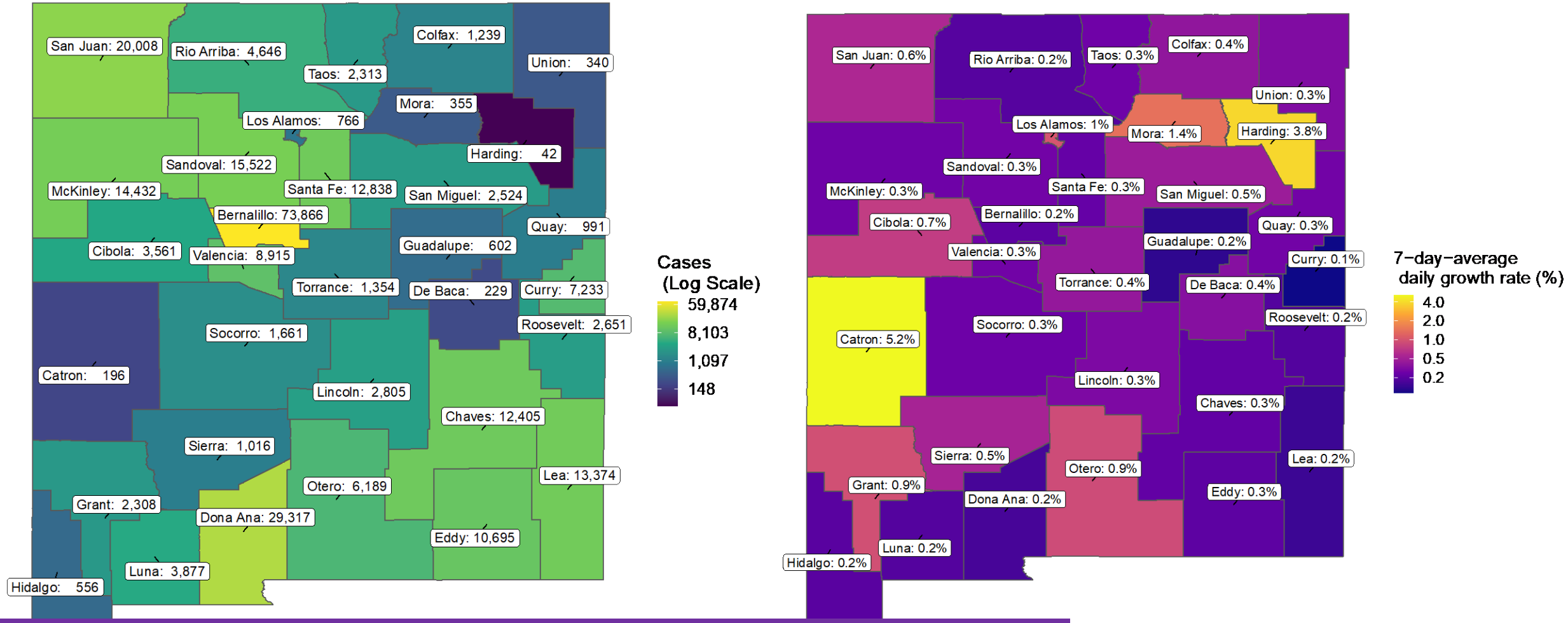
Modeling & Forecasting COVID-19 in NM

October 19, 2021

NNSA
National Nuclear Security Administration

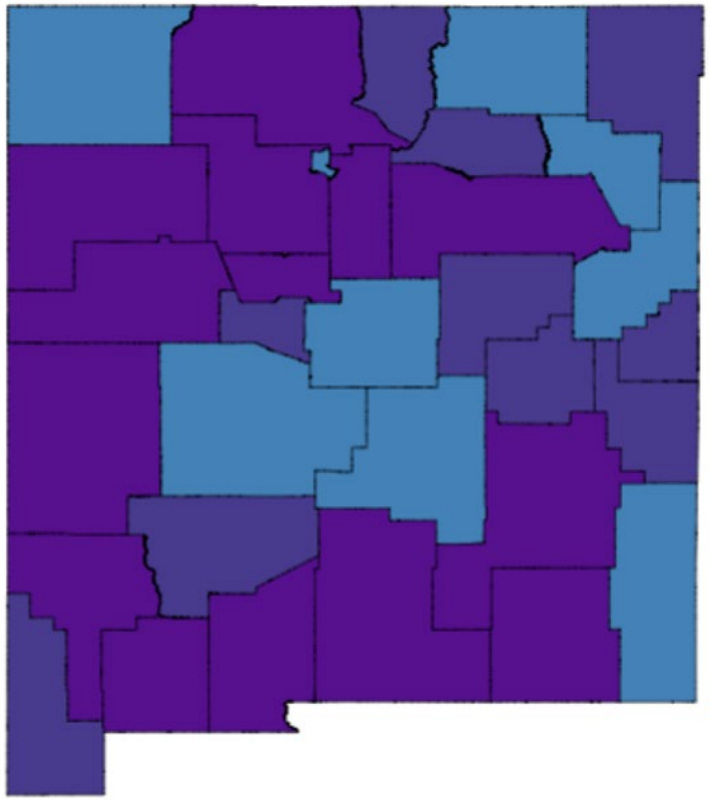
Cumulative Cases & Daily Growth Rate for NM: Oct 18

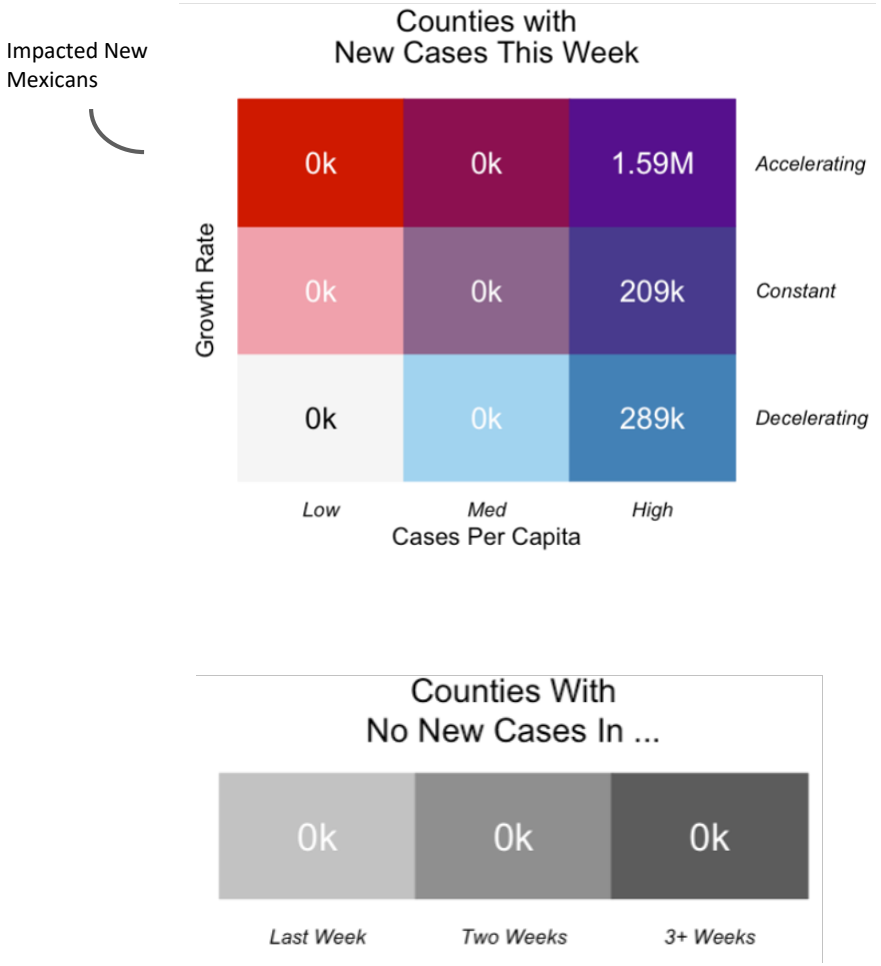


Catron, Harding, Mora, Los Alamos, Grant, Otero, Cibola, and San Juan have elevated cumulative growth rates

*Growth rate is in cumulative cases

Weekly Growth Rate for NM: Another View (Oct 18)





So what?

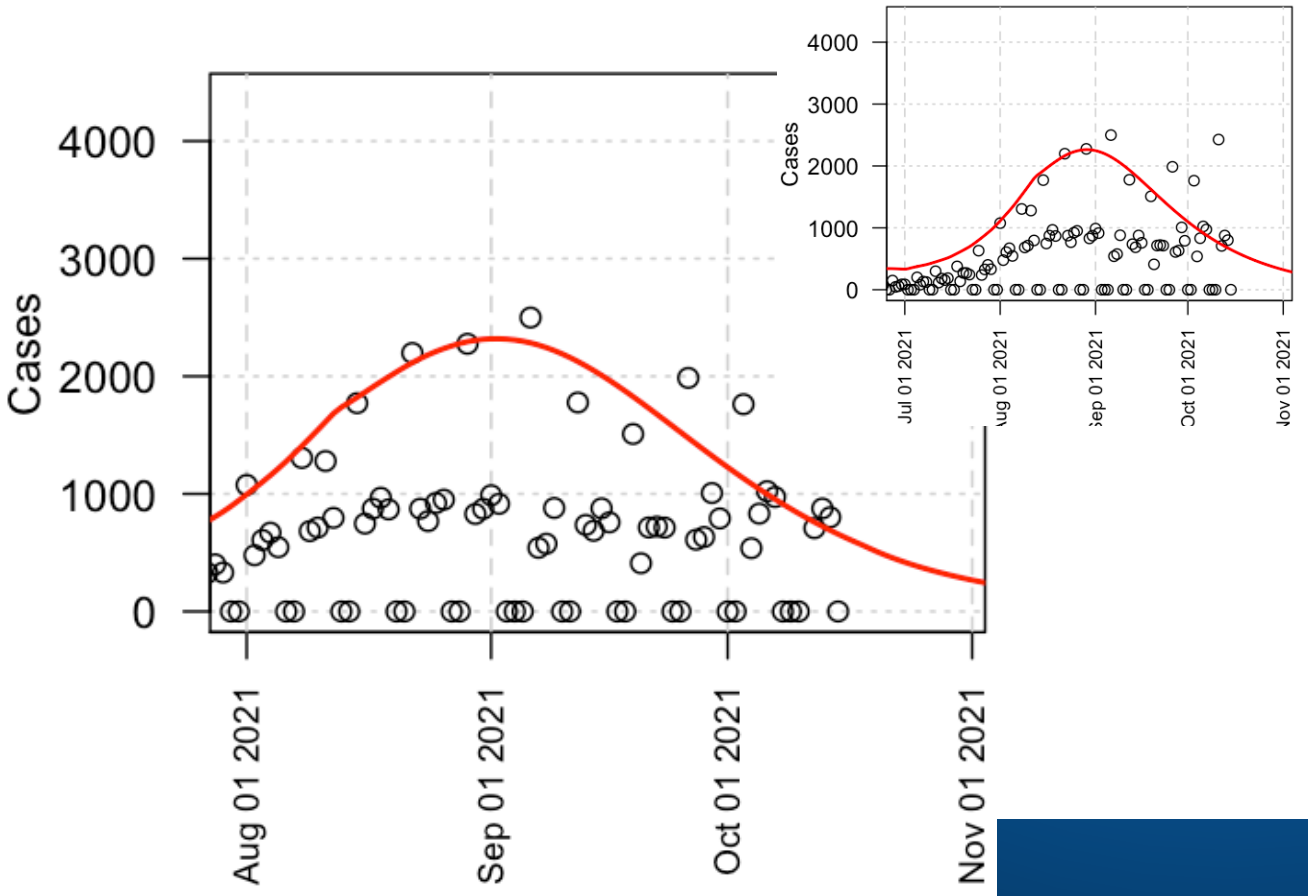
- Bernalillo, Catron, Chaves, Cibola, Dona Ana, Eddy, Grant, Luna, McKinley, Rio Arriba, Sandoval, San Miguel, and Santa Fe are accelerating
- San Juan, Otero, Mora have higher per-capita cases
- Most people in New Mexico are living in a county that is high per-capita case counts and accelerating

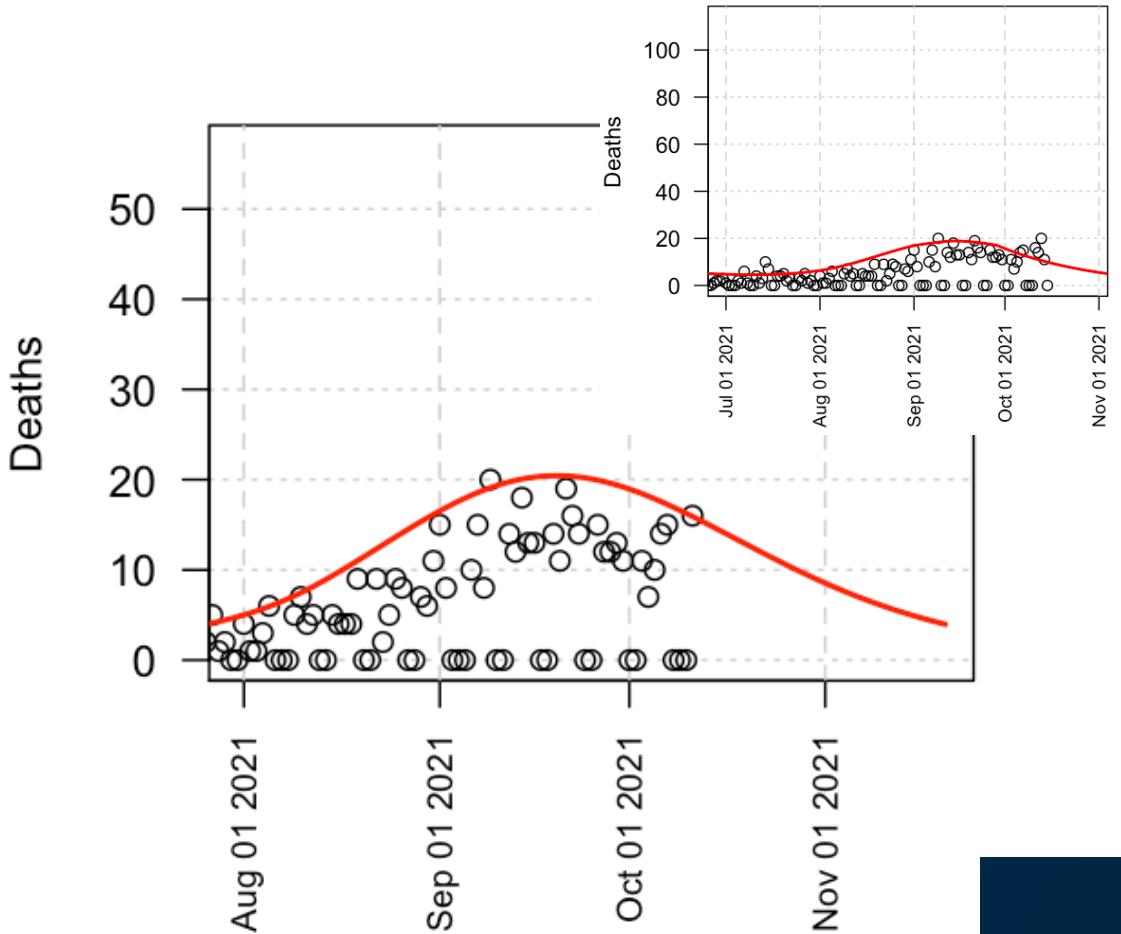
Number of New Mexicans living in regions with particular combinations of per capita case counts and 7-day growth rates

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

19 Oct 2021: EpiGrid modeling

- This model is *optimistic*. New Mexico has flat incidence.
- The fraction of individuals who isolate may be deteriorating (not timeliness for most who do isolate). This may be partly causative.
- Some large-population counties are deteriorating.
- NM daily deaths show a weak peak in September. A long tail of mortality into October is occurring. An transient increase in mortality is possible.
- Improved vaccination levels after 26 October are likely to improve the overall outlook, as will third doses.



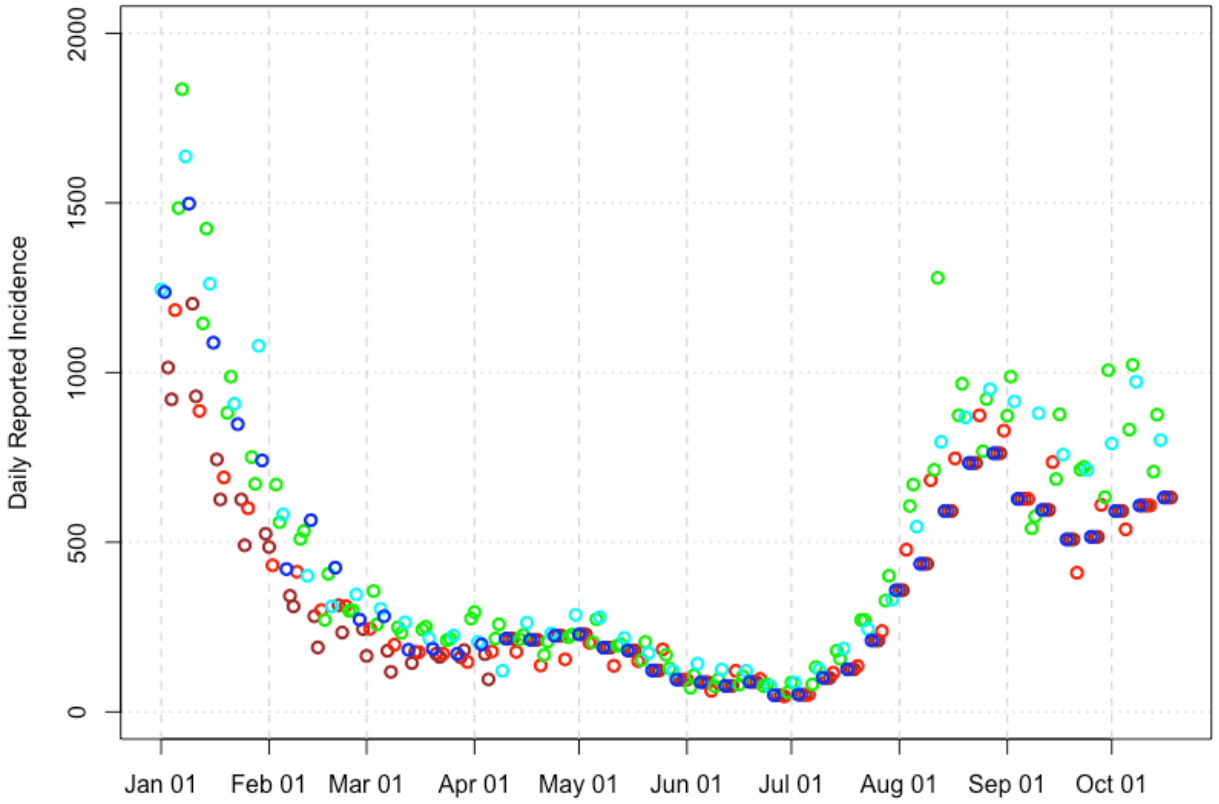


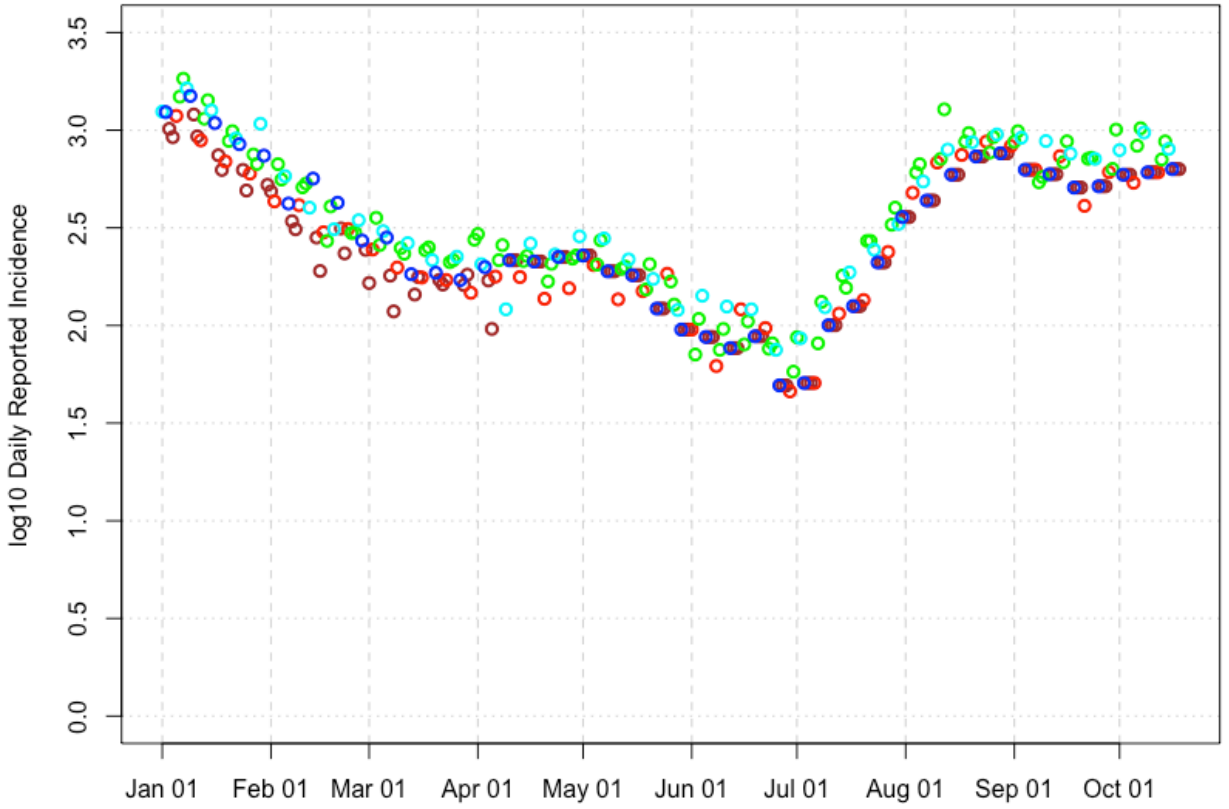
A look at the raw incidence data

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

Cases rates are flat, or rising.

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.

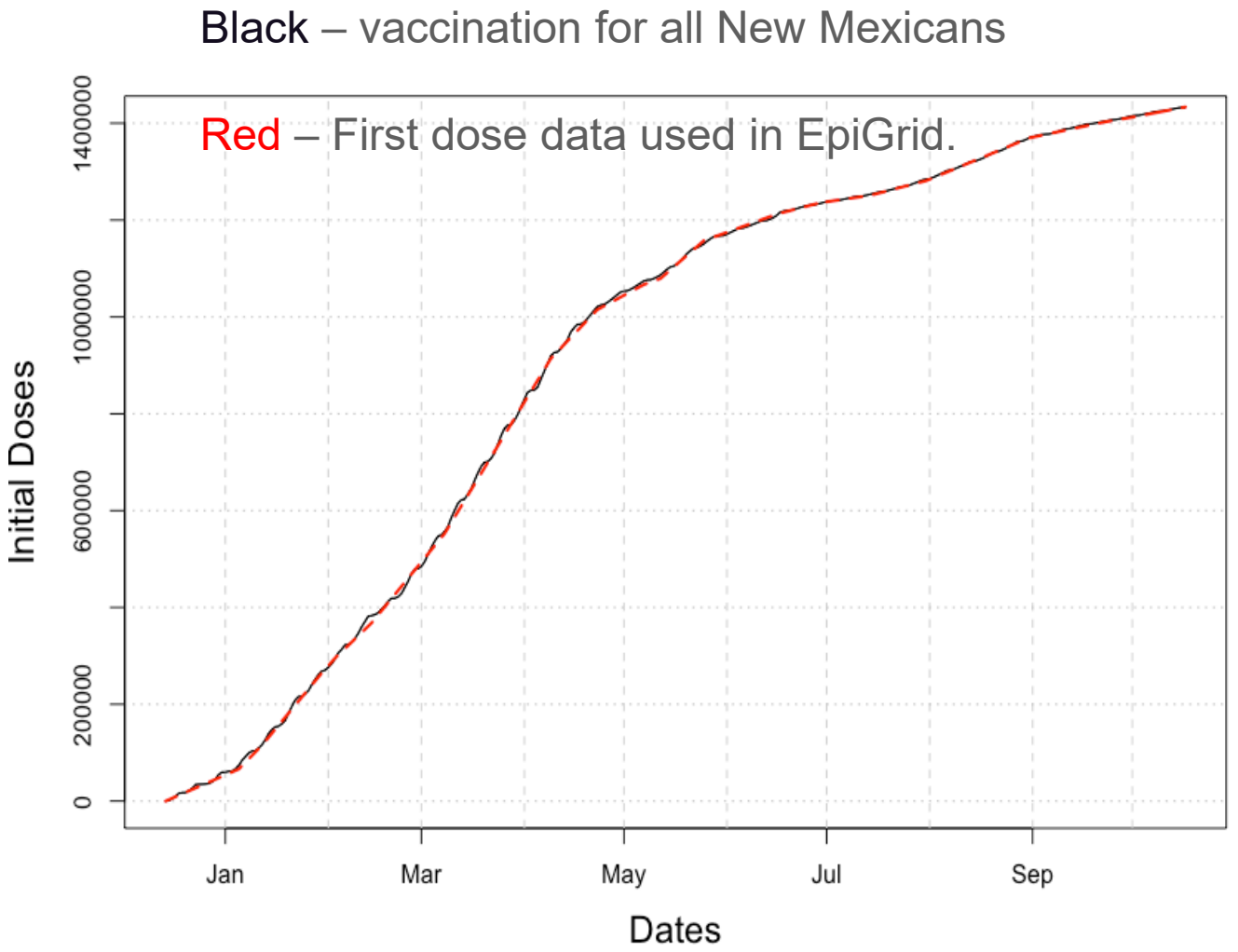




19 October 2021 Vaccine Analysis

- **~1426k first doses have been administered in NM.**
- **~1258k completed vaccine series in NM.**
- **~68.0% of all persons in New Mexico are at least minimally vaccinated.**
- **~85.5% of all persons in New Mexico are currently eligible (~1792k).**
- **68.0/85.5 ~ 79.5% of all eligible people are vaccinated.**
- **5-11 year-old vaccinations are likely next week.**

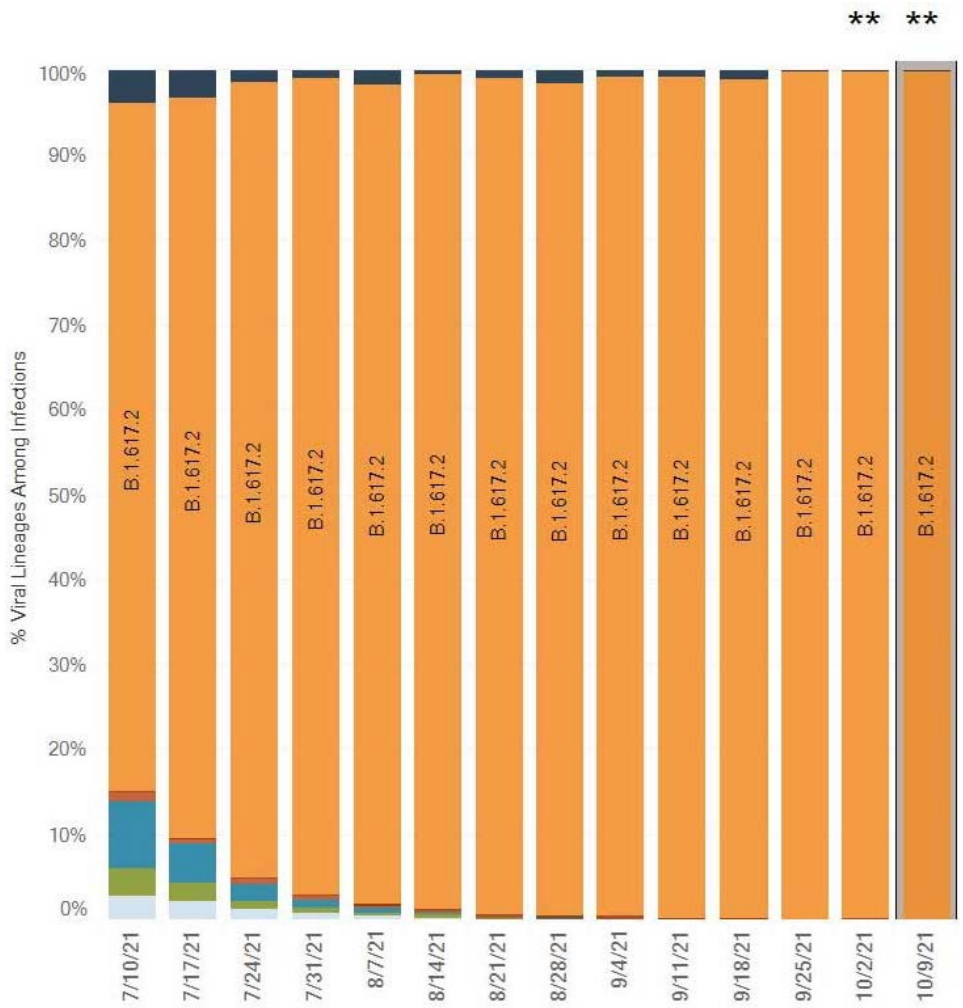
- **A simple calculation of effective reproductive number for Delta variant with ~75% immune suggests "intrinsic" Re >~2.**
- **An effective reproductive number near 1 based solely on vaccination will not be achieved until >~80% vaccination of the total population.**
- **High adoption of third/months-spaced doses in vulnerable populations will lower mortality.**



US Census Bureau reports 2097k people in New Mexico.

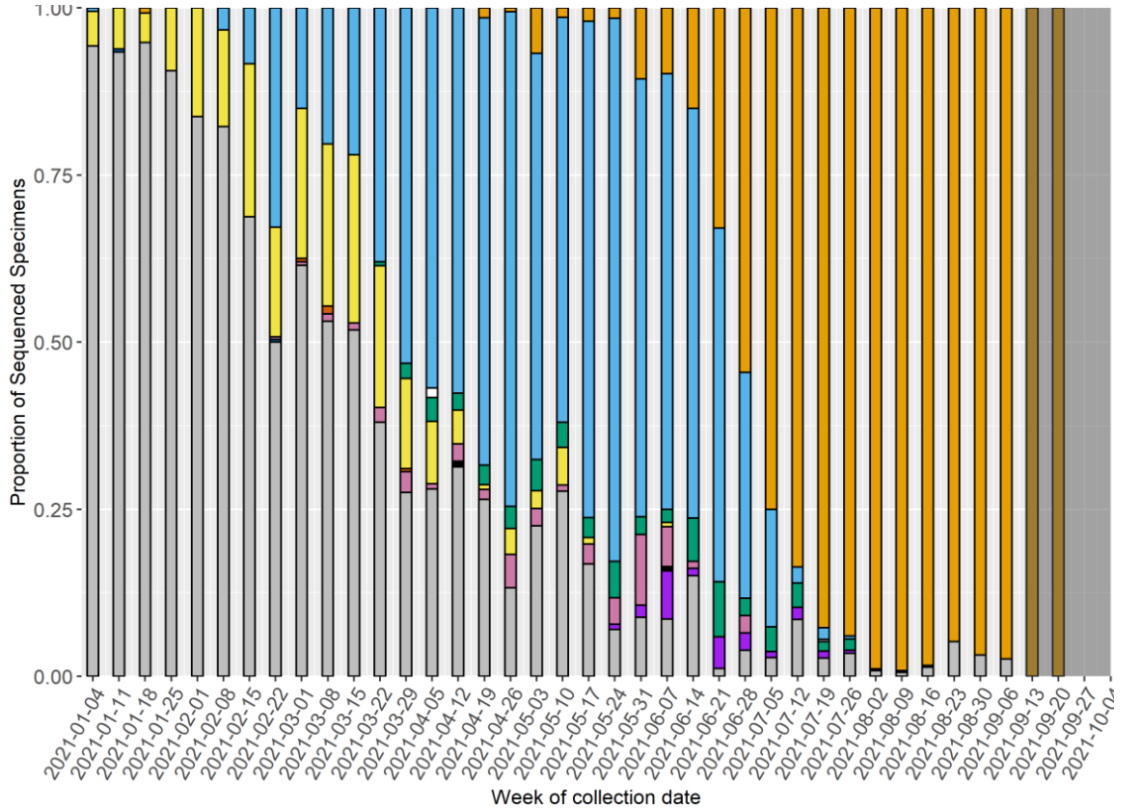
Variant Monitoring: Changing epidemic trends are not driven by variant replacement.

https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview/index.html



- B.1.617.2, "Δ", "Delta", is the "Indian" variant.
- New variants have appeared without evident intermediates.
- *Low levels* of old variants often persist (the A-lineage and many others).

New Mexico's data are consistent with Delta being dominant.



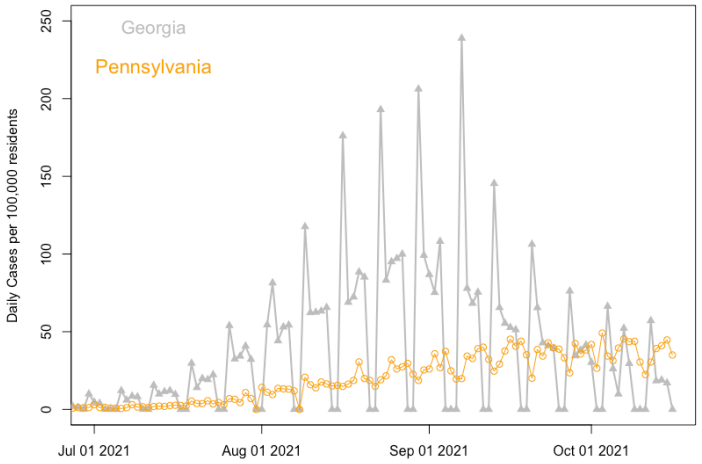
https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview/10152021/images/variants1_10152021.jpg?_=44822?noicon

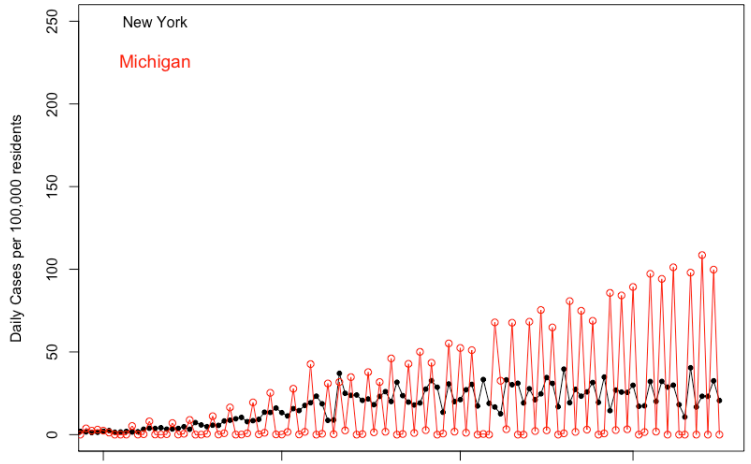
What is happening in the rest of the U.S.? The 10 most populous states and New Mexico

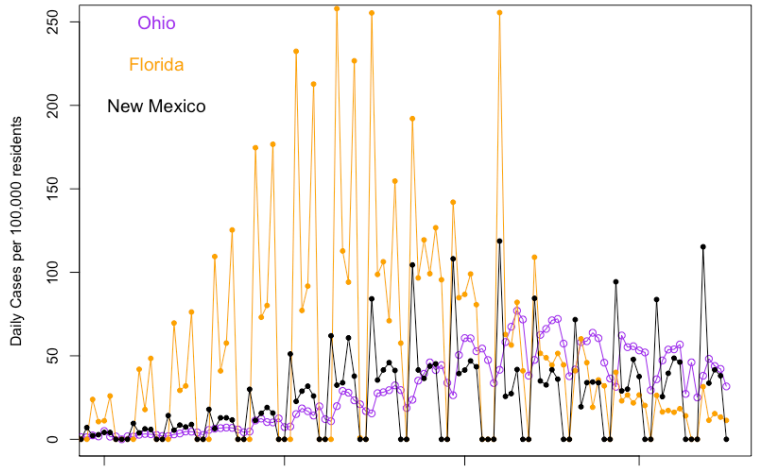
Trends over the last 3 weeks: Increasing:. Steady: California, Illinois, Michigan(?), New Mexico(?), Pennsylvania, New York. Modest Declines: Florida(*), Georgia, N. Carolina, Ohio, Texas. Declining:

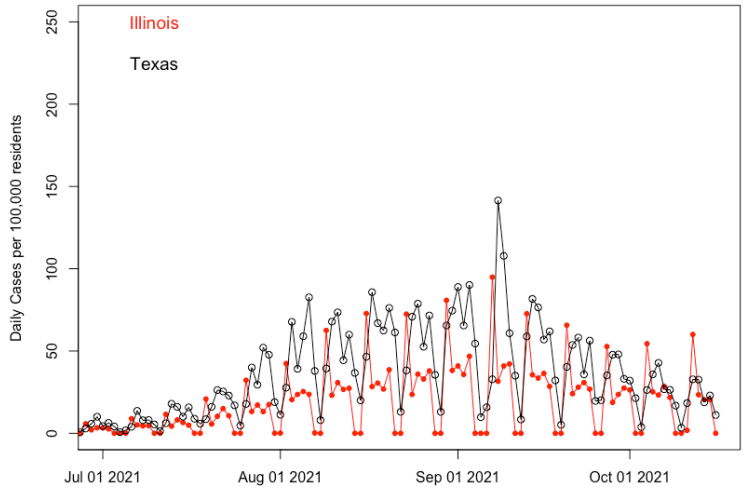
	Cases	Deaths
New York	23.9	0.187
Michigan	43.76	0.379
Ohio	39.3	0.619
Florida	11.85	0.776
New Mexico	32.66	0.414
Illinois	18.02	0.264
Texas	20.01	0.665
California	13.82	0.224
North Carolina	29.06	0.469
Georgia	15.91	0.786
Pennsylvania	34.76	0.57

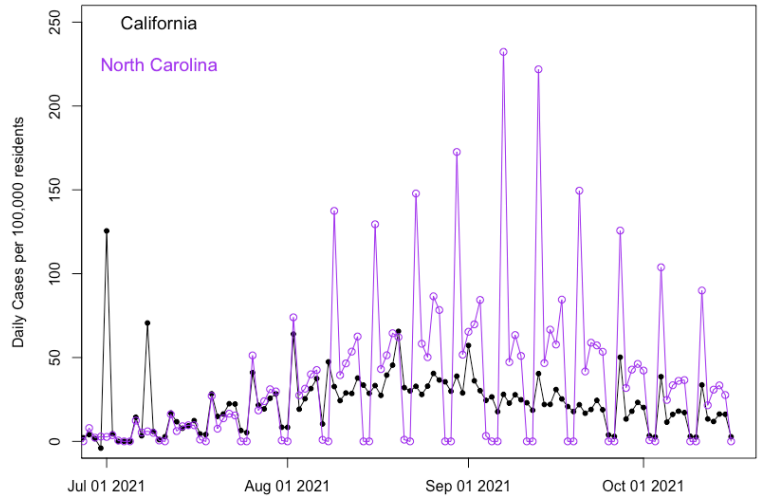
Daily rates per 100,000 residents averaged October 11th thru October 18th 2021.





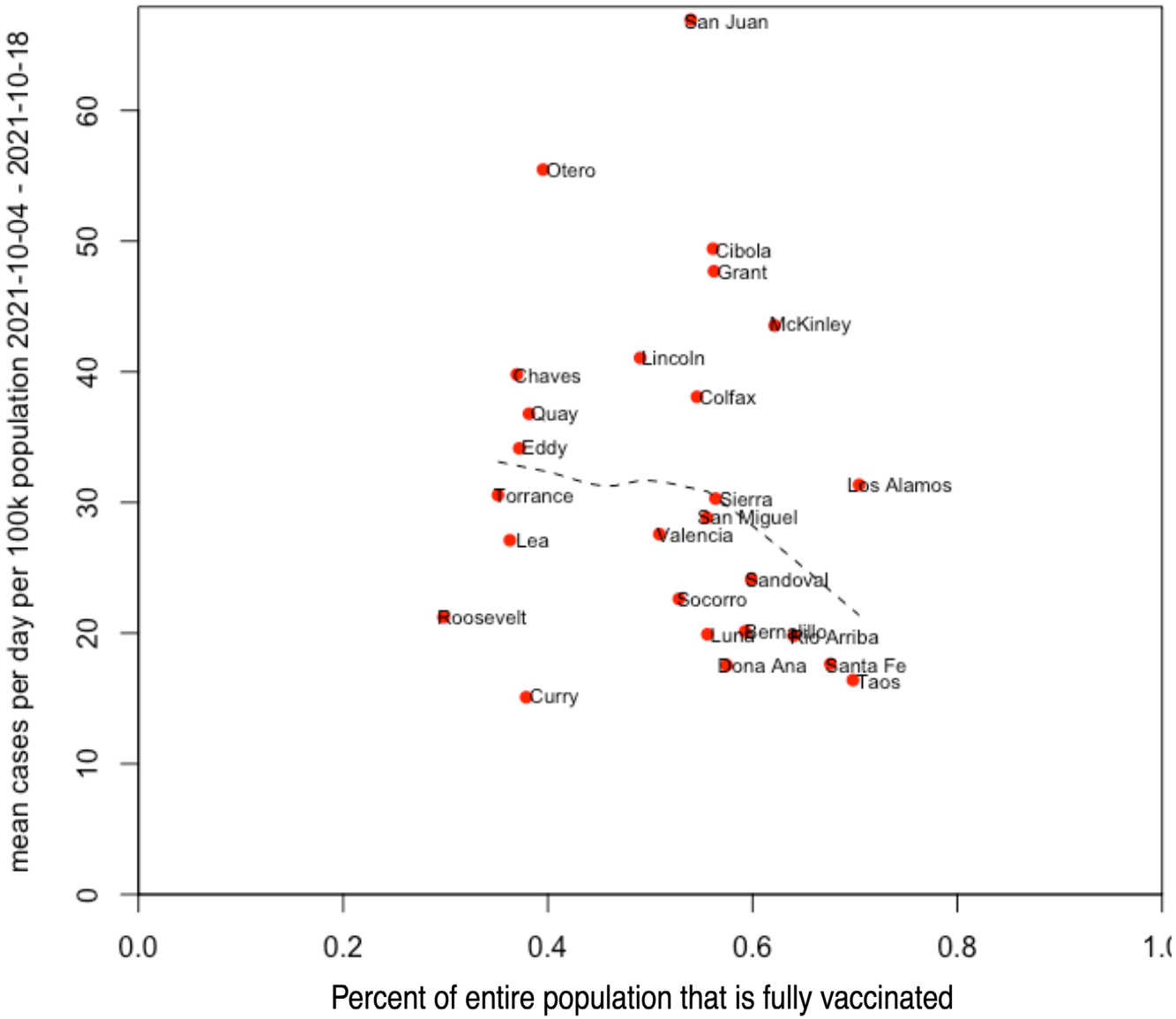






* The suggestion has been made that cooler weather leads to people outside.

Cases plotted versus vaccination by county



The relationship between vaccination and cases is strong and protective on a by-county basis.

Infection control *relative to vaccination rates*.

- San Juan County has very high incidence.
- Cibola, Grant, McKinley, Otero Counties are high.
- Chaves, Colfax, Lincoln, and Los Alamos Counties are marginally high compared with vaccination.
- Curry, Dona Ana, Lea, Luna, Roosevelt, and Socorro have better than typical incidence compared to vaccination.
- Roosevelt and Curry has surprisingly low incidence.
- Seven counties are not on this plot due to relative isolation and small populations: Catron, De Baca, Guadalupe, Harding, Hidalgo, Mora and Union.

Vaccination rates are uniformly low in: Quay, Lea, Eddy, Chaves, Torrance, Curry, Otero, and Roosevelt Counties. All have rates below ~40% of their *total* population.

- All counties have high absolute transmission, well above 10 per 10^5 per day.
- The current vaccination levels <80% of the total population are insufficient to prevent substantial, sustained transmission.
- The dotted line *still* points to roughly the most likely vaccination level that will give lower-level endemic transmission, while also reducing the heavy burden on hospitals. This is >~90% of the total population.
- Current vaccine effectiveness of <~90% will not support herd immunity, but may support future “super-immunity”.
- November 22nd is the federal deadline for full vaccination.

Recent by-county *trends* in daily incidence (are things getting better? No.)

- Trends, meaning time-dependence, not magnitude
- Per capita normalization not needed here (trends, not magnitude)
- Not referenced to vaccination rates (see the previous slide)
- Not referenced to whether the situation is currently intermediate, bad, or really bad. Barely reaching good anywhere in the USA.

- **Counties with falling incidence: Chaves, Curry.**

- **Counties with slowly falling incidence: Lea, Cibola.**

- **Counties with steady incidence: Bernalillo, Catron, Colfax, De Baca, Dona Ana, Eddy, Guadalupe, Harding, Hidalgo, Lincoln, Los Alamos, Luna, McKinley, Quay, Rio Arriba, Roosevelt, Sandoval, Santa Fe, San Miguel, Sierra, Socorro, Taos, Torrance, Union, Valencia.**

- **Counties with rising incidence: Grant, Mora, Otero, San Juan.**

Statewide by-county incidence trends are heterogeneous, with few areas of good control, some counties with poor control, and most in an unstable intermediate range.

Need a population-wide understanding of what makes good infection control. The Delta variant is sufficiently contagious that people will have to re-learn what constitutes good infection control because lessons learned for the Alpha variant are no longer correct.