# Effect of State-Level Stay-At-Home Orders on Non-Essential Movement

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# Background

**Motivation**

- Minimal federal restrictions at beginning of pandemic
- Many states imposed stay-at-home orders

**So What?**

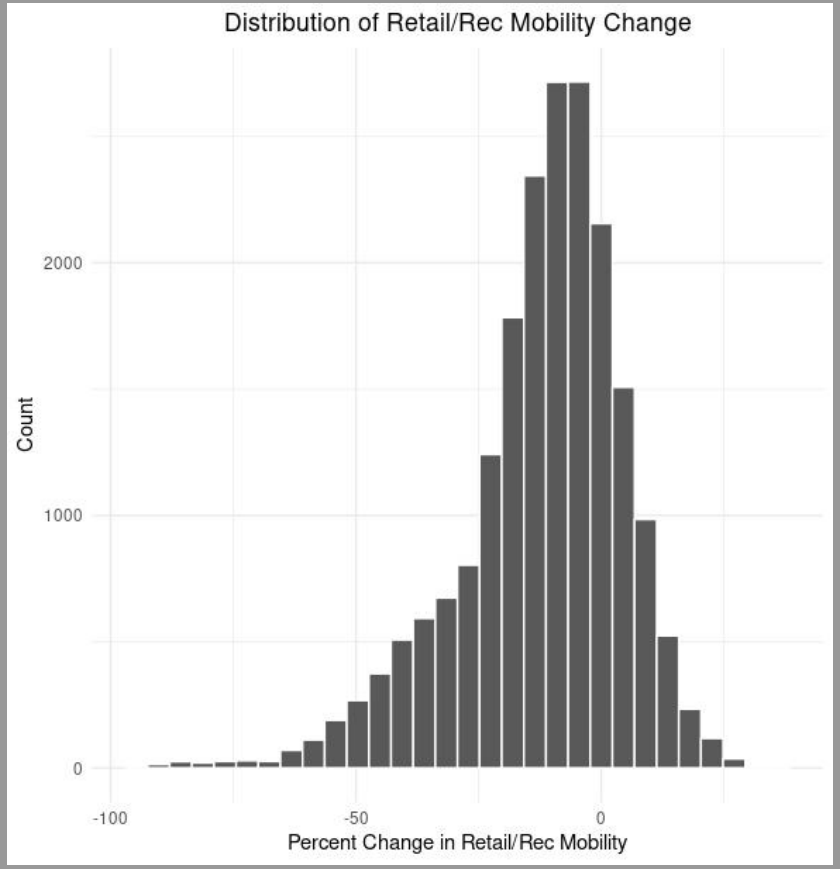
- Quantify the effectiveness of at-home orders
- How well might similar policies work in the future?

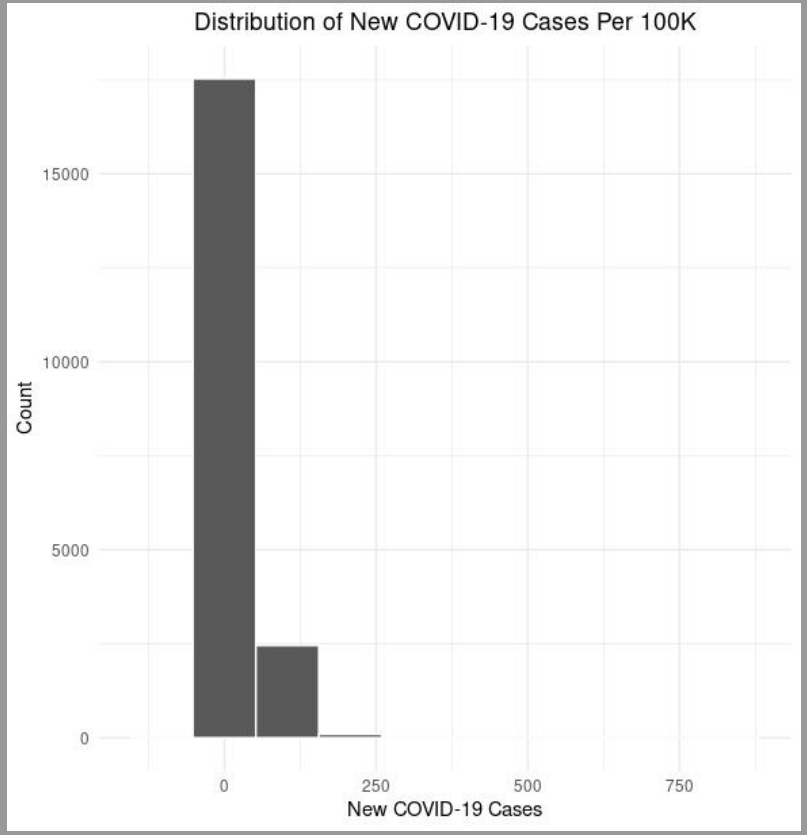
# Research Question

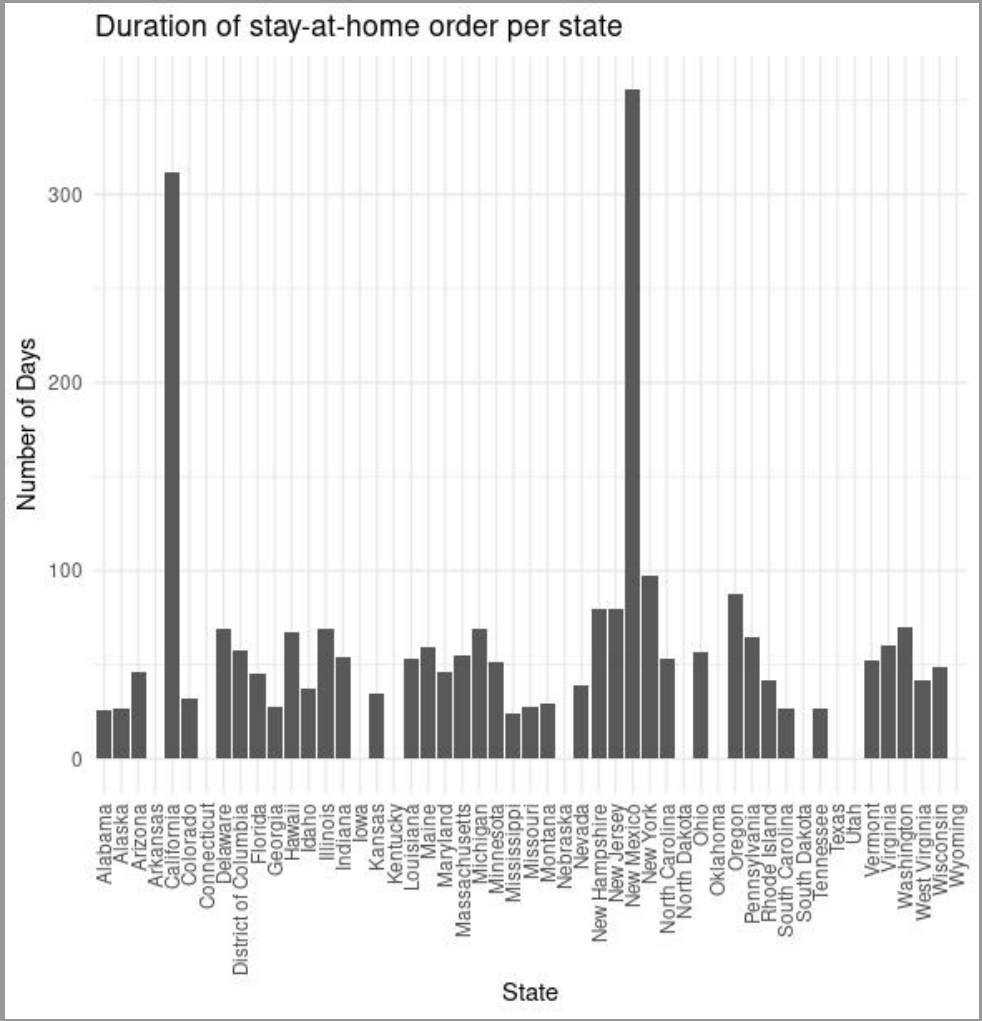
How effective are stay-at-home orders in reducing non-essential travel?

# Variables

| Variable Name | Variable Type | Description |
|---|---|---|
| **Non-essential mobility (outcome)** | Numeric variable | Percent change in retail/rec mobility compared to baseline |
| **Stay-at-home order** | Indicator variable | 1 if state is under stay-at-home order, else 0 |
| **Duration of stay-at-home order** | Numeric variable | Number of days a state has been in quarantine at date ‘t’ |
| **Mask order** | Indicator variable | 1 if state is under mask order, else 0 |
| **Population density** | Numeric variable | Population density for the state |
| **New covid cases** | Numeric variable | New covid case count (normalized) |


Distribution of Retail/Rec Mobility Change
Count
2000
1000
0
-100
-50
0
Percent Change in Retail/Rec Mobility


Distribution of New COVID-19 Cases Per 100K
Count
15000
10000
5000
0
0
250
500
750
New COVID-19 Cases


Duration of stay-at-home order per state
Number of Days
0
100
200
300
State
Alabama
Alaska
Arizona
Arkansas
California
Colorado
Connecticut
Delaware
District of Columbia
Florida
Georgia
Hawaii
Idaho
Illinois
Indiana
Iowa
Kansas
Kentucky
Louisiana
Maine
Maryland
Massachusetts
Michigan
Minnesota
Mississippi
Missouri
Montana
Nebraska
Nevada
New Hampshire
New Jersey
New Mexico
New York
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Vermont
Virginia
Washington
West Virginia
Wisconsin
Wyoming

# Models

# Base Model

| | *Dependent variable:* |
|---|---|
| | avg_retail_rec_change |
| at_home_order | −21.965*** |
| | (0.300) |
| Constant | −9.322*** |
| | (0.115) |

- Stay-at-home orders influenced a 22% decrease in non-essential mobility
- Holding stay-at-home order constant, 9% decrease in non-essential mobility

# Primary Model

| | *Dependent variable:* | |
|---|---|---|
| | avg_retail_rec_change | |
| | (1) | (2) |
| at_home_order | −21.965*** | −28.379*** |
| | (0.300) | (0.355) |
| quarantine_length | | 0.082*** |
| | | (0.003) |
| mask_order | | −3.398*** |
| | | (0.207) |
| population_density | | −0.003*** |
| | | (0.0001) |
| new_cases_per_100k | | −0.070*** |
| | | (0.005) |
| Constant | −9.322*** | −4.748*** |
| | (0.115) | (0.193) |

- Stay-at-home orders influenced a 28% decrease in non-essential mobility
- Extended stay-at-home orders are related to an **increase** in non-essential travel
- Mask orders have a small (4%) impact on mobility
- Population density and new cases have limited impacts on mobility, but are necessary controls

# Over-Specified Model

Table 1: Regression Results

| | *Dependent variable:* | | |
|---|---|---|---|
| | avg_retail_rec_change | | |
| | (1) | (2) | (3) |
| at_home_order | −21.965*** | −28.379*** | −25.614*** |
| | (0.300) | (0.355) | (0.318) |
| quarantine_length | | 0.082*** | 0.086*** |
| | | (0.003) | (0.003) |
| mask_order | | −3.398*** | −4.097*** |
| | | (0.207) | (0.182) |
| population_density | | −0.003*** | −0.003*** |
| | | (0.0001) | (0.0001) |
| new_cases_per_100k | | −0.070*** | 0.009** |
| | | (0.005) | (0.004) |
| new_cases | | | −0.0003*** |
| | | | (0.00004) |
| population | | | 0.00000*** |
| | | | (0.000) |
| avg_parks_change | | | 0.106*** |
| | | | (0.002) |
| Constant | −9.322*** | −4.748*** | −11.026*** |
| | (0.115) | (0.193) | (0.229) |

- Stay-at-home orders influenced a ~25% decrease in non-essential mobility
- Coefficients of quarantine length and population density effectively same as before
- Split effect between new cases per 100K residents and new cases
- For every percent increase in mobility at parks, 0.1% increase in non-essential mobility

# Conclusion

**Result**

- Strong negative link between stay-at-home orders and non-essential mobility - 28%

- Significant negative correlation
  - Face Mask Mandate
  - State-normalized New COVID-19 Cases per Day
  - Population Density

- Significant positive correlation
  - Stay-at-home Duration

**Omitted variables**

- Demographic and Socioeconomic Factors
- Age
- Medical Risk
- Political Affiliation

**Practical Significance**

- Impose stay-at-home orders but of reasonable length
- Publish local COVID trends