Key context April 28, 2020

• Improvements in NM *plateaued* over this past week with an R\_effective of 1.24 compared to 1.28 last week.
• There are rising concerns across many communities that patients may be *delaying care* for essential and urgent healthcare services.
• The NW sees *continued growth* extending into additional nursing homes and pueblos.
• Data suggest *risk* of more broad spread of COVID is increasing in the southern half of the state as well.
Improvements in the reduction of COVID has plateaued

- Statewide $R_{\text{effective}}$ improvements have now plateaued.
- Additional actions will be necessary to reduce transmission of COVID-19.

Updated calculation in $R_{\text{effective}}$ pushed back to retrospective graphing
Data suggests statewide mobility may be increasing

- NM showed a steep reduction in cellphone mobility as a result of social distancing policy.
- Statewide trend appears to indicate some movement toward increased mobility.
- Rural communities may impact validity of data given need for long distance travel for essential businesses.
Regional growth rates remain above desired state

- **Central region** continues to approach a low level endemic state.

- **NW region** has the highest growth rate; week-over-week improvement is leveling off indicating additional actions are critical.

- **NE region** has very few cases making trending of growth rate less meaningful.

- **SW region** is seeing an acceleration in growth rate requiring mitigation to prevent large scale spread.

- **SE region** has a relatively low level of cases but is seeing increasing growth rate and at additional risk due to proximity of adjacent non-NM counties with increasing spread.
Cases per 100,000 show disproportionate concentration in NW

New Mexico Health Region

Cases per 100,000 Population

Northwest
Northeast
Metro
Southeast
Southwest

Age 0-14
Age 15-44
Age 45-64
Age 65 and Over

6.6
65
48.7
21.2
13.7

754.6
756.7
576.7
787.7
72.4

4.6
45.7
131.3
145.9
72.4

40.8
130.6
145.9
61.4
0

200
300
400
500
600
700
800
900

Northwest
Northeast
Metro
Southeast
Southwest
Hospitalization rate per 100,000

Hospitalizations per 100,000 Population

- Northwest: 62.7
- Northeast: 5.1
- Metro: 12.2
- Southeast: 3.8
- Southwest: 5.6
- New Mexico: 14.3

New Mexico Health Region
Cases will continue to grow over next 6 weeks

- 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

- As a state we have successfully flattened the curve preventing health system from being overwhelmed.

- Changes in social distancing policy or practice will lead to additional peaks due to lack of herd immunity.

- As a state we have, or will hit, our peak between now and end of May assuming no changes in social distancing.
Regional growth

Greatest Concerns:

• Increasing growth rate in Socorro and Dona Ana are significant.

• Growth in Guadalupe is concerning for initiation of significant community spread

• Growth rates remain concerning in McKinley, Dona Ana, San Juan, and Socorro are concerning due to the relatively large number of cases in these areas.

Other:

• Santa Fe had an increase in growth rate but remains at a relatively lower overall growth rate

• Small numbers of cases in Roosevelt, Lea, Eddy, and Quay make growth rate difficult to interpret as single cases cause large delta.
• The SE portion of the state has potential for significant spread of COVID due to current growth rate and risks associated with the adjacent counties in Texas

• The NW continues to have significant growth

• The SW is at increased risk for spread from adjacent communities in Arizona
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
Simulating reductions in social distancing

Scenario 1

- Social distancing significantly relaxed causing NM to revert back to our R_effective as of April 1.
- Relaxation stays for 30 days then we reinstitute current social distancing for 90 days and relax again.
- Example – reopening schools for a month

Scenario 2

- Social distancing minimally relaxed causing a 10% slip in the gains we have made since April 1.
- Relaxation stays for 90 days then we reinstitute current social distancing for 90 days and relax again.
- Example – reopening a very limited segment of the economy state wide today
Central New Mexico
Achieving control of COVID-19 – Central NM

- Santa Fe is in a low level endemic state with an R_effective of 1.05, Los Alamos is in similar state. Further improvements will become difficult until state wide spread is mitigated.

- Bernalillo and is reaching a low level endemic state with an R_effective of 1.13 – caution must be taken to prevent fatigue and relaxation of social distancing given the large population.

- Valencia remains in growth phase and additional actions must be taken

- Torrance continues to have minimal cases and very little growth
Minimal changes in social distancing may create significant risk

• Bernalillo is currently at an $R_{\text{effective}}$ of 1.13.
• A relaxation in social distancing taking us back to our April 1st $R_{\text{effective}}$ of 1.71 would quickly overwhelm NM health systems and lead to significant morbidity and mortality.

**Conclusion:** Bernalillo must continue to maintain effectiveness of social distancing given the large population and ability to quickly grow in cases if distancing is relaxed.
Northwest Region
NW counties have continued spread of COVID-19

- San Juan, McKinley and Cibola remain at significant risk.
- Sandoval has significantly reduced spread and is now at an $R_{effective}$ of 1.14.
- Per-capita cases in NW are 4 times that of NM as a whole.
- New spread to regional nursing homes poses additional risk.
Counts in NW New Mexico continue to exhibit spread that will lead to high volumes in ICUs resulting in a peak of 144 simultaneous ICU patients from McKinley county alone. San Juan at peak is projected have 78 simultaneous ICU patients.

Contrast to Santa Fe county where the current trend without additional improvements leads to 3 simultaneous ICU patients at peak.
Northwest NM will require additional ICU Support

- ICU Capacity in McKinley, San Juan, Sandoval, and Cibola will be exceeded without significant improvements.
- This is supported and consistent with:
  - Presbyterian modeling
  - LANL Forecasting
  - LANL Epi (unmitigated scenario)
- Recommendation:
  - Implement and open alternate care site in Gallup / Farmington
  - Enhance and enforce social distancing and testing and tracing
  - Partner with Tribes and Navajo Nation to assist with testing and resources for self isolation and quarantine.
Northeast Region
NE Counties early in COVID – Concern for Guadalupe

Significant growth rate noted in Guadalupe County requiring mitigation and enhanced social distancing.

Minimal community testing completed so actual disease burden is unknown.

At risk for spread if social distancing measures are not effective. Taos cases have leveled off but overall data is inadequate to model control.
Southeast Region
High Risk to SE Counties of Continued Spread

• SE region of the state requires additional attention as areas remain in a growth phase and do not project adequate control.
  • Lea and Roosevelt now with new growth.

• Small number of cases limit statistical analysis of SE counties
  • Counties with minimal or no community spread will continue to exhibit an interest in a trial of relaxation of social distancing
  • There is significant risk to rapid COVID spread without an increase in testing and tracing and validation of current effectiveness of social distancing.
SE counties at additional risk from proximity

LANL modeling shows significant risk of spread in the SE portion of New Mexico.
- Current new growth rate in counties
- Risks associated with the adjacent counties in Texas
- El Paso shows continued growth with unusual lack of correlation of cellphone movement data indicating unidentified variables are at play.
Southwest Region
SW counties with continued spread

- SW region of the state is in an active phase of COVID growth and spread.
- Dona Ana and Socorro need significant additional attention to reduce spread.
- Dona Ana at additional risk due to projected growth in El Paso and potential for spread between communities.
- Additional testing will be important in reducing spread.
Successful interventions

• Early closing of schools
• All non-essential businesses closed
• Expand testing capabilities in NM
• Early tracing of positive cases with expanded DOH workforce from redeployment
• Enactment of NM Crisis Standards of Care
• Enforcement of social distancing
• Closing of additional non-essential business
Further intervention considerations

• Increase and augment DOH staffing for tracers to enhance early isolation and quarantine
  • Consider augmenting staff with furloughed state and healthcare employees.
  • Consider leveraging health system training capabilities to onboard workforce early.
• Mandatory and enforced quarantine of all household members of COVID positives and PUIs
  • Weekly random observation.
  • Requires essential-needs support for food/water/sanitation.
• Enhanced public awareness campaign
  • Partner with local media and healthcare organizations on a comprehensive and exhaustive campaign to educate community members, dispel myths and reinforce social distancing.
  • Protect against social distancing “fatigue” as nationally and federally there is a drive to re-open at the end of April prior to the NM peak.
• Prevention of spread from adjacent states
  • Consider preparing additional policies to mitigate spread along the Texas border.
Epidemiology Details
New Mexico Health Regions
Prevalence Rate
Number of COVID-19 Cases per 100,000 Population by Health Region, New Mexico

Source: Infectious Disease Epidemiology Bureau, Epidemiology and Response Division 4.27.2020, New Mexico Department of Health. Population estimates, UNM Geospatial and Population Studies Program.
Prevalence Rate
Number of COVID-19 Cases per 100,000 Population by Health Region and Age Group, New Mexico

Projected Doubling Time

Projected Doubling Time Based on Date of Test Specimen Collection and Cumulative Average Rate of Increase.
Source: Infectious Disease Epidemiology Bureau, Epidemiology and Response Division 4.27.2020, New Mexico Department of Health.
Hospitalization Rate
Number of COVID-19 Hospitalizations per 100,000 Population by Health Region, New Mexico

<table>
<thead>
<tr>
<th>New Mexico Health Region</th>
<th>Hospitalizations per 100,000 Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northwest</td>
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</tbody>
</table>

Mortality Rate
Number of COVID-19 Deaths per 100,000 Population by Health Region, New Mexico

Rates have been age-adjusted to the U.S. 2000 standard population.
Case Fatality Rate
Percentage of COVID-19 Cases Resulting in Death by Health Region, New Mexico

Source: Bureau of Vital Records and Health Statistics and Infectious Disease Epidemiology Bureau, Epidemiology and Response Division, reporting through 4.27.2020, New Mexico Department of Health.
Modeling Details
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**
Shifting from initial assumptions to NM specific measured values increases accuracy of modeling

<table>
<thead>
<tr>
<th>Variable</th>
<th>Initial Assumption</th>
<th>Measured Value</th>
<th>Value as of 4.16.20</th>
</tr>
</thead>
<tbody>
<tr>
<td>R_Effective</td>
<td>2.5, 2.25, 1.5, 1.3 scenarios</td>
<td>Actual Measured Daily Value by key county</td>
<td>R_eff=1.24</td>
</tr>
<tr>
<td>Positive Test Multiplier</td>
<td>4</td>
<td>Calculated by LANL</td>
<td>2</td>
</tr>
<tr>
<td>Hospitalization and Mortality</td>
<td>Medical 3.75% ICU 1.25% Vent Rate 75% of ICU Mortality 1%</td>
<td>Actual rolling value / estimated number of total infected</td>
<td>Medical 6.5% ICU 1.6% Vent Rate 64.2% of ICU Mortality 2.5%</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>Medical 8 days ICU 15 days</td>
<td>Actual rolling value / estimated number of total infected</td>
<td>Medical 5 days ICU 14 days ICU on Vent 14 days</td>
</tr>
</tbody>
</table>
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 $R_{\text{effective}}$ from these variables lacks specificity
  - The NM model calculates the $R_{\text{effective}}$ 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 $R_{\text{effective}}$ 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.
Interpreting County-Specific LANL Projections

- Modeling for each county has been completed by LANL
- The series of graphs show the actual growth and a projection if no further actions or changes are made.
  - Black dots are actual result
  - Red line is simulation of expected growth based on current trend
- The following set of charts help each county understand if their current efforts are adequate.
  - Example to right shows San Juan needs additional action to prevent continued spread
  - Santa Fe model shows full control
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