

POLICYLAB

February, 2021

COVID-19 AND SCHOOLS: FROM SCIENCE TO POLICY

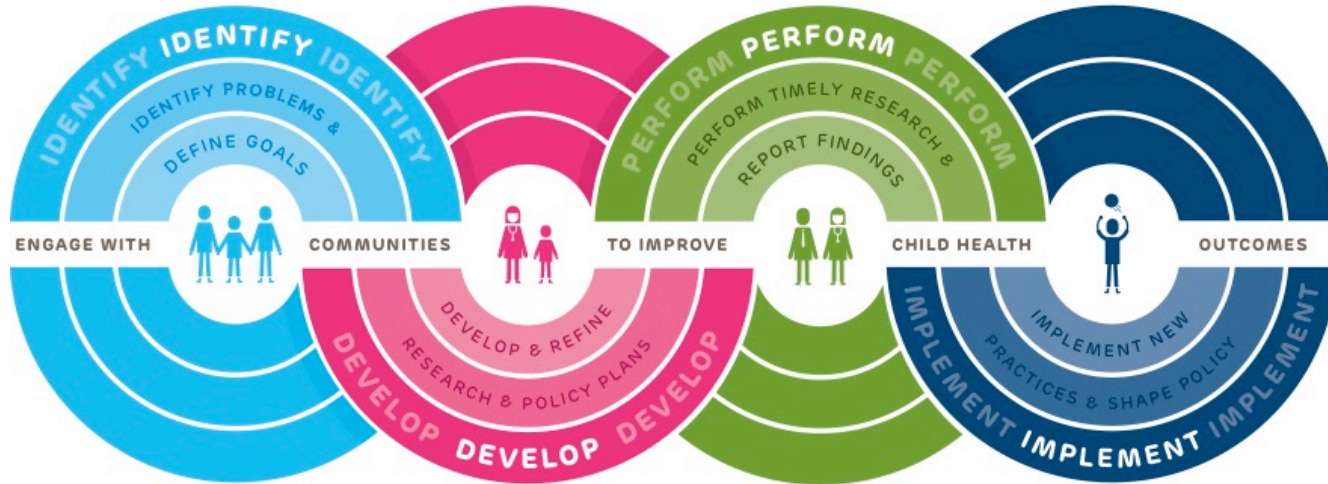
David Rubin, MD |

policylab.chop.edu |  [@PolicyLabCHOP](https://twitter.com/PolicyLabCHOP)



INNOVATING THROUGH POLICYLAB

At PolicyLab we are poised and ready to anticipate and respond quickly to the challenges that children and their families experience in communities all across the country.





MODELING TEAM

Lead Investigators



The interdisciplinary team is made up of biostatisticians, infectious disease experts, public health professionals, and epidemiologists.

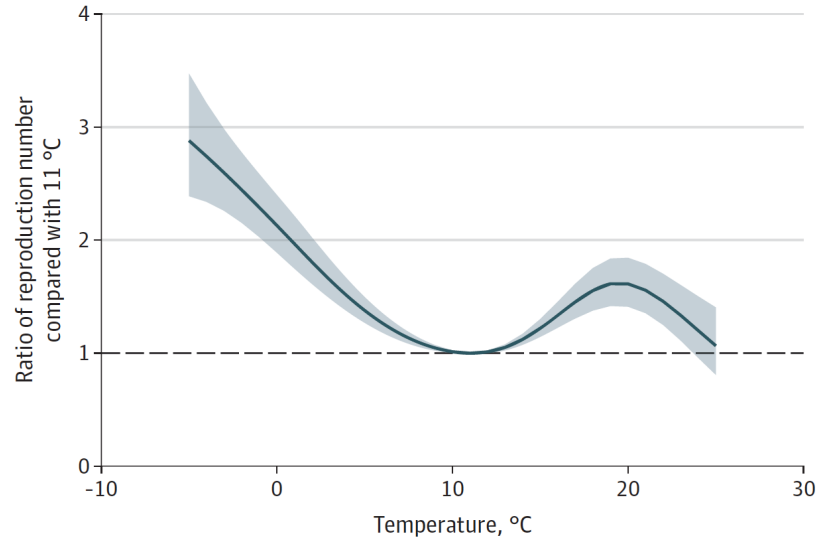
THE KEY QUESTIONS


- How much do children contribute to community transmission?
- Can multi-layered safety protocols reduce in-school transmission?
- How much can layered mitigation and masking reduce transmission within 6 feet?
- How important are community transmission rates in interpreting the data?



COVID SEASONALITY IS OFTEN UNRECOGNIZED

Figure 2. Cumulative Lagged Temperature Dependence of the Instantaneous Reproduction Number of Severe Acute Respiratory Syndrome Coronavirus 2 in 211 US Counties



 JAMA Network Open. 2020;3(7):e2016099. doi:10.1001/jamanetworkopen.2020.16099

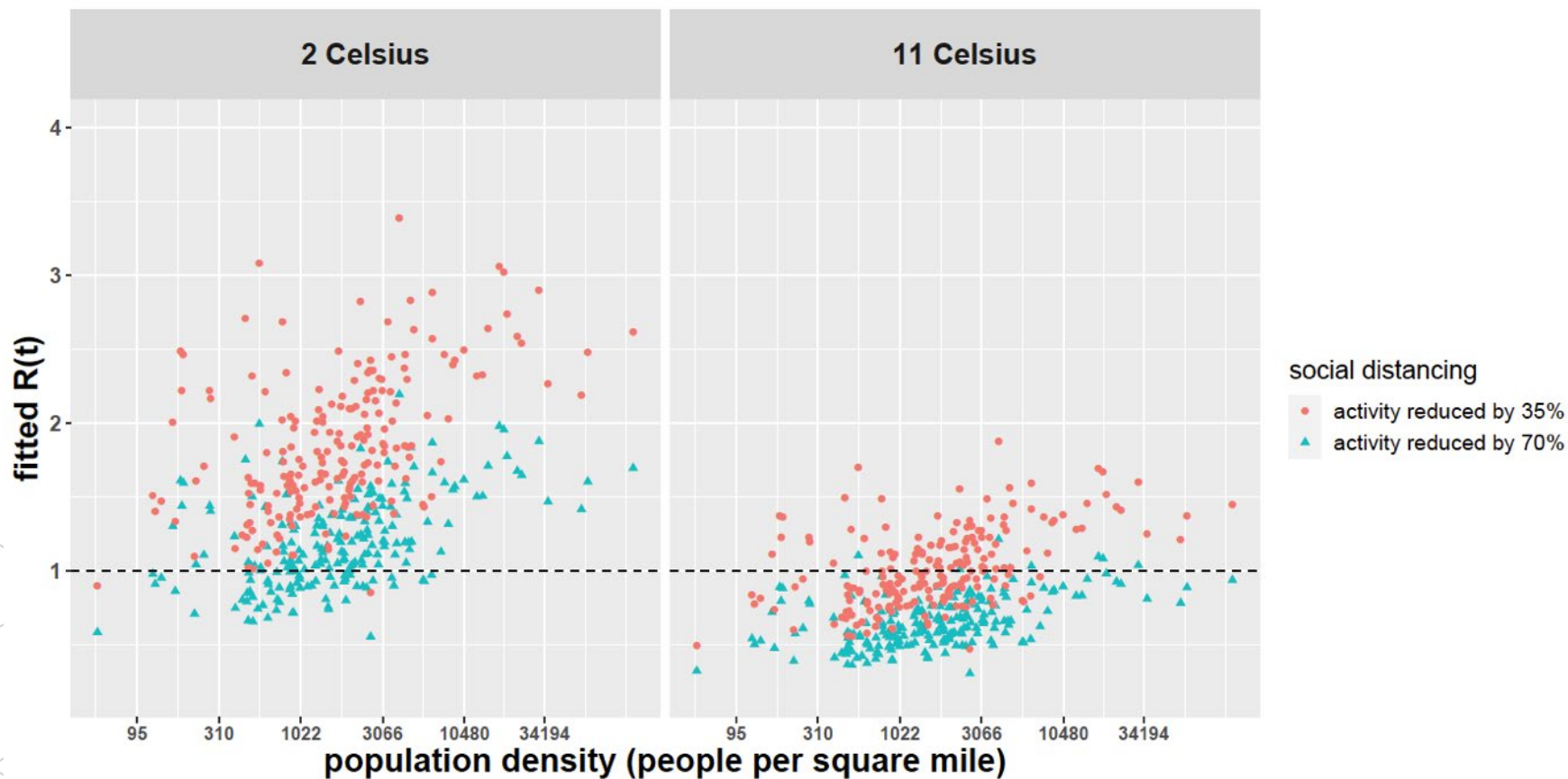
HUMIDITY-RELATED PROPERTIES OF RESPIRATORY VIRUSES

Table 1 Droplet transmission under different relative humidity conditions

Climate/season	Outdoor absolute humidity	Indoor relative humidity (%)	Respiratory virus stability	Proportion of droplet nuclei	Viability of respiratory viruses	Predominant transmission
Tropical	High	60–100	High	Low	High	Fomite, direct and indirect contact
Temperate: spring, fall	Intermediate	40–60	Low	Low	Low	All transmission ways possible
Temperate: winter	Low	10–40	High	High	High	Predominantly airborne

From Moriyama M, Hugentobler WJ, and Iwasaki A. Seasonality of Respiratory Viral Infections, **Annual Review of Virology**, 7:2.1-2.19, 2020
<https://doi.org/10.1146/annurev-virology-012420-022445>.

WE KNEW THE WINTER WAS GOING TO BE DIFFICULT



When the facts change, I change my mind. What do you do?

John Maynard Keynes



COVID-LAB: MAPPING COVID-19 IN YOUR COMMUNITY

Projected Cases for 4 Weeks	Projected Cases with Roll-back Scenarios
Social Distancing Over Time	Map of Current Cases

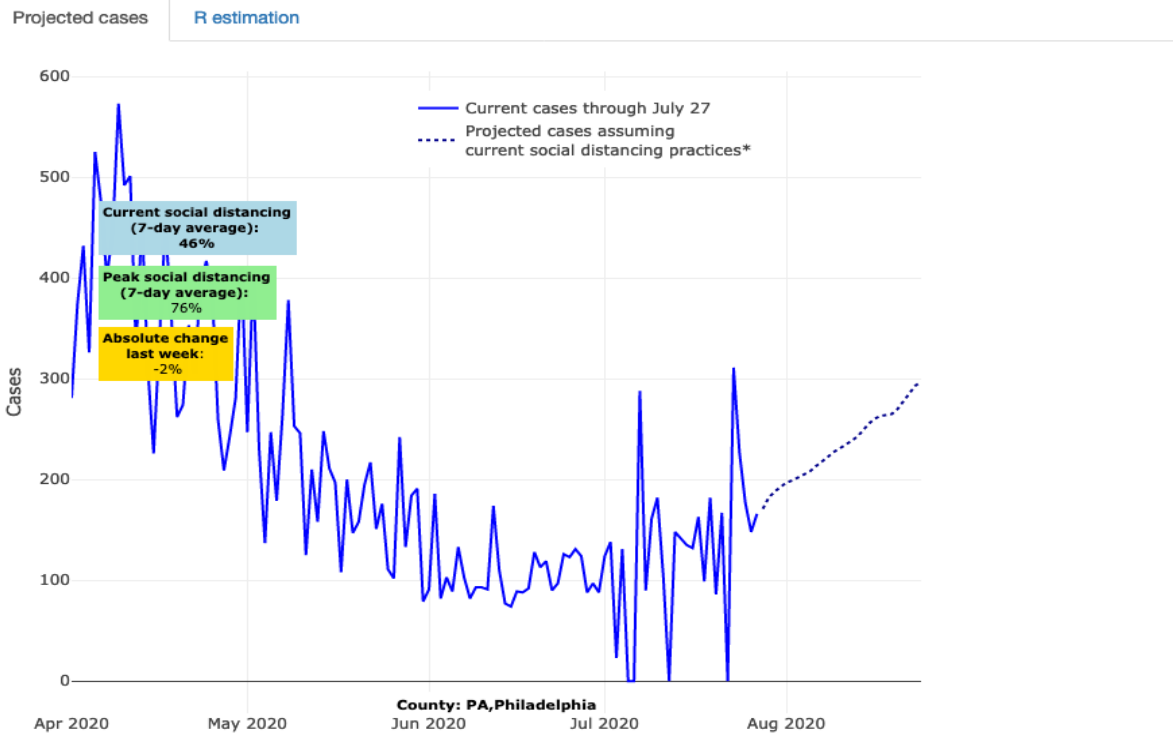
See projections by county:

PA,Philadelphia

The instantaneous reproduction number (R) is estimated using the daily incidence of new cases, while including effects of social distancing, population density, testing capacity, and combined temperature and humidity lagged over the prior 14 days. Each county's effects are standardized by population demographics. In prediction models, the future R is estimated from an autoregressive linear mixed effects model that includes county-level population density, 3-day average of social distancing, and lagged non-linear averaged historical temperatures effects over the prior 14 days. Future cases are estimated from predicted values of R .

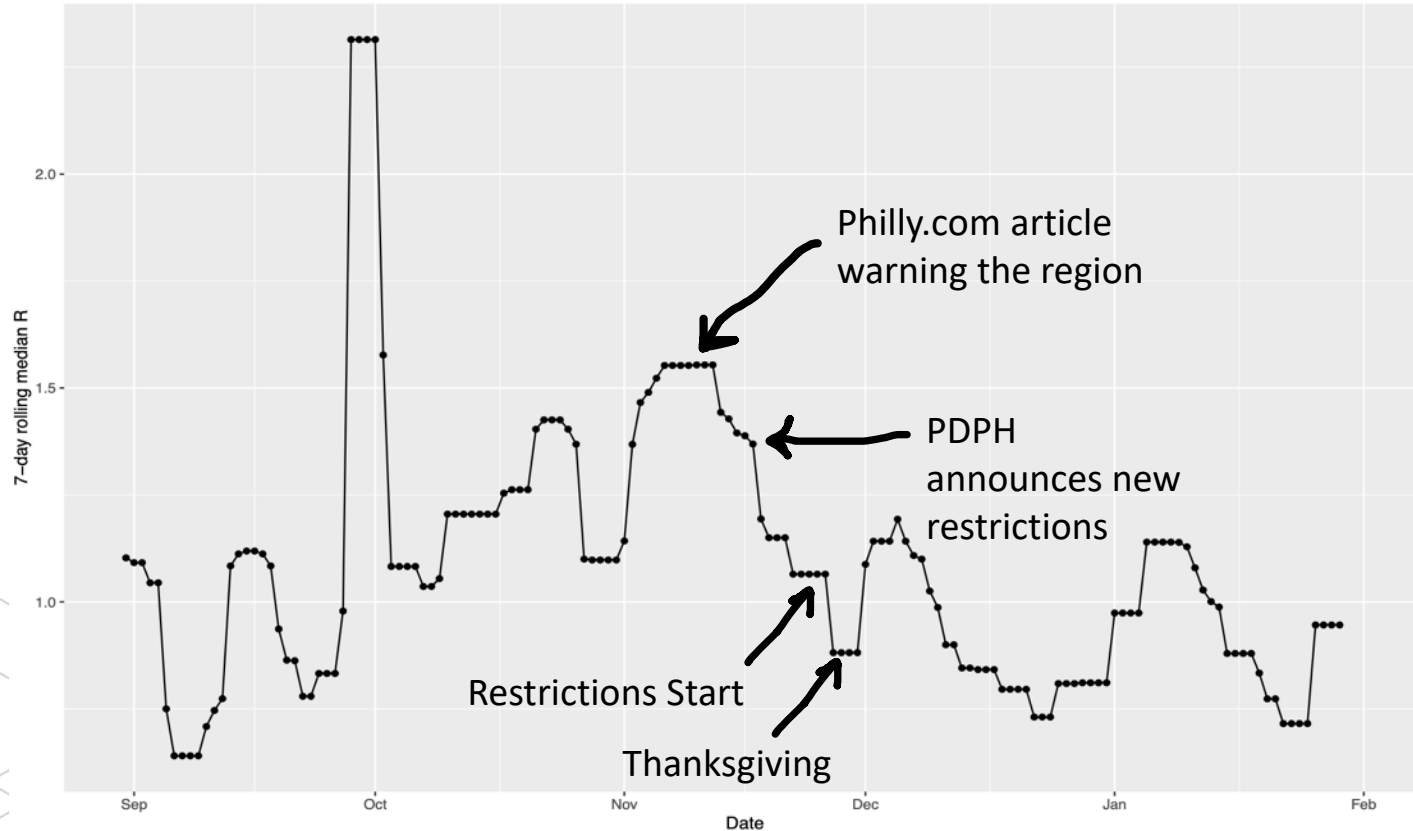
*We measure social distancing as the percentage change in travel to non-essential businesses, as compared to normal activity before the pandemic. We calculate travel to non-essential businesses using cellphone GPS data from Unacast.

These projections were updated on July 29.



MAKING TOUGH CHOICES: THE HOLIDAY CHALLENGE

Philadelphia, PA



COVID-LAB: MAPPING COVID-19 IN YOUR COMMUNITY

Test Positivity Rate & Case Counts by County

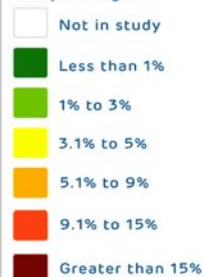
Hospitalizations & ED Visits by State

Projected Cases for 4 Weeks

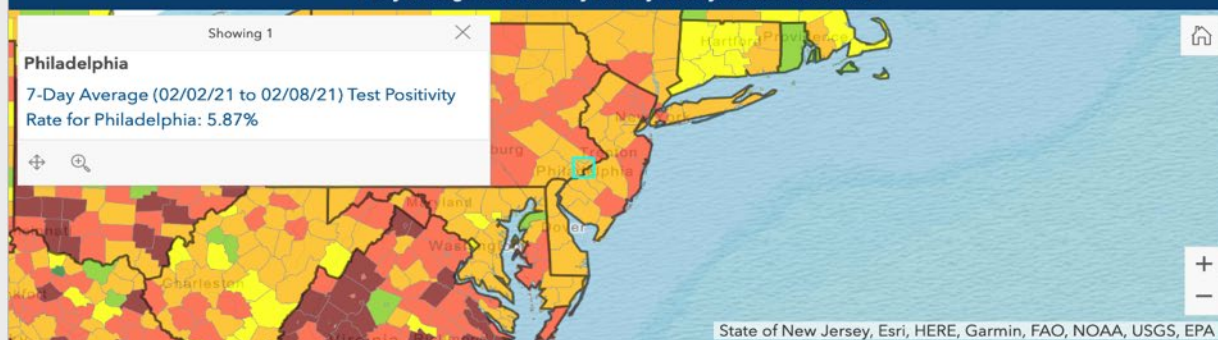
Pennsylvania Maps & Metrics

Select a State: Pennsylvania

Test Positivity Rate
7-Day Average



7-Day Average Test Positivity Rate by County: 02/02/21 to 02/08/21



Available Counties:

Northampton, PA
Northumberland, PA
Perry, PA
Philadelphia, PA
Pike, PA
Potter, PA

Graphs below showing data for: Philadelphia Pennsylvania

Absolute Change in Weekly Cases
from Last Week per 100K People
(02/08/21)



Weekly Cases per 100K People



*Threshold lines align with PolicyLab's updated guidance for in-person schooling, found [here](#).

7-Day Average Test Positivity Rate



Data courtesy of HHS and CDC.

Weekly Cases

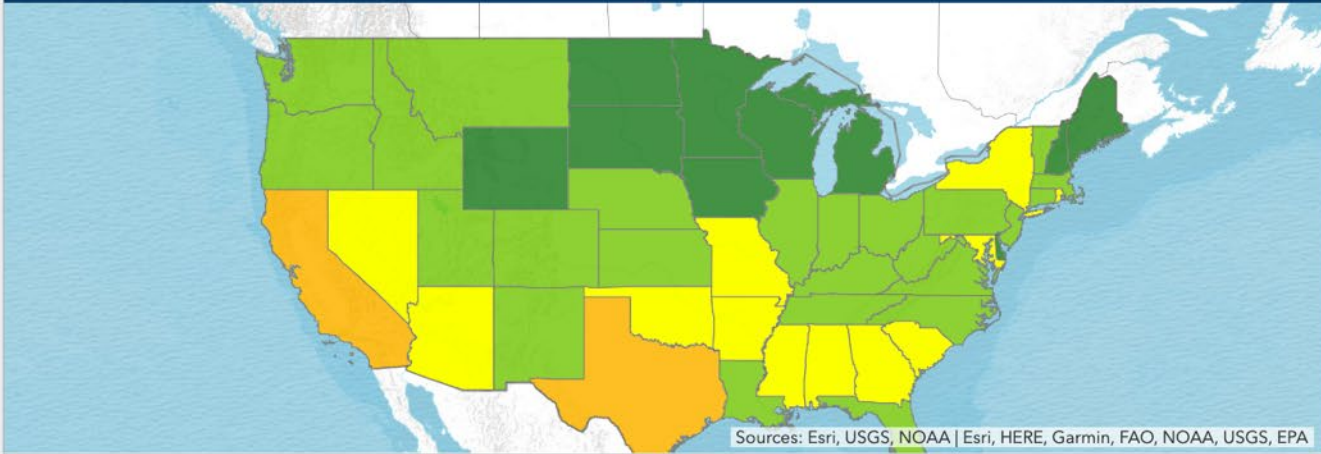
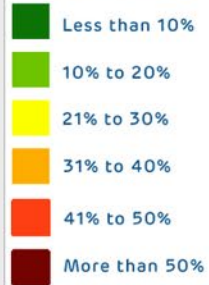
Daily Cases

Positive Tests

Total Tests

ICU Capacity by State as of 02/15/21

Percent of Adult ICU
Beds Occupied by
COVID-19 Patients



Select a
State:

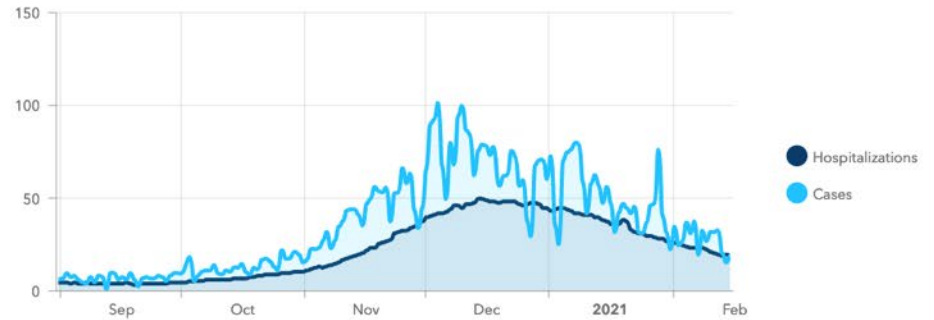
- Oregon
- Pennsylvania
- Rhode Island
- South Carolina
- South Dakota
- Tennessee

Graphs below showing data for: Pennsylvania

Percent of ICU Beds Occupied by COVID-19 Patients



Daily COVID-19 Cases and Hospital Census per 100K People



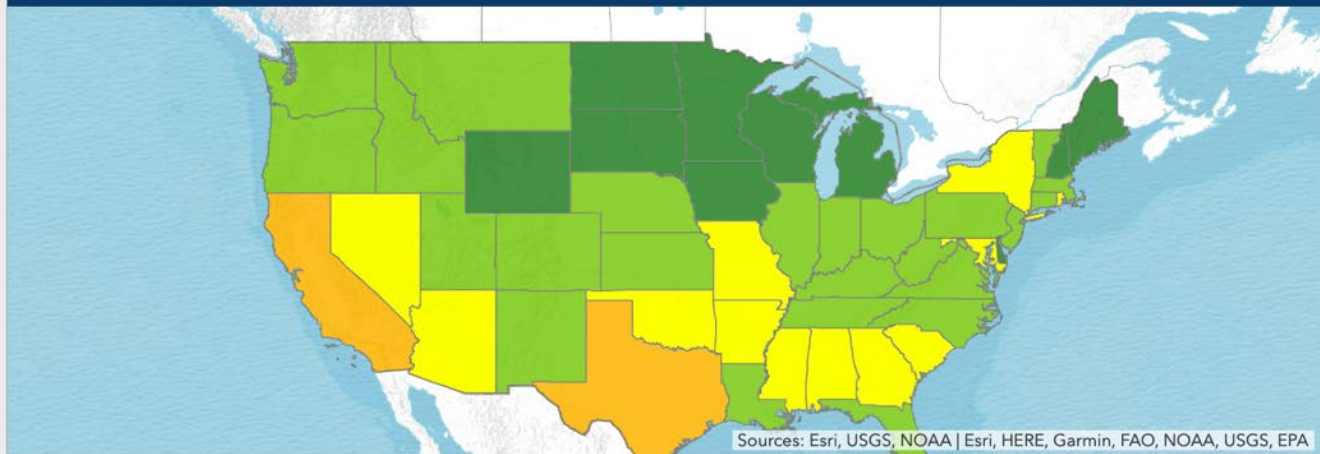
Data courtesy of HHS.

Cases and Hospitalizations

Admissions and ED Visits

ICU Capacity by State as of 02/15/21

Percent of Adult ICU Beds Occupied by COVID-19 Patients

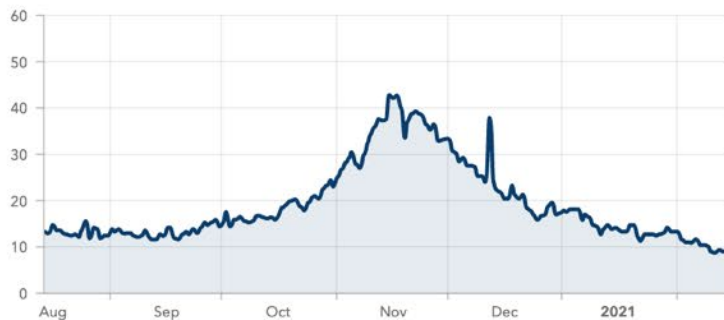


Select a State:

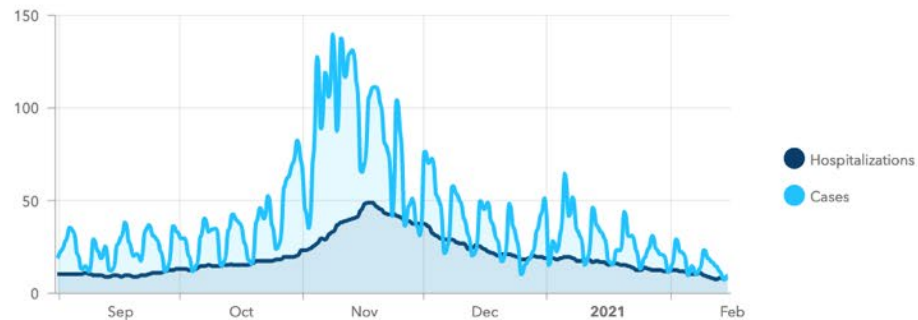
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana

Graphs below showing data for: Iowa

Percent of ICU Beds Occupied by COVID-19 Patients



Daily COVID-19 Cases and Hospital Census per 100K People



Data courtesy of HHS.

Cases and Hospitalizations

Admissions and ED Visits



THE ESSENCE OF THE CDC GUIDELINES

- Universal and correct use of [masks](#)
- [Physical distancing](#)
- [Handwashing and respiratory etiquette](#)
- [Cleaning](#) and maintaining healthy facilities
- [Contact tracing](#) in combination with isolation and quarantine, in collaboration with the health department





ADDITIONAL LAYERS OF MITIGATION

- Testing to identify individuals with a SARS-CoV-2 infection to limit transmission and outbreaks
- Vaccination for teachers, staff, and in communities as soon as supply allows



PHASED AND LAYERED MITIGATION STRATEGIES

Table 1. CDC Indicators and Thresholds for Community Transmission of COVID-19¹

Indicator	Low Transmission Blue	Moderate Transmission Yellow	Substantial Transmission Orange	High Transmission Red
Total new cases per 100,000 persons in the past 7 days ²	0-9	10-49	50-99	≥100
Percentage of NAATs that are positive during the past 7 days ³	<5.0%	5.0%-7.9%	8.0%-9.9%	≥10.0%

Full In-School with “6 feet to the greatest extent possible”

COVID-LAB: MAPPING COVID-19 IN YOUR COMMUNITY

Test Positivity Rate & Case Counts by County

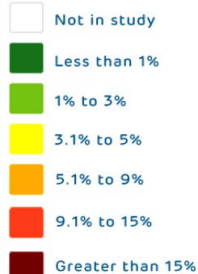
Hospitalizations & ED Visits by State

Projected Cases for 4 Weeks

Pennsylvania Maps & Metrics

Select a State: California

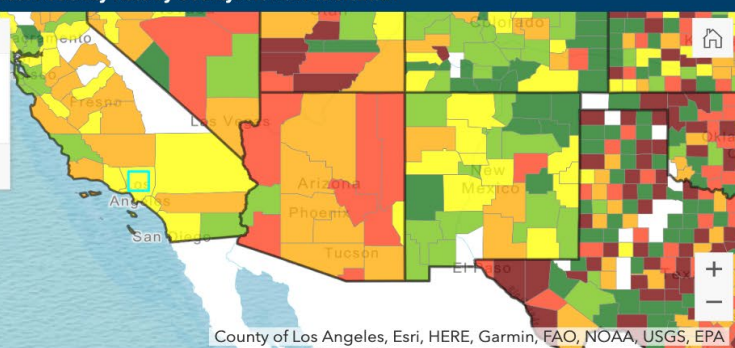
Test Positivity Rate
7-Day Average



7-Day Average Test Positivity Rate by County: 02/14/21 to 02/20/21

Los Angeles County

7-Day Average (02/14/21 to 02/20/21) Test Positivity Rate for Los Angeles: 3.58%



Available Counties:

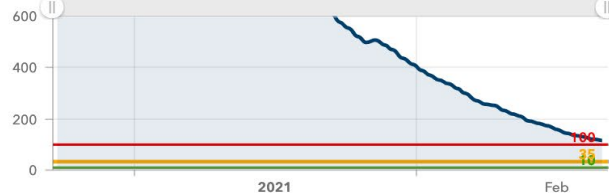
Kern, CA
Kings, CA
Lake, CA
Los Angeles, CA
Madera, CA

Graphs below showing data for: Los Angeles California

Absolute Change in Weekly Cases
from Last Week per 100K People
(02/20/21)



Weekly Cases per 100K People



*Threshold lines align with PolicyLab's updated guidance for in-person schooling, found [here](#).

7-Day Average Test Positivity Rate



Data courtesy of HHS and CDC.

Weekly Cases

Daily Cases

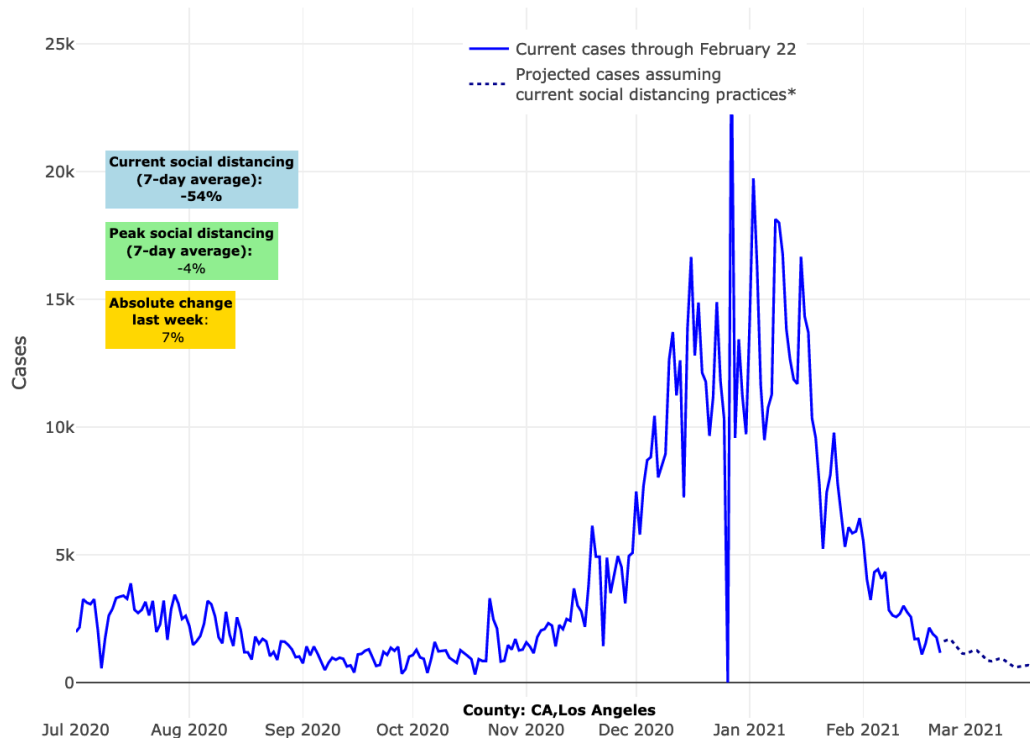
Positive Tests

Total Tests

THE WINDOW OF OPPORTUNITY HAS OPENED

Projected cases

R estimation





LESSONS LEARNED IN MODELING THE PANDEMIC

- **Everything is local**
- **Avoid pitfalls of confirmation bias**
- **Accept that you can't make everyone happy**
- **Don't ever be too certain that you are right**
- **Do not become a prisoner to speculation**





QUESTIONS AND COMMENTS?



PolicyLab

The Children's Hospital of Philadelphia
3401 Civic Center Boulevard
Roberts Center, 10th Floor
Philadelphia, PA 19104

Rubin@chop.edu
policylab.chop.edu

 *@PolicyLabCHOP*