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Demographics of Opioid Prescriptions

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Demographics of Opioid Prescriptions

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Research Question

- What?
  - Do/how do race and socioeconomic status predict opioid abuse? How do prescription and overprescription, and poverty and unemployment interact across race and SES?
  - How do racial and socioeconomic factors affect initial prescription?
- Why?
  - Opioid epidemic is a pressing issue (spiking overdose deaths)
  - Missions trips Spring and Summer 2018 in Philadelphia
  - Understanding the gravity of the issue
  - Interested in working on the issue, to improve quality of life and find solutions

Literature Review

- Journal of Health Economics: Macroeconomic Conditions and Opioid Abuse (2017)
  - Unemployment rate: proxy for macroeconomic conditions
  - Emergency Department visits and mortality data
  - Change in drug deaths has affected whites, while hispanic and black overdose rates held constant
  - “1% increase in unemployment increases predicted opioid-involved mortality rates by [3.6%]”
- Strength
  - Demographics
- Limitation
  - Mortality data → symptom, not cause
  - Prescription: source of epidemic, gateway

Literature Review (cont'd)

- Brookings Papers on Economic Activity: Where Have All the Workers Gone? (2017)
  - Declining labor force participation rate "has fallen more in U.S. counties where relatively more opioid pain medication is prescribed"
  - Prime-age men are not in the labor force due to pain that causes them to miss work
- Strength
  - Demographic affected: working males
- Limitation
  - Drills down to counties, but not individual demographics
  - Need for more demographic info to determine causal link between opioids and labor force
    - See if the same demographics out of labor force are the ones receiving opioids

Methods

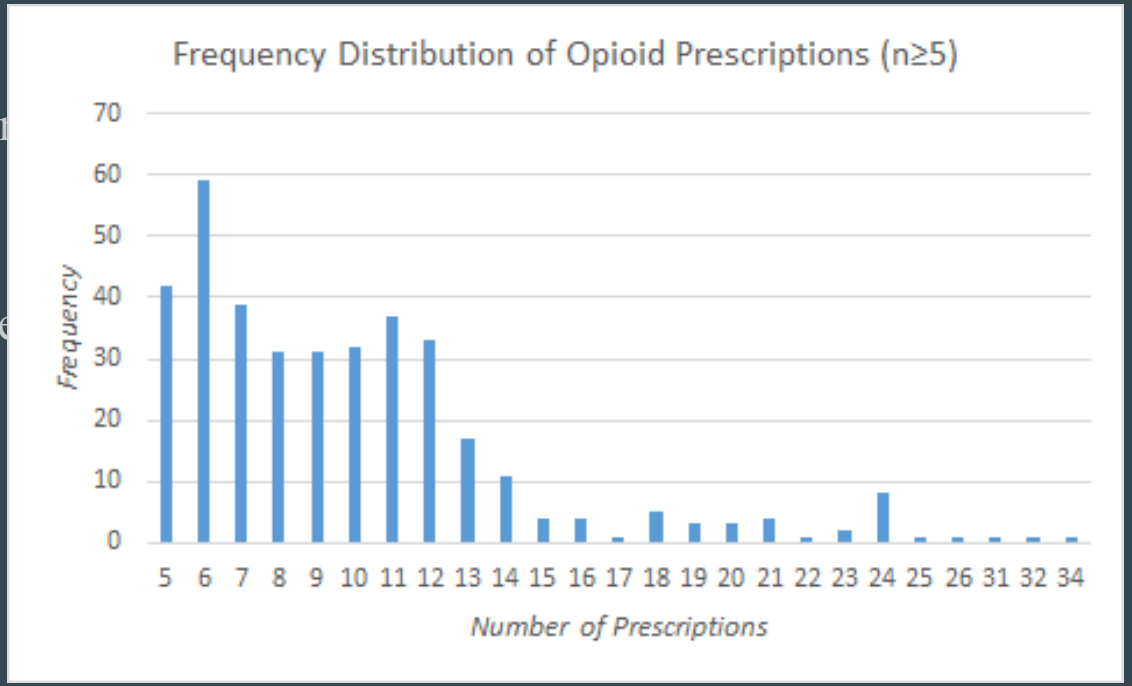
- Yp = f(Xa, Xa2, Xs, Xr, Xi, Xreg, Xe, Xm, Xpov)
  - Where Yp = Patient received Opioid Prescription
  - X= Age, age^2, sex, race, insurance status, region, educ. attainment, military status, poverty index
- Prediction: differences in opioid prescriptions across races and income levels
  - Expect to see white, low education, low income
- Looking at a cause of the opioid epidemic to stop it at the source
- Data Set: Medical Expenditures Panel Survey (2017)
  - Nationwide, representative cross-section
  - Prescribed Medicines
- Variable: Poverty Index: essentially income per capita for households
- Regression Models
  - Linear Probability Model: adults; similar to Ordinary Least Squares, for binary dependent variable
  - Logistic Regression: all survey participants

Descriptive Statistics

Variable	Minimum	Mean	Maximum	Std Dev	Exp. Sign	Variable	Minimum	Mean	Maximum	Std Dev	Exp. Sign
N=31880											
Opioid	0	0.0	1	0.2		doctorate	0	0.0	1	0.1	-
Count	0	0.2	34	1.2		otherdeg	0	0.2	1	0.4	
SEX	0	0.5	1	0.5	-	REGION17	-1	2.7	4	1.0	
RACEV1X	1	1.6	6	1.2		midwest	0	0.2	1	0.4	
black	0	0.2	1	0.4	-	south	0	0.4	1	0.5	+
amerind	0	0.0	1	0.1		west	0	0.3	1	0.4	-
asian	0	0.1	1	0.2		privins	0	0.6	1	0.5	+
mrace	0	0.0	1	0.2		pubins	0	0.3	1	0.5	+
ACTDTY31	-9	2.6	4	1.0	+	POVCAT17	1	3.4	5	1.5	
militarg	0	0.0	1	0.0	+	poor	0	0.2	1	0.4	+
HIDEG	-9	4.3	8	2.7		nearpoor	0	0.1	1	0.2	+
nodegree	0	0.1	1	0.4	+	lowinc	0	0.2	1	0.4	-
GED	0	0.0	1	0.2		highinc	0	0.3	1	0.5	+
bachelors	0	0.1	1	0.3	-	AGE17X	-1	37.4	85	23.4	+
masters	0	0.1	1	0.2	-	agesq	0	1948.0	7225	1918.9	

Descriptive Statistic Observations

- One outlier in the data set had 34 opioid prescriptions in the year 2017
- Average: 0.2 prescriptions
- Relative spike at 24; could be explained by allocation of two prescriptions/month



Regression Statistics (Linear Probability Model)

- Dependent Variable: Received Opioid Prescription (Y/N) (Dummy Variable)
- Observations: Adults only
- R-square: can be explained by cross-sectional data
    - More years of data would dramatically improve R-square

R-Square	0.0236
Adj R-Sq	0.0226
F Value	24.2300
Pr > F	<.0001
Number of Observations	23091.0000

Results

Independent Variables	Model: Linear	Model: Logit	Model: Logit
	Parameter Estimate	Estimate	Odds Ratio Estimates
Intercept	-0.0665	-6.8726	
male	-0.0148	-0.3342	0.716
black	-0.0038	-0.0685	0.934
american indian	0.0026	0.0218	1.022
asian	-0.0267	-1.0201	0.361
mixedrace	-0.0050	-0.1053	0.900
military	0.0024	-0.0486	0.953
nodegree	-0.0083	-0.1094	0.896
GED	0.0161	0.3059	1.358
bachelors	-0.0090	-0.1692	0.844
masters	-0.0159	-0.3497	0.705
doctorate	-0.0060	-0.0864	0.917
otherdeg	0.0083	0.1810	1.198
midwest	0.0062	0.0302	1.031
south	0.0100	0.0831	1.087
west	-0.0060	-0.2126	0.809
private insurance	0.0279	0.9129	2.491
public insurance	0.0471	1.1907	3.289
poor	0.0091	0.1647	1.179
nearpoor	0.0210	0.3828	1.466
lowinc	0.0069	0.1433	1.154
highinc	-0.0068	-0.1452	0.865
age	0.0029	0.1022	1.108
agesq	0.0000	-0.0007	0.999

1% significance level
5% significance level
10% significance level

Interpreting Results (Linear Probability Model)

- Gender: males are 1.5% less likely than females to receive an opioid prescription
  - Surprising as the opioid epidemic has been reported as mainly a white male problem
- Race/Ethnicity: Asians are 2.67% less likely than whites to receive a prescription
- Educational attainment: Bachelor's degree 0.9% less likely, Master's 1.59% less likely
- Region: South 1% more likely to receive opioid prescription than Northeast

Interpreting Results cont'd (Linear Probability Model)

- Military Service: positive but not significant
- Poverty Category: Near-poor 2.1% more likely than middle income to receive Rx
- Age: Positive and significant; aging people might have more need for opioids
- Public Insurance: 4.71% more likely to receive opioid prescription than someone without insurance
- Private Insurance: 2.79% more likely to receive opioid prescription than without
    - Insurance coverage gives greater access to doctors and prescriptions
    - Potential need to review insurance prescription policies

Interpreting Results (Logistic Regression)

- Vast majority of same variables significant
- Regression statistics (model fit)
  - Akaike Information Criterion: 10395.4
  - Schwarz Criterion: 10403.77
- Insurance variables again significant at 1% level
  - Odds Ratio Estimates: Private Insurance 2.491; Public Insurance 3.289
  - To find the change in odds, subtract 1 from odds ratio estimates
  - Interpretation: the odds that someone with private insurance will receive an opioid prescription are 149% higher than someone without insurance; public insurance 229% higher than without

Conclusions

- Key takeaways
  - Public Insurance holders more likely to be prescribed an opioid
  - Demographics of those receiving opioids are largely white
  - Questioning assumption of problem largely being male
- Further research
  - Multiple years of data to include fixed effects over time
  - Drill down into high-frequency patients (34)
  - Add more variables (unemployment, pain level experienced)
  - Look state- or county-level for specific local demographics
- Applications
  - Government and healthcare sectors as they try to combat the opioid epidemic: knowing who is at risk will allow for better preventive care and more careful prescribing
  - Insurance providers evaluate opioid prescription policies

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