Statistics for "**Prescribing of Opioids among Medical Professionals"**

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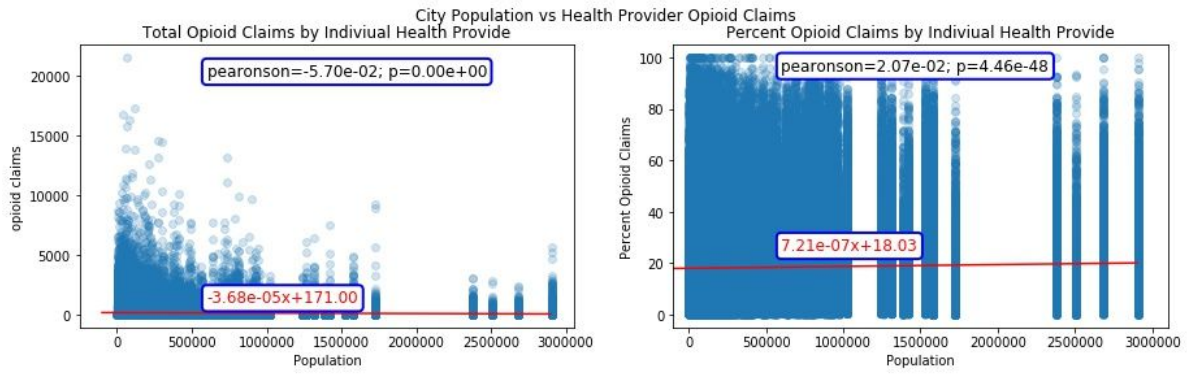
Besides speciality, there is a question on what other factors contribute to the amount of opioid prescribed. Including more important factors in a machine learning algorithm may increase the predictable capability of the model. City's population are correlated with its total opioid claims and weakly (but statistically significantly) with opioid claims percentages but it as not be established that the city population is a predictor of the amount of opioid claims of an individual healthcare provider. In this section, the correlation between city population and city temperature to amount of opioid claims will examined. Because lower temperatures may make the symptoms opioids treat worst, it is plausible that temperature may be a useful attribute to opioid claim outlier detection.

1. **Correlation Between Population and Number Opioid Claims by Healthcare Provider**

In Figure 1, the correlation with number of opioid claims and percentage opioid claims of a healthcare provider to city population was examined. Both were weakly correlated with population but were statistically significant ($p < 0.05$). Surprisingly the total number of claims negatively correlated. Because the correlation is weak, the ability of population to detect outliers opioid claims by a healthcare provider is suspect.

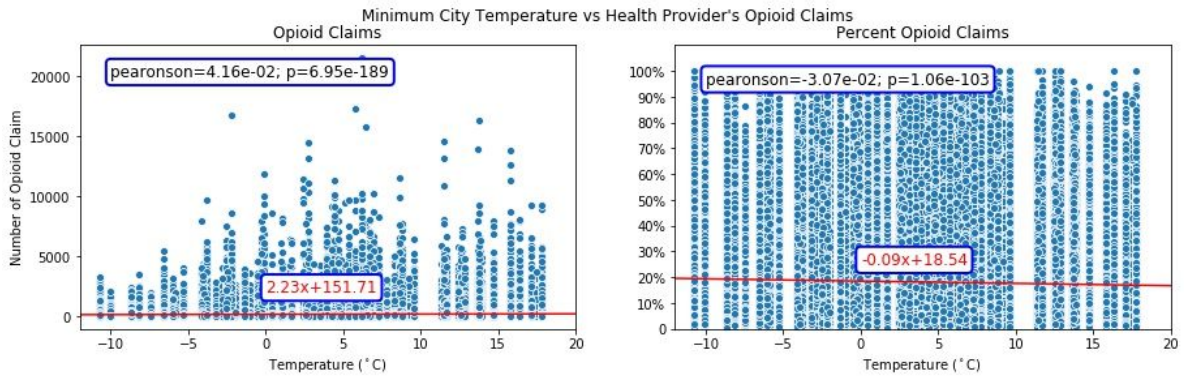
Figure 1) Opioid claims of individual healthcare provider by population. On the left, the number of opioid claims by individual versus city population scatter plot is shown. On the right, the percent opioids claims vs city population scatter plot is shown.



2. Correlation Between Temperature and Opioid Claims by Healthcare provider

In Figure 2, the correlation between lowest month average temperature of 2013 with both the the number opioid claim and the precent opioid claim of the healthcare provider is examined. Lowest month average temperature is weakly positively correlated with number of opioid claims and weakly negative with percent opioid claims. Both correlations were statistically significant ($p < 0.05$) but similar to population because it is weak, the predictability of temperature in detecting opioid claim outliers is suspect. Similar plot using mean and highest average temperature of 2013 were also produced with similar results.

Figure 2 Percent opioid claims of individual healthcare provider versus the lowers month average city temperature of 2013. On the left, a scatter plot of opioid claims by individual healthcare provider versus lowest city temperature is shown. The scatter plot on the right uses percentage opioid claims instead of opioid claims.



Conclusion: With statistical significance, both city population and temperature were correlated with opioid claims. Due to the correlation being weak, the importance of these attributes is questionable.