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R Project Data Analysis: Accidental Drug-Related Deaths from the years 2012-2018 in the state of Connecticut

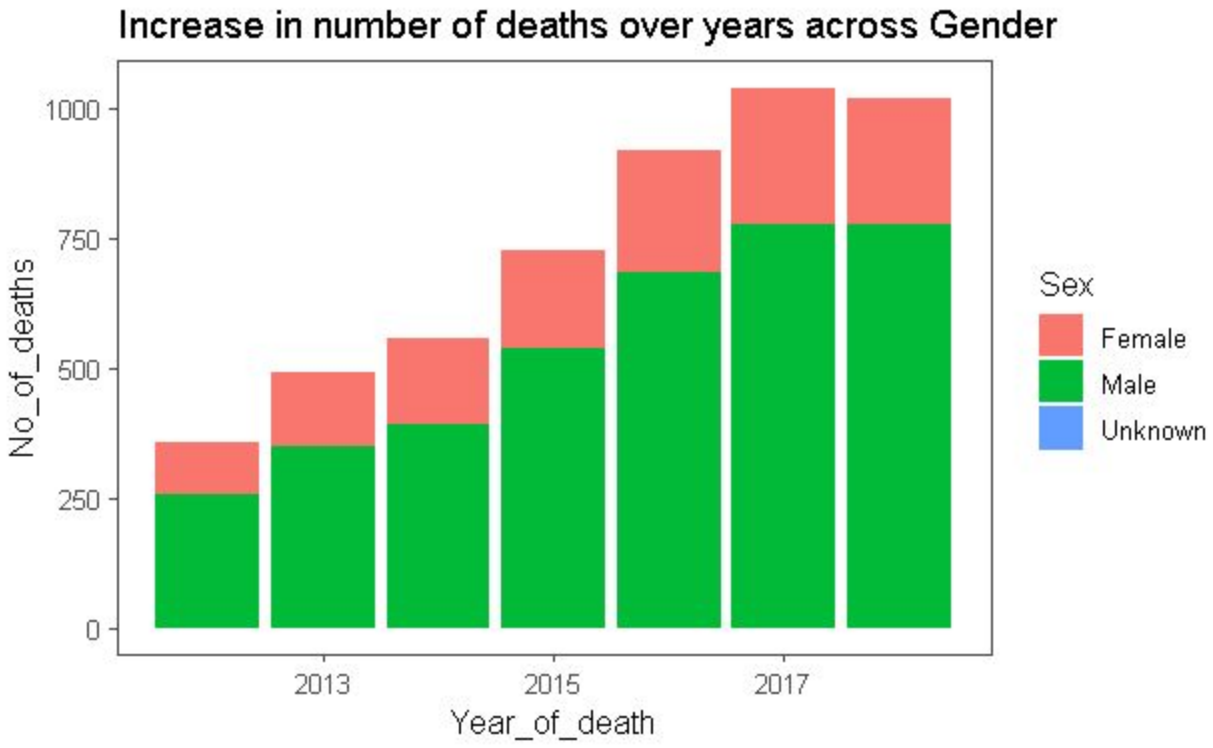
Access Data:
https://catalog.data.gov/dataset/accidental-drug-related-deaths-january-2012-sept-2015

Initial Analysis:
The given data has a listing of each accidental death associated with drug overdose in **Connecticut** from 2012 to 2018.
There are 5105 observations and 41 features.
A "Y" value under the different substance columns indicates that particular substance was detected.

Interesting Find 1: *Timeline Analysis:*

Part A: First, we look at the number of deaths across gender, year-over-year.

The graph below is plotted by taking years vs the number of deaths in each year, across Male and Female.



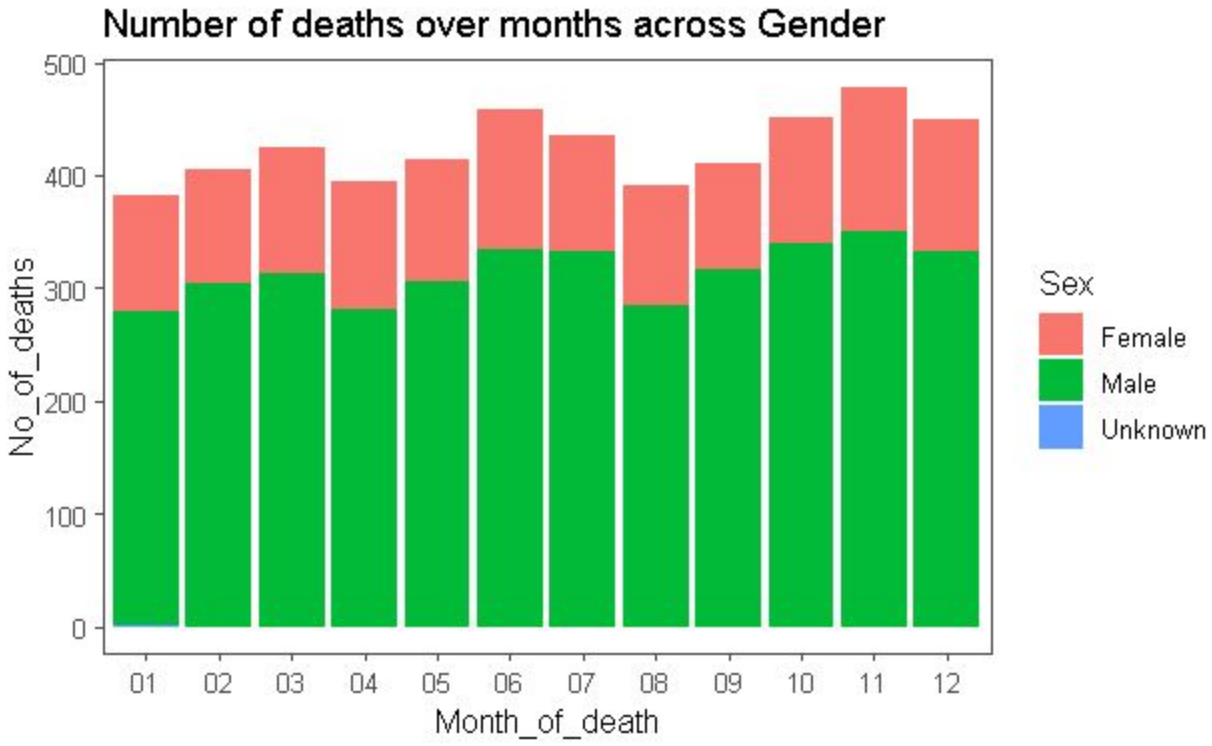
- **Increase in number of deaths over the years:** From the graph above, we see that the number of deaths due to drug overdose has doubled in 6 years from 2012 to 2017. Drug overdose deaths in Connecticut dropped for the first time in 2018 after continuous increment over the years.

- **Increase in death rate across gender:** We see that this pattern is prevalent across Male and Female both. The increase in consumption of drugs in females has considerably risen over the years, this tells us that drugs are becoming popular even amongst women. We can see that, from the significant amount of increase in the usage from 2012 to 2017.

  Prevention Measures: Connecticut has passed a number of laws and prevention programs over the past few years in an effort to curtail drug addiction epidemic. Emergency responders have also been equipped with naloxone, the opioid overdose reversing drug which have reduced the fatality rates as observed in the data. Awareness amongst population regarding the side-effects of usage on drugs have increased and thus we see a decline in the drug fatalities due to overdose as observed in our data.

Part B: Second, we look at the number of deaths across gender, month-over-month for all the years.

The graph below is plotted by taking the months in which death occurred vs the number of deaths for all the years, across gender.



- **Looking at the variance in number of deaths,month-by-month for all the years:** From the graph above, we see that the number of deaths due to drug overdose are highest in November and the lowest in the month of January. The deaths are relatively lower in January, April and August, i.e. during the spring and summer months, there seems to be relatively less usage of drugs.
- **Looking at deaths across gender:** We see that this pattern is prevalent across Male and Female both. Males and females have the highest deaths in November and relatively lower in Spring and Summer months.

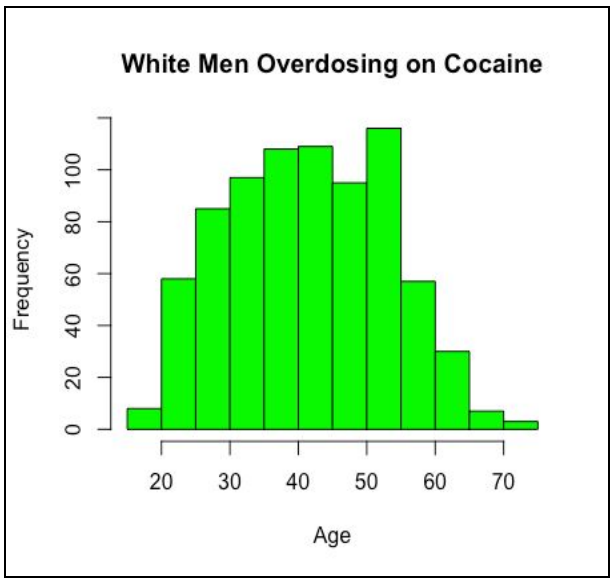
<u>Interesting Find 2:</u> *Drug Overdose Fatalities by Demographics*

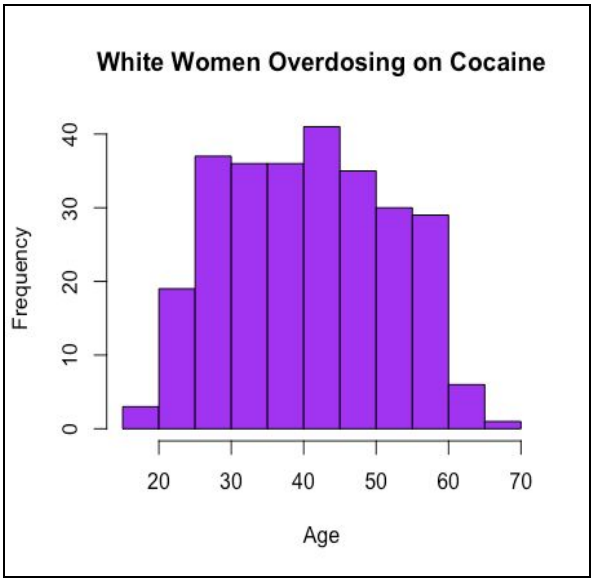
Taking into consideration deaths caused by Heroin or Cocaine overdose, which race in both genders had the highest number of deaths.

- From the two tables below, we can deduce that White people in both men and women have the highest death rate for drug overdose by Heroin and Cocaine.
- White overdose victims vastly outnumbered those of races, particularly for heroin. And in both cases, men have a higher death rate than women.

<u>Part A: Deaths caused by Cocaine overdose</u>

	Deaths caused by Cocaine		
	Female	Male	Unknown
Asian Indian	1	4	0
Asian, Other	2	4	0
Black	67	168	0
Chinese	0	0	0
Hawaiian	0	0	0
Hispanic, Black	1	5	0
Hispanic, White	34	170	0
Native American, Other	0	0	0
Other	0	6	0
Unknown	1	5	0
White	273	773	0

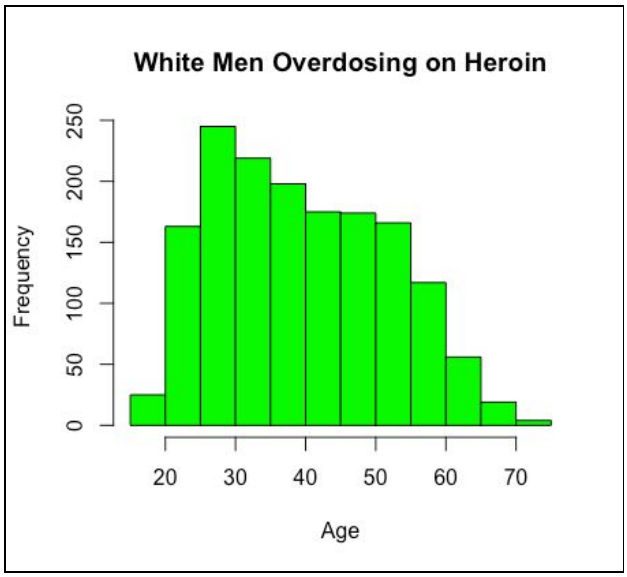


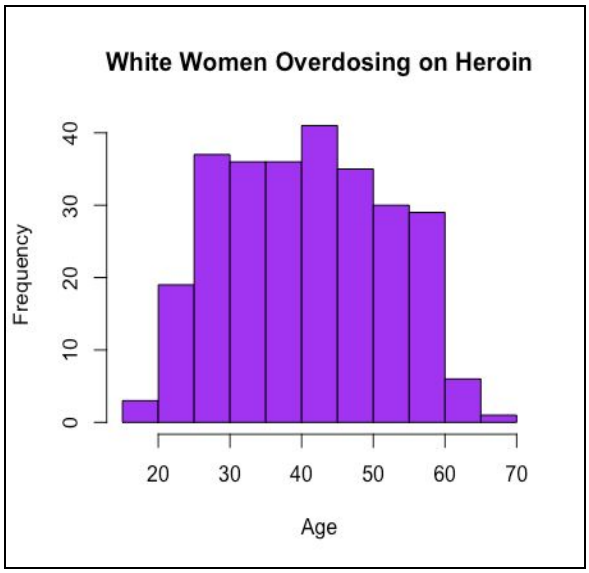


Analysis of death frequency: The Histogram shows the frequency of deaths in each age range for Cocaine Overdose. It seems that Men in the age range 50-55 have the highest overdose rate while for Women the age range is between 40-45.

Part B: Deaths caused by Heroin overdose

	Deaths caused by Heroin		
	Female	Male	Unknown
Asian Indian	2	5	0
Asian, Other	4	7	0
Black	36	129	0
Chinese	1	1	0
Hawaiian	0	0	0
Hispanic, Black	1	8	0
Hispanic, White	48	260	0
Native American, Other	0	0	0
Other	0	4	0
Unknown	2	12	0
White	444	1561	0





Analysis of death frequency: The Histogram shows the frequency of deaths in each age range for Heroin Overdose. It seems that Men in the age range 25-30 have the highest overdose rate while for women the age range is between 40-45.

Interesting Find 3: *Drug Specific Death Rate*

Part A: Analysis of Deaths caused by different types of drugs on different age groups.

By sorting and analyzing the dataset of accidentals deaths caused by drug overdose, it is possible to draw a correlation between the age of the victims and the type of drug that caused the death.

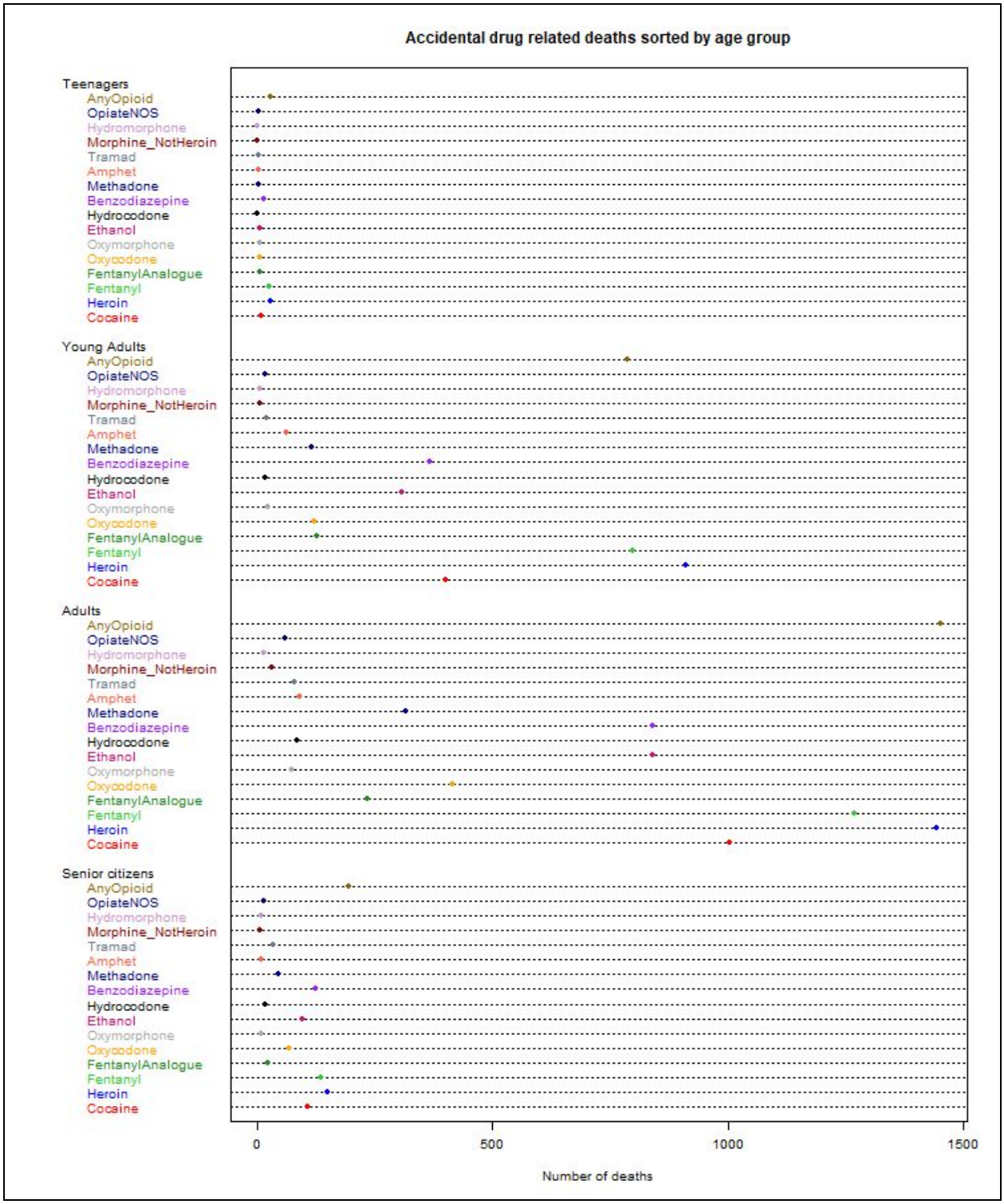
- **Teenagers (Age group < 20 years):** From the table and graph below, we can deduce that the highest cause of drug-related deaths in teenagers is due to Heroin, Fentanyl and Opioid. However, the casualties caused by these drugs in other age groups are significantly higher.

- **Young Adults (Age group 20 - 35 years):** The death fatalities caused by Heroin, Fentanyl and Opioid are significant in young adults.

- **Adults(Age group 35 - 60 years):** In this age group, 62.7% of all deaths were caused by Cocaine, Heroin, Fentanyl and Opioid overdose.

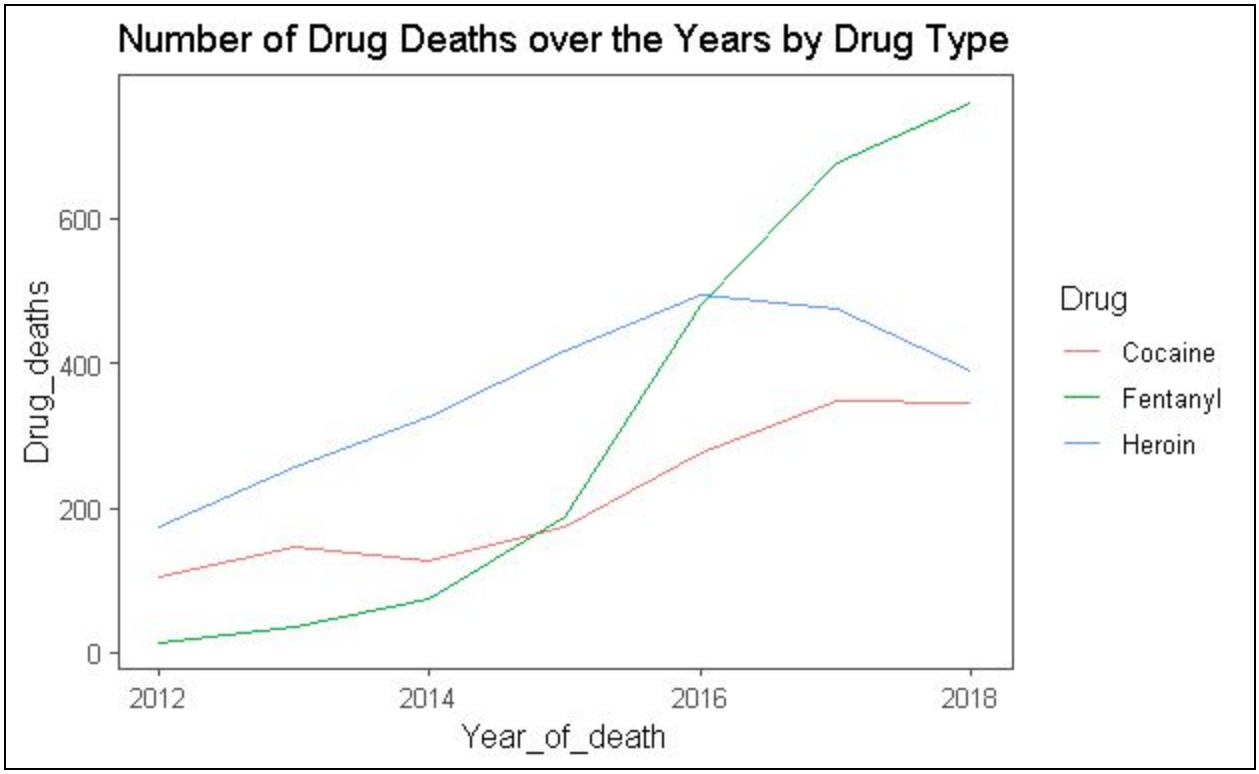
- **Senior Citizens (Age group >60 years):** Drug fatalities due to Heroin and Opioid are higher in population age above 60 years.

	Teenagers	Young Adults	Adults	Senior citizens
Cocaine	9	401	1003	107
Heroin	27	911	1443	148
Fentanyl	24	799	1269	134
FentanylAnalogue	6	127	233	23
Oxycodone	5	120	414	68
Oxymorphone	4	22	74	8
Ethanol	6	306	841	94
Hydrocodone	0	16	85	16
Benzodiazepine	14	366	839	123
Methadone	1	114	316	43
Amphet	2	60	90	7
Tramad	1	20	77	32
Morphine_NotHeroin	0	4	30	4
Hydromorphone	0	4	14	7
OpiateNOS	2	16	58	12
AnyOpioid	27	787	1452	193


Accidental drug related deaths sorted by age group
Teenagers
AnyOpioid
OpiateNOS
Hydromorphone
Morphine_NotHeroin
Tramad
Amphet
Methadone
Benzodiazepine
Hydrocodone
Ethanol
Oxymorphone
Oxycodone
FentanylAnalogue
Fentanyl
Heroin
Cocaine
Young Adults
AnyOpioid
OpiateNOS
Hydromorphone
Morphine_NotHeroin
Tramad
Amphet
Methadone
Benzodiazepine
Hydrocodone
Ethanol
Oxymorphone
Oxycodone
FentanylAnalogue
Fentanyl
Heroin
Cocaine
Adults
AnyOpioid
OpiateNOS
Hydromorphone
Morphine_NotHeroin
Tramad
Amphet
Methadone
Benzodiazepine
Hydrocodone
Ethanol
Oxymorphone
Oxycodone
FentanylAnalogue
Fentanyl
Heroin
Cocaine
Senior citizens
AnyOpioid
OpiateNOS
Hydromorphone
Morphine_NotHeroin
Tramad
Amphet
Methadone
Benzodiazepine
Hydrocodone
Ethanol
Oxymorphone
Oxycodone
FentanylAnalogue
Fentanyl
Heroin
Cocaine
0
500
1000
1500
Number of deaths

Part B: Analysis of deaths caused due to specific drug usage, over the years.

The graph below is plotted by keeping the years over which death occurred constantly vs the deaths caused by drugs Fentanyl, Heroin and Cocaine for all the years.



By looking at the graph above, we can identify trends for each type of drug:

- **Trends among Fentanyl:** From the graph above, we see that the popularity for Fentanyl drug in Connecticut began to surge at the end of 2013. The fatal overdoses involving fentanyl doubled in the next 5 years, “rising at an exponential rate.”
- **Trends among Cocaine:** The usage for Cocaine and thus the number of deaths due to Cocaine has become stagnant after the year 2017. Though the trend line has generally increased from the years 2012-2017. We see that the deaths are least due to Cocaine overdose.
- **Trends among Heroin:** The usage for Heroin has increased over the years from 2012-2016, flattened from 2016-2017 and then started declining from 2017 onwards. The associated deaths because of Heroin have decreased. This signifies that people are not consuming as much Heroin as before.

Conclusion:

- ***Why Connecticut's drug overdose crisis isn't slowing down ?***

- We see that the deaths caused due to drugs has increased over the years across gender.
- Even though we see that the deaths due to overdose of Heroin and Cocaine have started declining in the past few years, the deaths caused due to overdose of Fentanyl still keeps on increasing.
- Opioid drugs are crucial for the treatment of pain and illness, but have the potential to lead to dependence, abuse, addiction, and overdose.
- When we compare both of our findings above, we can validate that the number of deaths have increased over the years across gender, and an important factor for this increase in deaths was caused by Fentanyl overdose.

- ***Who is dying in Connecticut's drug overdose crisis?***

- As shown in our findings in Connecticut, death by drug overdose is more common among white people than among other racial and ethnic group.
- Affluent communities tend to have better access to prescription pain medications which causes addiction and leads to over dosage of drugs .
- Among all the age groups, the total number of fatalities are much higher in teenagers over the 7 year time series.

- ***Which drugs have been causing fatalities the most?***
- Fentanyl is fueling the deadly drug overdose epidemic.
- Fentanyl is a powerful synthetic opioid that is much more pervasive and more potent than heroin and can shut down breathing in less than a minute.
- As observed in our findings, Fentanyl-related drug deaths are the highest recorded amongst all age groups combined and the deaths in 2017 outnumbered deaths due to other drugs. The usage of Fentanyl has significantly increased over the years and has an upward trend.

References:

https://catalog.data.gov/dataset/accidental-drug-related-deaths-january-2012-sept-2015
https://ctmirror.org/
https://www.ctpost.com/