

Project 1: Data Analysis for Accidental Drug Deaths in Connecticut

Introduction

Today, there is a rise in drug overdose incidence worldwide and the effect it poses to society. The effects of overdose are solely negative. According to reports and data collected, there is a dramatic rise of drug overdose here in the US. Society needs to identify those individuals who are vulnerable and implement programs that will help reduce the impact of this hidden epidemic.

Motivations and Hypotheses

We were interested in uncovering demographic trends and other unexpected phenomena among narcotics users, which is difficult given many attempts to be secretive about such activity. We were specifically curious about the following:

What age groups and ethnicities of narcotics users may be more prone to accidental overdose or other lethal incidents?

Contamination among illegal narcotics is said to be on the rise; does our data support this as a possibility? Accordingly, which drugs appear to be the most lethal (cause the most deaths)? How are these narcotics taken: by themselves, with other drugs?

When do these accidents occur? Are they confined to certain parts of the week or month?

Are these deaths concentrated in urban/populated regions? Are certain narcotics found to be more popular/prevalent in specific areas?

Significance of the Analysis

There are many parties that will benefit from this analysis. The first group are the healthcare professionals that prescribe some of these narcotics; our findings may influence the targeted demographics and timing of their distribution. The second party is law enforcement. With our findings they can identify regions with greater incidence of overdose and adjust their programs and resource distribution accordingly. Other possible

influences include the real estate industry as our findings may highlight certain hotspots of narcotics use on a city or county level.

A large assumption we are making in our analysis is that our findings in accidental drug deaths is parallel to drug use. As drug use is extremely difficult to track, we assume the same demographics, timing, and use patterns are similar to those of general narcotics users.

Methods

The data used in this analysis is limited to the data from the state of Connecticut (Accidental drug related deaths 2012 - 2018). The data is collected from the investigation by the Office of the Chief Medical Examiner which includes the toxicity report, death date, address of the victim, and etc.

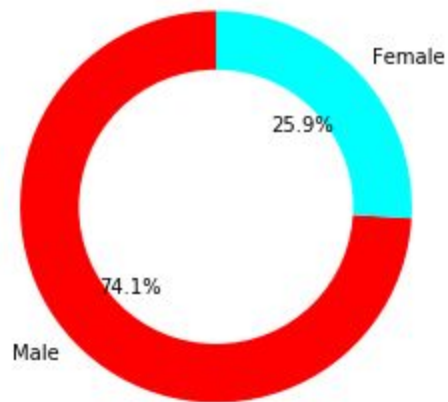
Python, Jupyter, and Pandas were the primary tools used for preparing our findings. The Google API in combination with Jupyter Gmaps was used for visualization and mapping of our results.

Results and Conclusion

1. User Demographics (Age, Gender, Race)

a.) Gender Analysis

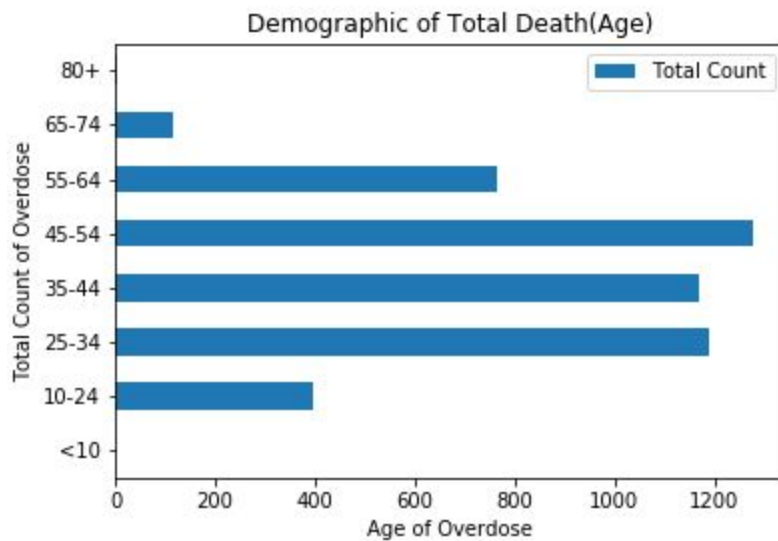
After manipulating the data, the result indicated that the drug incidence of death overdose is significantly higher in males than females. Males are after all, the majority of drug users and traffickers of illegal drugs according to drug abuse study conducted worldwide. This analysis might shed some insights about the gender roles and drug abuse relationship between sex-linked personality characteristics and substance use patterns.



The total number of percentage of male drug overdose is 74.1% more than twice the number of percentage representing the female drug overdose which is 25.9%.

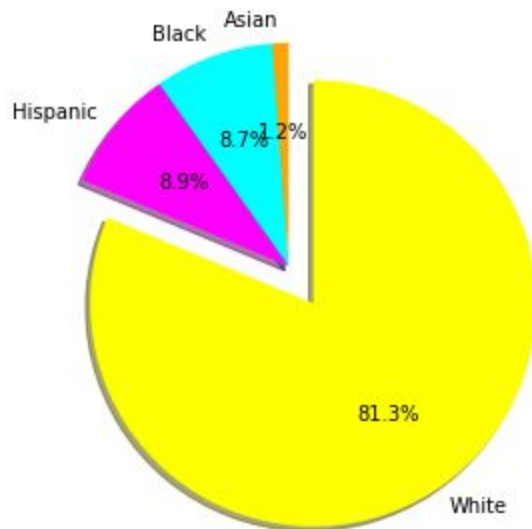
b.) Age Analysis

The data collected in Connecticut on Drug overdose Incidence based on the number of deaths related to age is progressively accelerated starting at the age of 25 to the age of 54. This analysis about drug overdose in Connecticut is valuable, examining the accelerated overdose recorded starting at the age of 25 may address questions inside and outside the scope of the analysis. One important benefit of this analysis is research and prevention effort will be focused in this age demographic.



c.) Demographic(Race)

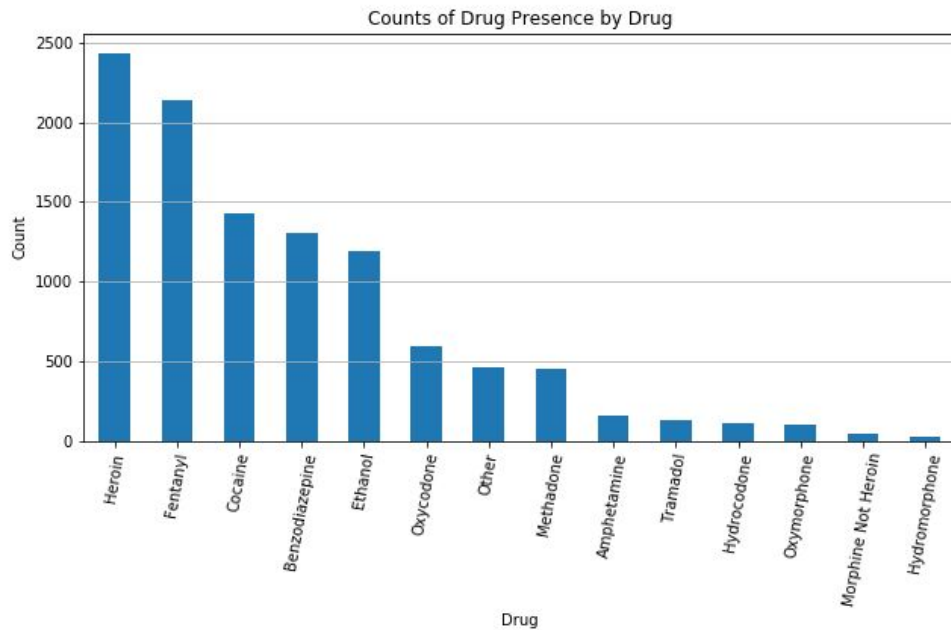
This data and information is intended to analyze the demographic based on race of the top 4 race with the highest rate of drug overdose.



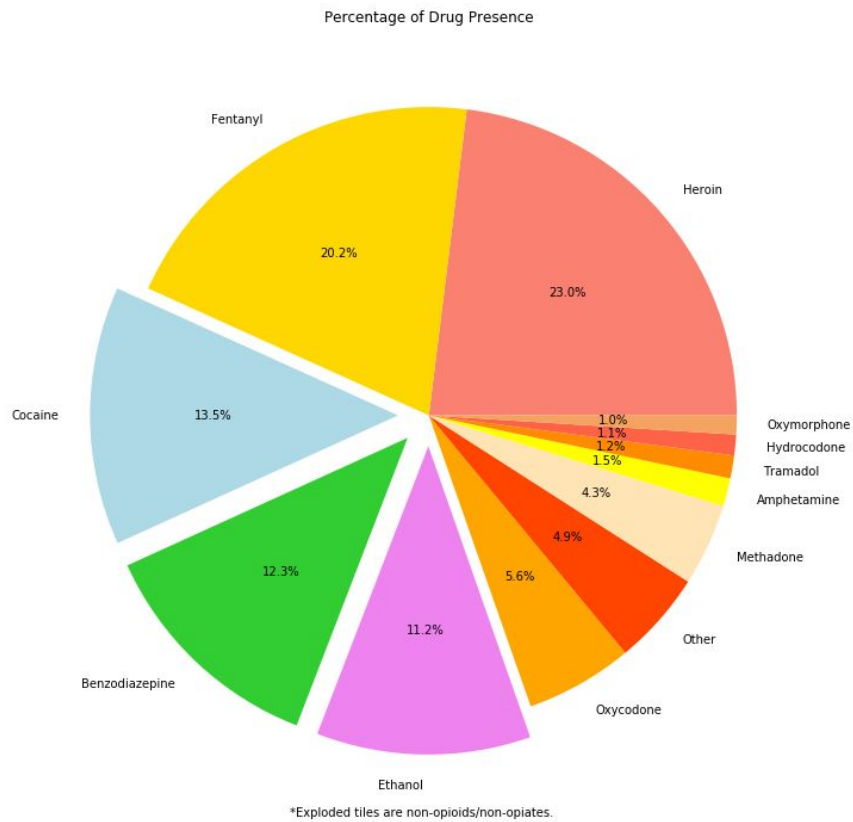
This report includes the disparities based on race within Connecticut. White being the majority of the population has a total of 81.3% of deaths.

2. Drug Lethality

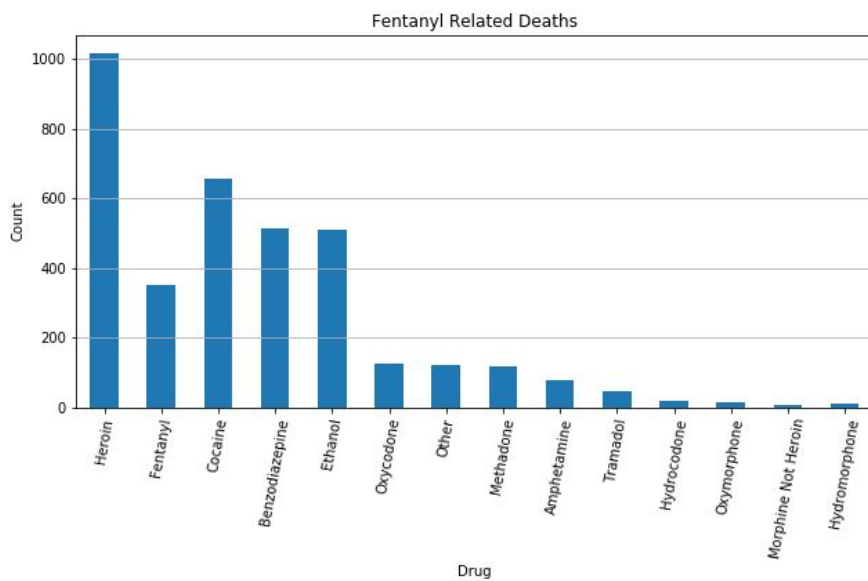
As described previously, heroin was generally unable to be distinguished from morphine in the toxicology reports. Because of this, heroin appeared as our most used/most lethal narcotic, with fentanyl following as a close second.

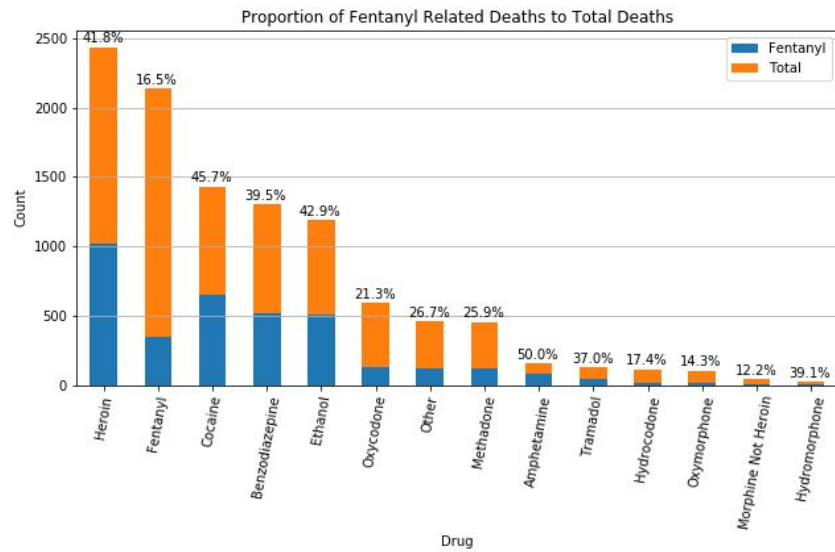


Heroin or fentanyl findings made up over 45% of all toxicology, and opiates/opioids made up for approximately % of all findings.



As fentanyl is known to be an extremely potent opioid, we further investigated these counts looking specifically at cases in which fentanyl was detected. Fentanyl was responsible for up to 50% but on average about ~30% of all other accidents.

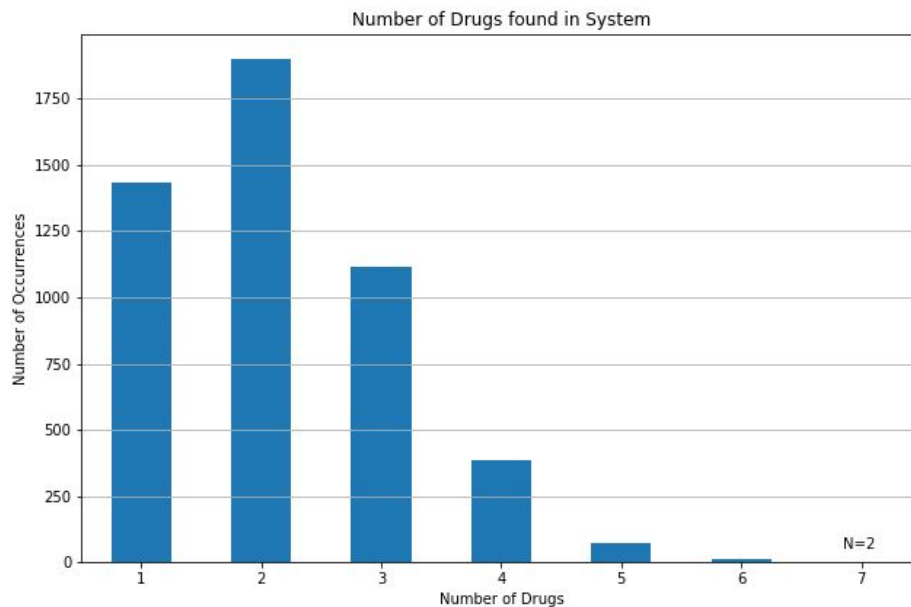




In almost 85% of all accidents involving fentanyl, other narcotics were detected. This gives good implication to the verity of other research suggesting that lacing and contamination of other narcotics with fentanyl is on the rise.

3. Drug Use

Following this we did a brief exploration into how users are taking their narcotics: only using a single drug or using more than one. Our analysis found ~60% of accidents involved the use of more than one drug.

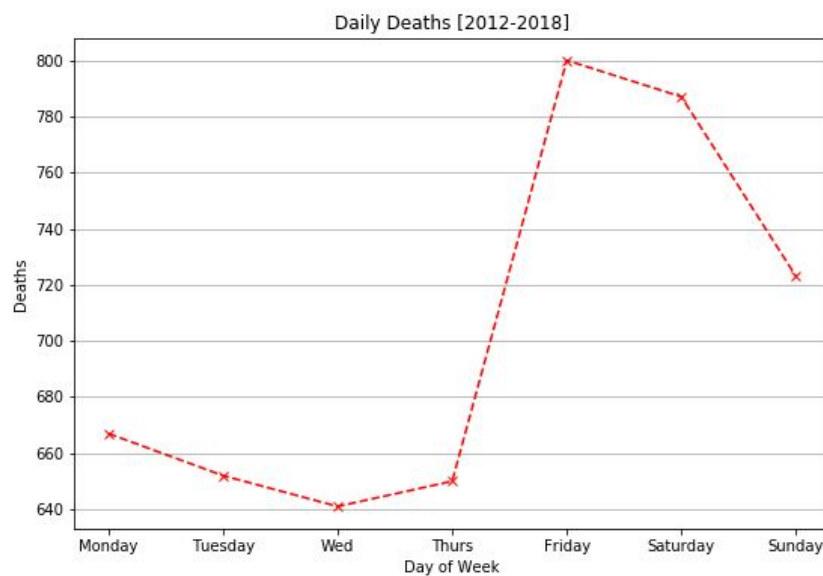


Up to 7 drugs were detected in victims' toxicology, however the majority of users used 1-3. This further supports the possibility of drug lacing and contamination being on the rise.

4. Timing of Use/Death

We explored the correlation between dates and deaths:

Daily Deaths:

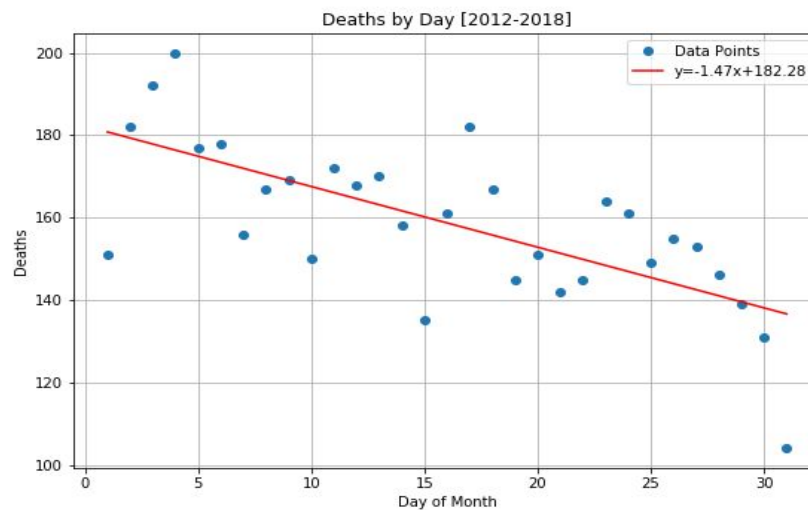


There exists a clear peak in deaths as we approach the weekends.

Possible explanations could be:

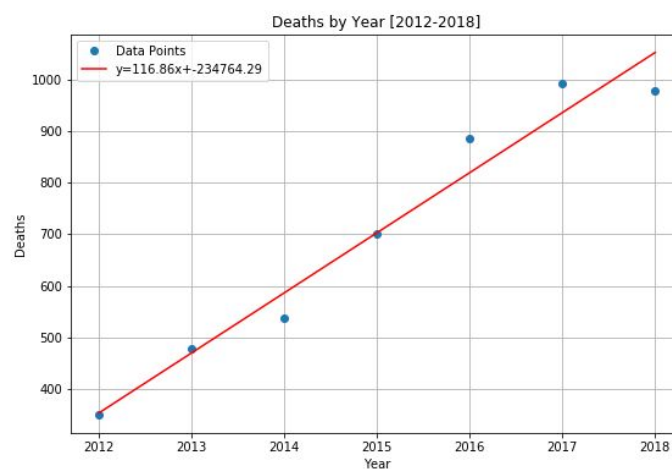
- Pay day
- Amount of free time

Deaths by day of month:



There is a significant correlation between the day of the month and the day of the month. As we progress through the month the deaths tend to decrease. A possible explanation for the peak in deaths in the beginning of the month are due to increased stress levels possibly related to rent payment days. Assuming rent payments are due within the first 5 days of the week.

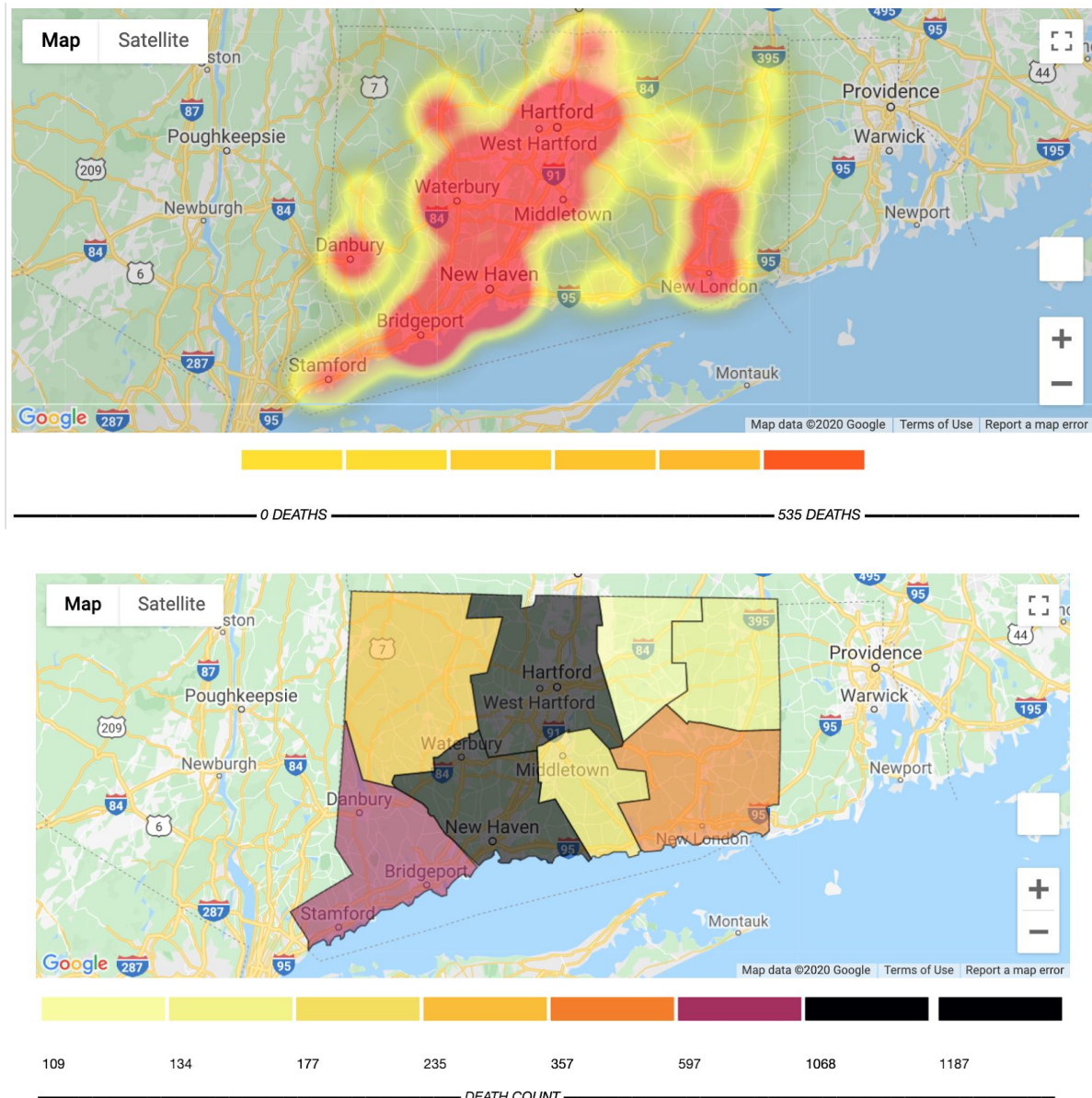
Deaths by year:



The most correlation between date data and deaths occurred between the year and deaths. It is clear that this epidemic is getting worse over the years.

5. Location and Concentration

In the interest of investigating the locations and concentrations of drug-related accidents, we mapped our data using the Google Maps API and Jupyter Gmaps. The resulting informatics were mostly unsurprising: the majority of these accidents occurred in areas of greater populations. This was also supported by a grouping by county.



Upon further investigation into a per capita basis, we found the same trend still present, although to a lesser degree.

