Mobility Tendencies and the COVID-19 Pandemic

Project and presentation by:
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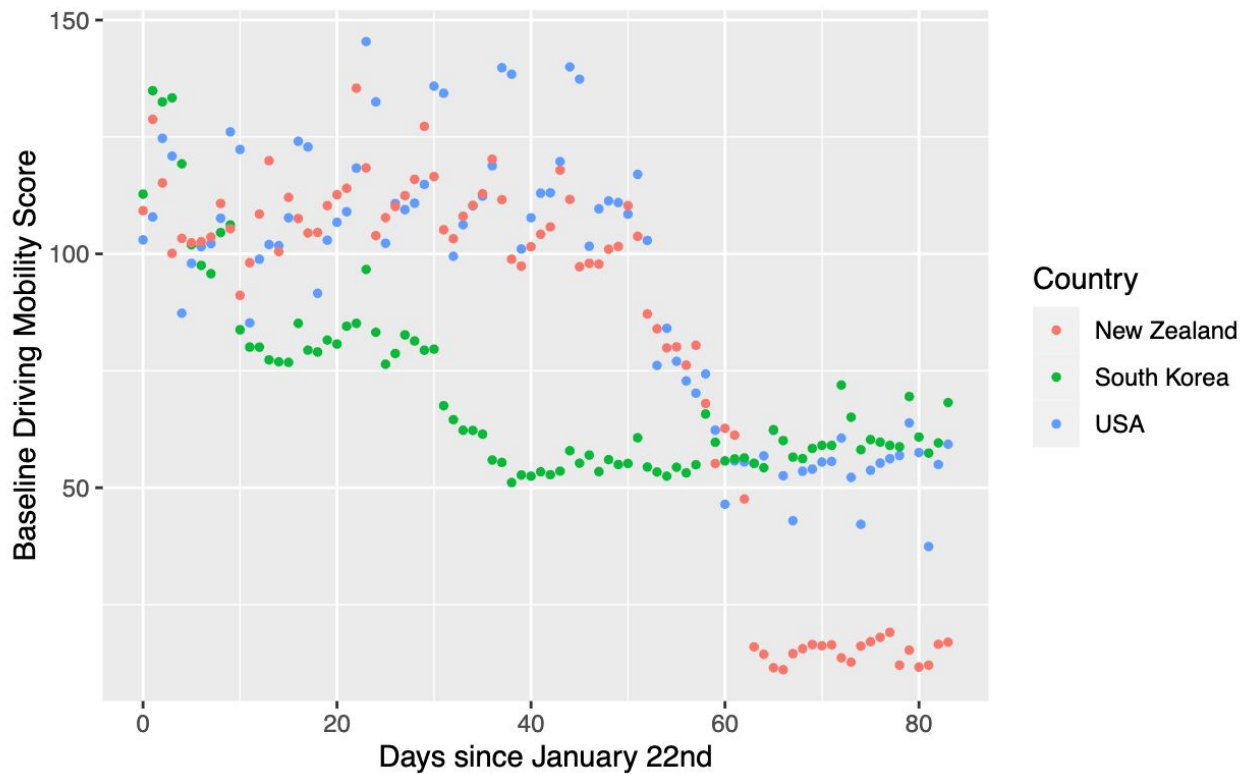
Research Question: "How did the progression of the COVID-19 pandemic affect mobility trends in different countries"?
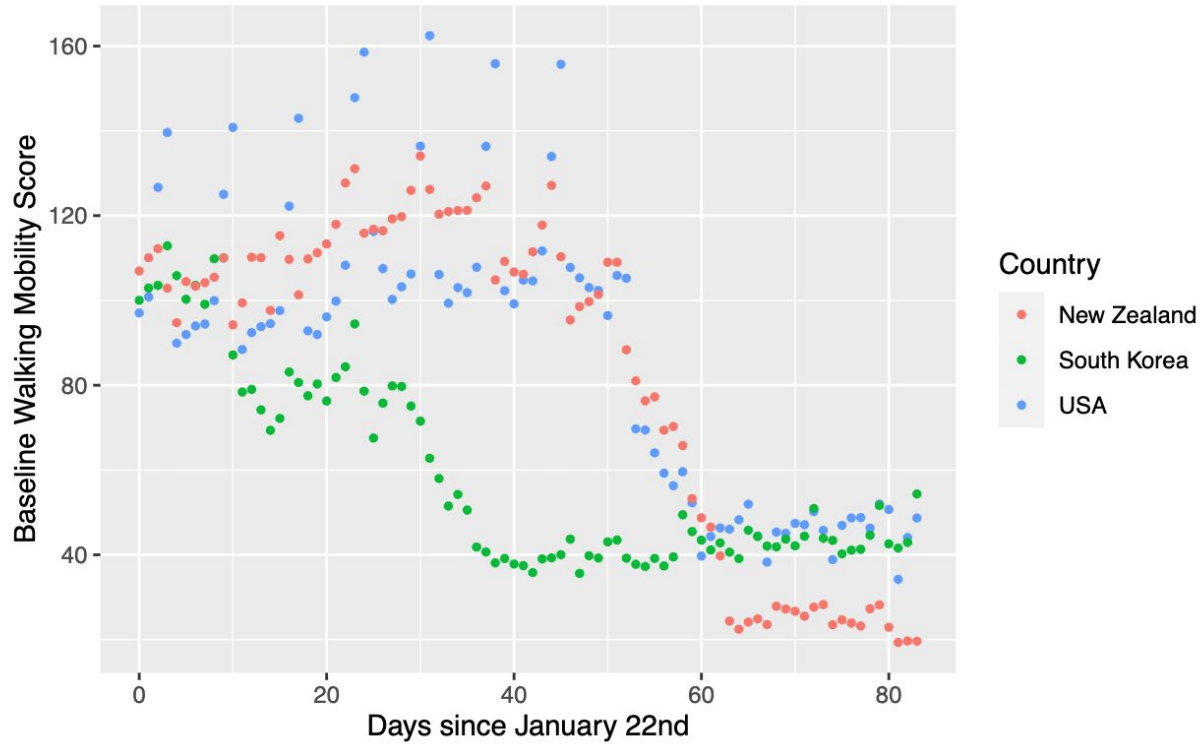
Datasets → Key Information

- # of COVID-19 Cases by day for each country

- Walking and Driving "Mobility Score" by day for each country

All Countries Expereience a Decrease in Driving Mobility Scores

All Countries Expereience a Decrease in Walking Mobility Scores

Scatter-Plot Analysis

- All the countries' mobility scores suffer a drop-off
- Drop-off isn't constant, but seems to occur at a certain time period
- Why is this?

To further explore why this could be, we performed multiple statistical tests.

Could COVID-19 be a reason for these changes in mobility?

Linear Regression
Is there a linear relationship between COVID-19 cases and mobility scores?
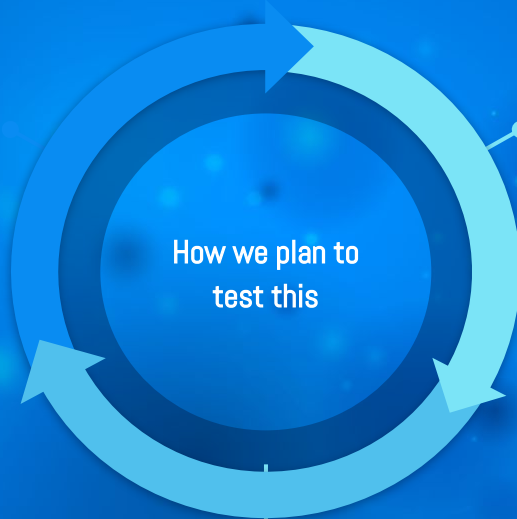
2-sample T-test:
Are the before and after COVID mobility means the same?

How we plan to test this

Wilcoxon Rank Sum
Are the before and after COVID-19 mobility medians the same?

Comparing Means and Medians (for driving)

Two-Sample T-tests

t = 7.733

p = 4.134e-11

Wilcoxon Rank Sum Test

W = 1454

p = 6.533e-08

Conclusion: there is evidence to suggest that the baseline mean+median for driving mobility trends in the pre-covid era is greater than in the post-covid era in the US

Comparing Means and Medians (for walking)

Two-Sample T-tests

t = 7.812

p = 1.13e-11

Wilcoxon Rank Sum Test

W = 1465

p = 1.65e-07

Conclusion: there is evidence to suggest that the baseline mean+median for walking mobility trends in the pre-covid era is greater than in the post-covid era in the US

Change in Mobility Trends

- Analysis shows both US mobility trend indicators drop after March 1st
- To what extent is COVID-19 related to this decrease in mobility?
- What is it like in other countries?

10

There is a negative correlation between the log number of COVID cases and the averaged mobility score in all 3 countries
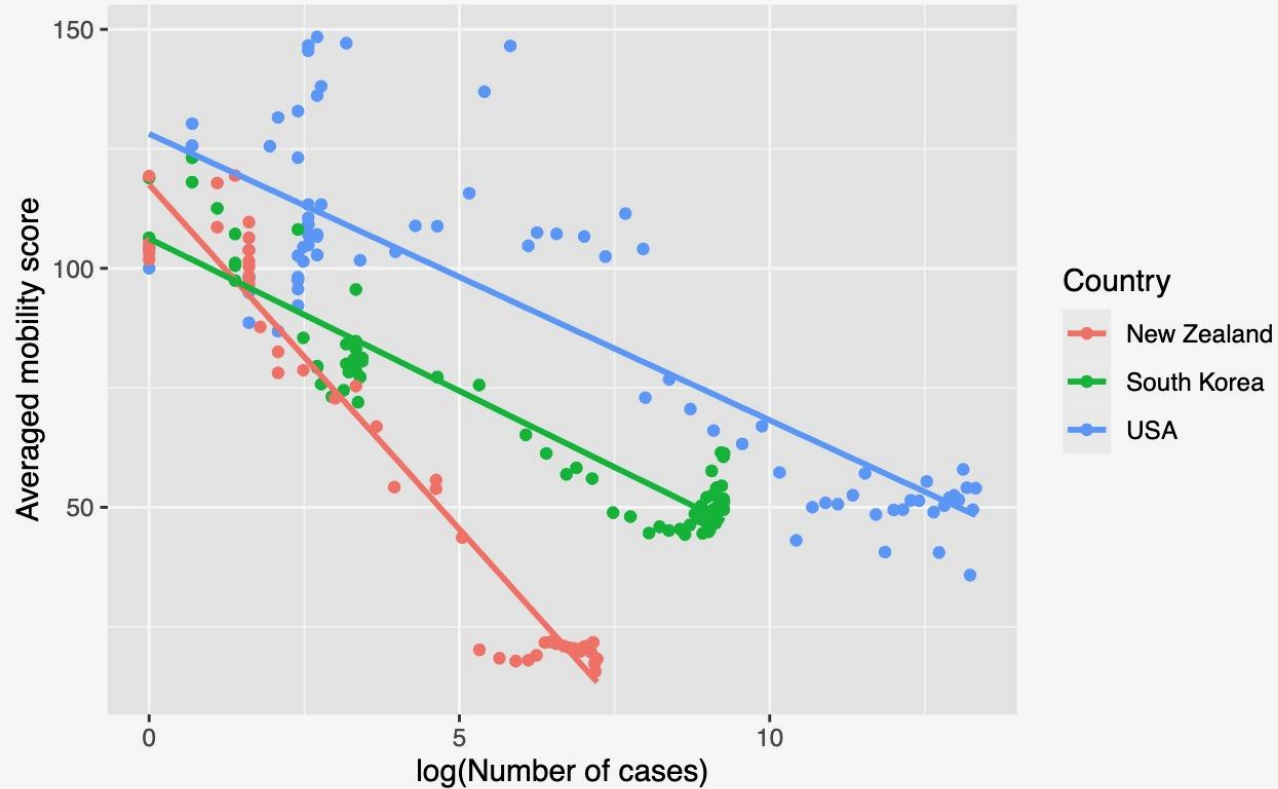
Linear Regression Statistics

	Intercept	Slope Coefficient	Slope P-value	R^2
US	128	**-5.99**	1.28e-23	0.7078605
New Zealand	118	**-14.4**	4.44e-30	0.9455342
South Korea	106	-6.38	3.26e-40	0.8846441

Linear Regression -- Continued

Slopes:

All of the countries had negative slopes corresponding to log(COVID cases).

P-values:

All of the p-values corresponding to the slopes were extremely low and statistically significant at an alpha level of 0.05

Steepness:

South Korea's mobility scores were the most responsive to COVID cases while the US's were the least. How Come?

Limitations/Caveats

- Many of the assumptions for statistical tests were not fully met
  - independence of outcomes likely violated for t-tests
  - linear regression requirements also not met

14

Limitations/Caveats -- Continued

- Our data for mobility came from Apple Maps data
  - Not representative of the true country's population
  - This population have differing mobility habits than the general population

Conclusions

- Mean/median mobility ratings were lower post-March 1st for the US
- Negative correlation between log(cases) and mobility scores in three countries
- Future directions:
  - analyzing post-COVID-19 data
  - examine what people are doing at home (due to decreased mobility)

16

Works Cited

Garrett, K. (2020, April 16). COVID-19 Mobility Trends in Apple Maps - dataset by kgarrett. Retrieved from https://data.world/kgarrett/covid-19-mobility-trends

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Thanks!