Modeling & Forecasting COVID-19 in NM

December 20, 2021

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Our model suggests that the number of daily cases is expected to range between 210 and 2,510 in the next few weeks.
So what?

Our model suggests that the number of daily deaths is expected to range between 3 and 14 in the next few weeks.
Cumulative Cases & Daily Growth Rate for NM: Dec 20

Harding and Union counties have an elevated cumulative growth rate.

*Growth rate is in cumulative cases
Weekly Growth Rate for NM: Another View (Dec 20)

So what?
- Most people in New Mexico are living in a county that has higher per-capita case counts and decelerating growth rates.

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
The CDC ForecastHub shows an 8% decrease in incident weekly cases by Jan 1, 2021 from current counts observed at 9209 (Dec18). 

[Diagram showing a decrease in cases from July 2021 to January 2022, with a prediction for February 2022.]

COVIDhub-4_week_ensemble prediction, COVID 19 ForecastHub
https://viz.covid19forecasthub.org/
> Additional Regional Forecasts
Central & North Regions Daily Cases Forecast

So what?
The central region is expected to see the most number of cases followed by the northeast and northwest regions.
South Regions Daily Cases Forecast

Southwest

Southeast

So what?
The southwest region is expected to see the most number of cases followed by the southeast region.
> 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

<table>
<thead>
<tr>
<th>Week</th>
<th>Qu. 5% (best case)</th>
<th>Qu. 50% (median)</th>
<th>Qu. 95% (worst case)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/26/21</td>
<td>94</td>
<td>162</td>
<td>331</td>
</tr>
<tr>
<td>1/2/22</td>
<td>33</td>
<td>142</td>
<td>435</td>
</tr>
<tr>
<td>1/9/22</td>
<td>23</td>
<td>135</td>
<td>454</td>
</tr>
<tr>
<td>1/16/22</td>
<td>19</td>
<td>137</td>
<td>459</td>
</tr>
<tr>
<td>1/23/22</td>
<td>18</td>
<td>137</td>
<td>470</td>
</tr>
<tr>
<td>1/30/22</td>
<td>19</td>
<td>139</td>
<td>514</td>
</tr>
</tbody>
</table>

“So what?”

Model is predicting a decrease in COVID-19 ICU beds needed over the next 3 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

<table>
<thead>
<tr>
<th>Week</th>
<th>Qu. 5% (best case)</th>
<th>Qu. 50% (median)</th>
<th>Qu. 95% (worst case)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12/26/21</td>
<td>129</td>
<td>300</td>
<td>742</td>
</tr>
<tr>
<td>1/2/22</td>
<td>56</td>
<td>274</td>
<td>882</td>
</tr>
<tr>
<td>1/9/22</td>
<td>48</td>
<td>260</td>
<td>919</td>
</tr>
<tr>
<td>1/16/22</td>
<td>33</td>
<td>274</td>
<td>904</td>
</tr>
<tr>
<td>1/23/22</td>
<td>37</td>
<td>273</td>
<td>953</td>
</tr>
<tr>
<td>1/30/22</td>
<td>34</td>
<td>275</td>
<td>1002</td>
</tr>
</tbody>
</table>

“Scaled” Scenario

So what?

Med-surge general bed needs are predicted to decrease slightly, then increase during the next 3 weeks
21 Dec 2021: Epigrid modeling

- New Mexico has declining incidence recently.
- Deterioration of immunity/waning immunity in the context of unvaccinated. Omicron variant may add further difficulty in weeks.
- Booster vaccination appear to have driven the recent rollover.
- *Indoor* masking remains critical to moderating all consequence. This is independent of genetic variation.
- New pharmaceuticals are not sensitive to changes in S protein; contrast with Regeneron, vaccines, waning immunity.
- Drug administration is time-sensitive: Rapid contact-tracing is beneficial.
A look at the raw incidence data

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

Reported cases rates are slowly declining; within-weekly variation remains consistent with past performance.

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.
20 December 2021 Vaccine Analysis

- 1586k first doses are used in modeling.
- ~1585k first doses have been administered in NM.
- ~1345k completed vaccine series in NM.
- ~518k boosters completed in NM.
- ~75.6% of all persons in New Mexico are at least minimally vaccinated.
- ~94.5% of all persons in New Mexico are currently eligible (~1981k).
- 75.6/94.5 ~80.0% of all eligible people are vaccinated.
- 5-11 year-olds have received ~46k first doses.

- Rapid adoption of booster doses in NM is likely leading to a moderation of new case data.

Black – vaccination for all New Mexicans

Red – First dose data used in EpiGrid

US Census Bureau reports 2097k people in New Mexico.
Variant Monitoring: Omicron has arrived nationally. NM slightly delayed arrival?

- B.1.617.2, “Δ”, ”Delta”, is the “Indian” variant.
- New variants have appeared without evident intermediates.
- Latest no-intermediate variant is B.1.1.529 (Omicron)
- Omicron has arrived nationally.
- Immune evasion by Omicron’s S protein. Tens of percent.
- NM Data will soon show replacement with Omicron/B.1.1.529
- Three weeks is an outside estimate for a delay in New Mexico.

https://www.cdc.gov/covid-data-tracker/#variant-proportions
Recent By-State Trends: Most Populous 10 States


Date-of-40%-vaccinated:
Red = May 2020, or earlier
Green = after May 2020
Improvement in one populous state.

<table>
<thead>
<tr>
<th>State</th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>67.48</td>
<td>0.304</td>
</tr>
<tr>
<td>Michigan</td>
<td>66.42</td>
<td>1.179</td>
</tr>
<tr>
<td>Ohio</td>
<td>76.9</td>
<td>0.801</td>
</tr>
<tr>
<td>Florida</td>
<td>22.74</td>
<td>0.126</td>
</tr>
<tr>
<td>New Mexico</td>
<td>47.59</td>
<td>0.713</td>
</tr>
<tr>
<td>Illinois</td>
<td>67.56</td>
<td>0.409</td>
</tr>
<tr>
<td>Texas</td>
<td>17.53</td>
<td>0.229</td>
</tr>
<tr>
<td>California</td>
<td>17.27</td>
<td>0.161</td>
</tr>
<tr>
<td>North Carolina</td>
<td>30.47</td>
<td>0.194</td>
</tr>
<tr>
<td>Georgia</td>
<td>16.47</td>
<td>0.214</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>59.89</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Daily rates per 100,000 residents averaged December 7th thru December 20th 2021.
Recent case load relative to the fraction of the entire population vaccinated.

- Correlation between vaccination and cases still holds in the large majority of counties
- Lea, Torrance, Otero have anomalously low case reports
- Quay is anomalously high.
- Roosevelt was anomalously low two weeks ago. Reporting?
- Chavez, Lincoln, Curry, Eddy have changed in two weeks.
- All counties have high absolute transmission, above 10 per 10^5 per day over the last two weeks.
- Endemicity will require broader population-wide immunity, hopefully acquired without infection, and
- Endemicity is likely to require broader antigenic coverage by the population.
- Analysis with boosters in the future.