UofT Tri-Campus Datafest 2021

Can Money Buy Happiness?

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Motivation

Prospective Analytics was interested in analyzing how:

- 5 Medical drug categories are misused based on 5 different income brackets.
  - Drug categories:
    - Pain relievers
    - Opioids
    - Stimulants
    - Sedatives
    - Cannabinoids (THC)
  - Income Brackets (USD):
    - Less $25,000
    - $25,000 - $49,999
    - $50,000 - $74,999
    - $75,000-$99,999
    - $100,000 or more

Note: Data sourced from online survey conducted by the Survey of Non-Medical Use of Prescription Drugs Program from the United States in 2019
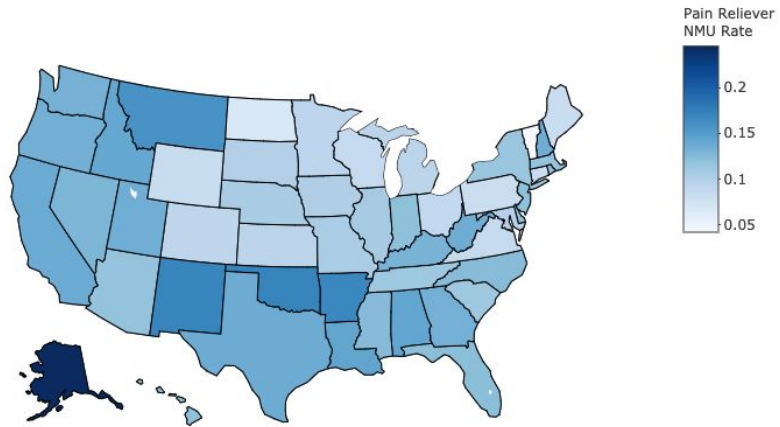
Data Exploration

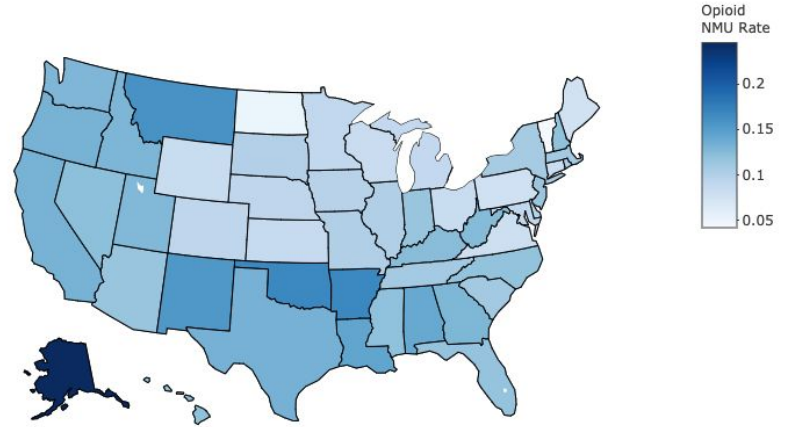2019 US Stimulant Non Medical Use Rate Per State
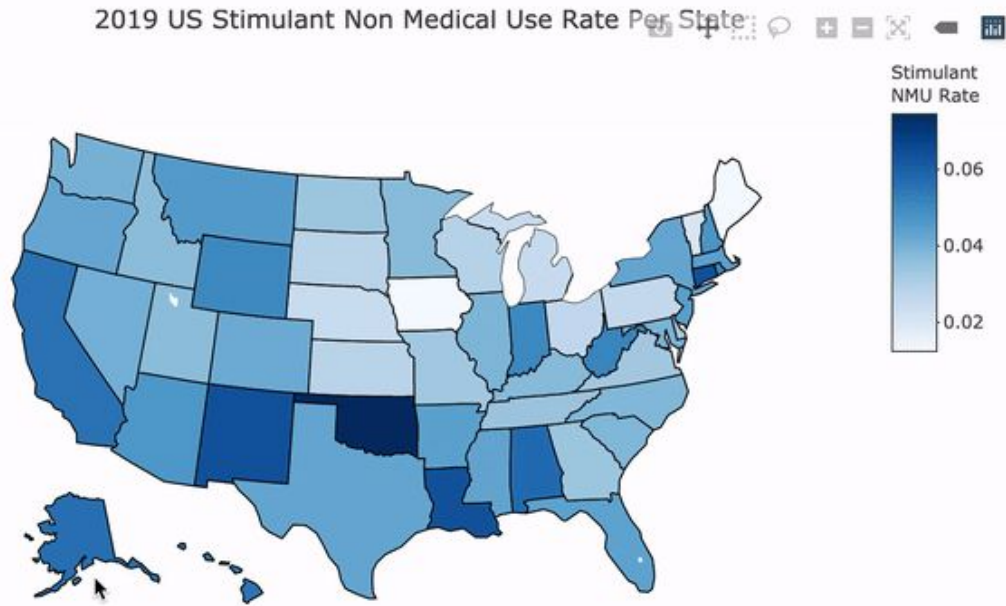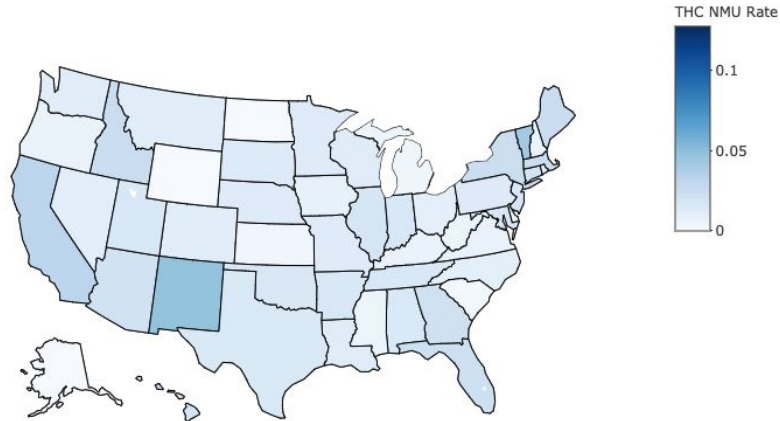
NMU = non-medical use

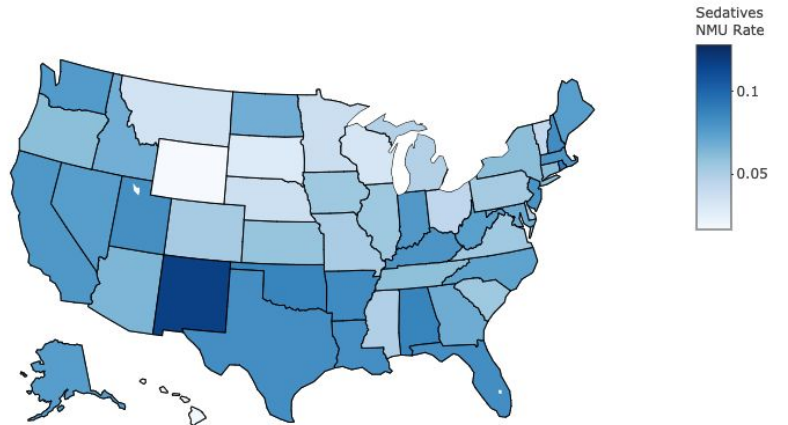2019 US Pain Reliever Non Medical Use Rate Per State

2019 US Opioid Non Medical Use Rate Per State

2019 US THC Non Medical Use Rate Per State

2019 US Sedatives Non Medical Use Rate Per State

NMU = non-medical use

Research Question

What are the effects of income and behavioural/social factors on 2019 drug misuse in the USA?

Methodology

- Logistic regression models
  - Used **non medical use** in each drug category (binary response) as response variable
  - Used income bracket as the explanatory variable
- Further explored relationship between **DAST-10** (screening test) answers for each logistic model's significant coefficients (significant income brackets)
- All analysis was performed using Rstudio with standard R packages

Analysis and Interpretations

Income brackets and NMU

Statistical significance of income brackets and NMU of drug categories

	Less than 25,000	Between 25,000 and 49,999	Between 50,000 and 74,999	Between 75,000 and $99,999	100,000 or more
Pain Relievers	Yes	No	Yes	Yes	Yes
Stimulants	Yes	No	No	No	Yes
Sedatives	Yes	Yes	No	No	Yes
Cannabinoids	Yes	No	No	Yes	No
Opioids	Yes	No	No	No	Yes

Note: baseline statistical significance of 0.05

Pain relievers

Estimates and 95% Confidence Interval for Probability of Pain Reliever NMU

	Estimate	2.5%	97.5%	pval
Less than 25k	0.1301	0.1213	0.1393	0.0000
25k-49.9k	0.1199	0.1017	0.1406	0.0785
50k-74.9k	0.1158	0.0977	0.1365	0.0173
75k-99.9k	0.1168	0.0974	0.1391	0.0475
100k+	0.0982	0.0818	0.1171	0.0000

Note: p-values correspond to those of log-odds

Opioids

Estimates and 95% Confidence Interval for
Probability of Opioid NMU

	Estimate	2.5%	97.5%	pval
Less than 25k	0.1219	0.1133	0.1308	0.0000
25k-49.9k	0.1148	0.0969	0.1353	0.2114
50k-74.9k	0.1113	0.0935	0.1320	0.0739
75k-99.9k	0.1131	0.0939	0.1354	0.1825
100k+	0.0935	0.0775	0.1121	0.0000

Note: p-values correspond to those of log-odds

Stimulants

Estimates and 95% Confidence Interval for
Probability of Stimulant NMU

	Estimate	2.5%	97.5%	pval
Less than 25k	0.0443	0.0390	0.0500	0.0000
25k-49.9k	0.0399	0.0298	0.0531	0.2136
50k-74.9k	0.0415	0.0308	0.0556	0.4557
75k-99.9k	0.0449	0.0328	0.0608	0.8914
100k+	0.0348	0.0253	0.0474	0.0113

Note: p-values correspond to those of log-odds

Sedatives

Estimates and 95% Confidence Interval for
Probability of Sedatives NMU

	Estimate	2.5%	97.5%	pval
Less than 25k	0.0725	0.0658	0.0797	0.0000
25k-49.9k	0.0631	0.0502	0.0787	0.0315
50k-74.9k	0.0720	0.0573	0.0898	0.9020
75k-99.9k	0.0687	0.0537	0.0871	0.4630
100k+	0.0565	0.0442	0.0717	0.0007

Note: p-values correspond to those of log-odds

Cannabinoids (THC)

Estimates and 95% Confidence Interval for
Probability of THC NMU

	Estimate	2.5%	97.5%	pval
Less than 25k	0.0140	0.0111	0.0174	0.0000
25k-49.9k	0.0139	0.0083	0.0232	0.9643
50k-74.9k	0.0179	0.0107	0.0297	0.0917
75k-99.9k	0.0231	0.0137	0.0384	0.0009
100k+	0.0175	0.0103	0.0293	0.1460

Note: p-values correspond to those of log-odds

1. Have you used drugs other than those required for medical reasons?

2. Do you abuse more than one drug at a time?

3. Are you able to stop using drugs when you want to?

5. Do you ever feel bad or guilty about your drug use?

9. Have you ever experienced withdrawal symptoms (felt sick) when you stopped taking drugs?

Number of Significant DAST-10 Questions Per Each Drug Category in Each Income Bracket

Question	Less than 25k	25k-49.999k	50k-74.999k	75k-99.999k	100k or more
DAST_1	5	1	1	1	5
DAST_2	4	1	1	1	4
DAST_3	3	1	1	1	5
DAST_4	1	1	1	0	0
DAST_5	5	1	1	1	4
DAST_6	2	0	1	0	1
DAST_7	0	0	0	0	0
DAST_8	3	1	0	0	1
DAST_9	4	1	1	1	4
DAST_10	2	0	0	0	1

Modified Drug Abuse Screening Test (DAST-10)

Conclusion

Overall:
- Less than $25,000 and $100,000+ brackets show hidden behavioural motives
- Pain relievers affect the most income levels (4/5 levels have significant coefficients)

Limitations:
- DAST-10 insufficient adequacy

Next steps:
- Look into substance abuse for more than one drug
- Create questionnaire to ask more in depth about the degree of consequences related to drug misuse

Potential Question:
- Have you ever had to stop medical treatment as a result of your drug misuse due to financial constraints?
  - Yes = 1
  - No = 0