

Climate Solutions

An analysis of US efforts to prevent a climate crisis



Our Climate Progress Questions: Our Data Sources:

- 1) Is the US successfully transitioning to clean energy?
- 2) Have electric car sales made an impact on air quality in the US?
- 3) Does increased educational attainment lead to stabilization of population in the US?
- 4) Have COVID-19 lockdowns affected air quality in the US?

- Energy
 - U.S. Energy Information Administration
- Covid
 - Google COVID mobility data
 - A The Guardian article
- Electric vehicles and air quality
 - US Department of Energy
 - Alternative Fuels Data Center
 - Energy Efficiency and Renewable Energy
 - EPA
- Population and education
 - [Rahwa's sources]

Exploratory Data Analysis And Cleanup Process

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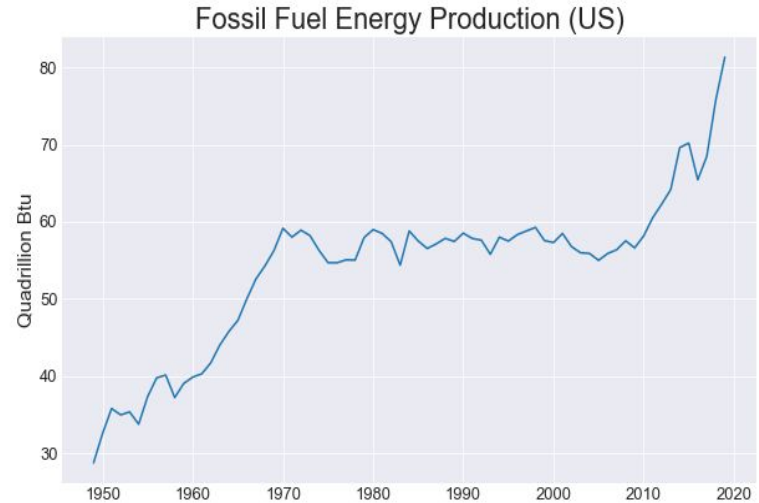
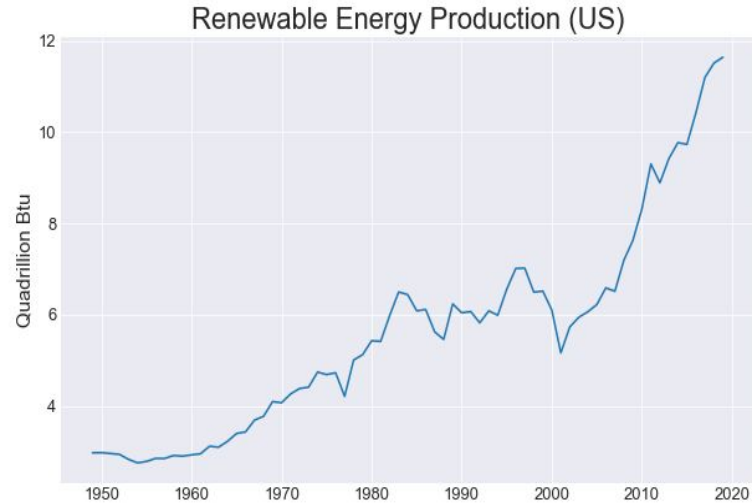
A lesson on complicated data sources and the disparity in record keeping among governmental organizations.

Is America Successfully Transitioning To Clean Energy?

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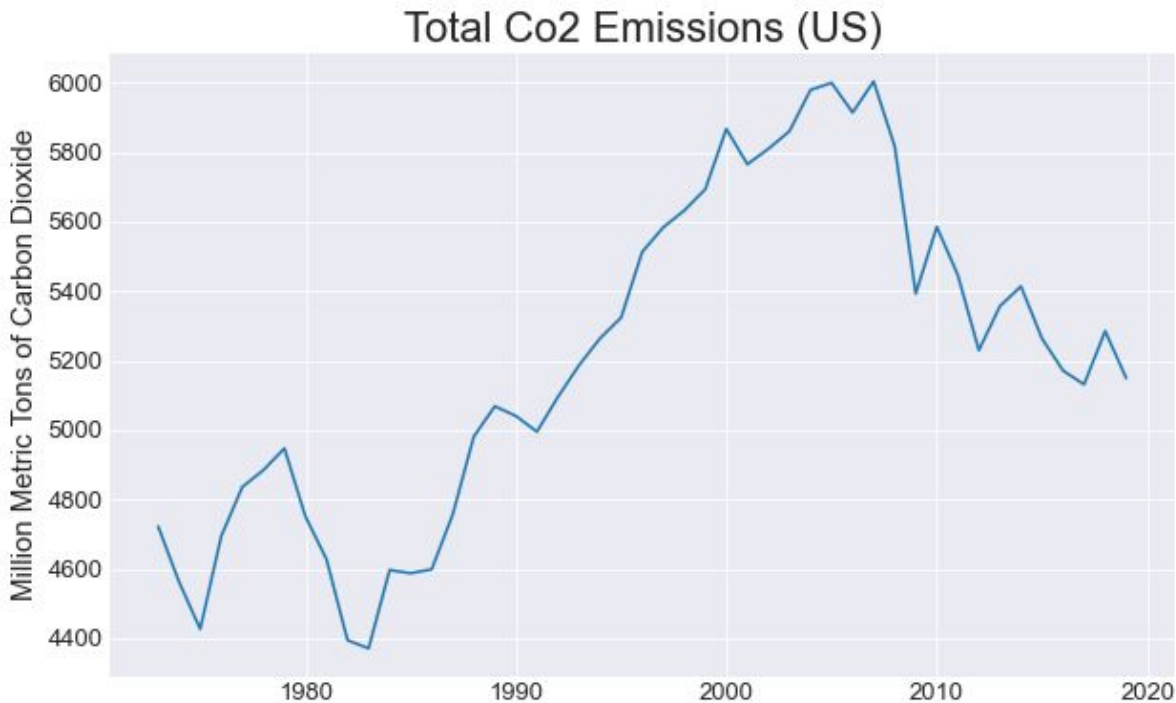
An analysis of energy production and Co2 emissions in the
United States.

Energy Production



- Renewable energy production has more than doubled since 2001.
 - Adding around 6.5 Quadrillion Btu.
- However, fossil fuel production has outpaced that growth.
 - Growing by over 20 Quadrillion Btu since 2010

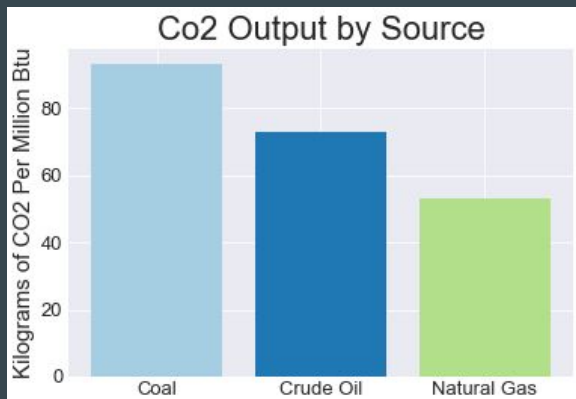
Some Good News



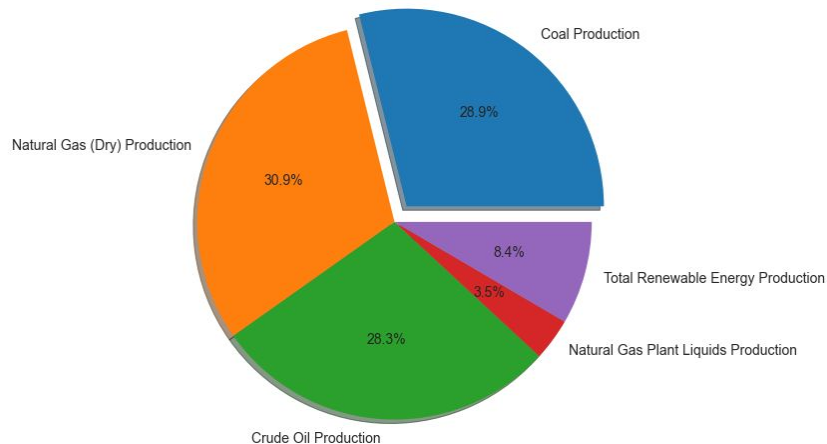
- Overall Co2 emissions have been dropping since around 2005

Analysis

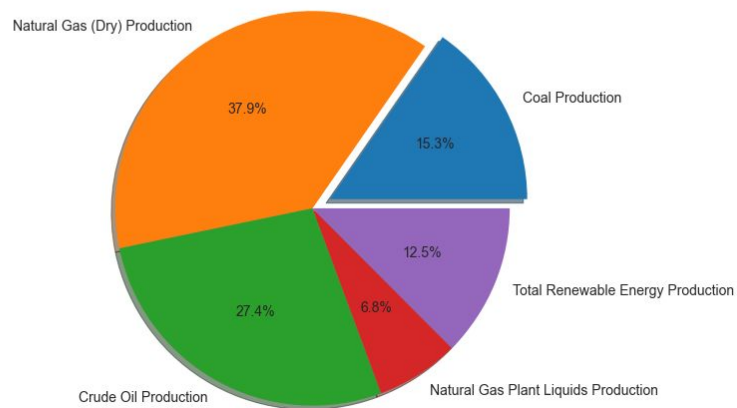
- The US remains a power hungry nation.
- Fossil fuel still accounts for the lion's share of our energy production.
 - However, we are transitioning away from coal to cleaner fossil alternatives
- Renewable energy has grown quickly over the last decade but needs to accelerate if it is to outpace fossil fuel growth.



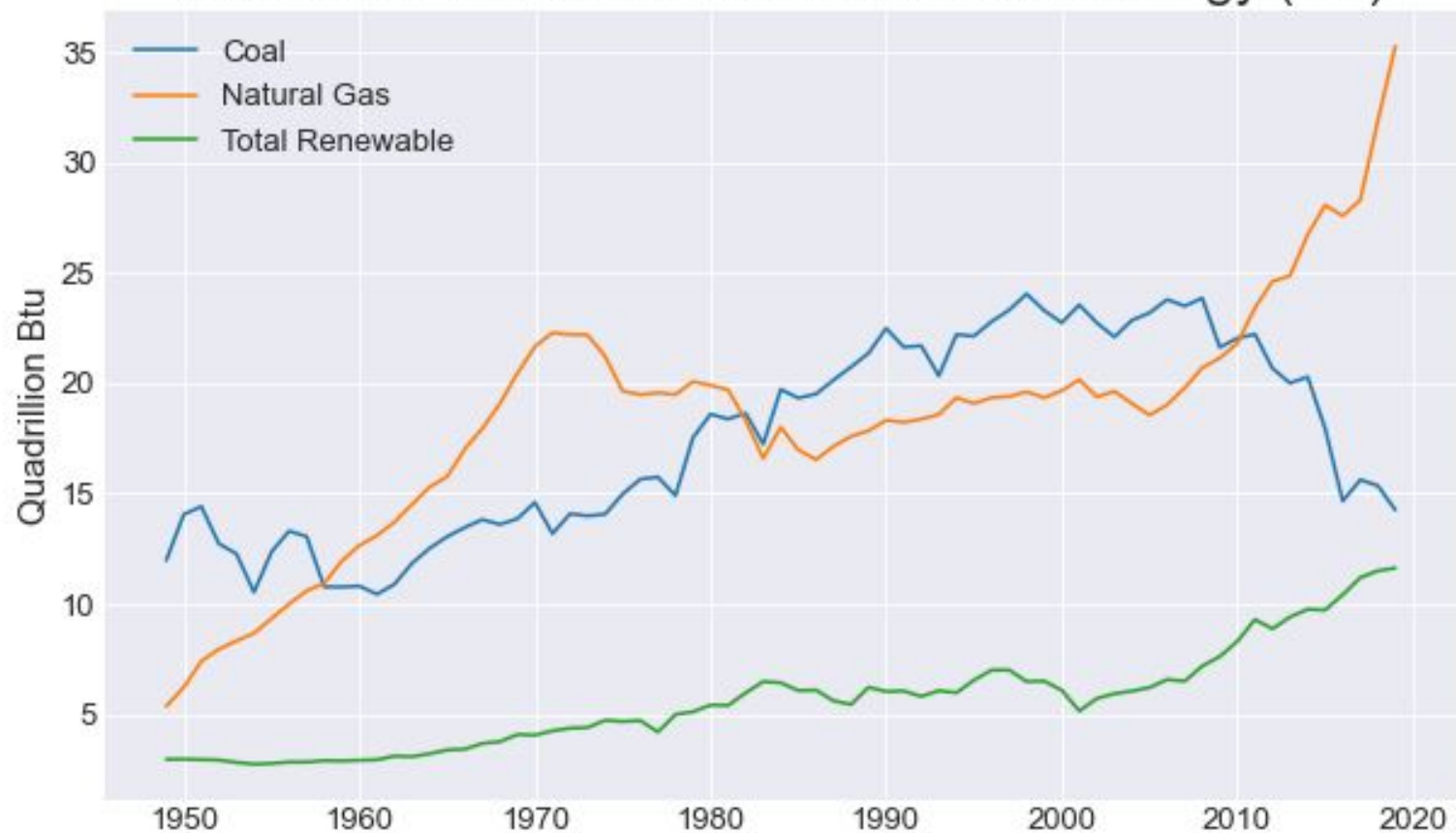
Total US Energy Production by Source (1970)



Total US Energy Production by Source (2019)



Dominant Fossils Fuels vs Renewable Energy (US)



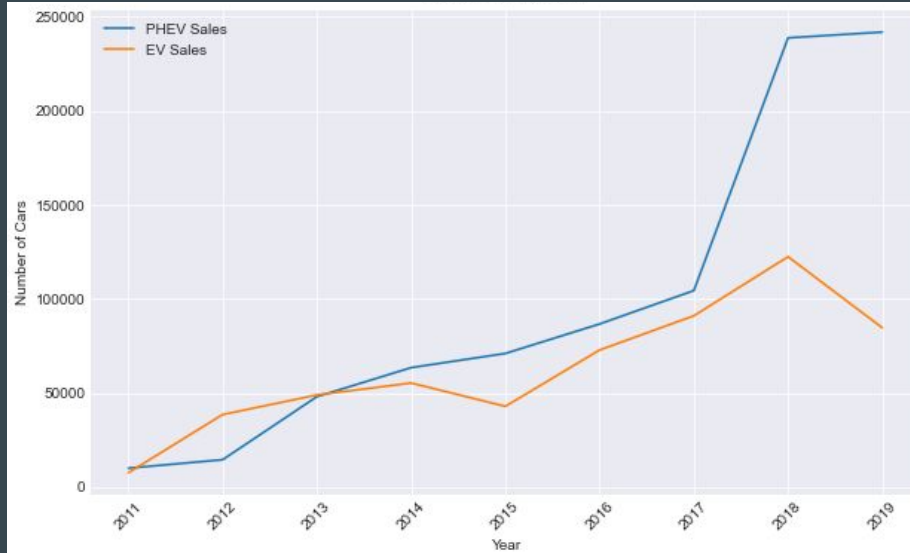
Has Electric Car Sales Made an Impact on Air Quality in the United States?

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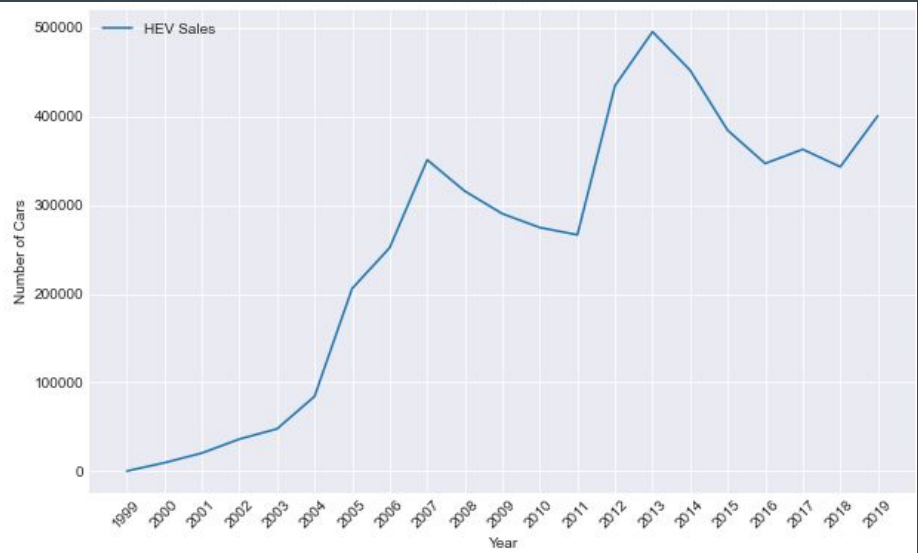
An analysis of PHEV, EV and HEV Sales and Air Quality in the
United States.

PHEV, HEV and EV Car Sale Data (U.S.)

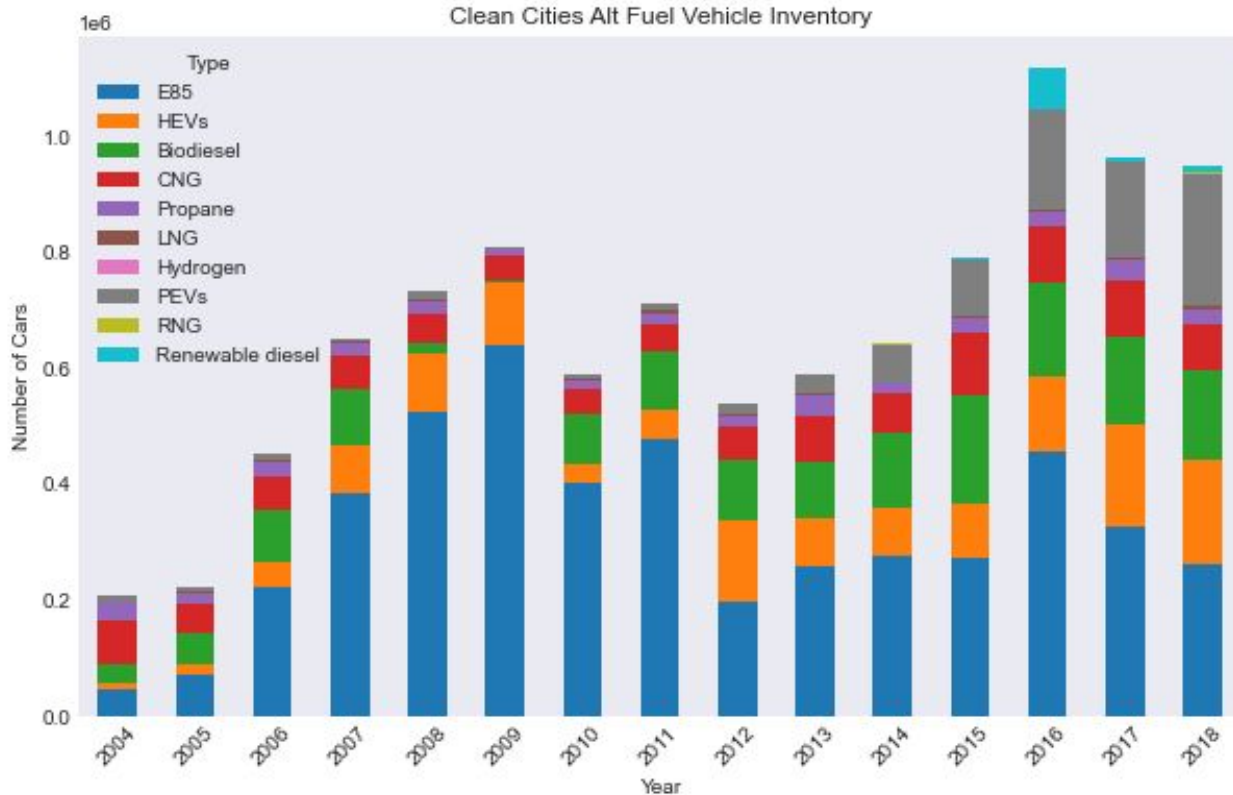
PHEV and EV Sales



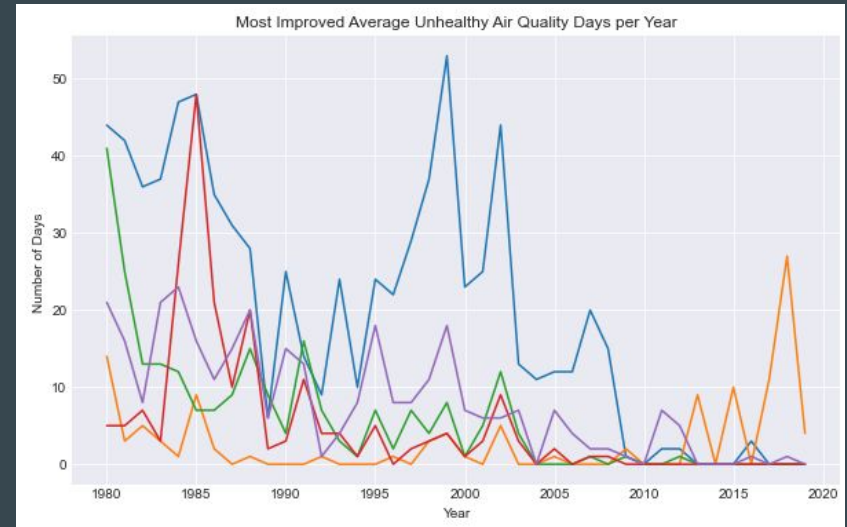
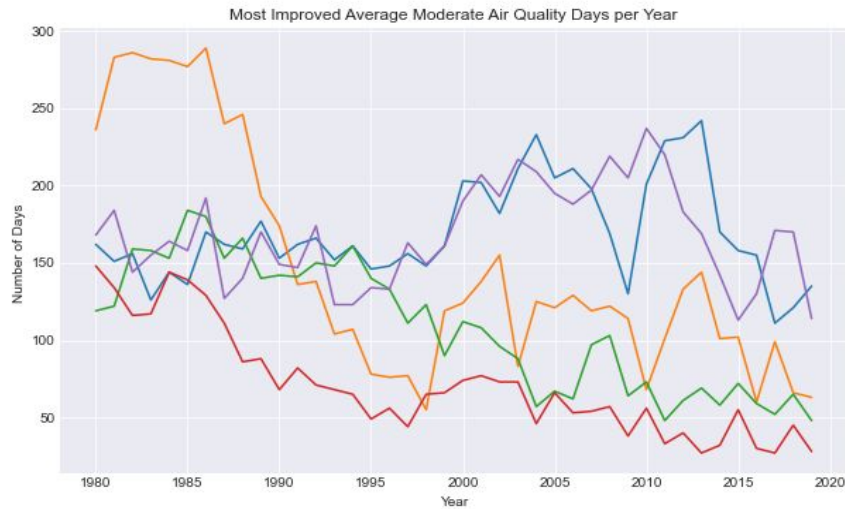
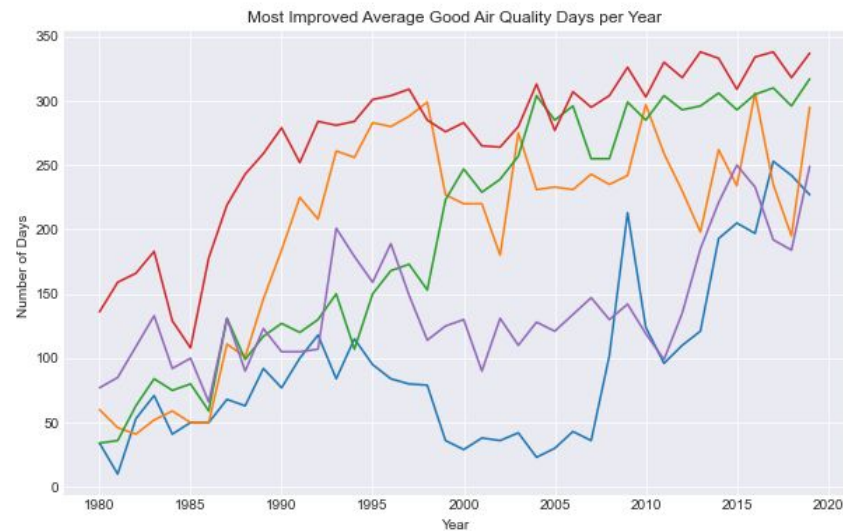
HEV Sales



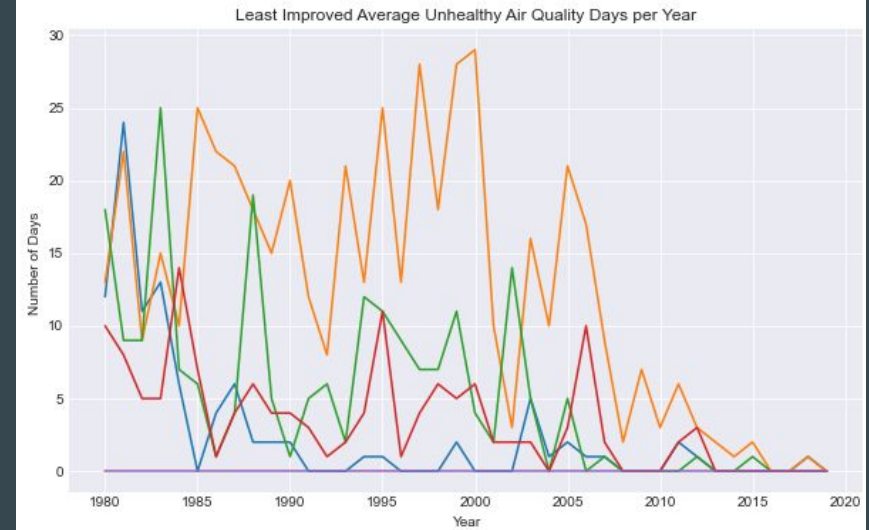
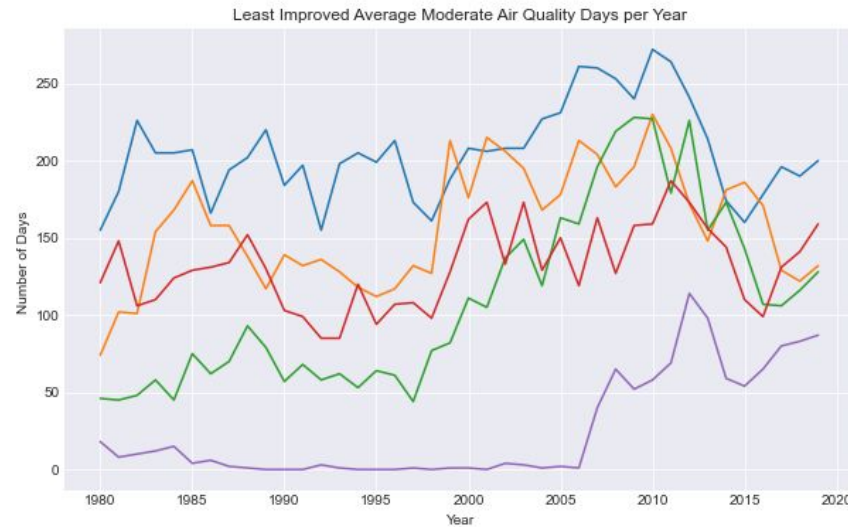
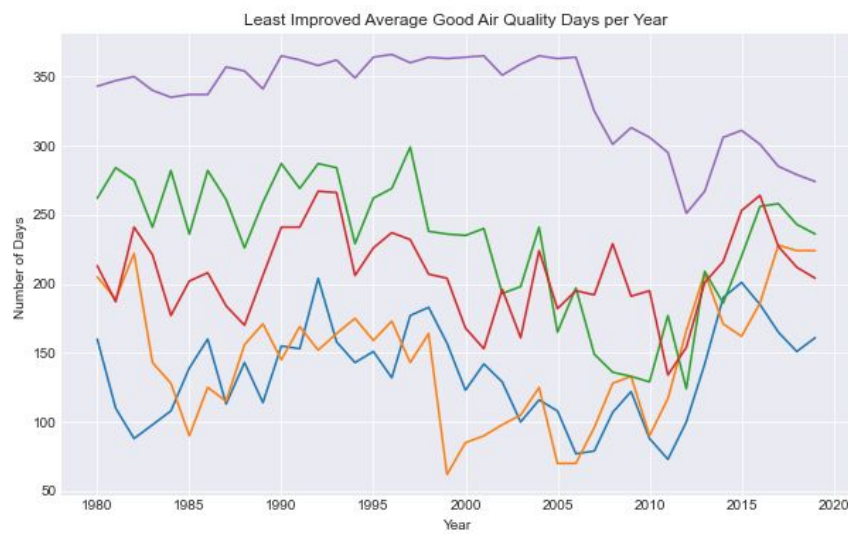
Cars with Alternative Fuel in Clean Cities Data



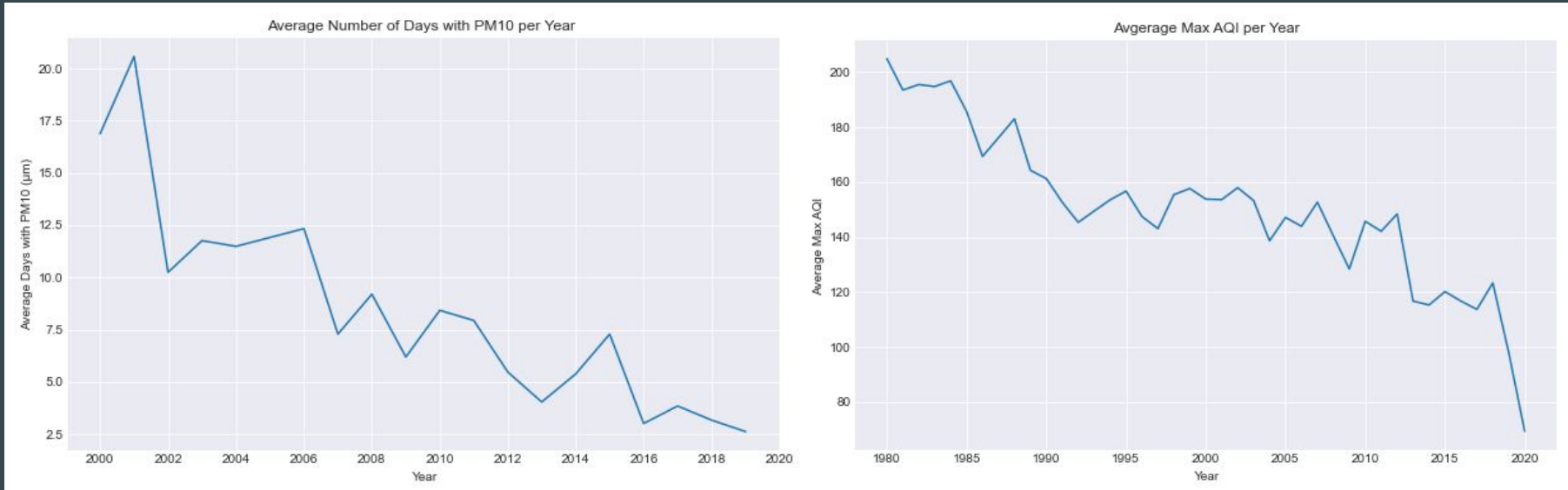
5 Most Improved Average Number of Days of Good, Moderate and Unhealthy Air Quality



5 Least Improved Average Number of Days of Good, Moderate and Unhealthy Air Quality



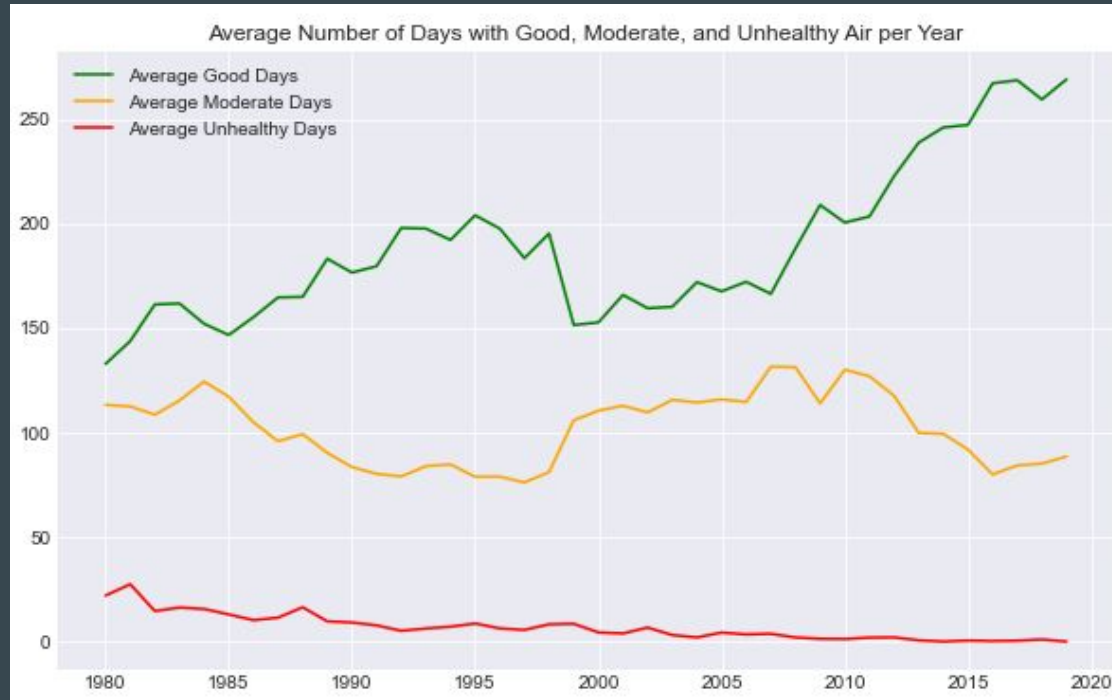
Air Quality Yearly Averages



*note, 2020 data is incomplete

Electric Vehicle and Air Quality Analysis

- Overall, air quality from has improved.
- EV and other vehicles using alternative, renewable sources for fuel have increased in popularity since initial introduction.
- Although the average number of good air quality days has an increasing trendline, the average number of unhealthy air quality days remains relatively consistent.

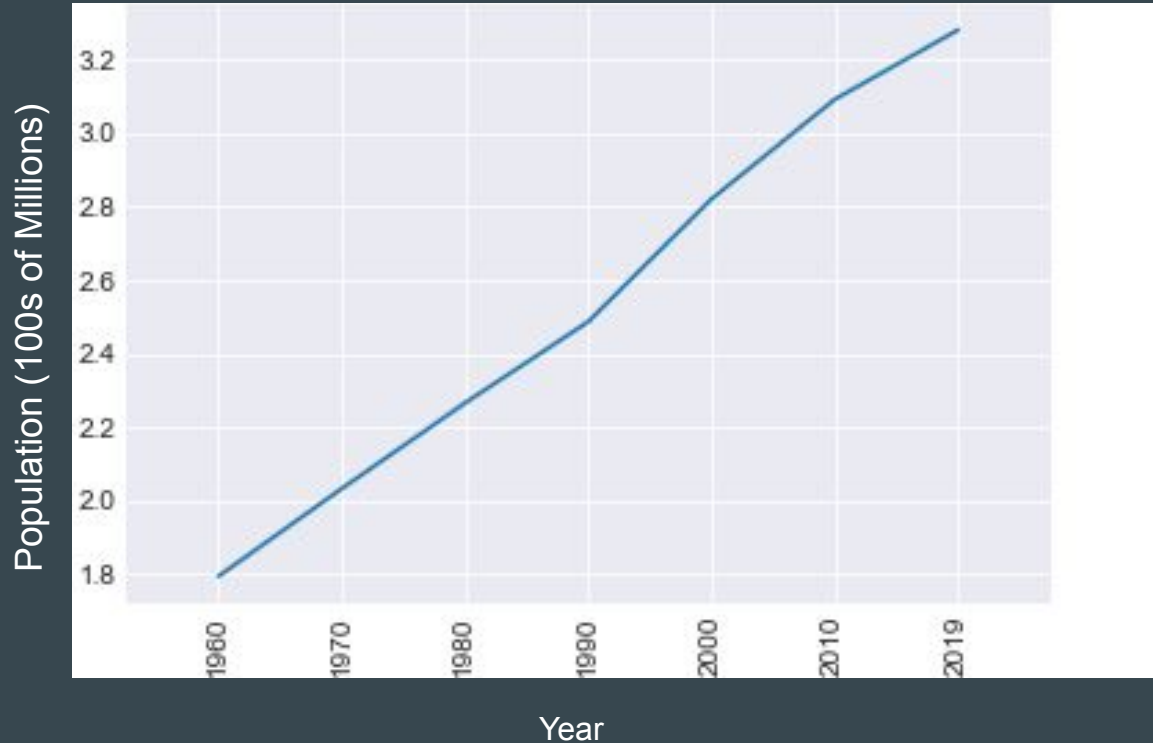


Do Education Rates have an effect Population Stabilization?

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An analysis of Education Rates in US Counties and
Population.

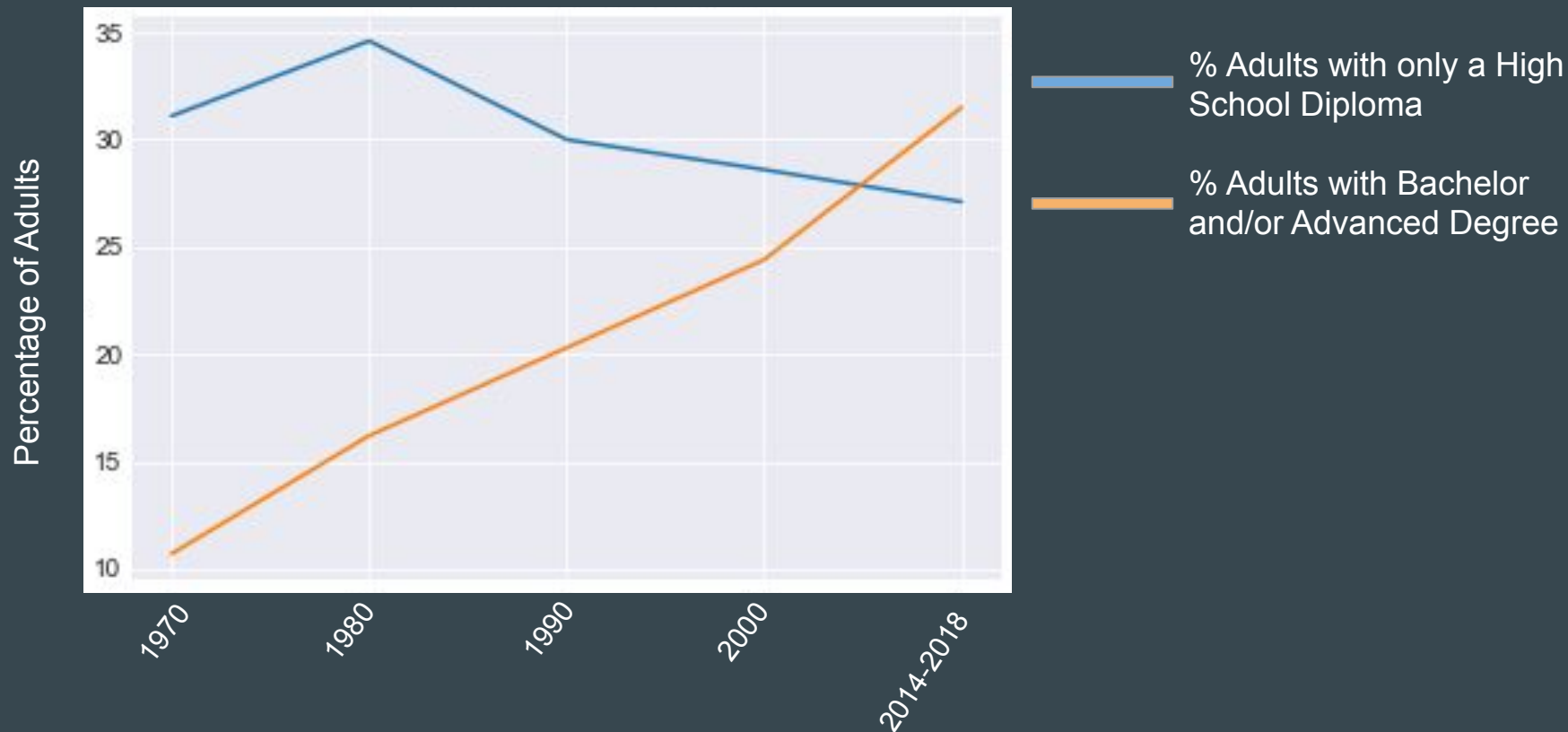
U.S. Population Trend (100s of Millions)



Since 2010 the rate of Population Growth in United States has started to decrease.

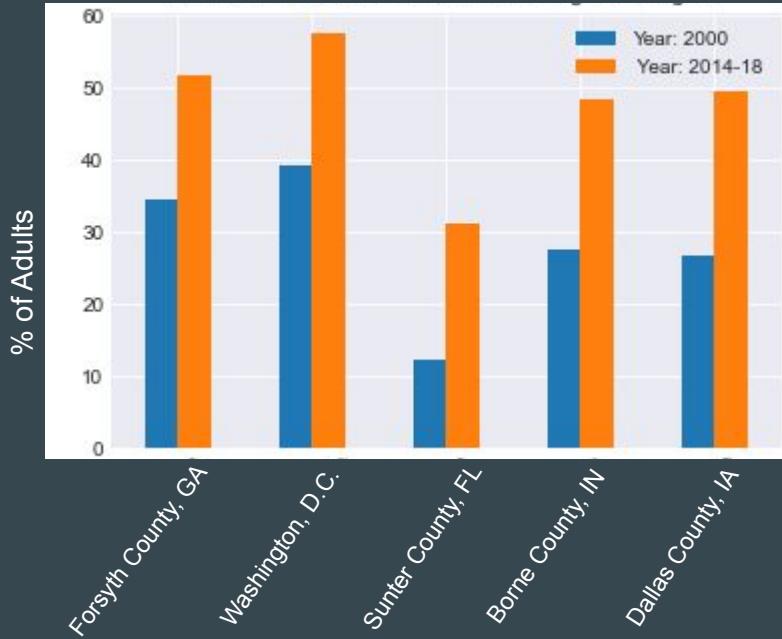
Is that attributed to the increase in education attainment?

U.S. High School Diploma, Bachelor and Advanced Degree Data

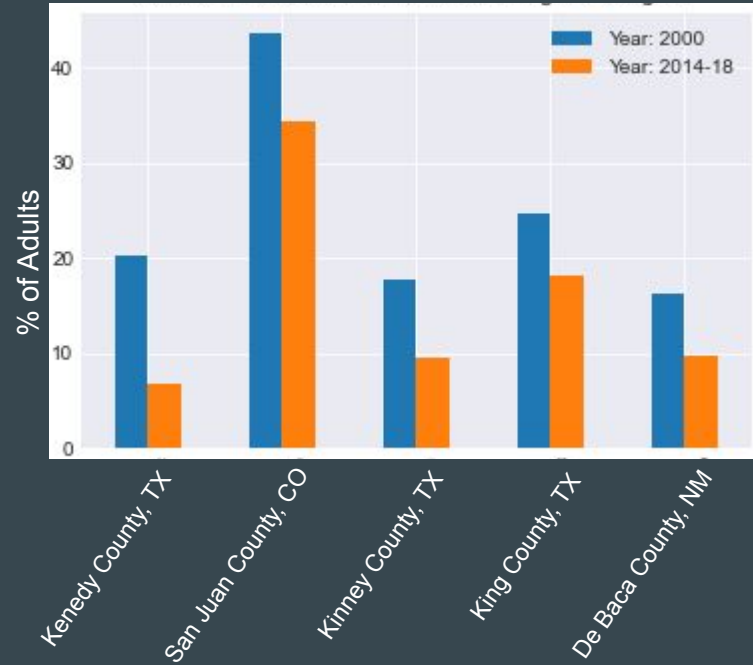


U.S. Bachelor and Advanced Degree Data

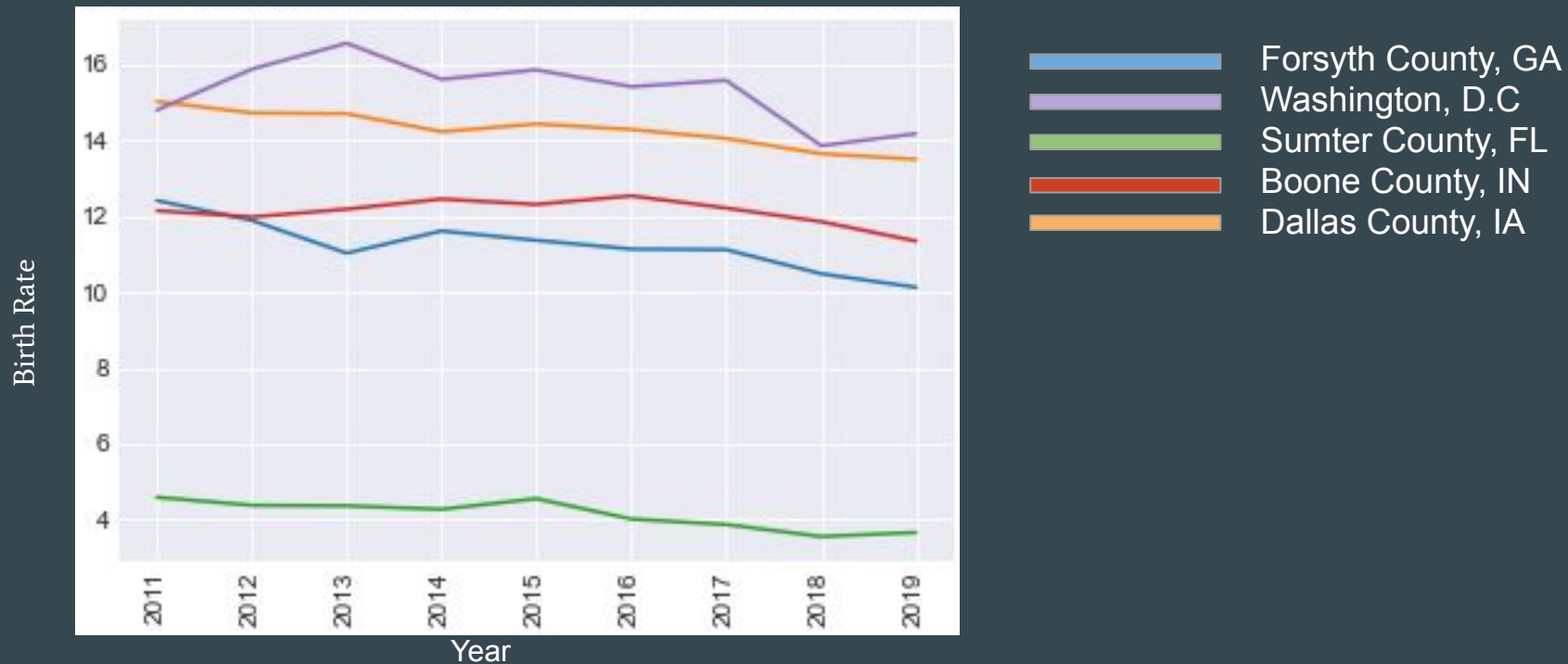
Top 5 Most Improved Counties



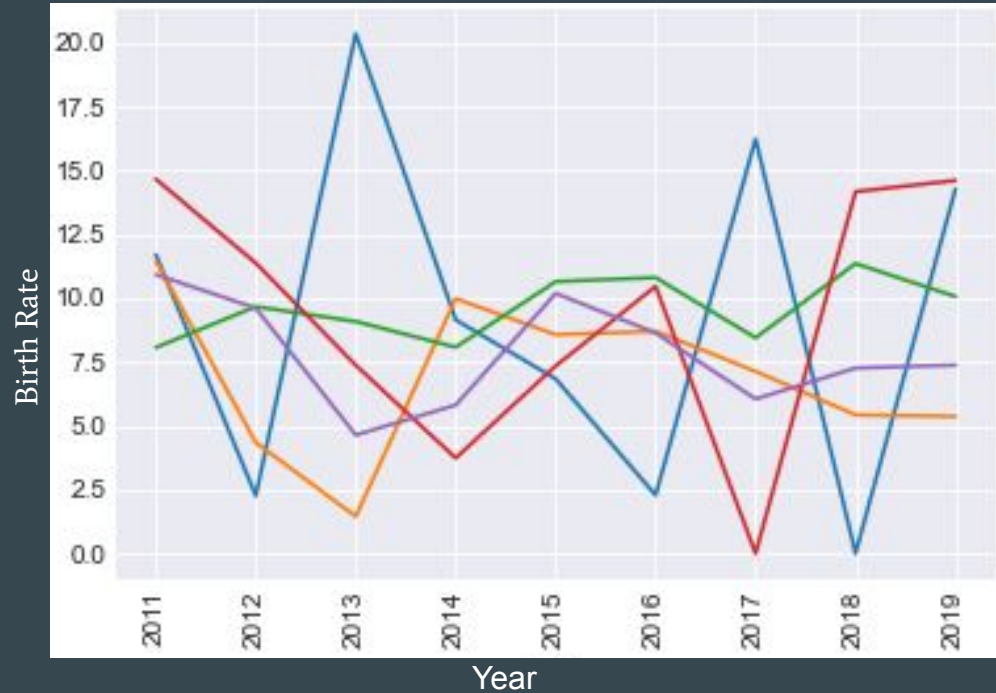
Top 5 Most Least Improved Counties



County Birth Rate with Greatest Increase in Education Degree Attainment



County Birth Rate with Greatest Decrease in Education Degree Attainment



- Kenedy County, TX
- San Juan County, CO
- Kinney County, TX
- King County, TX
- De Baca County, NM

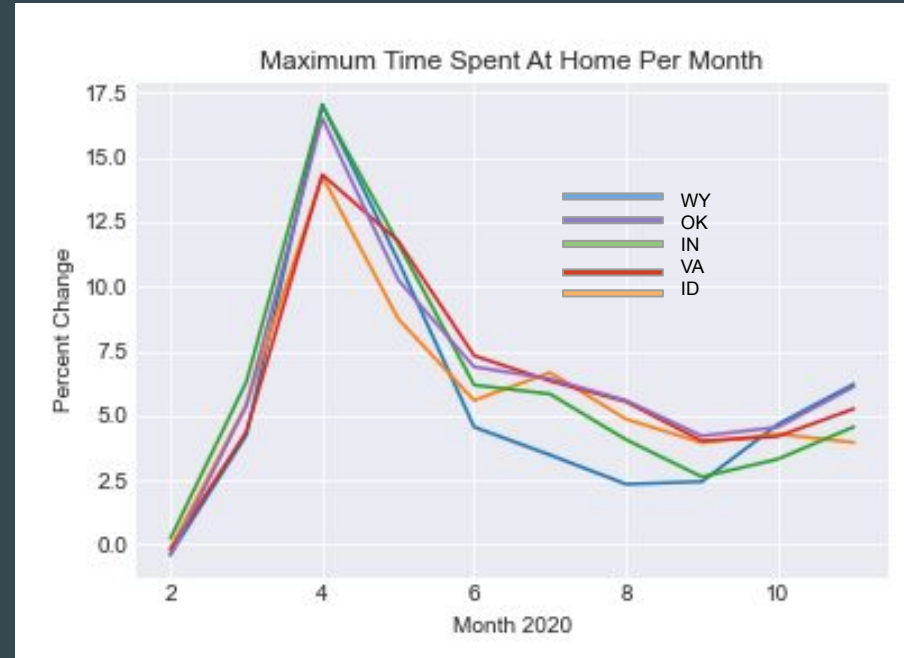
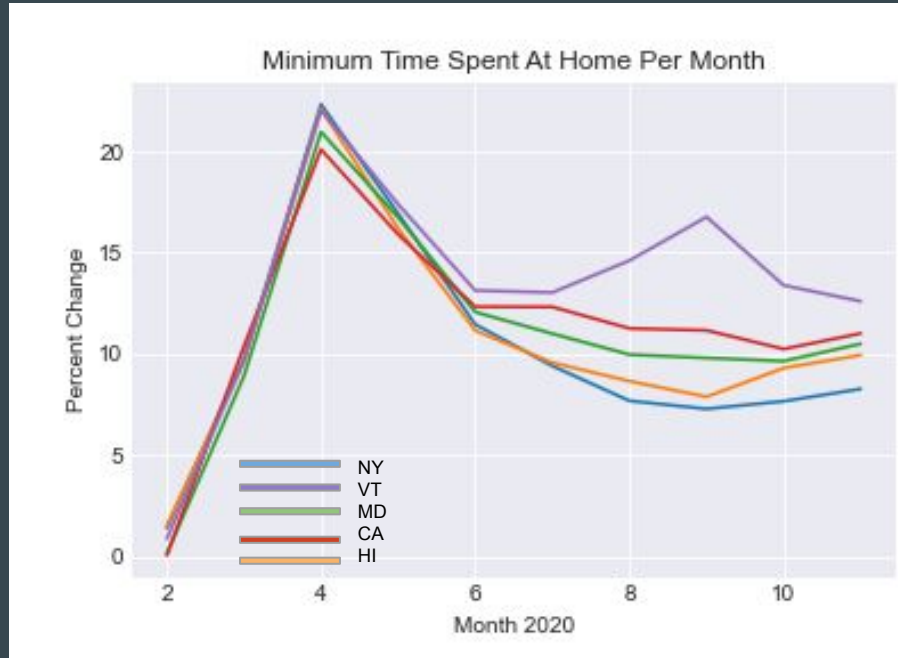
My hypothesis was not supported as the data shows high variability. If there was more time I would look into the Migration Rate, Conception Rate, and Sex Education within these counties.

Have COVID-19 Lockdowns affected Air and/or Water Quality?

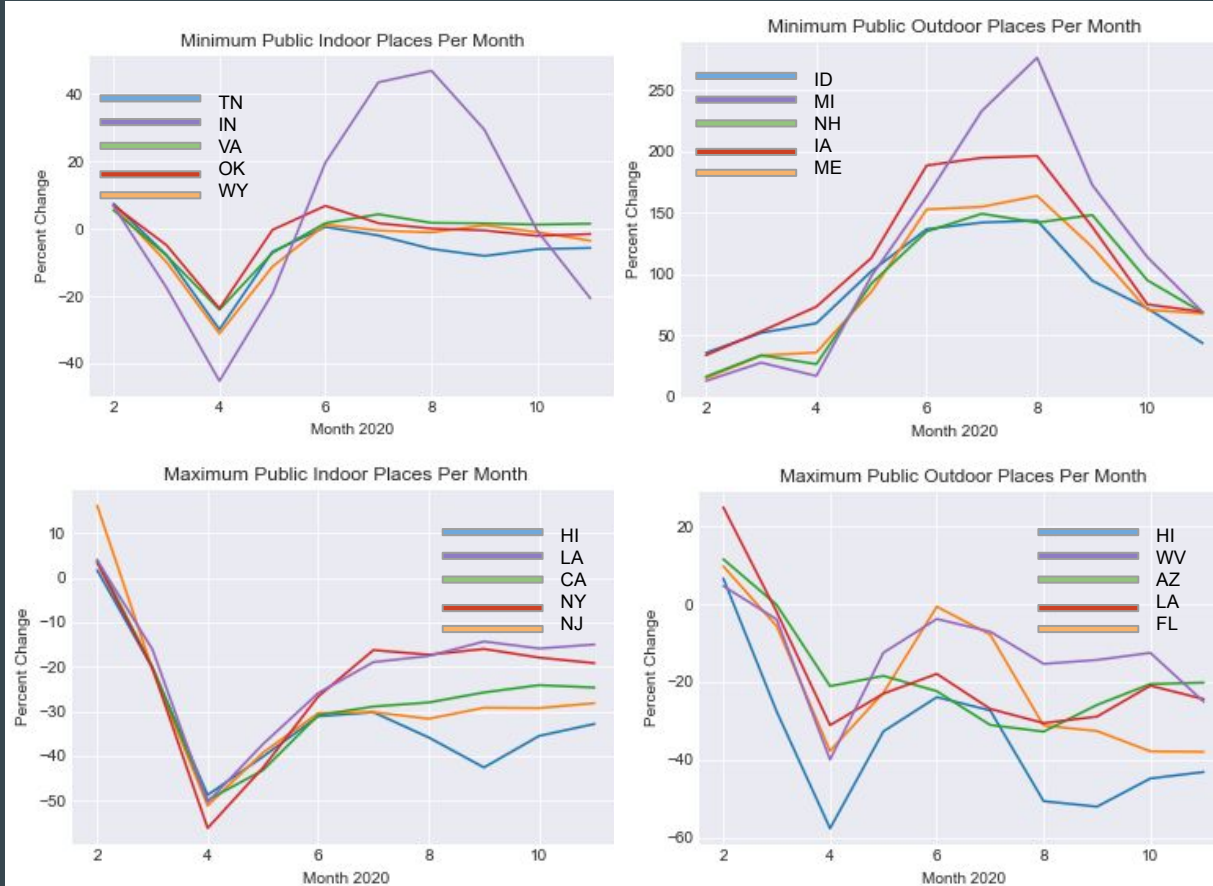
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An analysis of COVID-19 Lockdown Activity and Monthly
Air/Water Quality

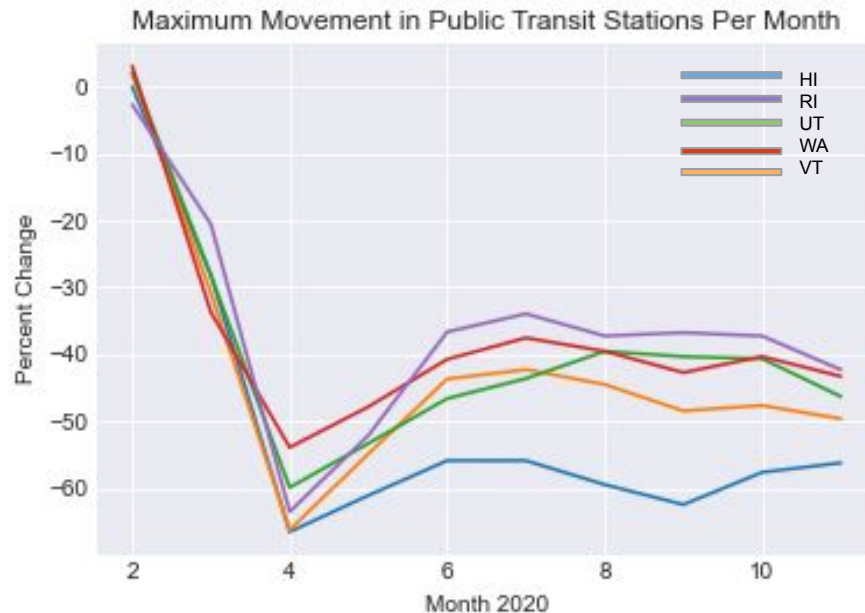
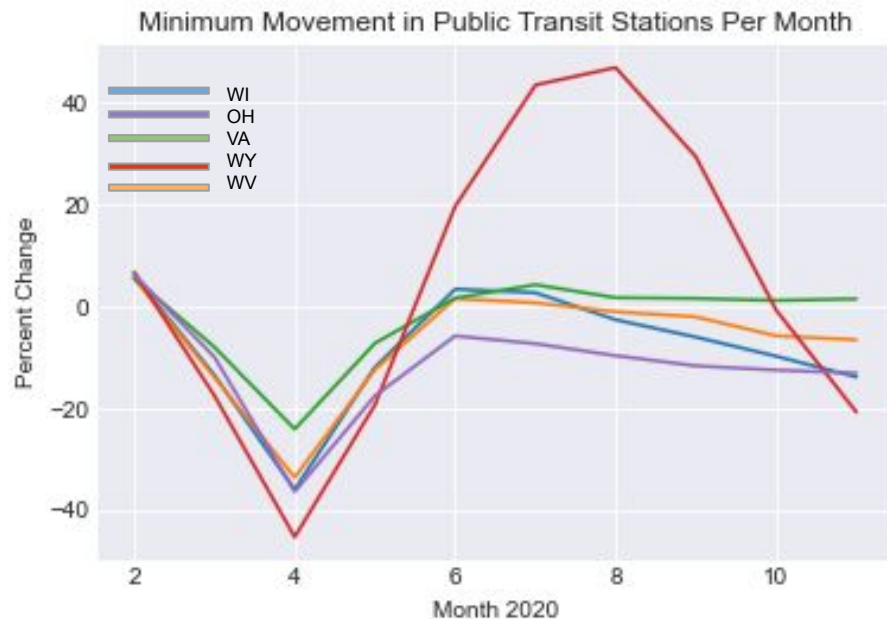
Percentages of People Staying At Home During Lock Down Months of 2020



Percentages of People Going to Public Indoor/Outdoor Vicinities During Lockdown Months of 2020

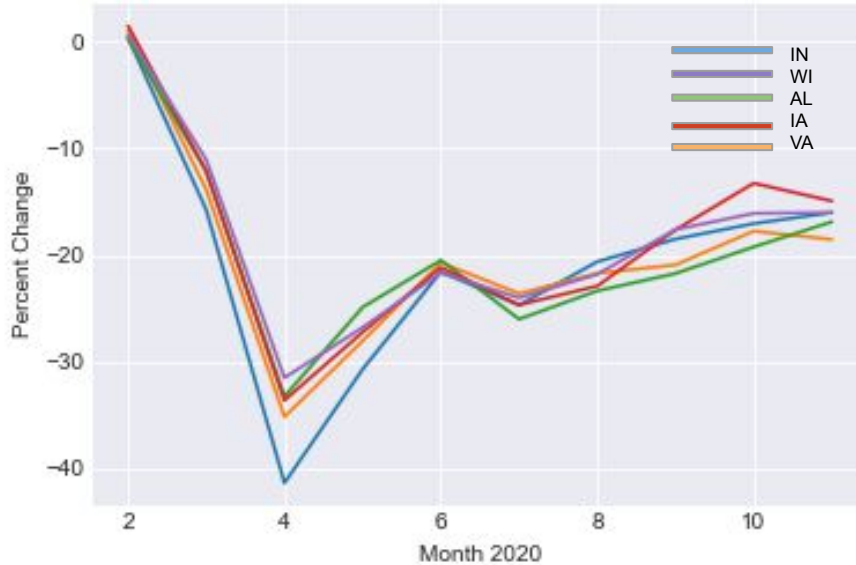


Percentages of People Using Public Transit During Lockdown Months of 2020

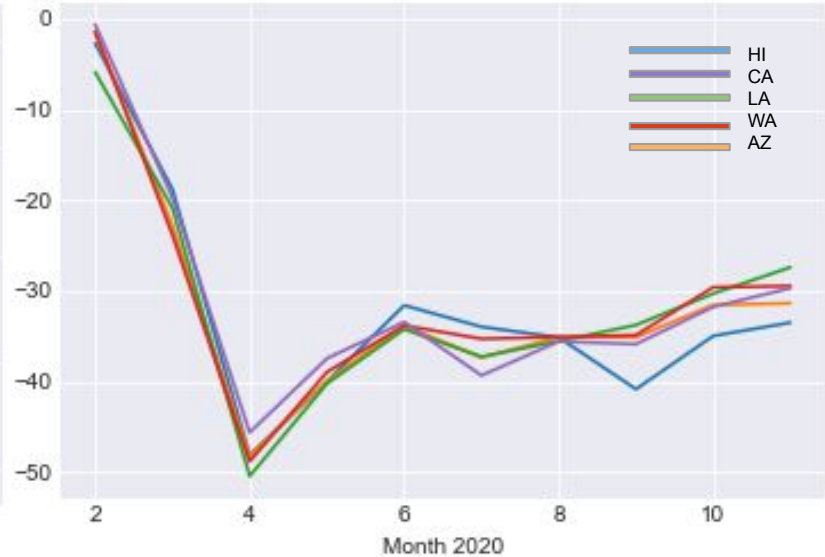


Percentages of People Going to Work Facilities During Lockdown Months of 2020

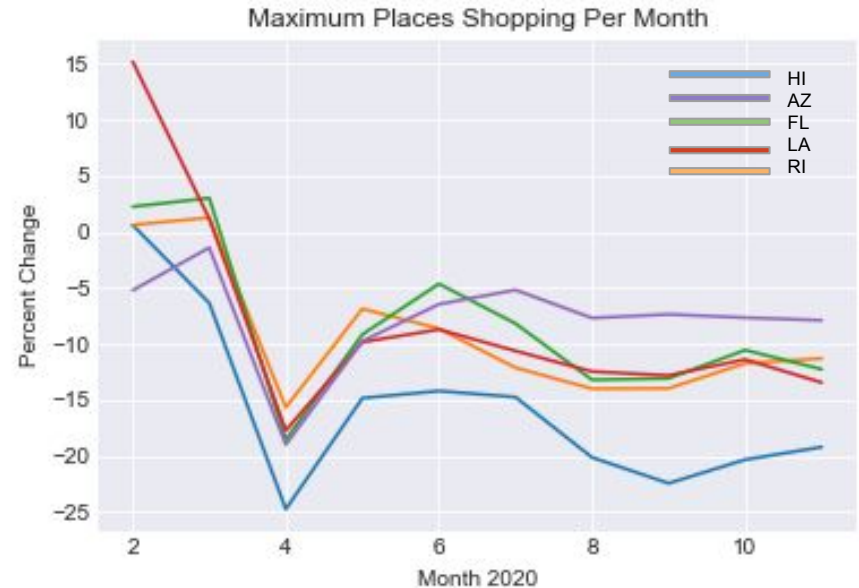
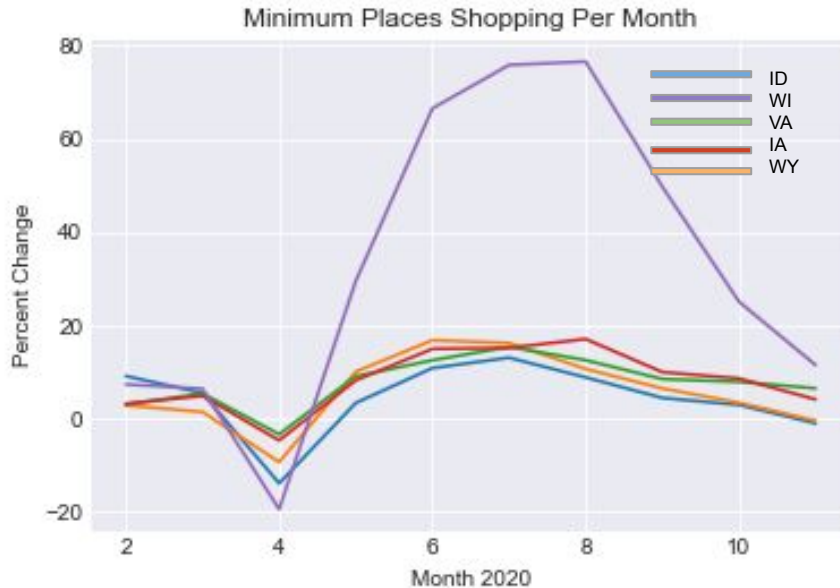
Minimum Movement to Work Places Per Month



Maximum Movement to Work Places Per Month



Percentages of People In-Person Shopping During Lockdown Months of 2020



COVID-19 Activity Analysis

- Overall, people stayed indoors at the beginning of COVID-19 lockdowns, and in March, people began going back to public indoor and outdoor vacinities, to work, and using public transit.

Conclusions & Implications

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Sluggish response lacks desired effect.
Strong central leadership required to effect broad improvement.