COVID-19 Epidemiologic Update

A Presbyterian, LANL, SNL, and NMDOH Partnership

May 5, 2020

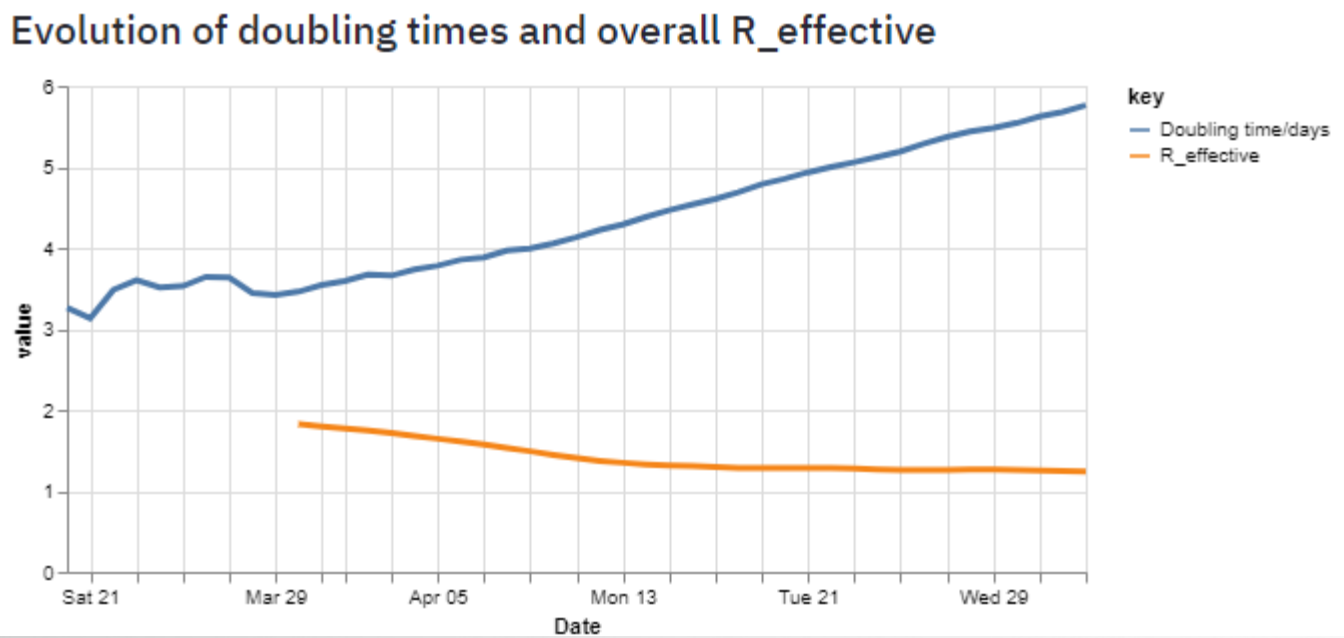
Key context May 5th 2020

- Improvements in NM plateaued; over this past week no improvements made in R_effective of 1.24

- The NW sees continued growth in cases. McKinley has demonstrated a positive trend in improvement but must continue. San Juan has plateaued and now has the highest rate of transmission in the state.

- Bernalillo has seen degradation in mitigation - the effective rate of transmission has increased in the past week requiring attention.

Improvements in the reduction of COVID has plateaued

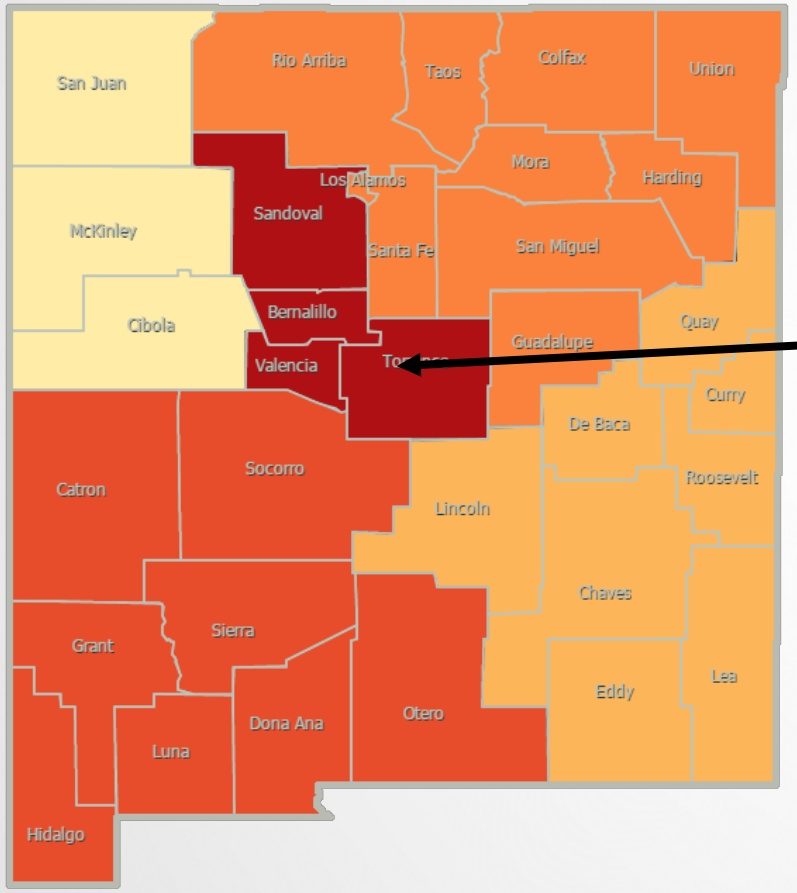


- Statewide R_effective improvements have now plateaued.
- Additional actions will be necessary to reduce transmission of COVID-19.

Updated calculation in R_effective pushed back to retrospective graphing

Regional Transmission above target

Northwest
R_effective
1.31



Northeast
R_effective
1.12

Central
R_effective
1.16

Southwest
R_effective
1.23

Southeast
R_effective
1.15

Key

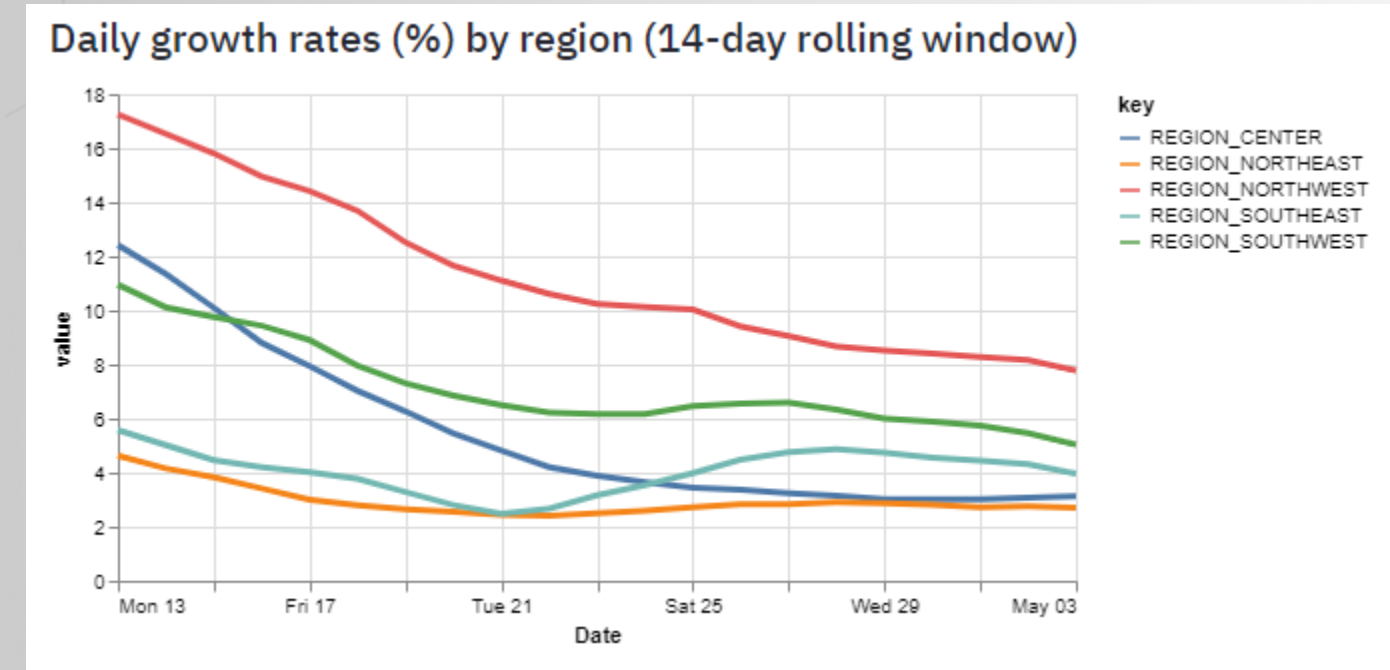
Low Level Endemic
1-1.1

Approaching Low Level Endemic
1.11-1.15

Requiring further mitigation >1.15

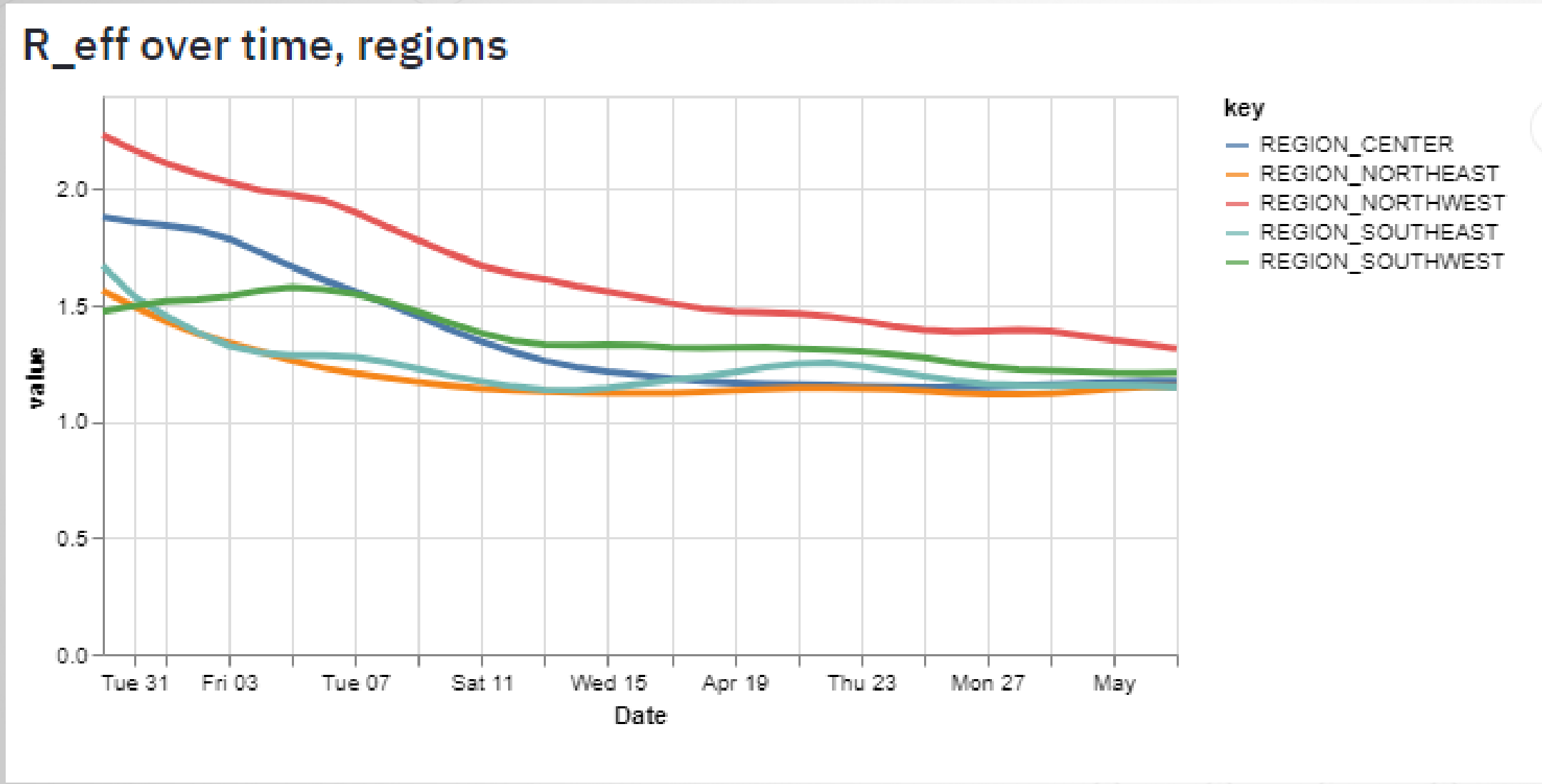
Please note that county distribution to each region has been updated to match DOH distribution

Regional growth rates remain above desired state

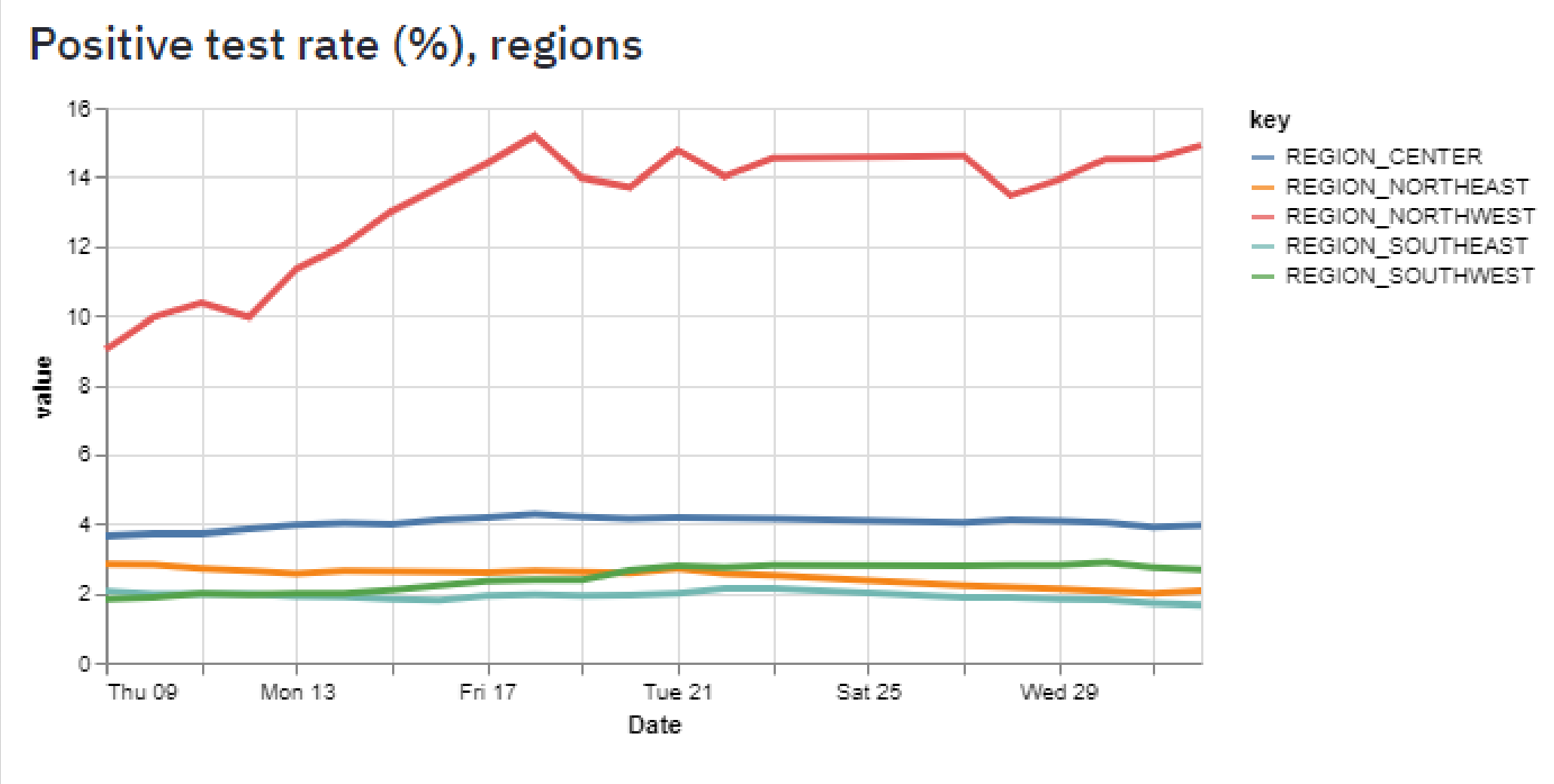


- **Central "metro" region** has seen degradation in mitigation and needs action given the potential related to population size.
- **NW region** has the highest growth rate and subsequent continued increases in mortality and admissions; additional actions are critical and must be sustained.
- **SW region** is only partially mitigated and in need of further actions to prevent large scale spread.

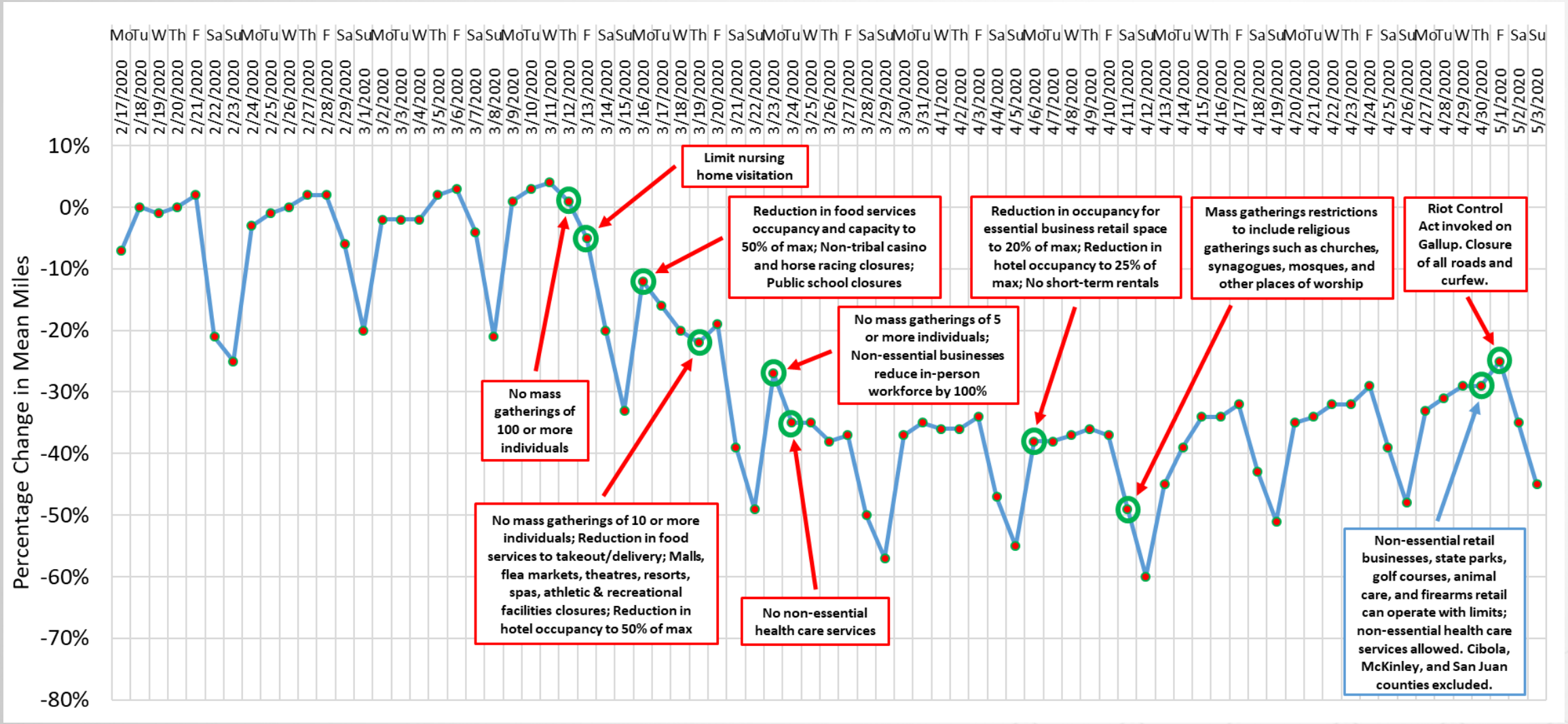
The effective rate of transmission plateaus above target



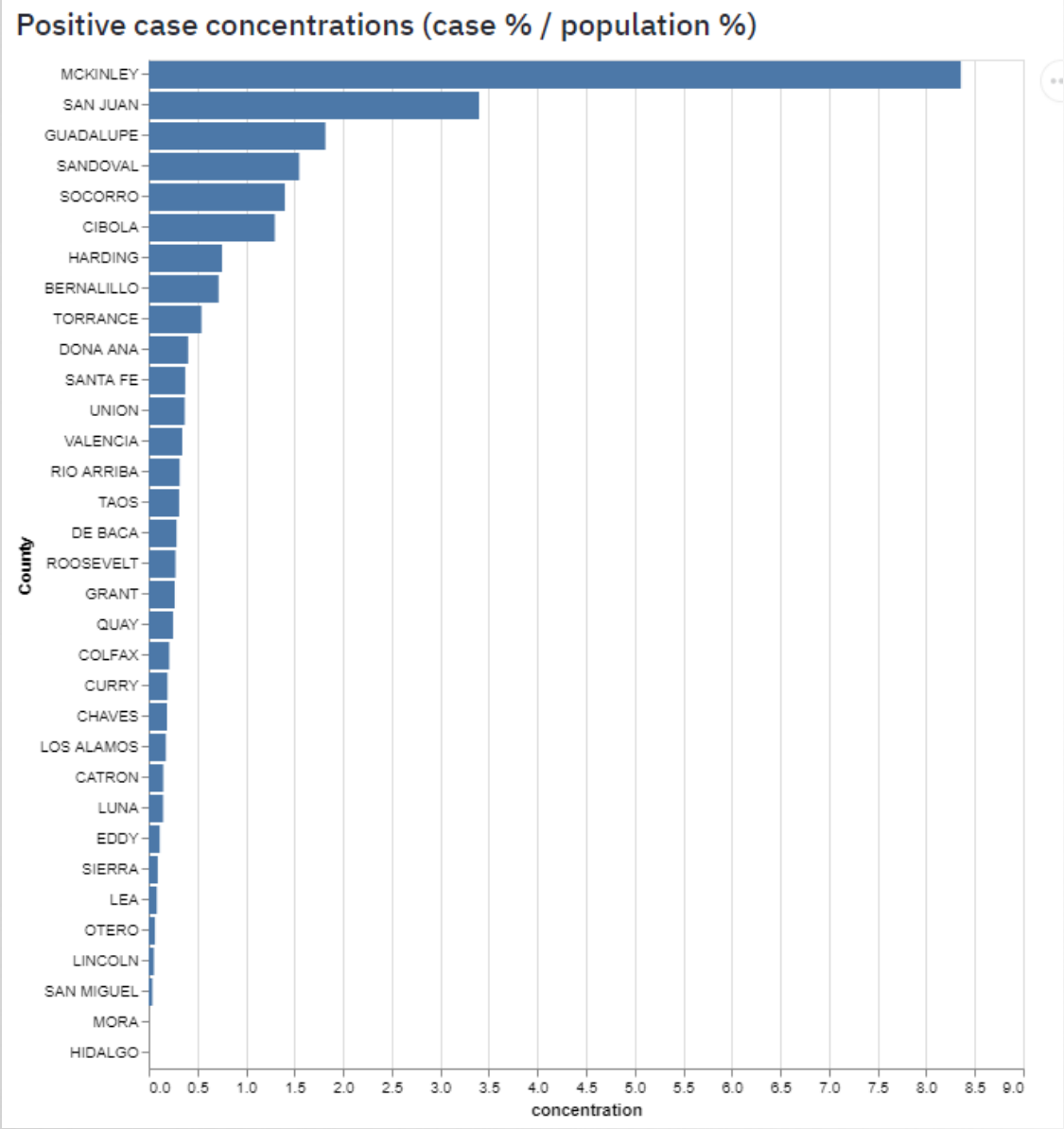
Positive test rates in NW region continue to grow



Data show statewide mobility is increasing



Relative case concentration is highest in the NW



Cases will continue to grow over next 6 weeks

6-Week Forecast of Confirmed Cases for New Mexico Based on Data as of 2020-05-03

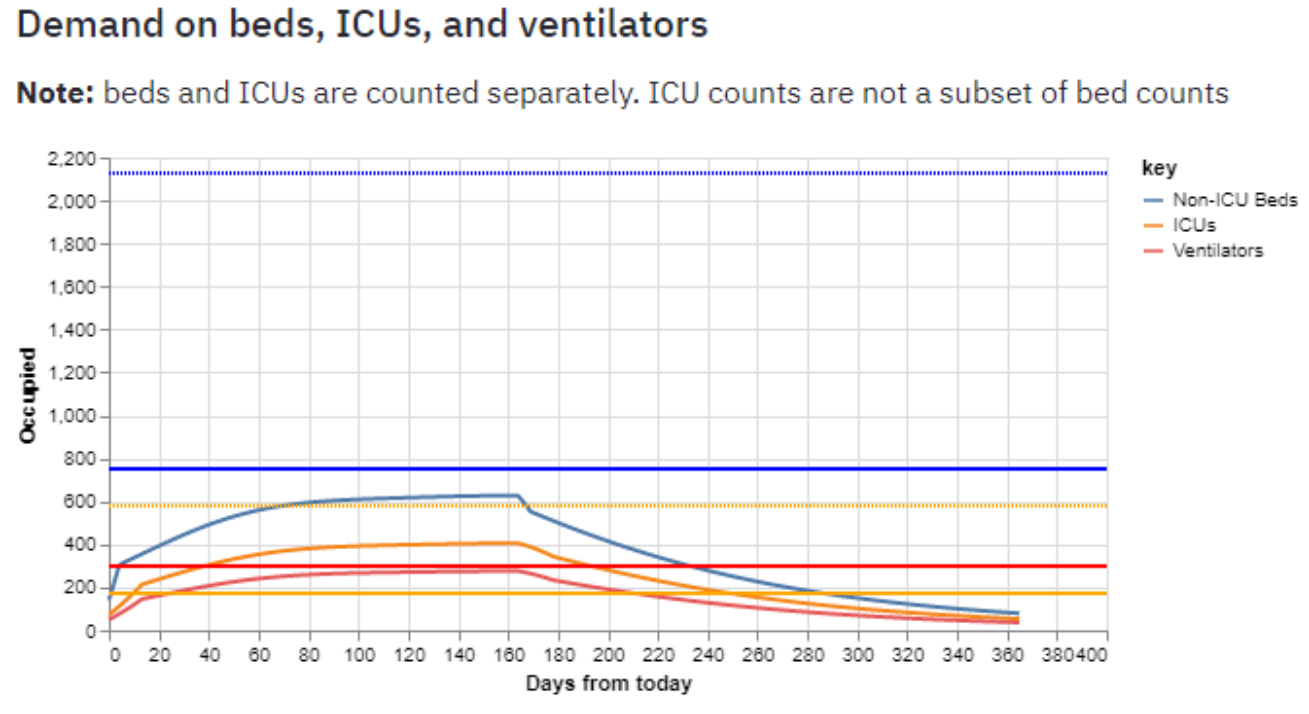
Week	Best Case (5th Percentile)^	Middle Case (50th Percentile)	Worst Case (95th Percentile)
2020-05-03		3,850*	
2020-05-10	4,146	4,786	6,649
2020-05-17	4,359	5,611	9,714
2020-05-24	4,500	6,270	12,817
2020-05-31	4,578	6,786	15,962
2020-06-07	4,632	7,175	18,900
2020-06-14	4,685	7,496	21,443

*Last reported confirmed cases count

^Closest-matching scenario

- LANL middle case projections have had very high correlation with actual counts.
- Changes in current social distancing policy would impact these projections.

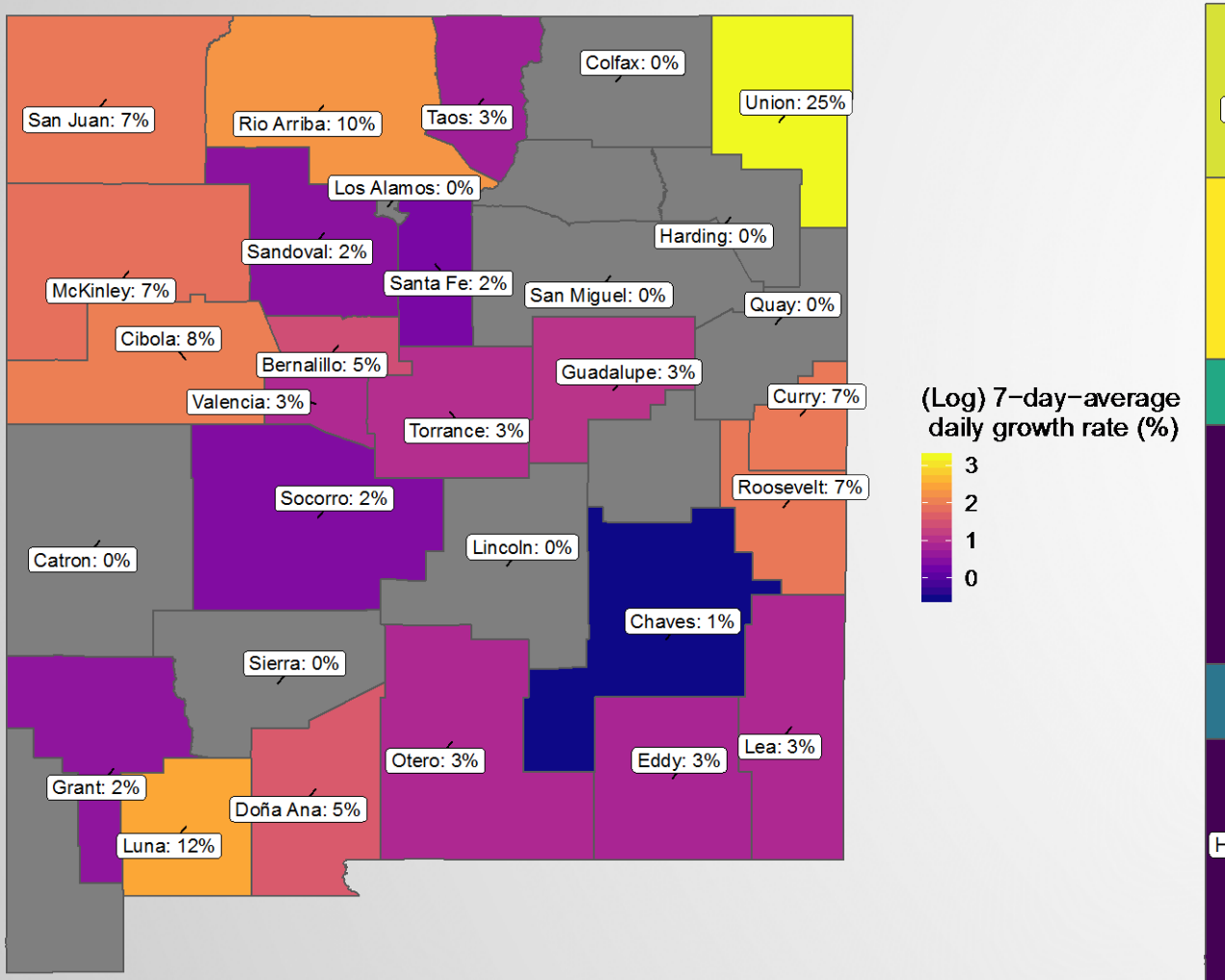
State has flattened the curve – We must now work regionally



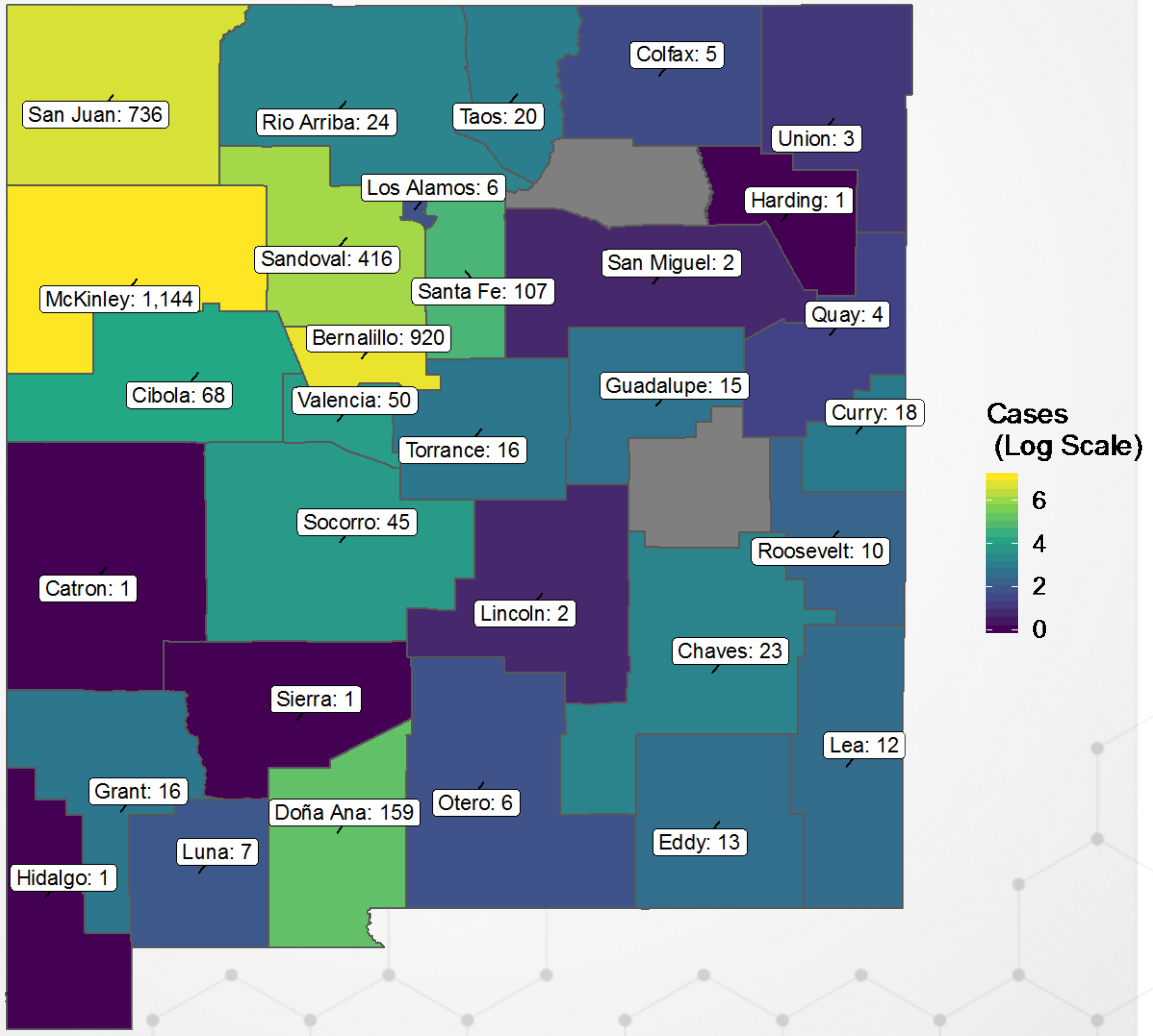
- We are seeing some degradation in control in Bernalillo county
- The NW area of the state is creating significant hospital volumes
- Changes in social distancing policy or practice will lead to additional peaks due to lack of herd immunity
- Social distancing appears to already be relaxing based on mobility data and increase in rate of transmission in Bernalillo

Growth and case count, by county

COVID-19 growth rate by county



COVID-19 cases by county



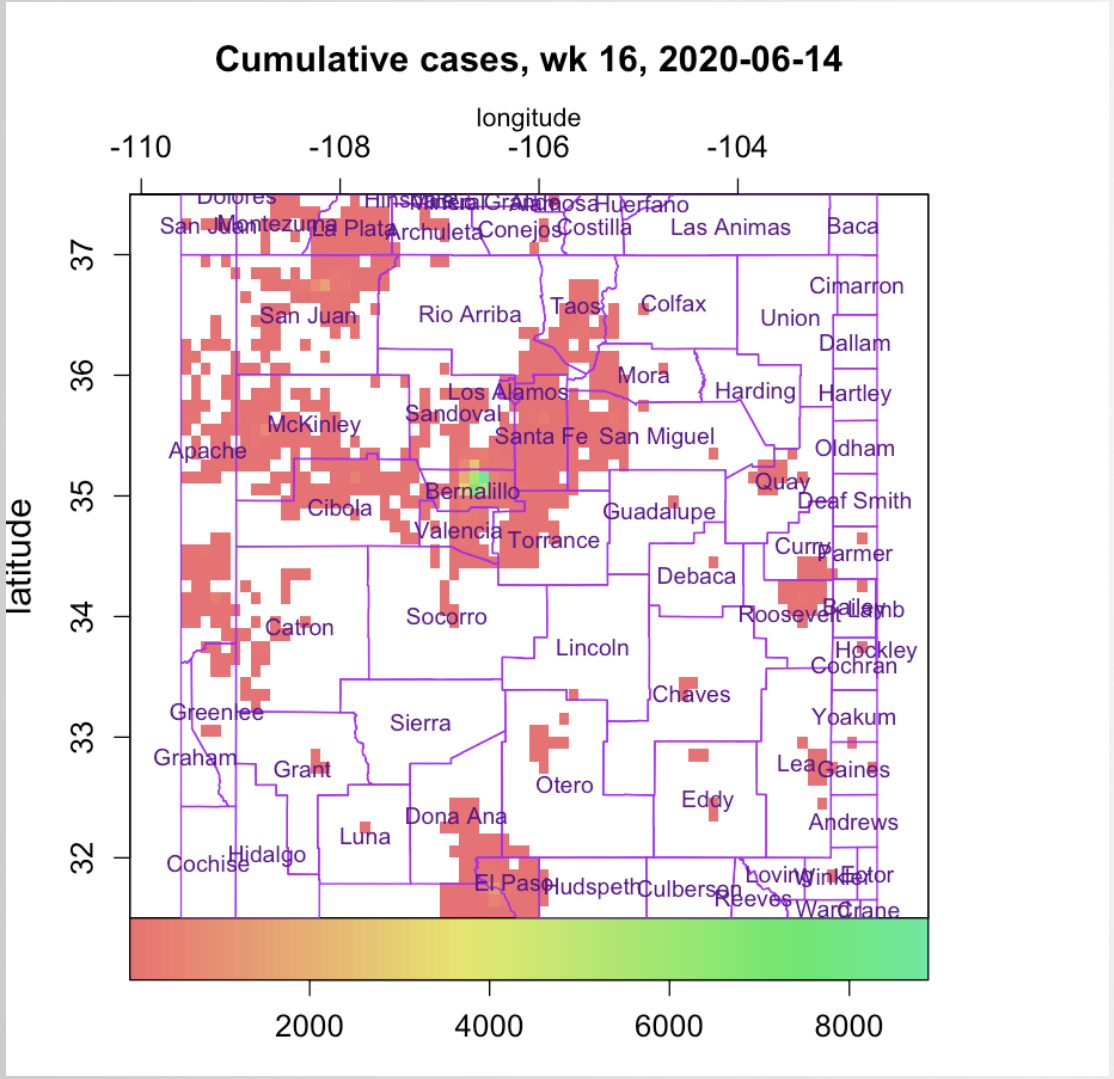
Regional growth

Greatest Concerns:

- Increasing growth in Bernalillo
- Growth rates remain concerning in McKinley, Dona Ana, Cibola, San Juan, and Socorro

County	Daily Growth Rate	Change
San Juan	7%	↓
Rio Arriba	10%	↑
Roosevelt	7%	↓
McKinley	7%	↓
Sandoval	2%	↓
Santa Fe	2%	=
Cibola	8%	↑
Bernalillo	5%	↑
Valencia	3%	↓
Torrance	3%	=
Guadalupe	3%	↓
Socorro	2%	↓
Chaves	1%	=
Grant	2%	=
Dona Ana	5%	↓
Otero	3%	↓
Lea	3%	↓
Eddy	3%	↓
Curry	7%	↑
Union	25%	↑
Luna	12%	↑

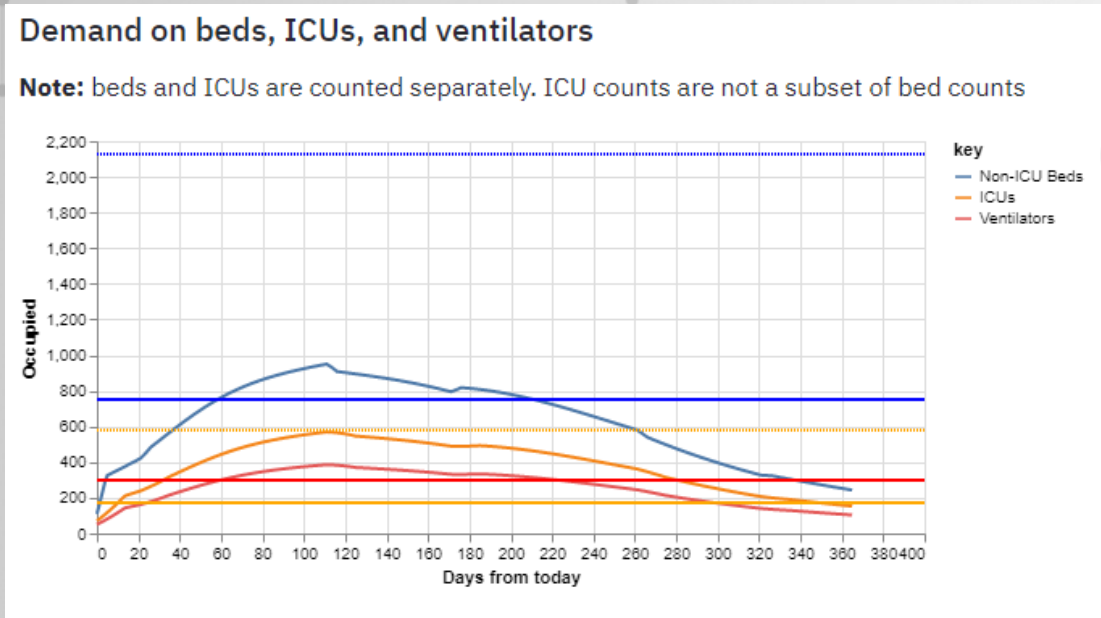
Adjacent State Impact - 20 Day Forecasting



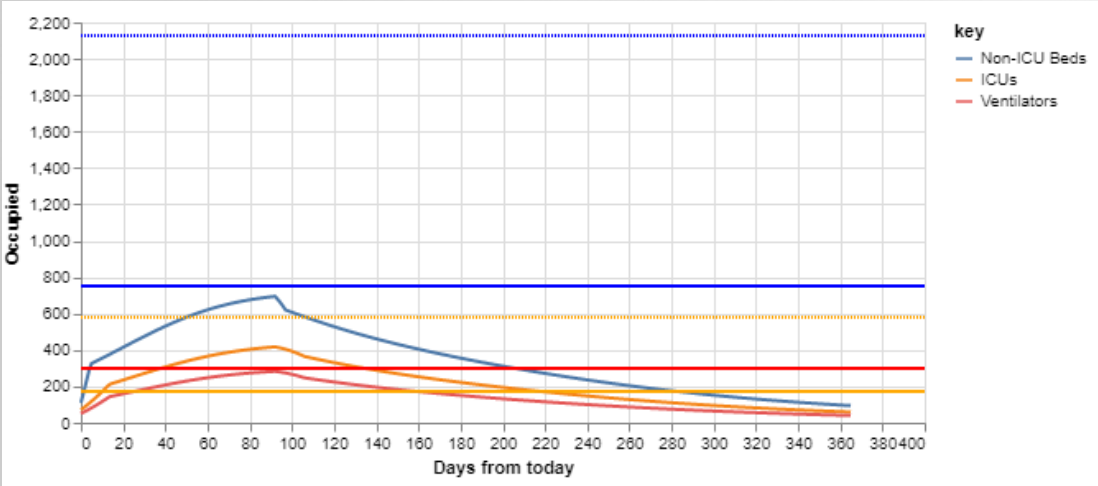
- The SE portion of the state has potential for significant spread of COVID due to current growth rate and risks associated with El Paso
- The NW continues to have significant growth
- The SW is at increased risk for spread from adjacent communities in Arizona

Simulating reductions in social distancing

Scenario 1



Scenario 2



Scenario 1

- Social distancing begins May 15th causing NM to lose 10% of the improvements gained since April 1st in control over COVID
- Relaxation stays for 90 days then we reinstitute current social distancing
- NOTE: the 10% loss is an illustration, actual changes will be measured to understand effect

Scenario 2

- No relaxation in social distancing
- Current R_effective remain constant with no further improvements

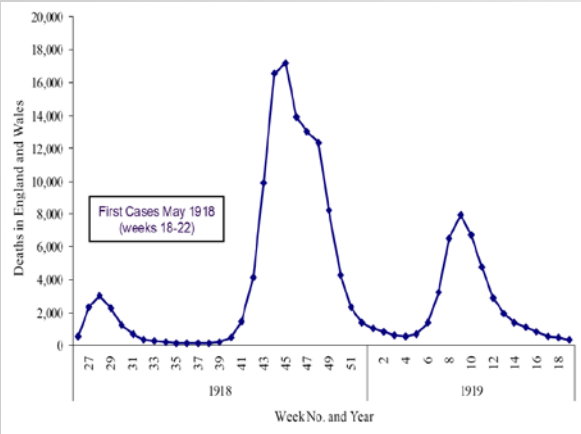
Implications

- Peak in simultaneous patients in ICUs increases by 50% and duration of surge more than doubles
- This estimate is illustrative only. We will observe any actual changes in the effective rate of transmission over the next 21 days to determine impact of the May 1st changes.

Modeling changes in social distancing

- Safely relaxing social distancing will require additional modeling and predictions.
- These triggers have been built into the modeling so we can begin to assess impact of different scenarios.
  - Allow configuration of duration and intensity of distancing relaxation as well as reimplementation of strict distancing.
  - Assumptions around impact of different actions such as resuming elective procedures, opening schools, opening restaurants will need to be tuned and based on this, and other, historic pandemics.
- Winter months may be complicated due to combined volumes of seasonal Influenza and COVID-19

Influenza 1918



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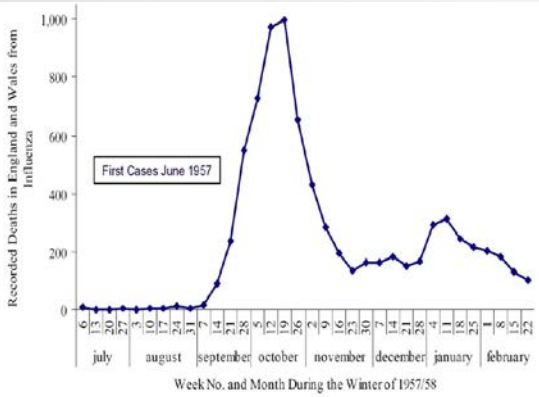

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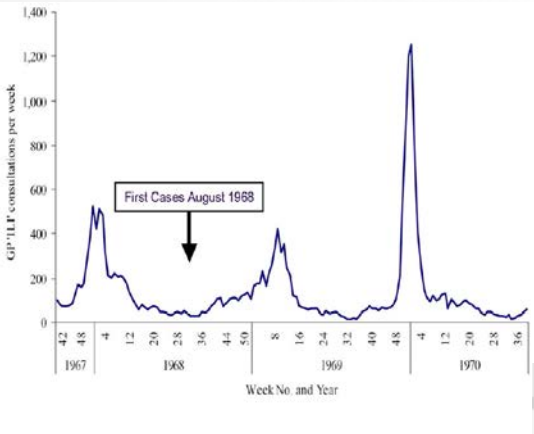
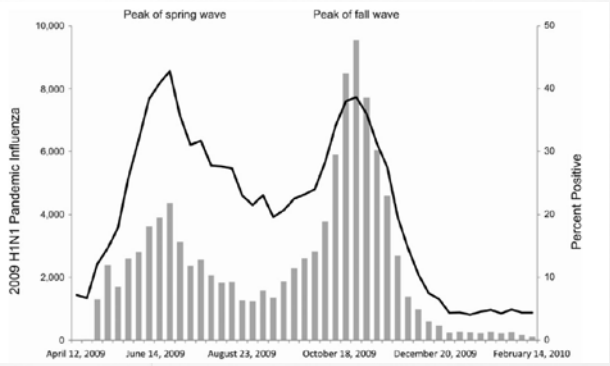
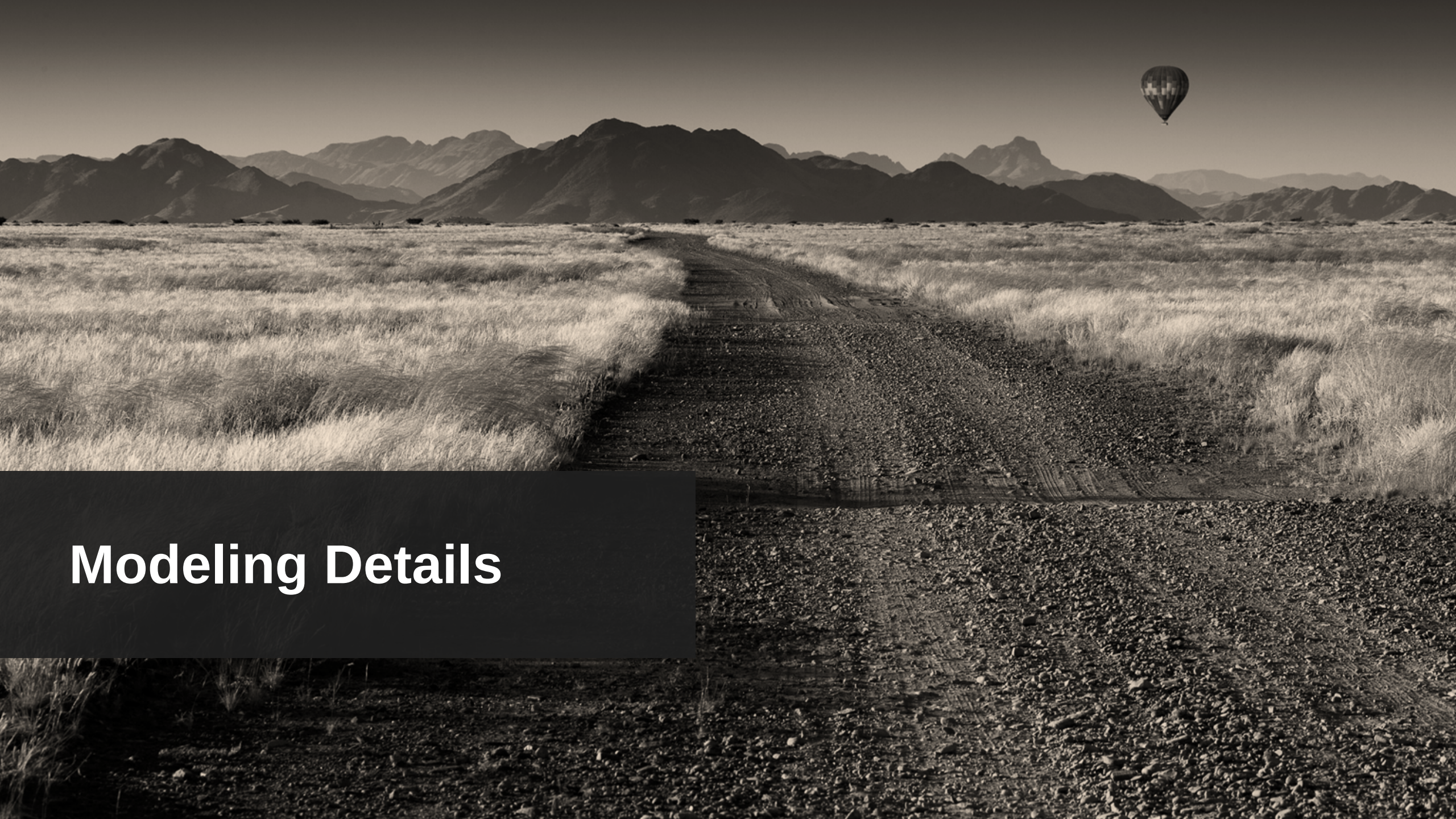


2009 H1N1





Modeling Details

Shifting from initial assumptions to NM specific measured values increases accuracy of modeling

Variable	Initial Assumption	Measured Value	Value as of 4.16.20
R_Effective	2.5, 2.25, 1.5, 1.3 scenarios	Actual Measured Daily Value by key county	R_eff=1.24
Positive Test Multiplier	4	Calculated by LANL	2
Hospitalization and Mortality	Medical 3.75% ICU 1.25% Vent Rate 75% of ICU Mortality 1%	Actual rolling value / estimated number of total infected	Medical 6.3% ICU 1.5% Vent Rate 68.1% of ICU Mortality 2.4%
Length of Stay	Medical 8 days ICU 15 days	Actual rolling value / estimated number of total infected	Medical 5 days ICU 14 days ICU on Vent 14 days

NM Modeling and Forecasting Update

- Enhanced SIR Model powered by Presbyterian in combination with LANL forecasting and Epi Modeling
- Near Real-time daily data feeds
  - State wide testing rates and results
  - Geographic distribution
  - Hospitalizations/Vents/ICU/ and outcomes
  - Capacity and demand by county and facility
  - County level SIR model projections
- Population Risk Adjusted
  - Integrated comprehensive data on social determinants of health (SDOH)
  - Integrated Johns Hopkins ACG Groupers for county level risk adjusted for disease burden
    - Further enhanced with health plan claims data and delivery system clinical data
- Partnered with LANL, Sandia Labs and DOH

The NM Model is the most accurate model for our state

Specific causes of differences between the NM SIR Model and the IHME Model

- IHME's approach of extrapolating from current death rate is likely to have substantial errors in a state like NM with few very deaths.
- All models—New Mexico's and IHME's—are highly sensitive to the assumptions related to social distancing
  - The IMHE model assumes four potential Non Pharmaceutical Interventions (close schools, close non-essential businesses, stay-at-home order, travel severely limited). Once a state implements 3 of the 4 interventions, the IHME model considers that the state has automatic maximized effect of social distancing. There are many more social distancing techniques than these that are highly effective. Extrapolating a fixed R_effective from these variables lacks specificity
  - The NM model calculates the R_effective each day based on actual NM data and updates day to day ensuring projections are accurate
- The NM model allows for modeling around many aspects of social distancing and also provides risk adjustment for age, disease burden, and social determinants of health by county.

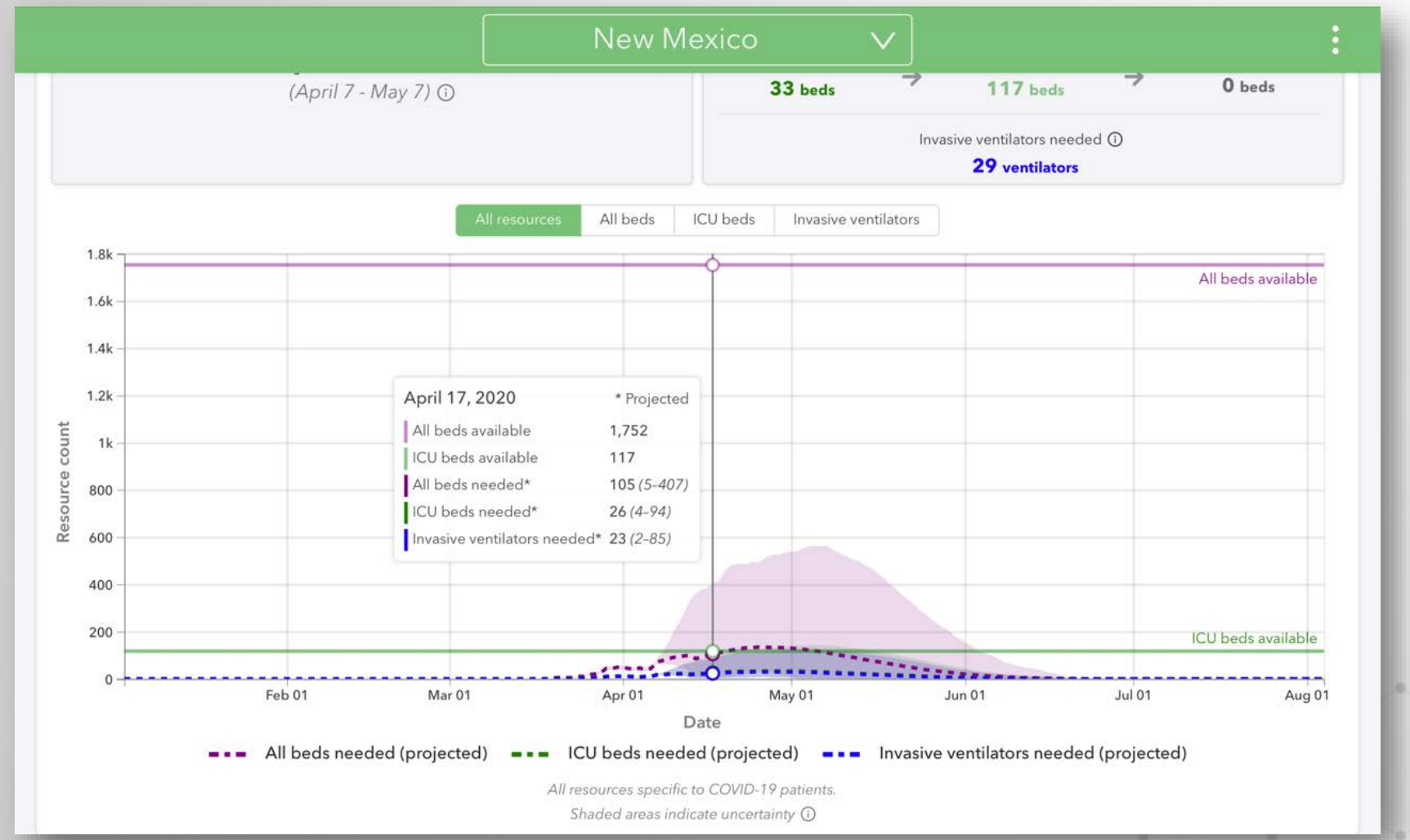
Background to the differences between the two models

- The NM model (and most others that have been published) compartmentalize the population into Susceptible, Infected, and Recovered, and models the movement of individuals between these compartments. We then are able to look at variable length of stay for ICU and medicine beds and enrich model with demographic data as well.
- In contrast, IHME assumes that death rates in a pandemic follow a particular S-shape and tunes the model parameters to match that observed death rate. It was tuned using historic data (including estimates of levels of social distancing) from China, Italy, S. Korea, and the 27 US states that had already exceeded a death rate threshold.
- The IHME approach predicts death rates directly. It then infers the number of hospitalizations, ICUs etc. that would lead to this death rate using a separate utilization model.

Risk for following IHME

- NM (current) low death rate causes problems in IHME's extrapolation
- It lacks specificity for NM and ability to analyze regional areas of NM
- It estimates the R_effective as opposed to using actual data and shows a factor of up to 2000% variation on a single day in NM for resources
- It does not take into account the unique characteristics of the nineteen Pueblos, three Apache Tribes, and Navajo Nation within New Mexico

IHME Model Provides Unusable Range of Predictions



- IHME shows profound ranges on a single day
  - ICU beds of 4 to 94
  - Ventilators 2 to 85
  - All beds 5 to 406
- This demonstrates an intolerable level of prediction.

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