Modeling & Forecasting COVID-19 in NM

January 3, 2022

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4 Jan 2022: Epigrid modeling.

- New Mexico incidence continued to decline in December. This is explained by improved vaccination (boosters, initial series).
- Challenges: (i) Omicron variant rising now (immune evasion) (ii) Significant transmission over holidays likely (iii) Relaxed infection control is possible.
- **Indoor masking remains critical** to moderating all consequence. This is independent of genetic variation.
- New pharmaceuticals are not sensitive to changes in S protein; but Regeneron is.
- 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 were declining, now a recent rise. (i) Holiday transmission? (ii) Fraction of Omicron cases is rising in New Mexico. 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.
3 January 2021 Vaccine Analysis

• 1611k first doses are used in modeling.
• ~1611k first doses have been administered in NM.
• ~1362k completed vaccine series in NM.
• ~584k boosters completed in NM.
• ~76.8% of all persons in New Mexico are at least minimally vaccinated.
• ~94.5% of all persons in New Mexico are currently eligible (~1981k).
  76.8/94.5 ~81.3% of all eligible people are vaccinated.
• 5-11 year-olds have received ~54k first doses (28.5%).
• Rapid adoption of booster doses in NM has lowered daily incidence in December.
• ~500k unvaccinated New Mexicans are susceptible to infection. Even if half have been infected, likely >300k susceptible to infection.
• At 50% waning immunity against Delta for initial vaccination series, there would have been ~500k people susceptible to infection. Boosting has mitigated this.
• Omicron will be a stringent test of existing immunity for un-boosted individuals.

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

- Latest no-intermediate variant is B.1.1.529 (Omicron). Extremely rapid rise; faster than Δ. Immune evasion plays a major role.
- New variants have appeared without evident intermediates.
- NM Data showing replacement in-progress by Omicron/B.1.1.529
- If Omicron’s rise is in New Mexico is slower than the national experience, this would indicate better infection control in New Mexico than nationally.

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
Only NM improved. Boosting likely important. Better infection control possible.

Daily rates per 100,000 residents averaged December 21th 2021 thru January 3th 2022.

<table>
<thead>
<tr>
<th>States</th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>334.77</td>
<td>0.476</td>
</tr>
<tr>
<td>Michigan</td>
<td>91.46</td>
<td>0.964</td>
</tr>
<tr>
<td>Ohio</td>
<td>128.17</td>
<td>0.887</td>
</tr>
<tr>
<td>Florida</td>
<td>196.72</td>
<td>0.102</td>
</tr>
<tr>
<td>New Mexico</td>
<td>50.18</td>
<td>0.747</td>
</tr>
<tr>
<td>Illinois</td>
<td>145.77</td>
<td>0.513</td>
</tr>
<tr>
<td>Texas</td>
<td>52.35</td>
<td>0.205</td>
</tr>
<tr>
<td>California</td>
<td>80.51</td>
<td>0.14</td>
</tr>
<tr>
<td>North Carolina</td>
<td>103.77</td>
<td>0.258</td>
</tr>
<tr>
<td>Georgia</td>
<td>132.43</td>
<td>0.293</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>124.94</td>
<td>0.741</td>
</tr>
</tbody>
</table>
Cumulative Cases & Daily Growth Rate for NM: Jan 3

Curry, Grant, Hidalgo, Santa Fe, and Union counties have an elevated cumulative growth rate.

*Growth rate is in cumulative cases
So what?

- Most people in New Mexico are living in a county that has higher per-capita case counts and accelerating growth rates.
State Forecasts: Interpret with caution as new and delayed data comes in this week; we expect a higher increase than predicted based on outbreaks other states.
The CDC ForecastHub shows a slight decrease from incident weekly cases observed at 5859 (Dec 25) and then rise by Jan 22, 2021.
Our model suggests that the number of daily cases is expected to range between 160 and 2,485 in the next few weeks.
So what?

Our model suggests that the number of daily deaths is expected to range between 3 and 92 in the next few weeks.
Regional Forecasts: Interpret with caution as new and delayed data comes in this week
Central & North Regions Daily Cases Forecast

Northwest

Northeast

Central

So what?
The central region is expected to see an increase in cases with Northwest and Northeast projected to be steady.
South Regions Daily Cases Forecast

Southwest

Southeast

So what?
The southwest and southeast regions are expected to increase over the next few weeks.
Hospitalization Forecast: The 2-6 week ahead forecast will be impacted by new and delayed data coming in this week.
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>

“Scaled” Scenario

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>
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<tr>
<td>1/9/22</td>
<td>48</td>
<td>260</td>
<td>919</td>
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<tr>
<td>1/16/22</td>
<td>33</td>
<td>274</td>
<td>904</td>
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<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