Locking Down: The COVID-19 Pandemic and Air Pollution in Salt Lake City

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In densely populated mountain valleys like Utah's Salt Lake Valley, air pollution is a constant concern. Cold inversions trap PM2.5 in winter, creating smog-like haze, and hot summer months raise ozone levels. Nitrogen dioxide (NO_2) is more constant, staying at similar levels year-round. This project explores the effects that reducing cars on the Valley's roadways has on air quality. In the past, scientists have only been able to estimate the effects that decreased traffic would have on air pollution. The COVID-19 lockdown provides a unique opportunity to study how air quality was actually affected by a traffic reduction of up to 40%. I used U.S. Environmental Protection Agency data gathered from the Hawthorne Air Quality Monitor near downtown Salt Lake City. This monitor is the Valley's most complete air pollution data collection center and is in an area with heavy traffic. I averaged the 2015-2019 data and compared it to post-lockdown 2020 data using two statistical tests: an analysis of variance test and a difference-in-differences test. The decrease in NO_2 was statistically significant, which is important because nitrogen oxides are precursor gases for PM2.5 and ozone. The results for ozone and PM2.5 were not as clear, but the results still showed decreased levels of pollution in the months when ozone and PM2.5 exist in high concentrations. Thus, declines in ozone and PM2.5 were shown when it might be expected that they would be present. The results for NO_2 support my hypothesis that the lockdown decreased pollution, while the results for ozone and PM2.5 partially confirm my hypothesis. These results could influence environmental policy to limit the number of bad air quality days in the Valley by encouraging a decrease in traffic on those days.

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