“Emergency 911 Call Analysis”

Year 2021-2022

INTRODUCTION

As the nation's helpline, 911 is typically the only resource that's readily available to people seeking any kind of timely assistance. So, it's not surprising that 911 dispatchers receive 240 million calls per year—an average of 7.6 calls every second. Based on Vera's analysis, most 911 calls relate to non-criminal issues. Calls are placed predominantly to make nuisance complaints, report low-level offenses, and request well-being checks. And although the vast majority of 911 calls have nothing to do with crime or violence, police are too often dispatched to respond. Our project revolves around gauging these non-criminal types of issues reported and recorded with 911 dispatchers.

DATASET:

We analyzed publicly available historic 911 dataset on Kaggle between January 2015 and December 2020. For our project, we analyzed the data between 2015 and 2016 from various police departments across the United States. Our dataset includes a variety of variables to work with including:

- latitude and longitude of the locations from which 911 calls were placed.
- brief description of the call
- Type of emergency reported
- location and time of the occurrence
- station that answered it

Description of dataset columns used:

1. zip: Provides zip code for the location of incidents.
2. title: Provides reason for call. (Type of accident and Type of incident)
3. timestamp: Provides date and time of call.
4. twp: Provides the station of call
5. e: Call attended or not

Source: Kaggle(https://www.kaggle.com/datasets/aayushmishra1512/911calls-historic-data)

OBJECTIVE

Using Tableau, we determined the underlying causes and nature of non- violent 911 calls, identifying the categories of dispositions and their frequency, examining prominent hotspots for emergency help, gauging the stations receiving maximum calls, as well as how they vary by call volume, type, time, and location.

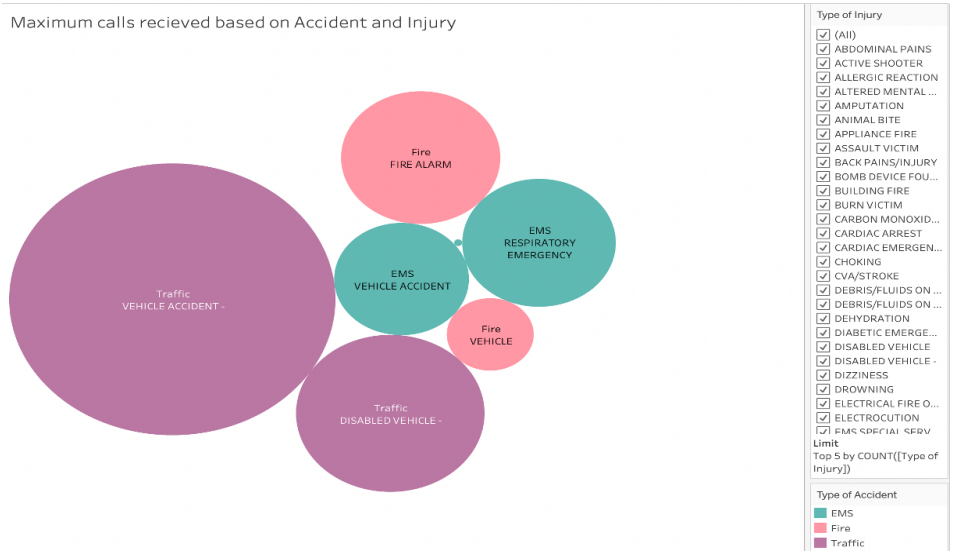
APPROACH

There are a lot of non- violent emergencies and thus addressing them are as important as addressing violent crimes. With our data set we found the title column that described the type of accident or emergency with the type of injury or incident occurring. Since it was clustered in one column with the help of excel, we used the split function to divide it into 2 columns namely type of accident and type of injury.

title	Type of Accident	Type of Injury
EMS: BACK PAINS/INJURY	EMS	BACK PAINS/INJURY
EMS: DIABETIC EMERGENCY	EMS	DIABETIC EMERGENCY
Fire: GAS-ODOR/LEAK	Fire	GAS-ODOR/LEAK
EMS: CARDIAC EMERGENCY	EMS	CARDIAC EMERGENCY
EMS: DIZZINESS	EMS	DIZZINESS
EMS: HEAD INJURY	EMS	HEAD INJURY
EMS: NAUSEA/VOMITING	EMS	NAUSEA/VOMITING
EMS: RESPIRATORY EMERGE	EMS	RESPIRATORY EMERGE
EMS: SYNCOPAL EPISODE	EMS	SYNCOPAL EPISODE
Traffic: VEHICLE ACCIDENT -	Traffic	VEHICLE ACCIDENT -

Thus, we broadly classified the type of accident into three categories:

1. EMS which is Emergency medical services.
2. Fire emergencies
3. Traffic emergencies.

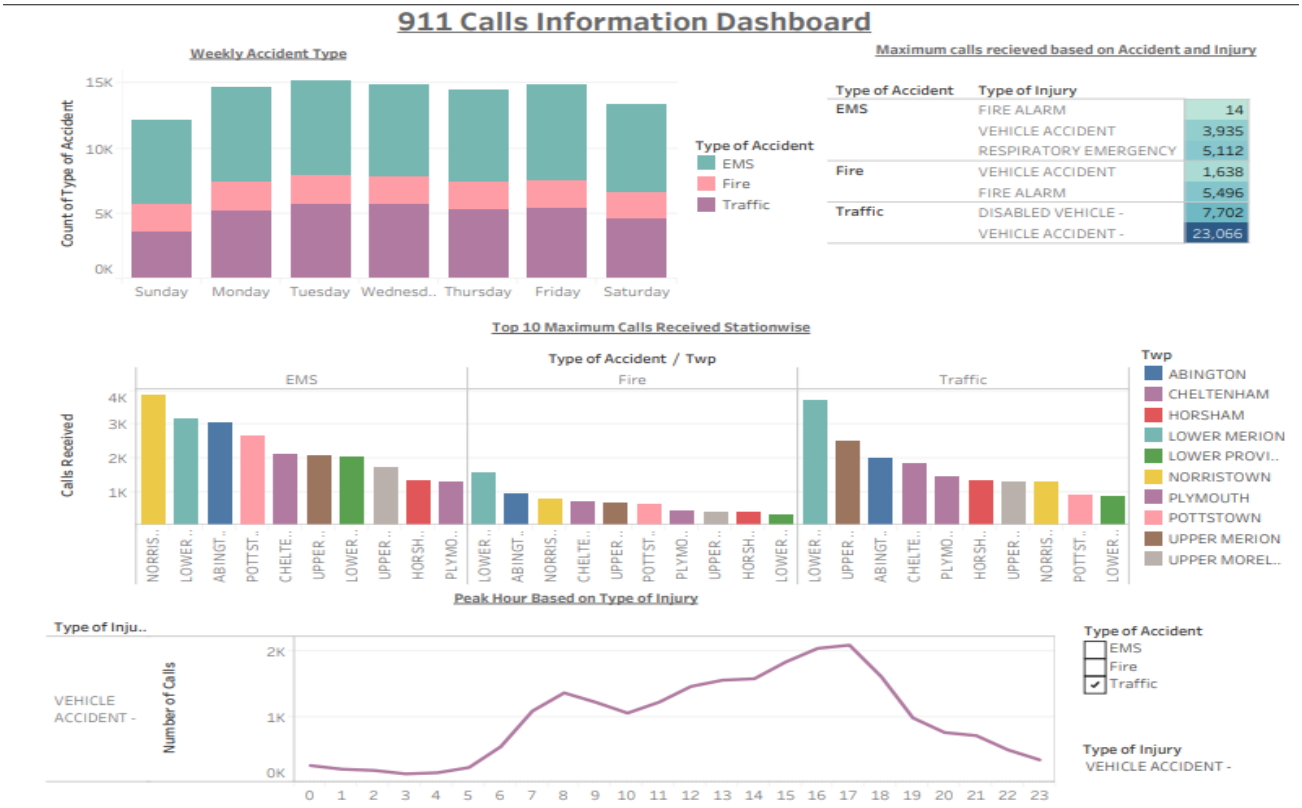


After categorizing the data, we were able to derive various insights using Tableau.

CHALLENGES

- We first wanted to use PowerBI to view our data and get insights. However, as we began using PowerBI for visualization on our dataset, we discovered that there were very few visualizations and that PowerBI could not run rapidly on our enormous dataset. As a result, we must recreate the dashboards in Tableau which gave us better visualizations.
- **Filtering dashboards:** Picking right filters while making various graphs and dashboards in Tableau was tricky.
- Some parameters being clustered in a single column of our dataset made it difficult to identify trends and choose the best data visualization. The segregation of data in excel and recognizing the elements and rows that needed to be separated were a difficulty, as was understanding that the "title" column is a mix of two different types of information, which was producing the disparity in the graphs. Therefore, we sub-categorized those columns using split function to achieve clear insights based on injury type (Fire, EMS, Traffic).
- Choosing the proper color scheme was a major challenge given the issues that could arise from misusing/overusing colors.
- While adding the text for the title, I found it a bit challenging as while I was trying to drag drop the text in the Dashboard it was not taking the value for the text, hence I had to double click the text and then rearrange it in the dashboard. Due to space restriction, correctly arranging the dashboard so that it gives a meaningful insight was a bit tricky.

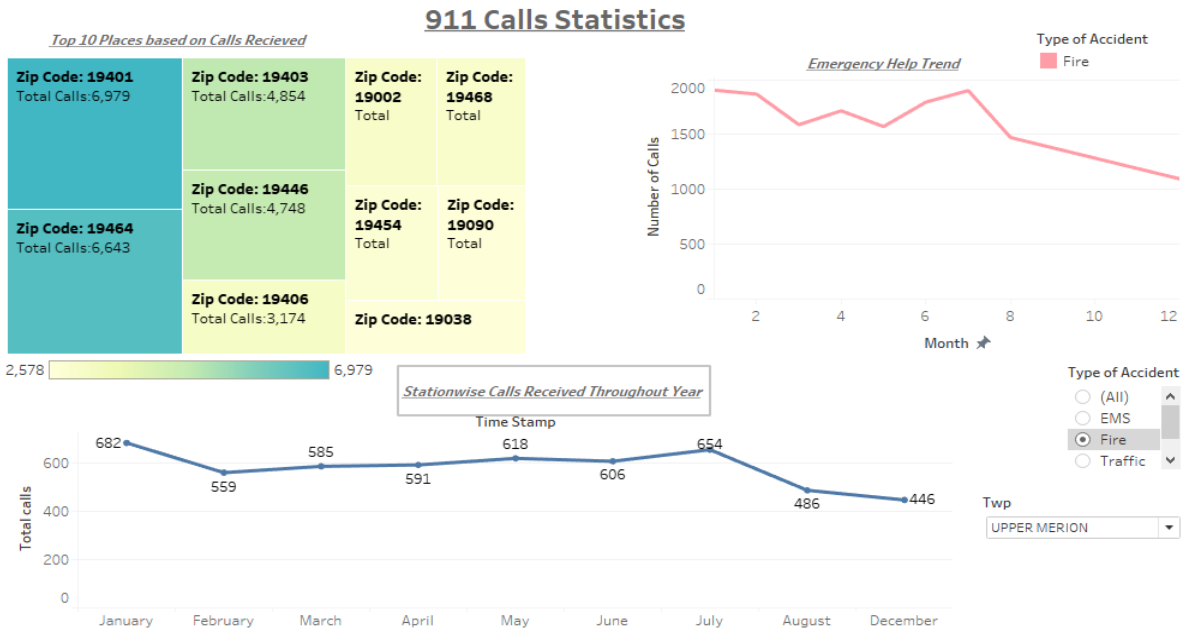
RESULTS AND INSIGHTS:



From the first dashboard we can get detailed information and insights from the calls placed:

- We utilized stacked bars in the first visualization, "Weekly Accident Type," to show the amount of weekly accident calls reported for the accident that happened. The dashboard shows the weekday with the highest number of calls for any of the major nonviolent offenses.
- The second visualization, "Maximum Calls Received Based on Accident and Injury," shows the sort of accident and injury/emergency that received the most calls. Thus, by applying a filter to the top 8 results for this column chart, we discovered that "Traffic-Vehicle accident" received the most calls.
- In the next visualization, "Peak Hour based on Type of Injury," we utilized a line graph to focus on the topmost emergency calls. We determine the peak hour for 911-reported incidents. This is usually at its peak around 5 p.m. for the urgency of Traffic: Vehicle Accident.
- The following three dashboard graphs assist us in determining and assessing the type of injury and accident for the most likely day and time of day. Similarly, the results can be found for not only Traffic but also for EMS and Fire.
- After studying and determining findings from the previous three dashboard plots, we use the "Top 10 maximum calls received stationwise" side-by-side barplot to determine the stations that have received the most calls for the three types of incidents. When we combine this result with the other plots on the dashboard, we discover not only the day, time, and kind of accident, but also the station that is most likely to get the call for the accident.

With the assistance of our other dashboard, we have discovered the following findings that will enable the 911 call analysis more effectively with the data of the calls received.



- We may investigate the statistics of calls received from a specific Zip Code to determine which areas are most prone to crime. The treemap "Top 10 Places Based on Calls Received" might help with this. This graphic might be used to increase station vigilance in that zip code.
- The second graph, "Emergency Help Trend," shows how the trend of emergency calls has changed over the years. This might tell us when the time of year the crimes were at their peak and how they progressed during the time studied.
- The following graph, "Stationwise Calls Received Throughout Year," not only illustrates the call progression during the year, but also assesses the calls received stationwise throughout the year. This will help stations to work and plan their year accordingly which will effectively help in the crime calls reduction.

CONCLUSION

Although the 911 call system has been in place for over five decades, there is a dearth of knowledge on many of its fundamental components, such as how calls are handled, how call takers, dispatchers, and other staff are taught. Our analysis on call progression through years can help understand the trends of emergency calls in different longitudes and latitudes aiding in prompt police response.

We can use these dashboards to determine the best analytics for police stations to use in determining the best methods for the emergency 911 calls received. We might assist them in analyzing and forecasting potential accident spots. These dashboards will also assist them in keeping track of crime numbers, the types of reinforcements that need to be addressed, and methods that will allow them to assist as many people as possible in a timely manner. This would aid Police officers to be taught to provide quick assistance and resolve these emergency situations more successfully.

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