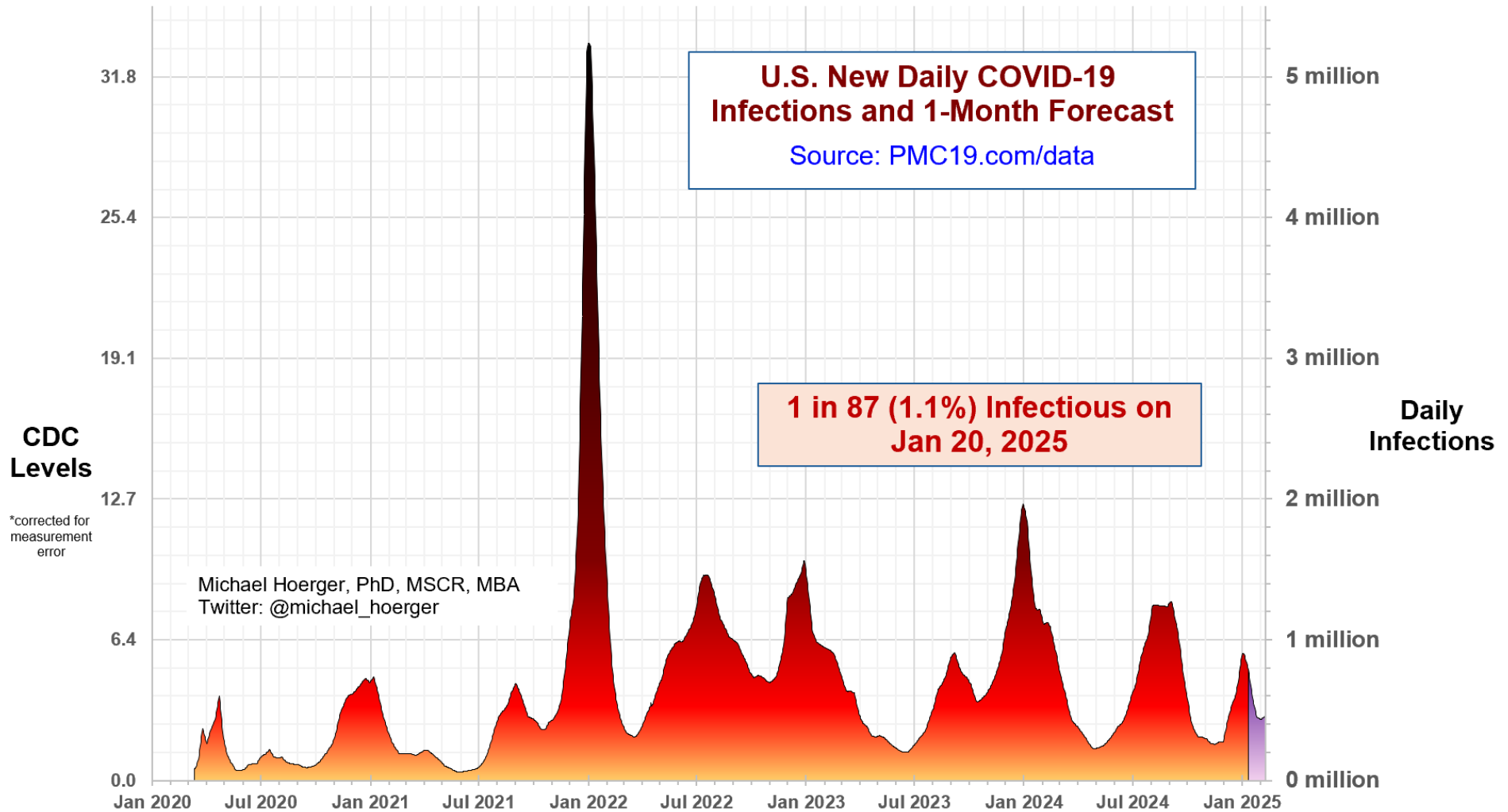


PMC U.S. COVID-19 Case Estimation and Forecasting Model: Report for January 20, 2025, pmc19.com/data

Michael Hoerger, PhD, MSCR, MBA, Pandemic Mitigation Collaborative (PMC)



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Announcements

PMC Dashboard Survey (closes Wednesday, Jan 22): Thank you to those who have completed the survey about how you use the PMC Dashboard. The survey results will be used in papers and grant applications to make the case that many remain committed to reducing their lifetime number of COVID infections. We will start holding town halls to discuss the results in March.

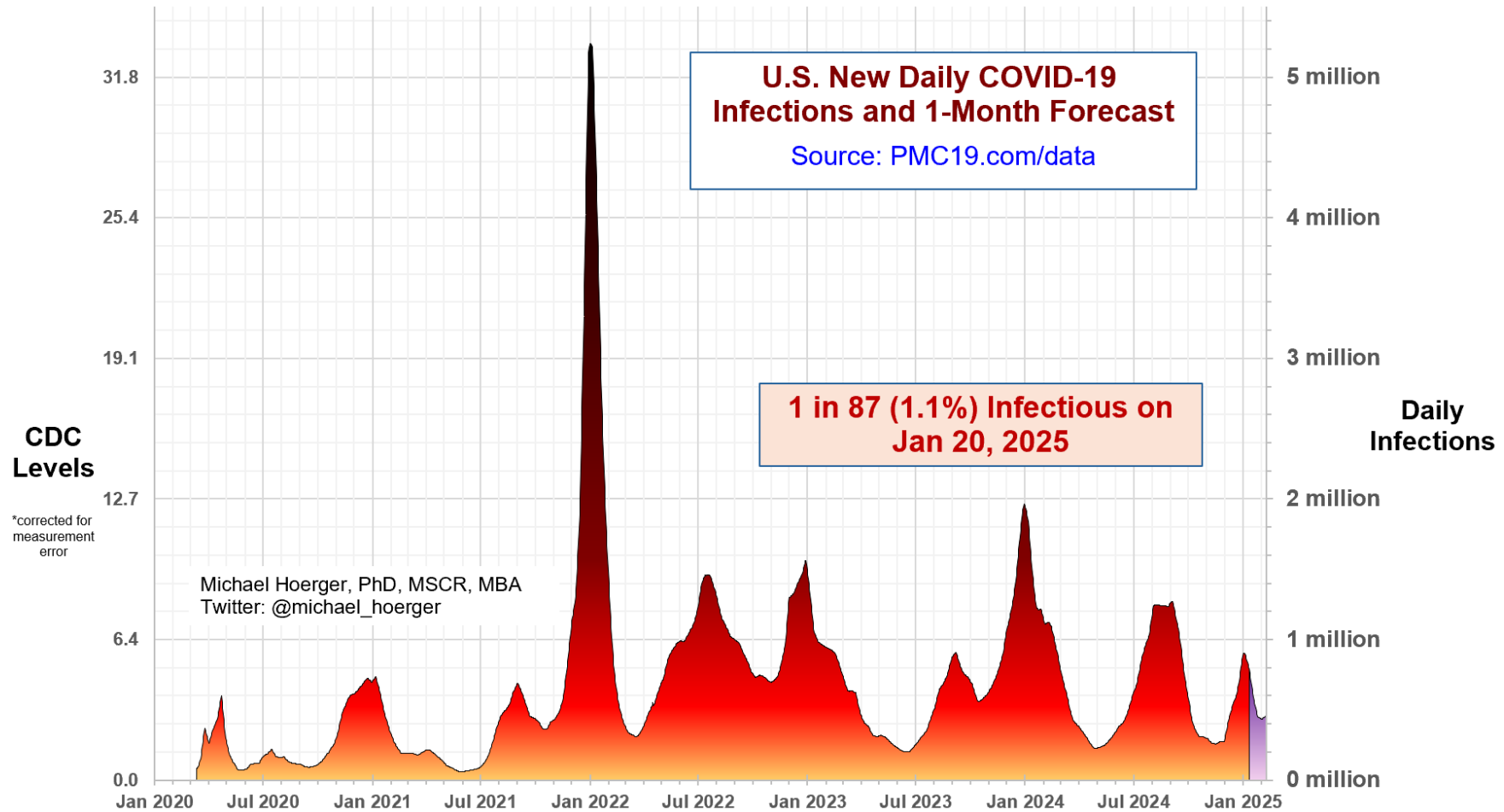
Survey Link: https://tulane.co1.qualtrics.com/jfe/form/SV_0okopCSxA26Mgxo

Recent News Coverage:

- CNN: <https://www.cnn.com/2024/12/31/health/covid-holiday-surge-us/index.html>
- The Atlantic: <https://www.theatlantic.com/health/archive/2024/12/covid-christmas-winter-wave/681133/>
- TODAY: <https://www.today.com/health/coronavirus/us-silent-covid-surge-holidays-2024-rcna184828>
- USA Today: <https://www.usatoday.com/story/news/health/2024/12/24/covid-winter-2024-cdc-data/77199841007/>

The Big-Picture View of the Pandemic

If lucky, we have passed the peak of the 10th wave. It is common for 50-60% of transmission to occur on the back end of the wave, so there remains a need for caution over the weeks ahead. Unfortunately, data quality is at an all-time low (next page), so take these estimates with a grain of salt. The most recent CDC data through Jan 11 suggest 1 in 59 were actively infectious, and carrying forward, we estimate 1 in 87 today, with a wave peak of 0.9-1.0 million daily infections.

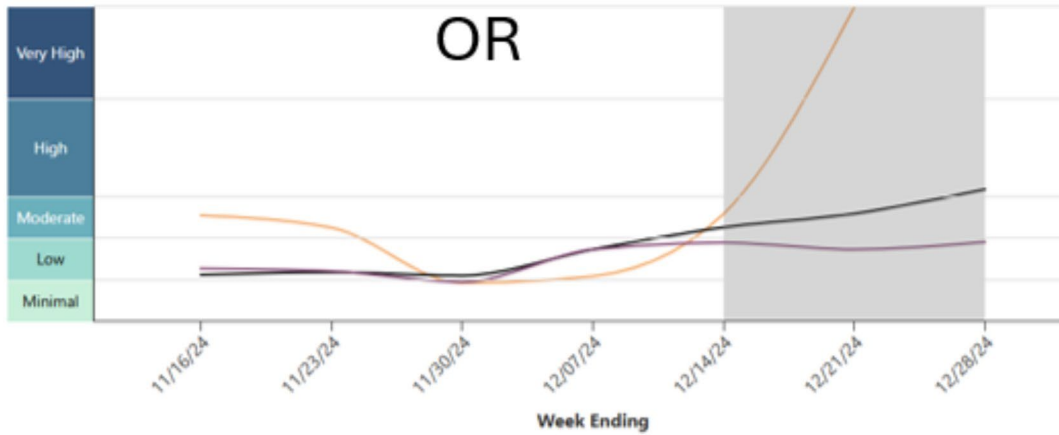


This report is qualified by several data quality issues.

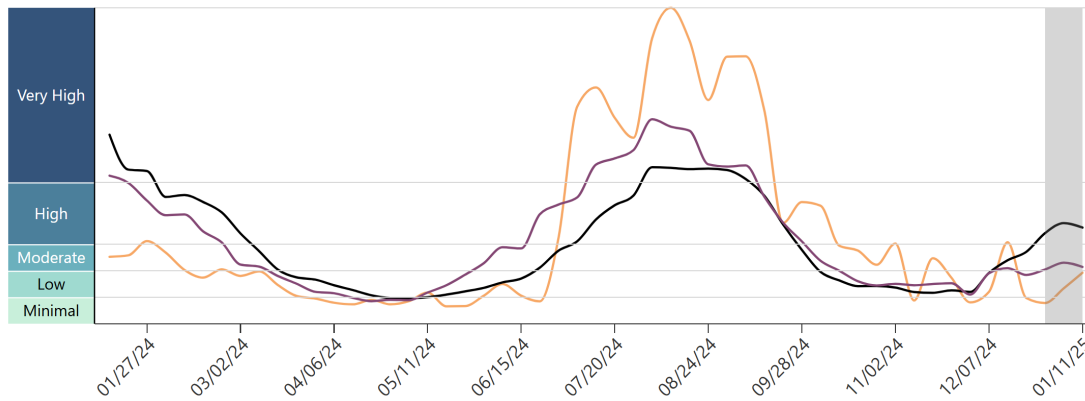
- 1) Biobot (20% model weight) has not reported since Dec 30, which referenced data through Dec 25. The Biobot data provide an important check against the CDC data. Interestingly, Biobot has had their largest gaps in reporting when the summer wave began to pick up, when the winter wave began to pick up, and when the winter wave began to decline. A hypothesis could be that they are saving their most pivotal updates for their paid subscription reports (we do not access those so cannot verify). As a qualitative observation, if transmission is during a plausible wave escalation period, one might take it as a potential early warning sign if Biobot takes 1-3 weeks off from reporting.
- 2) The CDC data have had peculiar retroactive reductions in transmission estimates. You will notice that the wave peaked closer to the bottom of our 50% confidence interval. Several data points were corrected substantially downward in the CDC data. This goes beyond typical corrections. Take Oregon (see next page). The CDC had Oregon in an off-the-charts surge, then a week of missing data, and then everything was downgraded retroactively to a complete winter lull. We never presume anything nefarious in the underlying CDC data, but there are weird downward corrections that warrant comment. These are uncontrollable factors.
- 3) In our own forecasting model, we have struggled with how to best integrate historical data during these “weird” waves of the late summer and current winter. In prior iterations of the model, we have used different versions of historical levels as one model input (medians over various time periods). That approach is helpful from a decompartmentalized perspective, in that when a wave “underperforms” it assumes transmission will catch up to historical levels. This helped predict the “winter haunch” in January 2025, or the extra bumps on the back-side of the wave. However, it can also push some unhelpful aberrations, including what looked like a potential uptick in transmission last May, a prolonged period of high transmission on the back end of the summer wave, and what would be prolonged high transmission currently. In the Appendix, we note switching to a relative rather than absolute model, which simply uses historical levels on the change in transmission, rather than historical levels themselves. This will likely perform better overall, but it may underestimate post-peak haunch transmission. If we see ongoing good data reporting in the next administration, we will invest more time in these issues, but that may be a moot point soon.

Example data aberration, Oregon.

Real-time, yellow line, past 6 weeks (1 in 27 actively infectious on Dec 21):



Corrected, yellow line, past year (1 in 217 infectious for Dec 21):



What If Wastewater Data Disappear?

We would take a 3-week break and then return. At this point, we have compelling evidence of the average level of transmission. A model can be readily formulated that assumes each day has an average level of transmission and then augments it based on key predictors, such as the day of the year, or ongoing available statistics (e.g., ED visits). Biobot continues to report (sporadically). WastewaterSCAN reports consistently, and their data are standardized inadequately for year-over-year comparisons but would suffice for such a model. Our qualitative observation is that such models tend to be too stable, underestimating wave peaks and overestimating transmission during lulls, but these issues tend to cancel out when considering the bigger picture of 2-month levels of transmission. The inside word we have received is that CDC cuts will be about half of what was initially anticipated, but these are ongoing political issues.

Overall, How is the Model Performing?

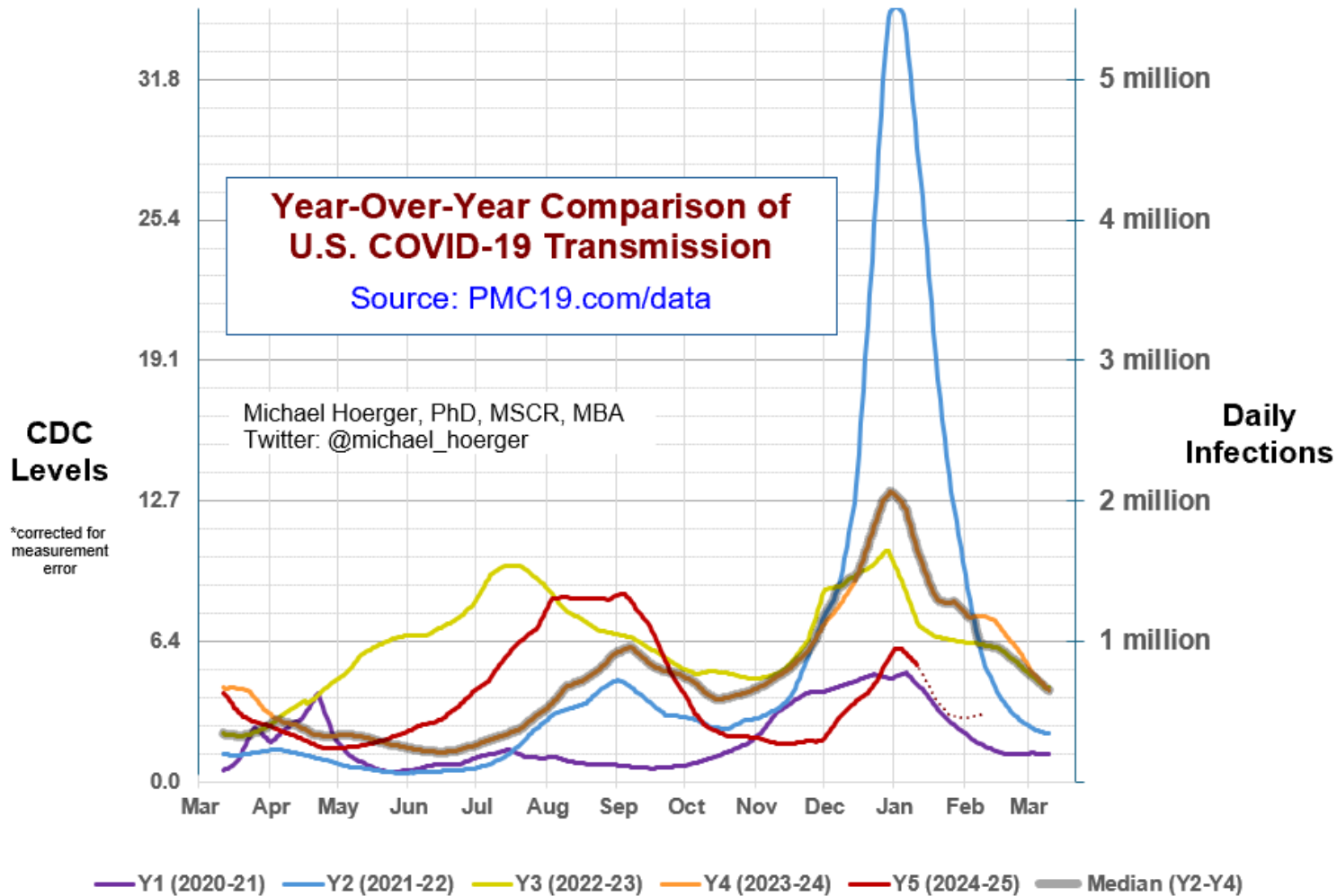
The model has two components: case estimation and forecasting. Case estimation is very easy. Case estimation refers to taking current or historical wastewater levels and converting it into estimated daily infections. Forecasting is very challenging especially with the current data quality issues and refers to predicting changes in the pattern of transmission. We recently posted a pre-print on the case estimation model, basically showing that our independent estimates of transmission levels in the U.S. mapped on near-perfectly to those estimated in the U.K during their UKHSA winter study, a testing-based surveillance program, among the most rigorous studies of transmission of the pandemic. We would have expected very similar estimates, but in fact they were near-exact (see Figure 1B). Estimates compared to Canada were very close, when considering a broader 2-month interval (see Table 4). Overall, if you see models that are providing current or historical estimates that are 30-50% below ours (pseudonym account) or a small fraction of our estimates (CDC, BNO), that is really worth questioning because it means they are suggesting transmission in the U.S. occurs at levels unfathomably lower than those in the U.K. during arguably the most rigorous national study of transmission. We do not see any reason to believe Americans would have 1/8th the transmission of Europeans and found the analyses in our report quite reassuring.

Case estimation is the backbone of any model. If a model underestimates current/historic cases by 50%, then basically any forecast of a big or small change will still just be a massive underestimate.

Pre-print: <https://www.researchsquare.com/article/rs-5786667/v1>

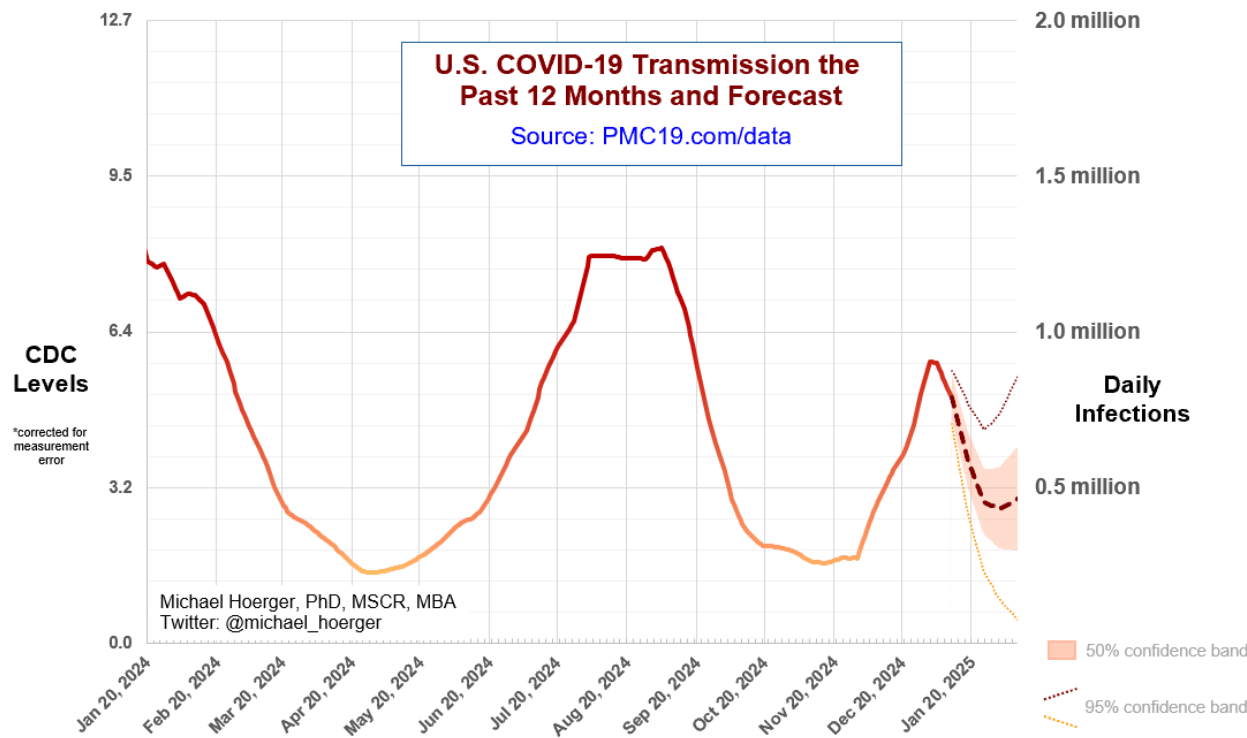
Year-Over-Year Comparisons

The year-over-year graph shows how the current winter wave departs from the pattern of prior years. See the late onset, yet the presumed peak occurring very near the “usual” time point.



Close-up on the Current Forecast

This graph shows the best- and worst- case anticipated scenarios. Several key points stand out. One, peak transmission for the 10th wave is currently estimated at 0.9-1.0 million daily infections. This may shift upward/downward when we get 3-4 weeks of delayed Biobot data and any further CDC retroactive corrections. Two, note the lull is higher than one might anticipate. This is basically accounting for uncertainty that transmission could fall more slowly with a post-peak haunch. The lull will likely go considerably lower. Three, the updated model assumes the peak has happened. The Midwest appears to have peaked, and it is unclear whether other regions could escalate faster than it declines. Caveats are that back-to-school is ongoing, California has wildfires that may increase unanticipated mixing (but are also increasing mask wearing and air cleaning), and some of the South may experience its largest snowstorm in 30 years on Tuesday (30% chance).



Supplemental Statistics

These supplemental statistics may prove useful in conversations about transmission and mitigation. If these statistics hold, note the rapid decline in transmission. These are not “safe” circumstances but much better than 2 weeks ago. That is much less risk for people to deal with in medical appointments. However, the back of the wave remains risky. Even with aggressive predictions on decline, this would amount to 14 million infections the next month. In a class of 35 people, there is still a 1-in-3 chance of exposure if average risk and no firm testing/isolation policies.

Current Levels for Jan 20, 2025
% of the Population Infectious 1.1% (1 in 87)
New Daily Infections 547,000
New Weekly Infections 3,829,000
Resulting Weekly Long COVID Cases 191,000 to 766,000

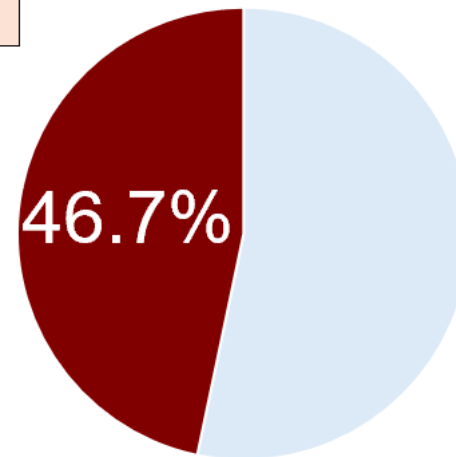
Monthly Forecast
Average % of the Population Infectious 1.0% (1 in 102)
Average New Daily Infections 466,700
New Infections During the Next Month 14,001,000
Resulting Monthly Long COVID Cases 700,000 to 2,800,000

Running Totals
Infections Nationwide in 2025 15,281,000
Average Number of Infections Per Person All-Time, U.S. 3.59

How Does Risk Increase with More Social Contacts?			
Number of People	Chances Anyone Is Infectious	Number of People	Chances Anyone Is Infectious
1	1.1%	15	15.9%
2	2.3%	20	20.6%
3	3.4%	25	25.0%
4	4.5%	30	29.2%
5	5.6%	35	33.2%
6	6.7%	40	36.9%
7	7.7%	50	43.8%
8	8.8%	75	57.8%
9	9.8%	100	68.4%
10	10.9%	300	96.8%

Assumes no testing/isolation protocols (U.S. only)
pmc19.com/data

Michael Hoerger, PhD, MSCR, MBA
Twitter: @michael_hoerger



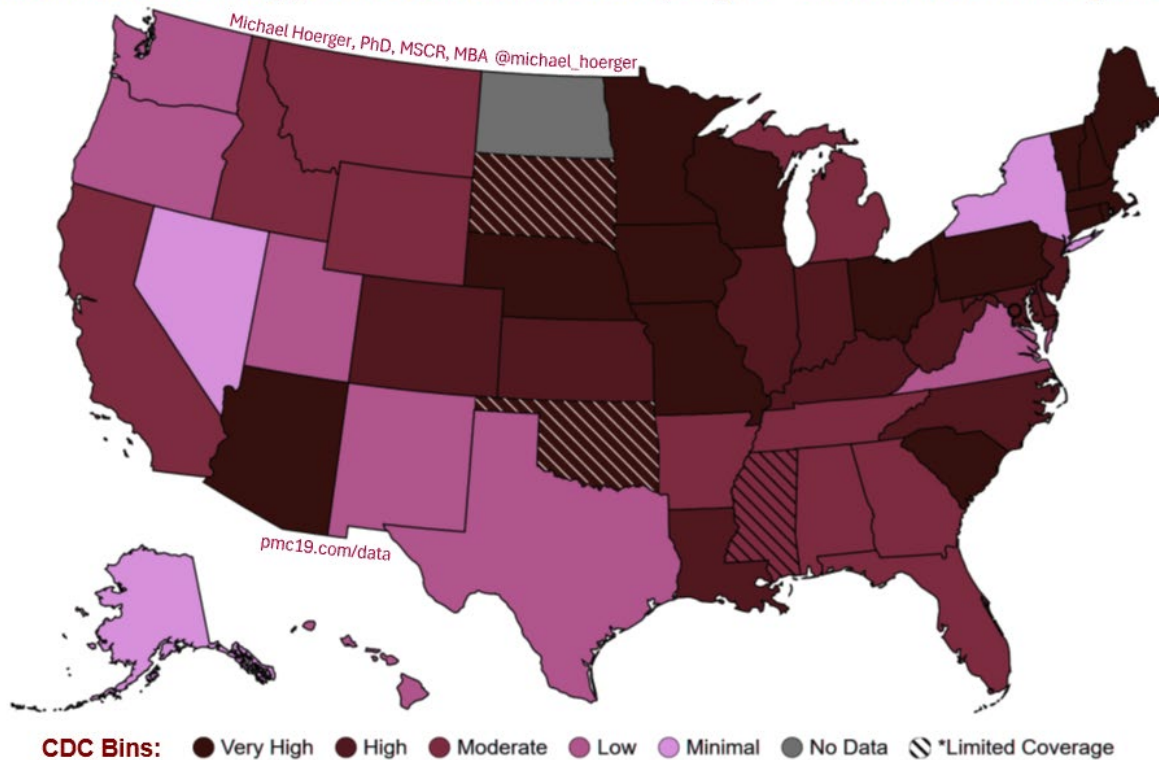
There is more COVID-19 transmission today than during 46.7% of the pandemic.

CDC COVID-19 Heat Map

This map uses the CDC state-by-state data to show areas with higher transmission in deeper red. Notice the considerable geographic variation. The CDC version of the map, colored in cool blue is available online. Blue tends to confuse people into thinking transmission is “cool” or low, so we and various popular media outlets (e.g., Newsweek) tend to recolor. The dashed lines indicate atypically low representation from the wastewater sites within a state.

<https://www.cdc.gov/nwss/rv/COVID19-currentlevels.html>

COVID-19 Heat Map, CDC Data & Risk Levels, Higher Transmission in Deeper Red



Regional Case Estimation

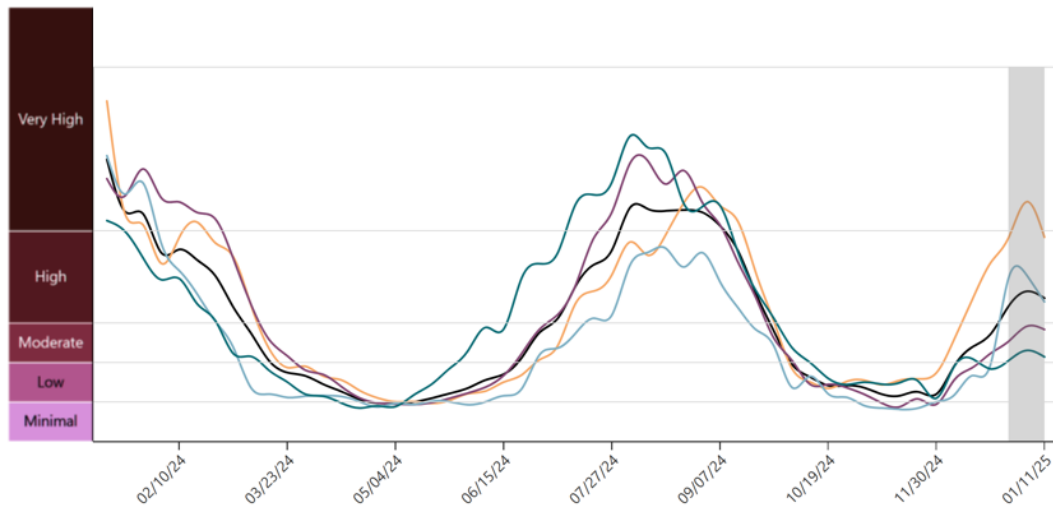
This graph from the CDC shows regional variation in transmission. You can use the “PMC Regional Multiplier” to get a ballpark estimate the proportion of a given region actively infectious with COVID-19 (see Technical Appendix document on the dashboard page).

The CDC regional data are available online:

<https://www.cdc.gov/nwss/rv/COVID19-nationaltrend.html>

State-level data are also available: <https://www.cdc.gov/nwss/rv/COVID19-statetrend.html>

CDC Regional Levels with PMC Estimates of the Percentage Actively Infectious



Estimated Percentage Actively Infectious*		
	PMC Model	Raw CDC Data
National	1.1% (1 in 87)	1.7% (1 in 59)
Northeast	1.1% (1 in 90)	1.7% (1 in 60)
Midwest	1.6% (1 in 61)	2.4% (1 in 41)
South	0.9% (1 in 112)	1.3% (1 in 75)
West	0.7% (1 in 148)	1.0% (1 in 100)

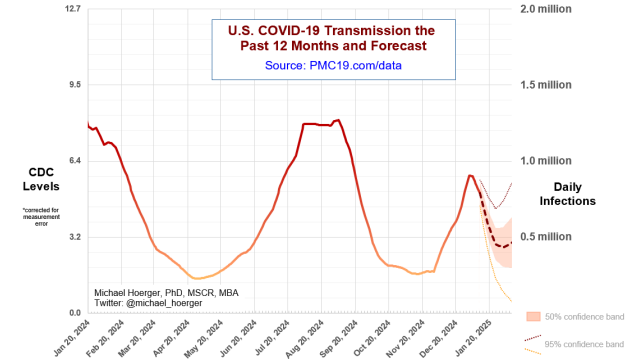
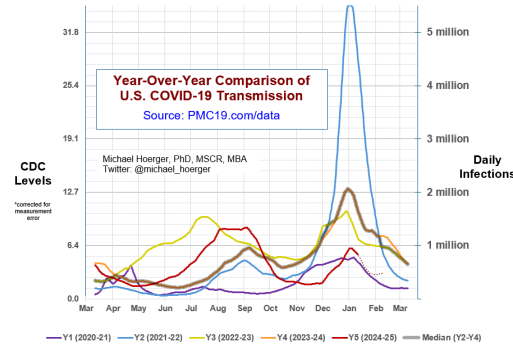
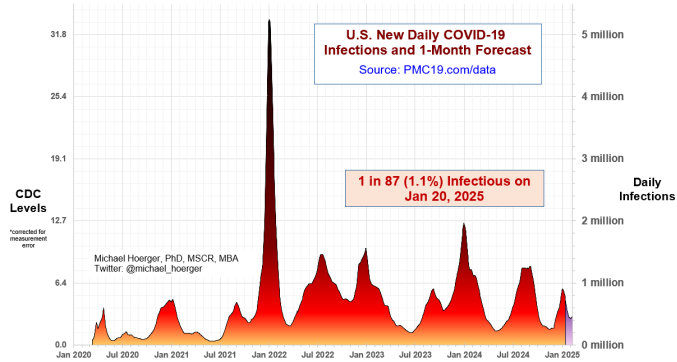
PMC Regional Multiplier*
0.312

* CDC level multiplied by the PMC Regional Multiplier provides an approximate estimate of the percentage actively infectious.

* The "Raw CDC" values are simply the value in the CDC chart multiplied by the PMC Regional Multiplier. The "PMC Model" estimates adjust those data by accounting for reporting time lag.

PMC COVID-19 Dashboard

Here is the complete PMC COVID-19 Dashboard. Please share the images across social media and other websites. Michael Hoerger, PhD, MSCR, MBA | Pandemic Mitigation Collaborative | pmc19.com/data



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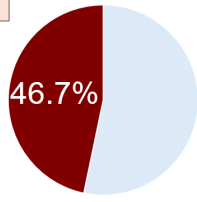
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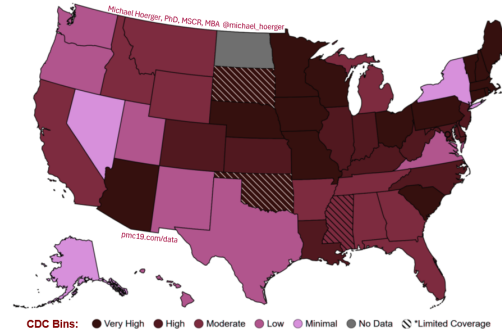
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6	6.7%	40	36.9%
7	7.7%	50	43.8%
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9	9.9%	100	69.4%
10	10.9%	300	98.8%

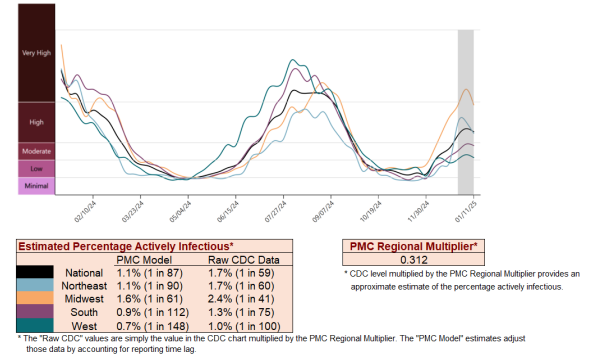


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COVID-19 Heat Map, CDC Data & Risk Levels, Higher Transmission in Deeper Red



CDC Regional Levels with PMC Estimates of the Percentage Actively Infectious



A separate document called a Technical Appendix appears on the dashboard page and has more methodologic info.