Accidental Deaths Due to Opioid Abuse

By Christopher Bradway

DSC 630 Predictive Analytics

Bellevue University

Professor Amirfarrokh Iranitalab

Executive Summary

On average 130 people in the United States die from an opioid related death. In 2017 these numbers made it the leading cause of injury related deaths in the US. Many people think of heroin when we discuss opioid related deaths, but prescription opioids have contributed to a lot of these deaths over the last 30 years, with a recent surge in synthetic opioids such as fentanyl. This has become such a crisis in the United States that politicians have made it part of their platform, and government has budgeted funding into programs to help deal with this.

My data analysis investigates the effects of the crisis on the state of Connecticut. This is a state that is not densely populated, with it's leading county being the residence of just under 944,000 people. Connecticut is still seeing around 1000 opioid related deaths a year.

I chose to isolate the common traits among victims. I looked at several variables such as race, sex, age, and the county in which the victim's death took place. I also looked at the county of residence and city of residence of the victim. This was to make sure that the counties containing larger cities were not seen on a bias due to accessibility of opioids. It has been

claimed that this is an inner-city problem, but is it actually producing victims from rural towns that are dying in larger cities due to the accessibility of the drugs.

My goal is to isolate the common traits and residence location of the victims within Connecticut in order to provide information for possible out reach programs, that could provide counseling, treatment, and awareness.

Abstract

Deaths caused by opioids in this country have been labeled a crisis due to the frequency and numbers that we have recently witnessed. In 2017 more than 47,000 Americans died as a result of opioid overdose. (https://www.drugabuse.gov/drug-topics/opioids/opioid-overdose-crisis) The rate at which prescription opioid addiction is increasing is exponential. I will look for variable relationships within the victims of the opioid crisis in the state of Connecticut, in order to try to predict those at a higher risk. I will also be able to isolate specific regions of the state of Connecticut that are more prone to opioid related deaths in order to supply possible locations to focus relief and intervention efforts.

Intro

There are three distinguishable waves in opioid related deaths. The first wave began in the 1990's and continued to increase through 1999. This first wave was induced by the increase in prescribing opioids. The second wave began to build in 2010 with a rise in heroin related deaths. In 2013 we see the start of a third wave which is brought on by the increase in synthetic opioids such as fentanyl. The data shows that in many cases opioids are not the only drug in the victim's system, and the increase of fentanyl is staggering. It is also important to note that at the

time of death if the medical examination shows an opioid but cannot detect what type of opioid then it is defaulted to heroin. Opioids are responsible for 70% of all overdose deaths.

We will be discussing rates in this paper, so it is important to note that a rate is the number of people per 100,000 of the population. To put this measurement to work we can see that in 2018 there were 948 opioid related deaths in the state of Connecticut, which is a rate of 27.5. This means that for every 100,000 people of the population of Connecticut 27.5 people died of an opioid related death. In 2018 the deaths due to prescription opioids was down a rate of 6.4. The heroin death rate was down 9.9. But the synthetic rate (not including methadone) increased to a rate of 22.5. These rates are also reflected in the number of prescriptions written per 100 people in 2018, which was 43. This sounds like a lot of prescriptions per 100 people, but this is a 66% decrease from 2012. Based on these numbers we can see the magnitude of the crisis as well as what direction the crisis is trending. In order to help to solve the crisis the number of prescriptions were decreased purposefully, but in response to that the number of deaths caused by synthetics skyrocketed, led by fentanyl.

Methods

Using data collected mainly from government websites I will test the correlation between variables, such as city, county, type of opioid, sex, race, age, and location of death. Using histograms will give me a general look at my data to see if we can make some initial evaluations on certain variables, such as cities and counties. I then will check the specific opioid use for that city. I will then look for individual traits of users to see if we can monitor a certain age range for example or look to perform an outreach. I will be using linear regression models and scatter plots to test variable relationships. I will use box plots to help to identify the element of each

variable That I should take a closer look at. I attempted the use of the linear regression model to further predict future victim traits, and location.

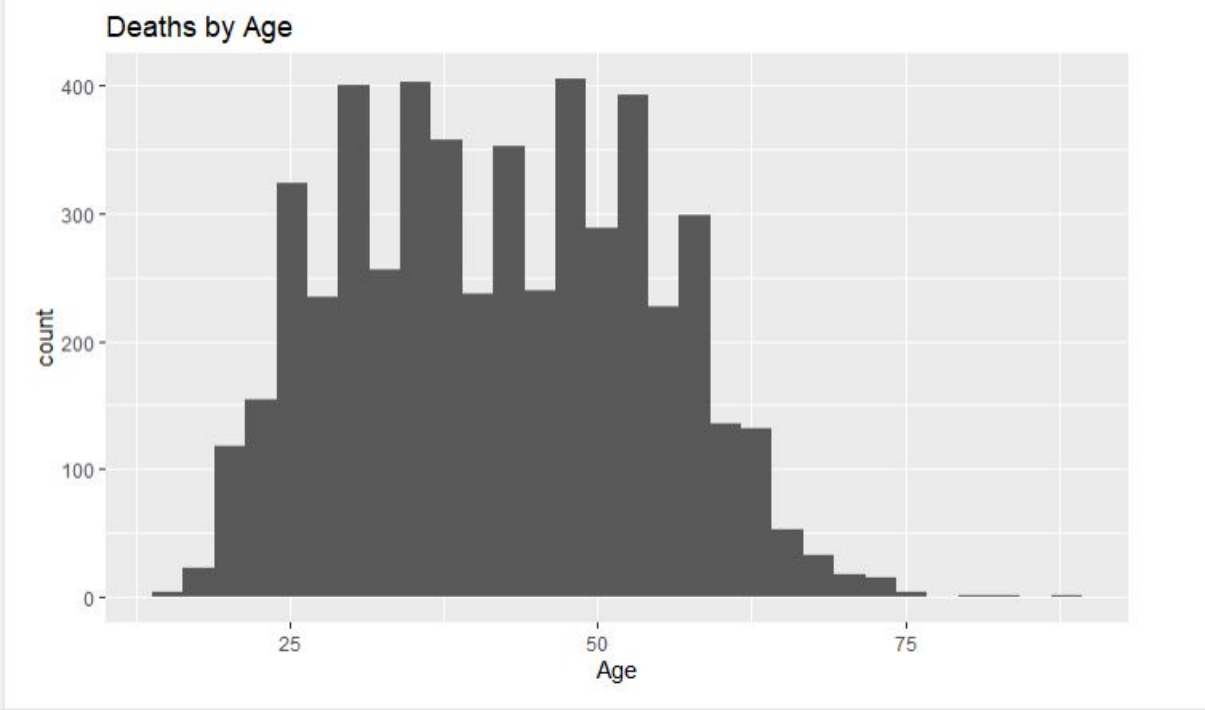
Results

Some of the results reflected in my analysis correlate with the three waves of the opioid crisis. The earlier data shows that the majority of the deaths were due to prescribed opioids. We then see an increase in heroin use around 2010. With the introduction of certain synthetic opioids such as fentanyl, we have seen a rise in the synthetic opioid deaths starting about 2013.

We see that the counties with the larger populations do not show the higher rates of opioid related deaths, which lays to rest the idea that the opioid crisis is an inner-city problem. One of the least populated counties is struggling the most with this crisis. Litchfield County had a population of 182,177 people in 2017, but from 2015-2018 a four-year period, they had 229 opioid related deaths. This is almost 126 deaths per 100,000 people.

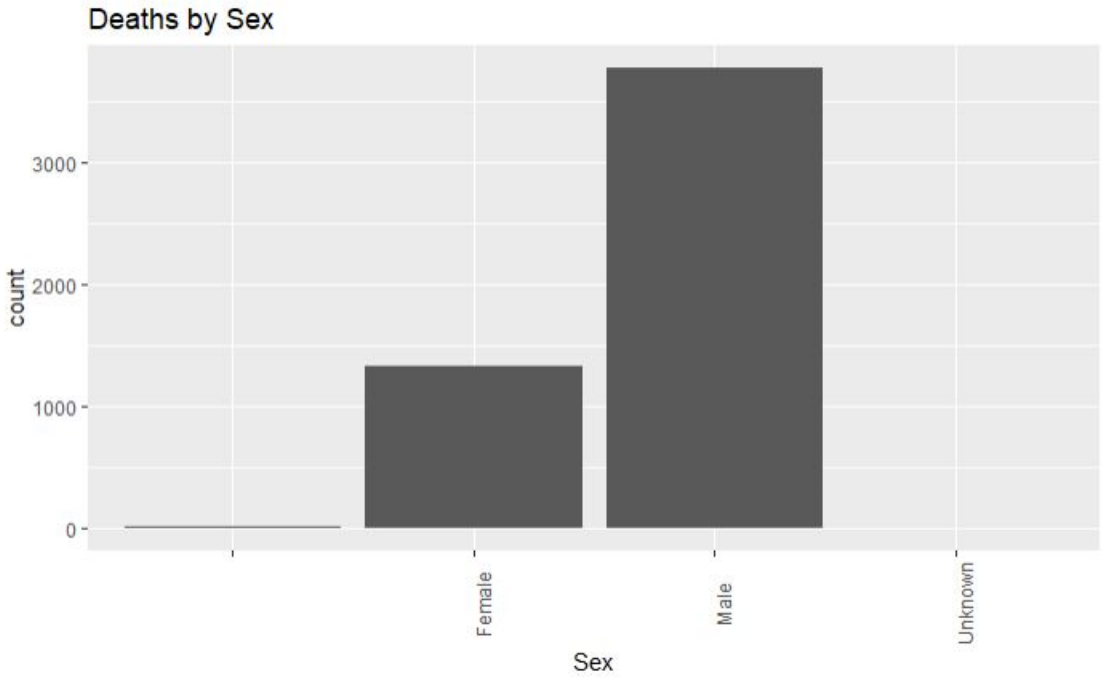
While performing some of the preliminary data analysis I was able to find key features or characteristics of the victims in the state of Connecticut. I created some histograms and bar graphs using variables based on victim traits and locations.

In the first histogram I looked at the age of our victims. This would give us insight to who is being exposed, so we can look at look at locations where people from that age range might be accessing opioids.



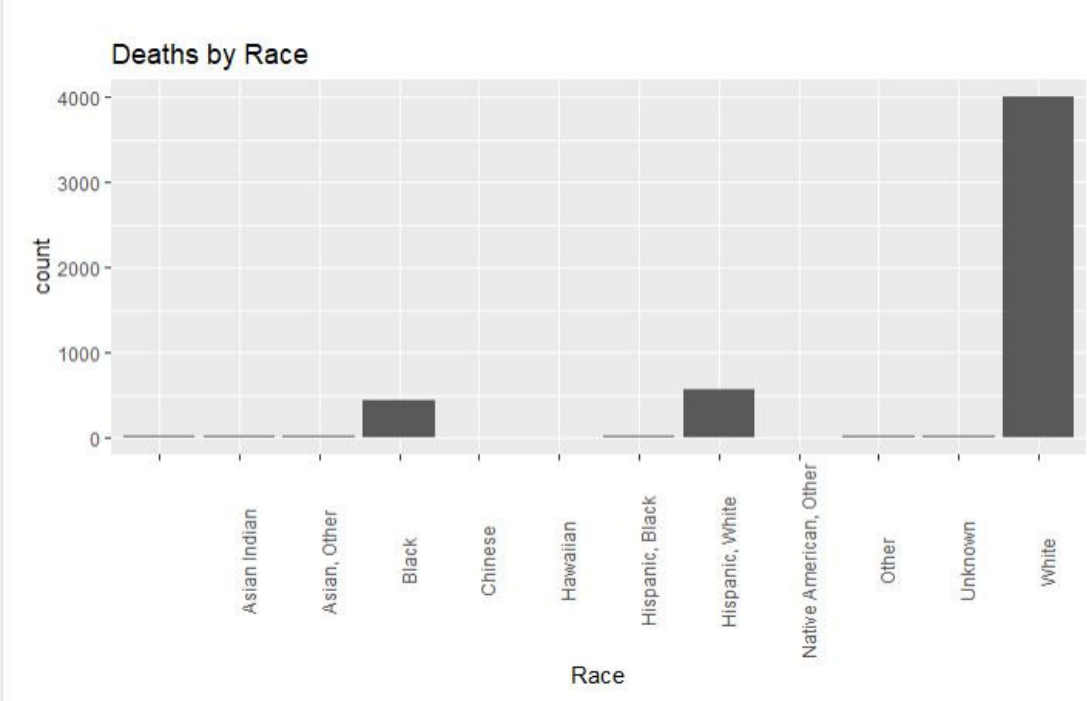
It is important to note the x-axis on a histogram is continuous therefore the bars are not disconnected, and they are spaced by bin size. With this graph we see that the ten year age range that contains the majority of our victims is 45-55 years old.

Next, I looked at the sex of the victims. This was done to isolate the male/female influence of the drug, and to see if it can be related to gender related health issues, or factors.



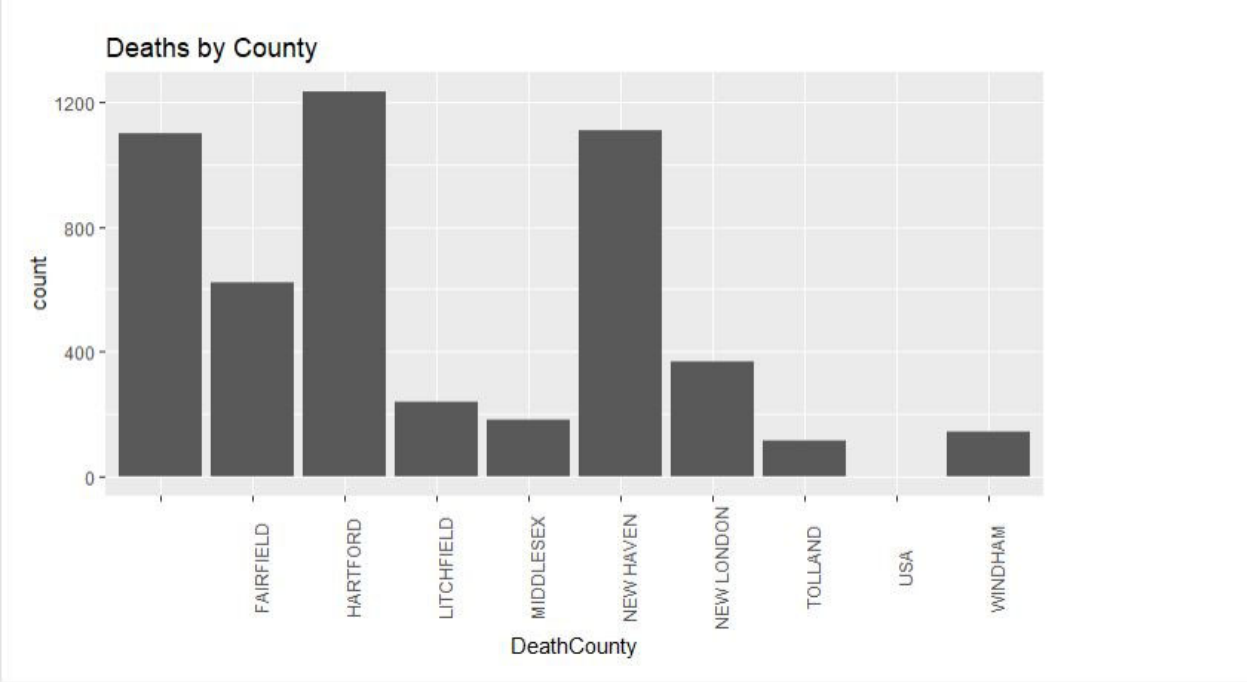
As we can see by the above bar graph, the male population of Connecticut has been plagued by this crisis at almost four times the rate as the female population. This result is much more extreme then I would have expected. I also checked the number of deaths per sex by age. I did not include this graph due to the necessity of color for the stacked bars, but it shows that in every age range male deaths out number females deaths by more than two to one.

I then investigated the racial makeup of the victims. Keeping in mind that Connecticut is 79.7% white, and 12.2% African American as it's two largest demographics. I would also like to point out that Connecticut is the tenth lowest state in poverty level. Meaning 40 more states have a higher rate of poverty than Connecticut.



We see, based on the results of the above bar graph, that the white community has been much more influenced by this crisis, at almost a rate of five to one to the next highest community.

The last variable I looked at was the County that the victims died in. Again here we need to keep in mind that the state is not densely populated, with it's heaviest populated county only having just under 944,000 people. This is lower than most major cities in most states. It is important to stress that the number of deaths span a six year period, from 2012 to 2018.



This bar graph shows us that the crisis is hitting Hartford the hardest. Fairfield is the most populated county in Connecticut, but is third in opioid related deaths.

Discussion/Conclusion

When we look at a state like Connecticut, that has obviously not been immune to the crisis at hand, it is important to remember some of the key factors. The poverty level of this state is the tenth lowest in the country. That makes this not only an inner-city, low income crisis. It is also important to keep in mind that this is not an overpopulated state. The most populated county still has less people than most major US cities.

Looking at the data and analyzing where the victim lives rather than location of death gives us a better overview of the crisis. As I stated earlier some people were ready to list the opioid crisis as an inner-city issue, but if we take the location of the victims home into account, we see that more people from rural locations are getting addicted to opioids and seem to have to

go to the larger cities in order to get their opiate of choice. We can also see that the generation that is losing the most people in the state of Connecticut is the 45-55 age range. This shows us that it is not just a crisis effecting the youth of today. This crisis is also killing men at four times the rate as women. In other graphics that I produced but did not include due to the lack of color coding with this medium, at every age range men are dying at more than twice the rate as women. We are also seeing that the opioid crisis is overwhelmingly greater in the white community. The number of white victims to this substance is five times more than the next highest race. Last, the county of Hartford in Connecticut is seeing the opioid related deaths. On a personal observation, related to the waves of opioids, that is good to include in the discussion, when I was living in Fort Myers Florida, when people were arrested with drugs it was almost always fentanyl. This includes students at competing high schools, and it was always an overwhelming amount. It was never enough to just kill a handful of people; it was always enough to kill thousands of people. This feeds into its popularity and ease of obtaining the substance. When we look at a state like Connecticut, suburban, predominantly white, middle aged, we see that none of the population is exempt from the influence of this highly addictive substance. We must find a way to control the production and distribution of synthetic opioids in order to taper off the number of deaths this country is witnessing due to this crisis.

Acknowledgements

I would like to thank:

Dr. Amirfarrokh Iranitalab, for his guidance and understand through this process.

Sounds cliché, but my dad for putting up with me when I was stressing about my milestones for the project during our two summer moves.

Brandon May for helping me, not just through the project, but throughout the program.

References

https://catalog.data.gov/dataset/accidental-drug-related-deaths-january-2012-sept-2015

https://llhd.org/healthy-communities/opioid-use-and-overdose-awareness-and-prevention/#:~:text=In%202016%2C%20917%20residents%20of,predicted%20to%20be%20even%20higher.

https://www.drugabuse.gov/drug-topics/opioids/opioid-overdose-crisis

https://www.cdc.gov/drugoverdose/epidemic/index.html#:~:text=The%20first%20wave%20began%20with,increasing%20since%20at%20least%201999.&text=The%20second%20wave%20began%20in,in%20overdose%20deaths%20involving%20heroin.

https://www.drugabuse.gov/drug-topics/opioids/opioid-summaries-by-state/connecticut-opioid-involved-deaths-related-harms#:~:text=Opioids%20were%20involved%20in%2046%2C802,9.9)%20overdose%20deaths%20in%202018.

https://www.govtech.com/analytics/Behind-the-Data-on-Connecticuts-Opioid-Overdose-Problem.html

https://assets.documentcloud.org/documents/5998085/Opioid-Deaths-All.pdf