

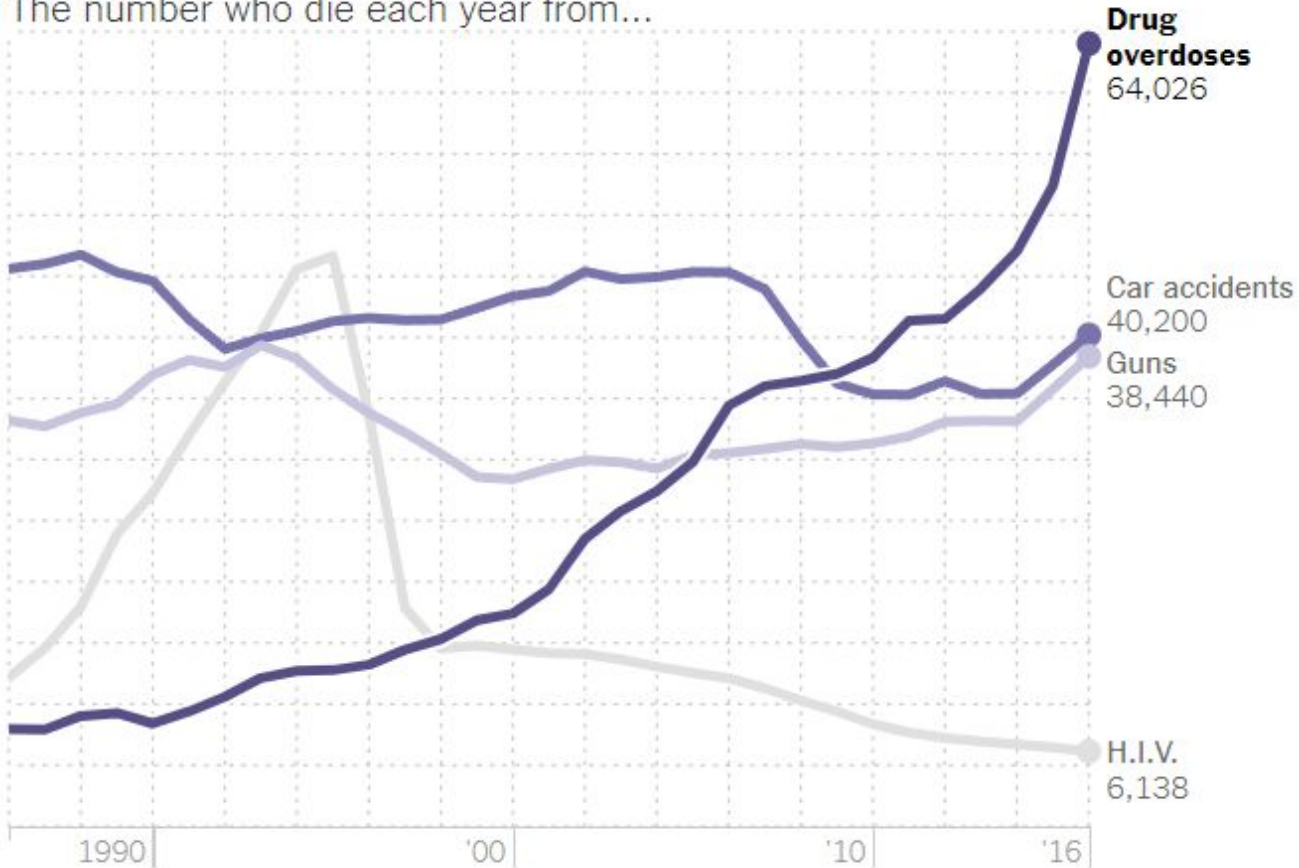
Drug Overdoses in the United States

Ashlyn Jew, Meera Duggal, Rhiann Zhang, Wei Deng



Background & Motivation

The number who die each year from...



1M

fatal overdoses
since 1999

100k+

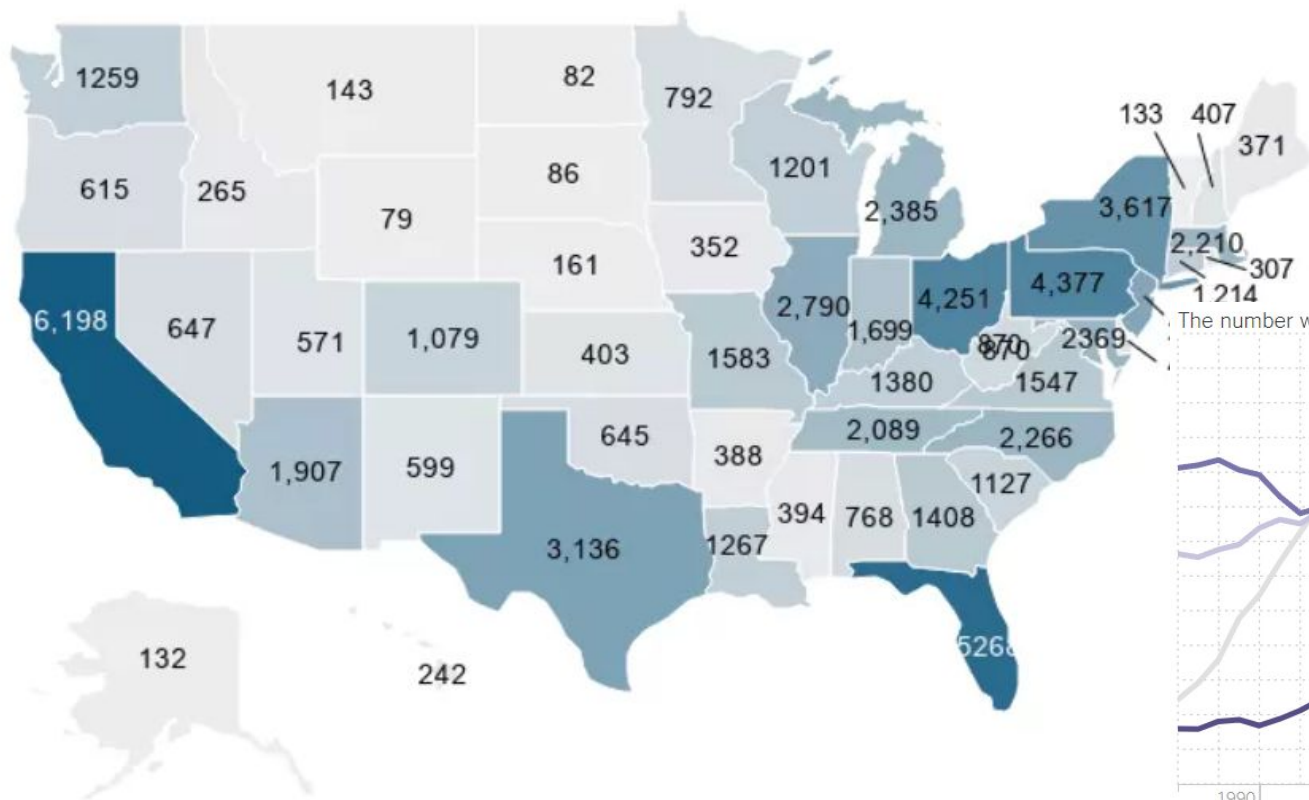
died from overdose
last year

275

died every day on
average from
overdose last year

Background & Motivation

Total Annual Overdose Deaths by State



1M

fatal overdoses
since 1999

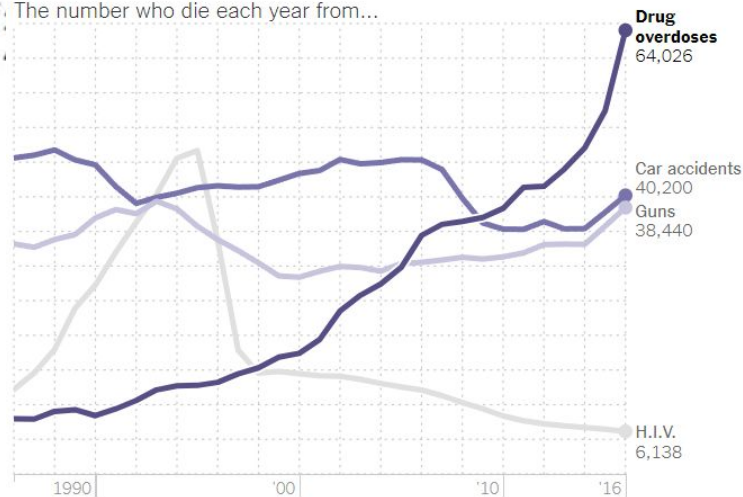
100k+

last year

~275

every day on
average last year

The number who die each year from...



How do different aspects of counties (e.g. location, demographics and opioid dispense rates) relate to drug overdose rates?

Can we utilize the various demographic trends of each county to more accurately predict drug overdoses?

Drug Overdose Deaths

"Notes"	"Year"	"Year Code"	"State"	"State Code"	"County"	"County Code"	Deaths	Popula
	"1999"	"1999"	"Alabama"	"01"	"Baldwin County, AL"	"01003"	11	137555
	"1999"	"1999"	"Alabama"	"01"	"Jefferson County, AL"	"01073"	34	662845
	"1999"	"1999"	"Alabama"	"01"	"Madison County, AL"	"01089"	10	274693
	"1999"	"1999"	"Alabama"	"01"	"Mobile County, AL"	"01097"	28	399323
	"1999"	"1999"	"Alaska"	"02"	"Anchorage Borough, AK"	"02020"	21	259348
	"1999"	"1999"	"Arizona"	"04"	"Cochise County, AZ"	"04003"	10	116530
	"1999"	"1999"	"Arizona"	"04"	"Coconino County, AZ"	"04005"	10	115307
	"1999"	"1999"	"Arizona"	"04"	"Maricopa County, AZ"	"04013"	288	3004985
	"1999"	"1999"	"Arizona"	"04"	"Navajo County, AZ"	"04017"	12	96100
	"1999"	"1999"	"Arizona"	"04"	"Pima County, AZ"	"04019"	137	828905
	"1999"	"1999"	"Arizona"	"04"	"Pinal County, AZ"	"04021"	11	173364
	"1999"	"1999"	"Arizona"	"04"	"Yuma County, AZ"	"04027"	10	155665
	"1999"	"1999"	"Arkansas"	"05"	"Pulaski County, AR"	"05119"	19	360312

Unemployment Rate

FIPS	State	County	Year	Unemployment_rate
1000	AL	Alabama	2000	4.6
1001	AL	Autauga Co	2000	4.1
1003	AL	Baldwin Co	2000	3.7
1005	AL	Barbour Co	2000	5.6
1007	AL	Bibb Count	2000	5.4
1009	AL	Blount Cou	2000	3.5
1011	AL	Bullock Co	2000	8.5
1013	AL	Butler Cou	2000	7.9

Data Generation

SUMLEV	State	STATE	COUNTY	County	Year	AGEGRP	TOT_POP	TOT_MAL	TOT_FEM	WA_MALE	WA_FEM	BA_MALE	BA_FEM
50	Alabama		1	1	Autauga C	2010	0	54773	26672	28101	21359	22061	4596
50	Alabama		1	1	Autauga C	2010	1	3575	1863	1712	1415	1314	356
50	Alabama		1	1	Autauga C	2010	2	3964	1984	1980	1506	1517	398
50	Alabama		1	1	Autauga C	2010	3	4292	2163	2129	1657	1621	427
50	Alabama		1	1	Autauga C	2010	4	4229	2182	2047	1601	1551	497
50	Alabama		1	1	Autauga C	2010	5	3152	1573	1579	1223	1219	306
50	Alabama		1	1	Autauga C	2010	6	3191	1574	1617	1251	1235	289
50	Alabama		1	1	Autauga C	2010	7	3372	1615	1757	1304	1312	281
50	Alabama		1	1	Autauga C	2010	8	4143	2002	2141	1586	1632	347
50	Alabama		1	1	Autauga C	2010	9	4118	1998	2120	1642	1663	305
50	Alabama		1	1	Autauga C	2010	10	4321	2162	2159	1798	1742	316
50	Alabama		1	1	Autauga C	2010	11	3908	1884	2024	1531	1588	318
50	Alabama		1	1	Autauga C	2010	12	3119	1533	1586	1267	1255	243
50	Alabama		1	1	Autauga C	2010	13	2790	1292	1498	1096	1229	175
50	Alabama		1	1	Autauga C	2010	14	2289	1018	1271	876	1064	128
50	Alabama		1	1	Autauga C	2010	15	1752	814	938	692	801	112
50	Alabama		1	1	Autauga C	2010	16	1259	552	707	500	599	50
50	Alabama		1	1	Autauga C	2010	17	743	299	444	273	375	25

County	State	County FIPS Code	Opioid Dispensing Rate per 100
ANCHORAGE	AK	2020	51.2
FAIRBANKS NORTH STAR	AK	2090	36.8
JUNEAU	AK	2110	54.9
KENAI PENINSULA	AK	2122	76.3
KETCHIKAN GATEWAY	AK	2130	58.6
KODIAK ISLAND	AK	2150	23.2
MATANUSKA-SUSITNA	AK	2170	60.8

Demographic

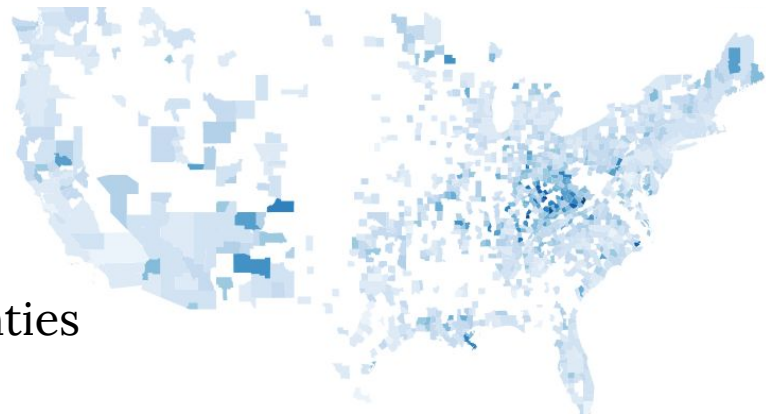
Opioid Dispensary Rates

Our Curated Data

Year	State	State Abv	State Cod	County	County Cc	Deaths	Population	Crude Rat	Cruder Ra	Deathrate	Unemploy	Dispense	SUMLEV	AGEGRP	TOT_POP	TOT_MAL	TOT_FEM	WA_MAL
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	6	2021	992	1029	965
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	7	2059	1021	1038	996
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	8	2055	989	1066	971
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	9	2278	1092	1186	1064
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	10	2444	1192	1252	1165
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	11	2426	1180	1246	1156
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	12	2405	1165	1240	1141
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	13	2149	1036	1113	1017
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	14	1802	862	940	846
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	15	1412	653	759	644
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	16	891	377	514	366
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	17	654	255	399	249
2012	Kentucky	KY		21 Whitley Co	21235	28	35499	78.88	78.87546	0.078875	10.7	364.2	50	18	548	178	370	173
2012	Louisiana	LA		22 Ascension	22005	15	112286	Unreliable	13.35874	0.013359	5.8	117.1	50	0	112218	55400	56818	41916
2012	Louisiana	LA		22 Ascension	22005	15	112286	Unreliable	13.35874	0.013359	5.8	117.1	50	1	8369	4302	4067	3028
2012	Louisiana	LA		22 Ascension	22005	15	112286	Unreliable	13.35874	0.013359	5.8	117.1	50	2	8956	4600	4356	3254
2012	Louisiana	LA		22 Ascension	22005	15	112286	Unreliable	13.35874	0.013359	5.8	117.1	50	3	9024	4566	4458	3225
2012	Louisiana	LA		22 Ascension	22005	15	112286	Unreliable	13.35874	0.013359	5.8	117.1	50	4	7890	4173	3717	2951
2012	Louisiana	LA		22 Ascension	22005	15	112286	Unreliable	13.35874	0.013359	5.8	117.1	50	5	6782	3405	3377	2433
2012	Louisiana	LA		22 Ascension	22005	15	112286	Unreliable	13.35874	0.013359	5.8	117.1	50	6	7449	3701	3748	2768
2012	Louisiana	LA		22 Ascension	22005	15	112286	Unreliable	13.35874	0.013359	5.8	117.1	50	7	8115	3913	4202	2979
2012	Louisiana	LA		22 Ascension	22005	15	112286	Unreliable	13.35874	0.013359	5.8	117.1	50	8	7924	3779	4145	2889
2012	Louisiana	LA		22 Ascension	22005	15	112286	Unreliable	13.35874	0.013359	5.8	117.1	50	9	8601	4204	4397	3295
2012	Louisiana	LA		22 Ascension	22005	15	112286	Unreliable	13.35874	0.013359	5.8	117.1	50	10	8384	4109	4275	3289
2012	Louisiana	LA		22 Ascension	22005	15	112286	Unreliable	13.35874	0.013359	5.8	117.1	50	11	7779	3865	3914	3092

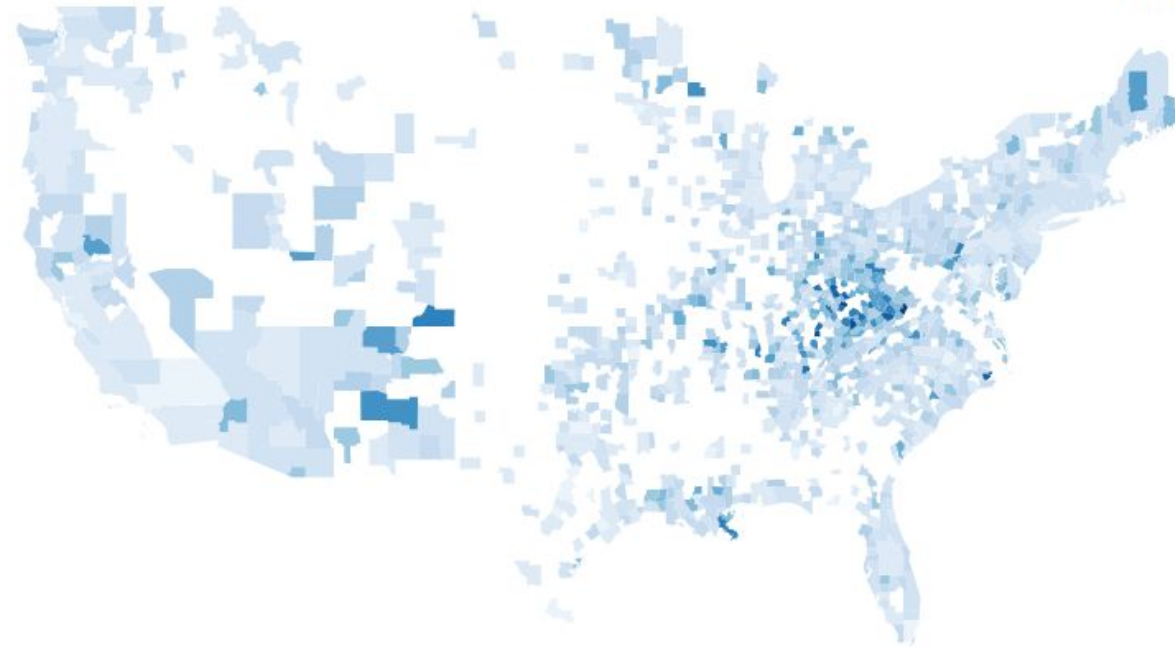
Challenges & Quality Control

- **Incompatible Years**
- **Limited Counties Available**
 - 1999 had 304 counties out of 3,006 U.S. counties
 - 2020 had 1,159 counties
- **Overdose deaths are not specified to demographics**
- **Possibility of leaving out crucial contributing factors**

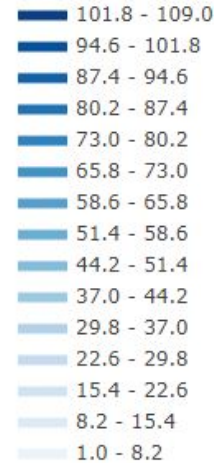


EDA: Location

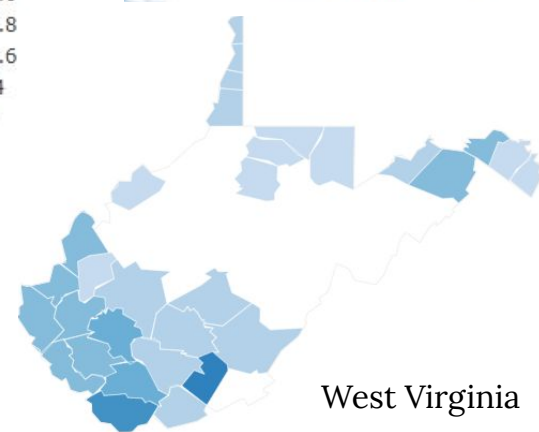
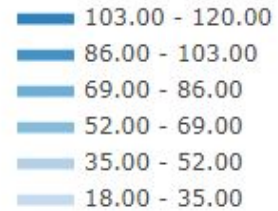
Average Overdose Rates by County (1999-2020)



Avg Overdose Cruder Rates

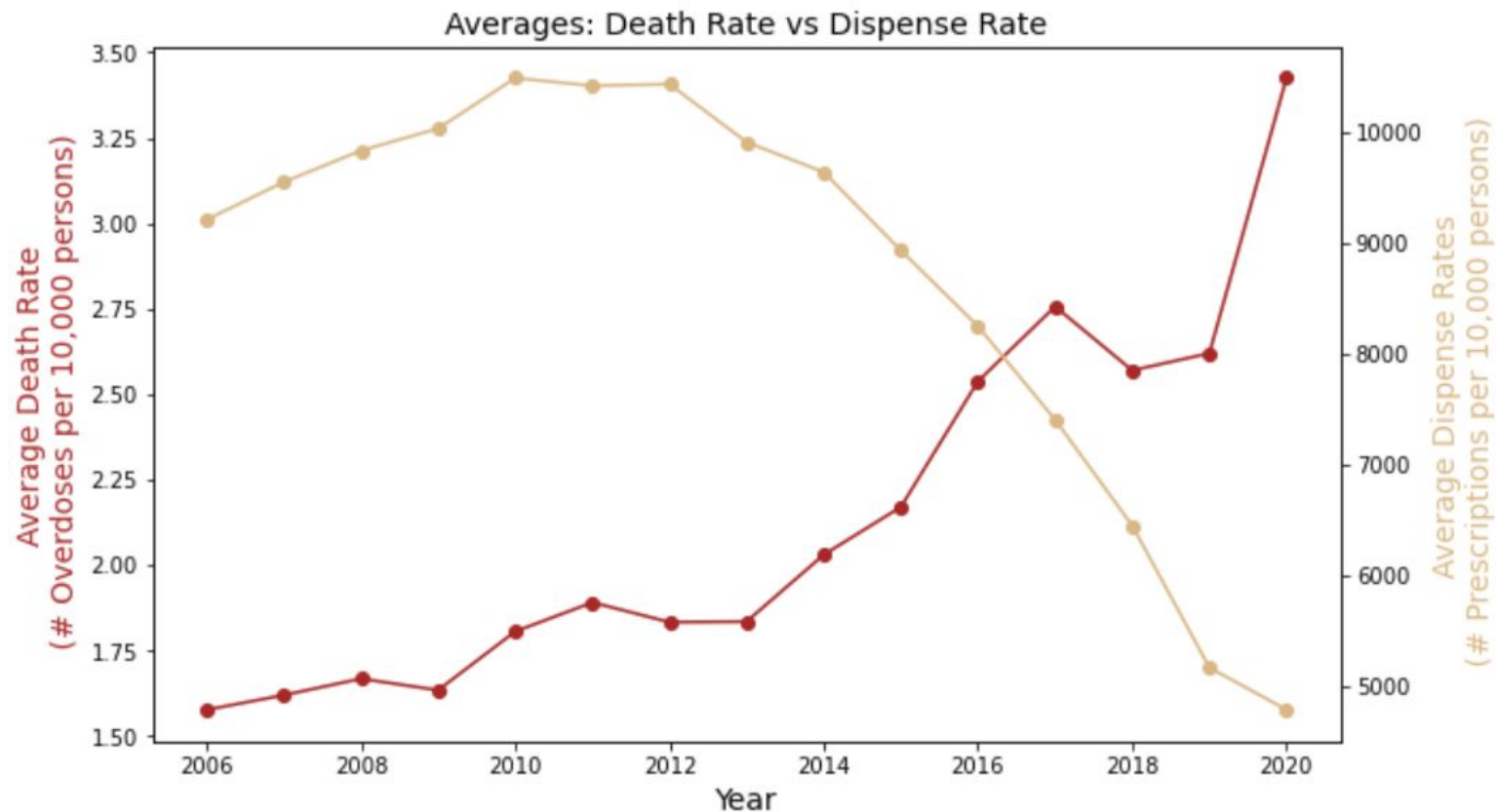


Mean of Cruder Rates by County

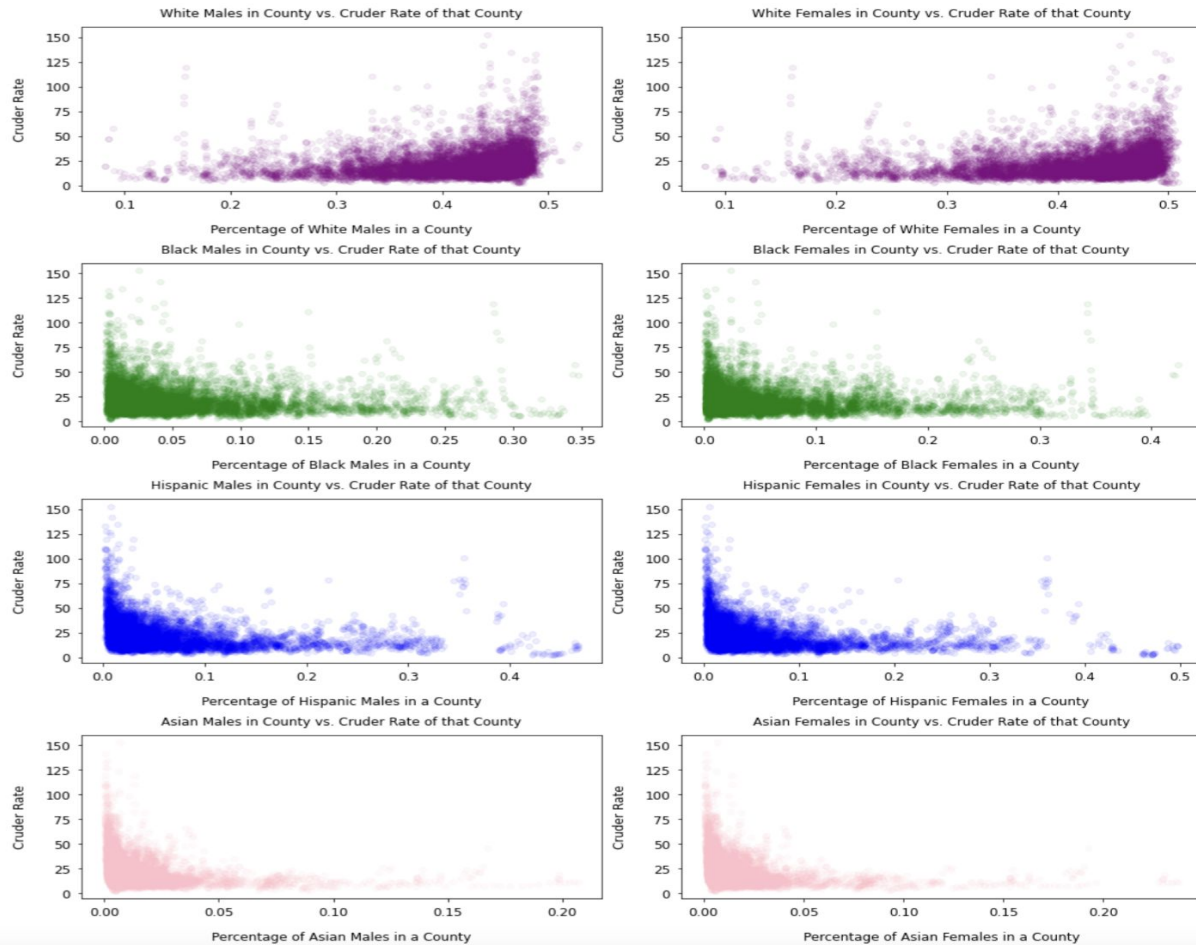


West Virginia

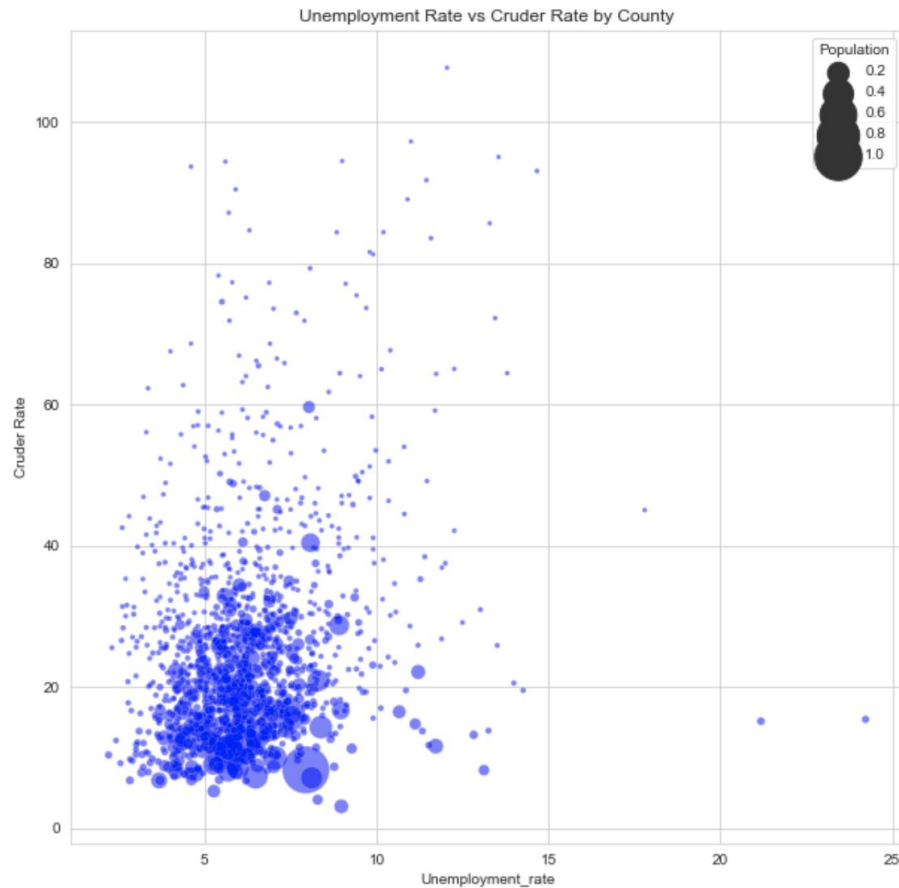
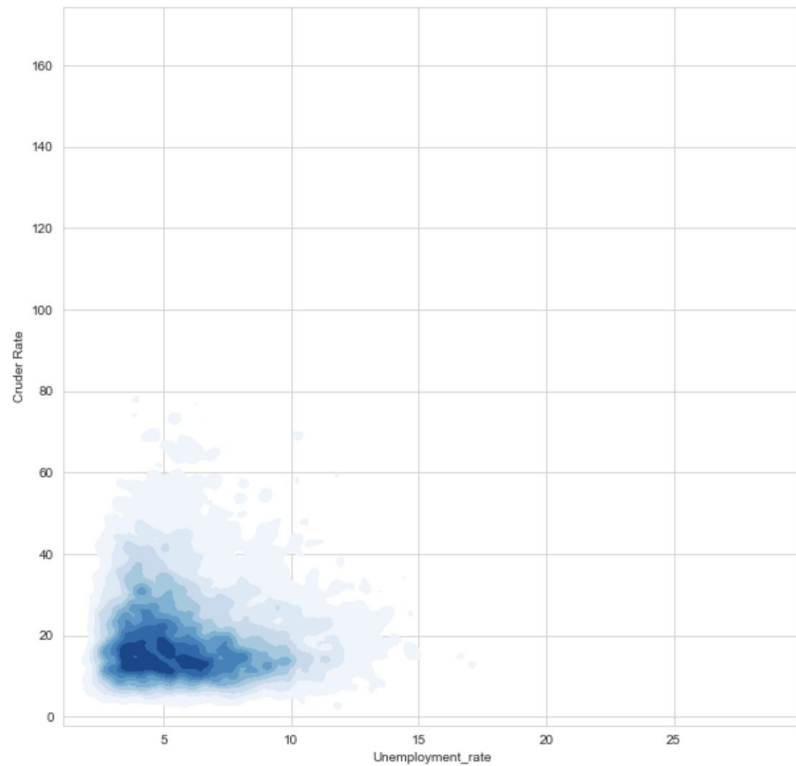
EDA: Dispensary Rates



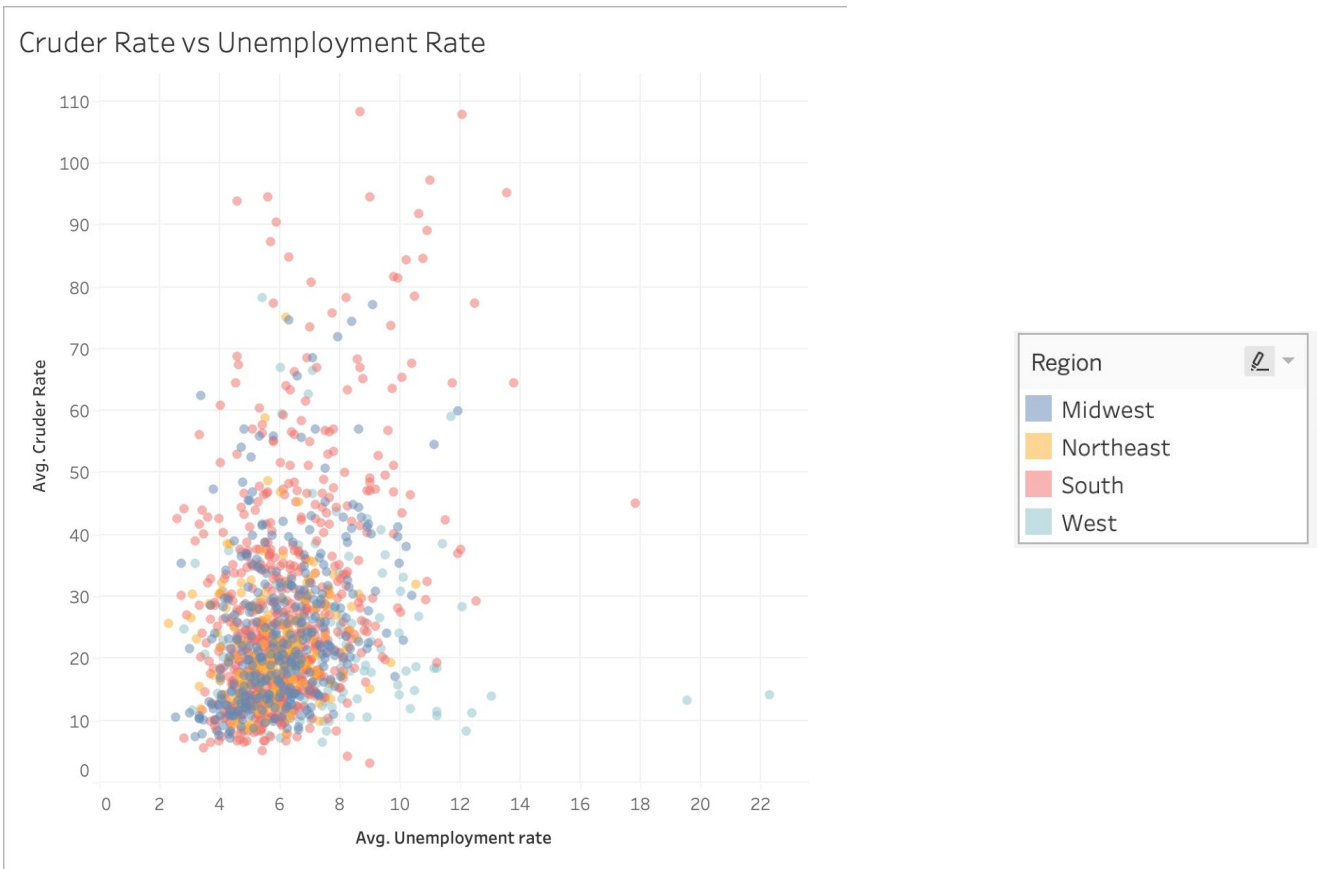
EDA: Demographics



EDA: Unemployment Rates

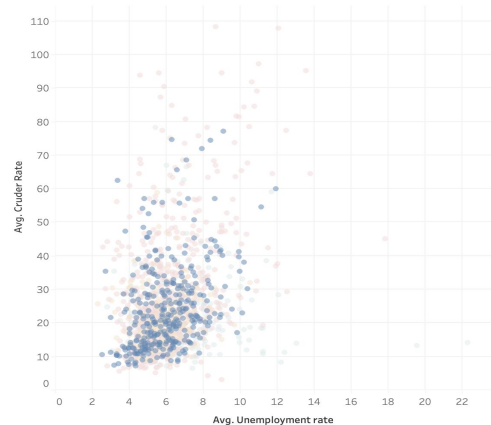


EDA: Unemployment Rate (by county)

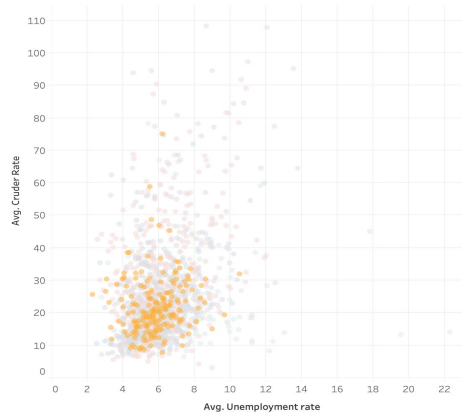


EDA: Unemployment Rate (by county)

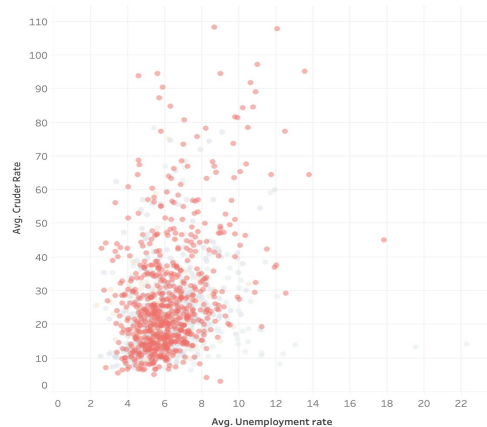
Cruder Rate vs Unemployment Rate



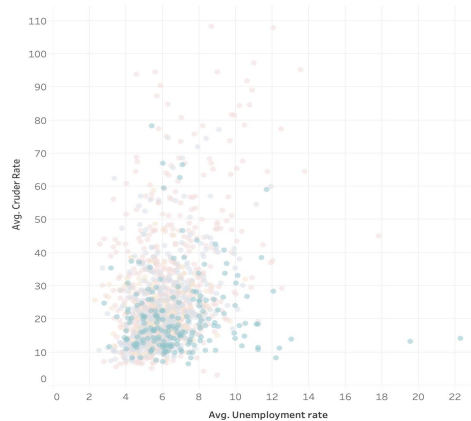
Cruder Rate vs Unemployment Rate



Cruder Rate vs Unemployment Rate



Cruder Rate vs Unemployment Rate



Region



Midwest

Northeast

South

West

Next Steps

- Visualize geospatial aspects
- Research drug policies
- Look for more demographic data
- Start building models
- Determine which factors are important at an individual county level
- Use the most impactful variables in our prediction model