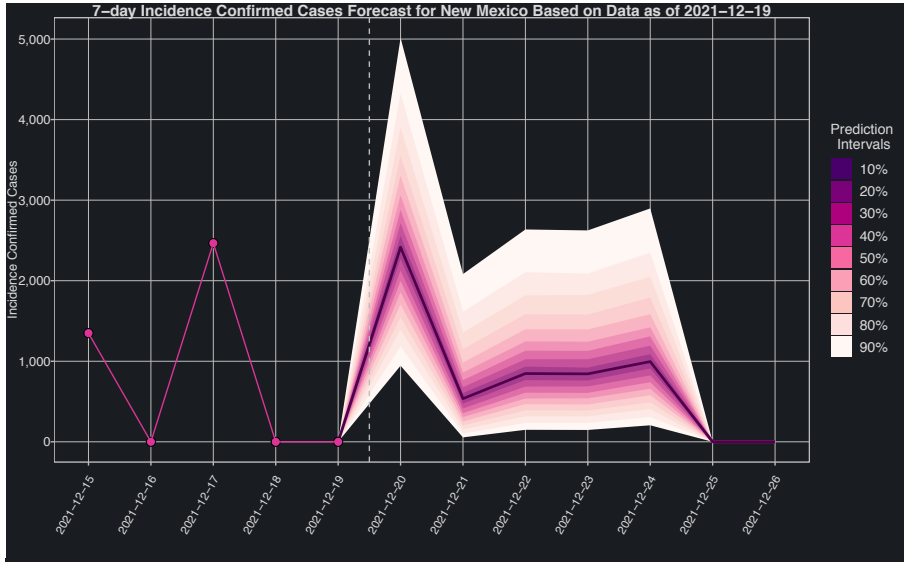
Modeling & Forecasting COVID-19 in NM

December 20, 2021

NNSA
National Nuclear Security Administration

Short- & Long-Term Forecast for NM: Cases



6–Week Forecast of Confirmed Cases for New Mexico Based on Data as of 2021–12–19

Week	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)
2021–12–19		336,790*	
2021–12–26	338,294	342,435	352,070
2022–01–02	339,710	347,914	367,134
2022–01–09	341,035	353,436	382,459
2022–01–16	342,320	358,910	398,181
2022–01–23	343,456	364,670	414,554
2022–01–30	344,672	370,472	431,837

*Last reported confirmed cases count

6–Week Forecast of Daily Average of Confirmed Cases for New Mexico Based on Data as of 2021–12–19

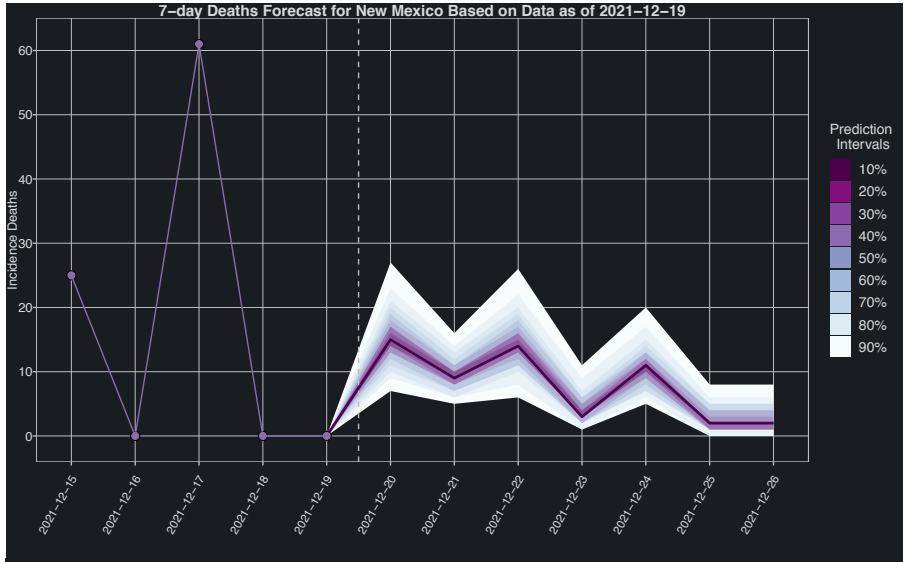
Week End Date	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)
2021–12–19		1,002*	
2021–12–26	214	806	2,179
2022–01–02	198	785	2,173
2022–01–09	184	782	2,200
2022–01–16	175	792	2,263
2022–01–23	163	798	2,364
2022–01–30	149	804	2,503

*Last reported confirmed cases count

So what?

Our model suggests that the number of daily cases is expected to range between 210 and 2,510 in the next few weeks

Short- & Long-Term Forecast for NM: Deaths



6–Week Forecast of Deaths for New Mexico Based on Data as of 2021–12–19

Week	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)
2021–12–19		5,577*	
2021–12–26	5,612	5,638	5,670
2022–01–02	5,643	5,691	5,753
2022–01–09	5,672	5,740	5,830
2022–01–16	5,698	5,788	5,903
2022–01–23	5,723	5,834	5,978
2022–01–30	5,748	5,880	6,057

*Last reported deaths count

6–Week Forecast of Daily Average of Deaths for New Mexico Based on Data as of 2021–12–19

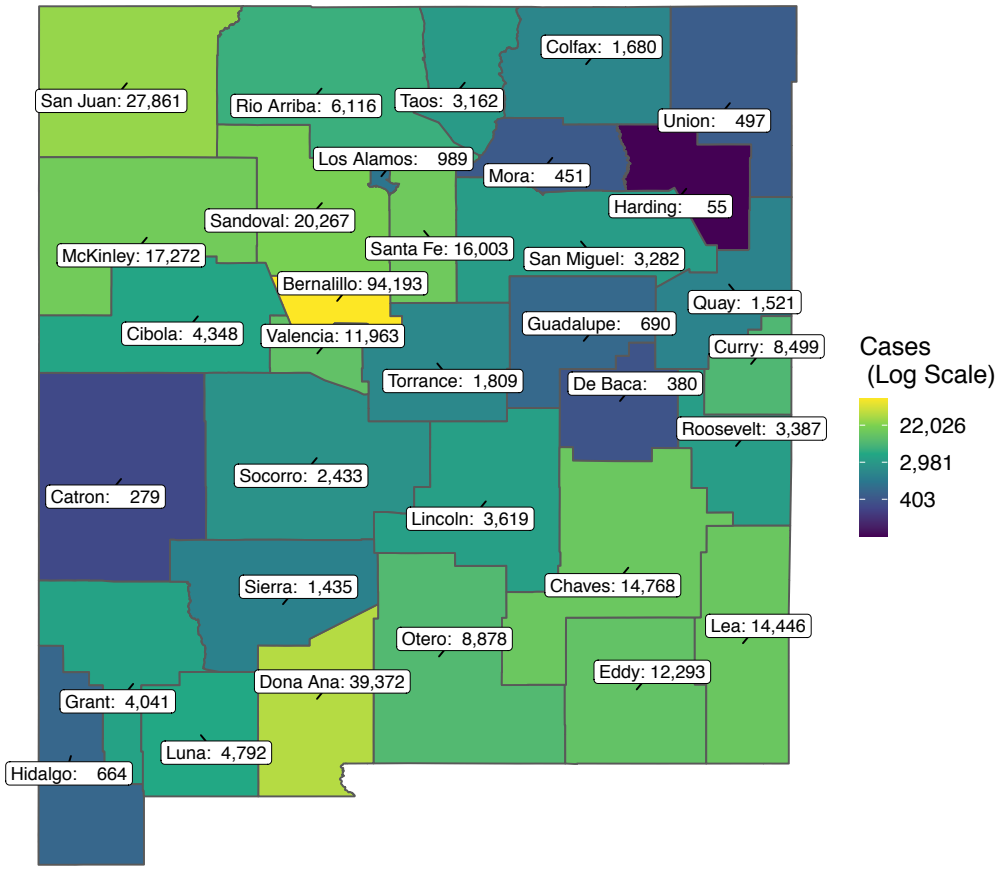
Week Start Date	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)
2021–12–19		15*	
2021–12–26	3	8	17
2022–01–02	3	7	15
2022–01–09	3	6	14
2022–01–16	3	6	14
2022–01–23	2	6	14
2022–01–30	2	6	14

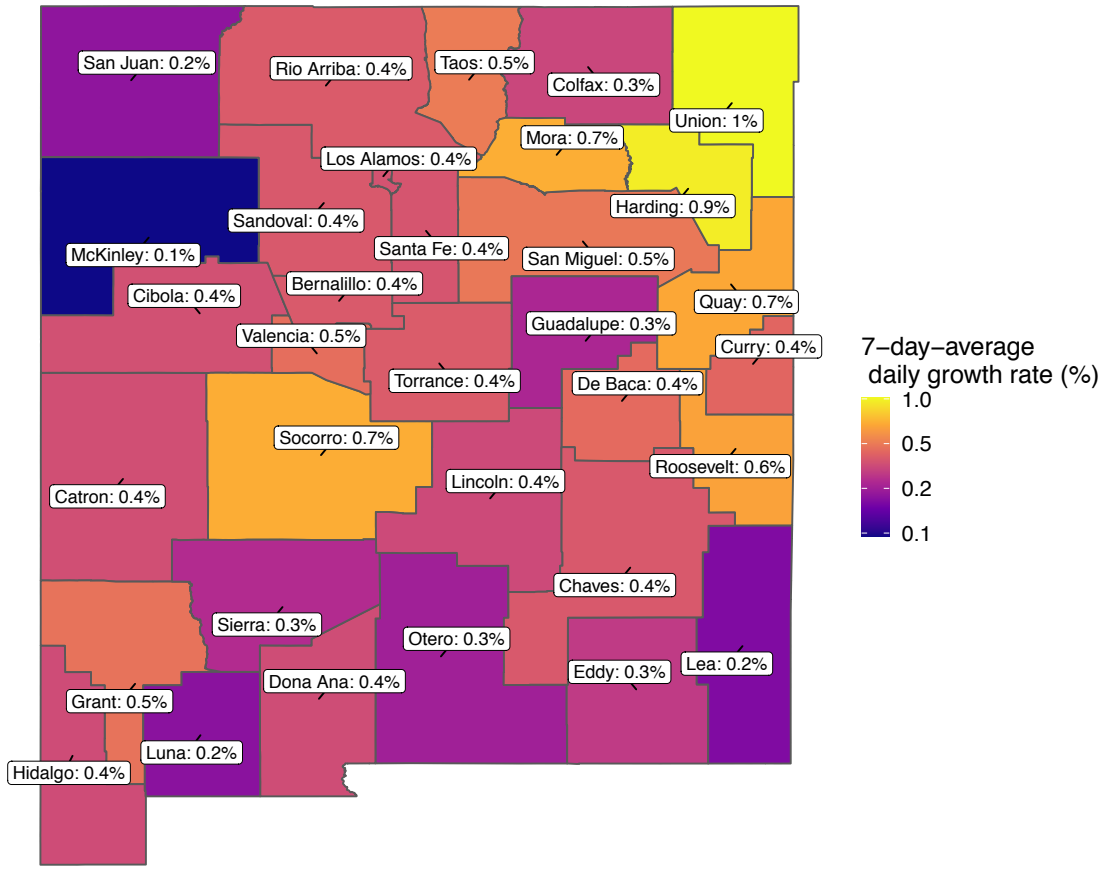
*Last reported confirmed deaths

So what?

Our model suggests that the number of daily deaths is expected to range between 3 and 14 in the next few weeks

Cumulative Cases & Daily Growth Rate for NM: Dec 20

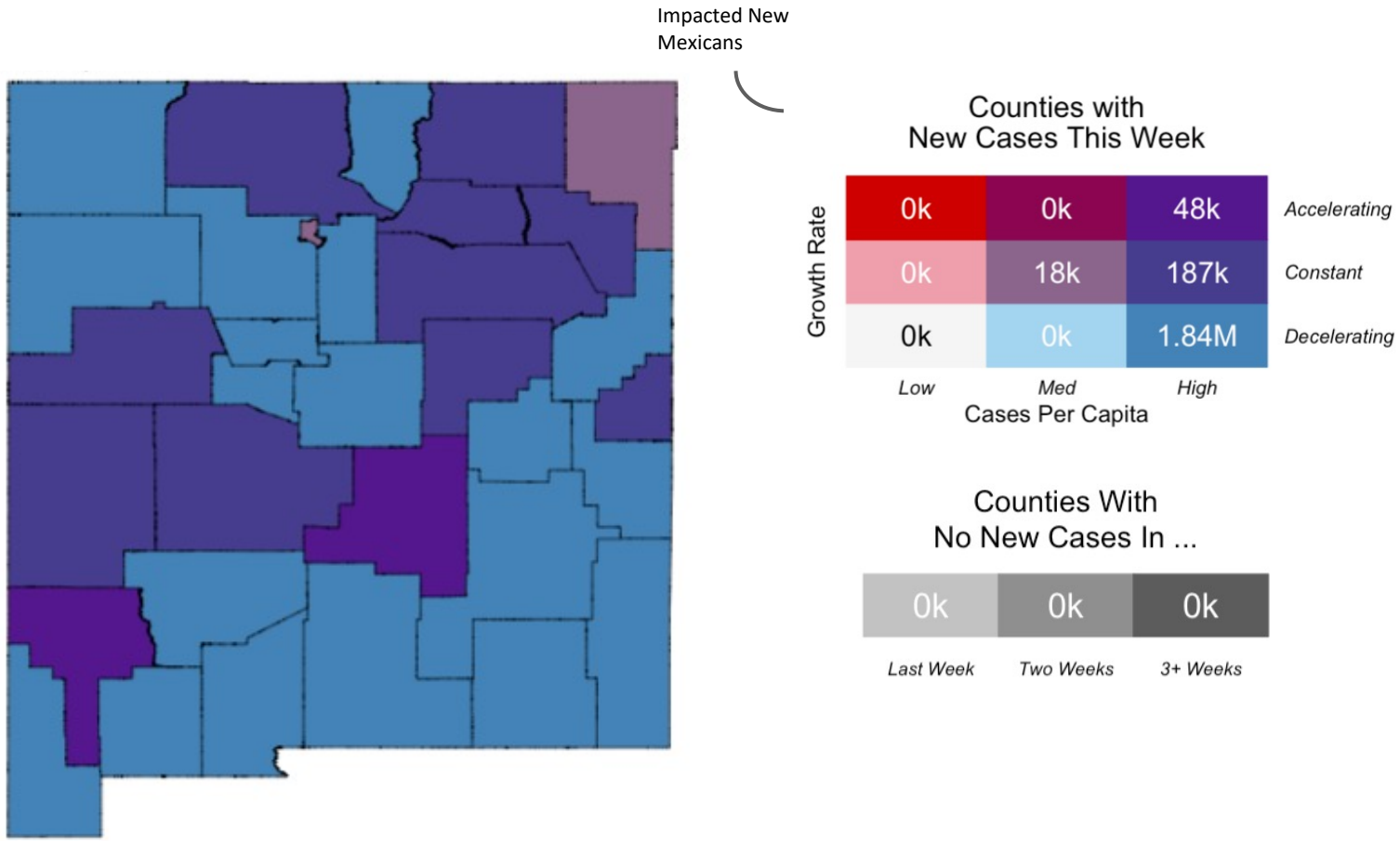




Harding and Union counties have an elevated cumulative growth rate.

*Growth rate is in cumulative cases

Weekly Growth Rate for NM: Another View (Dec 20)



So what?

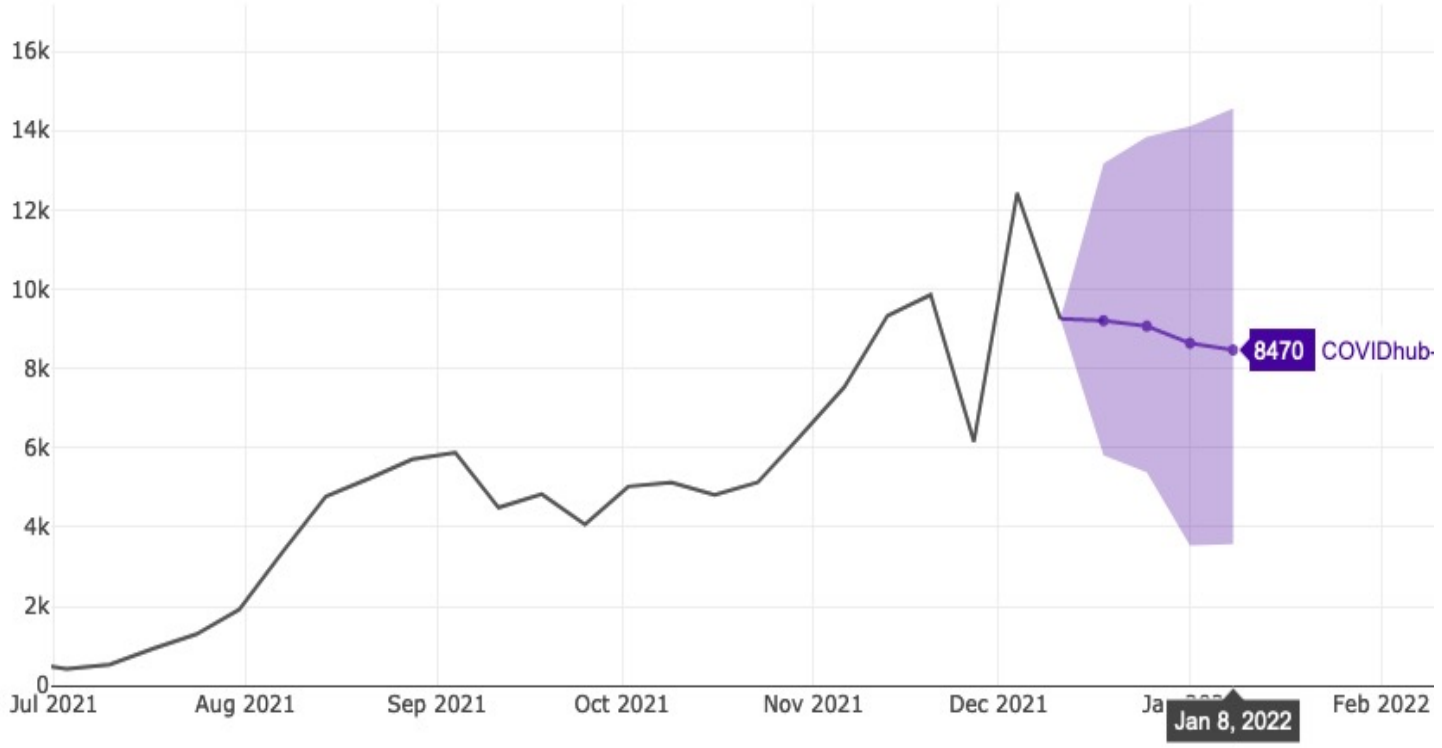
- **Most people in New Mexico are living in a county that has higher per-capita case counts and decelerating**

Number of New Mexicans living in regions with particular combinations of per capita case counts and 7-day growth rates

Low <10 cases/100k per week
Med 10-99 cases/100k per week
High >100 cases/100k per week

Forecast for Incident Weekly Cases in NM

The CDC ForecastHub shows an 8% decrease in incident weekly cases by Jan 1, 2021 from current counts observed at 9209 (Dec18)

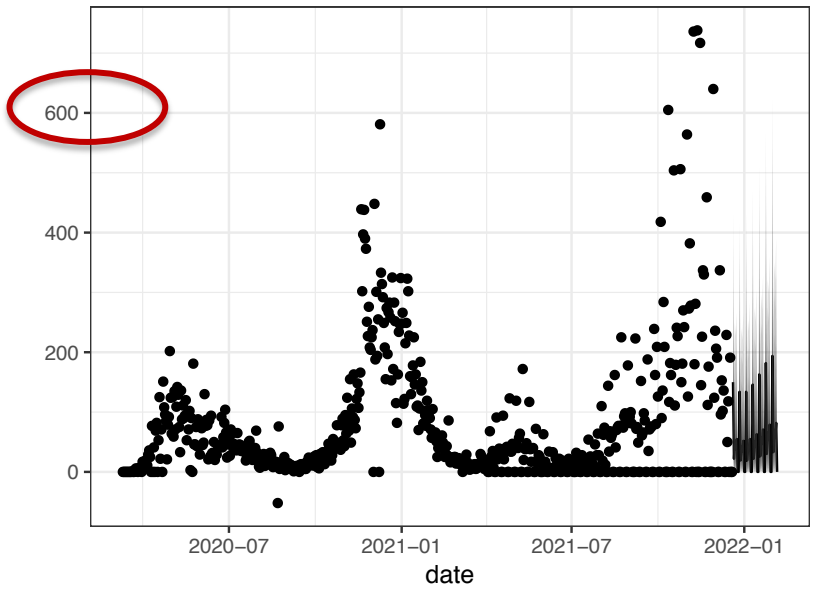


COVIDhub-4_week_ensemble prediction, COVID 19 ForecastHub
https://viz.covid19forecasthub.org/

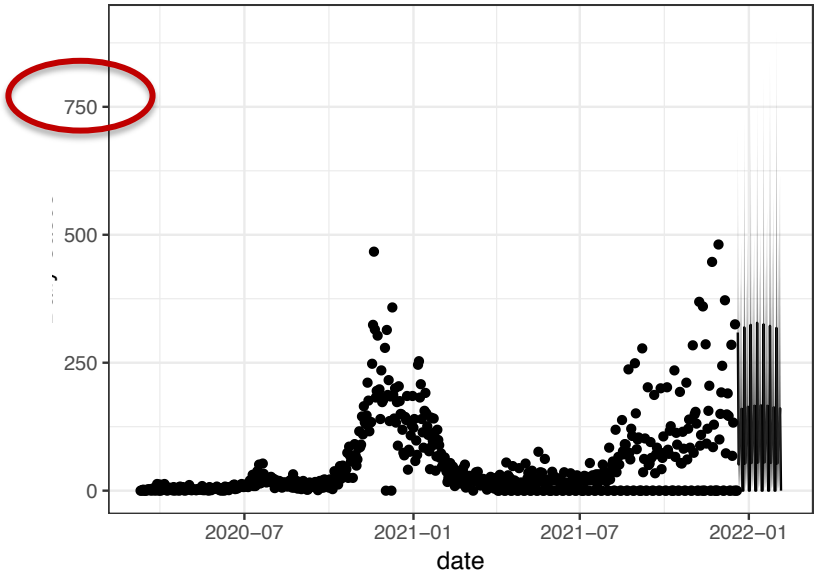
> Additional Regional Forecasts

Central & North Regions Daily Cases Forecast

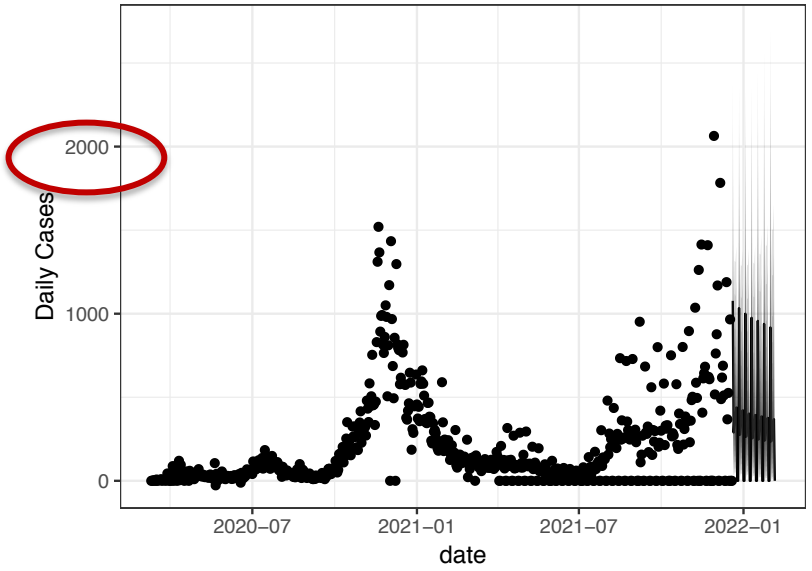
Northwest



Northeast



Central

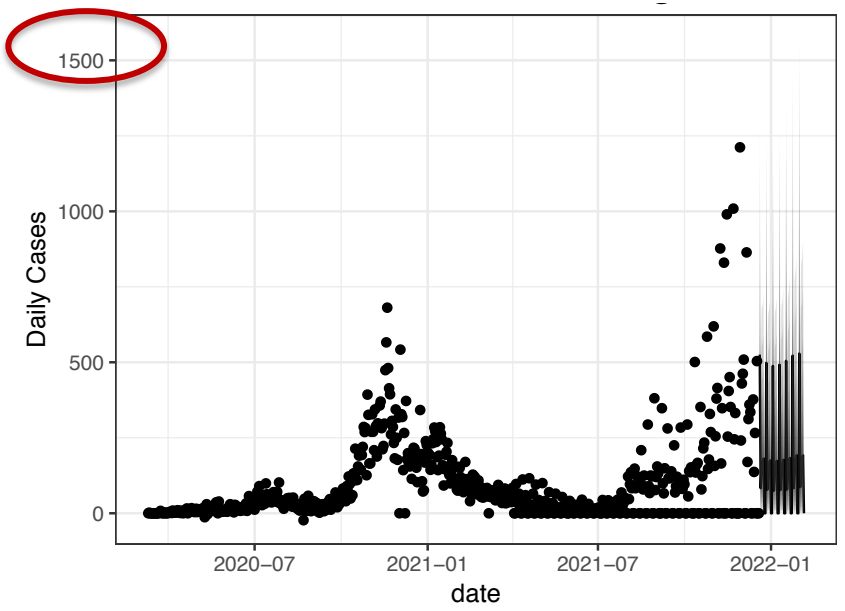


So what?

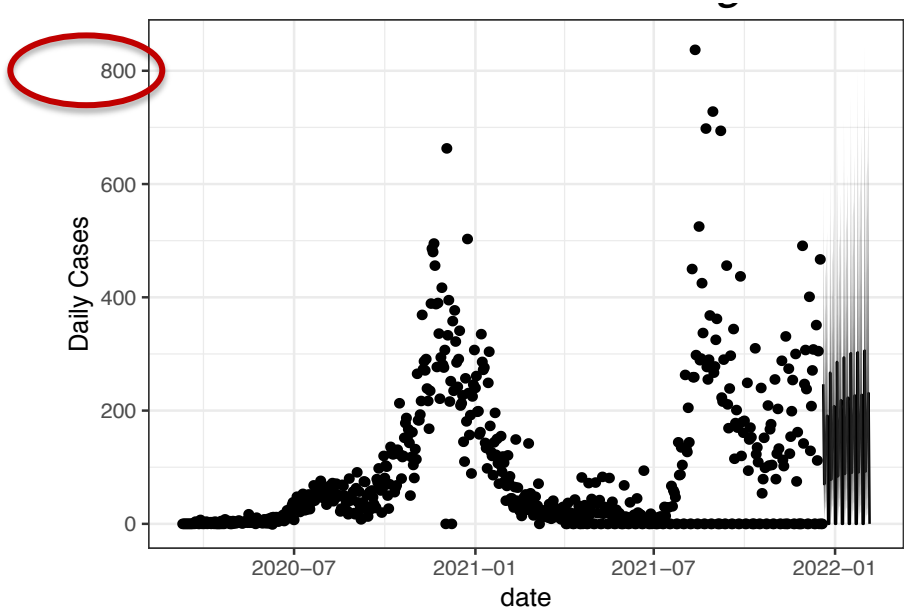
The central region is expected to see the most number of cases followed by the northeast and northwest regions.

South Regions Daily Cases Forecast

Southwest



Southeast

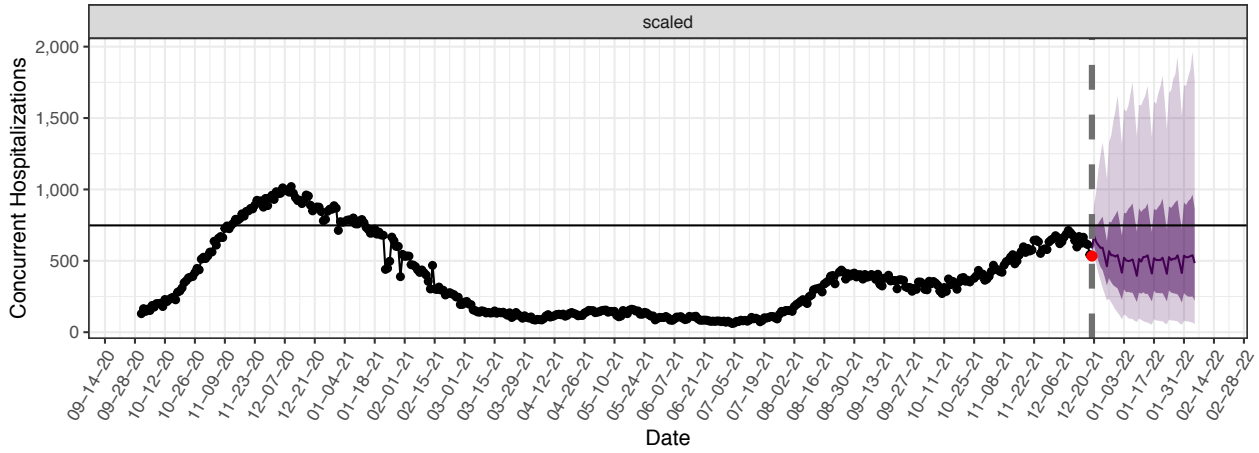


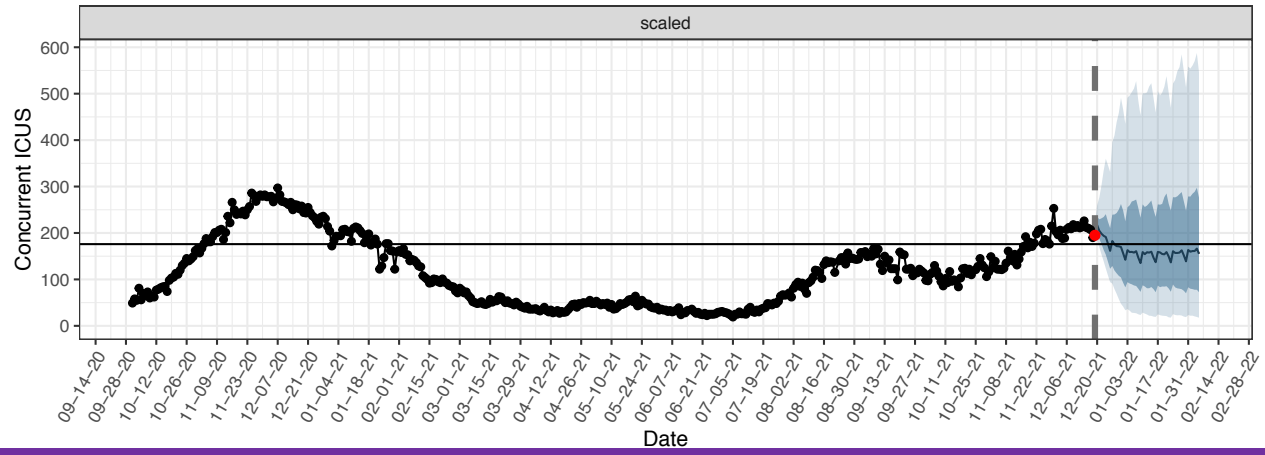
So what?

The southwest region is expected to see the most number of cases followed by the southeast region

> Hospitalization Forecast

Concurrent Hosp & ICU Beds Based on Forecasts – Average Stay of 8 Hosp, 15 Days for ICU/vent & 25% ICU rate





Concurrent COVID-19 ICU beds

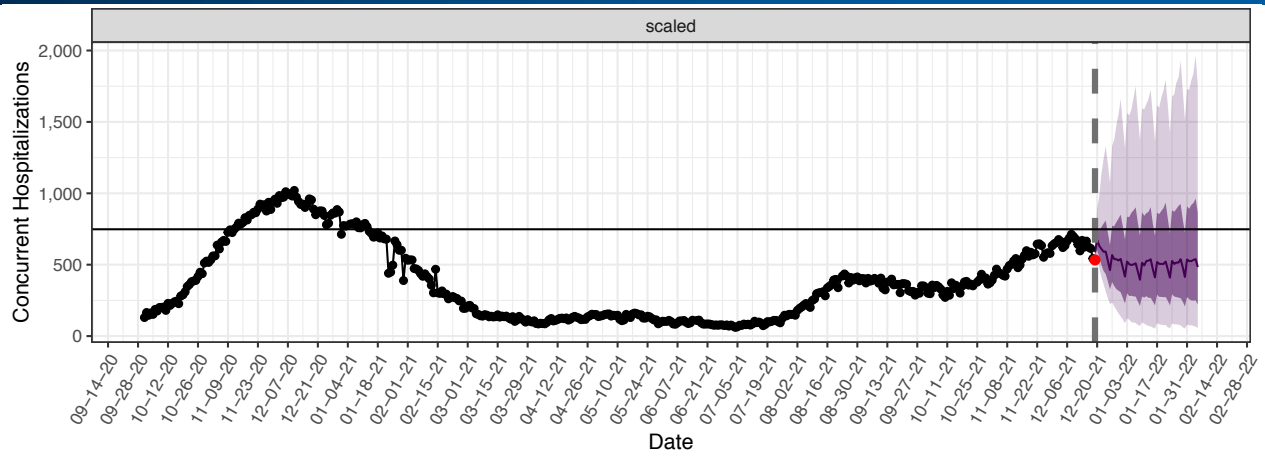
Week	Qu. 5% (best case)	Qu. 50% (median)	Qu. 95% (worst case)
12/26/21	94	162	331
1/2/22	33	142	435
1/9/22	23	135	454
1/16/22	19	137	459
1/23/22	18	137	470
1/30/22	19	139	514

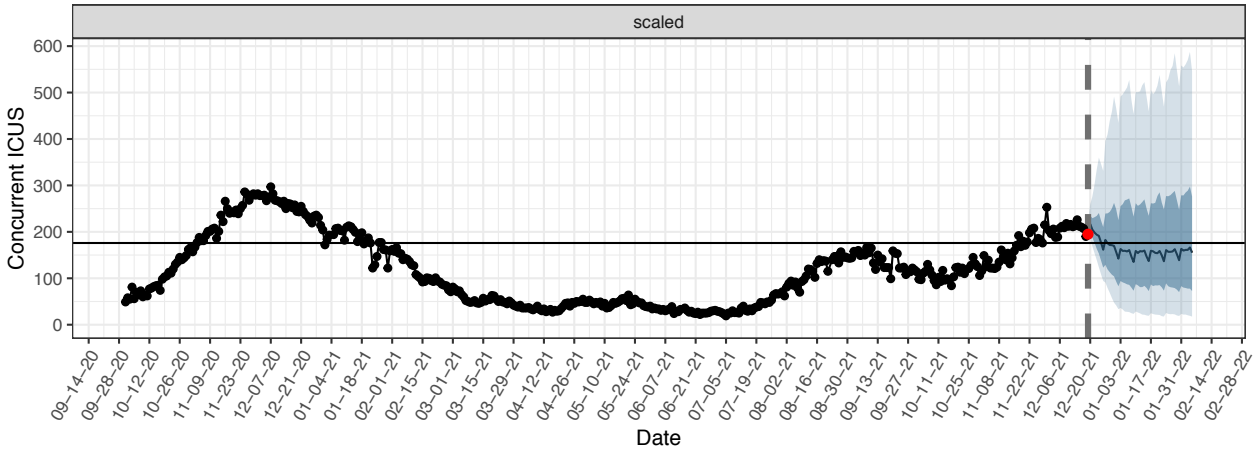
"Scaled" Scenario

So what?

Model is predicting a decrease in COVID-19 ICU beds needed over the next 3 weeks

Concurrent Hosp & ICU Beds Based on Forecasts – Average Stay of 8 Hosp, 15 Days for ICU/vent & 25% ICU rate





Concurrent COVID-19 non-ICU "med-surge" beds

Week	Qu. 5% (best case)	Qu. 50% (median)	Qu. 95% (worst case)
12/26/21	129	300	742
1/2/22	56	274	882
1/9/22	48	260	919
1/16/22	33	274	904
1/23/22	37	273	953
1/30/22	34	275	1002

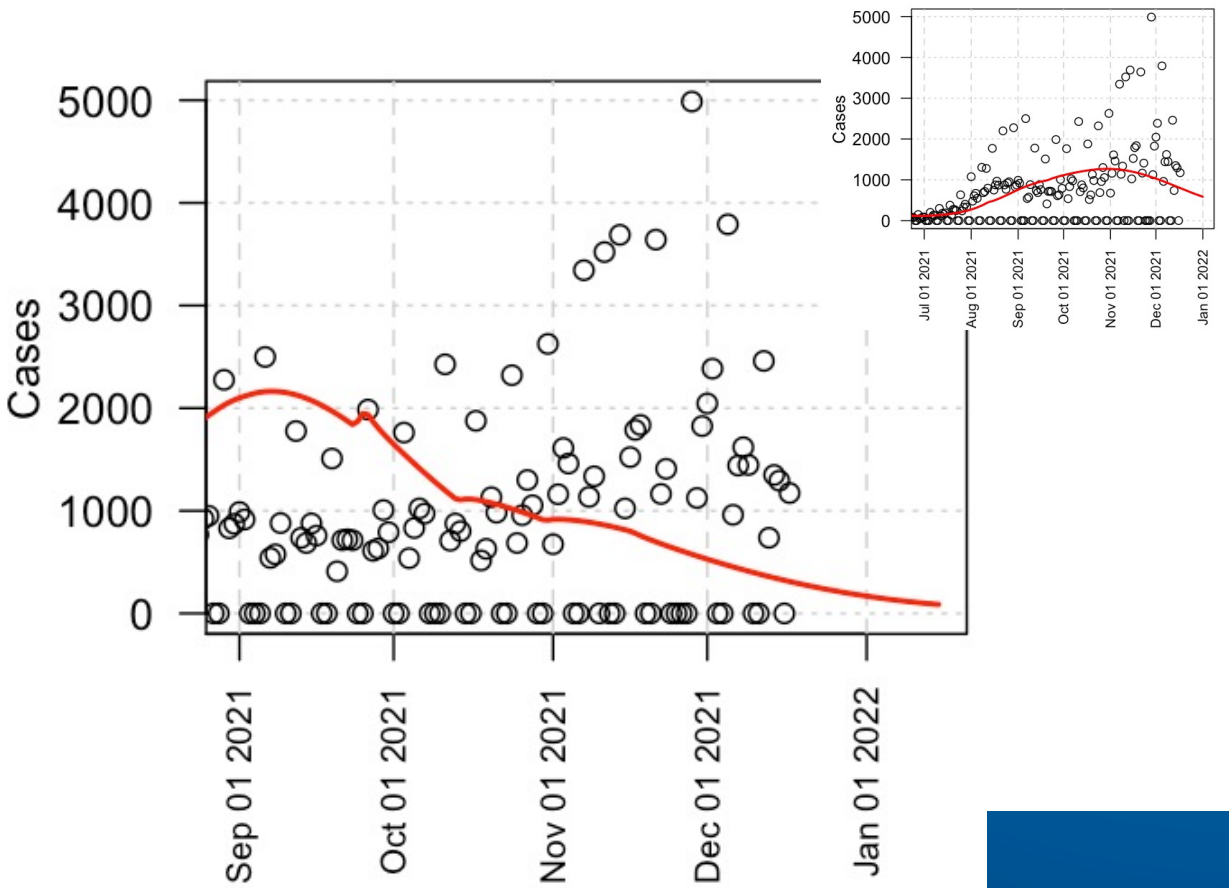
"Scaled" Scenario

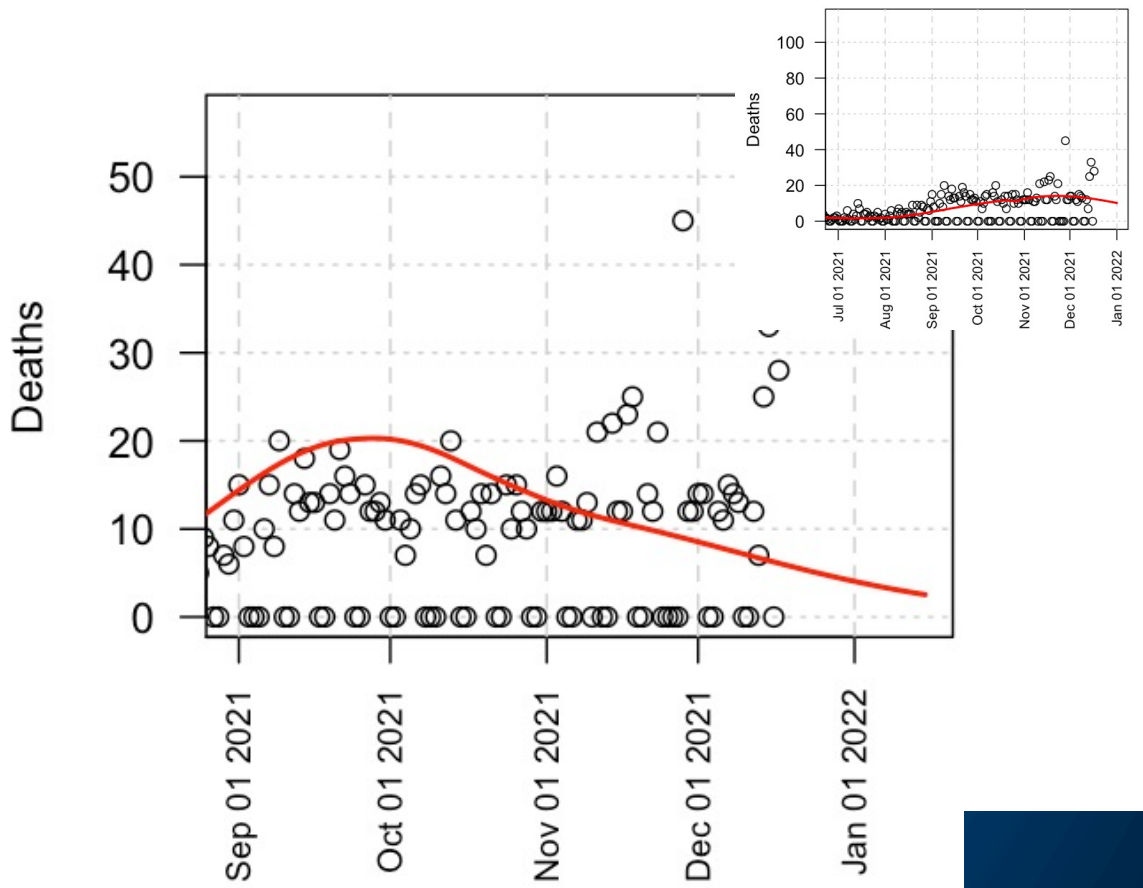
So what?

Med-surge general bed needs are predicted to decrease slightly, then increase during the next 3 weeks

21 Dec 2021: Epigrid modeling

- New Mexico has declining incidence recently.
- Deterioration of immunity/waning immunity in the context of unvaccinated. Omicron variant may add further difficulty in weeks.
- Booster vaccination appear to have driven the recent rollover.
- *Indoor* masking remains critical to moderating all consequence. This is independent of genetic variation.
- New pharmaceuticals are not sensitive to changes in S protein; contrast with Regeneron, vaccines, waning immunity.
- Drug administration is time-sensitive: Rapid contact-tracing is beneficial.



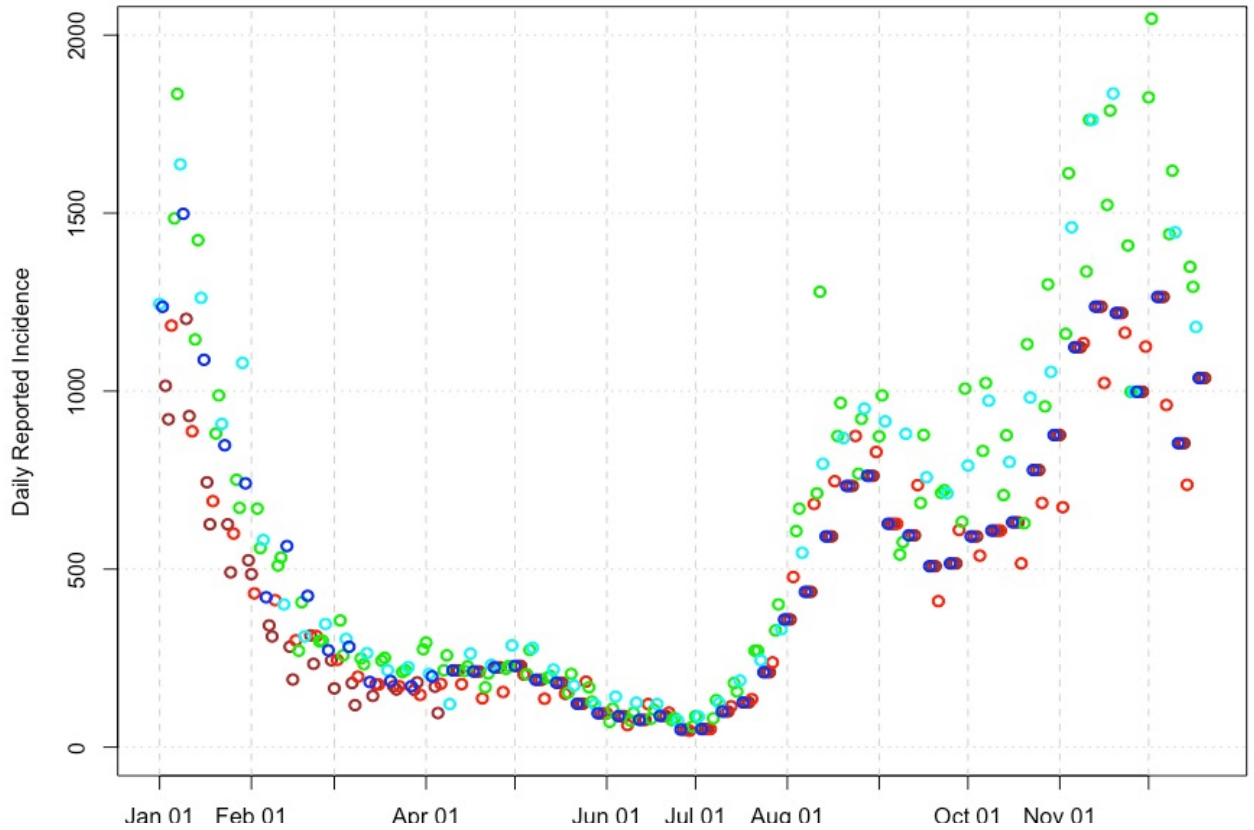


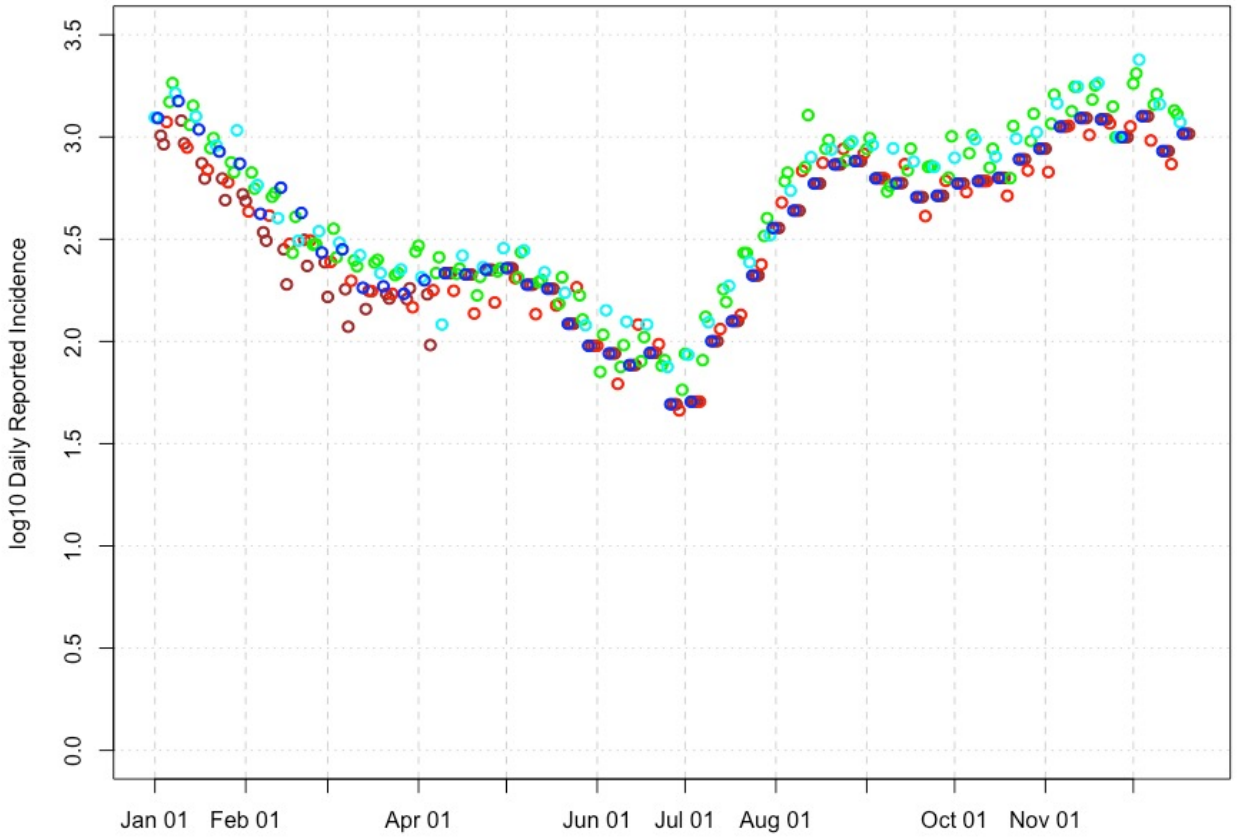
A look at the raw incidence data

- Sunday, Monday
- Tuesday
- Wednesday/Thursday
- Friday
- Saturday

Reported cases rates are slowly declining; within-weekly variation remains consistent with past performance.

The 190 cases in the Lea county correctional facility are removed from data reported on March 26th. The 1/3 of reported cases that were > 2 weeks prior were removed from March 24th. Case reported for weekends starting April 10-12th are each divided by 3 to estimate individual day counts.

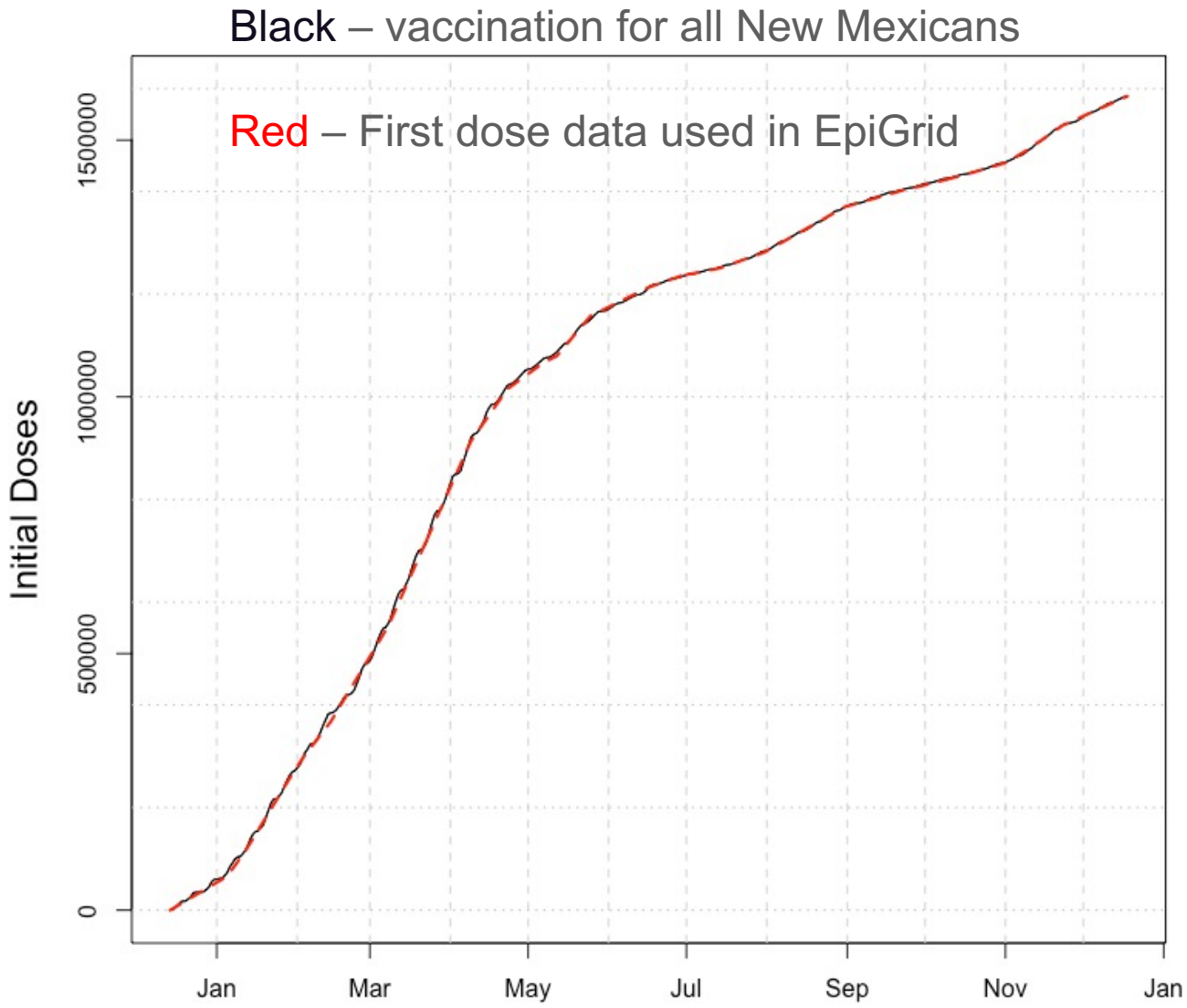




20 December 2021 Vaccine Analysis

- **1586k first doses are used in modeling.**
- **~1585k first doses have been administered in NM.**
- **~1345k completed vaccine series in NM.**
- **~518k boosters completed in NM.**
- **~75.6% of all persons in New Mexico are at least minimally vaccinated.**
- **~94.5% of all persons in New Mexico are currently eligible (~1981k).**
- **75.6/94.5 ~80.0% of all eligible people are vaccinated.**
- **5-11 year-olds have received ~46k first doses.**

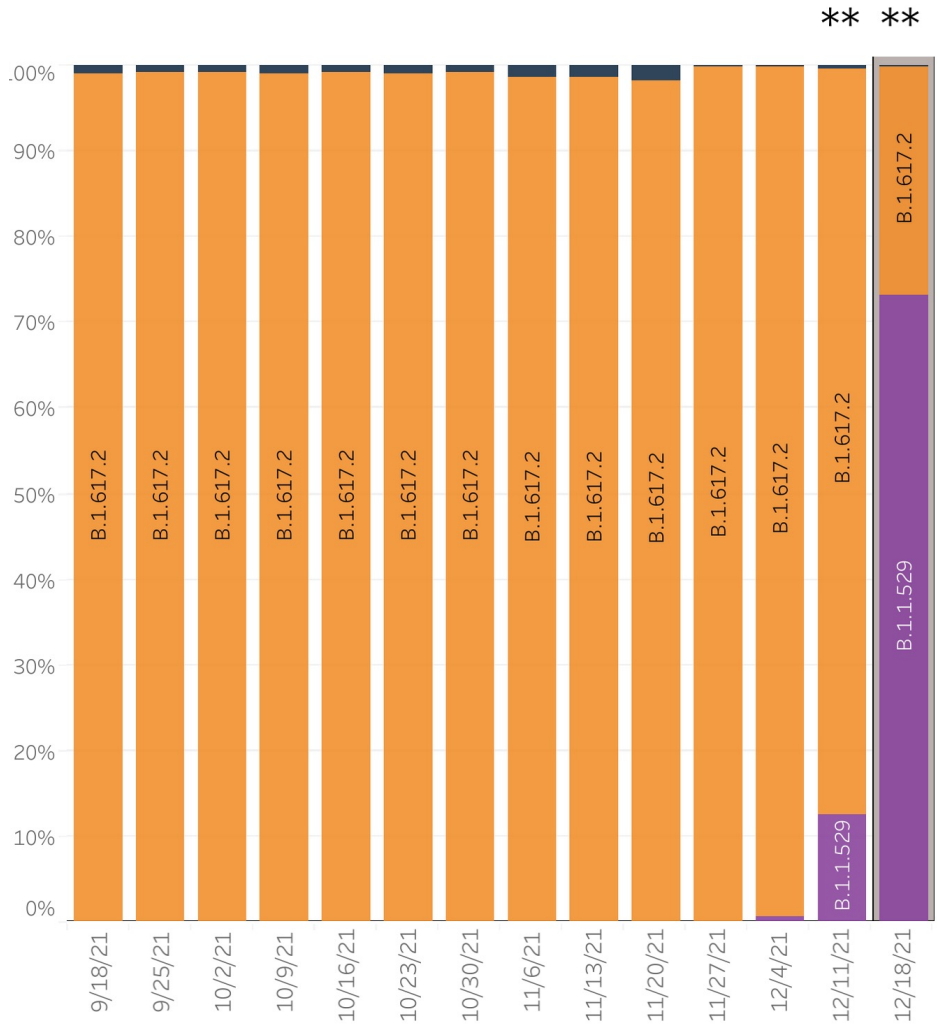
- **Rapid adoption of booster doses in NM is likely leading to a moderation of new case data.**



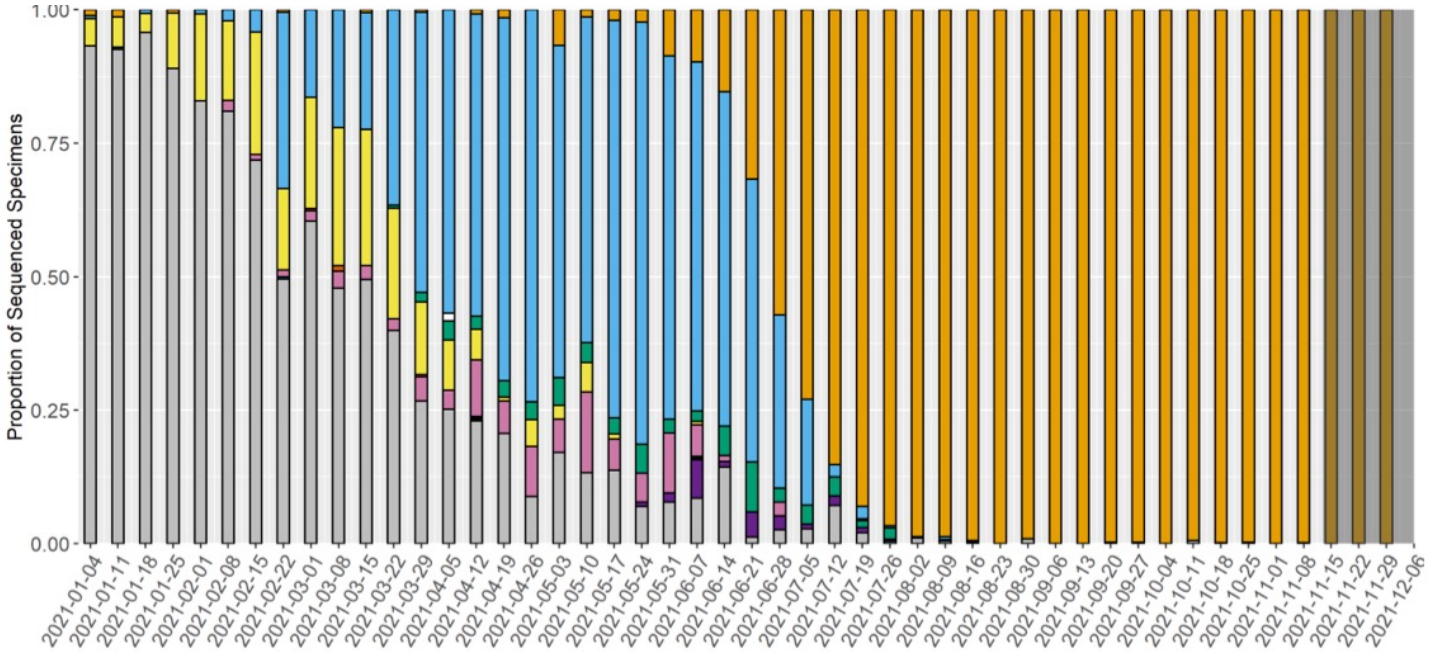
US Census Bureau reports 2097k people in New Mexico.

Variant Monitoring: Omicron has arrived nationally. NM slightly delayed arrival?

https://www.cdc.gov/covid-data-tracker/#variant-proportions



- B.1.617.2, “Δ”, ”Delta”, is the “Indian” variant.
- New variants have appeared without evident intermediates.
- Latest no-intermediate variant is B.1.1.529 (Omicron)
- Omicron has arrived nationally.
- Immune evasion by Omicron’s S protein. Tens of percent.
- NM Data will soon show replacement with Omicron/B.1.1.529
- Three weeks is an outside estimate for a delay in New Mexico.



Screen shot of CDC variant data only, no static image available

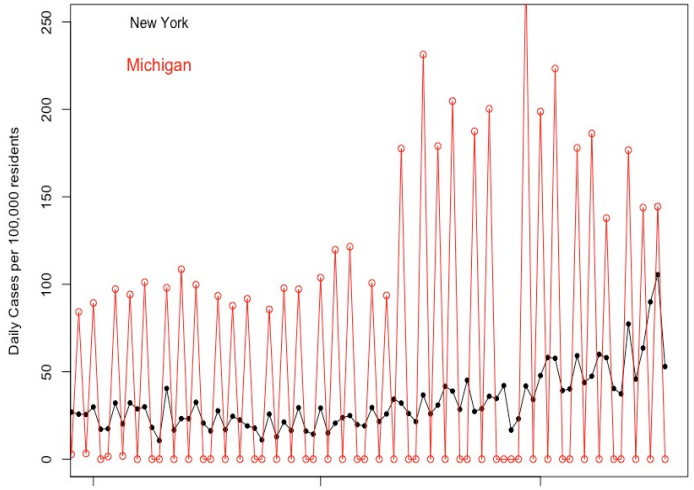
Recent By-State Trends: Most Populous 10 States

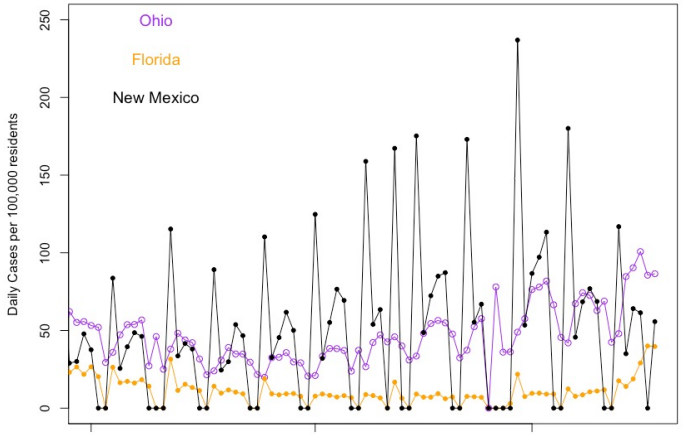
Trends over the last 3 weeks: Increasing: Florida, Georgia, Illinois, New York, N. Carolina, Ohio, Pennsylvania, Texas. Steady: California. Modest Declines: Michigan, New Mexico. Declining: n/a.

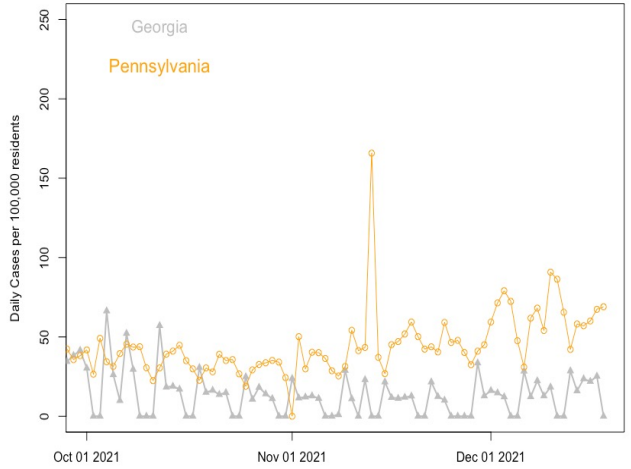
Date-of-40%-vaccinated:
Red = May 2020, or earlier
Green = after May 2020
Improvement in one populous state.

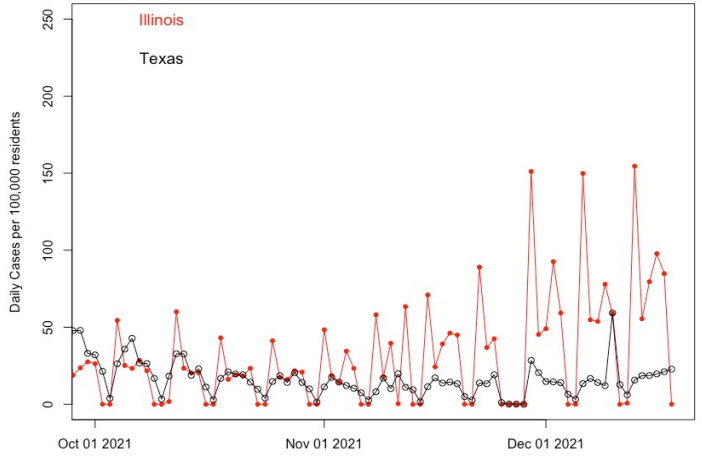
	Cases	Deaths
New York	67.48	0.304
Michigan	66.42	1.179
Ohio	76.9	0.801
Florida	22.74	0.126
New Mexico	47.59	0.713
Illinois	67.56	0.409
Texas	17.53	0.229
California	17.27	0.161
North Carolina	30.47	0.194
Georgia	16.47	0.214
Pennsylvania	59.89	0.9

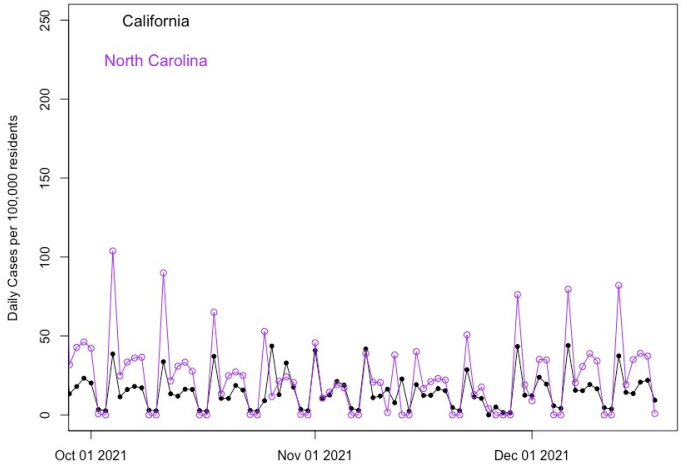
Daily rates per 100,000 residents averaged December 7th thru December 20th 2021.



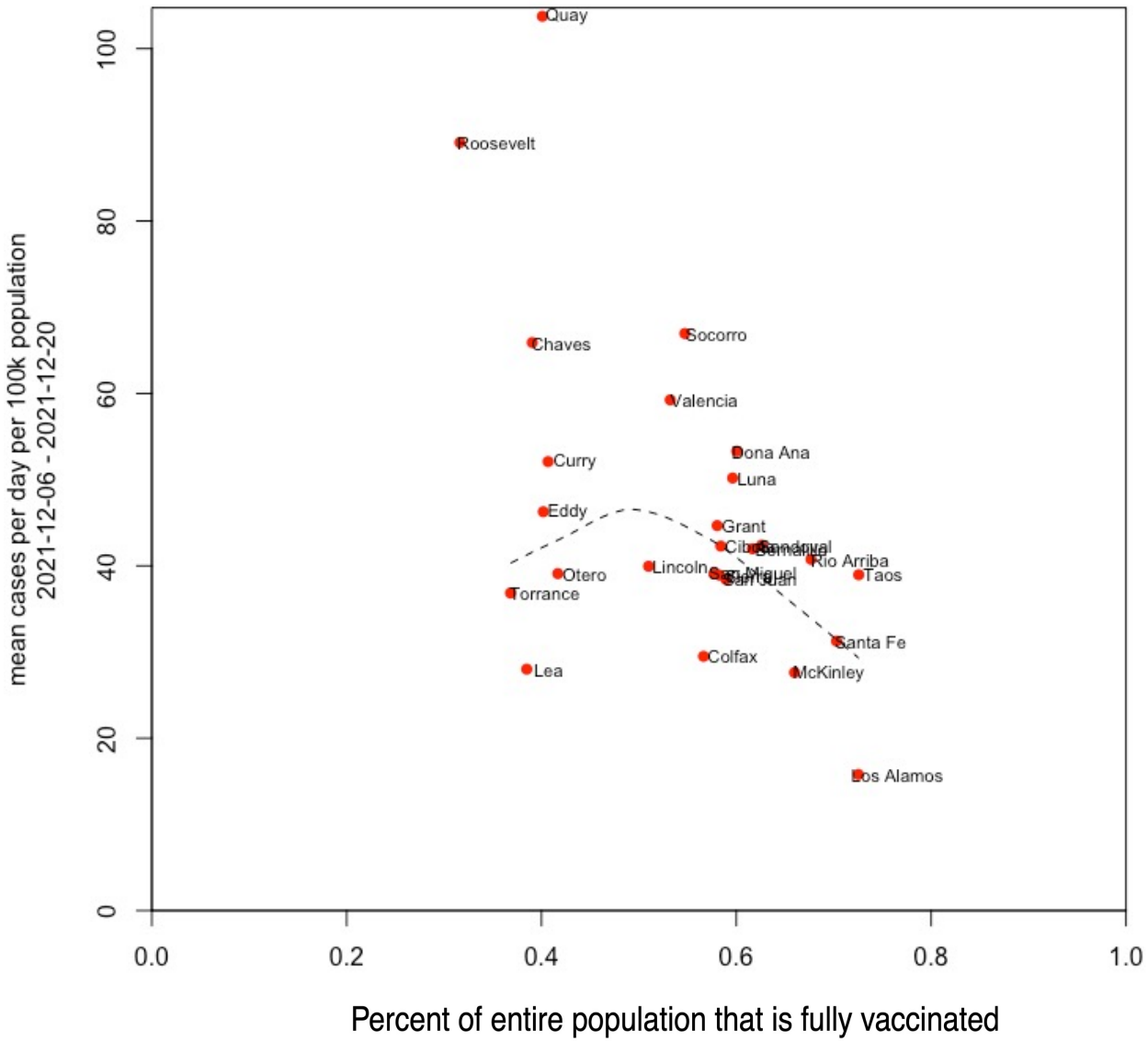








Cases plotted versus vaccination by county



Recent case load relative to the fraction of the entire population vaccinated.

- Correlation between vaccination and cases still holds in the large majority of counties
- Lea, Torrance, Otero have anomalously low case reports
- Quay is anomalously high.
- Roosevelt was anomalously low two weeks ago. Reporting?
- Chavez, Lincoln, Curry, Eddy have changed in two weeks.
- All counties have high absolute transmission, above 10 per 10^5 per day over the last two weeks.
- Endemicity will require broader population-wide immunity, hopefully acquired without infection, and
- Endemicity is likely to require broader antigenic coverage by the population.
- Analysis with boosters in the future.