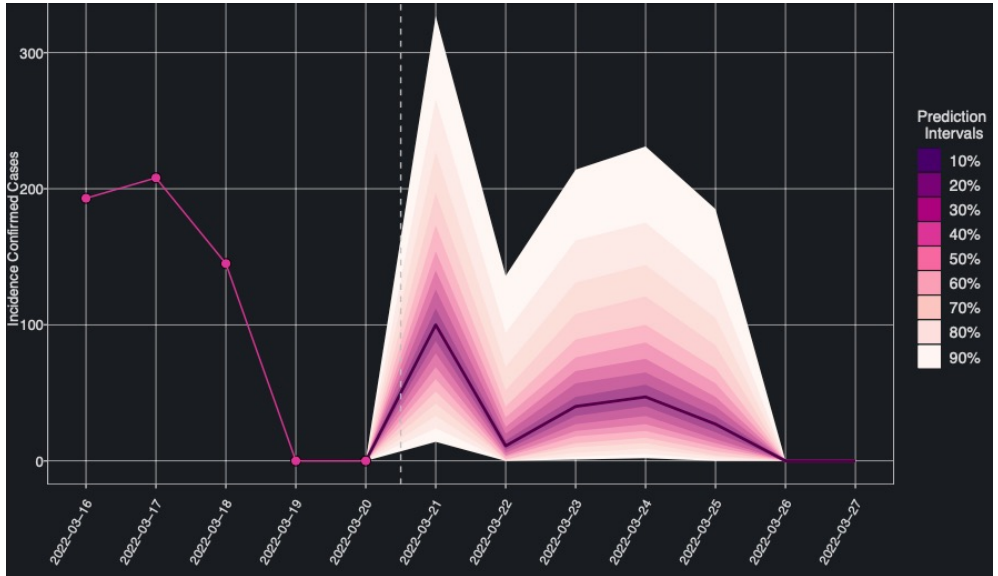
Modeling & Forecasting COVID-19 in NM

March 22, 2022

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 2022–03–20

Week	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)
2022–03–20		516,171*	
2022–03–27	516,189	516,396	517,270
2022–04–03	516,194	516,529	518,168
2022–04–10	516,197	516,668	519,197
2022–04–17	516,206	516,892	520,523
2022–04–24	516,219	517,216	522,155
2022–05–01	516,247	517,686	524,052

*Last reported confirmed cases count

6–Week Forecast of Daily Average of Confirmed Cases for New Mexico Based on Data as of 2022–03–20

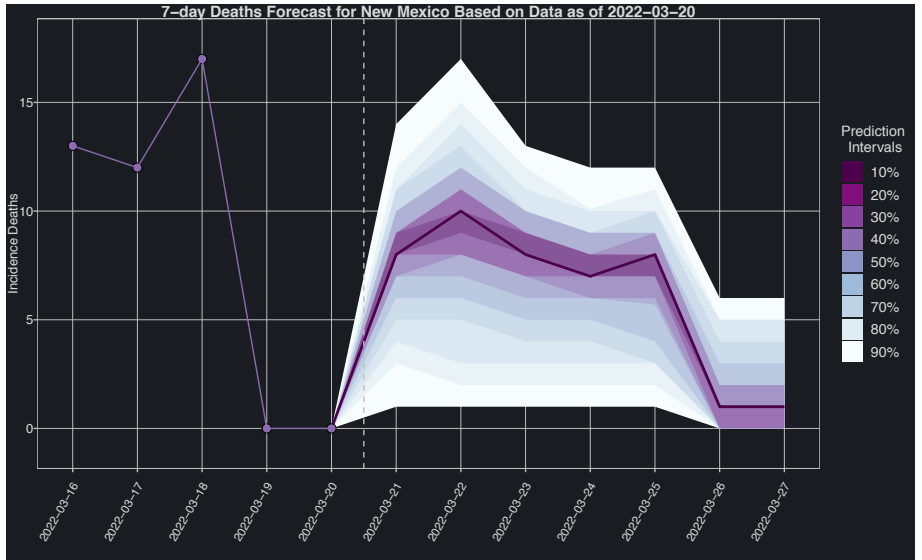
Week End Date	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)
2022–03–20		144*	
2022–03–27	2	32	156
2022–04–03	0	18	133
2022–04–10	0	17	160
2022–04–17	0	26	200
2022–04–24	0	44	245
2022–05–01	2	61	291

*Last reported confirmed cases count

So what?

Our model suggests that the number of daily cases is expected to range between 10 and 300 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 2022–03–20

Week	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)
2022–03–20		7,145*	
2022–03–27	7,150	7,191	7,216
2022–04–03	7,155	7,224	7,270
2022–04–10	7,155	7,248	7,313
2022–04–17	7,155	7,265	7,350
2022–04–24	7,156	7,279	7,386
2022–05–01	7,156	7,292	7,437

*Last reported deaths count

6–Week Forecast of Daily Average of Deaths for New Mexico Based on Data as of 2022–03–20

Week Start Date	Best Case (5th Percentile)	Middle Case (50th Percentile)	Worst Case (95th Percentile)
2022–03–20		14*	
2022–03–27	1	6	11
2022–04–03	1	4	9
2022–04–10	0	3	7
2022–04–17	0	2	6
2022–04–24	0	1	6
2022–05–01	0	1	9

*Last reported confirmed deaths

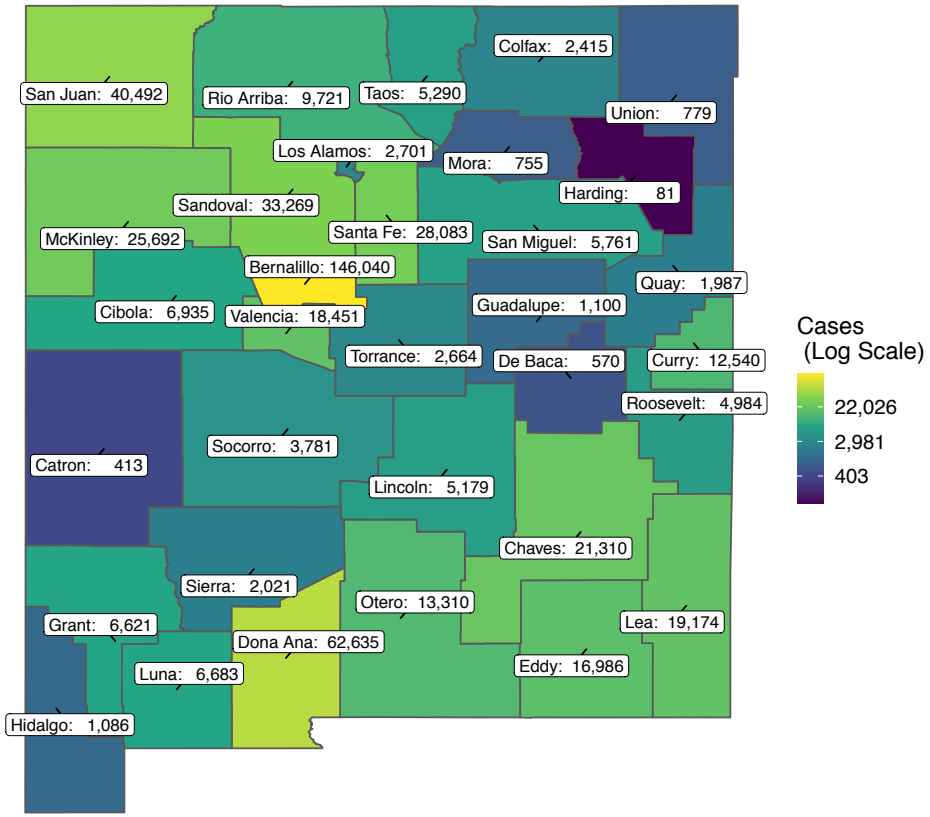
So what?

Our model suggests that the number of daily deaths is expected to range between 1 and 15 in the next few weeks

Cumulative Cases & Daily Growth Rate for NM: Mar 22

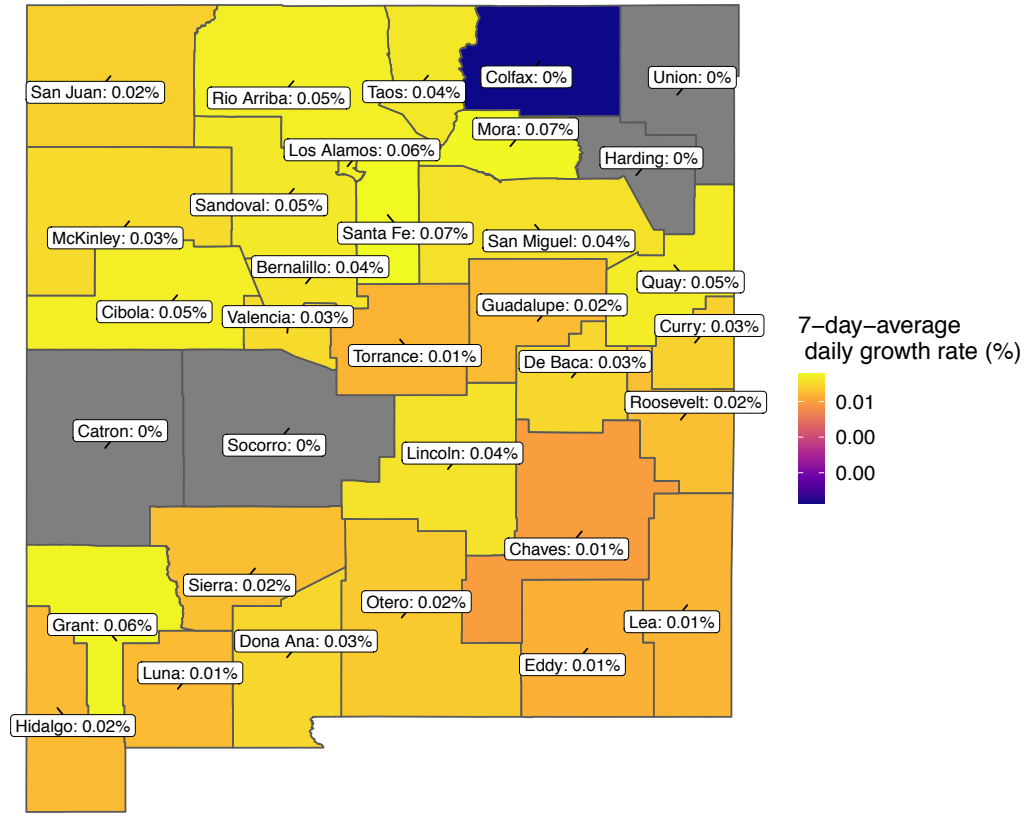
Cumulative Cases: 2022–03–20

Data Source: JHU https://github.com/CSSEGISandData/COVID–19



County COVID–19 Weekly Growth Rate

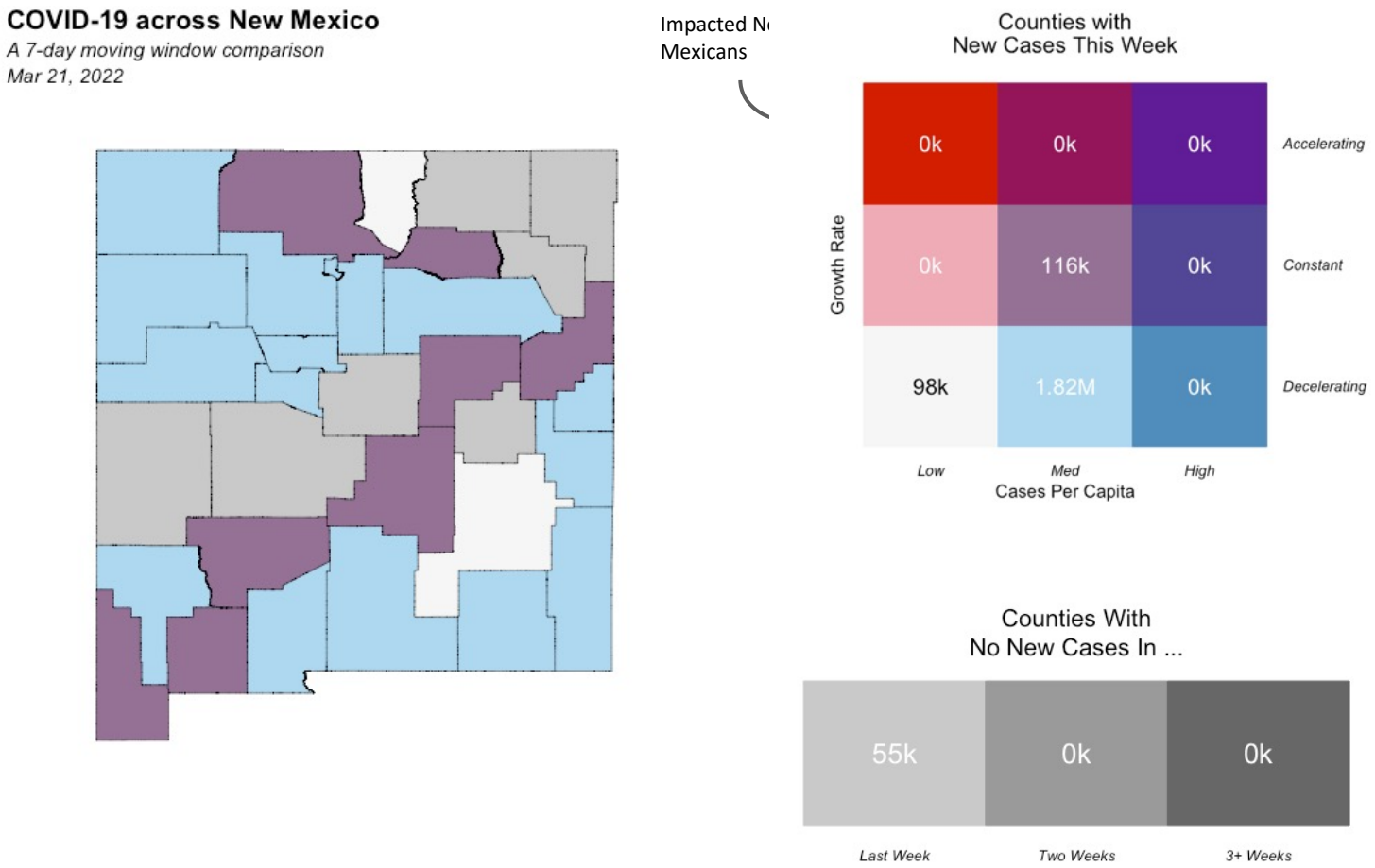
Data Source: JHU https://github.com/CSSEGISandData/COVID–19



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

*Growth rate is in cumulative cases

Weekly Growth Rate for NM: Another View (Mar 22)



So what?

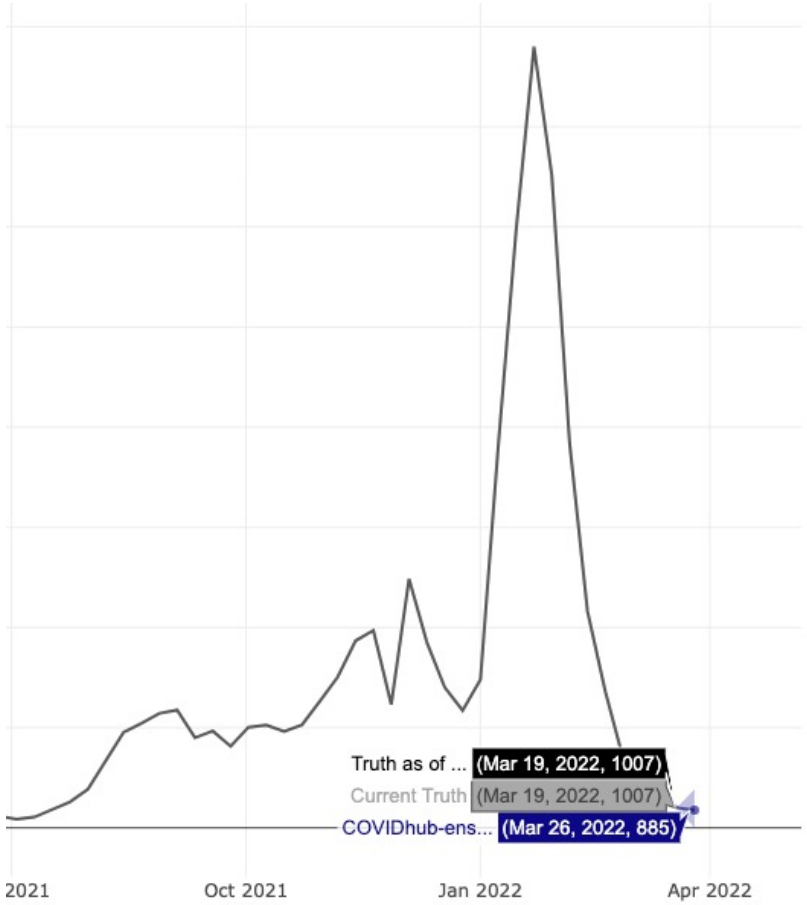
- Most people in New Mexico are living in a county that has medium per-capita case counts and decelerating

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 is predicting a 12% decrease in one week incident cases to 885 (from March 19 at 1,007)

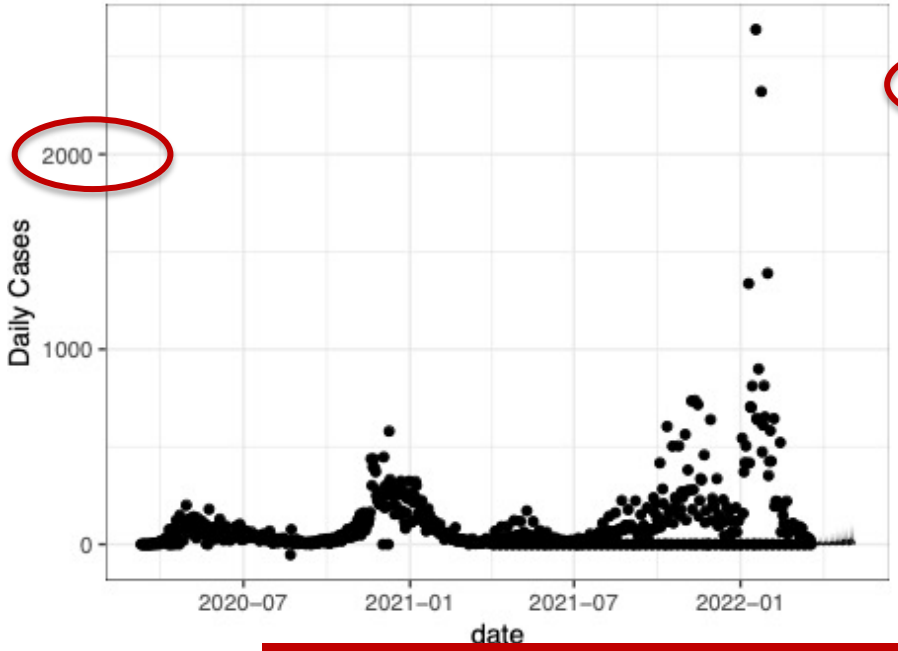


COVIDhub-4_week_ensemble prediction, COVID 19 ForecastHub
https://viz.covid19forecasthub.org/

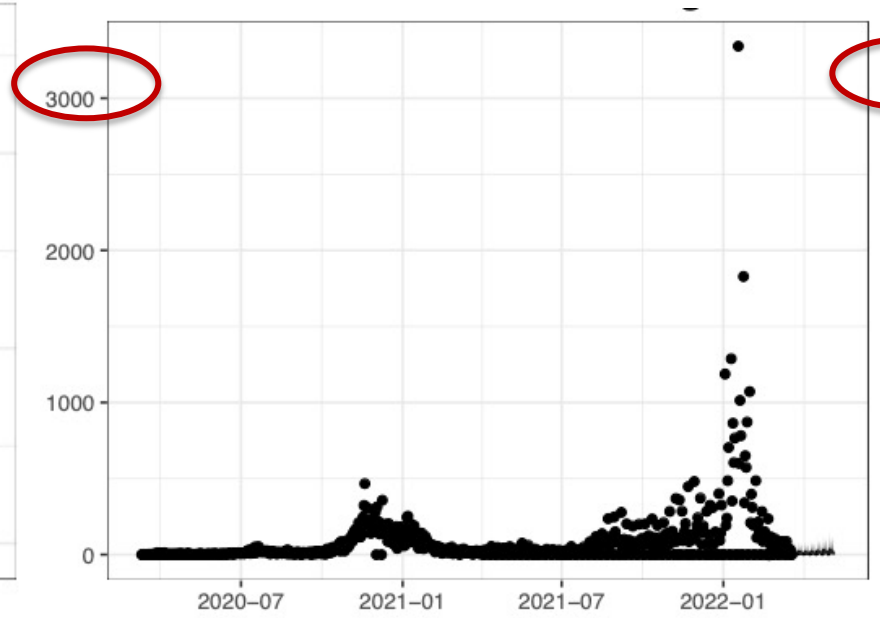
> Additional Regional Forecasts

Central & North Regions Daily Cases Forecast

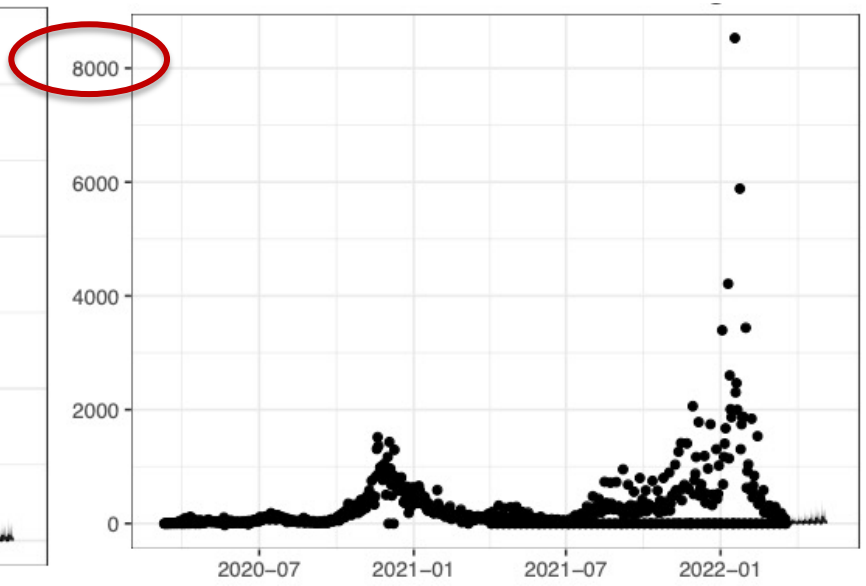
Northwest



Northeast



Central

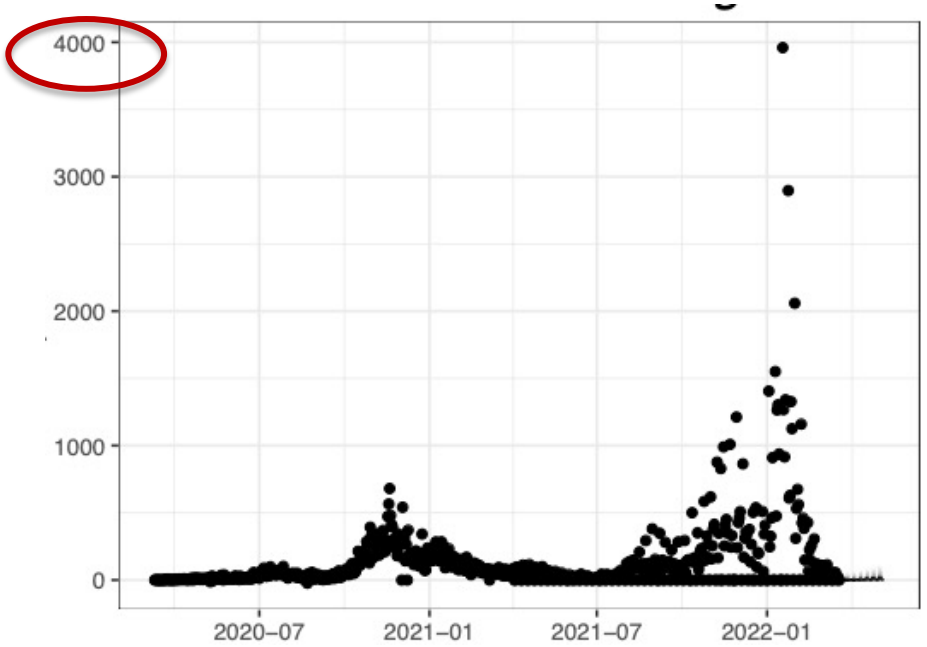


So what?

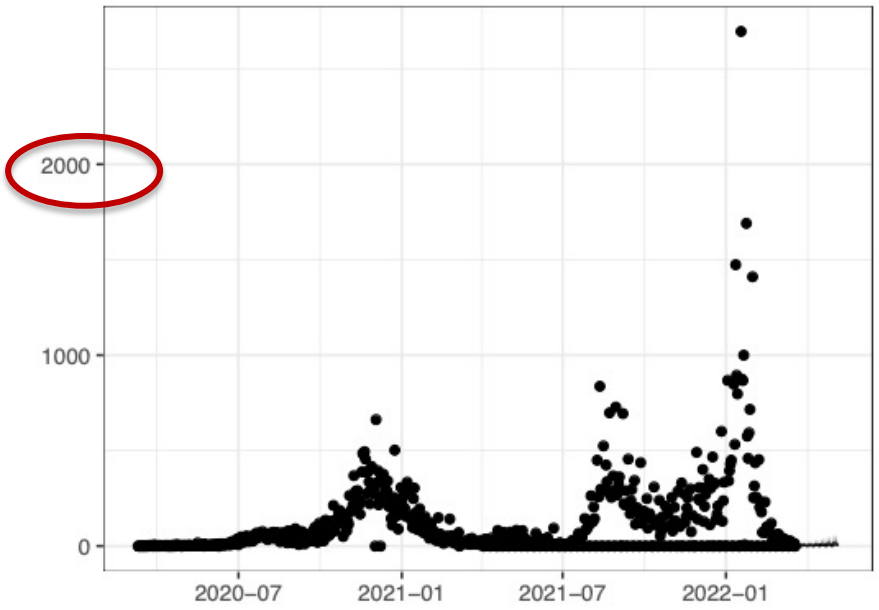
The Central region is expected to see the most number of cases. Cases appear to be plateauing.

South Regions Daily Cases Forecast

Southwest



Southeast

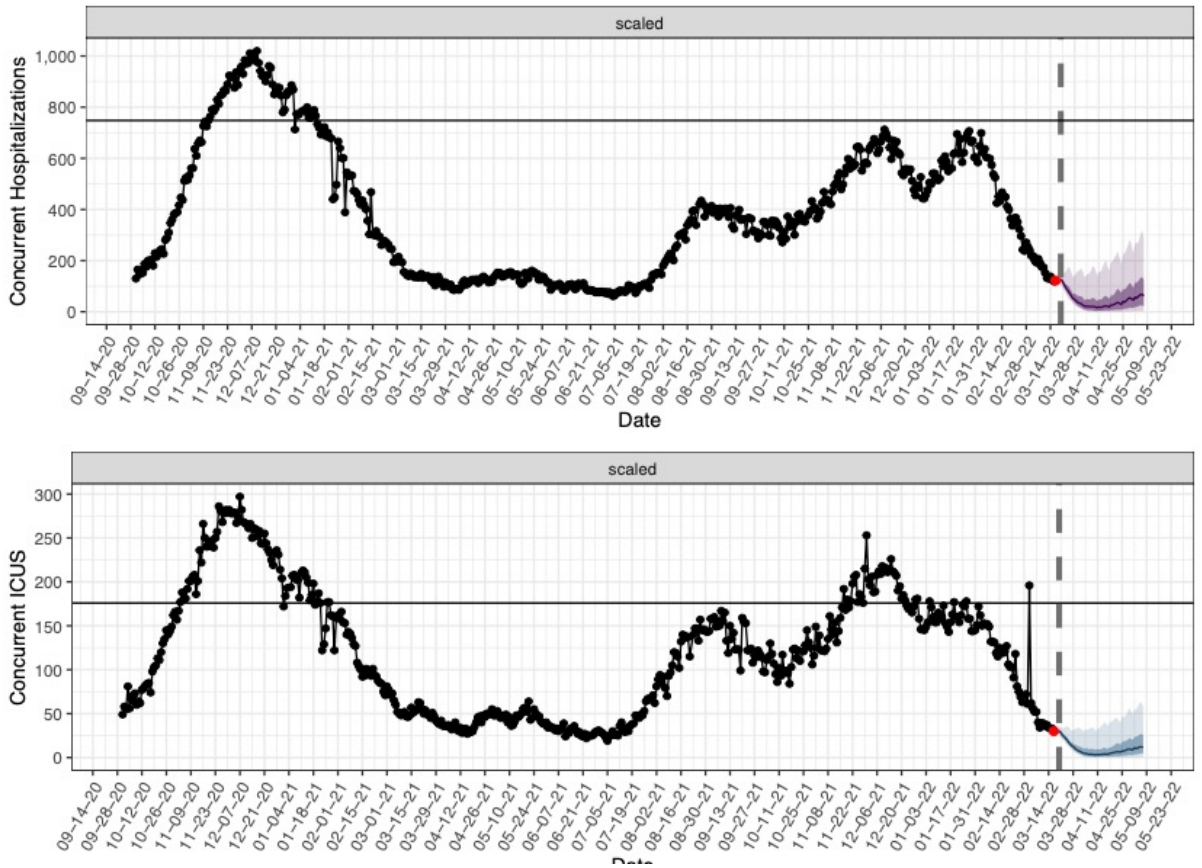


So what?

Both regions have a predicted plateau. The Southwest region is expected to see higher number of cases.

> 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

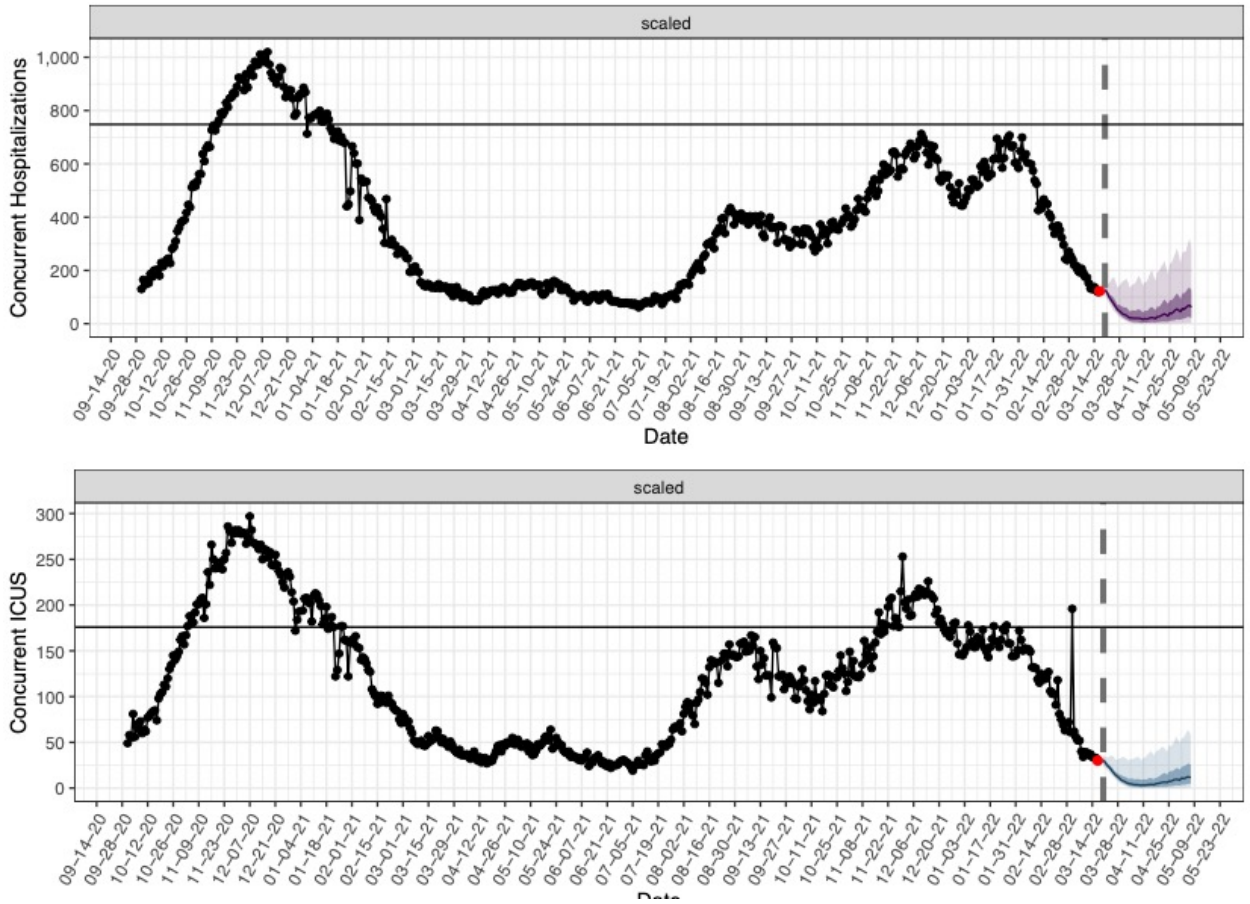
Week	Qu. 5% (best case)	Qu. 50% (median)	Qu. 95% (worst case)
3/27/22	9	14	31
4/3/22	1	5	30
4/10/22	0	3	30
4/17/22	0	4	36
4/24/22	0	6	40
5/1/22	0	8	50

"Scaled" Scenario

So what?

Model is predicting an decrease in COVID-19 ICU beds needed over the next several 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)
2/6/22	23	39	105
2/13/22	2	16	103
2/20/22	0	13	112
2/27/22	0	15	126
3/6/22	0	22	148
3/13/22	1	37	179

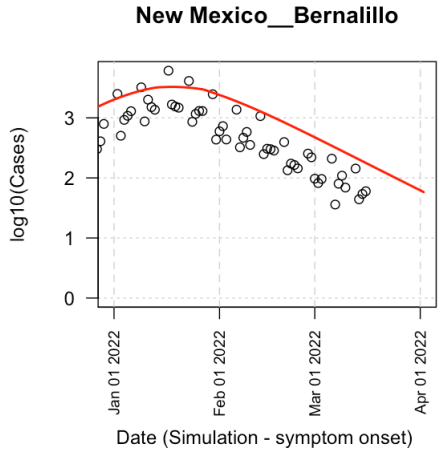
"Scaled" Scenario

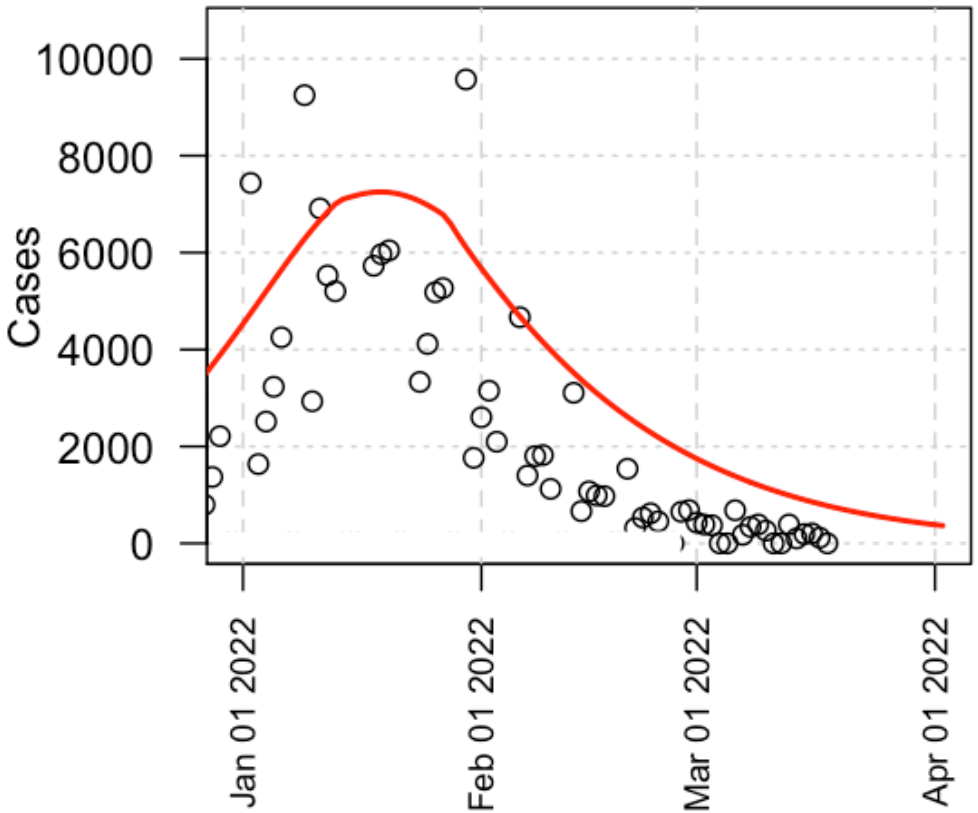
So what?

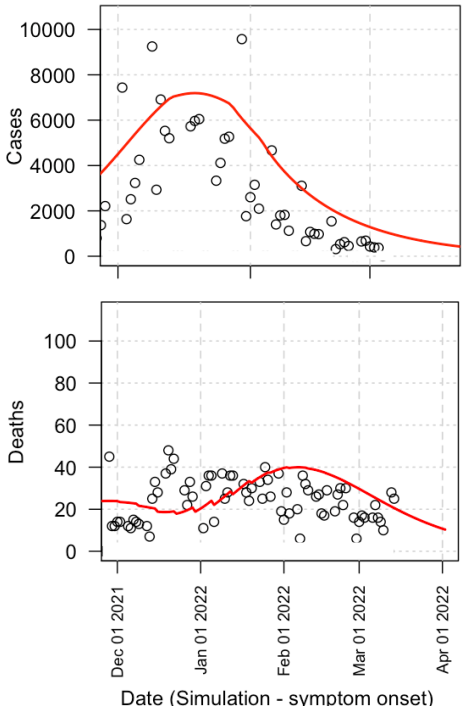
Med-surge general bed needs are predicted to decrease overall during the next 3 weeks

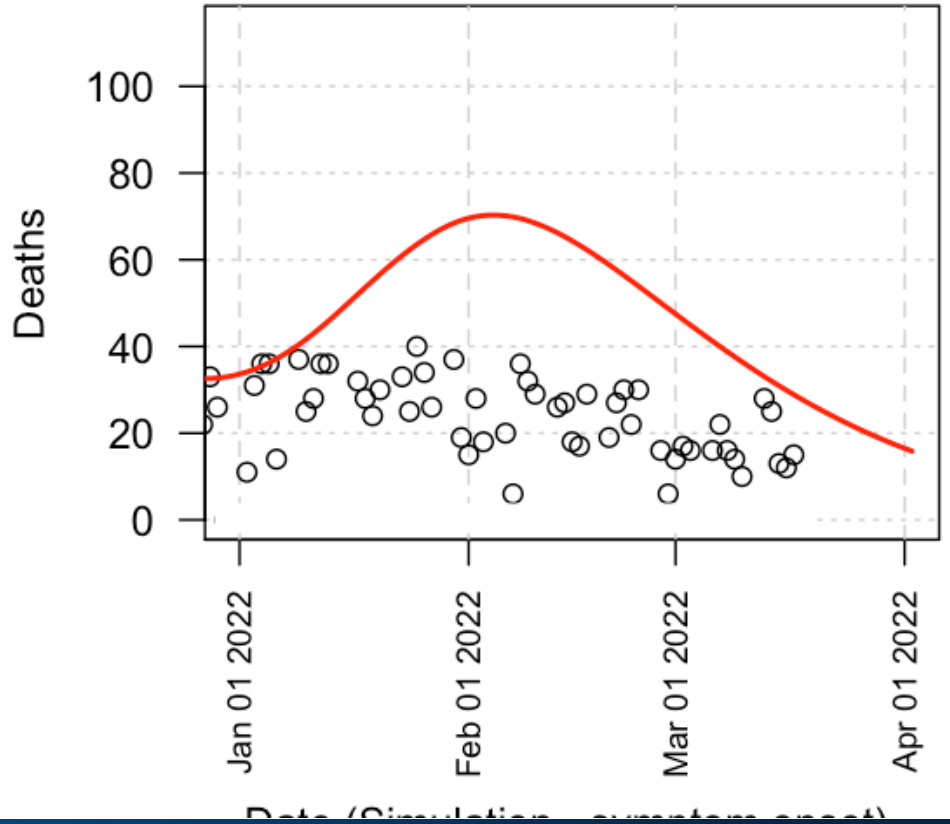
22 Mar 2022: Epigrid modeling

- NM daily incidence is declining. Drop in the death *rate* to 1/2x is highly notable (not only the number of deaths).
- A modest flattening of the rate of incidence-decline is highly likely. The causes are:
  - Reduced utilization of high quality masks while congregated and indoors, and
  - BA.2 variant virus. Proportion is increasing.
- Omicron is about as infectious as Delta variant. Virus evolution/immune evasion causative of Omicron wave.
- Immunological diversity from updated vaccines will further improve the situation.
- Situational awareness remains good as of January 2022, likely to the present time.







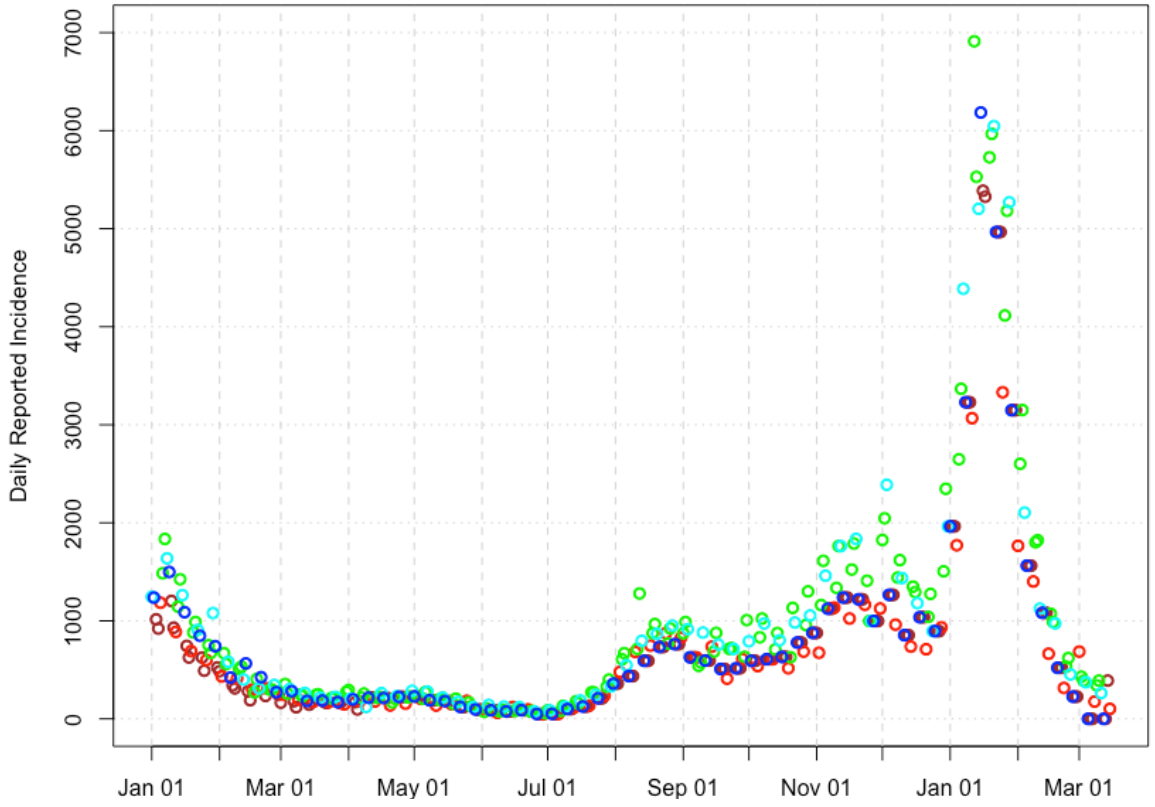


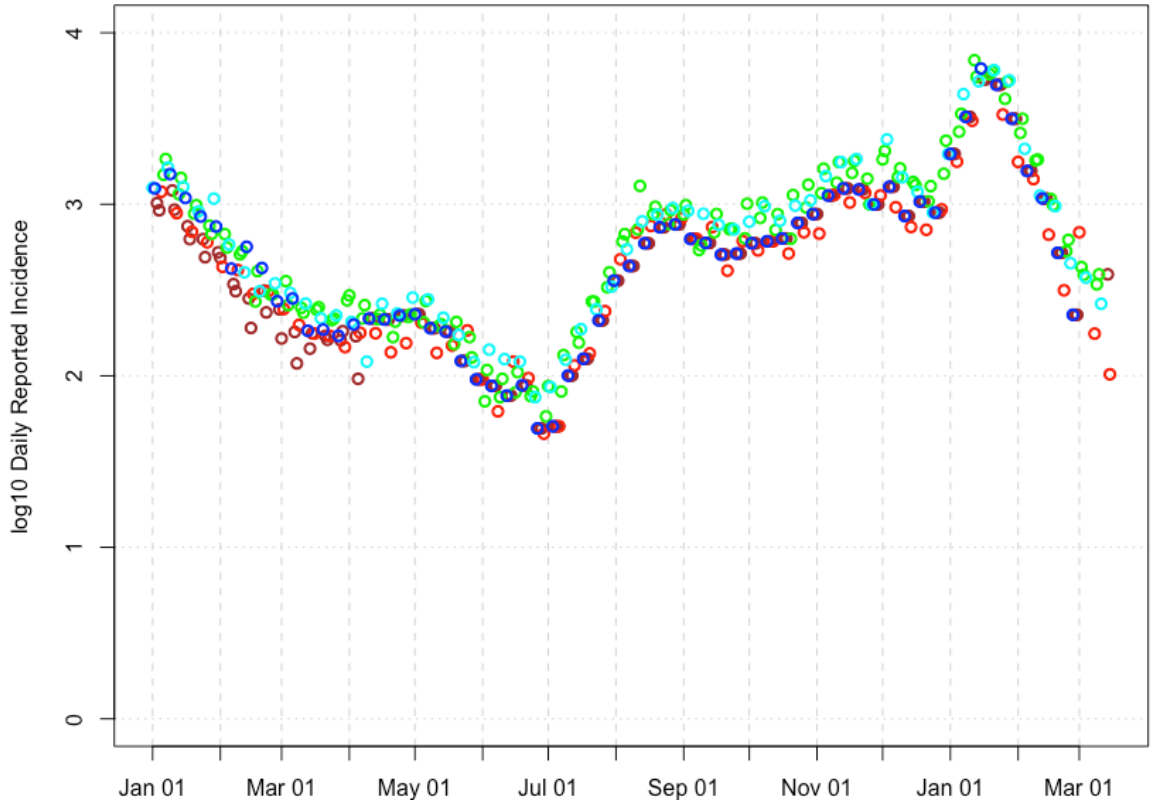
A look at the raw incidence data: 2021-2022

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

- The reported incidence level is falling.
- Within-weekly variation in NM data indicates reliability.
- Color-coded by-day-of-week decline is large, but slowing.

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.





22 March 2022 Vaccine Analysis (NM): Vaccinate *before* the next epidemic/wave

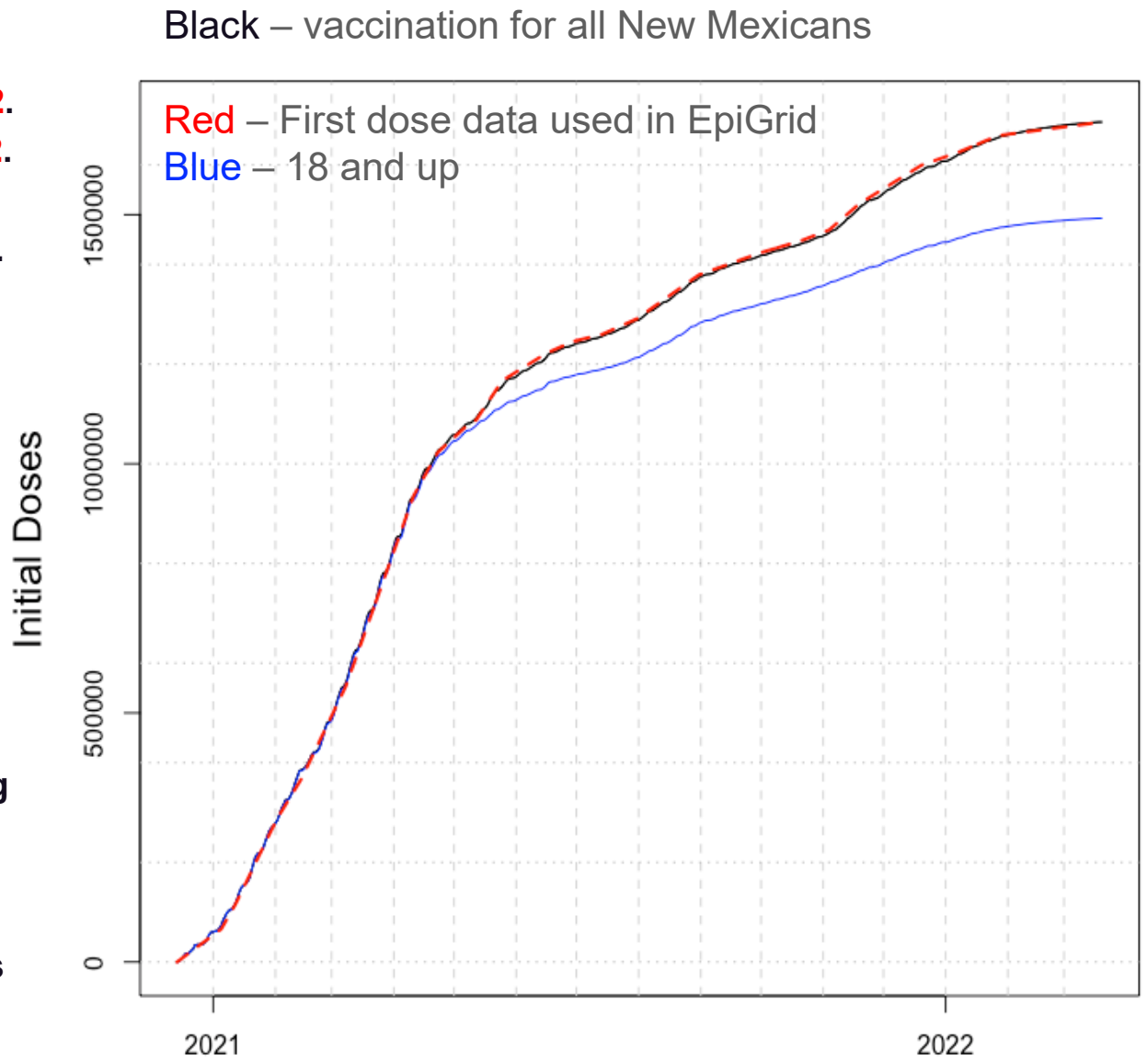
- 1687k first doses are used in modeling (3/22/22).
- 1687k first doses have been administered, +1k/2, +7k/2, +7,10k/2, +9k/2.
- 1435k completed initial vaccine series, +4k/2, +13k/2, +10,14k/2, +12k/2.
- 771k boosters completed, +11k/2, +22k/2, +20,28k/2, +35k/2.
- ~80.4% of all persons in New Mexico are at least minimally vaccinated.
- ~94.5% of all New Mexicans are eligible (~1981k).
- 78.0/94.5=85.1% of eligible New Mexicans vaccinated.
- 5-11 year-olds: 74k first doses (39.6%, 0.5%/2, 1.2%/2 +0%/2, +1.1%/2).

- Vaccination is slow. Expect waning immunity in May 2022.
- By-county 3rd-dose variation is large.

- Vaccination with updated antigen (i.e. Omicron) is likely to highly beneficial to limiting individual and population wide effects.

- Crucial to understand the level of immune evasion against neutralizing antibodies against the next variant *well before the peak of that epidemic is reached*.

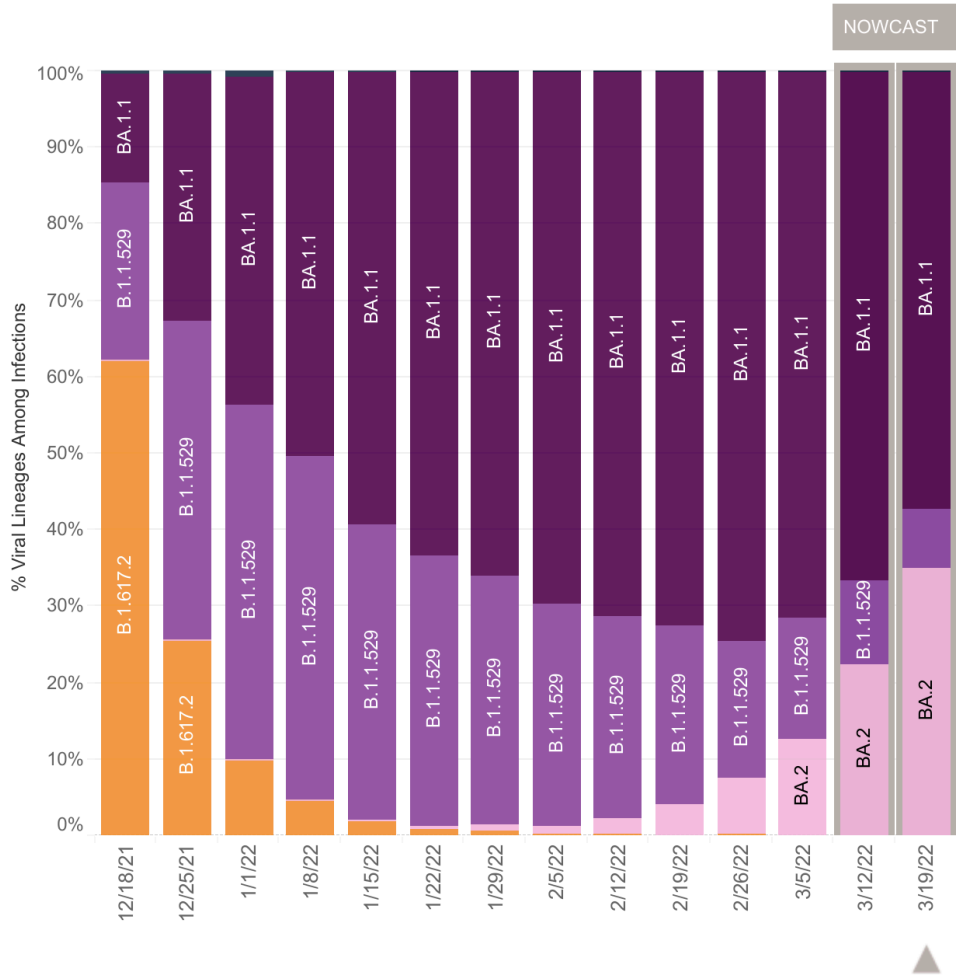
- Monitor low-vaccination & congregated environments (i.e. age cohorts with lower vaccination rates).



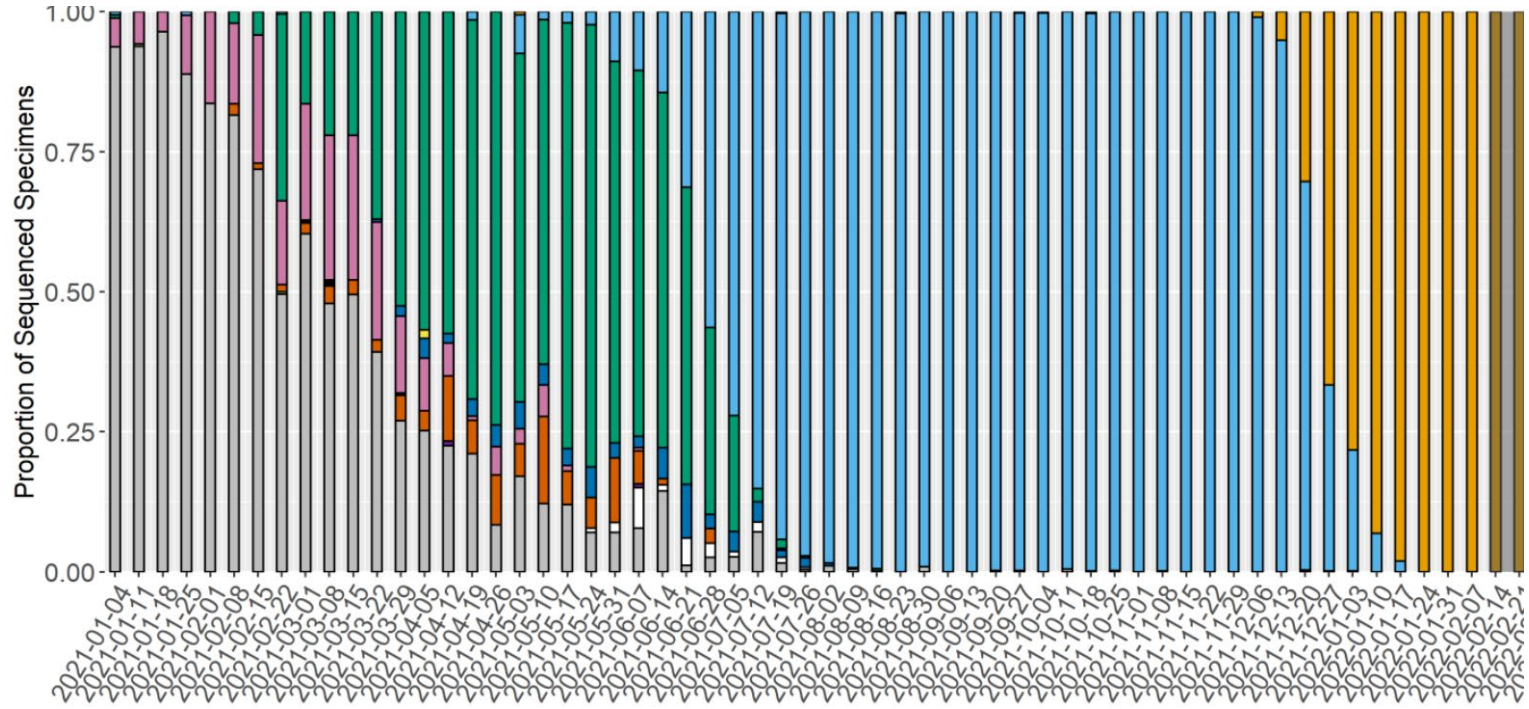
US Census Bureau reports 2097k people in New Mexico.

Variant Monitoring: Omicron is the current variant

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



- New variants have appeared without evident intermediates. Global and wastewater monitoring.
- NM data on BA.2 inconclusive for future events.
- Approximately 6-12 months is the longest variant-interval: D614G (~3 months), Alpha (~6-9 months), Delta (~6 months), Omicron (~6 months).
- Updated vaccine antigens likely important for limiting future severe disease.
- Priority on getting ahead of SARS-2 with immune diversity in the population. Both B- and T-cell.



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

Recent By-State Trends: Most Populous 10 States

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

	Cases	Deaths
New York	9.48	0.084
Michigan	8.02	0.503
Ohio	3.79	0.241
Florida	5.39	0.475
New Mexico	10.08	0.631
Illinois	9.91	0.241
Texas	13.43	0.287
California	10.29	0.322
North Carolina	12.21	0.199
Georgia	7.87	0.442
Pennsylvania	6.03	0.242

Daily rates per 100,000 residents averaged March 8thth 2022 thru March 22st 2022.