

# Modeling & Forecasting COVID-19 in NM

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January 25, 2022

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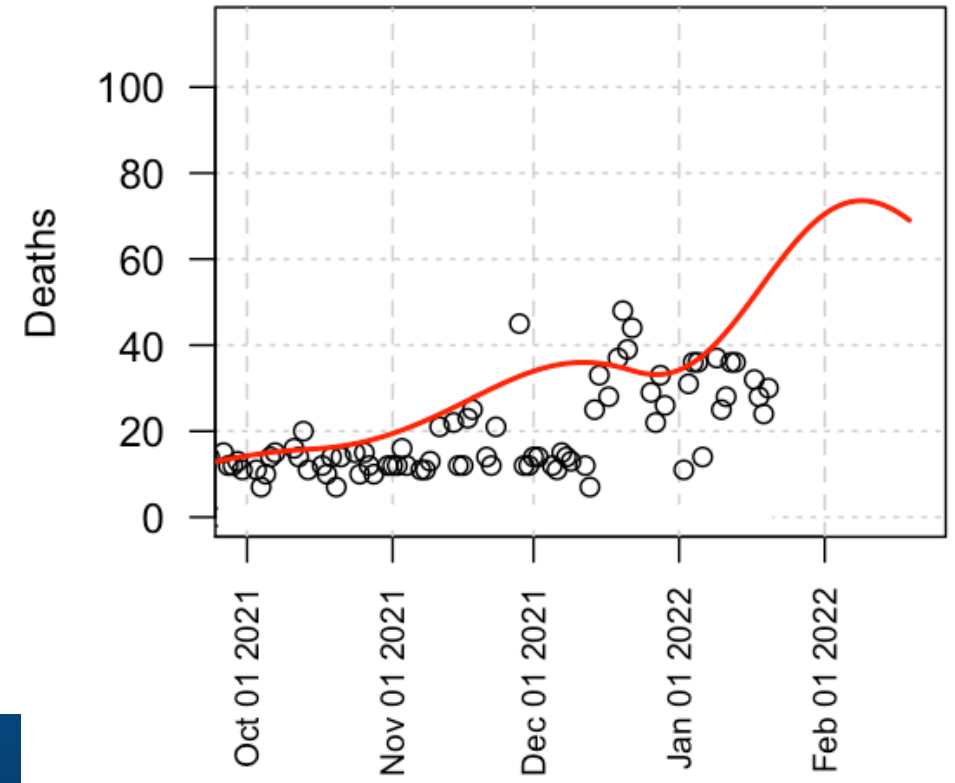
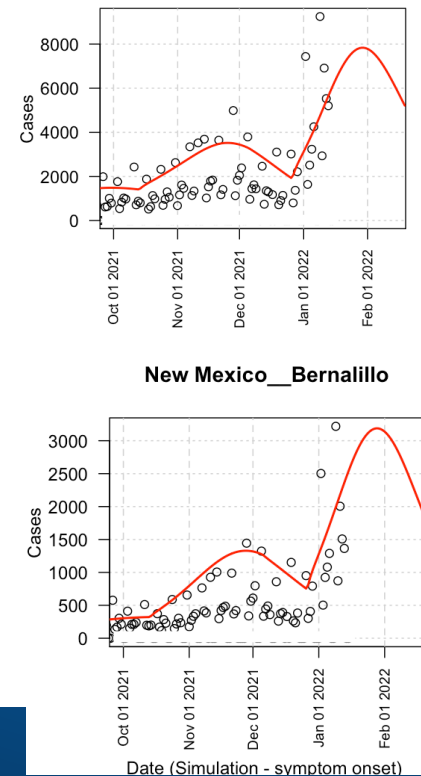
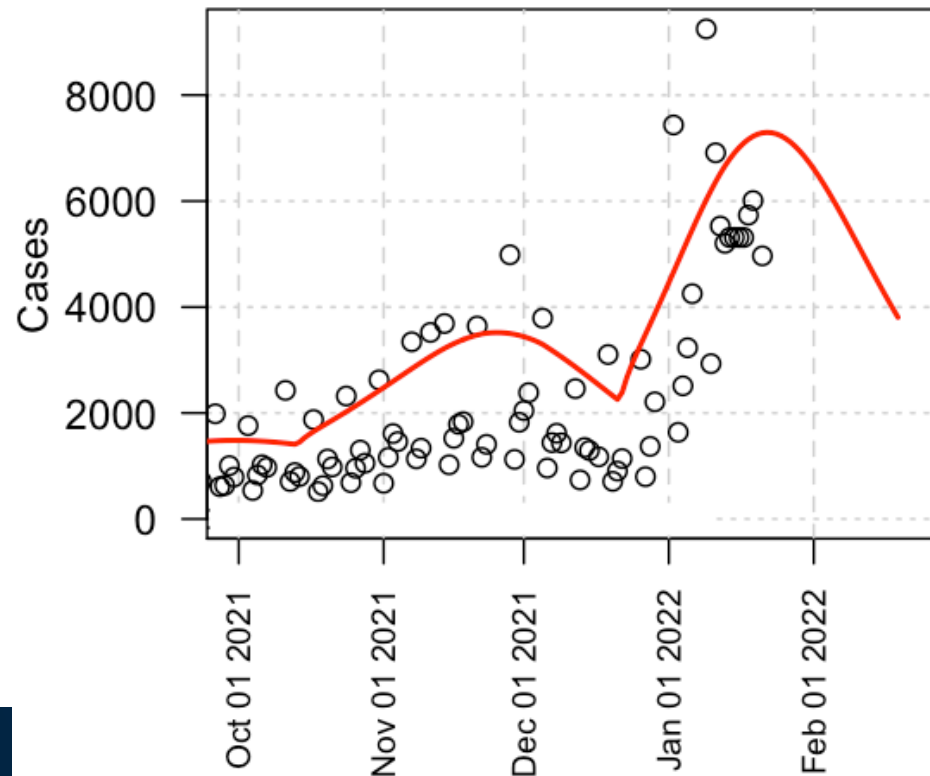
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# 25 Jan 2022: Epigrad modeling

- NM daily incidence has, or will very shortly, plateau. Viral evolution leading to the Omicron variant was the primary driver of the rise.
- Boosting is a strong countervailing effect to the evolution-driven rise, and is helping to bring the NM Omicron epidemic under control.
- Events are consistent with gradually improving respiratory infection control, and accelerating initial vaccination.
- **Decreases** in the case fatality rate are largely due to improved vaccination status.
- *Some* reduction in disease severity due to viral evolution is *possible*, but is not established or proven by these data.
- Omicron is about as infectious as Delta variant. Virus evolution leading to immune evasion explains of the main part of the rise in cases.
- **Indoor masking remains critical** to moderating all consequence. Respirator use instead of cloth masks will further mitigate consequences.
- New pharmaceuticals will improve the situation when available in large quantities.
- Drug administration is time-sensitive: Rapid contact-tracing is beneficial for early treatment.
- Immunological diversity from updated vaccines will be helpful when available, starting ~ March 2022.

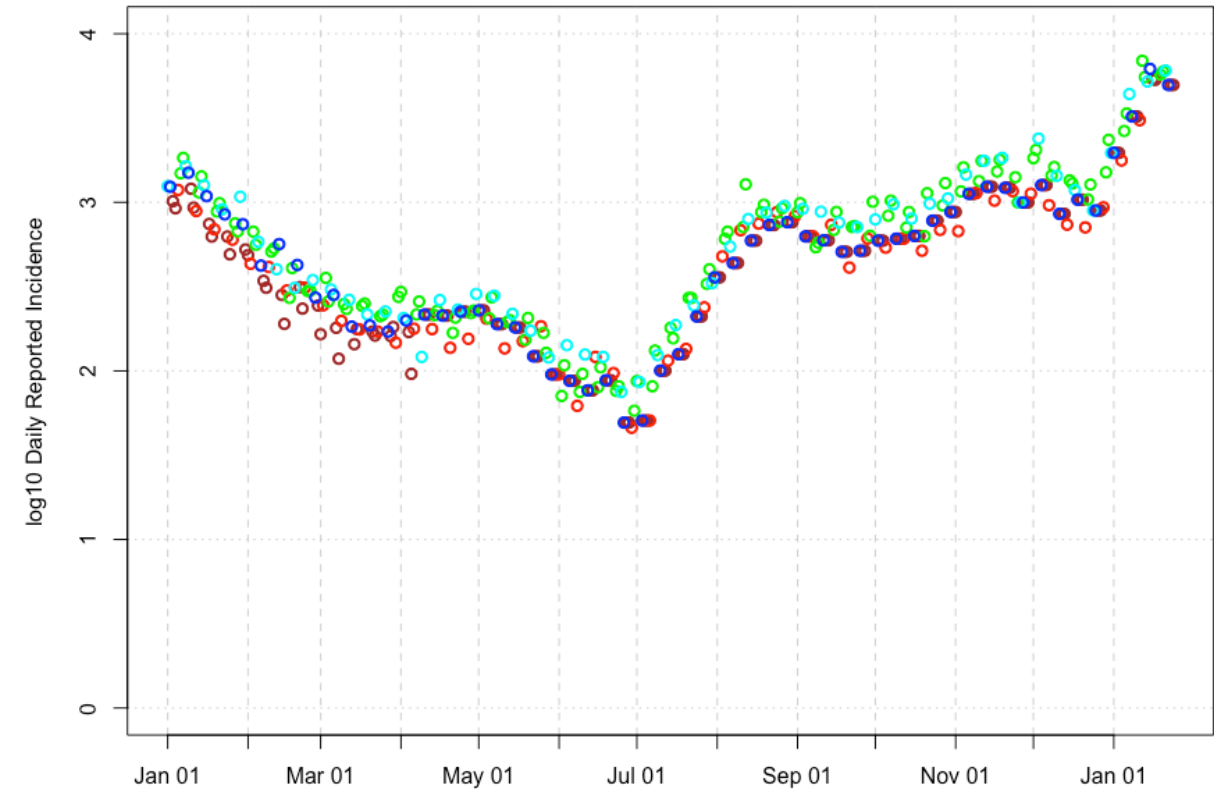
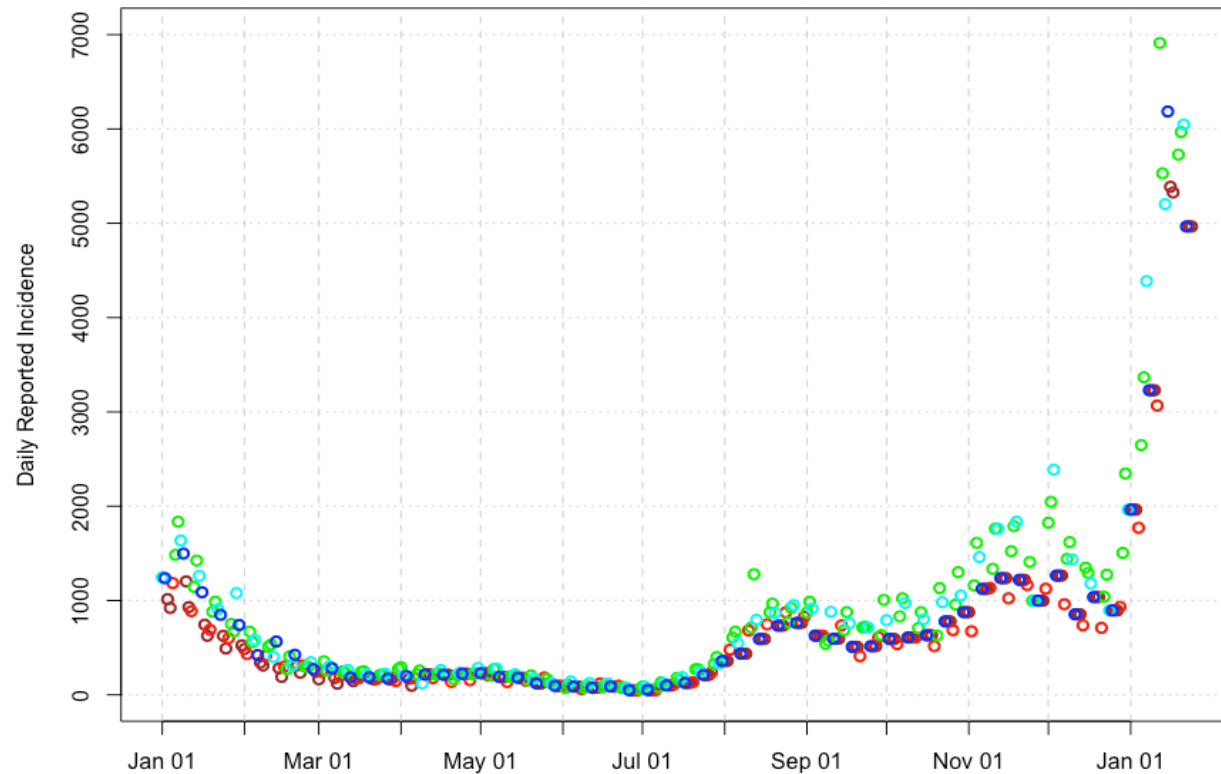


# A look at the raw incidence data

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

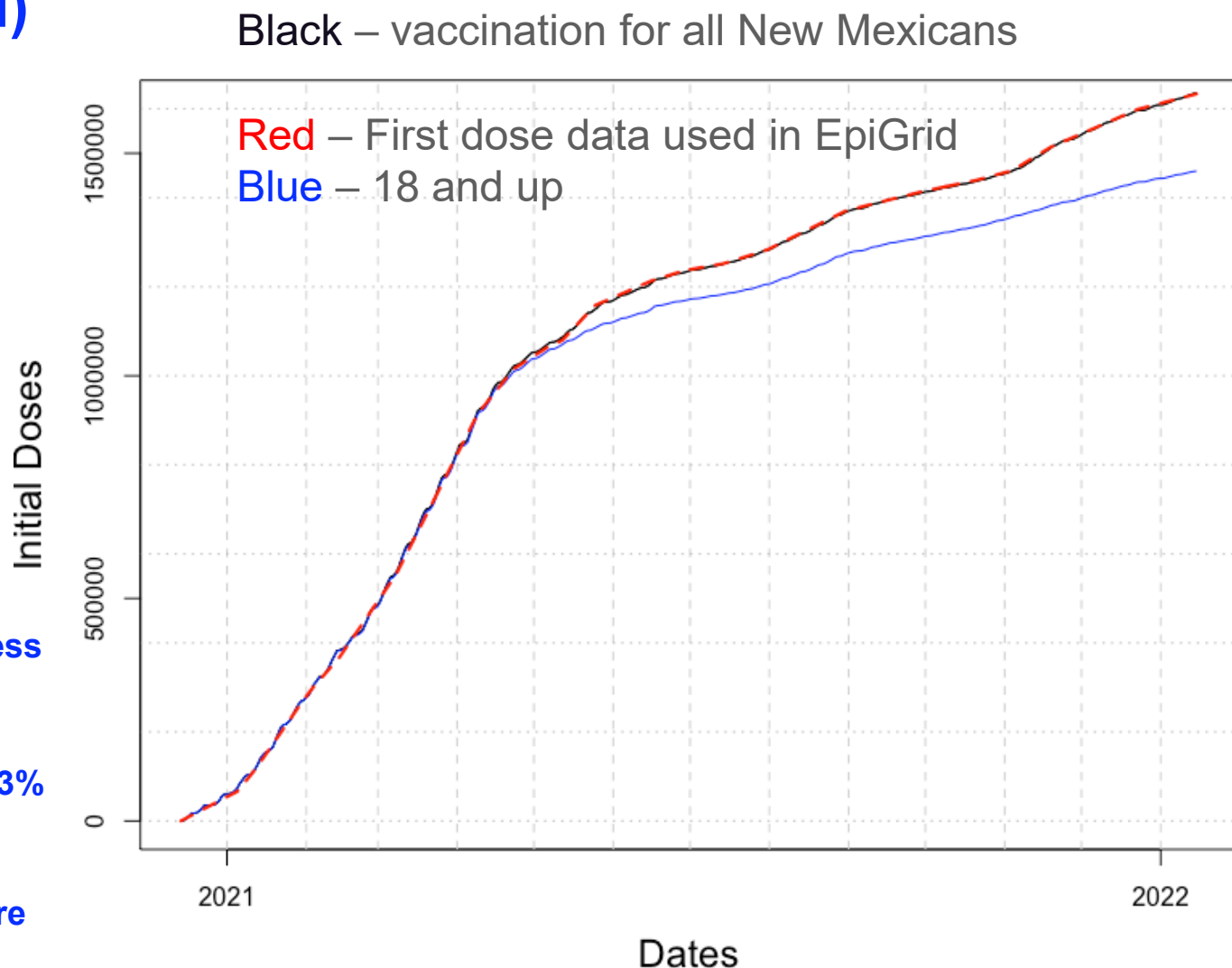
- Reported incidence level is high, significantly driven by viral evolution that lead to Omicron's partial evasion of existing antibody responses.
- Within-weekly variation still visible in NM data. Contrast some other states.
- Color-coded by-day-of-week decline is visible (log plot). Confirm with more days of data.

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



# 25 January 2022 Vaccine Analysis (NM)

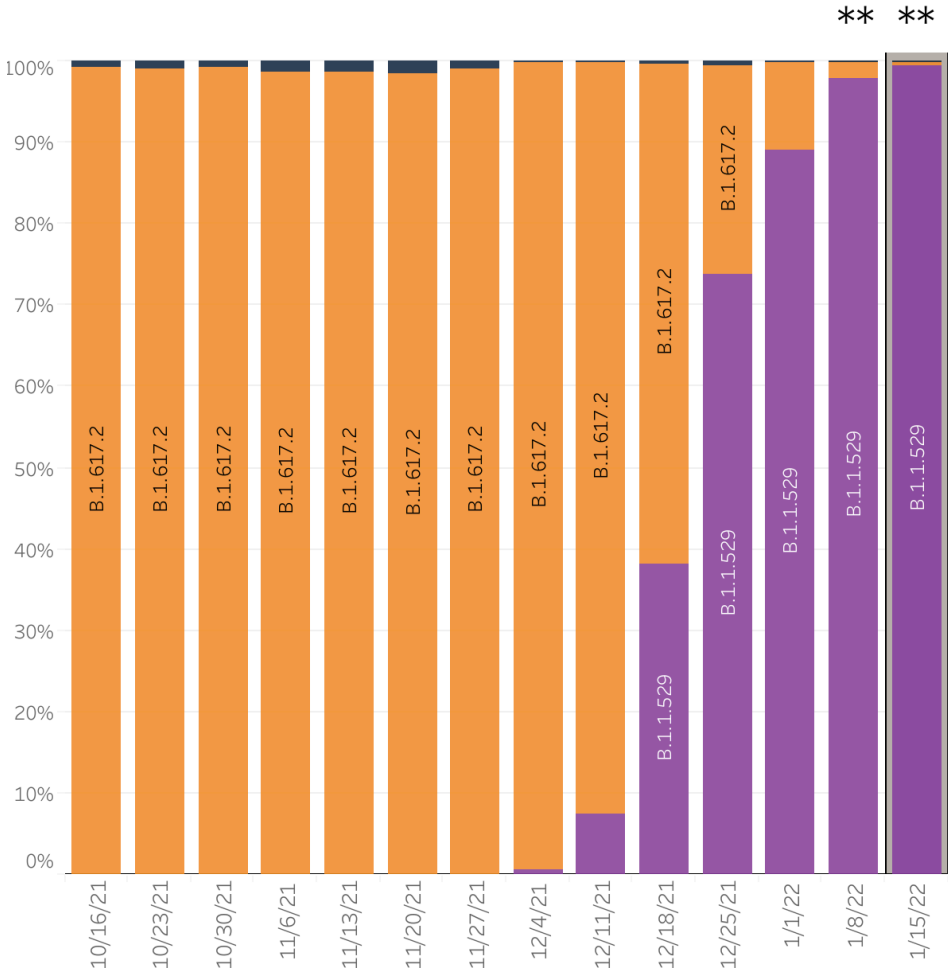
- 1663k first doses are used in modeling.
- 1663k first doses have been administered, +27k, +13k, +12k.
- 1396k completed initial vaccine series, +16k, +9k, +9k.
- ~683k boosters completed, +31k, +35k, +33k.
- ~79.3% of all persons in New Mexico are at least minimally vaccinated.
- ~94.5% of all New Mexicans are eligible (~1981k).
- 78.0/94.5=83.9% of eligible New Mexicans vaccinated.
- 5-11 year-olds: 65k first doses (34.6% +1.9%, +1.9%, +1.9%).
- ~434k unvaccinated New Mexicans. Many have been infected.
- ~267k incompletely vaccinated New Mexicans.
- Likely >275k New Mexicans are relatively unprotected.
- 50% VE against Omicron for initial series >500k susceptible, less serious outcomes.
- 75% VE boosted against Omicron, >150k, less serious.
- ~275k at higher risk for serious outcome (Omicron). This is ~13% of the population relatively to naïve to SARS-CoV-2 (excepting distant T-cell responses).
- >~646k at lower risk for serious outcome (Omicron) but who are susceptible to infection.
- ~1180k functionally immune (Omicron, for now only).
- These population levels of protection depend on the viral-variant.



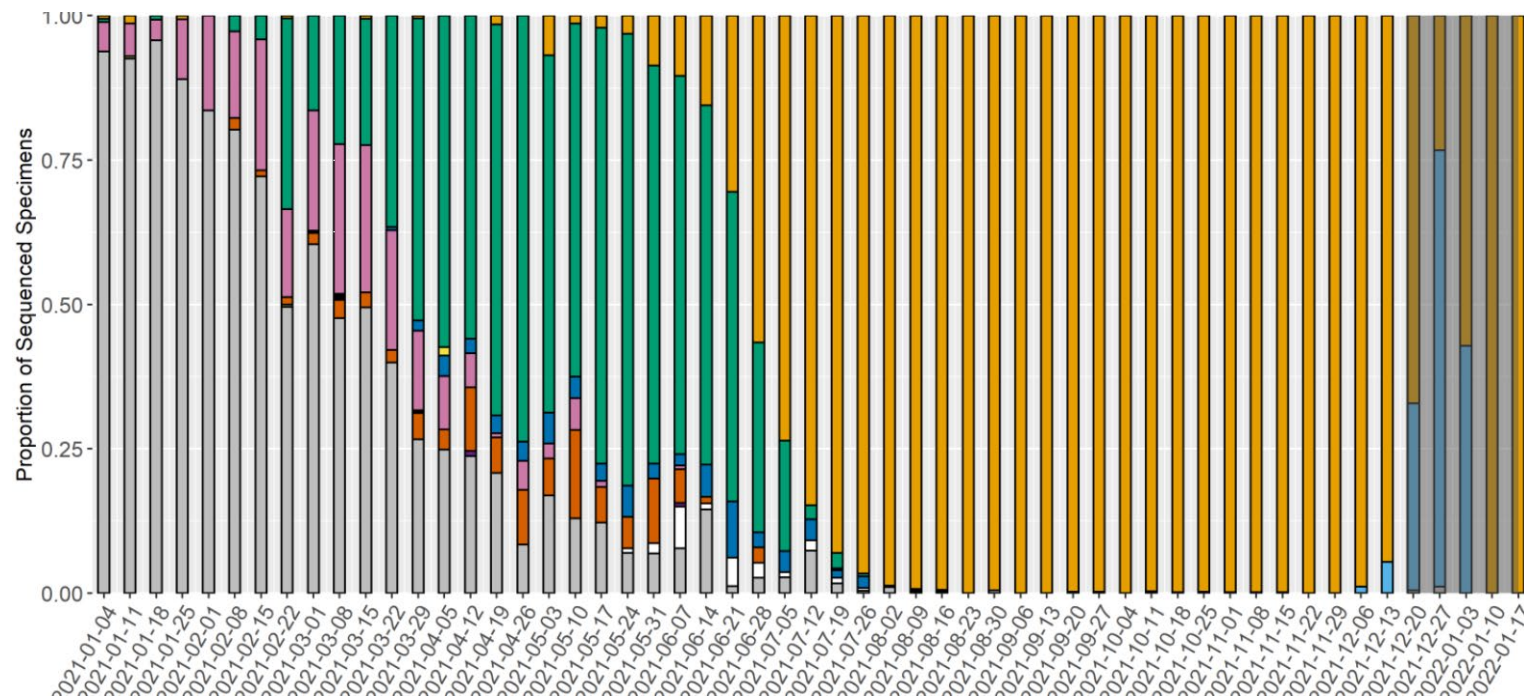
US Census Bureau reports 2097k people in New Mexico.

# Variant Monitoring: Omicron is the current variant

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



- New variants have appeared without evident intermediates. **Need better global monitoring.**
- NM small-number statistics, likely all B.1.1.529 (Omicron) in NM.
- Extremely rapid rise; faster than  $\Delta$ . Viral evolution / immune evasion played a major role.
- Possible shorter foot-to-head time of NM epidemic suggests help from vaccination.
- **Approximately 6-12 months is the longest variant-interval: D614G (~3 months), Alpha (~6-9 months), Delta (~6 months), Omicron (~6 months).**
- Updated mRNA vaccine from Pfizer in March 2022? Less than 6 months.



Screenshot-only of CDC variant data, no static image available



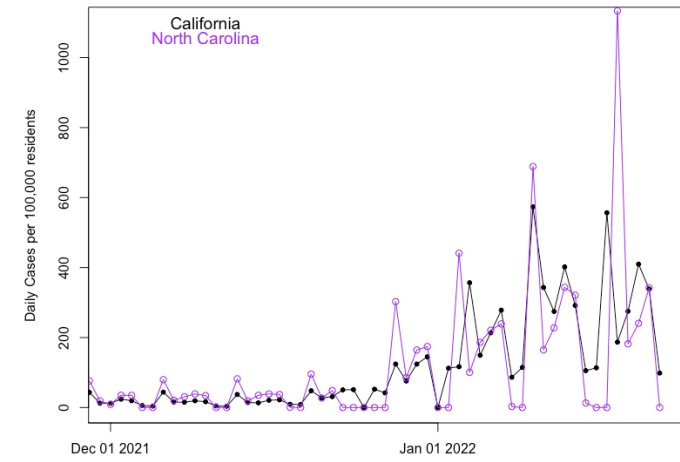
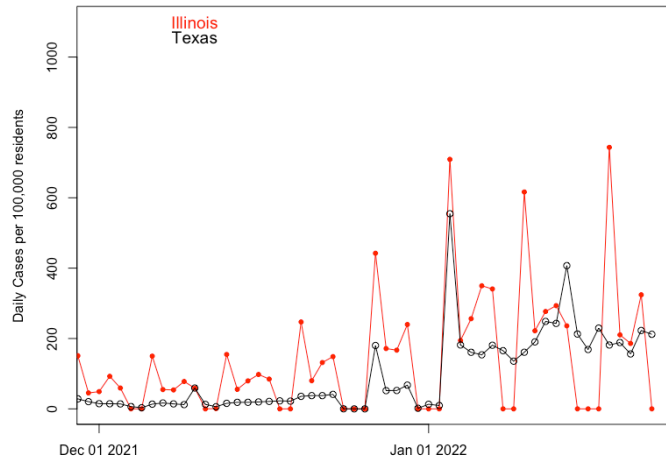
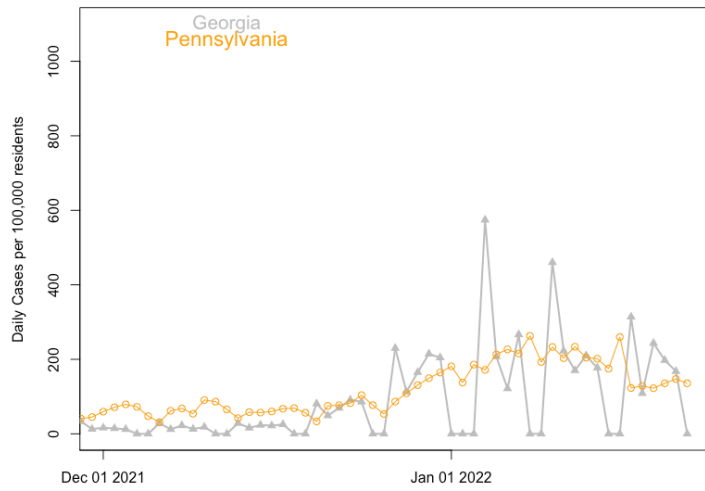
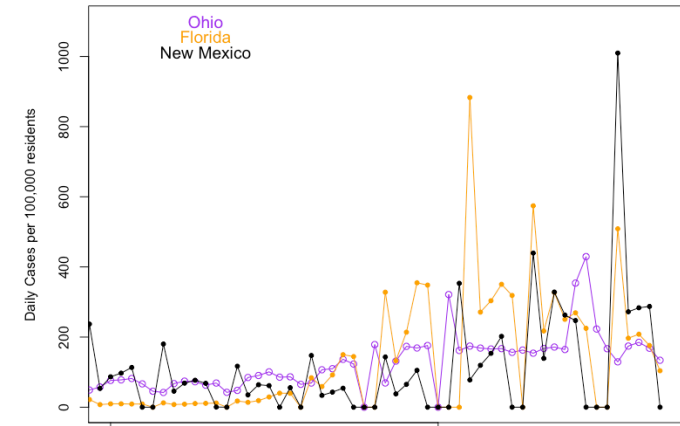
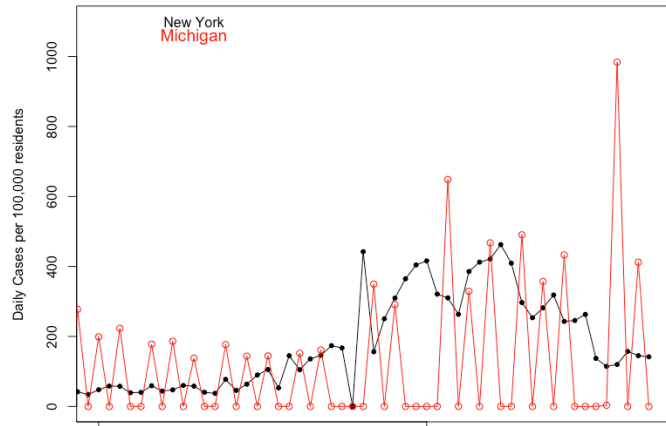
# Recent By-State Trends: Most Populous 10 States: True incidence?

Trends over the last 1-3 weeks: *Increasing: N. Carolina*    *Flat: Illinois, Michigan, New Mexico, Ohio\*, Texas\*.*  
*Declining: California, Florida, Georgia, New York, Pennsylvania?.*

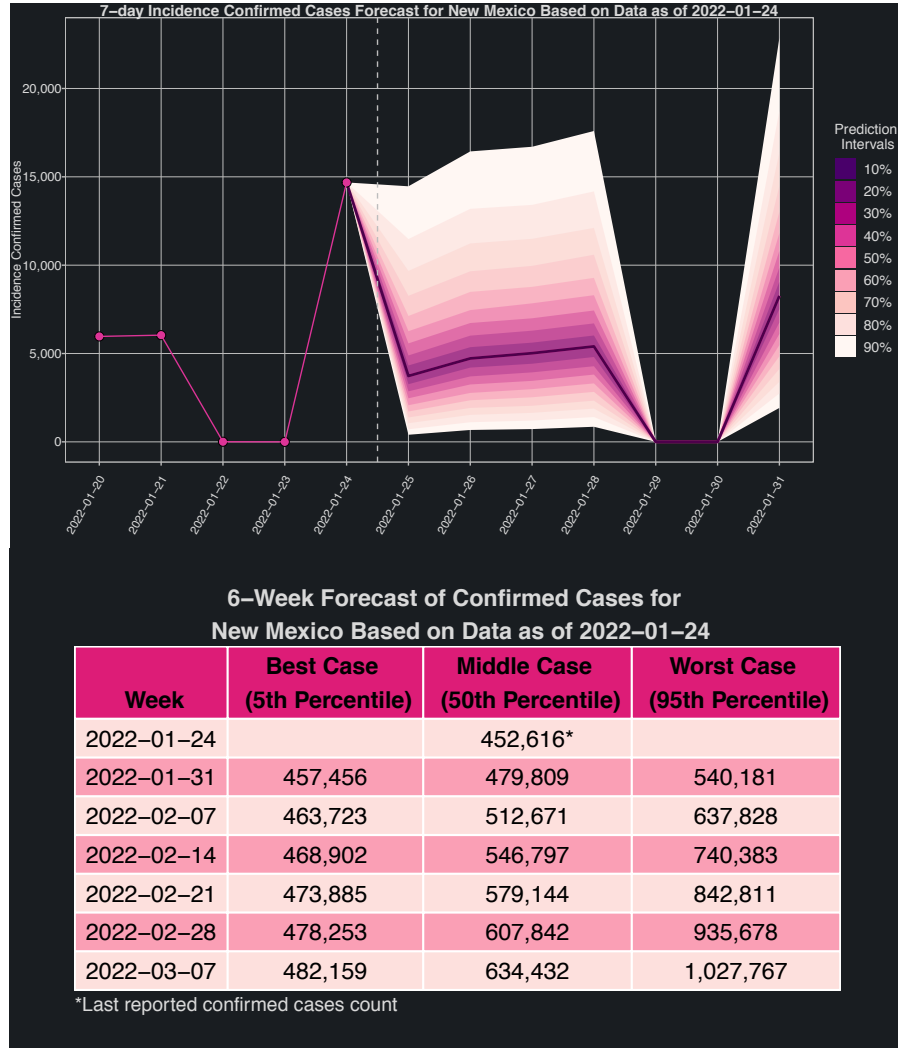
**14-Day Testing positivity (CDC):** **Red**  $\geq 25\%$  positivity, **Blue**  $\geq 20\%$  &  $< 25\%$  positivity, **Black**  $> 15\%$  &  $< 20\%$  positivity, **Orange** No Data, uncounting may be possible at these levels of test positivity. Serosurvey, T-cell epitopes, etc.?

	Cases	Deaths
New York	154.13	1.055
Michigan	199.88	1.132
Ohio	168.6	1.299
Florida	170.49	0.394
New Mexico	264.64	0.774
Illinois	209.1	1.039
Texas	194.17	0.413
California	282.69	0.291
North Carolina	271.16	0.387
Georgia	147.36	0.452
Pennsylvania	150.3	0.977

\* = case report failed "heart-beat"  
 Daily rates per 100,000 residents averaged January 18<sup>th</sup> 2022 thru January 24<sup>th</sup> 2022.



# Short- & Long-Term Forecast for NM: Cases



**6-Week Forecast of Daily Average of Confirmed Cases for New Mexico Based on Data as of 2022-01-24**

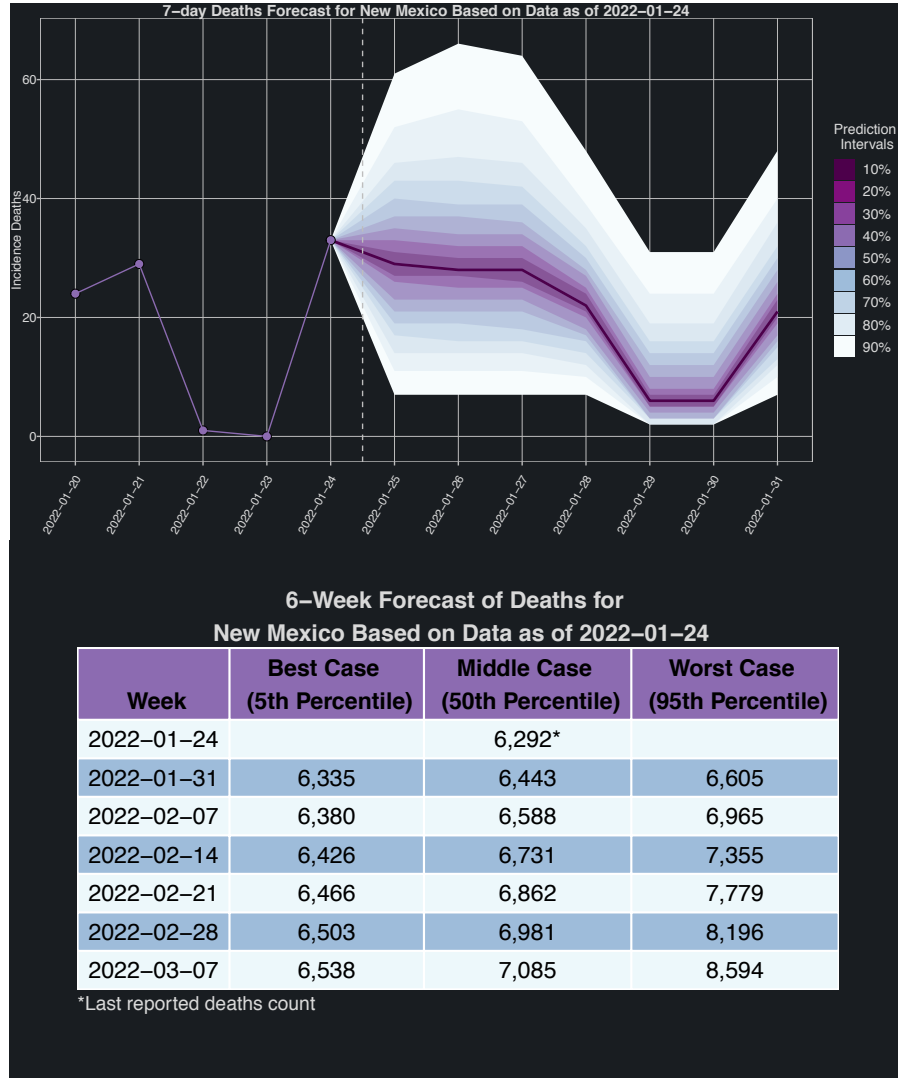
Week End Date	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)
2022-01-24		7,668*	
2022-01-31	654	3,876	12,580
2022-02-07	812	4,698	14,240
2022-02-14	728	4,762	14,993
2022-02-21	622	4,434	14,663
2022-02-28	520	4,068	13,827
2022-03-07	440	3,792	13,298

\*Last reported confirmed cases count

**So what?**

**Our model suggests that the number of daily cases is expected to stay high (but decreasing) over the next 2-3 weeks and then begin steady decline.**

# Short- & Long-Term Forecast for NM: Deaths



**6-Week Forecast of Daily Average of Deaths for New Mexico Based on Data as of 2022-01-24**

Week Start Date	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)
2022-01-24		21*	
2022-01-31	6	20	50
2022-02-07	5	20	55
2022-02-14	5	19	61
2022-02-21	5	18	65
2022-02-28	4	16	65
2022-03-07	3	14	62

\*Last reported confirmed deaths

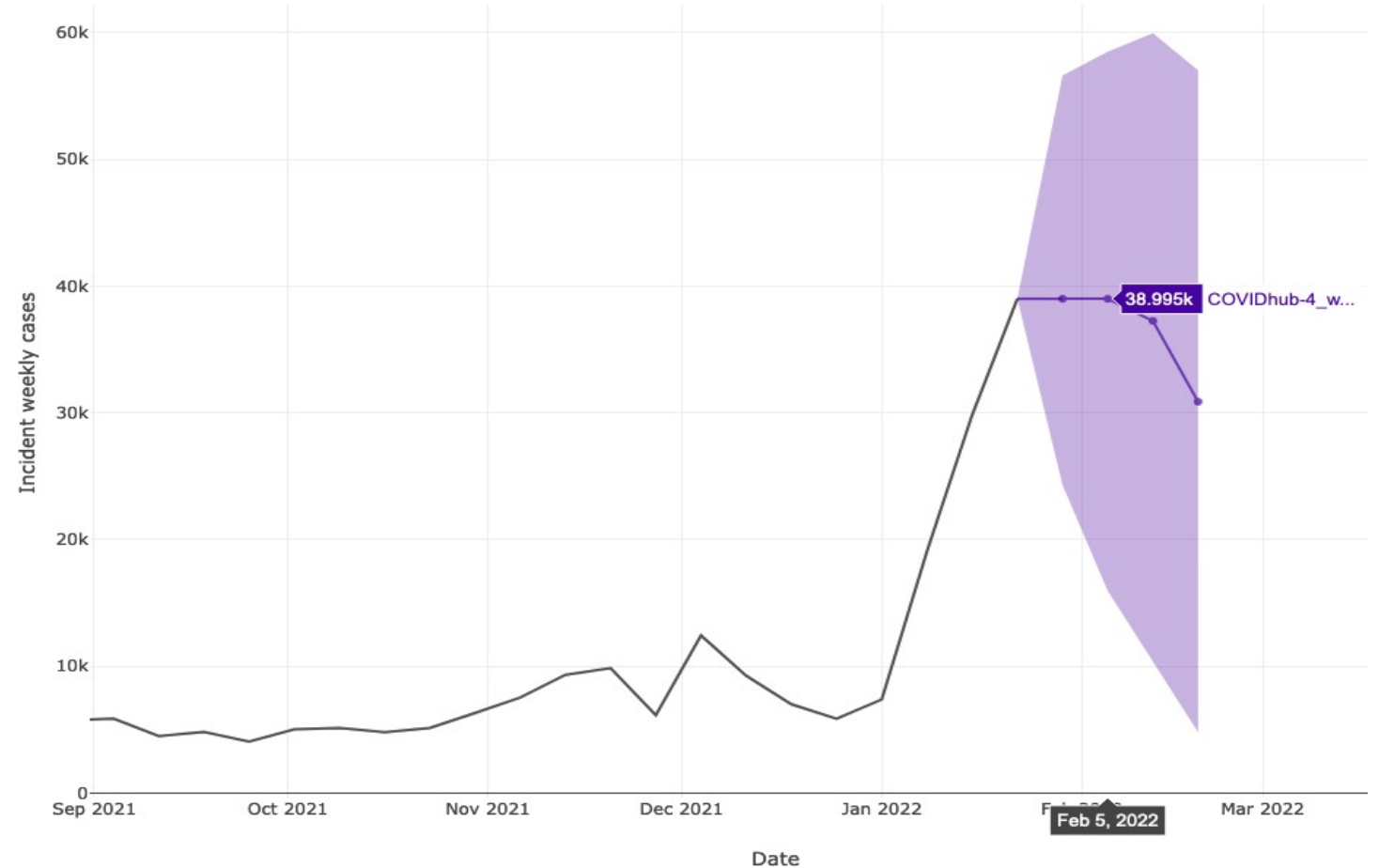
**So what?**

**Our model suggests that the number of daily deaths is expected to range between 5 and 65 in the next few weeks, slowly declining toward the end of February and beginning of March**



# Forecast for Incident Weekly Cases in NM

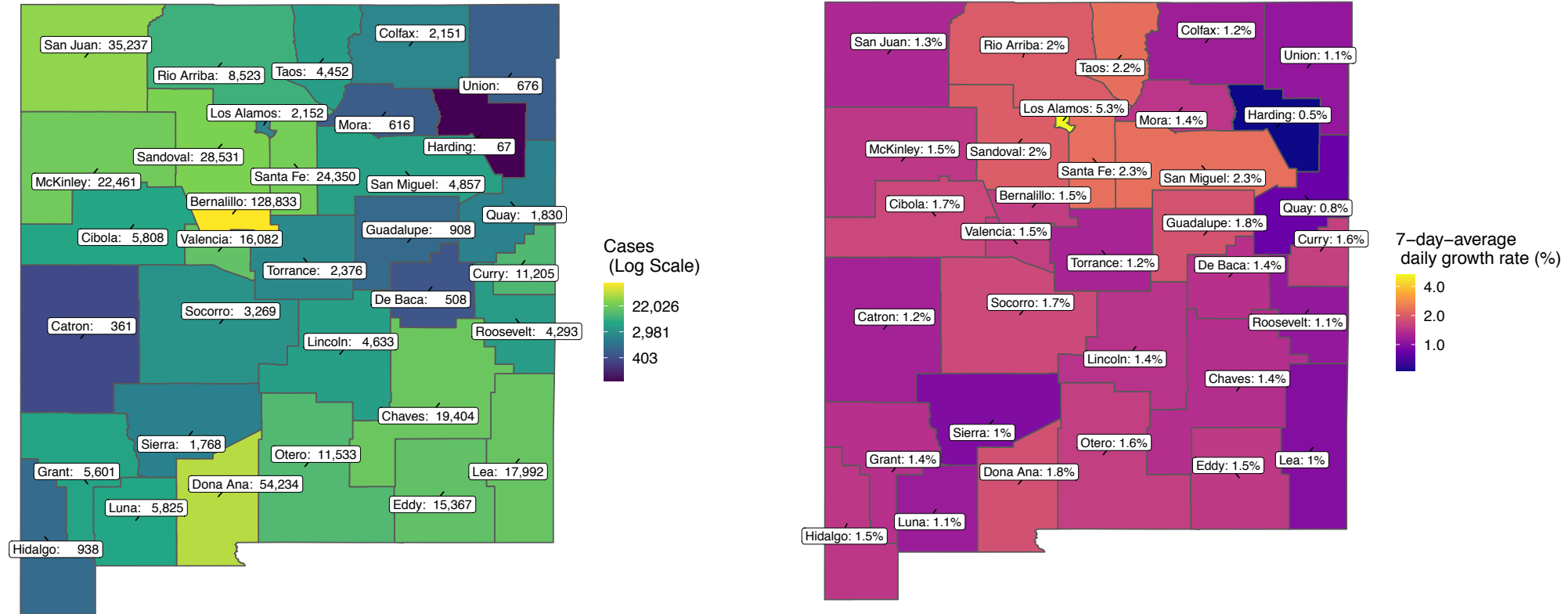
The CDC ForecastHub is predicting a 2% increase in incident weekly cases to 39,995K (from Jan 22 at 38,995K)



COVIDhub-4\_week\_ensemble prediction, COVID 19  
ForecastHub

<https://viz.covid19forecasthub.org/>

# Cumulative Cases & Daily Growth Rate for NM: Jan 25

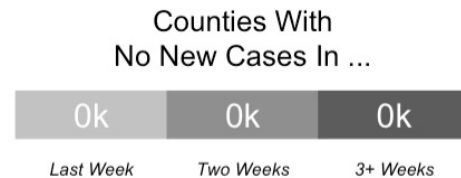
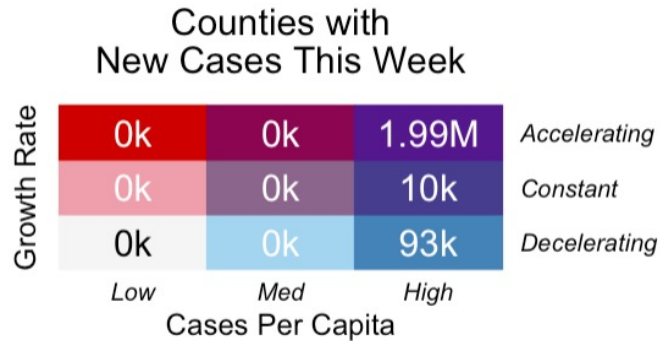
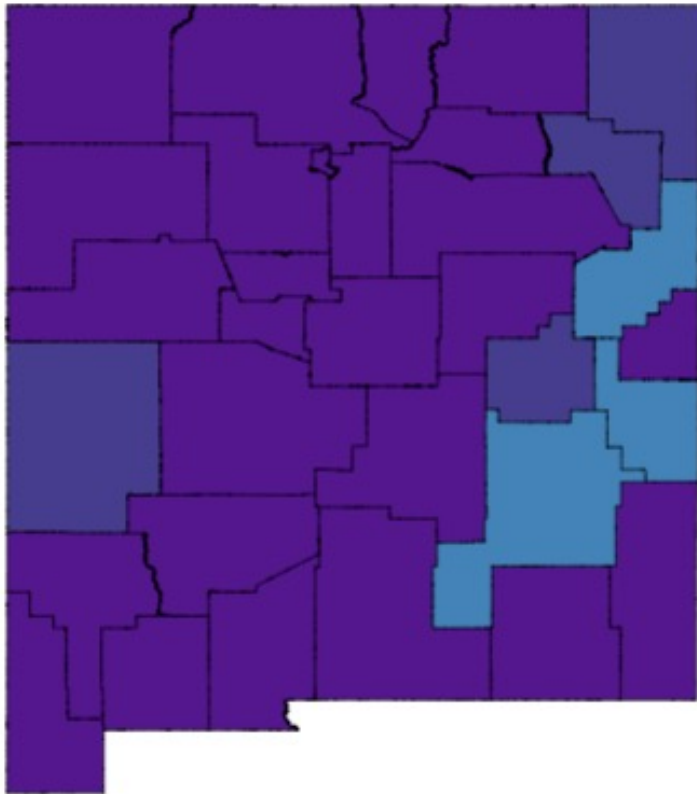


Los Alamos, Santa Fe and Taos counties have the highest cumulative growth rates.

\*Growth rate is in cumulative cases

# Weekly Growth Rate for NM: Another View (Jan 24)

Impacted New Mexicans



**So what?**

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

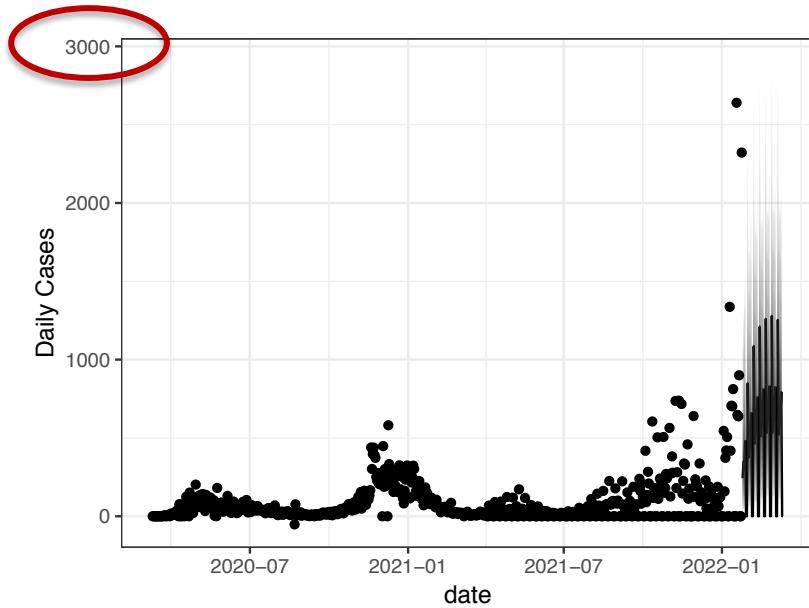
Number of New Mexicans living in regions with particular combinations of per capita case counts and 7-day growth rates

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

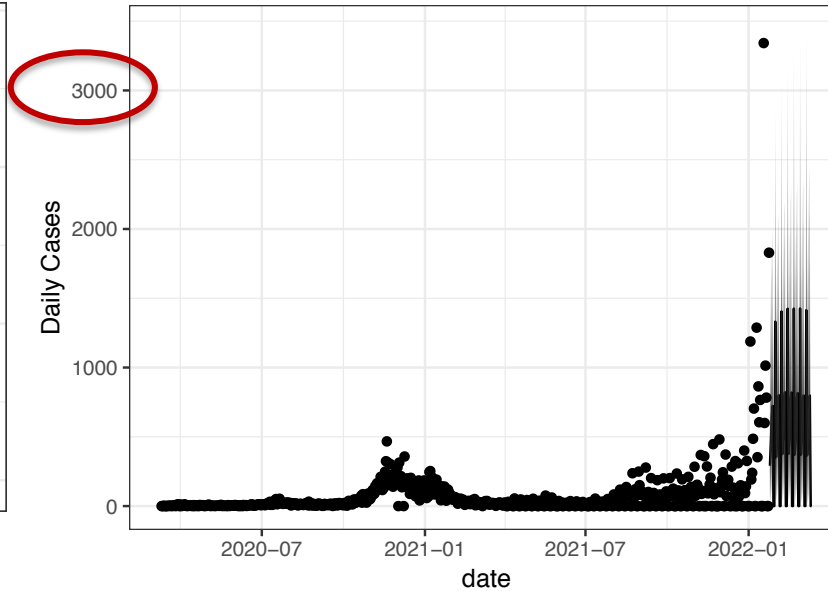
## > Additional Regional Forecasts

# Central & North Regions Daily Cases Forecast

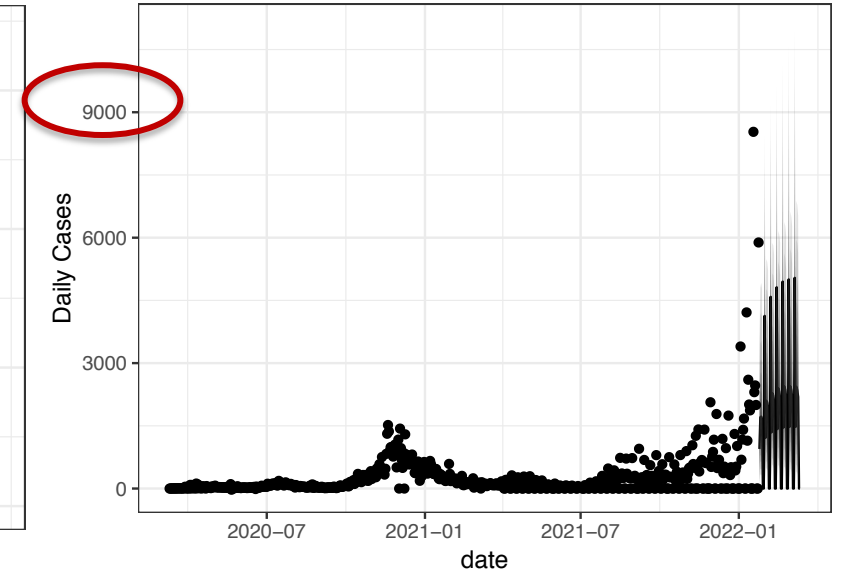
## Northwest



## Northeast



## Central

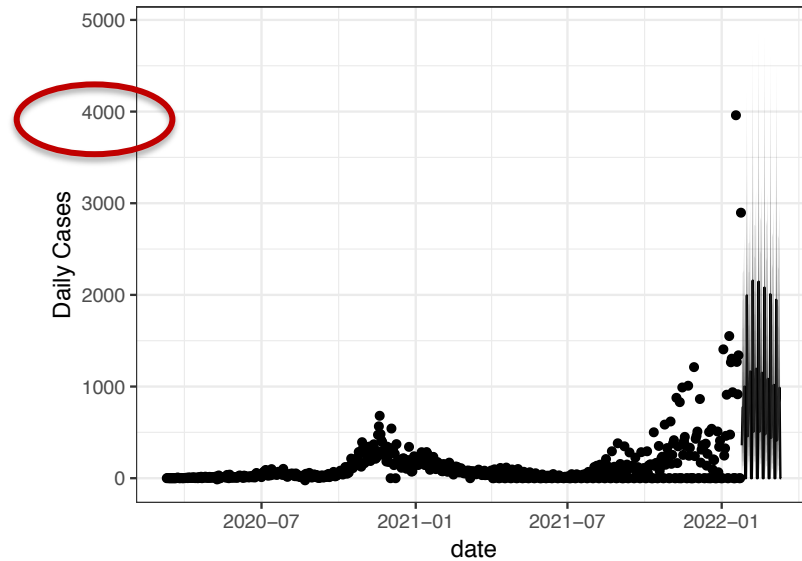


**So what?**

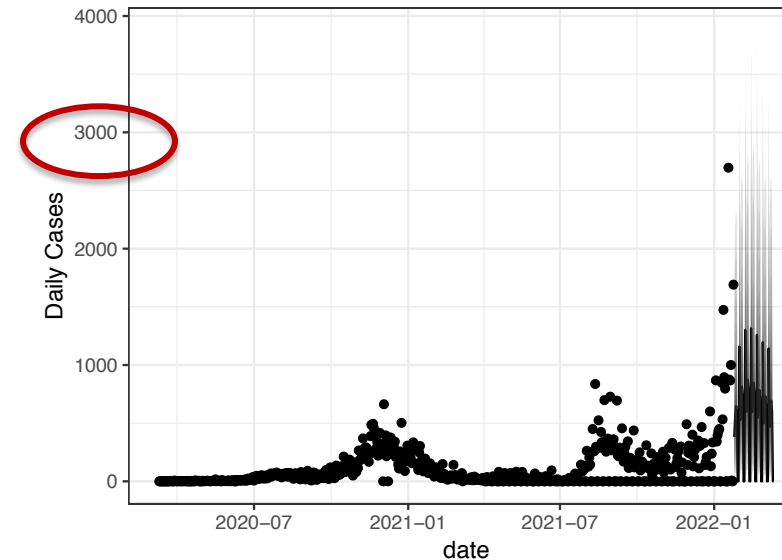
**The Central region is expected to see the most number of cases followed by the Northwest and Northeast regions. Cases still trending upward, Northeast appears to be plateauing.**

# South Regions Daily Cases Forecast

## Southwest



## Southeast



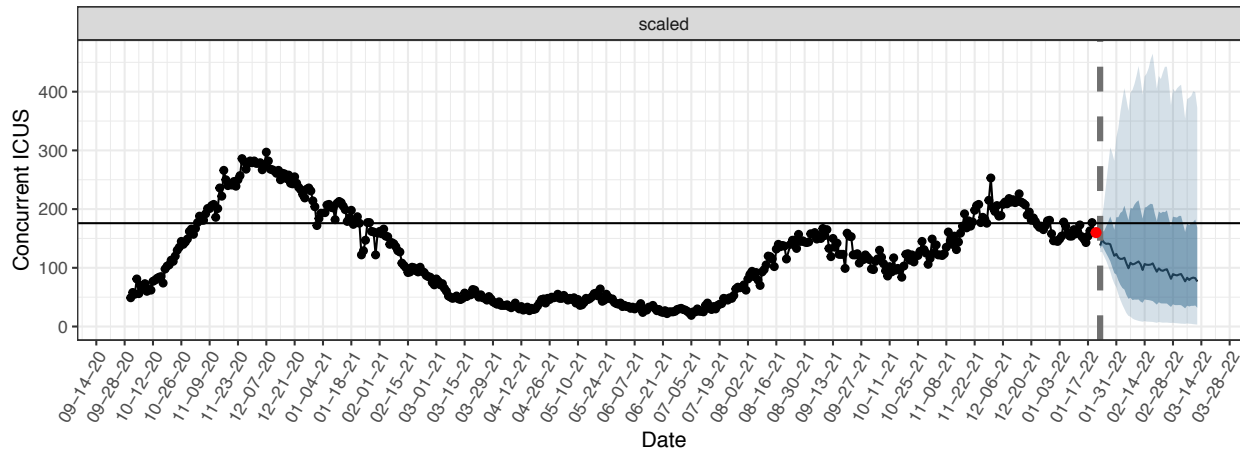
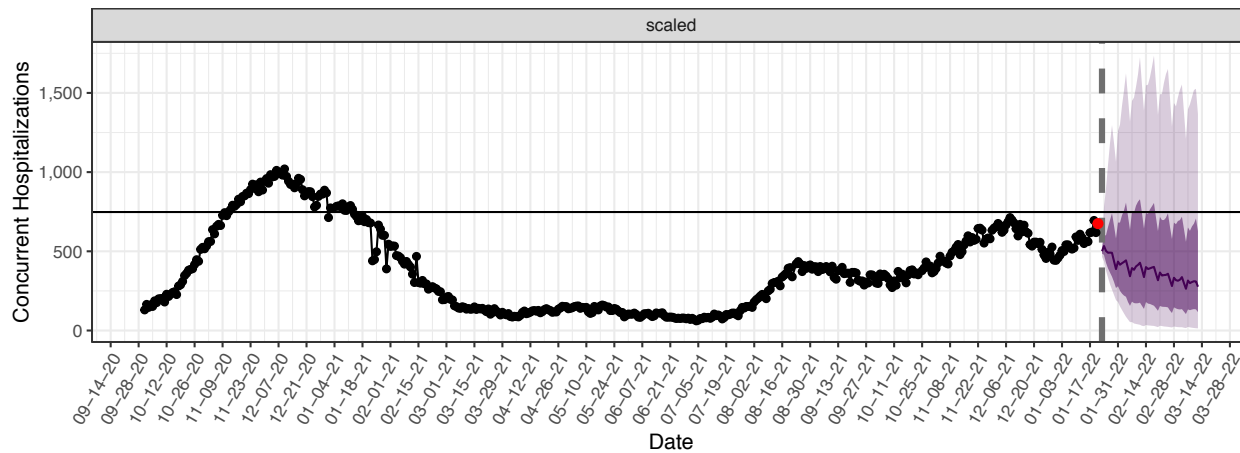
**So what?**

**Both regions trending upward still before predicted decline. The Southwest region is expected to see higher number of cases.**



**> Hospitalization Forecast: Model is Still Calibrating to Latest Hospitalization Ratios**

# 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

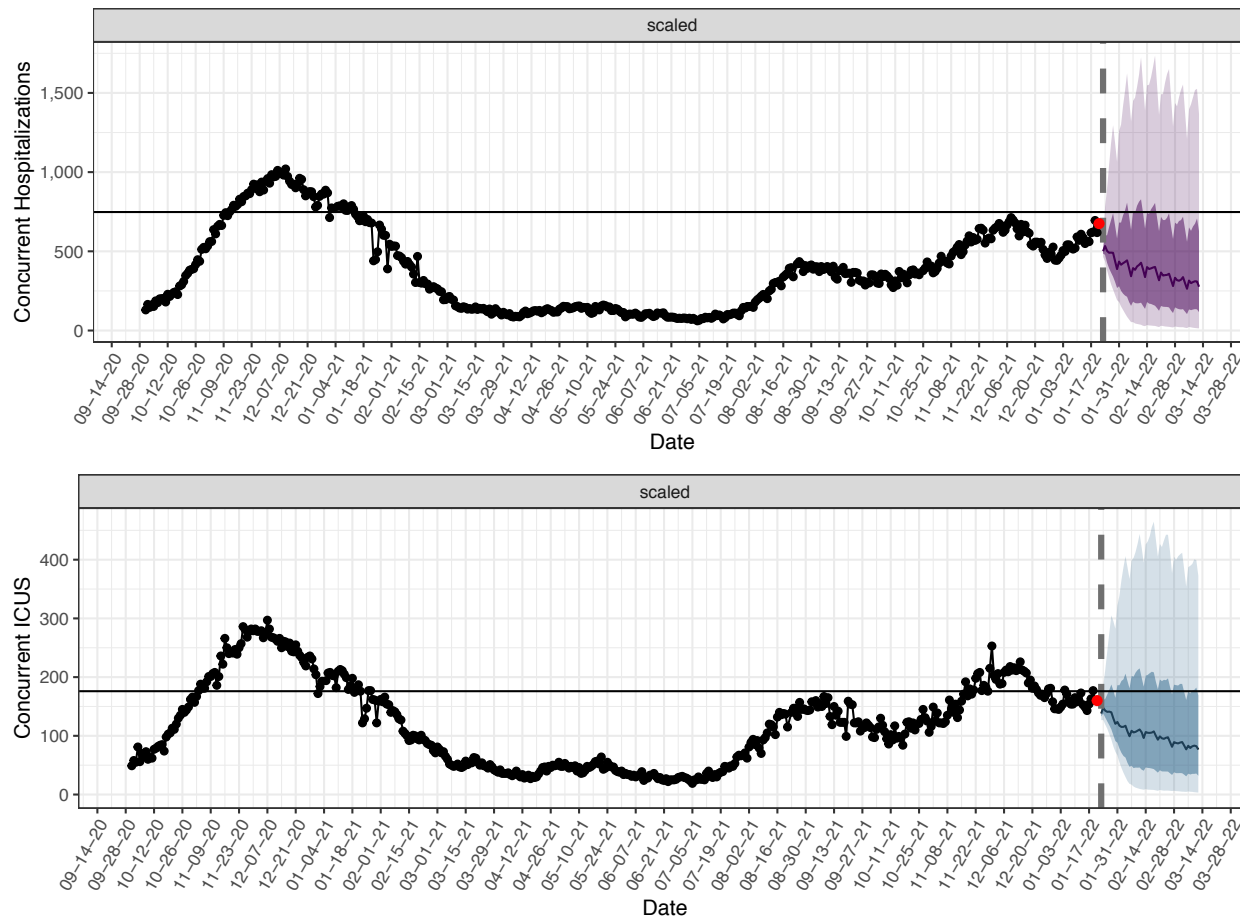
Week	Qu. 5% (best case)	Qu. 50% (median)	Qu. 95% (worst case)
1/30/22	73	120	282
2/6/22	18	99	367
2/13/22	8	96	395
2/20/22	6	93	406
2/27/22	6	81	377
3/6/22	5	77	354

“Scaled” Scenario

So what?

Model is predicting an decrease in COVID-19 ICU beds needed over the next several weeks (possibly too optimistic)

# 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)
1/30/22	119	267	783
2/6/22	35	243	953
2/13/22	19	241	994
2/20/22	15	224	957
2/27/22	13	199	911
3/6/22	11	187	856

“Scaled” Scenario

So what?

Med-surge general bed needs are predicted to decrease overall during the next 3 weeks (possibly too optimistic)