Project Proposal

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2/26/2018

Project Title

Geographic Illustration of Opioid Overdoses from 1999 to 2014

Team members and work:

I will be working alone on this project. All the tasks for this project will be completed by me.

Problem Statement and Planned Representation Technique

Over the past few years, the United States has been experiencing an increase in opioid addition and overdoses. As more data is collected, it is becoming evident that the United States is experiencing an epidemic related to opioid use. In this project, I will be using United States opioid overdose data collected from 1999 to 2014. The overall goal of this project plans to examine the geographic distribution of opioid related deaths over time and determine what states are disproportionately burdened by opioid deaths. In order to accomplish this goal, I plan to create 3 different types of maps.

The first map will be a proportional symbol map. The reason I would like to use this type of map is to explore what the raw opioid overdose totals tell us about the geographic distribution of these deaths. In addition, I would like to explore how this pattern is seen in a second map, a dorling cartogram map. Lastly, I plan to create a map that explores the percent of change in the number of opioid overdoses for each state between the year 1999 and 2014. I will use a dorling cartogram map to display this information.

In order to display the change of opioid overdose over time, the first two maps proposed will use an interactive component that allows users to examine the same map with data from 1999 to 2014. The last map will display information comparing the percent of change from 1999 to 2014, but allow users to change the years being compared.

Motivation

With the growing interest in what is now being called the opioid epidemic, many people have begun to create plots that display opioid use and overdoses. In the past, this data has mainly been displayed with standardized rates. By using a proportional symbol map and a dorling cartogram map I hope to compare the two maps and the patterns they display. In addition, by creating a map that displays the percentage change of opioid overdoses between time period, I hope to be able to determine which states are seeing an increase/decrease in opioid overdoses.

Data

Data Reference

The data I will be using was downloaded from the following website: https://data.world/health/opioid-overdose-deaths. Overall the individual who created this data used data from CDC's WONDER database which defined opioid overdose deaths as a death where the underlying cause was drug overdose and had a ICD-10 code for opium, heroin, other opioids, methadone, other synthetic narcotics, and other and unspecified narcotics.

Data limitation

The main limitation for this data is that certain totals are hidden due to suppression constraints where we cannot present or publish death counts of nine or fewer. This also includes death rates based on counts of nine or fewer. This restriction is included to reduce the likelihood of identifying any person included in this data.

Snapshot of Data

Below is a display of the first 6 lines of the data. From this display, we see that the data I will be using contains the following variables: state, year, deaths, population, crude_rate, crude_rate_lower_95_confidence_interval, crude_rate_upper_95_confidence_interval, prescriptions_dispensed_by_us_retailers_in_that_year_millions.

```
setwd("~/Documents/Spring2018/Geographic Visualization/Final Project/Opioid Overdoses 1999 to 2014/data
require('ggplot2')
```

```
## Loading required package: ggplot2
```

```
OpioidOverdoses = read.csv(file = "OpioidOverdose_DataWorld_02262018.csv")
head(OpioidOverdoses)
```

```
##     state year deaths population crude_rate
## 1 Alabama 1999     39    4430141        0.9
## 2 Alabama 2000     46    4447100          1
## 3 Alabama 2001     67    4467634        1.5
## 4 Alabama 2002     75    4480089        1.7
## 5 Alabama 2003     54    4503491        1.2
## 6 Alabama 2004     92    4530729          2
##   crude_rate_lower_95_confidence_interval
## 1                                     0.6
## 2                                     0.8
## 3                                     1.2
## 4                                     1.3
## 5                                     0.9
## 6                                     1.6
##   crude_rate_upper_95_confidence_interval
## 1                                     1.2
## 2                                     1.4
## 3                                     1.9
## 4                                     2.1
## 5                                     1.6
## 6                                     2.5
##   prescriptions_dispensed_by_us_retailers_in_that_year_millions
```

```
## 1                                                    116
## 2                                                    126
## 3                                                    138
## 4                                                    142
## 5                                                    149
## 6                                                    155
```

Description of Variables

Variable Name	Variable Description	Variable Type
state	The state the data was collected.	character/string
year	The year the data was collected for that state.	YYYY
deaths	The number of opioid related overdoses for each state and year.	integer
population	The total population of a state given a year.	integer
crude_rate	The total number of deaths in a state divided by the total population of the state given by a year and multiplied by 100,000	integer/100,000
crude_rate_lower _95_confidence _interval	Provides the lower 95% confidence interval for the crude_rate	integer/100,000
crude_rate_upper _95_confidence _interval	Provides the upper 95% confidence interval for the crude_rate	integer/100,000
prescriptions _dispensed_by_us _retailers_in _that_year _millions	The total number of Opioid prescriptions dispensed by US retailers in that year and state	integer/millions

Usefulness of data and data transformation/modification

From the data, I have all the information I would need to create the maps I outlined in the problem statement. The "deaths" variable provides the raw totals I want to plot in the proportional symbols and dorling cartogram maps. In order to work on the last plot I outlined earlier, I need calculate the percent difference in opioid related overdoses between 2014 and 1999. This would require that I divide thedeaths from 2014 by the deaths in 1999. For this calculation, I have to decide whether or not to use the crude death rates or the raw totals. Currently I plan to use the crude death rates in order to control for the change in the states total population size over time.

Related Work

1. Proportional Symbol Map:

- http://urbanobservatory.maps.arcgis.com/apps/Cascade/index.html?appid=f86499d99e4340b68229eaccfb02b29f

2. Percent Increase Map:

- https://www.cdc.gov/drugoverdose/data/statedeaths.html