have implemented new technologies or processes to better manage the high volume of complaints received during the pandemic. For example, the city may have

improved their online reporting system, which could have streamlined the process of submitting and responding to complaints. Another factor that may have contributed to the decrease in response time is the nature of the complaints being submitted during the pandemic. With many complaints related to health and safety concerns, the city may have prioritized these complaints over others, which could have led to a faster response time. Overall, the decrease in response time for complaints after COVID-19 likely reflects a combination of factors related to changes in technology, working conditions, and the prioritization of health and safety concerns.

### Complaint types before and after Covid 19:



The changes in the top complaint types before and after COVID-19 reflect the significant impact of the pandemic on daily life in New York City and the types of issues that residents were concerned about during this time. Before the pandemic, the most common complaint types were related to bulky item collection, noise, illegal parking, and heat/hot water issues. However, after the pandemic began, there was a significant shift in the types of complaints being reported.

The most common complaint type after COVID-19 was noise, with a significant increase after COVID-19, more than doubling in frequency from 212,068 to 398,618. This reflects the fact that many people were at home during the pandemic and more sensitive to noise disturbances. Additionally, with more people working from home and spending time in their neighborhoods, there may have been more opportunities for noise complaints to arise.

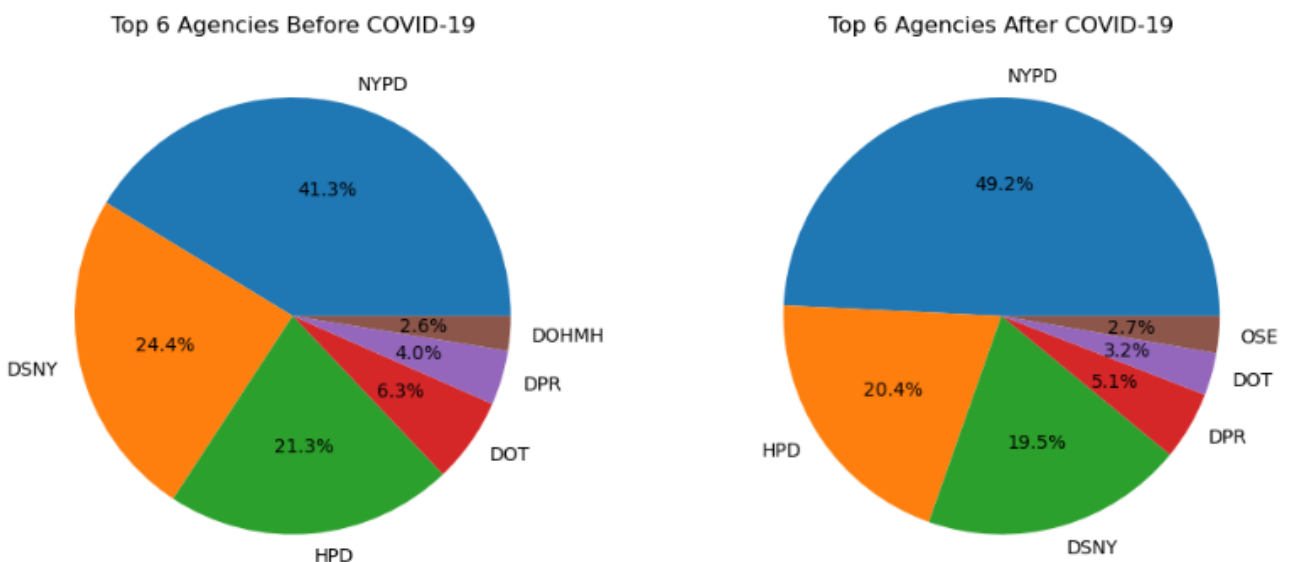
Another common complaint type after COVID-19 was the request for a large bulky item collection. Similarly, requests for large bulky item collections increased from 220,676 to 287,434, likely due to more people spending time at home and undertaking home improvement projects.

The third most common complaint type after COVID-19 was noise-related to streets and sidewalks, likely due to increased pedestrian traffic and outdoor dining.

The shift in the most common complaint types after COVID-19 also reflects changes in city policies and priorities. For example, there was an increase in non-compliance with phased reopening and non-emergency police matters, reflecting the impact of the pandemic on law enforcement and the city's response to public health concerns.

On the other hand, complaints related to illegal parking and blocked driveways remained prevalent both before and after COVID-19, although they decreased slightly in frequency after the pandemic began.

### Top agencies before and after Covid-19:



One notable trend is the significant increase in the number of complaints received by the NYPD after the pandemic began, from 742,772 to 1,122,847. This increase could be attributed to a variety of factors, such as an increase in crime or public safety concerns during the pandemic, changes in policing practices, or a greater willingness of residents to report issues to the police.

Another trend is the relatively consistent number of complaints received by the DSNY and HPD both before and after the pandemic. This suggests that certain issues related to sanitation and housing remained prevalent even during the pandemic.



There was a decrease in complaints received by the DOT after the pandemic began, which could be due to changes in traffic patterns or a reduction in construction and maintenance projects during the pandemic.

Overall, the changes in the top agencies for complaints before and after the pandemic reveal some interesting trends in the types of issues being reported by New York City residents, with significant increases in police-related complaints and relatively consistent numbers for sanitation and housing issues.

### **Conclusion:**

In conclusion, our analysis of the 311 NYC data has revealed significant changes in the number and types of service requests, complaint types, and response times in the wake of both Hurricane Sandy and the COVID-19 pandemic. The impact of these events on New York City is evident in the increase in service requests and the shift in complaint types, reflecting the extensive damage caused by Hurricane Sandy and the societal changes brought about by the COVID-19 pandemic. The improvement in response times after the pandemic suggests that the city has made strides in adapting to the challenges posed by these events, utilizing technology and prioritizing health and safety concerns to better serve the needs of its residents. As New York City continues to recover and adapt to these unprecedented events, it is crucial to learn from these experiences and develop robust emergency response and recovery systems to ensure the well-being of the city and its residents in the future.