

Introduction

Ohio ranked second in nation for drug overdose deaths in 2017. Synthetic opioids are believed to be the leading cause, especially illegally manufactured fentanyl. As fentanyl is extremely potent and impossible to dose correctly, illegal drug batches involving fentanyl could quickly lead to mass deaths. In this research, we examined the association between drug seizures and drug overdose deaths in Ohio from 2014-2018.

Methods

Two monthly datasets from 2014 to 2018 for Ohio:

- Drug seizures from Ohio Bureau of Criminal Investigation's crime lab*
 - Drug count, weight, chemical composition, law enforcement
- Unintentional drug overdose death dataset from CDC
 - Death count

1. Linear Regression Models:

- Between fentanyl seizures counts and overdose death over time
 - Explore the degree to which seizures lag behind deaths
 - Qualify the strength of the relationship
- Does the weight of the drug seizure matter?
 - Fentanyl more likely in lower weight drug seizures
 - Predict death count from seizure count and weight

2. ARIMA model: factor the past into the linear regression model

3. Kolmogorov-Smirnov tests and histograms: Different types of law enforcement seize different weight distributions

Percentage of Carfentanil/Fentanyl over all Seizures vs Overdose Deaths

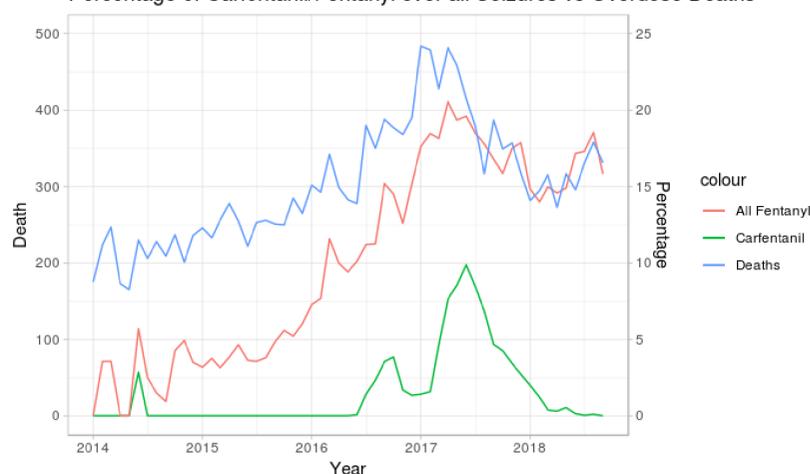


Figure 1: Percentage of carfentanil and fentanyl seizures, and overdose death.

Size of seizure, net weight	All seizures	Fentanyl Found	% seizures with fentanyl
Above 100 grams	4512	57	1.26%
50-100 grams	1682	63	3.74%
20-50 grams	3715	164	4.41%
10-20 grams	3706	242	6.53%
5-10 grams	4883	362	7.41%
2-5 grams	8778	763	8.69%
1-2 grams	8154	852	10.45%
0.5 -1 gram	13080	1531	11.70%
0.24-0.5 gram	22430	2337	10.42%
0.1-0.24 gram	24115	2869	11.90%
< 0.1 gram	23892	5143	21.53%

Table 1: Fentanyl adulteration by seizure size, Ohio, 2014-2018

Results

- Fentanyl-involved drug seizure count and weight explains 78% of variation in deaths in the same month
- Smaller weight seizures have a stronger effect on deaths than large weight seizures
- No significant lag between fentanyl seizures and deaths
- Seizure count and weight are significant even in time series model
- Statistically significant differences between weight distributions of seizures by national, specialized, and local law enforcement

Conclusions

- More crime labs should make data available
- Law enforcement should consider the Iron Law of Prohibition: as drug seizures increase, more potent drugs enter the market
- Local police is the best force at seizing low weight drugs (the most dangerous)
- Marijuana not a threat; legalization may even reduce deaths
- Focus on fentanyl hotspots; data analysis tools can help

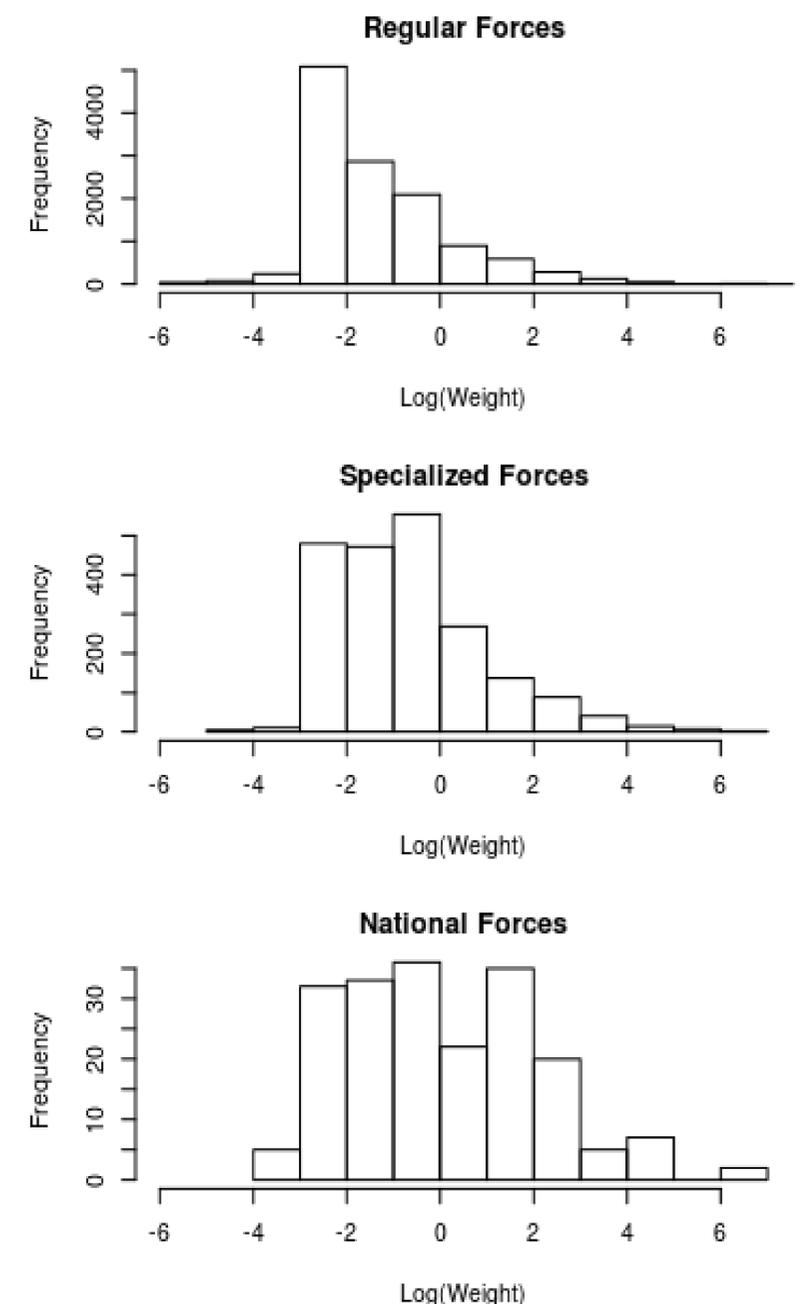


Figure 2: The distribution of the log(Weight) of seizures by each category of force.

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