

NORTHEASTERN UNIVERSIY
MIE
Department
IE5390 Excel

Mid-Term Case Report
Drug Overdose Deaths: the USA Opioid (Fentanyl) National Crisis

NAME: BALAJI PAMIDI

NEU ID: 002644804

Introduction

The fentanyl crisis has emerged as a widespread threat to public health in the United States, overshadowing the opioid epidemic with deadly potential from just 3% of opioid-related deaths in 2013, fentanyl now accounts for 80%, killing more than 73,000 lives only in 2022. The 300% increase is particularly alarming in its disproportionate impact on young adults ages 18–45, building on a generation grappling with the causes of emphasizing the terrible consequences of addiction. As the newly appointed data scientist for the USA government, the purpose of this report is to analyze relevant data to provide insights that can be used to confront this problem for the government through careful data collection, cleaning, and analysis using informative techniques to show the output in various graphs and charts. This report aims to identify complexity as actionable intelligence that drives informed decision-making and targeted interventions into a simple way of output. We strive to empower them with the knowledge needed to step in. This report can be used as an important resource, and it provides a way to address and stop the fentanyl crisis and protect the health and well-being of all Americans.

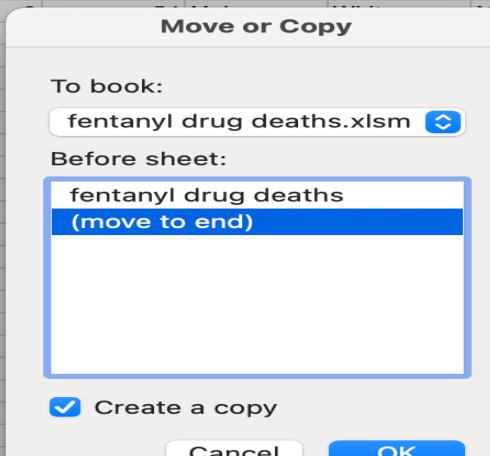
Tasks

There are many main tasks in this midterm case that has been assigned to you:

1. *Data Collection (in MS Excel)*

Download the dataset from canvas into Excel. The data we collected for our analysis of the fentanyl crisis required access to a dataset provided on Canvas, a curriculum management system. After finding and downloading the data set, we imported it into Excel for further analysis. Emphasizing the importance of accurate and accurate data, we performed quality control checks to ensure data integrity. The source and format of data sets were recorded extensively throughout the process to ensure visibility and reproducibility in our research workflow. Export the data from .csv file to .xlsm file. So, that it can be used for upcoming tasks.

fentanyl drug deaths - Saved																									
Home Insert Draw Page Layout Formulas Data Review View Automate Developer Tell me																									
Comments Share																									
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	
1	ID	Date	DateType	Age	Sex	Race	ResidenceCity	ResidenceCounty	ResidenceSt	DeathCity	DeathCount	Location	OffDescription	InjuryRace	InjuryCity	InjuryCounty	InjuryState	COD							
2	0 14-0273	06/28/2014 1		1	48	Male	NORWALK			NORWALK	FARFIELD	Hospital	Substance A Unknown	Substance					Acute fent, hydrocod, benzoc						
3	1 13-0102	03/21/2013 1		0	30	Female	SANDY HOOI FAIRFIELD	CT		DANBURY	FARFIELD	Hospital	Substance A Unknown	Substance A Unknown					Cocaine Intoxication						
4	2 16-0165	03/13/2016 1		0	30	Female	WHITE	RYE	WESTCHESTER	NY	GREENWICH	Hospital	Substance A Unknown	Substance A Unknown					Acute Heroin and Cocaine In						
5	3 16-0208	03/31/2016 1		0	23	Male	WHITE	FLUSHING	QUEENS	GREENWICH	FARFIELD	Hospital	Transdermal Other	Transdermal Other					Fentanyl and Morphin						
6	4 13-0052	02/13/2013 1		0	22	Male	Asian, Other			GREENWICH	FARFIELD	Hospital	Inhalation	Inhalation					Fentanyl Intoxication						
7	5 14-0277	06/29/2014 1		0	23	Male	WHITE	BRISTOL		BRISTOL	HARTFORD	Residence	Used Heroin	Used Heroin					Heroin Intoxication						
8	6 12-0205	06/29/2014 1		0	21	Female	WHITE	WEST HARTFORD		WEST HARTFORD	HARTFORD	Residence	Used Heroin	Used Heroin					Heroin Toxicity						
9	7 15-0278	04/25/2012 1		0	40	Male	WHITE	EAST HARTFC	HARTFORD	EAST HARTFORD	HARTFORD	Residence	Ingestion	Ingestion					Complications of Cocaine In						
10	8 12-0107	05/15/2013 1		0	49	Male	WHITE	NEW HAVEN	NEW HAVEN	NEW HAVEN	NEW HAVEN	Hospital	Injection/Ihh	Injection/Ihh					Heroin Toxicity						
11	9 13-0161	05/15/2013 1		0	50	Male	WHITE	MONTVILLE	NEW LONDON	MONTVILLE	NEW LONDON	Residence	Residence	Residence					Oxycodone Intoxication						
12	10 12-0218	08/23/2012 1		0	26	Female	Hispanic, White			STRATFORD	FARFIELD	Other	Honey Spot	Honey Spot					Multiple Drug Toxicity						
13	11 15-0334	#####		1	49	Female	White			NEW HAVEN	NEW HAVEN	Hospital	Unknown	Unknown					Acute intoxication from the c						
14	12 15-0728												Unknown	Unknown					Ruptured Aneurysm of right I						
15	13 15-0232	05/14/2015 1		1	50	Male	WHITE	DANBURY	FARFIELD	DANBURY	FARFIELD	Residence	Substance A Unknown	Substance A Unknown					Heroin Intoxication						
16	14 16-0028	01/13/2016 1		0	29	Male	Black	NEW HAVEN	NEW HAVEN	NEW HAVEN	NEW HAVEN	Residence	Substance A Unknown	Substance A Unknown					Acute Heroin Intoxication in						
17	15 13-0279	08/19/2013 1		0	45	Male	WHITE	HARTFORD	HARTFORD	HARTFORD	HARTFORD	Residence	Ingestion	Ingestion					Methadone Intoxication						
18	16 14-0042	01/29/2014 1		0	59	Female	WHITE	CANTERBURY		HARTFORD	HARTFORD	Residence	Substance A Unknown	Substance A Unknown					Acute intoxication due to the						
19	17 15-0278	04/25/2012 1		0	42	Male	WHITE	WALLINGFO	NEW HAVEN	WALLINGFO	NEW HAVEN	Residence	Ingestion	Ingestion					Ethanol and Oxycodone Tr						
20	20 16-0065	01/30/2016 1		0	54	Male	WHITE	MIDDLETON	MIDDLESEX	MIDDLETON	MIDDLESEX	Residence	Substance A Unknown	Substance A Unknown					Acute Heroin Intoxication W						
21	21 16-0889	12/20/2016 1		0	32	Male	White	WINDHAM	WINDHAM	WINDHAM	WINDHAM	Residence	Substance A Unknown	Substance A Unknown					Acute Intoxication due to the						
22	20 14-0474	11/14/2014 1		0	47	Male	WHITE	BRIDGEPORT	FAIRFIELD	BRIDGEPORT	FAIRFIELD	Residence	Substance A Unknown	Substance A Unknown					Acute Intoxication due to the						
23	21 15-0263	#####		1	39	Female	White	ANSONIA	NEW HAVEN	ANSONIA	NEW HAVEN	Hospital	Substance A Unknown	Substance A Unknown					Intoxication due to the Com						
24	22 14-0188	#####		0	27	Male	HAMDEN			DERBY	NEW HAVEN	Hospital	Ingestion	Ingestion					Intoxication due to the com						
25	23 16-0688	#####		0	34	Male	White	COS COB	FAIRFIELD	COS COB	FAIRFIELD	Residence	Substance A Unknown	Substance A Unknown					Acute Intoxication due to the						
26	24 16-0495	07/16/2016 1		0	27	Female	WHITE	STRAFTORD	FAIRFIELD	STRAFTORD	FAIRFIELD	Residence	Substance A Unknown	Substance A Unknown					Acute Intoxication due to the						
27	25 17-0817	10/13/2017 1		1	51	Male	WHITE	HARTFORD	HARTFORD	HARTFORD	HARTFORD	Residence	Substance A Unknown	Substance A Unknown					MERIDEN	NEW HAVEN	CT	ACUTE COMBINED HEROIN,			
28	26 18-0095	#####		1	49	Female	White	TORRINGTON	LITCHFIELD	TORRINGTON	LITCHFIELD	Residence	Substance A Unknown	Substance A Unknown					MIDDLETOW	MIDDLESE	CT	Acute Heroin and Hydrocod			
29	27 15-0182	#####		1	23	Male	WHITE	DANBURY	FARFIELD	DANBURY	FARFIELD	Other	Other	Other					Heron and Ethanol Intoxicat						
30	30 16-0098	02/27/2015 1		1	35	Male	White	NEW BRITAIN	HARTFORD	HARTFORD	HARTFORD	Residence	Substance A Unknown	Substance A Unknown					Acute Fentanyl Toxicity						
31	31 19-0285	#####		1	25	Male	Hispanic, Wt	HARRISBURG	DAUPHIN	PA	NEW HAVEN	Nursing Home	Substance A Unknown	Substance A Unknown					Complications of Anoxic-Isch						
32	30 16-0316	#####		0	43	Male	White	MELROSE	MIDDLESEX	MELROSE	MIDDLESEX	Other	Substance A Unknown	Substance A Unknown					Acute Heroin, Fentanyl and C						
33	31 13-0441	#####		0	48	Male	White	NORTH SALE	WESTCHESTER	NORTH SALE	WESTCHESTER	Hospital	Substance A Unknown	Substance A Unknown					Acute intoxication due to the						
34	32 18-0468	06/18/2018 1		1	40	Female	White	TORRINGTON	LITCHFIELD	TORRINGTON	LITCHFIELD	Residence	Substance A Unknown	Substance A Unknown					Methidring Toxicity Including I						
35	33 18-0055	#####		1	49	Female	White	SOUTHURY	NEW HAVEN	SOUTHURY	NEW HAVEN	Hospital	Drug abuse v In Vehicle	Drug abuse v In Vehicle					Acute Intoxication From the						
36	34 17-0907	11/16/2017 1		1	51	Male	WHITE	MIDDLETOW	MIDDLESEX	MIDDLETOW	MIDDLESEX	Residence	Substance A Unknown	Substance A Unknown					MIDDLETOW	MIDDLESE	CT	Acute Heroin and Hydrocod			
37	35 14-0490	11/22/2014 1		0	25	Male	White	DARIEN		NORWALK	FARFIELD	Hospital	Drug Use	Drug Use					Intoxication due to the comb						
38	36 17-0314	06/28/2015 1		1	55	Female	White	SAUGUS	ESSEX	MASHANTUC	NEW LONDON	Other	Unknown	Unknown					ethanol, clonazepam						
39	37 15-0314	06/28/2015 1		1	56	Male	Black	WATERBURY	NEW HAVEN	WATERBURY	NEW HAVEN	Hospital	Residence	Residence					acute Cecaline, CV disease						
40	38 15-0687	#####		1																					



fentanyl drug deaths	
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22	14-047	06/02/15 0:00	1	27	Male	White	STRATFORD	DAUPHIN	CT	NEW HAVEN	FAIRFIELD	Hospital
23	15-026	05/02/14 0:00	0	34	Male	White	MERIDEN	MIDDLESEX	CT	COS COB	LITCHFIELD	Residence
24	14-018	10/07/16 0:00	0	27	Female	White	HARTFORD	WESTCHESTER	CT	STRATFORD	NEW HAVEN	Residence
25	16-068	07/16/2016 12:00:00	0	25	Male	White	DANBURY	LITCHFIELD	CT	MERIDEN	NEW HAVEN	Hospital
26	16-049	10/13/2017 12:00:00	1	51	Male	White	NEW BRITAIN	NEW HAVEN	CT	HARTFORD	MIDDLESEX	Hospital

fentanyl_drug_deaths **fentanyl_drug_deaths_copy**

2. Data Cleanup (in MS Excel)

Moving on from facts series, the subsequent essential step is information cleaning in MS Excel. This method, corresponding to maintaining hygiene within the dataset, guarantees its accuracy and reliability for analysis. By employing 5 key cleaning principles which includes disposing of duplicates, dealing with missing values, standardizing codecs, correcting errors, and doing away with beside the point columns, we goal to enhance statistics nice. Through meticulous attention to element, we domesticate a dataset loose from redundancy and inconsistencies, laying a stable basis for meaningful evaluation of the fentanyl disaster in the United States.

Moving on from data collection, the next step is data cleaning in MS Excel. Here, I Am going to use the 5 cleaning concepts. This includes the use of hygiene concepts to ensure the accuracy and reliability of the data set for analysis:

First Method is Removal of Duplicate Records:

Here we are going to remove the duplicate records from the dataset as they were identified and removing it from the dataset to avoid duplication and to maintain data integrity.

by using the simple command on the excel sheet to removing the duplicate records by selecting the all the columns and cells.

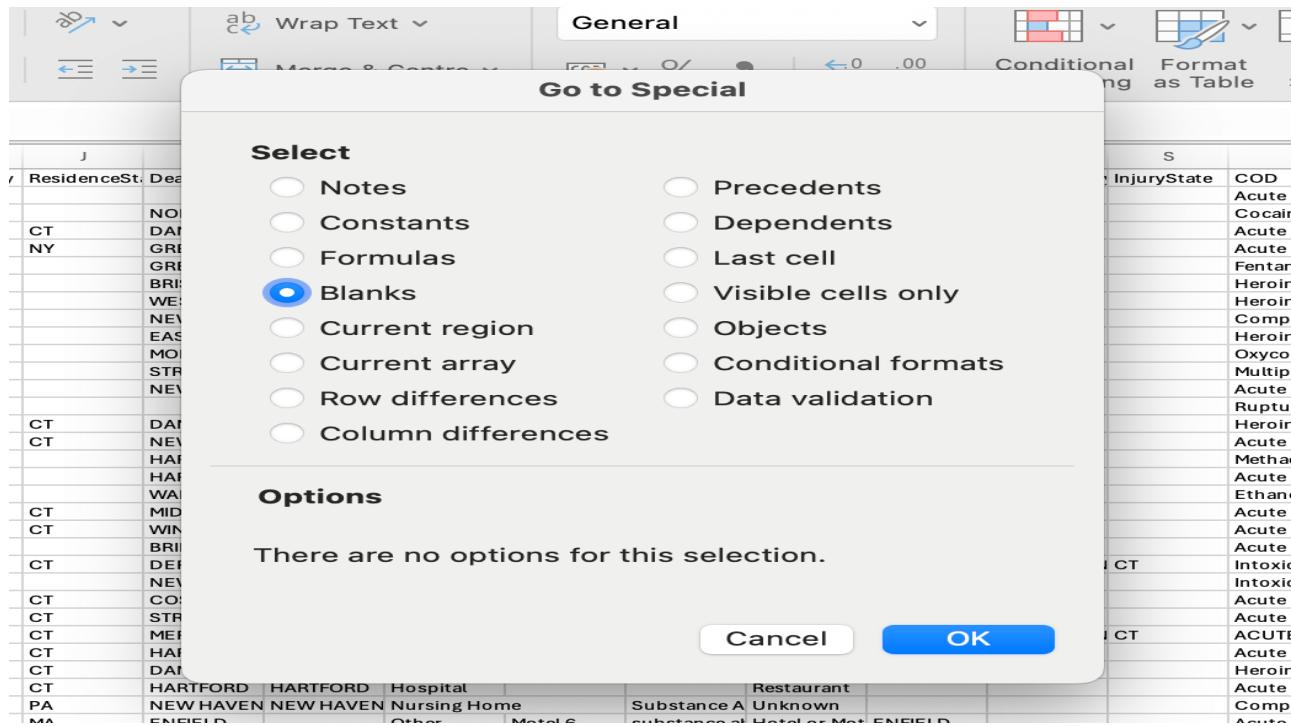
The screenshot shows a Microsoft Excel spreadsheet with data in columns M through S. A 'Remove Duplicates' dialog box is open in the foreground. The dialog box has a checked checkbox labeled 'My list has headers'. Below this, there is a list of columns selected for removal, each with a checked checkbox: 'Select All', '(Column A)', 'ID', 'Date', 'DateType', 'Age', and 'Sex'. At the bottom of the dialog box are 'Cancel' and 'OK' buttons.

we can see that there are no duplicate values founded.so, that we can move forward for the next method for cleaning the dataset.

The screenshot shows a Microsoft Excel spreadsheet with data in columns H through N. An 'Alert' dialog box is displayed in the center of the screen. The dialog box contains a green 'X' icon at the top, the word 'Alert' in bold, and the message 'No duplicate values found.' Below the message is a large blue 'OK' button. The background shows a dataset with various city names and other information.

Second method is Checking the data for missing values :

First Method - I have used the Find and select -> go to special -> blanks.



Here are some blanks founded in the dataset.

ID	Date	Datatype	Age	Sex	Race	ResidenceCity	ResidenceCounty	ResidenceState	DeathCity	DeathCount	Location	Description	InjuryPlace	InjuryCity	InjuryCount	InjuryState	COD
0	14-0273	06/28/2014	1	48	Male	NORWALK		NORWALK	FAIRFIELD	Hospital	substance A						Acute fent, hydrocod, benzodiazepine
1	13-0102	03/21/2013	0	30	Female	White	SANDY HOOK	FAIRFIELD	CT DANBURY	Hospital	substance A	Unknown	UNKNOWN				Cocaine Intoxication
2	16-0165	03/13/2016	0	23	Male	White	RYE	WESTCHESTER	NY GREENWICH	Hospital	substance A	Unknown				Acute Heroin and Cocaine Intoxication	
3	16-0208	03/31/2016	0	22	Male	Asian, Other	FLUSHING	QUEENS		Hospital	substance A	Residence	RYE			Acute Fentanyl and Morphine Intoxication	
4	13-0052	02/13/2013	0	23	Male	White	BRISTOL		BRISTOL HARTFORD	Residence	Transdermal	Other				Fentanyl Intoxication	
5	14-0277	06/29/2014	0	21	Female	White	WEST HARTT	HARTFORD		Residence	Inhalation	Residence				Heroin Intoxication	
6	12-0205	#####	0	40	Female	White	HAMDEN	NEW HAVEN		Residence	Used Heroin	Residence				Heroin Toxicity	
7	13-0404	#####	0	40	Male	White	EAST HARTT	HARTFORD		Residence	Used Heroin	Residence				Complications of Cocaine Intoxication	
8	12-0107	04/25/2012	0	40	Male	White	MONTVILLE	NEW LONDON		Residence	Ingestion					Heroin Toxicity	
9	13-0161	05/15/2013	0	50	Male	White	STURGEON	FAIRFIELD		Residence	Injection/Inh	Hotel or Motel				Oxycodone Intoxication	
10	12-0218	08/23/2012	0	26	Female	Hispanic, White										Multiple Drug Toxicity	
11	14-0274	#####	1	49	Female	White										Acute Intoxication due to the combined effects of heroin and met	
12	15-0728															Ruptured Aneurysm from the combined effects of heroin and met	
13	15-0232	05/14/2015	1	50	Male	White	DANBURY	FAIRFIELD	CT DANBURY	Residence	substance A	Residence				Ruptured Aneurysm from the combined effects of heroin and met	
14	16-0028	01/13/2016	0	29	Male	Black	NEWHAVEN	NEW HAVEN	CT NEWHAVEN	Residence	substance A	Residence	NEW HAVEN			Cocaine Intoxication	
15	13-0279	08/19/2013	0	45	Male	White	HARTFORD	HARTFORD		Residence	substance A	Unknown				Acute Heroin Intoxication in a Person Taking Clonazepam, Amph	
16	14-0042	01/29/2014	0	29	Female	White	CANTERBURY		HARTFORD	Hospital	substance A	Residence				Methadone Intoxication	
17	Dec-60	#####	0	42	Male	White	WALLINGFO	NEW HAVEN		Residence	substance A	Residence				Acute intoxication due to the combined effects of heroin, Citalop	
18	16-0065	01/30/2016	0	54	Male	White	MIDDLETON	MIDDLESEX	CT MIDDLETON	Residence	substance A	Residence	MIDDLETON			Ethanol and Oxymorphone Toxicity	
19	16-0889	12/20/2016	0	32	Male	White	WINDHAM	WINDHAM	CT WINDHAM	Residence	substance A	Residence	WINDHAM			Acute Heroin Intoxication While Using Alcohol, Trazadone, Bupr	
20	14-0474	11/14/2014	0	47	Male	White	BRIDGEPORT	HARTFORD		Residence	substance A	Residence				Acute Intoxication due to the Combined Effects of Fentanyl, Her	
21	15-0263	#####	1	39	Female	White	ANSONIA	NEW HAVEN	CT DFERSON	Residence	substance A	Residence	ANSONIA	NEW HAVEN CT		Acute Intoxication due to the combined effects of heroin and met	
22	16-0001	#####	0	27	Male	White	HAMDEN			Residence	substance A	Residence				Intoxication due to the combined effects of heroin and met	
23	16-0988	#####	0	34	Male	White	COS COB	FAIRFIELD	CT COS COB	Residence	substance A	Residence	COS COB			Dip	
24	16-0495	07/16/2016	0	27	Female	White	STRATFORD	HARTFORD	CT STRATFORD	Residence	substance A	Residence	STRATFORD			Acute Intoxication due to the Combined Effects of Cocaine, Oxy	
25	17-0817	10/13/2017	1	25	Male	White	MERIDEN	NEW HAVEN		Residence	substance A	Residence	MERIDEN	NEW HAVEN CT		Acute Intoxication due to the Combined Effects of Fentanyl and	
26	16-0095	#####	1	51	Male	White	HARTFORD	HARTFORD	CT HARTFORD	Residence	substance A	Residence	HARTFORD			Acute Intoxication due to the Combined Effects of Acetil Fentanyl	
27	15-0182	#####	1	23	Male	White	DANBURY	FAIRFIELD	CT DANBURY	Residence	substance A	Residence	FAIRFIELD	HARTFORD		ACUTE COMBINED HERON, FENTANYL, ACETYL, FENTANYL, AND	
28	15-0098	02/27/2015	1	35	Male	White	NEWBRIAN	HARTFORD	CT HARTFORD	Residence	substance A	Residence	HARTFORD			Acute Intoxication/Combined Effects of Ethanol, Alprazolam, Top	
29	18-0285	#####	1	25	Male	Hispanic, White	HABRISURI DAUPHIN	PA	PA NEW HAVEN	NEW HAVEN Nursing Home	Substance A	Residence	PA NEW HAVEN			Heroin and Ethanol Intoxication	
30	16-0316	#####	0	43	Male	White	MELROSE	MIDDLESEX	MA ENFIELD	Other	substance A	Residence	MA ENFIELD			Acute Fentanyl Toxicity	
31	13-0441	#####	0	48	Male	White	NORTH WEST	WESTCHESTER	CT NORWALK	FAIRFIELD	substance A	Residence	NORWALK			Complications of Anoxic-Ischemic Encephalopathy/Acute Opio	
32	18-0468	06/18/2018	1	40	Female	White	TORRINGTON	LITCHFIELD	CT TORRINGTON	LITCHFIELD	substance A	Residence	TORRINGTON	LITCHFIELD		Acute Heroin, Fentanyl and Cocaine Toxicities Associated With Al	
33	16-0004	#####	1	49	Female	White	SOUTHERN	NEW HAVEN	CT WATERBURY	NEW HAVEN	Drug abuse/	A Vehicle				Acute Intoxication due to the combined effects of fentanyl, Alpr	
34	17-0907	11/16/2017	1	40	Male	Black	NEW HAVEN	NEW HAVEN	CT NEW HAVEN	NEW HAVEN	Substance A	Residence	NEW HAVEN	NEW HAVEN CT		ACUTE COMBINED FENTANYL, HEROIN AND ALCOHOL TOXIC	
35	16-0475	09/14/2015	1	51	Male	White	MIDDLETON	MIDDLESEX	CT MIDDLETON	MIDDLESEX	Substance A	Residence	MIDDLETON	MIDDLESEX CT		Mutual Toxication/Alcohol, Cocaine, and Sertaline	
36	14-0490	11/22/2014	0	25	Male	White	DARIEN		CT NORWALK	FAIRFIELD	Drug Use	Residence	NORWALK			Acute Intoxication from the Combined Effects of Cocaine, Fenz	
37	15-0314	06/28/2015	1	55	Female	White	SAUGUS	ESSEX	MA MASHANTUCKET	NEW LONDON	Drug Use	Residence	SAUGUS			Intoxication due to the combined effects of Ethanol and Heroin	
38	15-0687	#####	1	56	Male	Black	WATERBURY	NEW HAVEN	CT WATERBURY	NEW HAVEN	Substance A	Residence	WATERBURY	NEW HAVEN CT		ethanol, clonazepam, acute Cocaine, CV disease	
39	17-0888	#####	1	39	Male	White	MERIDEN	NEW HAVEN	CT MERIDEN	NEW HAVEN	Substance A	Residence	MERIDEN	NEW HAVEN CT		Acute Intoxication due to the Combined Effects of Fluorouracil	
40	15-0007	#####	1	28	Male	White	MILFORD	NEW HAVEN	CT MILFORD	NEW HAVEN	Substance A	Residence	MILFORD	NEW HAVEN		Acute Intoxication due to the combined effects of heroin, Clona	
41	13-0263	#####	0	35	Female	White	BRISTOL	HARTFORD	CT BRISTOL	HARTFORD	Substance A	Residence	BRISTOL	HARTFORD		Acute Cocaine and Morphine Toxicities	
42	18-0122	02/21/2018	1	34	Male	White	GUILFORD	NEW HAVEN	CT GUILFORD	NEW HAVEN	Toxic effects	Residence	GUILFORD	NEW HAVEN		Fentanyl Toxicity	
43	16-0477	#####	0	23	Male	White	SOMERS	TOLLAND	CT SOMERS	TOLLAND	Substance A	Residence	SOMERS			Acute Fentanyl and Heroin Intoxication	
44	18-0001	#####	1	39	Male	White	WALLINGFO	NEW HAVEN	CT MERIDEN	NEW HAVEN	Took medica	Residence	WALLINGFO	NEW HAVEN		Acute Intoxication due to the Combined Effects of Methadone, E	
45	14-0176	04/22/2014	0	49	Female	Hispanic, White	STAMFORD		CT STAMFORD	FAIRFIELD	Substance A	Residence	STAMFORD			Combination Cocaine, Methadone and Alprazolam Toxicities	
46	16-0009	#####	1	40	Male	White	WATERBURY	HARTFORD	CT NEWBRITAIN	HARTFORD	Substance A	Residence	WATERBURY	HARTFORD		Intoxication due to the combined effects of Clonazepam, Cocai	
47	12-0353	12/29/2012	0	50	Male	Hispanic, White	WINDHAM	WINDHAM	CT WILLIAMS	WINDHAM	Park	Injection	Public Park			Multiple Drug Toxicity	
48	16-1002	12/23/2018	0	49	Male	White	WATERTOW	LITCHFIELD	CT WATERTOW	LITCHFIELD	Took drugs	Residence	WATERTOW	LITCHFIELD		Acute Diphenhydramine, hydrocodone, and benzodiazepines	
49	16-0610	#####	0	30	Male	White	BALTIC	NEW LONDON	CT BALTIC	Other	Friend's/Hen Substanc	A Other	BALTIC			Intoxication due to the combined effects of Cocaine, Fenz	
50	14-0522	#####	0	67	Female	White	LITCHFIELD		CT HARTFORD	HARTFORD	Substance A	Residence	HARTFORD			Intoxication due to the combined effects of Diazepam, Oxazepam, Acute	
51	18-0747	09/22/2018	0	36	Male	Hispanic, White	MIDDLETON	MIDDLESEX	CT NEW BRITAIN	HARTFORD	Drug Use	Residential B	NEW BRITAIN	HARTFORD		Intoxication Combined Effects of Olanzapine, Fentanyl, an	

Another way to find the blanks from dataset using the “=ISBLANK(B2:AP5106)” Function. so we have identified the cells which are blank we have absorb that some columns contains data less than 10 percent.

T	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	Co
1	DateType	Age	Sex	Race	ResidenceCir	ResidenceCc	ResidenceSt	DeathCity	DeathCount	Location	LocationifOt	Descriptionic	InjuryPlace	InjuryCity	InjuryCount	InjuryState	COD	OtherSignific	Heroin	Co
168	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	I
169	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	I
170	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	I
171	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	I
172	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	I
173	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	I
174	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	I
175	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	I
176	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	I
177	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	I
178	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	I
179	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	I
180	SE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	I

we are going to delete the cells which are blank. using the option on the excel

The screenshot shows the Microsoft Excel ribbon with the 'Delete' button highlighted. A dropdown menu is open, displaying options for deleting rows, columns, or sheets from both tables and the entire sheet. Below the ribbon, a portion of a table is visible, showing columns Q, R, and S with data related to injury counts and states.

Q	R	S	
InjuryCity	InjuryCount	InjuryState	COD
UNKNOWN			Acute fent, hydrocodone
E			Cocaine Intoxication
			Acute Heroin and Cocaine
			Acute Fentanyl and Cocaine
			Fentanyl Intoxication
			Heroin Intoxication
			Heroin Toxicity
			Complications of Opioid Use
			Heroin Toxicity
			Oxycodone Intoxication
			Multiple Drug Toxicity
			Acute intoxication from the combined effects of heroin and methadone
			Ruptured Aneurysm of right Iliac Artery with Hemoperitoneum
			Heroin Intoxication
			Acute Heroin Intoxication in a Person Taking Clonazepam, Amphetamine, Citalopram, and Aripiprazole
			Methadone Intoxication
			Acute intoxication due to the combined effects of heroin, Citalopram and Clonazepam
			Ethanol and Oxymorphone Toxicity
			Acute Heroin Intoxication While Using Alcohol, Trazodone, Bupropion and Abilify
			Acute Intoxication due to the Combined Effects of Fentanyl, Heroin, Clonazepam and Nordiazepam
			Acute intoxication due to the combined effects of heroin and alcohol
SONIA	NEW HAVEN CT		Intoxication due to the Combined Effects of Methadone and Diphenhydramine
OS COB			Intoxication due to the combined effects of Oxycodone, Oxymorphone, Clonazepam, and Alprazolam
RATFORD			Acute Intoxication due to the Combined Effects of Fentanyl and Heroin
			Acute Intoxication due to the Combined Effects of Acetyl Fentanyl, Fentanyl, and Heroin

After deleting the cells we got a new data sheet so that we use it for the next processing methods and we have identified more columns that contains more blank cells and data has less than 10 percent when compared with hole data set.

B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	COD
ID	Date	DateType	Age	Sex	Race	ResidenceCity	ResidenceCounty	ResidenceState	DeathCity	DeathCount	Location	LocationIfNot	Description	InjuryPlace	InjuryCity	InjuryCount	InjuryState	
14-0273	06/28/2014	1	48	Male	Black	NORWALK	FAIRFIELD	CT	NORWALK	FAIRFIELD	Hospital	Honey Spot	substance	Unknown	UNKNOWN	NEW HAVEN CT	Acute fent, hydrocod, benzodiazepine	
13-0102	03/21/2013	0	30	Female	White	SANDY HOO	WESTCHESTER	NY	DANBURY	FAIRFIELD	Hospital	Motel 6	Substance A	Residence	RYE	NEW HAVEN CT	Cocaine Intoxication	
16-0165	03/13/2016	0	23	Male	White	RYE	QUEENS	CT	GREENWICH	HARTFORD	Hospital	Hotel/Motel	substance at Other		NEW HAVEN	HARTFORD CT	Acute Heroin and Cocaine Intoxication	
16-0208	03/31/2016	0	22	Male	Asian, Other	FLUSHING	HARTFORD	CT	GREENWICH	HARTFORD	Hospital	Park	Transdermal	Residence	MIDDLETOW	LITCHFIELD CT	Acute Fentanyl and Morphine Intoxication	
13-0052	02/13/2013	0	23	Male	White	BRISTOL	NEW HAVEN	CT	BRISTOL	NEW HAVEN	Residence	Friend's/Hon	Inhalation	Residence	WINDHAM	NEW HAVEN CT	Fentanyl Intoxication	
14-0277	06/29/2014	0	21	Female	White	WEST HART	HARTFORD	CT	WEST HART	HARTFORD	Residence	Outside	Used Heroin	Residence	ANSONIA	MIDDLESEX CT	Heroin Intoxication	
12-0205	*****	0	40	Female	White	HAMDEN	NEW LONDON	CT	NEW HAVEN	NEW LOND	Hospital	Dunkin don	Used Heroin	Residence	COS COB	NEW HAVEN CT	Heroin Toxicity	
13-0404	*****	0	40	Male	White	EAST HART	FAIRFIELD	CT	EAST HART	FAIRFIELD	Residence	Father's/hou	Ingestion	Hotel or Mot	STRATFORD	NEW HAVEN CT	Complications of Cocaine Intoxication	
12-0107	04/25/2012	0	50	Male	White	MONTVILLE	NEW HAVEN	CT	MONTVILLE	NEW HAVEN	Residence	Halfway hou	Injection/Inh	Unknown	MERIDEN	NEW HAVEN CT	Heroin Toxicity	
13-0161	05/15/2013	0	26	Female	Micronia	MANHATTAN	HARTFORD	CT	STRATFORD	FAIRFIELD	Other	Friend's/Hon	Substance A	Unknown	HARTFORD	NEW HAVEN CT	Oxydonea Intoxication	

I have highlight with yellow color for the columns having less than 10 percent.

D	E	F	G	H	I	J	K	L	M	N							
Type	Age	Sex	Race	ResidenceCity	ResidenceCounty	ResidenceState	DeathCity	DeathCounty	Location	LocationIfOther							
586 1	23	Male	White	NEW HAVEN	NEW HAVEN	CT	MOOSUP	HARTFORD	Residence	The Inn							
587 1	58	Male	White	CANTERBURY	HARTFORD	CT	TORRINGTON	HARTFORD	Residence	Friends House							
588 0	42	Male	White	BRISTOL	LITCHFIELD	CT	WALLINGFORD	HARTFORD	Residence	Boyfriends Residence							
589 1	42	Male	Hispanic, White	HARTFORD	NEW LONDON	CT	MANCHESTER	FAIRFIELD	Other	Rear Parking Lot							
590 0	55	Male	White	WESTHAVEN	NEW HAVEN	ME	BRANFORD	HARTFORD	Other	Shoreline Hotel							
591 1	46	Male	White	NORWALK	NEW LONDON	CT	STAMFORD	FAIRFIELD	Hospital	By Railroad Tracks							
592 0	55	Male	Hispanic, White	BRIDGEPORT	HARTFORD	CT	NORWICH	NEW HAVEN	Residence								
593 1	25	Female	White	BRIDGEPORT	FAIRFIELD	CT	NEW HAVEN	NEW HAVEN	Residence								
594 1	57	Male	White	TORRINGTON	HARTFORD	CT	ENFIELD	HARTFORD	Residence								
595 1	46	Male	White	TERRYVILLE	FAIRFIELD	CT	EASTHAMPTON	MIDDLESEX	Hospital								
596 0	38	Male	White	HAMDEN	NEW HAVEN	CT	NEW BRITAIN	HARTFORD	Residence								
597 0	45	Male	White	TORRINGTON	HARTFORD	CT	HARTFORD	HARTFORD	Other								
598 1	49	Male	Black	NEW LONDON	NEW LONDON	CT	BRANFORD	HARTFORD	Hospital								
599 1	40	Male	White	WATERBURY	FAIRFIELD	OK	NEW HAVEN	NEW HAVEN	Residence								
600 0	36	Male	White	HAMDEN	NEW HAVEN	CT	STAFFORDSPRINGS	NEW HAVEN	Hospital								
601 0	54	Male	Black	HARTFORD	HARTFORD	CT	MIDDLETOWN	HARTFORD	Residence								
602 1	25	Male	White	BRONX	QUEENS	CT	HARTFORD	FAIRFIELD	Other								
J	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AH	AI	AI
1	OtherSignifican	Hesin	Ocaine	Fentanyl	Fentanyl_Analogues	Oxycodone	Oxymorphone	Ethanol	Hydrocodone	Benzodiazepine	Methadone	Amphet	Transe	Morphine	NoHeroin	Hydromorphone	Other
434		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	PSEUDO
435		0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	Opiates
436		1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	MORPHOP
437		0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
438		0	0	1	0	0	0	0	1	1	1	0	0	0	0	0	
439		0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	

Third Method is Data Formatting and Standardized Text:

Here we are going to data formatting and standardized the text using the VBA. we have created the new module for the running the function.

```

Microsoft Visual Basic - fentanyl_drug_deaths.xlsm - [Sheet3 (Code)]
Project - VBAProject
Properties - Sheet3

Sub CorrectDataAndStandardizeText()
    ' Specify the range where you want to correct data formats and standardize text
    Dim rng As Range
    Set rng = Sheet1.Range("B2:AP5106") ' Update with your actual range

    ' Loop through each cell in the range
    Dim cell As Range
    For Each cell In rng
        ' Check if the cell contains numeric value
        If IsNumeric(cell.Value) Then
            ' Correct data format to two decimal places
            cell.NumberFormat = "0.00"
        Elseif VarType(cell.Value) = vbString Then
            ' Standardize text by converting it to uppercase
            cell.Value = UCase(cell.Value)
        End If
        Next cell
    End Sub

```

After running the VBA code, we have formatted the data for each column having the numeric values of the data set in the right format and the standardize the text form lower case to uppercase. we see in the below screenshot of the data sheet on excel. by using the functions “isNumeric” for and “Vartype”.

Here we see many missing values and some empty columns and unrequired columns for the data analysis.

Fourth Method is Trim Whitespace:

Here we are going to trim the white space for the whole data just by using the excel command “=TRIM (fentanyl drug deaths!B1:AP5106)” .

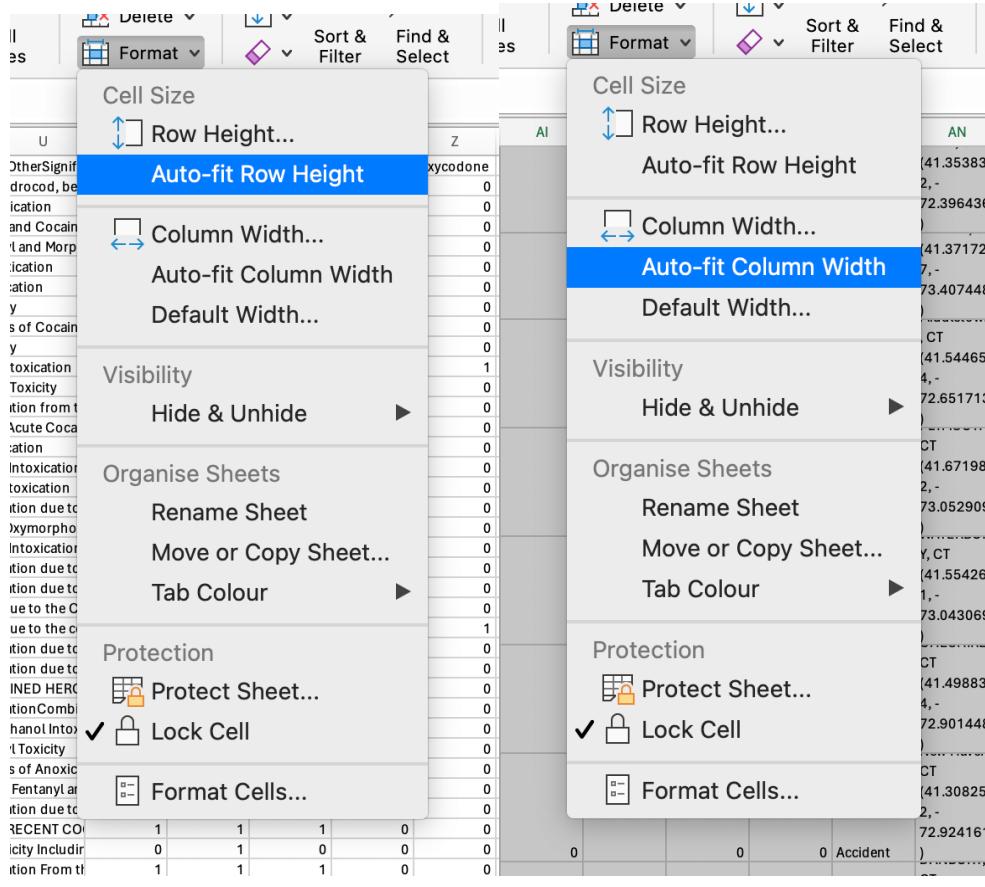
I Have copied the values into new sheet without formula.

SUM	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
	Date	DateType	Age	Sex	Race	ResidenceCity	ResidenceCity	ResidenceState	DeathCity	DeathCounty	Location	LocationOfOrt	Description	InjuryPlace	InjuryCity	InjuryCounty	InjuryState	COD	OtherSignific	Heroin	Cocain	
1	B1:AP5106																					
2	14-0273	41818	1		MALE	BLACK	NORWALK		FAIRFIELD		HOSPITAL		SUBSTANCE					ACUTE FENT,	0	0		
3	13-0102	41354	0	48													COCAINE IN'	0	1			
4	16-0165	42422	0	30	FEMALE	WHITE	SANDY HOOI	FAIRFIELD	CT	DANBURY	HOSPITAL	SUBSTANCE UNKNOWN	UNKNOWN				ACUTE HERO	1	1			
5	16-0208	42460	0	23	MALE	WHITE	RYE	WESTCHESTER	NY	GREENWICH	HOSPITAL	SUBSTANCE RESIDENCE	RYE				ACUTE FENT/	1	0			
6	13-0052	41318	0	22	MALE	ASIAN, OTH	FLUSHING	QUEENS		GREENWICH	FAIRFIELD	HOSPITAL	TRANSDERM OTHER				FENTANYLIN	0	0			
7	14-0277	41819	0	23	MALE	WHITE	BRISTOL			BRISTOL	HARTFORD	RESIDENCE	INHALATION	RESIDENCE			HEROIN INTC	1	0			
8	12-0205	41251	0	21	FEMALE	WHITE	WEST HARTF	HARTFORD		WEST HARTF	HARTFORD	RESIDENCE	USED HEROI	RESIDENCE			HEROIN TOX	1	0			
9	13-0040	41558	0	40	FEMALE	WHITE	HAMDEN	NEW HAVEN		NEW HAVEN	NEW HAVEN	HOSPITAL					COMPLICATI	0	1			
10	12-0107	41024	0	40	MALE	WHITE	EAST HARTF	HARTFORD		EASTHARTF	HARTFORD	RESIDENCE	USED HEROI	RESIDENCE			HEROIN TOX	1	0			
11	13-0161	41409	0	50	MALE	WHITE	MONTVILLE	NEW LONDON		MONTVILLE	NEW LONDON	RESIDENCE	INGESTION	RESIDENCE			OXYCODONI	0	0			
12	12-0218	41144	0	26	FEMALE	HISPANIC, W				STRATFORD	FAIRFIELD	OTHER	HONEY SPOT INJECTION/HOTEL OR M				MULTIPLE DR	1	1			
13	15-0334	42131	1	49	FEMALE	WHITE				NEW HAVEN	NEW HAVEN	HOSPITAL	UNKNOWN				ACUTE INTO	1	0			
14	15-0728												UNKNOWN				RUPTURED A ACUTE COCA/	0	1			
15	15-0323	42138	1	50	MALE	WHITE	DANBURY	FAIRFIELD	CT	DANBURY	FAIRFIELD	RESIDENCE	SUBSTANCE	RESIDENCE			HEROIN INTC	1	0			
16	16-0028	42382	0	29	MALE	BLACK	NEW HAVEN	NEW HAVEN	CT	NEW HAVEN		RESIDENCE	SUBSTANCE RESIDENCE	NEW HAVEN			ACUTE HERO	1	0			
17	13-0279	41505	0	45	MALE	WHITE	HARTFORD	HARTFORD		HARTFORD	HARTFORD	RESIDENCE	INGESTION	RESIDENCE			METHADONE	0	0			
18	14-0042	41668	0	29	FEMALE	WHITE	CANTERBUR			HARTFORD	HOSPITAL	SUBSTANCE UNKNOWN					ACUTE INTOX	1	0			
19	22251	40942	0	42	MALE	WHITE	WALINGFOI	NEW HAVEN		WALINGFOI	NEW HAVEN	RESIDENCE	INGESTION	RESIDENCE			ETHANOLAN	0	0			
20	16-0065	42399	0	54	MALE	WHITE	MIDDLETOWN	MIDDLESEX	CT	MIDDLETOW	MIDDLESEX	RESIDENCE	SUBSTANCE RESIDENCE	MIDDLETOW			ACUTE HERO	1	0			
21	16-0889	42724	0	32	MALE	WHITE	WINDHAM	WINDHAM	CT	WINDHAM		RESIDENCE				ACUTE INTOX	1	0				
22	14-0474	41957	0	47	MALE	WHITE	BRIDGEPO	FAIRFIELD		BRIDGEPO	FAIRFIELD	RESIDENCE	SUBSTANCE RESIDENCE				ACUTE INTOX	1	0			
23	15-0263	42041	1	39	FEMALE	WHITE	ANSONIA	NEW HAVEN	CT	DERBY	NEW HAVEN	HOSPITAL	RESIDENCE	ANSONIA	NEW HAVEN	CT	INTOXICATIO	0	0			
24	14-0188	41675	0	27	MALE	WHITE	HAMDEN			NEW HAVEN	NEW HAVEN	HOSPITAL	INGESTION	RESIDENCE			INTOXICATIO	0	0			
25	16-0688	42561	0	34	MALE	WHITE	COS COB	FAIRFIELD	CT	COS COB		RESIDENCE	SUBSTANCE RESIDENCE	COS COB			ACUTE INTOX	1	0			
26	16-0495	42567	0	27	FEMALE	WHITE	STRATFORD	FAIRFIELD	CT	STRATFORD		RESIDENCE	SUBSTANCE RESIDENCE	STRATFORD			ACUTE INTOX	1	0			
27	17-0817	43021	1	25	MALE	WHITE	MERIDEN	NEW HAVEN	CT	MERIDEN	NEW HAVEN	HOSPITAL	SUBSTANCE RESIDENCE	MERIDEN	NEW HAVEN	CT	ACUTE COMI	1	1			
28	18-0095	43375	1	51	MALE	WHITE	HARTFORD	HARTFORD	CT	HARTFORD	HARTFORD	HOSPITAL	DRUG USE OTHER, PUBLI	HARTFORD	HARTFORD		ACUTE INTOX	0	0			
29	15-0182	42342	1	23	MALE	WHITE	DANBURY	FAIRFIELD	CT	DANBURY	FAIRFIELD	OTHER	OTHER				HEROIN ANC	1	0			
30	15-0098	42062	1	35	MALE	WHITE	NEW BRITAIN	HARTFORD	CT	HARTFORD	HARTFORD	HOSPITAL	RESTAURANT				ACUTE FENT/	0	0			
31	18-0285	43408	1	25	MALE	HISPANIC, W	HARRISBURG	DAUPHIN	PA	NEW HAVEN	NEW HAVEN	HOSPITAL	SUBSTANCE UNKNOWN				COMPLICATI	0	0			
32	16-0316	42648	0	43	MALE	WHITE	MELROSE	MIDDLESEX	MA	ENFIELD	OTHER	MOTEL6	SUBSTANCE HOTEL OR M	ENFIELD			ACUTE HERO	1	1			
33	13-0441	41376	0	48	MALE	WHITE	NORTH SALE	WESTCHEST		NORWALK	FAIRFIELD	HOSPITAL	SUBSTANCE UNKNOWN				ACUTE INTOX	1	0			
34	18-0468	43269	1	40	FEMALE	WHITE	TORRINGTON	LITCHFIELD	CT	TORRINGTON	LITCHFIELD	RESIDENCE	SUBSTANCE RESIDENCE	TORRINGTON	LITCHFIELD		ACUTE COMI RECENT CO	1	1			
35	18-0355	43348	1	49	FEMALE	WHITE	SOUTHURY	NEW HAVEN	CT	WATERBURY	NEW HAVEN	HOSPITAL	DRUG ABUSE IN VEHICLE				MULTIDRUG	0	1			
36	17-0907	43055	1	40	MALE	BLACK	NEW HAVEN	NEW HAVEN	CT	NEW HAVEN	NEW HAVEN	HOSPITAL	SUBSTANCE RESIDENCE	NEW HAVEN	NEW HAVEN	CT	ACUTE INTOX	1	1			
37	15-0475	42261	1	51	MALE	WHITE	MIDDLETOW	MIDDLESEX	CT	MIDDLETOW	MIDDLESEX	RESIDENCE	RESIDENCE	MIDDLETOW	MIDDLESEX	CT	INTOXICATIO	1	0			
38	14-0490	41965	0	25	MALE	WHITE	DARIEN			NORWALK	FAIRFIELD	HOSPITAL	DRUG USE RESIDENCE				ETHANOL CI	0	0			
39	15-0314	42183	1	55	FEMALE	WHITE	SAUGUS	ESSEX	MA	MASHANTUC	NEW LONDON	OTHER	UNKNOWN									
40	15-0687	42197	1	56	MALE	BLACK	WATERBURY	NEW HAVEN	CT	WATERBURY	NEW HAVEN	HOSPITAL	RESIDENCE				ACUTE COCA/	0	1			

Fifth Method is to Autofit he rows and columns:

Here we are going to Auto fit the rows and columns using the excel commands. I preferred this method because it is simple and easy method can be used to large datasets.

Using the format function we have auto fitted the column-width and row-height of the dataset.



Here is the dataset after the Auto fit of column and rows.

3. Data Manipulation (in MS Excel)

As a Data Scientist for the US Government, I lead the analysis of datasets on the fentanyl crisis using Microsoft Excel. Leveraging advanced data manipulation techniques, including VBA, I uncover alarming trends, such as a 2,300% surge in fentanyl-related deaths since 2013. My findings drive actionable recommendations for targeted intervention strategies.

First Method is changing date format:

Here we are going to manipulate the date format and unnecessary number presented in the cells.

	A	B	C
1	ID	Date	Sex
2	14-0273	06/28/2014 12:00:00 AM	
3	13-0102	03/21/2013 12:00:00 AM	MALE
4	16-0165	03/13/2016 12:00:00 AM	FEMALE
5	16-0208	03/31/2016 12:00:00 AM	MALE
6	13-0052	02/13/2013 12:00:00 AM	MALE
7	14-0277	06/29/2014 12:00:00 AM	MALE
8	12-0205	41251	FEMALE
9	13-0404	41558	FEMALE
10	12-0107	04/25/2012 12:00:00 AM	MALE
11	13-0161	05/15/2013 12:00:00 AM	MALE
12	12-0218	08/23/2012 12:00:00 AM	FEMALE
13	15-0334	42131	FEMALE
14	15-0728		
15	15-0232	05/14/2015 12:00:00 AM	MALE
16	16-0028	01/13/2016 12:00:00 AM	MALE
17	13-0279	08/19/2013 12:00:00 AM	MALE
18	14-0042	01/29/2014 12:00:00 AM	FEMALE
19	22251	40942	MALE
20	16-0065	01/30/2016 12:00:00 AM	MALE
21	16-0889	12/20/2016 12:00:00 AM	MALE
22	14-0474	11/11/2014 12:00:00 AM	MALE

By using the VBA macro ChangeDateFormat removing of time and unnecessary values from Date columns.

```
(General)
Sub ChangeDateFormat()
'Data Manipulating

    Dim ws As Worksheet
    Dim lastRow As Long
    Dim dateColumn As Range
    Dim cell As Range

    Set ws = ThisWorkbook.Sheets("Sheet9")

    lastRow = ws.Cells(ws.Rows.Count, "B").End(xlUp).Row
    Set dateColumn = ws.Range("B2:B" & lastRow)

    ' Loop through each cell in the date column
    For Each cell In dateColumn
        If IsDate(cell.Value) Then
            ' Check if the cell contains a valid date
            cell.Value = Format(cell.Value, "mm/dd/yyyy")
        ElseIf IsNumeric(cell.Value) Then
            ' Check if the cell contains a numeric value
            If cell.Value >= 1 And cell.Value < 2958466 Then ' Check if the numeric value represents a valid Excel date
                On Error Resume Next
                cell.Value = DateSerial(1900, 1, cell.Value)
                If Err.Number = 0 Then
                    cell.NumberFormat = "mm/dd/yyyy"
                Else
                    ' Handle overflow error (numeric value outside valid date range)
                    cell.ClearContents
                End If
                On Error GoTo 0
            Else
                ' Handle other numeric values (not representing dates) by clearing the cell
                cell.ClearContents
            End If
        Else
            ' Handle non-date values (e.g., text) by clearing the cell
            cell.ClearContents
        End If
    Next cell

```

Here we are got the data in to right date format.

	A	B	C	D	E	F
1	ID	Date	Sex	Race	ResidenceCity	ResidenceState
2	14-0273	06/28/2014				
3	13-0102	03/21/2013	MALE	BLACK	NORWALK	
4	16-0165	03/13/2016	FEMALE	WHITE	SANDY HOOK	FAIRFIELD
5	16-0208	03/31/2016	MALE	WHITE	RYE	WESTCHESTER
6	13-0052	02/13/2013	MALE	ASIAN, OTHER	FLUSHING	QUEENS
7	14-0277	06/29/2014	MALE	WHITE	BRISTOL	
8	12-0205		FEMALE	WHITE	WEST HARTFORD	HARTFORD
9	13-0404		FEMALE	WHITE	HAMDEN	NEW HAVEN
10	12-0107	04/25/2012	MALE	WHITE	EAST HARTFORD	HARTFORD
11	13-0161	05/15/2013	MALE	WHITE	MONTVILLE	NEW LONDON
12	12-0218	08/23/2012	FEMALE	HISPANIC, WHITE		
13	15-0334		FEMALE	WHITE		
14	15-0728					
15	15-0232	05/14/2015	MALE	WHITE	DANBURY	FAIRFIELD
16	16-0028	01/13/2016	MALE	BLACK	NEW HAVEN	NEW HAVEN
17	13-0279	08/19/2013	MALE	WHITE	HARTFORD	HARTFORD
18	14-0042	01/29/2014	FEMALE	WHITE	CANTERBURY	
19	22251		MALE	WHITE	WALLINGFORD	NEW HAVEN
20	16-0065	01/30/2016	MALE	WHITE	MIDDLETON	MIDDLESEX
21	16-0889	12/20/2016	MALE	WHITE	WINDHAM	WINDHAM
22	14-0474	11/14/2014	MALE	WHITE	BRIDGEPORT	
23	15-0263		FEMALE	WHITE	ANSONIA	NEW HAVEN
24	14-0188		MALE		HAMDEN	
25	16-0688		MALE	WHITE	COS COB	FAIRFIELD
26	16-0495	07/16/2016	FEMALE	WHITE	STRATFORD	FAIRFIELD
27	17-0817	10/13/2017	MALE	WHITE	MERIDEN	NEW HAVEN
28	18-0095		MALE	WHITE	HARTFORD	HARTFORD
29	15-0182		MALE	WHITE	DANBURY	FAIRFIELD
30	15-0098	02/27/2015	MALE	WHITE	NEW BRITAIN	HARTFORD
31	18-0285		MALE	HISPANIC, WHITE	HARRISBURG	DAUPHIN
32	16-0316		MALE	WHITE	MELROSE	MIDDLESEX
33	13-0441		MALE	WHITE	NORTH SALEM	WESTCHESTER
34	18-0168	06/18/2018	FFMALE	WHITE	TORRINGTON	LITCHFIELD

Second Method Splitting data into new column:

Here I am going to Split data of last three columns are Death city geo, Injury city geo and Residence city geo were moving of Geographic coordinates to respective new columns.

Here I have used the VBA Macros coding for doing this process.

Initial dataset

AK	AL	AM	AN	AO
DeathCityGeo	ResidenceCityGeo	InjuryCityGeo		
CT41.575155,-72.738288)	CT41.575155,-72.738288)	CT41.575155,-72.738288)		
NORWALK, CT41.11805,-73.412906)	NORWALK, CT41.11805,-73.412906)	CT41.575155,-72.738288)		
DANBURY, CT41.393666,-73.451539)	SANDY HOOK, CT41.491998,-73.282501)			
GREENWICH, CT41.026526,-73.628549)				
GREENWICH, CT41.026526,-73.628549)				
BRISTOL, CT41.673037,-72.945791)	BRISTOL, CT41.673037,-72.945791)	CT41.575155,-72.738288)		
WEST HARTFORD, CT41.762008,-72.741807)	WEST HARTFORD, CT41.762008,-72.741807)	CT41.575155,-72.738288)		
NEW HAVEN, CT41.308252,-72.924161)	HAMDEN, CT41.382918,-72.907743)	CT41.575155,-72.738288)		
EAST HARTFORD, CT41.769319,-72.643785)	EAST HARTFORD, CT41.769319,-72.643785)	CT41.575155,-72.738288)		
MONTVILLE, CT41.45305,-72.136336)	MONTVILLE, CT41.45305,-72.136336)	CT41.575155,-72.738288)		
STRATFORD, CT41.200888,-73.131323)	CT41.575155,-72.738288)	CT41.575155,-72.738288)		
NEW HAVEN, CT41.306252,-72.924161)	CT41.575155,-72.738288)	CT41.575155,-72.738288)		
CT41.575155,-72.738288)	CT41.575155,-72.738288)	CT41.575155,-72.738288)		
NEW HAVEN, CT41.393666,-73.451539)	DANBURY, CT41.393666,-73.451539)	CT41.575155,-72.738288)		
HARTFORD, CT41.765775,-72.673368)	NEW HAVEN, CT41.308252,-72.924161)	NEW HAVEN, CT41.308252,-72.924161)		
HARTFORD, CT41.765775,-72.673368)	HARTFORD, CT41.765775,-72.673368)	CT41.575155,-72.738288)		
CANTERBURY, CT41.673037,-72.945791)	CANTERBURY, CT41.673037,-72.945791)	CT41.575155,-72.738288)		
WALLINGFORGE, CT41.454408,-72.818444)	WALLINGFORGE, CT41.454408,-72.818444)	CT41.575155,-72.738288)		
MIDDLETOWN, CT41.544654,-72.651713)	MIDDLETOWN, CT41.544654,-72.651713)	MIDDLETOWN, CT41.544654,-72.651713)		
WINDHAM, CT41.179195,-73.188476)	WINDHAM, CT41.179195,-73.188476)	WINDHAM, CT41.179195,-73.188476)		
BRIDGEPORT, CT41.179195,-73.188476)	BRIDGEPORT, CT41.179195,-73.188476)	BRIDGEPORT, CT41.179195,-73.188476)		
DERBY, CT41.308252,-72.924161)	ANSIONA, CT41.179195,-73.188476)	ANSIONA, CT41.179195,-73.188476)		
NEW HAVEN, CT41.308252,-72.924161)	HAMDEN, CT41.382918,-72.907743)	CT41.575155,-72.738288)		
COS COB, CT41.037899,-73.598976)	COS COB, CT41.037899,-73.598976)	CT41.575155,-72.738288)		
STRATFORD, CT41.200888,-73.131323)	STRATFORD, CT41.200888,-73.131323)	STRATFORD, CT41.200888,-73.131323)		
MERIDEN, CT41.557589,-72.8011)	MERIDEN, CT41.557589,-72.8011)	MERIDEN, CT41.557589,-72.8011)		
HARTFORD, CT41.765775,-72.673356)	HARTFORD, CT41.765775,-72.673356)	HARTFORD, CT41.765775,-72.673356)		
DANBURY, CT41.393666,-73.451539)	CT41.575155,-72.738288)	CT41.575155,-72.738288)		
STRATFORD, CT41.765775,-72.673356)	NEW BRITAIN, CT41.667528,-72.783437)	NEW BRITAIN, CT41.667528,-72.783437)		
MIDDLETOWN, CT41.544654,-72.651713)	HARRISBURG, CT41.671199,-72.204203)	HARRISBURG, CT41.671199,-72.204203)		
NORTH WATKINS, CT41.11805,-73.412906)	MELROSE, CT41.5375,-72.512698)	MELROSE, CT41.5375,-72.512698)		
TORRINGTON, CT41.812186,-73.101552)	NORTH SALEM, CT41.8978,-72.890397)	ENFIELD, CT41.976501,-72.591985)		
WATERBURY, CT41.554261,-73.043099)	TORRINGTON, CT41.812186,-73.101552)	CT41.575155,-72.738288)		
NEW HAVEN, CT41.308252,-72.924161)	SOUTHBURY, CT41.466592,-73.302497)	NEW HAVEN, CT41.308252,-72.924161)		
MIDDLETOWN, CT41.544654,-72.651713)	NEW HAVEN, CT41.308252,-72.924161)	MIDDLETOWN, CT41.544654,-72.651713)		
NORWALK, CT41.11805,-73.412906)	DARIEN, CT41.80002,-73.463771)	CT41.575155,-72.738288)		
MASHANTUCKET, CT41.471499,-71.956393)	WATERBURY, CT41.554261,-73.043069)	CT41.575155,-72.738288)		
WATERBURY, CT41.554261,-73.043069)	WATERBURY, CT41.554261,-73.043069)	WATERBURY, CT41.554261,-73.043069)		

After running the VBA code

AJ	AK	AL	AM	AN	AO	AP	
id	MannerofDe	DeathCityGeo	ResidenceCityGeo	InjuryCityGeo	DeathCity coordinates	ResidenceCity coordinates	InjuryCityGeo coordinates
	ACCIDENT	CT	CT	CT	(41.575155, -72.738288)	(41.575155, -72.738288)	(41.575155, -72.738288)
	ACCIDENT	NORWALK, CT	NORWALK, CT	CT	(41.11805, -73.412906)	(41.11805, -73.412906)	(41.575155, -72.738288)
	ACCIDENT	DANBURY, CT	SANDY HOOK, CT		(41.393666, -73.451539)	(41.419998, -73.282501)	
	ACCIDENT	GREENWICH, CT			(41.026526, -73.628549)		
	ACCIDENT	GREENWICH, CT		CT	(41.026526, -73.628549)		(41.575155, -72.738288)
	ACCIDENT	BRISTOL, CT	BRISTOL, CT	CT	(41.673037, -72.945791)	(41.673037, -72.945791)	(41.575155, -72.738288)
	ACCIDENT	WEST HARTFORD, CT	WEST HARTFORD, CT	CT	(41.762008, -72.741807)	(41.762008, -72.741807)	(41.575155, -72.738288)
	ACCIDENT	NEW HAVEN, CT	HAMDEN, CT	CT	(41.308252, -72.924161)	(41.382918, -72.907743)	(41.575155, -72.738288)
	ACCIDENT	EAST HARTFORD, CT	EAST HARTFORD, CT	CT	(41.769319, -72.643785)	(41.769319, -72.643785)	(41.575155, -72.738288)
	ACCIDENT	MONTVILLE, CT	MONTVILLE, CT	CT	(41.45303, -72.136336)	(41.45303, -72.136336)	(41.575155, -72.738288)
	ACCIDENT	STRATFORD, CT	CT	CT	(41.200888, -73.131323)	(41.575155, -72.738288)	(41.575155, -72.738288)
	ACCIDENT	NEW HAVEN, CT	CT	CT	(41.308252, -72.924161)	(41.575155, -72.738288)	(41.575155, -72.738288)
	ACCIDENT	CT	CT	CT	(41.575155, -72.738288)	(41.575155, -72.738288)	(41.575155, -72.738288)
	ACCIDENT	DANBURY, CT	DANBURY, CT	CT	(41.393666, -73.451539)	(41.393666, -73.451539)	(41.575155, -72.738288)
	ACCIDENT	NEW HAVEN, CT	NEW HAVEN, CT	NEW HAVEN, CT	(41.308252, -72.924161)	(41.308252, -72.924161)	(41.308252, -72.924161)

Code:

```

(General) MoveCoordinatesForAllRows
Sub MoveCoordinatesForAllRows()
    Dim ws As Worksheet
    Dim lastRow As Long, i As Long
    Dim coordinateStart As Long
    Dim coordinateText As String
    Dim cellValue As String

    ' Set the worksheet to "Sheet2"
    Set ws = ThisWorkbook.Sheets("Data_Manipulation_2_")

    ' Find the last row with data in column AK, AL, and AM
    lastRow = ws.Cells(ws.Rows.Count, "AK").End(xlUp).Row

    ' Loop through each row in the range of AK, AL, and AM columns
    For i = 2 To lastRow
        ' Move coordinates from column AK to AN
        cellValue = ws.Cells(i, "AK").Value
        coordinateStart = InStr(cellValue, "(")
        If coordinateStart > 0 Then
            coordinateText = Mid(cellValue, coordinateStart)
            ws.Cells(i, "AN").Value = coordinateText
            ws.Cells(i, "AK").Value = Replace(cellValue, coordinateText, "")
        End If

        ' Move coordinates from column AL to AO
        cellValue = ws.Cells(i, "AL").Value
        coordinateStart = InStr(cellValue, "(")
        If coordinateStart > 0 Then
            coordinateText = Mid(cellValue, coordinateStart)
            ws.Cells(i, "AO").Value = coordinateText
            ws.Cells(i, "AL").Value = Replace(cellValue, coordinateText, "")
        End If

        ' Move coordinates from column AM to AP
        cellValue = ws.Cells(i, "AM").Value
        coordinateStart = InStr(cellValue, "(")
        If coordinateStart > 0 Then
            coordinateText = Mid(cellValue, coordinateStart)
            ws.Cells(i, "AP").Value = coordinateText
            ws.Cells(i, "AM").Value = Replace(cellValue, coordinateText, "")
        End If
    Next i

    ' Rename columns AN, AO, and AP
    ws.Cells(1, "AN").Value = "DeathCity coordinates"
    ws.Cells(1, "AO").Value = "ResidenceCity coordinates"
    ws.Cells(1, "AP").Value = "InjuryCityGeo coordinates"
End Sub

```

Third Method is to remove the columns having more missing values:

Here we are going to remove the columns that has more than 1000 values of data is missing from the column from data set so that we can use the proper data for future terms needed.

I am going to use the VBA code for the removing of columns. I have considered the more than 1000 values because it is 20 % of data is missing in these specific columns.

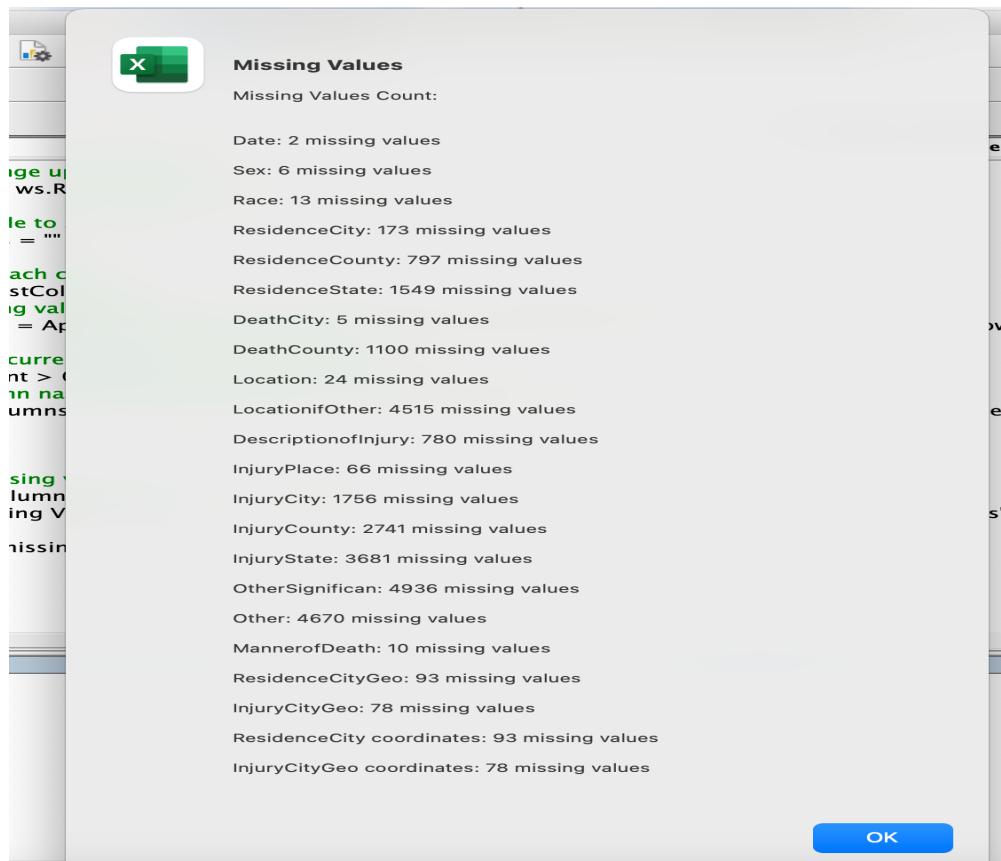
First, I have calculated the total missing values from each column.

Second, I have calculated the more than 1000 values missing's of the columns.

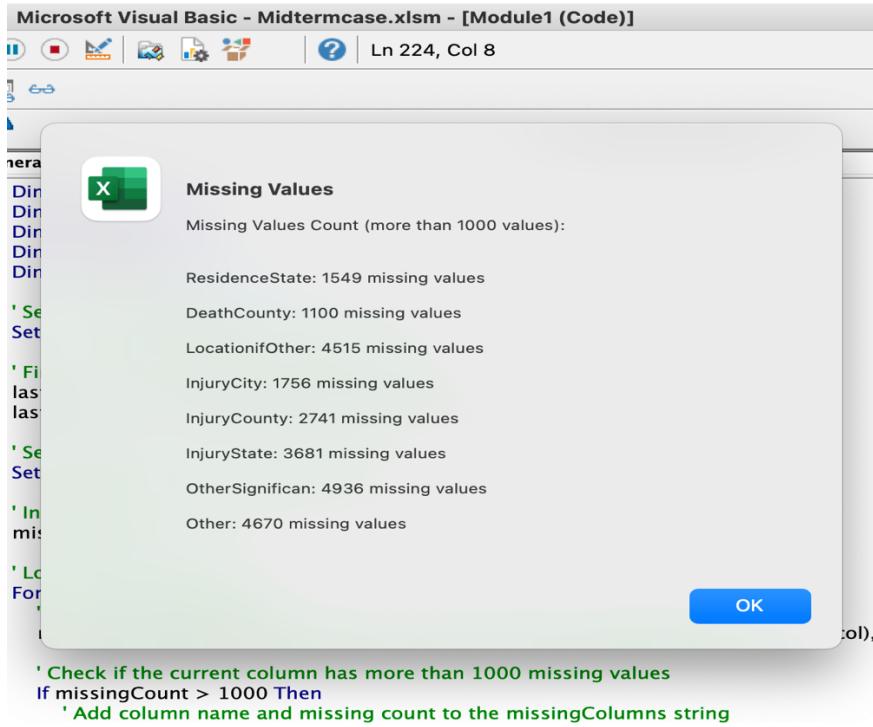
Third, I have deleted those columns having more than 100 values missing.

Next page we see the outputs from the message box of excelsheet.

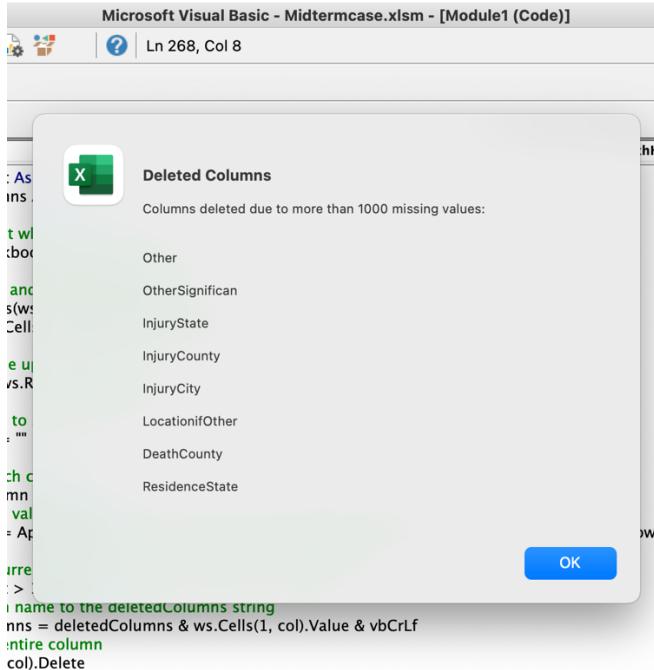
For All the Columns



For the missing values more than 1000



Here we see the Columns names which are deleted for missing more than 1000 values.



Here is the outlook of the all the columns presented in the dataset.

ID	Date	Sex	Race	ResidenceCity	ResidenceCity	DeathCity	Location	Description/Agent	Hypn/Pince	COD	Heroin	Cocaine	Fentanyl	Ana. Opiate/other	Diazepam/Other	Hydrocodone	Benzodiazepine	Methadone	Norphine	No Hydromorph.	Opiate/Other	AnyQ3d	MannerOfDeathCityGeo	ResidenceCityGeo	AgentCityGeo	DeathCityGeo	coordinates	ResidenceCityGeo coordinates	AgentCityGeo coordinates	
2	14-0272	06/09/2014					SUBSTANCE	ACUTE/ENT.0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	ACCIDENT	CT	CT	CT	(41.570105, -72.793086)	(41.570105, -72.793086)	(41.570105, -72.793086)
3	13-0102	09/21/2013	MALE	BLACK	NORMAN	NORMAN	HOSPITAL	COCAINEMENTO	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	ACCIDENT	NORMAN, CT	CT	CT	(41.11005, -73.412006)	(41.11005, -73.412006)	(41.11005, -73.412006)
4	16-0165	09/13/2016	FEMALE	WHITE	SANDY HOOK	FAIRFIELD	DANBURY	SUBSTANCE/ABUSE	UNKNOWN	ACUTE/HERC.1	1	0	0	0	0	0	0	0	0	0	0	0	1	ACCIDENT	DANBURY, CT	SANDY HOOK, CT	(41.300004, -73.412006)	(41.300004, -73.202001)	(41.300004, -73.202001)	
5	16-0206	09/31/2016	MALE	WHITE	REE	WESTCHESTER	GREENWICH	SUBSTANCE/ABUSE	RESIDENCE	ACUTE/ENT.1	0	1	0	0	0	0	0	0	0	0	0	1	ACCIDENT	GREENWICH, CT	CT	CT	(41.280226, -73.625046)	(41.280226, -73.625046)	(41.280226, -73.625046)	
6	13-0002	02/13/2013	MALE	ASIAN, OTHER, PLEASURE	QUEENS	GREENWICH	HOSPITAL	TRANSDERMAL/ABSORPTION	OTHER	FENTANYL/B-0	0	1	0	0	0	0	0	0	0	0	0	0	0	ACCIDENT	GREENWICH, CT	CT	CT	(41.570105, -72.793086)	(41.570105, -72.793086)	(41.570105, -72.793086)
7	14-0277	06/29/2014	MALE	WHITE	BRENTOL	BRENTOL	RESIDENCE	INHALATION	RESIDENCE	HERON, NTC.1	0	0	0	0	0	0	0	0	0	0	0	0	0	ACCIDENT	BRENTOL, CT	BRENTOL, CT	CT	(41.670017, -72.945791)	(41.670017, -72.945791)	(41.570105, -72.793086)
8	12-0205	12/08/2012	FEMALE	WHITE	WEST HARTFORD	HARTFORD	WEST HARTFORD	RESIDENCE	USED HERON	RESIDENCE	HERON, T0K.1	0	0	0	0	0	0	0	0	0	0	0	0	ACCIDENT	WEST HARTFORD, CT	CT	CT	(41.762008, -72.741007)	(41.762008, -72.741007)	(41.570105, -72.793086)
9	13-0404	19/11/2013	FEMALE	WHITE	HARDEEN	NEW HAVEN	NEW HAVEN	HOSPITAL	COPULICATOR.0	1	0	0	0	0	0	0	0	0	0	0	0	0	ACCIDENT	NEW HAVEN, CT	CT	CT	(41.360226, -72.954191)	(41.360226, -72.954191)	(41.570105, -72.793086)	
10	12-0107	04/25/2012	MALE	WHITE	EAST HARTFORD	HARTFORD	EAST HARTFORD	RESIDENCE	USED HERON	RESIDENCE	HERON, T0K.1	0	0	0	0	0	0	0	0	0	0	0	0	ACCIDENT	EAST HARTFORD, CT	CT	CT	(41.760019, -72.642000)	(41.760019, -72.642000)	(41.570105, -72.793086)
11	13-0162	05/15/2013	MALE	WHITE	MONTVILLE	NEW LONDON	MONTVILLE	RESIDENCE	INGESTION	RESIDENCE	OXOCODONE.0	0	0	0	1	0	0	0	0	0	0	0	0	ACCIDENT	MONTVILLE, CT	CT	CT	(41.450003, -72.180000)	(41.450003, -72.180000)	(41.570105, -72.793086)
12	12-0218	08/23/2012	FEMALE	HEBREW, W.	STAMFORD	OTHER	STAMFORD	INJECTION/INHALATION	HOTEL/DRM/MULTIPLE/OT.1	1	0	0	0	0	0	0	0	0	0	0	0	0	ACCIDENT	STAMFORD, CT	CT	CT	(41.200008, -73.111020)	(41.200008, -73.111020)	(41.570105, -72.793086)	
13	15-0324	06/07/2015	FEMALE	WHITE		NEW HAVEN	NEW HAVEN	HOSPITAL	UNKNOWN	ACUTE/ENT.0.1	0	0	0	0	0	0	0	0	1	0	0	0	ACCIDENT	NEW HAVEN, CT	CT	CT	(41.300252, -72.934191)	(41.300252, -72.934191)	(41.570105, -72.793086)	
14	15-0728							UNKNOWN	RUFERRED/AD.0	1	0	0	0	0	0	0	0	0	0	0	0	0	ACCIDENT	CT	CT	CT	(41.570105, -72.793086)	(41.570105, -72.793086)	(41.570105, -72.793086)	
15	10-0202	05/14/2015	MALE	WHITE	DANBURY	FAIRFIELD	DANBURY	RESIDENCE	RESIDENCE	HERON, NTC.1	0	0	0	0	0	0	0	0	0	0	0	1	ACCIDENT	DANBURY, CT	CT	CT	(41.300004, -73.412006)	(41.300004, -73.412006)	(41.570105, -72.793086)	
16	16-0023	01/13/2016	MALE	BLACK	NEW HAVEN	NEW HAVEN	NEW HAVEN	RESIDENCE	SUBSTANCE/ABUSE	RESIDENCE	ACUTE/HERC.1	0	0	0	0	0	0	0	1	0	1	0	0	ACCIDENT	NEW HAVEN, CT	NEW HAVEN, CT	NEW HAVEN, CT	(41.300252, -72.934191)	(41.300252, -72.934191)	(41.570105, -72.793086)
17	13-0279	06/19/2013	MALE	WHITE	HARTFORD	HARTFORD	HARTFORD	RESIDENCE	INGESTION	RESIDENCE	METHODOINE.0	0	0	0	0	0	0	0	0	1	0	0	0	ACCIDENT	HARTFORD, CT	CT	CT	(41.765775, -72.673000)	(41.765775, -72.673000)	(41.570105, -72.793086)
18	14-0042	01/29/2014	FEMALE	WHITE	CANTERBURY	HARTFORD	HOSPITAL	SUBSTANCE/ABUSE	UNKNOWN	ACUTE/ENT.0.1	0	0	0	0	0	0	0	0	1	0	0	0	0	ACCIDENT	CANTERBURY, CT	CT	CT	(41.765775, -72.673000)	(41.765775, -72.673000)	(41.570105, -72.793086)
19	22/01	02/03/2012	MALE	WHITE	WILLINGFORD	NEW HAVEN	WILLINGFORD	RESIDENCE	INGESTION	RESIDENCE	ETHAMOL/0.0	0	0	0	0	1	1	0	0	0	0	0	0	ACCIDENT	WILLINGFORD, CT	CT	CT	(41.454008, -72.818014)	(41.454008, -72.818014)	(41.570105, -72.793086)
20	16-0005	01/26/2016	MALE	WHITE	MEDOLETTAN	MEDOLETTAN	MEDOLETTAN	RESIDENCE	SUBSTANCE/ABUSE/INCLUDING RESIDENCE	ACUTE/HERC.1	0	0	0	0	0	0	1	0	0	0	0	0	1	ACCIDENT	MEDOLETTAN, CT	WN, CT	WN, CT	(41.540004, -72.651173)	(41.540004, -72.651173)	(41.540004, -72.651173)

Fourth Method is Filling the missing values in the columns:

In the fourth step we are going to fill the blank or empty cells of the Sex column with using of the count value of male and female the column and other remaining columns with “Unknown”.

Here I have only to chosen Sex column only to modify because the sex column does not depend on another column and doesn't affect the dataset.

The reason for the filling the blank cells with “Unknown” because the other columns independent to each other example for the death of the city and death city geo, where both places are same. If we modify any of these two columns will affect on other. so, I only want to fill the blank cells with unknown than using imputation method.

Sex column, I have used the VBA by using the Count value of the Male and Female values of the entire column. if the male count is more than female it will fill male in the blank space.

Code for the filling the Sex column.

(General)	▼	ImputeMissingValuesInColumn
End Sub		
<pre>Sub ImputeMissingValuesInColumn() 'DataManipulationSEXcolumn Dim ws As Worksheet Dim lastRow As Long Dim dataRange As Range Dim cell As Range Dim maleCount As Long Dim femaleCount As Long Set ws = ThisWorkbook.Sheets("Datamanipulation4") lastRow = ws.Cells(ws.Rows.Count, "C").End(xlUp).row Set dataRange = ws.Range("C2:C" & lastRow) For Each cell In dataRange If cell.Value = "MALE" Then maleCount = maleCount + 1 ElseIf cell.Value = "FEMALE" Then femaleCount = femaleCount + 1 End If Next cell Dim imputedValue As String If maleCount > femaleCount Then imputedValue = "MALE" Else imputedValue = "FEMALE" End If For Each cell In dataRange If cell.Value = "" Then cell.Value = imputedValue End If Next cell End Sub</pre>		

In the next page we can see the output of the Sex column after running the code and got changes in the sex column.

	A	B	C	D	E
1	ID	Date	Sex	Race	
2	14-0273	06/28/2014			
3	13-0102	03/21/2013	MALE	BLACK	
4	16-0165	03/13/2016	FEMALE	WHITE	
5	16-0208	03/31/2016	MALE	WHITE	
6	13-0052	02/13/2013	MALE	ASIAN, OTHER	
7	14-0277	06/29/2014	MALE	WHITE	
8	12-0205	12/08/2012	FEMALE	WHITE	
9	13-0404	10/11/2013	FEMALE	WHITE	
10	12-0107	04/25/2012	MALE	WHITE	
11	13-0161	05/15/2013	MALE	WHITE	
12	12-0218	08/23/2012	FEMALE	HISPANIC, WH	
13	15-0334	05/07/2015	FEMALE	WHITE	
14	15-0728				
15	15-0232	05/14/2015	MALE	WHITE	

	A	B	C	D	E
	Date	Sex	Race	ResidenceCity	
0273	06/28/2014	MALE			
0102	03/21/2013	MALE	BLACK	NORWALK	
0165	03/13/2016	FEMALE	WHITE	SANDY HOOK	
0208	03/31/2016	MALE	WHITE	RYE	
0052	02/13/2013	MALE	ASIAN, OTHER	FLUSHING	
0277	06/29/2014	MALE	WHITE	BRISTOL	
0205	12/08/2012	FEMALE	WHITE	WESTHARTFORD	
0404	10/11/2013	FEMALE	WHITE	HAMDEN	
0107	04/25/2012	MALE	WHITE	EASTHARTFORD	
0161	05/15/2013	MALE	WHITE	MONTVILLE	
0218	08/23/2012	FEMALE	HISPANIC, W		
0334	05/07/2015	FEMALE	WHITE		
0728		MALE			
0232	05/14/2015	MALE	WHITE	DANBURY	
0028	01/13/2016	MALE	BLACK	NEW HAVEN	
0279	08/19/2013	MALE	WHITE	HARTFORD	
0042	01/29/2014	FEMALE	WHITE	CANTERBURY	
151	02/03/2012	MALE	WHITE	WALLINGFORD	
		MALE	WHITE	MONTGOMERY	

Left over blank cells are filled with “Unknown” in the remaining columns cells by using the VBA.

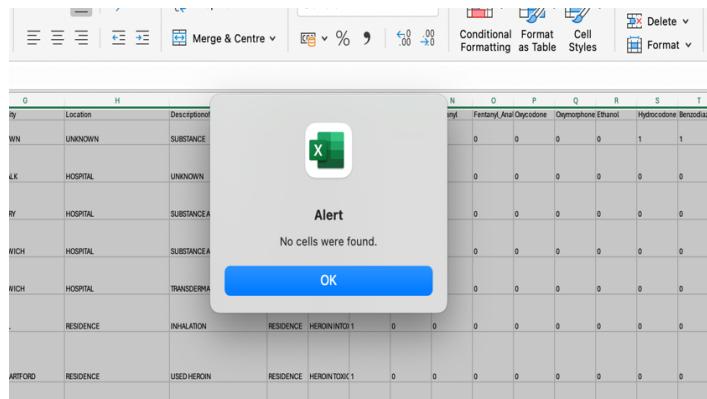
Code for the filling the empty cells for all the columns.

```
(General) | FillEmptyCellsInAllColumns
imputedValue = "MALE"
Else
    imputedValue = "FEMALE"
End If
For Each cell In dataRange
    If cell.Value = "" Then
        cell.Value = imputedValue
    End If
Next cell
End Sub
Sub FillEmptyCellsInAllColumns()
    Dim ws As Worksheet
    Dim lastRow As Long
    Dim lastColumn As Long
    Dim dataRange As Range
    Dim cell As Range
    Dim rowCounter As Long
    Dim colCounter As Long
    Set ws = ThisWorkbook.Sheets("Datamanipulation4 (2)")
    lastRow = ws.Cells(ws.Rows.Count, 1).End(xlUp).row
    lastColumn = ws.Cells(1, ws.Columns.Count).End(xlToLeft).column
    Set dataRange = ws.Range("A1").Resize(lastRow, lastColumn)
    For rowCounter = 1 To lastRow
        For colCounter = 1 To lastColumn
            Set cell = ws.Cells(rowCounter, colCounter)
            If IsEmpty(cell.Value) Then
                cell.Value = "UNKNOWN"
            End If
        Next colCounter
    Next rowCounter
End Sub
```

Output: We can see the empty cells got filled after running the code.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
ID	Date	Sex	Race	ResidenceCity	ResidenceCounty	DeathCity	Location	DescriptionofInjury	InjuryPlace	COD	Heron	Cocaine	Fentanyl	Fentanyl_Aral	Oxycodone	Oxymorphone	Ethanol	Hydrocodone	Benzodiazepin	Methadone	Amphet	Tramad	Morphine_Nor	Hydromorphi	Opiate/NOS	Al
2 14-0273	06/29/2014	MALE	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	SUBSTANCE	UNKNOWN	ACUTE FENT1/0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	
3 13-0102	03/21/2013	MALE	BLACK	NORWALK	UNKNOWN	NORWALK	HOSPITAL	UNKNOWN	UNKNOWN	COCAINE INTO1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4 16-0165	03/13/2016	FEMALE	WHITE	SANDY HOOK	FAIRFIELD	DANBURY	HOSPITAL	SUBSTANCE/ABUSE	UNKNOWN	ACUTE HERO1/1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
5 16-0208	03/21/2016	MALE	WHITE	RYE	WESTCHESTER	GREENWICH	HOSPITAL	SUBSTANCE/ABUSE	RESIDENCE	ACUTE/FENTAL/1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	
6 13-0052	02/13/2013	MALE	ASIAN, OTHER FLUSHING	QUEENS	GREENWICH	HOSPITAL	TRANSDERMAL ABSORPTION	OTHER	FENTANYL/INTO1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7 14-0277	06/29/2014	MALE	WHITE	BRIXTON	UNKNOWN	BRIXTON	RESIDENCE	INHALATION	RESIDENCE	HEROIN/INTO1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8 12-0205	12/08/2012	FEMALE	WHITE	WESTHARTFORD	HARTFORD	WESTHARTFORD	RESIDENCE	USED/HERON	RESIDENCE	HEROIN/TOXIC1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
9 13-0404	10/11/2013	FEMALE	WHITE	HAMDEN	NEW HAVEN	NEW HAVEN	HOSPITAL	UNKNOWN	UNKNOWN	COMPLICATIO1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10 12-0107	04/25/2012	MALE	WHITE	EASTHARTFORD	HARTFORD	EASTHARTFORD	RESIDENCE	USED/HERON	RESIDENCE	HEROIN/TOXIC1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11 13-0161	05/15/2013	MALE	WHITE	MONTVILLE	NEW LONDON	MONTVILLE	RESIDENCE	INGESTION	RESIDENCE	OXYCODONE/0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
12 12-0218	08/23/2012	FEMALE	HISPANIC,WI	UNKNOWN	UNKNOWN	STRATFORD	OTHER	INJECTION/INHALATION	HOTEL/ORMO MULTIPLE/0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
13 15-0334	05/07/2015	FEMALE	WHITE	UNKNOWN	UNKNOWN	NEW HAVEN	HOSPITAL	UNKNOWN	UNKNOWN	ACUTE/INTOX1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	
14 15-0278	UNKNOWN	MALE	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	RUPTURED/AN1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
15 15-0232	05/14/2015	MALE	WHITE	DAIRY	FAIRFIELD	DANBURY	RESIDENCE	UNKNOWN	RESIDENCE	HEROIN/INTO1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
16 19-0028	01/13/2016	MALE	BLACK	NEW HAVEN	NEW HAVEN	RESIDENCE	SUBSTANCE/ABUSE	RESIDENCE	ACUTE HERO1/1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	
17 13-0279	08/19/2013	MALE	WHITE	HARTFORD	HARTFORD	HARTFORD	RESIDENCE	INGESTION	RESIDENCE	METHADONE/0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
18 14-0042	01/29/2014	FEMALE	WHITE	CANTERBURY	UNKNOWN	HARTFORD	HOSPITAL	SUBSTANCE/ABUSE	UNKNOWN	ACUTE/INTOX1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
19 22251	02/03/2012	MALE	WHITE	WALLINGFORD	NEW HAVEN	WALLINGFORD	RESIDENCE	INGESTION	RESIDENCE	ETHANOL/AN1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	

After filling the all the blank cells there no blank cells leftover in the dataset.



I have done the trim again for removing the white spaces from the cells.

A1#	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
1	ID	Date	Sex	Race	ResidenceCity	ResidenceCounty	DeathCity	Location	Description	InjuryPlace	COD	Heron	Cocaine	Fentanyl	Fentanyl_Aral	Oxycodone	Oxymorphone	Ethanol	Hydrocodone	Benzodiazepin	Methadone	Amphet	Tramad	Morphine_Nor	Hydromorphi	Opiate/NOS	Al

Fifth Method is Binning:

Here I have considered the two columns for binning “Date” and “COD”
I have used the VBA for the binning both columns at time.

Code:

```
(General) | PerformBinningForDateAndCOD
Sub PerformBinningForDateAndCOD()
    Dim ws As Worksheet
    Dim lastRow As Long
    Dim i As Long

    Set ws = ThisWorkbook.Sheets("Binning")
    lastRow = ws.Cells(ws.Rows.Count, 1).End(xlUp).row
    ws.Cells(1, ws.Cells(1, ws.Columns.Count).End(xlToLeft).column + 1).Value = "DateBinning"
    ws.Cells(1, ws.Cells(1, ws.Columns.Count).End(xlToLeft).column + 1).Value = "CODBinning"
    For i = 2 To lastRow
        If IsDate(ws.Cells(i, "B").Value) Then
            ws.Cells(i, ws.Cells(1, ws.Columns.Count).End(xlToLeft).column).Value = Year(ws.Cells(i, "B").Value)
        Else
            ws.Cells(i, ws.Cells(1, ws.Columns.Count).End(xlToLeft).column).Value = "Unknown"
        End If
        Dim codValue As String
        codValue = Left(ws.Cells(i, "K").Value, 4)
        If codValue <> "" Then
            ws.Cells(i, ws.Cells(1, ws.Columns.Count).End(xlToLeft).column + 1).Value = codValue
        Else
            ws.Cells(i, ws.Cells(1, ws.Columns.Count).End(xlToLeft).column + 1).Value = "Unknown"
        End If
    Next i
End Sub
```

The Binning of the Date column will be based on the year and Age column will be binning based on the range of age from different ranges .

Binning for Date

1. 2012
2. 2013
3. 2014
4. 2015
5. 2016
6. 2017
7. 2018

Binning for age

- range 1 will be 0 to 18
range 2 will be 19 to 35
range 3 will be 36 to 50
range 4 will be 51 to 65
range 5 will be more than 65.

The output will be seen in the last two columns of the dataset.
with header of “Date Binning” and “Age Binning”.

AE	AF	AG	AH	AI
ResidenceCit	InjuryCityGeo	DateBinning	AgeBinning	
(41.575155, -7)	(41.575155, 2014)		19-35	
(41.11805, -7)	(41.575155, 2013)		36-50	
(41.419998, 0)	0	2016	19-35	
0	0	2016	19-35	
0	(41.575155, 2013)		19-35	
(41.673037, -7)	(41.575155, 2014)		19-35	
(41.762008, -7)	(41.575155, 2012)		19-35	
(41.382918, -7)	(41.575155, 2013)		36-50	
(41.769319, -7)	(41.575155, 2012)		36-50	
(41.45303, -7)	(41.575155, 2013)		36-50	
(41.575155, -7)	(41.575155, 2012)		19-35	
(41.575155, -7)	(41.575155, 2015)		36-50	

Next task we are going to do Data Analysis.

4. Data Analysis (in MS Excel)

As Data scientist, our subsequent venture is to behaviour data analysis following the facts cleaning and manipulation levels. This entails appearing descriptive analysis to recognize the traits of the dataset, creating pivoted tables to summarize and gift key insights, utilizing VLOOKUP tables to integrate extra relevant facts, and conducting different analyses to offer correct and significant statistics to the united states government. By employing those analytical strategies, we goal to give the right records in a clean and informative way, allowing knowledgeable decision-making and centred interventions to address critical issues along with the fentanyl crisis.

First Data Analysis:

Here we are going to do Descriptive analysis on the Age column and Drug test column.

Age Column:

Here we have done analysis by using the data analysis from the excel by putting the all the age column values to find mean, mode and median values.

AGE	
Mean	42.01018777
Standard Error	0.17438452
Median	42
Mode	29
Standard Deviation	12.33824395
Sample Variance	152.2322638
Kurtosis	-0.86122747
Skewness	0.100314903
Range	73
Minimum	14
Maximum	87
Sum	210303
Count	5006
Confidence Level(95.0%)	0.341870053

Based on the provided statistics for age, here's a summary of the descriptive analysis:

- Mean: The average age in the dataset is approximately 42 years.
- Standard Error: The standard error of the mean age is approximately 0.17, indicating the precision of the mean estimate.
- Median: The median age is 42, which represents the middle value of the dataset.
- Mode: The mode age is 29, which is the most frequently occurring age in the dataset.
- Standard Deviation: The standard deviation of age is approximately 12.34, indicating the spread of ages around the mean.
- Kurtosis: The kurtosis value is approximately -0.86, indicating a relatively flat distribution compared to a normal distribution.
- Skewness: The skewness value is approximately 0.10, suggesting a slightly right-skewed distribution.
- Range: The age range is 73 years, calculated as the difference between the maximum and minimum ages.
- Minimum and Maximum: The minimum age observed is 14, and the maximum age observed is 87.
- Sum: The sum of all ages in the dataset is 210,303.
- Count: There are 5,006 observations of age in the dataset.
- Confidence Level (95.0%): The confidence level for the mean age is approximately 0.34, indicating the precision of the mean estimate within a 95% confidence interval.

we see that average age is 42 got affected more by drugs. Age 29 People are the most effected by drugs and caused to death because the mode is 29 most occurring age. By using these data we can concentrate on these age grouped to give more consuming and rising the awareness in the public to stop consuming the drugs to this particular age people.

Drug test column:

Using this test we can observe more in detail of the drug test of death persons. From this of Descriptive analysis we have observe that range is between 0 and 1 . mode value is zero and same for all the drugs tests. Mean values are different for each drug from 0.11 to 0.49. I can say each person got positive for more than one drug test.

AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BI	BK	BL	BM	BN	BO	BP	BQ	BR
Heroin	Cocaine	Fentanyl	Fentanyl/Analogue	Oxycodone	Oxymorphone	Ethanol	Hydrocodone	Benzodiazepine	Methadone	Amphet	Tramad	Morphine Not Heroin	Hydromorphone	Opiate/NOS	Any Opioid																
Mean	0.4946065	Mean	0.2976428	Mean	0.437475	Mean	0.0765082	Mean	0.1198662	Mean	0.0211746	Mean	0.2449961	Mean	0.023372	Mean	0.2630843	Mean	0.0928885	Mean	0.0315621	Mean	0.02497	Mean	0.0075909	Mean	0.004994	Mean	0.0173791	Mean	0.4804235
Standard Err	0.0070671	Standard Err	0.0064629	Standard Err	0.0070121	Standard Err	0.0037572	Standard Err	0.004591	Standard Err	0.002035	Standard Err	0.0060785	Standard Err	0.0021356	Standard Err	0.0062238	Standard Err	0.0041031	Standard Err	0.0024713	Standard Err	0.0022055	Standard Err	0.0012268	Standard Err	0.0009964	Standard Err	0.0018472	Standard Err	0.0070621
Median	0	Median	0	Median	0	Median	0	Median	0	Median	0	Median	0	Median	0	Median	0	Median	0	Median	0	Median	0	Median	0	Median	0	Median	0	Median	0
Mode	0	Mode	0	Mode	0	Mode	0	Mode	0	Mode	0	Mode	0	Mode	0	Mode	0	Mode	0	Mode	0	Mode	0	Mode	0	Mode	0	Mode	0	Mode	0
Standard Dev	0.5000209	Standard Dev	0.4572673	Standard Dev	0.4961248	Standard Dev	0.265836	Standard Dev	0.3248257	Standard Dev	0.1439804	Standard Dev	0.430745	Standard Dev	0.1510969	Standard Dev	0.4403518	Standard Dev	0.2903052	Standard Dev	0.1748487	Standard Dev	0.1560493	Standard Dev	0.0866031	Standard Dev	0.0704987	Standard Dev	0.1306925	Standard Dev	0.4996665
Sample Varia	0.2500209	Sample Varia	0.20396933	Sample Varia	0.2461398	Sample Varia	0.0706688	Sample Varia	0.1055117	Sample Varia	0.0267304	Sample Varia	0.1849641	Sample Varia	0.0228303	Sample Varia	0.1939097	Sample Varia	0.0842771	Sample Varia	0.0305721	Sample Varia	0.0243514	Sample Varia	0.0075348	Sample Varia	0.0049701	Sample Varia	0.0170805	Sample Varia	0.2496666
Kurtosis	-2.000336	Kurtosis	-1.2165078	Kurtosis	-1.9371924	Kurtosis	8.1626917	Kurtosis	3.4841886	Kurtosis	42.291475	Kurtosis	-0.5918566	Kurtosis	37.849248	Kurtosis	-0.8415717	Kurtosis	5.870564	Kurtosis	26.744038	Kurtosis	35.109866	Kurtosis	126.87237	Kurtosis	195.44137	Kurtosis	52.611649	Kurtosis	-1.9946521
Skewness	0.0215818	Skewness	0.8854255	Skewness	0.2521541	Skewness	3.1873862	Skewness	3.2415373	Skewness	6.6539146	Skewness	1.1867519	Skewness	6.3114282	Skewness	1.0764593	Skewness	2.8058349	Skewness	5.3603501	Skewness	6.0906353	Skewness	11.349954	Skewness	14.048604	Skewness	7.3885472	Skewness	0.0738396
Range	1	Range	1	Range	1	Range	1	Range	1	Range	1	Range	1	Range	1	Range	1	Range	1	Range	1	Range	1	Range	1	Range	1	Range	1	Range	1
Minimum	0	Minimum	0	Minimum	0	Minimum	0	Minimum	0	Minimum	0	Minimum	0	Minimum	0	Minimum	0	Minimum	0	Minimum	0	Minimum	0	Minimum	0	Minimum	0	Minimum	0	Minimum	0
Maximum	1	Maximum	1	Maximum	1	Maximum	1	Maximum	1	Maximum	1	Maximum	1	Maximum	1	Maximum	1	Maximum	1	Maximum	1	Maximum	1	Maximum	1	Maximum	1	Maximum	1	Maximum	1
Sum	2476	Sum	1490	Sum	2190	Sum	383	Sum	600	Sum	106	Sum	1226	Sum	117	Sum	1317	Sum	465	Sum	158	Sum	125	Sum	38	Sum	25	Sum	87	Sum	2405
Count	5006	Count	5006	Count	5006	Count	5006	Count	5006	Count	5006	Count	5006	Count	5006	Count	5006	Count	5006	Count	5006	Count	5006	Count	5006	Count	5006	Count	5006	Count	5006
Confidence	0.0138547	Confidence	0.013267	Confidence	0.0137467	Confidence	0.0073658	Confidence	0.0090003	Confidence	0.0039894	Confidence	0.0119156	Confidence	0.0041866	Confidence	0.0120203	Confidence	0.0080438	Confidence	0.0048447	Confidence	0.0043238	Confidence	0.0024052	Confidence	0.0019534	Confidence	0.0036212	Confidence	0.0138448

Example of Summary of Heroin Substance:

Mean: The average proportion of cases involving Heroin is approximately 0.495, indicating that it is present in nearly half of the cases on average.

Standard Error: The standard error associated with the mean is approximately 0.00707, representing the precision of the mean estimate.

Median: The median value is 0, suggesting that half of the cases have a proportion of Heroin less than or equal to 0.

Mode: The mode is also 0, indicating that the most common proportion of cases does not involve Heroin.

Standard Deviation: The standard deviation is approximately 0.500, indicating the variability or dispersion of the data around the mean.

Sample Variance: The sample variance is approximately 0.250, representing the variability of proportions within the sample.

Kurtosis: The kurtosis value of -2.00 suggests that the distribution of proportions is platykurtic, meaning it has fewer extreme values than a normal distribution.

Skewness: The skewness value of 0.0216 indicates a slight right skew, implying that the distribution is slightly asymmetrical with a longer right tail.

Range: The range is 1, indicating that the proportions range from 0 to 1.

Minimum: The minimum proportion is 0, indicating that there are cases where Heroin is not involved.

Maximum: The maximum proportion is 1, indicating that there are cases where Heroin is the sole substance involved.

Sum: The total count of cases involving Heroin is 2476.

Count: The total number of observations is 5006.

Confidence Level (95.0%): The confidence level for the mean proportion of Heroin is approximately 0.0139, indicating the range within which the true population mean is likely to fall with 95% confidence.

Second Analysis Using Pivot Table:

By using the Pivot Table we say that total 1299 Female persons caused to death. Male persons are 3707 persons are dead due to drugs. we compare there are more Males persons than Females and also we see that year wise of the people. Data Range: The table spans from 2012 to 2018.

Yearly Count: For each year, the table displays the count of IDs for both genders.

Pivot Table 1.

Count of ID	Column Labels		
Row Labels	FEMALE	MALE	Grand Total
2012	91	258	349
2013	120	358	478
2014	148	403	551
2015	183	526	709
2016	212	684	896
2017	297	727	1024
2018	248	751	999
Grand Total	1299	3707	5006

Pivot Table 2

From this table we say that Substance of drugs got test between this age group people and we see clearly that Heroin, AnyOpioid and Fentanyl are the top three drug got tested positive more than compare with others .

we take this data as and can be used more useful for the future purpose.

Values	0-18	19-35	36-50	51-65	Over 65	Grand Total
Sum of Fentanyl	11	747	804	587	41	2190
Sum of Fentanyl,Analogue	1	124	152	103	3	383
Sum of Oxycodone	3	215	217	152	13	600
Sum of Oxymorphine	1	32	37	32	4	106
Sum of Ethanol	7	421	425	353	20	1226
Sum of Hydrocodone	2	52	36	25	2	117
Sum of Benzodiazepine	6	461	474	348	28	1317
Sum of Methadone	2	154	173	127	9	465
Sum of Amphet	1	44	59	52	2	158
Sum of Tramad	1	46	44	30	4	125
Sum of Morphine,NotHeroin	0	10	15	12	1	38
Sum of Hydromorphone	0	9	9	6	1	25
Sum of OpiateNOS	2	25	36	22	2	87
Sum of AnyOpioid	11	800	902	642	50	2405
Sum of Heroin	12	841	919	662	42	2476
Sum of Cocaine	7	510	543	401	29	1490

Pivot Table 3.

In the third pivot table we can use this facts to analyse the distribution of incidents across unique forms of places. We would possibly check out whether or not there are any patterns or traits in the dataset associated with the region of incidents and other variables consisting of way of demise, materials concerned, or demographic facts like age, sex, and race. Analysing the distribution of incidents through vicinity should provide insights into where certain sorts of incidents are more likely to arise, which can inform public fitness interventions, coverage selections, or useful resource allocation techniques. Additionally, expertise in which incidents are occurring can assist perceive capacity chance elements associated with particular locations and inform efforts to prevent similar incidents within the future.

CountofID	Column Labels	CONVALESCENTHOME	HOSPICE	HOSPITAL	NURSINGHOME	OTHER	RESIDENCE	UNKNOWN	Grand Total
2012				110		41	196	2	349
2013				150		77	251		478
2014				174		93	280	4	551
2015				208	1	101	397	2	709
2016		1		280		136	474	5	896
2017		1		334		165	520	4	1024
2018		1	1	331		150	511	5	999
Grand Total		3	1	1587	1	763	2629	22	5006

Third Method is VLOOKUP Table:

Studying the fentanyl crisis uses the VLOOKUP table to integrate a wealth of information, such as clinical data, demographics, prescription rates, heroin and opioid overdose deaths. This planned program facilitates access to information and allows for easy cross-referencing of interaction patterns between specific chemicals. Providing It helps to develop a better understanding of the landscape by helping to identify patterns and materials that occurs in chemical interactions. The structured layout facilitates the creation of educational diagrams such as histogram, which show how drugs interact with each other and affect situations and, by summarizing key issues and relationships between drugs and population movement so on confirmed fentanyl-related death networks -Aids risk assessment by classifying data , identifying high-risk groups, and identifying areas requiring specific actions. Capturing all items VLOOKUP table is a tool a the importance of organizing, interpreting and displaying the information necessary to address the complex problems posed by the fentanyl crisis.

Here I have created the VLOOKUP table for 4 Columns(Age,Sex, DescriptionofInjury,Cause of Death) using the ID column as reference for calling the all the columns.

P26	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	ID	Age	Sex	Descriptionof COD										
2	14-0273	29	MALE	SUBSTANCE ACUTE FENT, HYDROCOD, BENZODIAZEPINE										
3	13-0102	48	MALE	UNKNOWN COCAINE INTOXICATION										
4	16-0165	30	FEMALE	SUBSTANCE ACUTE HEROIN AND COCAINE INTOXICATION										
5	16-0208	23	MALE	SUBSTANCE ACUTE FENTANYL AND MORPHINE INTOXICATION										
6	13-0052	22	MALE	TRANSDERM FENTANYL INTOXICATION										
7	14-0277	23	MALE	INHALATION HEROIN INTOXICATION										
8	12-0205	21	FEMALE	USED HEROI HEROIN TOXICITY										
9	13-0404	40	FEMALE	UNKNOWN COMPLICATIONS OF COCAINE INTOXICATION										
10	12-0107	40	MALE	USED HEROI HEROIN TOXICITY										
11	13-0161	50	MALE	INGESTION OXYCODONE INTOXICATION										
12	12-0218	26	FEMALE	INJECTION// MULTIPLE DRUG TOXICITY										
13	15-0334	49	FEMALE	UNKNOWN ACUTE INTOXICATION FROM THE COMBINED EFFECTS OF HEROIN AND METHADONE										
14	15-0728	50	MALE	UNKNOWN HEROIN INTOXICATION										
15	15-0232	29	MALE	SUBSTANCE ACUTE HEROIN INTOXICATION IN A PERSON TAKING CLONAZEPAM, AMPHETAMINE, CITALOPRAM, AND ARIPIPRAZOLE										
16	16-0028	45	FEMALE	INGESTION METHADONE INTOXICATION										
17	13-0279	29	MALE	SUBSTANCE ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF HEROIN, CITALOPRAM AND CLONAZEPAM										
18	14-0042	42	MALE	INGESTION ETHANOL AND OXYMORPHONE TOXICITY										
19	16-0065	54	MALE	SUBSTANCE ACUTE HEROIN INTOXICATION WHILE USING ALCOHOL, TRAZODONE, BUPROPION AND ABILIFY										
20	16-0889	32	MALE	UNKNOWN ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF FENTANYL, HEROIN, CLONAZEPAM AND NORDIAZEPAM										
21	14-0474	47	FEMALE	SUBSTANCE ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF HEROIN AND ALCOHOL										
22	15-0263	39	MALE	UNKNOWN INTOXICATION DUE TO THE COMBINED EFFECTS OF METHADONE AND DIPHENHYDRAMINE										
23	14-0188	27	MALE	INGESTION INTOXICATION DUE TO THE COMBINED EFFECTS OF OXYCODONE, OXYMORPHONE, CLONAZEPAM, AND ALPRAZOLAM										
24	16-0688	34	FEMALE	SUBSTANCE ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF FENTANYL AND HEROIN										
25	16-0495	27	MALE	SUBSTANCE ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF ACETYL FENTANYL, FENTANYL, AND HEROIN										
26	17-0817	25	MALE	SUBSTANCE ACUTE COMBINED HEROIN, FENTANYL, ACETYL FENTANYL AND COCAINE TOXICITIES										
27	18-0095	51	MALE	DRUG USE ACUTE INTOXICATION COMBINED EFFECTS OF ETHANOL, ALPRAZOLAM, TOPIRAMATE, FLUOXETINE, AND FENTANYL										
28	15-0182	23	MALE	UNKNOWN HEROIN AND ETHANOL INTOXICATION										
29	15-0098	35	MALE	UNKNOWN ACUTE FENTANYL TOXICITY										
30	18-0285	25	MALE	SUBSTANCE COMPLICATIONS OF ANOXIC-ISCHEMIC ENCEPHALOPATHY ACUTE OPIOID INTOXICATION										
31	16-0316	43	MALE	SUBSTANCE ACUTE HEROIN, FENTANYL AND COCAINE TOXICITIES ASSOCIATED WITH ALPRAZOLAM AND ALCOHOL USE										
32	13-0441	48	FEMALE	SUBSTANCE ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF HEROIN, ALPRAZOLAM AND ETHANOL										
33	18-0468	40	FEMALE	SUBSTANCE ACUTE COMBINED FENTANYL, HEROIN AND ALCOHOL TOXICITY										
34	18-0355	49	MALE	DRUG ABUSE MULTIDRUG TOXICITY INCLUDING ETHANOL, COCAINE, AND SERTRALINE										
35	17-0907	40	MALE	SUBSTANCE ACUTE INTOXICATION FROM THE COMBINED EFFECTS OF COCAINE, FENTANYL, HEROIN, AND ALCOHOL										
36	15-0475	51	MALE	UNKNOWN ACUTE INTOXICATION ETHANOL, HYDROCODONE, AND BENZODIAZEPINES										

And the last Records of VLOOKUP Dataset.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1973	17-0877	57	MALE	SUBSTANCE	ACUTE HEROIN INTOXICATION											
1974	17-0500	20	MALE	INGESTED PF	ACUTE OXYCODONE AND ALPRAZOLAM INTOXICATION											
1975	18-0366	30	FEMALE	UNKNOWN	ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF HEROIN AND FENTANYL											
1976	13-0226	61	MALE	DRUG ABUSE MULTIDRUG TOXICITY INCLUDING FENTANYL, ACETYL FENTANYL, AND ALPRAZOLAM												
1977	18-0890	35	MALE	SUBSTANCE	ACUTE HEROIN AND ALPRAZOLAM INTOXICATION											
1978	15-0065	50	FEMALE	INJECTION	INTOXICATION DUE TO THE COMBINED EFFECTS OF CLONAZEPAM, METHADONE, CITALOPRAM, METHYLPHENIDATE, AND OLANZAPINE											
1979	16-0914	46	MALE	INGESTION	HYDROMORPHONE AND ALPRAZOLAM INTOXICATION											
1980	16-0334	31	MALE	SUBSTANCE	ACUTE FENTANYL INTOXICATION											
1981	13-0128	50	FEMALE	SUBSTANCE	ACUTE COMBINED FENTANYL, HEROIN AND ALCOHOL TOXICITIES											
1982	17-0668	49	MALE	UNKNOWN	ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF MORPHINE, OXYMORPHONE, AND ETHANOL											
1983	13-0086	64	MALE	SUBSTANCE	ETHANOL AND FENTANYL											
1984	18-0080	33	MALE	SUBSTANCE	ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF FENTANYL, COCAINE, METHADONE AND ALPRAZOLAM											
1985	14-0220	63	FEMALE	SUBSTANCE	COMPPLICATIONS OF ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF ETHANOL AND HEROIN											
1986	12-0352	39	MALE	SUBSTANCE	ACUTE FENTANYL INTOXICATION											
1987	17-0242	49	MALE	MULTIPLE DR	COMBINED DRUG TOXICITY, COCAINE AND HEROIN											
1988	18-0853	49	MALE	SUBSTANCE	MULTIDRUG TOXICITY INCLUDING ETHANOL, FENTANYL, CHLORPROMAZINE, BUPROPION, AND TRAMADOL											
1989	13-0341	58	FEMALE	INHALATION	DICHLOROMETHANE TOXICITY											
1990	12-0222	58	MALE	INHALATION/	HEROIN, COCAINE, AND QUETIAPINE INTOXICATION											
1991	15-0508	52	MALE	UNKNOWN	ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF FENTANYL, MORPHINE, AND ETHANOL											
1992	16-0847	30	MALE	SUBSTANCE	ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF HEROIN, COCAINE, ALPRAZOLAM, AND OXYCODONE											
1993	16-0902	34	MALE	SUBSTANCE	ACRYL FENTANYL, FENTANYL, AND HEROIN											
1994	17-0525	62	MALE	DRUG USE	INTOXICATION DUE TO THE COMBINED EFFECTS OF METHADONE AND HEROIN											
1995	14-0030	33	MALE	SUBSTANCE	ACUTE FENTANYL, ACETYL FENTANYL AND COCAINE TOXICITIES											
1996	18-0460	24	MALE	DRUG ABUSE	MULTIDRUG TOXICITY INCLUDING COCAINE, METHADONE, AND DIPHENHYDRAMINE											
1997	16-0043	37	MALE	SUBSTANCE	ACUTE FENTANYL, METHADONE AND TRAZODONE TOXICITIES											
1998	18-0206	23	FEMALE	SUBSTANCE	ACUTE INTOXICATION FROM THE COMBINED EFFECTS OF FENTANYL, HEROIN, AND HYDROMORPHONE											
1999	16-0520	65	MALE	ABUSE OF M	ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF OXYCODONE AND CLONAZEPAM											
0000	17-0947	22	MALE	SUBSTANCE	ACUTE FENTANYL INTOXICATION											
0001	14-0166	54	MALE	DRUG USE	ACUTE INTOXICATION COMBINED EFFECTS OF FENTANYL AND ACETYL FENTANYL											
0002	15-0013	44	FEMALE	UNKNOWN	ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF HEROIN, FENTANYL, ALPRAZOLAM AND ETHANOL											
0003	15-0466	33	MALE	UNKNOWN	ACUTE INTOXICATION DUE TO THE COMBINED EFFECTS OF METHADONE AND TRAZODONE											
0004	17-0618	58	MALE	SUBSTANCE	ACUTE HEROIN, HYDROMORPHONE AND PHARMACEUTICAL FENTANYL INTOXICATION WITH PNEUMONIA											
0005	18-0646	34	MALE	SUBSTANCE	ACUTE FENTANYL INTOXICATION											
0006	14-0124	40	MALE	SUBSTANCE	ACUTE INTOXICATION FROM THE COMBINED EFFECTS OF COCAINE, FENTANYL, ACETYL FENTANYL, AND 9-HYDROXYRISPERIDONE											
0007	16-0637	41	MALE	DRUG USE	INTOXICATION FROM THE COMBINED EFFECTS OF ETHANOL AND HEROIN											
0008																

Fourth Method is Correlation Analysis :

Drug Correlation matrix modelling provides more knowledge about the complex relationships among drugs, supporting public health, policy, and healthcare activities. By identifying potential drug interactions, health professionals can provide treatment plans have optimized and improved medication delivery for patients struggling with substance use disorders. Furthermore, understanding the binding of drug combinations enhances risk assessment and enables reduction of adverse effects from targeted interventions. Communication data that can be used by policymakers to guide decision-making and interventions, by targeting resources on addressing specific drug combinations or drug use issues. Communication insights can also support public health campaigns because interventions can be tailored to highlight linked drug use and associated concerns, encouraging citizens to use medications responsibly in the greater. In the end, the correlation matrix analysis improves in evidence-based decision-making, optimizes intervention tactics, and promotes improved healthcare outcomes in the battle against drug abuse.

	Heroin	Cocaine	Fentanyl	Fentanyl_Alt	Oxycodone	Oxymorphone	Ethanol	Hydrocodone	Benzodiazepine	Methadone	Amphetamine	Tramadol	Morphine	Hydromorphone	OpiateNOS	AnyOpioid
Heroin	1															
Cocaine	-0.00259	1														
Fentanyl	-0.03076	0.0345	1													
Fentanyl_Alt	-0.00967	0.0378	0.32487	1												
Oxycodone	-0.22606	-0.1165	-0.1692	-0.0553	1											
Oxymorphone	-0.1122	-0.0624	-0.0878	-0.0371	0.3216693	1										
Ethanol	-0.02545	-0.0446	-0.0003	0.00909	0.0043712	0.003356	1									
Hydrocodone	-0.08692	-0.0602	-0.0805	-0.0246	0.0487564	-0.004385	0.034885	1								
Benzodiazepine	-0.10925	-0.13	-0.0541	0.00723	0.1370988	0.069685	-0.004791	0.0367	1							
Methadone	-0.128	-0.0608	-0.1157	-0.0274	-0.039692	-0.004045	-0.038217	-0.031	0.11045	1						
Amphetamine	-0.00491	0.0024	0.02045	0.02541	-0.006815	0.005194	-0.031074	-0.013	0.05821	-0.0145	1					
Tramadol	-0.04052	-0.0398	-0.0198	-0.0027	0.0040126	-0.005752	0.0071055	0.0007	0.04104	-0.0027	0.0004	1				
Morphine	-0.08652	-0.0418	-0.0632	-0.0252	0.0811043	0.003123	-0.006992	0.0017	0.06274	-0.0042	-0.003	0.000754	1			
Hydromorphone	-0.00207	-0.0213	-0.0111	-0.0097	0.0349313	0.009264	-0.027167	0.0078	0.02847	-0.0031	0.0034	0.006824	0.1244	1		
OpiateNOS	-0.13156	-0.0565	-0.0711	-0.0383	0.0309333	-0.008942	-0.011755	0.0199	0.03163	-0.0162	0.011	0.017905	0.1821	-0.00942178	1	
AnyOpioid	0.057156	-0.0497	0.27635	0.0175	-0.031088	-0.071959	0.0120877	-0.006	0.02931	0.02011	0.0094	0.022926	0.03567	-0.017075997	0.0924097	1

Summary of the correlation matrix:

- Heroin has a correlation coefficient of one, which by itself indicates a perfectly positive relationship.
- The ratio between cocaine and fentanyl is about 0.034, indicating a moderate positive correlation.
- Moderate positive correlations between fentanyl and its analogues (correlation values about 0.324 to 0.325).
- Moderate to moderate sensitivity between opioids such as oxycodone, oxymorphone, hydrocodone, methadone and morphine, and between drugs such as amphetamines and benzodiazepines
- Reactions between ethanol and other chemicals are poor.
- There is a slight positive relationship between amphetamines and benzodiazepines.
- A slight positive correlation between OpiateNOS and Hydrocodone and Tramadol.
- Minimal to moderate positive association between hydromorphone and other opioid use.
- Most opioid and opiateNOS levels show moderate positive correlations.
- There is a slight positive correlation between AnyOpioid and Tramadol, Fentanyl, Fentanyl_Analogue.

Fifth Method is Histogram Analysis :

Histogram analysis of fentanyl-related deaths in specific age groups provides important information to address the situation. The epidemic mainly affects young people between the ages of 18 to 45 range, who are identified as a high-risk population by visually determining mortality rates in different age groups. Visualization helps policymakers inform policy new and make better use of their resources. In addition to pursuing targeted actions, public health campaigns, and treatment programs to mitigate the negative effects of the crisis through this data-based awareness, visual support contributes to public awareness and support evidence-based strategic management, enabling collective action to combat the growing threat of fentanyl in the United States.

J29		
	A	B
1	Bin	Frequency
2	14	1
3	15.04286	1
4	16.08571	0
5	17.12857	10
6	18.17143	13
7	19.21429	25
8	20.25714	39
9	21.3	49
10	22.34286	70
11	23.38571	79
12	24.42857	108
13	25.47143	96
14	26.51429	115
15	27.55714	103
16	28.6	129
17	29.64286	147
18	30.68571	127
19	31.72857	114
20	32.77143	107
21	33.81429	141
22	34.85714	135
23	35.9	131
24	36.94286	131
25	37.98571	118
26	39.02857	231
27	40.07143	115
28	41.11429	121
29	42.15714	89
30	43.2	111
31	44.24286	146
32	45.28571	119
33	46.32857	117
34	47.37143	123
35	48.41429	136
36	49.45714	137
37	50.5	142
38	51.54286	140
39	52.58571	128
40	53.62857	116
41	54.67143	140
42	55.71429	117
43	56.75714	107
44	57.8	108
45	58.84286	101
46	59.88571	86
47	60.92857	75
48	61.97143	57
49	63.01429	97
50	64.05714	34
51	65.1	27
52	66.14286	26
53	67.18571	13
54	68.22857	11
55	69.27143	9
56	70.31429	7
57	71.35714	9
58	72.4	10
59	73.44286	4
60	74.48571	1
61	75.52857	3
62	76.57143	0
63	77.61429	0
64	78.65714	0
65	79.7	0
66	80.74286	0
67	81.78571	1
68	82.82857	0
69	83.87143	0
70	84.91429	1
71	85.95714	0
72	More	1
73		

The summary of the data: The bins range from 14 to 85.95714286, with a final category labelled as "More." The frequencies vary widely across the bins, ranging from 0 to 231. The dataset contains a total of 58 bins, with some bins having zero frequency.

5. Data Visualization (in MS Excel)

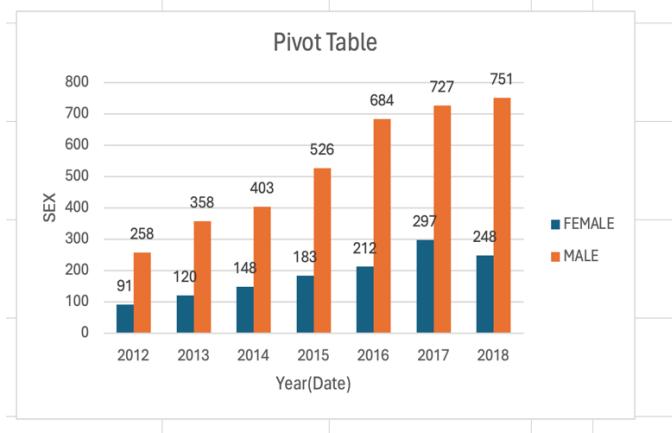
Once we have done data analysis, data visualization is the next important step. Insights from research are transformed into complex visual representations through data visualization, which facilitate and engage readers and communicate key study findings visually through charts, diagrams, and documents using software such as Microsoft Excel. Stakeholders, politicians and the general public can better understand the scope of the opioid issue, identify hotspots, and learn about demographics thanks to these images. We can better convey and convey the seriousness of the situation decision-making processes using clear and useful diagrams. In addition to improving knowledge, data visualization encourages actions to combat the opioid crisis by facilitating communication.

1. I Have done Data Visualization using the pivot table.

The pivot 1 will describe the comparison between Male and Female each year due to health problem related to drugs.

Count of ID	Column Labels		
Row Labels	FEMALE	MALE	Grand Total
2012		91 258	349
2013		120 358	478
2014		148 403	551
2015		183 526	709
2016		212 684	896
2017		297 727	1024
2018		248 751	999
Grand Total	1299	3707	5006

The bar chart will show the clear observation between both male and female. This bar will give us the clear idea in a physical representation and it can easily understand by public.

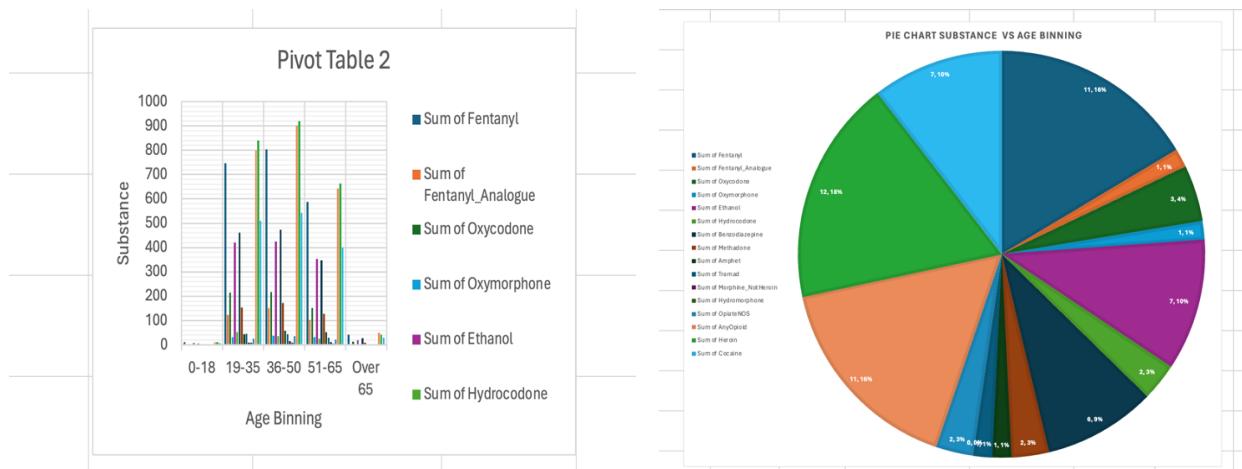


2. Second pivot table used for the visualization

This table will describe the between Age binning and each Drug test .

Row Label	Sum of Fentanyl	Sum of Fentanyl_Analogue	Sum of Oxycodone	Sum of Oxymorphone	Sum of Ethanol	Sum of Hydrocodone	Sum of Benzodiazepin	Sum of Methadone	Sum of Amphetamine	Sum of Tramadol	Sum of Morphine_NonHeroin	Sum of Hydromorphine	Sum of Opiate_NOS	Sum of AnyOpioid	Sum of Heroin	Sum of Cocaine
0-18	11	1	3	1	7	2	6	2	1	1	0	0	2	11	12	7
19-35	747	124	215	32	421	52	461	154	44	46	10	9	25	800	841	510
36-50	804	152	217	37	425	36	474	173	59	44	15	9	36	902	919	543
51-65	587	103	152	32	353	25	348	127	52	30	12	6	22	642	662	401
Over65	41	3	13	4	20	2	28	9	2	4	1	1	2	50	42	29
Grand Total	2190	383	600	106	1226	117	1317	465	158	125	38	25	87	2405	2476	1490

The bar representation between age binning and drug substance test we see with naked eye and can understand the which age group fallen into more and got tested positive for each drug.



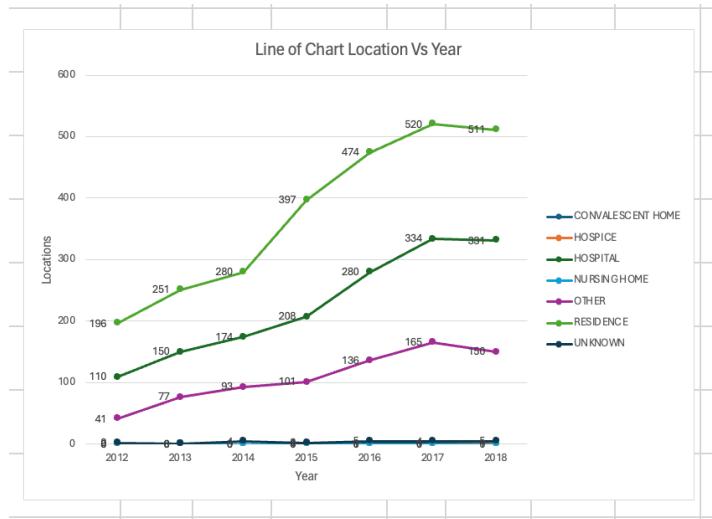
we can see this in the pie chart visualization with percent of each drug test Heroin is the more percent has tested positive with more people.

3. Third pivot table used for the visualization.

The pivot table is between the Location verses Year.

Count of ID	Column Labels	CONVALESCENTHOME	HOSPICE	HOSPITAL	NURSINGHOME	OTHER	RESIDENCE	UNKNOWN	Grand Total
2012		110	41	196	2	349			
2013		150	77	251		478			
2014		174	93	280	4	551			
2015		208	1	101	397	2	709		
2016		1	280	136	474	5	896		
2017		1	334	165	520	4	1024		
2018		1	1	331	150	511	5	999	
Grand Total		3	1	1587	1	763	2629	22	5096

This line of chart will be show as the number of residences are high as compare with other locations each year. This line of chart can see the drastic increase in the residence line each.

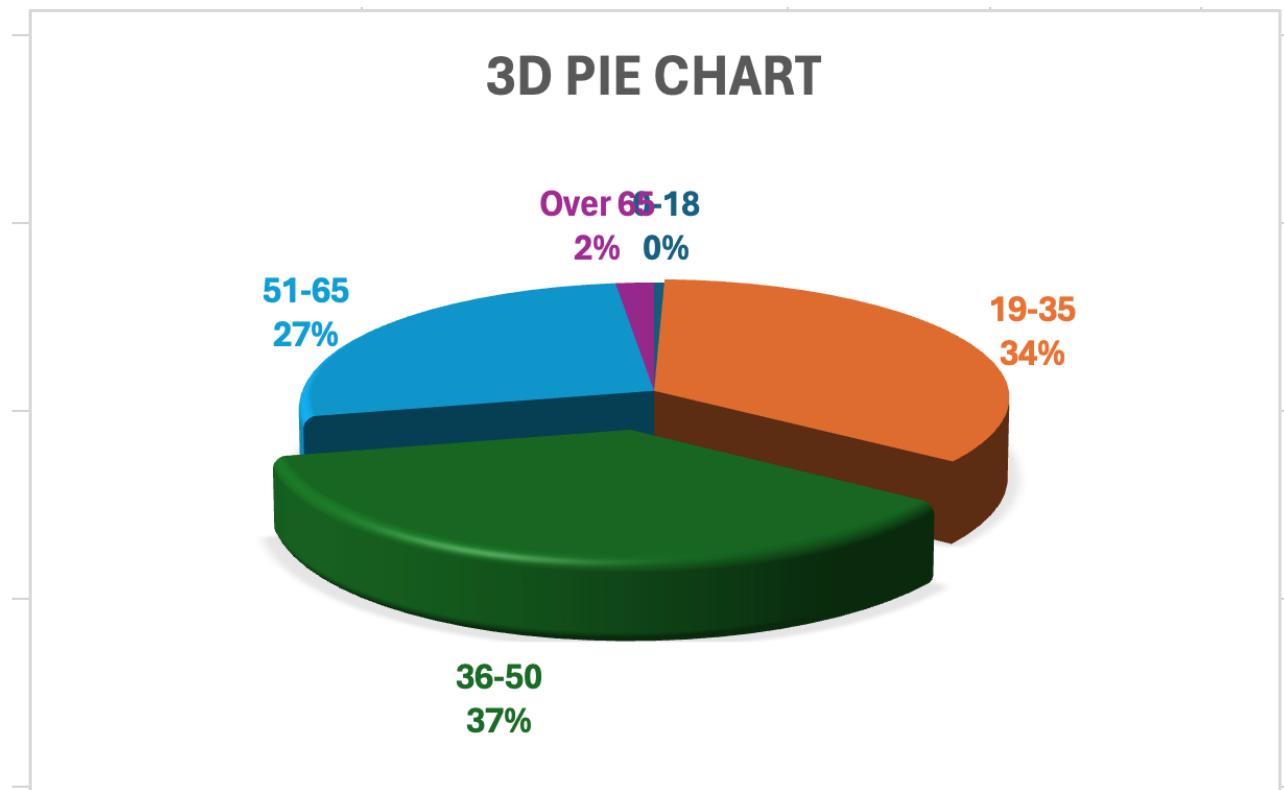


4. Fourth Pivot table used for the visualization.

Count of ID		Column Labels		
RowLabels	ACCIDENT	NATURAL	PENDING	GrandTotal
0-18	25			25
19-35	1711	1	4	1716
36-50	1826	5	5	1836
51-65	1326	2	5	1333
Over65	94	2		96
GrandTotal	4982	10	14	5006

The pivot table will tells us about the number of Manner of deaths as has between each age group for total of seven years. So, Accidental manner of deaths occurred mor percent than Natural and pending cases. Three age groups are fallen into these field from 18 to 65.

we are going to see this table into the 3D Pie chart 37 percent are 36-50 age group people died. then followed by 19-35 age group with 34 percent and final 51-65 age group people with 27 percent of death rate.

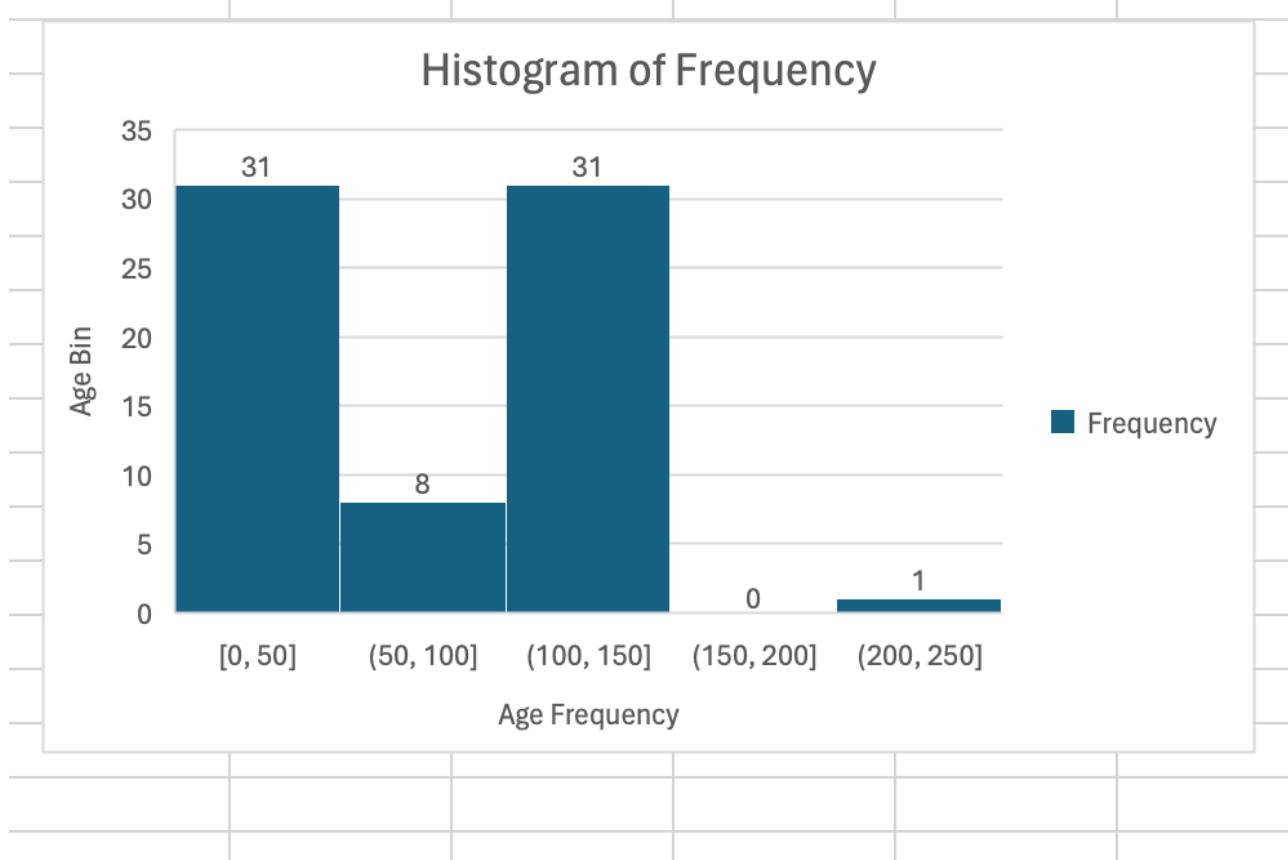


5. Fifth Visualization was on the Histogram plot

Here I have used the data of age column into histogram data analysis where I have plot the chat with help of age binning and frequency of that age column.

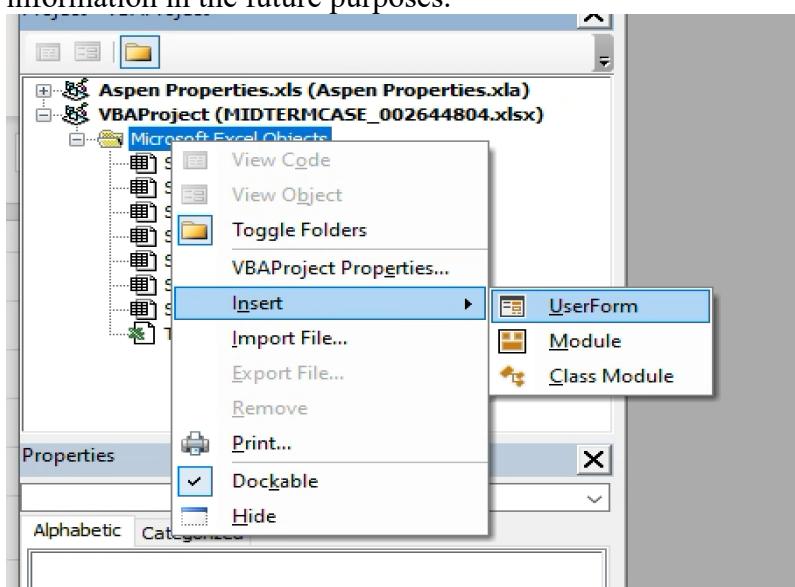
	A	B	C
Bin	Frequency		
1	14	1	
2	15.04286	1	
3	16.08571	0	
4	17.12857	10	
5	18.17143	13	
6	19.21429	25	
7	20.25714	39	
8	21.3	49	
9	22.34286	70	
10	23.38571	79	
11	24.42857	108	
12	25.47143	96	
13	26.51429	115	
14	27.55714	103	
15	28.6	129	
16	29.64286	147	
17	30.68571	127	
18	31.72857	114	
19	32.77143	107	
20	33.81429	141	
21	34.85714	135	
22	35.9	131	
23	36.94286	131	
24	37.98571	118	
25	39.02857	231	
26	40.07143	115	
27	41.11429	121	
28	42.15714	89	
29	43.2	111	
30	44.24286	146	
31	45.28571	119	
32	46.32857	117	
33	47.37143	123	
34	48.41429	136	
35	49.45714	137	
36	50.5	142	
37	51.54286	140	
38	52.58571	128	
39	53.62857	116	
40	54.67143	140	
41	55.71429	117	
42	56.75714	107	
43	57.8	108	
44	58.84286	101	
45	59.88571	86	
46	60.92857	75	
47	61.97143	57	
48	63.01429	97	
49	64.05714	34	
50	65.1	27	
51	66.14286	26	
52	67.18571	13	
53	68.22857	11	
54	69.27143	9	
55	70.31429	7	
56	71.35714	9	
57	72.4	10	
58	73.44286	4	
59	74.48571	1	
60	75.52857	3	
61	76.57143	0	
62	77.61429	0	
63	78.65714	0	
64	79.7	0	
65	80.74286	0	
66	81.78571	1	
67	82.82857	0	
68	83.87143	0	
69	84.91429	1	
70	85.95714	0	
71	More	1	
72			
73			

Date visualization of Histogram using the above data set of Age column. the binning age of 31 got more repeated 50.



6. Data Entry

Data Entry of the Two new records into the dataset using the Userform in VBA. This help will use to add addition Data into the dataset which is available and also give us the more information in the future purposes.



MIDTERM CASE_002644804.xlsx - UserForm1 (UserForm)

UserForm1

Please Enter the Following Information

ID :	Drug Test:
Date(dd/mm/yyyy) :	<input checked="" type="checkbox"/> Heroin <input checked="" type="checkbox"/> Opiate NOS
Age :	<input checked="" type="checkbox"/> Cocaine <input checked="" type="checkbox"/> Any Opioid
Sex :	<input checked="" type="checkbox"/> Fentanyl <input checked="" type="checkbox"/> DeathCity
	<input checked="" type="checkbox"/> Fentanyl_Analogue
	<input checked="" type="checkbox"/> Oxycodone
	<input checked="" type="checkbox"/> Oxymorphone
	<input checked="" type="checkbox"/> Ethanol
Race :	<input checked="" type="checkbox"/> Hydrocodone <input checked="" type="checkbox"/> ResidenceCity
Location :	<input checked="" type="checkbox"/> Benzodiazepine <input checked="" type="checkbox"/> ResidenceCityGeo
Injury Place :	<input checked="" type="checkbox"/> Methadone <input checked="" type="checkbox"/> InjuryCity
Cause of Death :	<input checked="" type="checkbox"/> Amphet <input checked="" type="checkbox"/> DeathCityGeo
Manner of Death :	<input checked="" type="checkbox"/> Tramad <input checked="" type="checkbox"/> ResidenceCityGeo
	<input checked="" type="checkbox"/> Morphine(Not Heroin)
	<input checked="" type="checkbox"/> Hydromorphone

Submit Data

MIDTERM CASE_002644804.xlsx - UserForm1 (Code)

SubmitData

Private Sub SubmitData_Click()
 Dim wsheet As Worksheet
 Dim lastRow As Long
 Dim ageGroupOption As String
 Dim genderOption As String

 Set wsheet = ThisWorkbook.Sheets("Data_Entry")

 lastRow = wsheet.Cells(wsheet.Rows.Count, "A").End(xlUp).Row + 1

 With wsheet
 .Cells(lastRow, 1).Value = UCase(ID_TB.Value)
 .Cells(lastRow, 2).Value = UCase(date_TB.Value)
 .Cells(lastRow, 3).Value = UCase(Age_TB.Value)

 genderOption = ""

 If male = True Then
 genderOption = "MALE"
 ElseIf female = True Then
 genderOption = "FEMALE"
 ElseIf unknownsex = True Then
 genderOption = "UNKNOWN"
 End If
 .Cells(lastRow, 4).Value = UCase(genderOption)

 .Cells(lastRow, 5).Value = UCase(Race_TB.Value)
 .Cells(lastRow, 6).Value = UCase(location_TB.Value)
 .Cells(lastRow, 7).Value = UCase(injuryplace_TB.Value)
 .Cells(lastRow, 8).Value = UCase(cod_TB.Value)

 checkboxesdataentry wsheet, lastRow
 .Cells(lastRow, 25).Value = UCase(MannerofDeath_TB.Value)
 .Cells(lastRow, 26).Value = UCase(DeathCity_TB.Value)
 .Cells(lastRow, 27).Value = UCase(InjuryCity_TB.Value)
 .Cells(lastRow, 28).Value = UCase(ResidenceCity_TB.Value)
 .Cells(lastRow, 29).Value = UCase(DeathCityGeo_TB.Value)
 .Cells(lastRow, 30).Value = UCase(ResidenceCityGeo_TB.Value)
 .Cells(lastRow, 31).Value = UCase(InjuryCityGeo_TB.Value)
 End With
End Sub

SubmitData

Click

```
cod_TB.Value = ""
MannerofDeath_TB.Value = ""
DeathCity_TB.Value = ""
DeathCityGeo_TB.Value = ""
ResidenceCity_TB.Value = ""
ResidenceCityGeo_TB.Value = ""
InjuryCity_TB.Value = ""
InjuryCityGeo_TB.Value = ""

ageGroupOption = False
genderOption = False
End With
End Sub

Private Sub checkboxesdataentry(wsheets As Worksheet, currentRow As Long)
Dim CheckBoxArray(1 To 16) As MSForms.CheckBox
Set CheckBoxArray(1) = CheckBox1
Set CheckBoxArray(2) = CheckBox2
Set CheckBoxArray(3) = CheckBox3
Set CheckBoxArray(4) = CheckBox4
Set CheckBoxArray(5) = CheckBox5
Set CheckBoxArray(6) = CheckBox6
Set CheckBoxArray(7) = CheckBox7
Set CheckBoxArray(8) = CheckBox8
Set CheckBoxArray(9) = CheckBox9
Set CheckBoxArray(10) = CheckBox10
Set CheckBoxArray(11) = CheckBox11
Set CheckBoxArray(12) = CheckBox12
Set CheckBoxArray(13) = CheckBox13
Set CheckBoxArray(14) = CheckBox14
Set CheckBoxArray(15) = CheckBox15
Set CheckBoxArray(16) = CheckBox16

For i = 1 To 16
    wsheets.Cells(currentRow, i + 9).Value = IIf(CheckBoxArray(i).Value, 1, 0)
Next i
End Sub
```

UserForm1

Please Enter the Following Information

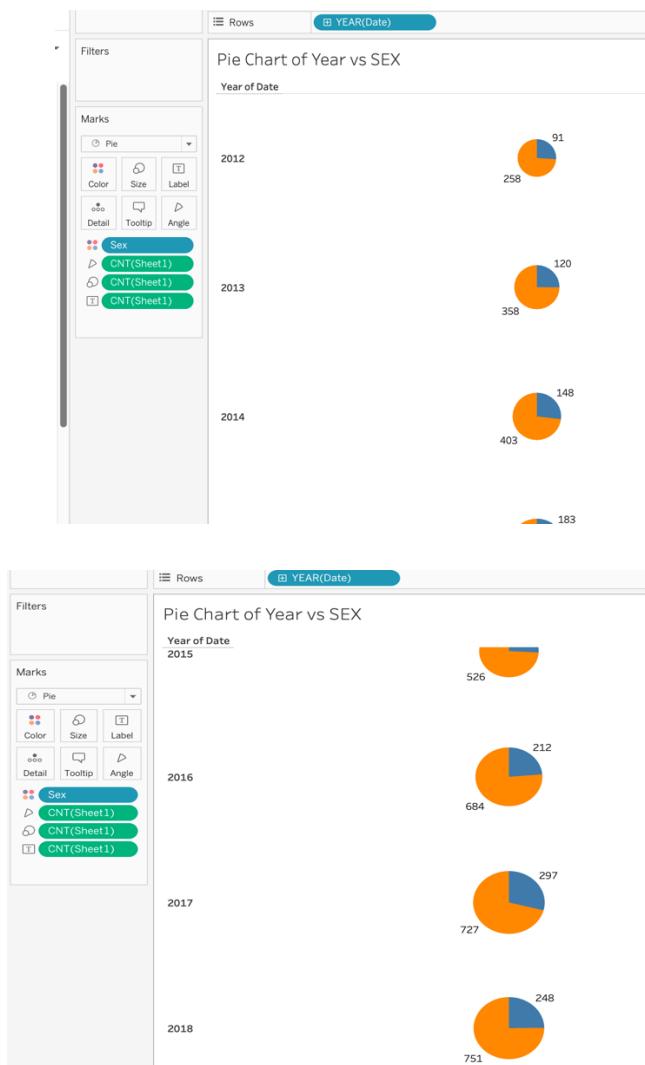
ID :	34-567	
Date(dd/mm/yyyy)	21/05/2021	Drug Test:
Age	29	<input type="checkbox"/> Heroin <input type="checkbox"/> Opiate NOS
Sex	<input checked="" type="radio"/> Male <input type="radio"/> Female <input type="radio"/> Unknown	<input type="checkbox"/> Cocaine <input type="checkbox"/> Any Opioid
Race	Black	<input type="checkbox"/> Fentanyl DeathCity <input type="text" value="Dallas"/>
Location	Tampa	<input type="checkbox"/> Fentanyl_Analogue ResidenceCity <input type="text" value="Tampa"/>
Injury Place	Dallas	<input type="checkbox"/> Oxycodone ResidenceCityGeo <input type="text" value="55.66,77.66"/>
Cause of Death	Unknown	<input type="checkbox"/> Oxymorphone InjuryCity <input type="text" value="Dallas"/>
Manner of Death	Natural	<input type="checkbox"/> Ethanol DeathCityGeo <input type="text" value="32.56,45.43"/>
		<input type="checkbox"/> Hydrocodone ResidenceCityGeo <input type="text" value="55.66,77.66"/>
		<input type="checkbox"/> Benzodiazepine InjuryCityGeo <input type="text" value="22.434,66.54"/>
		<input type="checkbox"/> Methadone Tramad <input type="button" value="Submit Data"/>
		<input type="checkbox"/> Amphet
		<input type="checkbox"/> Tramad
		<input type="checkbox"/> Morphine(Not Heroin)
		<input type="checkbox"/> Hydromorphone

Here we are able to add additional records to the dataset using the Userform from the Excel.

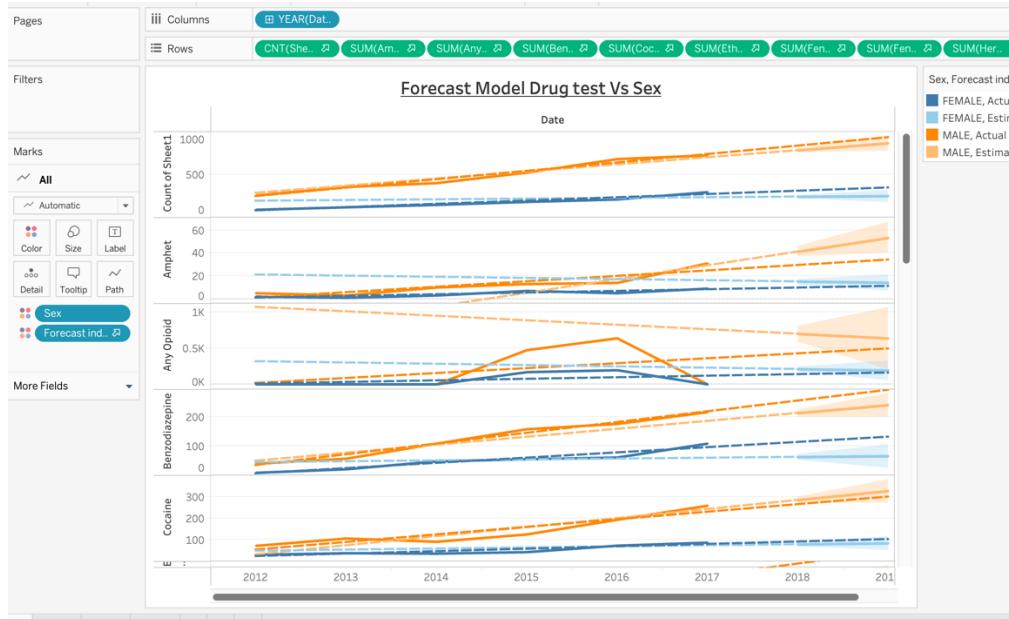
7. Data Visualizations (Tableau)

Tableau data visualization is essential to analyze and dissect the complexities of the fentanyl problem in the United States. Using these images as a data scientist for the US. government helps you communicate the scope and impact of the situation to stakeholders and policymakers. We can support evidence-based planning and decision-making to explore patterns, trends and correlations in fentanyl data, such as overdose rates, social contexts and community rates. Additionally, comparisons across variables such as age, sex, cause of death and others. we can use facilitated by the use of graphs to help identify anomalies and focus services Formation analysis forecasting using historical data also helps shape future impacts, enabling the development of pre-crisis management strategies.

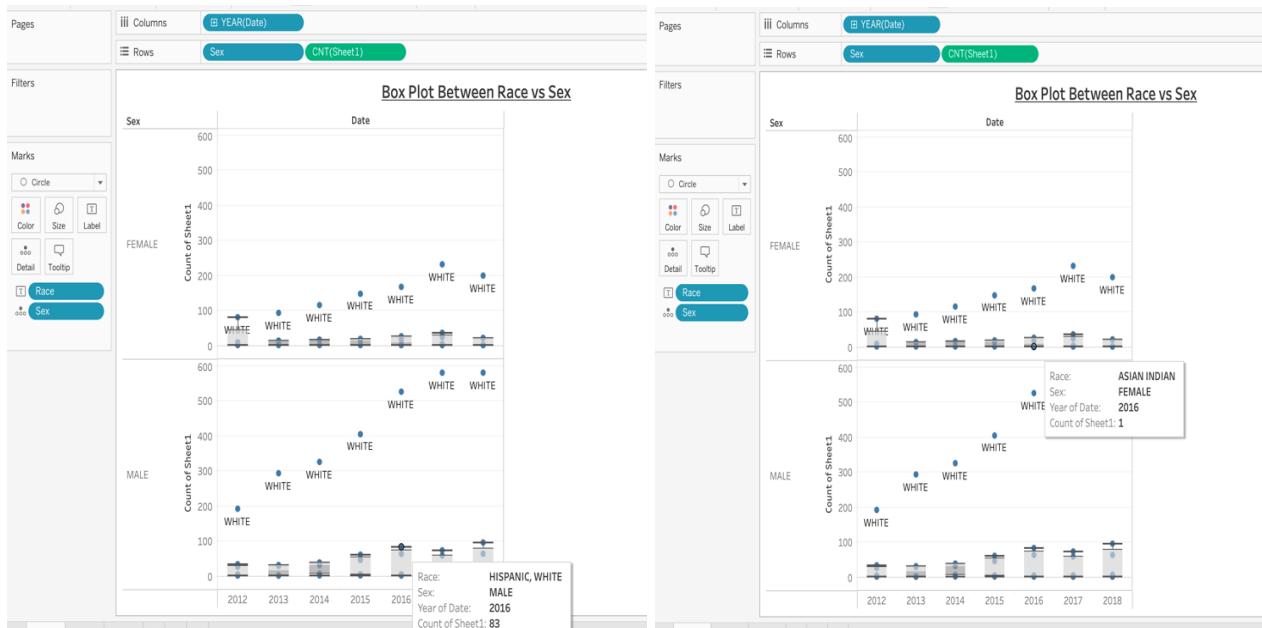
1. Pie Chart we give us the more better view for each year.



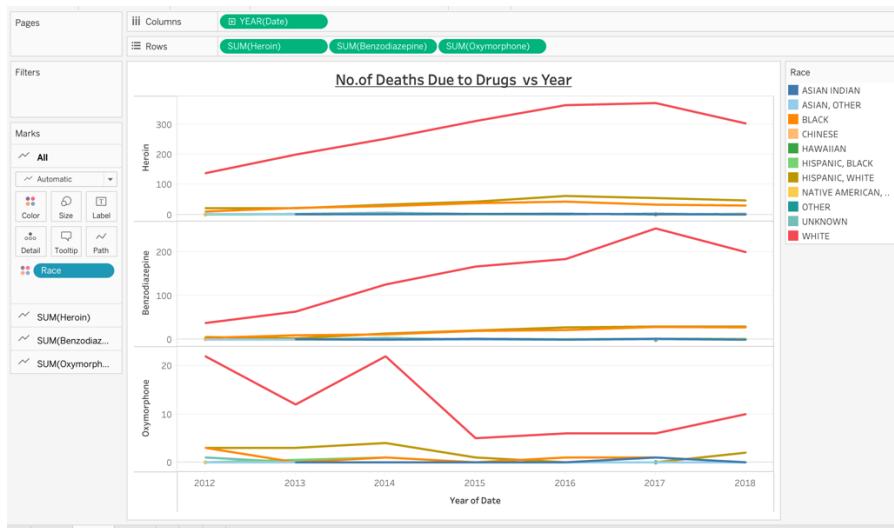
2. The Forecast Model each drug test and compared with Male and Female this will show as the predictive or estimate number of counts in future and we try to reduce them by taking measures.



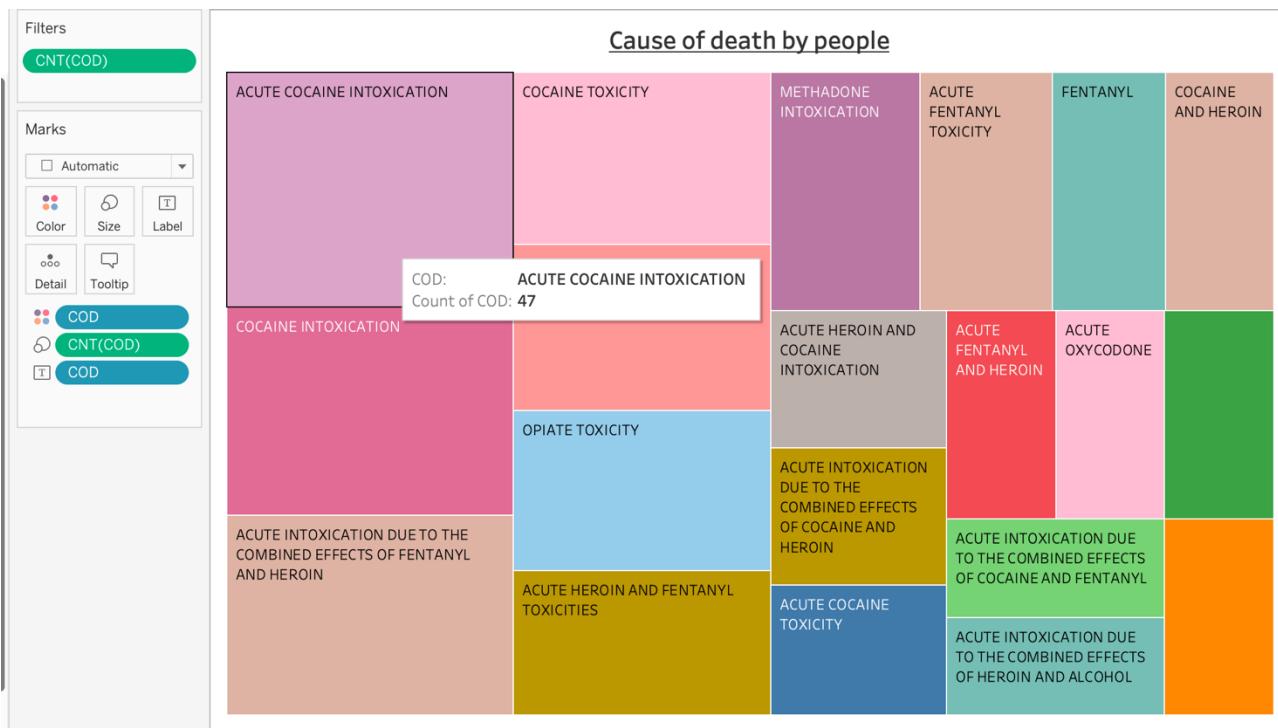
3. The Box plot will show as the outliers in each year. Where we can see that there are more White males as outliers in each as compared.

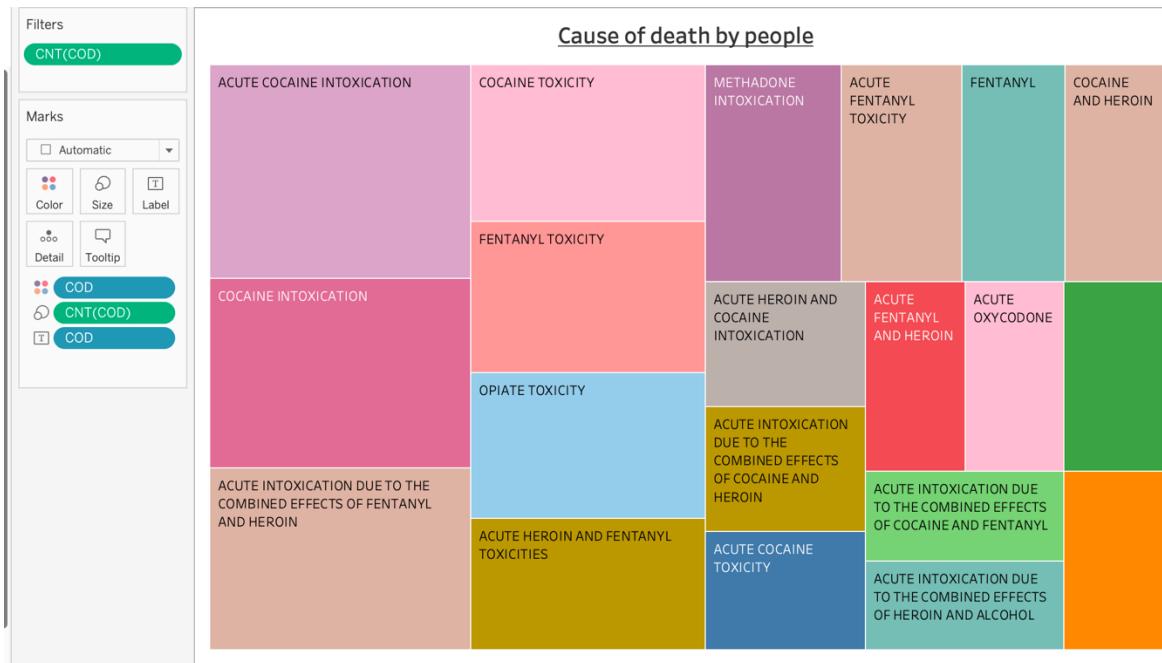


4. Line of chart for the top Three drugs got tested more and Died due to it each.

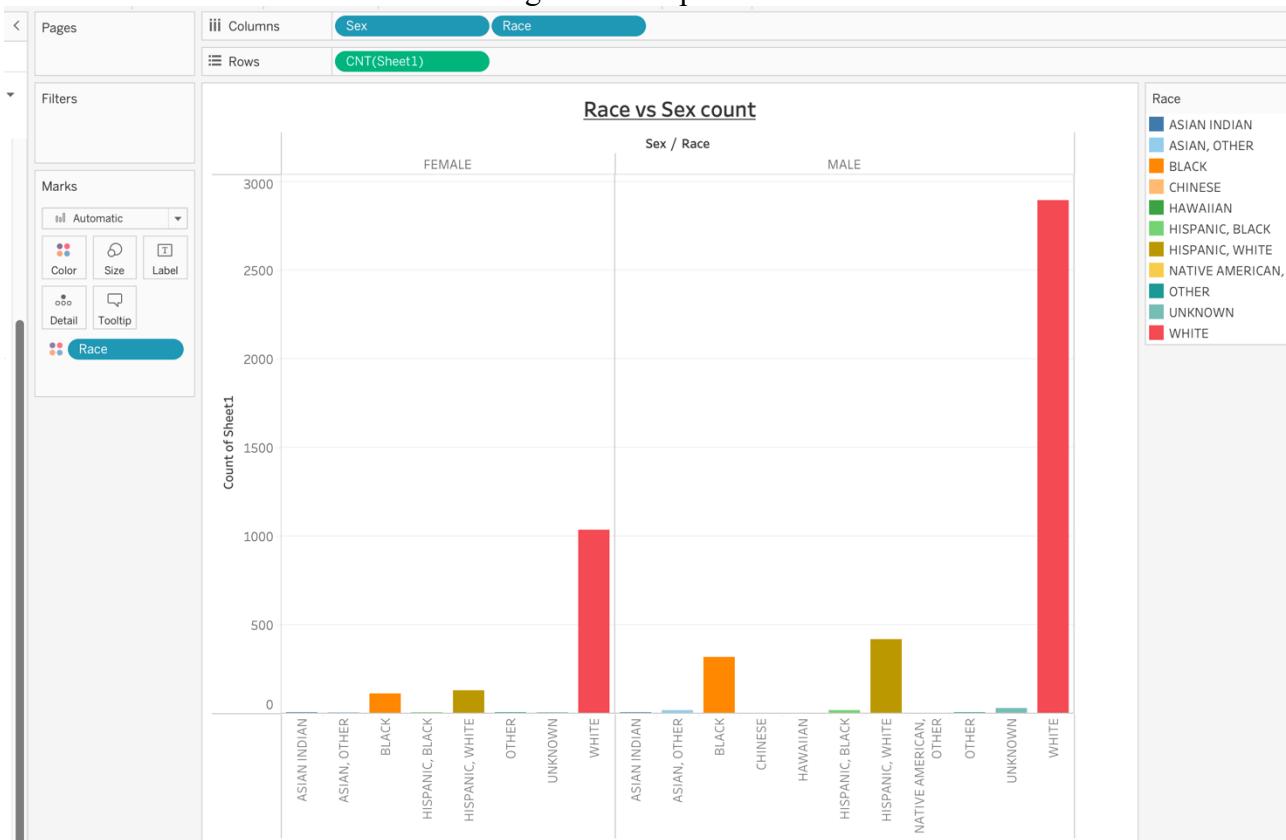


5. Top Twenty Drugs Caused to death.

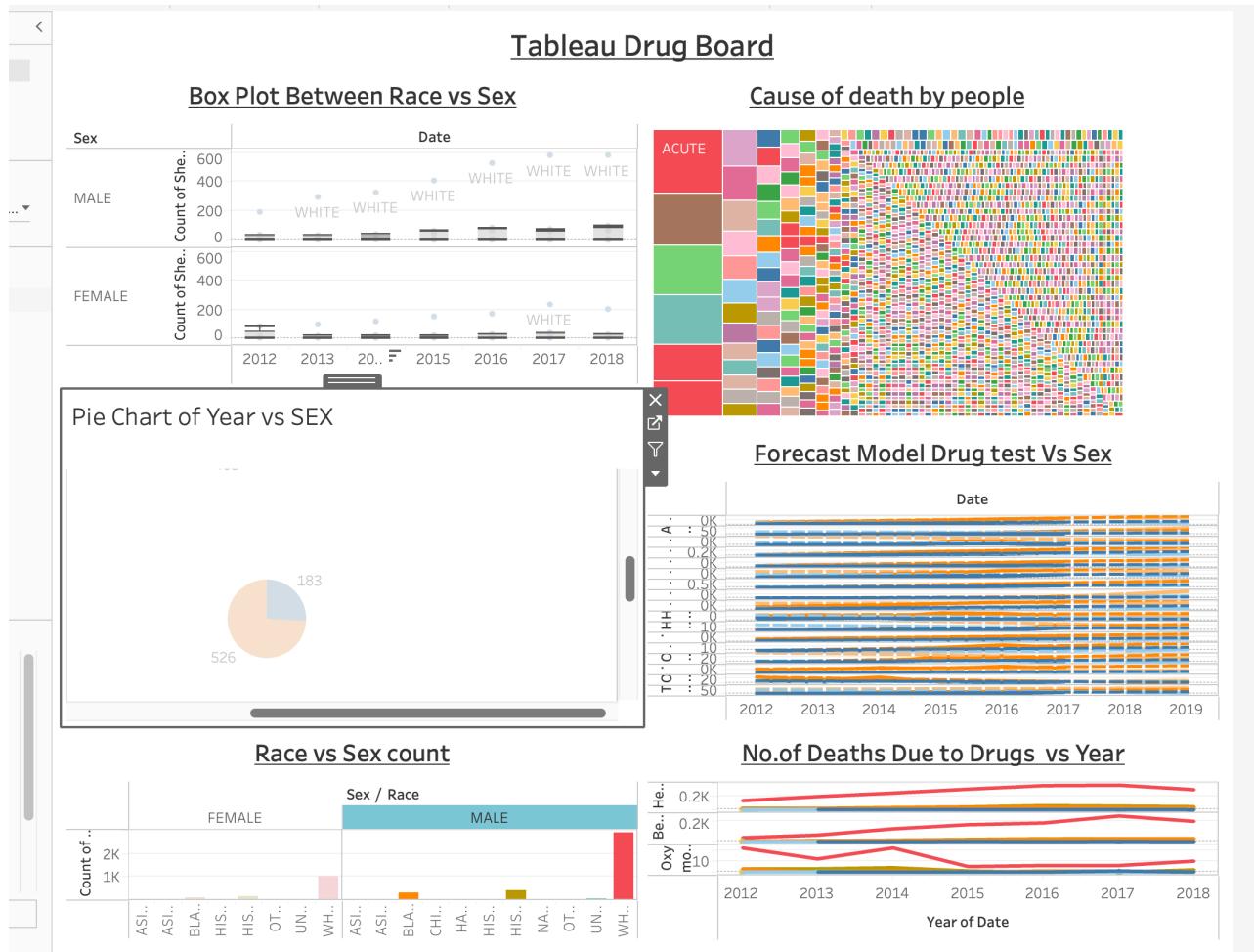




6. These Bar chart will show us the Difference between Race and sex who got addicted to drug more. we see that white male and female are higher as compare with others.



Dashboard :



8. Inferencing

- Over the years, there was an apparent upward thrust within the quantity of opioid-associated incidents, especially those involving heroin and fentanyl: This trend indicates to an alarming upward push in opioid-associated incidents, which is suggestive of a developing public fitness emergency. Despite their greater energy and increased chance of overdose and dying, notably sturdy opioids like heroin and fentanyl are associated with an alarming surge in instances. Recognizing the particular substances involved in those times is critical for growing targeted measurements, like increasing the provision of naloxone, the drug that forestalls opioid overdose, and finishing harm reduction measures.
- There is a gender difference in the amount of opioid-associated incidents, with a higher percentage of adult males than women: The effects of this look at implies that opioid-associated incidents are extra in men, highlighting that there may be gender-specific differences in opioid intake, get entry to to healthcare, and chance elements. In order to address the wonderful desires and troubles that males and females face on the subject of opioid prevention, remedy, and assist services, gender-precise techniques might be required. To remove this gender hole and improve results for guys who've opioid use disease, specially targeted campaigns and interventions can be necessary.

3. The age band of those implicated in opioid-related occurrences varies, with a sizable variety of incidents occurring component in the 19–35 age variety: The attention of incidents inside the 19–35 age range highlights the reality that younger human beings are specifically exposed to the hazards of addiction to opiates. Reaching teens must be the top aim for prevention projects. This entails addressing this age organization approximately the risks of opioid abuse and the options which are available for each prevention and treatment. Targeted this age organization with early intervention and support services can help reduce the results of opioid use ailment and prevent bad long-time period results.

Recommendations to Address the Opioid Crisis:

1. Enhanced Rehab and Treatment Program Accessibility: Medication-Assisted Treatment (MAT):
 - MAT provides a whole technique to deal with opioid dependency via using FDA-authorised drugs (such methadone, buprenorphine, and naltrexone) with behavioural treatment options and psychotherapy. Raising the reach of MAT applications can resource people in controlling their cravings, treating their withdrawal symptoms, and sticking to lengthy-term restoration.
 - Psychotherapy and Behavioural Treatments: The essential reasons of opioid dependency want to be addressed with the intention to help people succeed in and preserve healing. Evidence-based totally counselling and behavioural treatment plans, consisting of cognitive-behavioural therapy (CBT) and contingency management, are vital in attaining this goal.
 - Peer Support and Recovery Services: Social connections, beneficial guidance, and emotional assist are all supplied with the aid of peer support companies, healing education, and community-based recuperation applications, which serve as crucial guide structures for the ones mission remedy. These resources assist people in healing maintain their recovery all through time.
2. Prescription Drug Monitoring Programs (PDMPs) need to be reinforced.
 - Better Monitoring and Surveillance: Prescription medication manipulate plans (PDMPs) offer healthcare vendors the potential to keep an eye fixed on sufferers' previous use of medication, spot over prescription or misuse trends, and see any instances of physician purchasing or diversion. Improving records accuracy, nation database interoperability, and real-time reporting for making sure set off intervention are all a part of strengthening PDMPs.
 - Guidelines and Provider Education: Training on evidence-primarily based prescribing techniques, prescription information that means, and the efficient use of PDMPs in clinical exercise have to receive to healthcare practitioners. In order to encourage informed picks at the prescription of medicine along with opioids unique policies and approaches have to be set up. These have to cover danger evaluation, dosage optimization, and affected person education on the responsible use of opioids.
3. Increasing Awareness:
 - Public cognizance tasks ought to inform humans approximately the dangers of opioid abuse, addiction, and overdose further to stressing the price of having treatment for opioid-related issues. To reach quite a few audiences, these campaigns can employ a number of systems, along with social media, mainstream media, network activities, and school-based initiatives.
 - Encouraging Responsible Opioid Use: Educational programs need to consist of a sturdy emphasis at the secure and accountable use of prescription opioids, together with appropriate garage, following dosage commands, and the significance of not sharing drugs. Patients ought to be made aware about

the risks of developing an dependency to opioids in addition to exchange techniques of treating their pain.

- Distribution and Training of Naloxone: Narcotic overdoses can be reversed with naloxone, a lifestyles-saving drug that have to be made extra widely recognized thru public education campaigns. Training periods need to educate trainees on a way to administer naloxone, spot early proof of an opioid overdose, and the way to get in touch with 911 for assistance.

9. Tableau public link :

https://public.tableau.com/views/BalajiPamidi_002644804/Story1?:language=en-US&publish=yes&:sid=&:&display_count=n&:origin=viz_share_link