

### **Project Proposal: Due Friday April 24th**

Your project proposal should include the research question that you are planning to answer and a brief outline of methods that you plan to use to answer this question as well as at least 3 sources that are relevant to your topic. These sources could be data that you plan to use, blog posts about a method you want to use, or prior research on your topic

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The objective of this study is to explore the relationship between factors of weather and the transmission of Covid-19. Over the past few weeks, many news sources and medical experts have begun contemplating the possibility of high temperature and humidity slowing down the spread of the Covid-19, some even hoping that summer will bring this pandemic to an end. This possibility is derived from the fact that both SARS and influenza have shown similar patterns in the past, and considering that Covid-19 transmits very similarly to these other viruses, this behavior should be observed as well given the same high temperature and humidity environment.

The main factors of weather our team will be studying are: temperature, humidity, wind and precipitation. We will mostly be running linear regression of the basic reproductive values,  $R$ , against these four different factors. We will begin by running them individually to see if there are any significant relationships between the transmission rate and a single factor, and then with interaction terms to see if a certain combination of weather factors would result in a change in the  $R$  value. The analysis will focus on analyzing this relationship in the U.S as we felt that it was the most relevant to us and has a diverse mix of climates which could yield interesting results. The time period will begin on January 20, the first reported case in the U.S. up to the most current date.

We tried this method on an initial analysis of the relationship between temperature and the  $R$ -value of California. We were trying to run the analysis on counties but were not able to find weather data grouped by counties, so we decided to use it on states first. We used days where cases exceeded 40 to avoid having large amounts of 0-10 data when the infection first began spreading in California. We found that there was no significant relationship between temperature and the  $R$  value of California, with a  $p$ -value of 0.372 and an  $R^2$  value of 0.0266. This makes sense as temperature alone

explains so little of the data and we think that other factors like population density or socioeconomic class could also be significant in the R value of a state. As such, we may also look into improving these regressions by adding control variables as well.

We hope to find a significant relationship or model which allows us to predict possible R values given historical weather data as well. However, in the end, we hope to create a data visualization tool which would allow people to find information on the spread given historical data. An idea would be to build a model or jupyter notebook that can monitor the weather and numbers of cases, deaths or R value in a city, state or country in the future.

Sources:

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[www.stathelp.se/en/regression\\_controls\\_en.html](http://www.stathelp.se/en/regression_controls_en.html).

A. McManus, Patricia. *Introduction to Regression Models for Panel Data Analysis*. 2011.

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Gray, Richard. "Will Warm Weather Really Kill off Covid-19?" *Www.Bbc.Com*,  
[www.bbc.com/future/article/20200323-coronavirus-will-hot-weather-kill-covid-19](http://www.bbc.com/future/article/20200323-coronavirus-will-hot-weather-kill-covid-19). Accessed  
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