

Covid-19 "Vital Signs"

Issue # 282

February 10, 2021

- Projected Immunity:
 - **Our Current Projection scenario hints that we could achieve 70% immunity by July 1** (60% by May 30; 80% by August 2);
 - Our **Bad Variant scenario delays 70% immunity by eight weeks**, until August 27 (60% by July 18; 80% by October 23);
 - Our **New Vaccines scenario accelerates 70% immunity by nearly four weeks**, to June 6 (60% by May 9; 80% by July 1);
 - Combining the New Vaccines and Bad Variants into a single scenario serves to offset the adverse effects of the variants with the gains from more vaccinations;
 - **Natural immunity serves an important role in achieving herd immunity, yet the media and public officials remain silent on its impact**; we constructed a scenario that ignores natural immunity, relying solely on vaccines. In the scenario, 70% immunity is delayed until August 8, more than a month later than our Current Projection; we reach 60% on July 23 (nearly eleven weeks later than with our Current Projection); 80% on September 5, nine weeks later than our Current Projection).
- Protected cases, Covid-19 patient days, and deaths with Covid-19:
 - **Projected Covid-19 cases fall each of the next four weeks**, according to the [ensemble forecast published yesterday by the Covid-19 Forecast Hub](#);
 - **Projected deaths with Covid-19 drop each of the next four weeks**, based on this same ensemble forecast;
 - Estimated infections rise, starting next week until late March, then plummet through the end of May, according to [projections published by the Institute for Health Metrics and Evaluation \(IHME\)](#) last Thursday; infections at the upcoming apex, however, fall short of matching levels experienced in late December;
 - **Estimated Covid-19 patient days free-fall through the end of May**, according to IHME; Of note, IHME's projected February 9 census overestimated actual days by 15%;
 - Estimated daily deaths with Covid-19 free-fall through the end of May, too, according to IHME's model. IHME's 5-day-old projection overestimated the most recent death rate by 5%.
- Vaccination Progress:
 - **The US vaccinated an average of 1.5 million people each day over the last week. Our Current Projection model calls for 1.2 million per day, until March 1, when the JNJ vaccine boosts this to 1.8 million daily; Vaccinations outpaced this target eleven times in the past two weeks;**
 - Vaccines are being administered as soon as available - far better than earlier in the process. **As of yesterday, we have injected 71% of distributed doses, compared to 35% in early-January. The number of unused doses has hovered consistently at about 18 million.**
- Tests, cases, infections, hospitalization, and death rates:
 - **The Reproduction Rate (Rt) is falling, despite concerns about new variants**, according to [Gu's projection model](#); this rate declined seven consecutive days and has been below 1.0 (signaling decreasing infections) for thirty straight days;
 - Estimated new infections ([Yale/Harvard](#) and Gu models), as well as the 7-day new case rate in the US continue to fall from early-January peaks;
 - **Covid-19 patient days plunged 40% over the past four weeks;**
 - **Test-positivity fell each of the past three weeks; the current rate hovers just above the lowest level achieved during the pandemic.**

Immunity Projection Model

- HIA crafted this Immunity projection model to illustrate when the US could reach herd immunity, based on certain assumptions about:
 - Approved vaccines and dates of availability
 - Vaccine efficacy
 - Natural (infection) immunity
 - Immunity required for herd immunity
 - Time lag from infection or vaccination to immunity
- The model is for illustration purposes and cannot predict when herd immunity will occur; Instead, we strive to be directionally correct and to assess the impact of certain scenarios:
 - The level of immunity required for herd immunity
 - Possible approval of additional vaccines
 - Impact of emerging variants on:
 - infections rates,
 - sustainability of immunity from infection and
 - vaccine efficacy

Immunity Projection Model - Scenarios

- Our Current Projection model:
 - Reflects the current vaccination pace (we assume 1.2M doses per day; average has been 1.3M), increasing proportionally with each new vaccine approved
 - All presumed US contracts for approved (EUAs for Pfizer and Moderna) and soon-to-be-approved vaccines (JNJ, EUA anticipated in late-February)
 - Natural immunity based on Gu’s mean estimated infections
 - Two-week lag from infection or vaccination to immunity; no degradation in immunity over time
- Our Worse Case (not necessarily Worst Case); aka “Bad Variants”:
 - New variants (UK, South African, Brazilian or others)
 - Variants drive:
 - 20% increase in daily infection rate
 - 20% reduction in vaccine efficacy
 - 20% degradation in natural immunity
- Our Better Case (not necessarily Best Case); aka “New Vaccines”:
 - Vaccines from AstraZeneca and Novavax receive EUAs (April 1 and July , respectively)
 - Ignores impact of “Bad Variants”

Note: we also show a combination of the Bad Variants and New Vaccines

Covid-19 “Vital Signs”

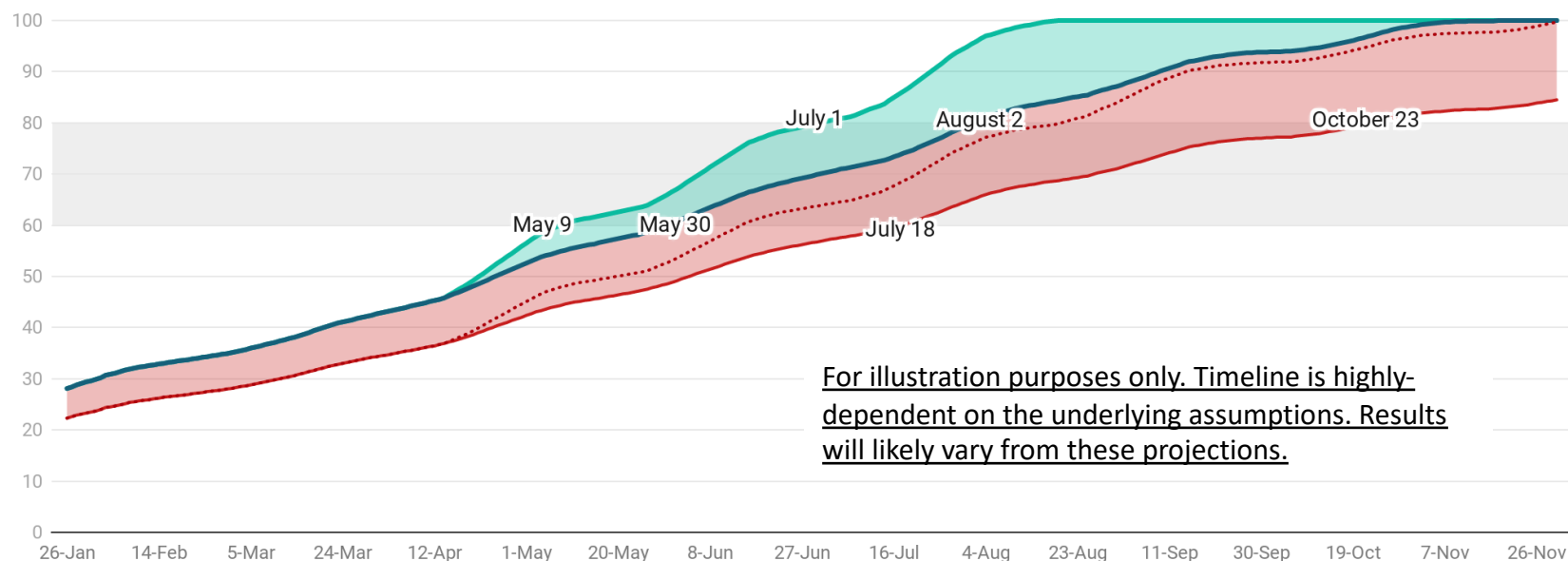
Immunity Projections

Our Current Projection shows herd immunity reached between May 30 and August 2; with the Bad Variants, it is delayed until July 18 to October 23; with the New Vaccines, it is accelerated to May 9 to July 1. New Vaccines tend to blunt the impact of Bad Variants

Immunity Projections

HIA Model, Updated February 9

— Current Projection — New Vaccines — Bad Variants - - - Bad Variants with New Vaccines

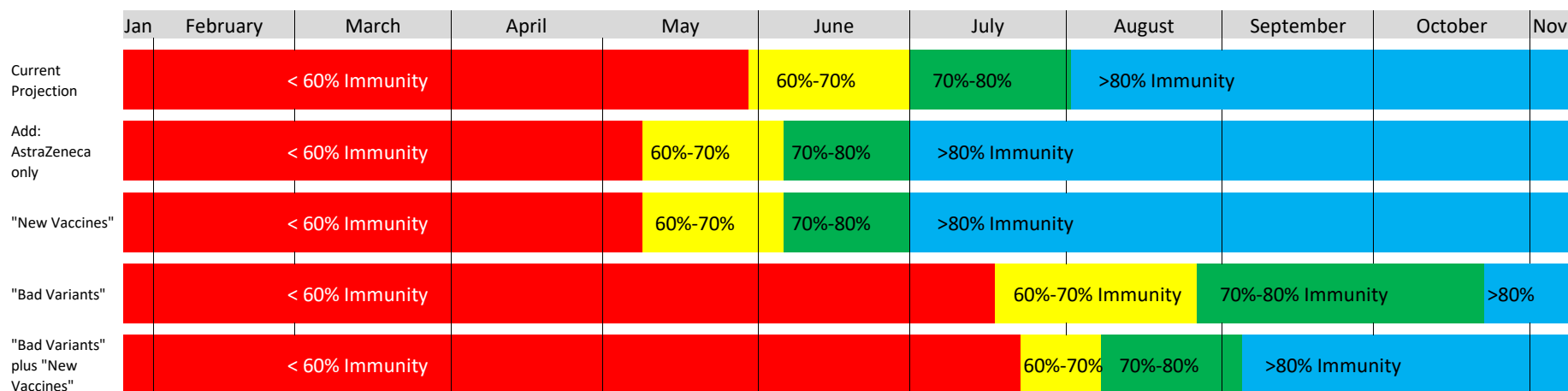


For illustration purposes only. Timeline is highly-dependent on the underlying assumptions. Results will likely vary from these projections.

Current Projection Based on 300M Pfizer, & Moderna doses and 100M JNJ doses; accelerated vaccinations

Chart: Health Industry Advisor LLC • Created with Datawrapper

Immunity Projections - Timeline



For illustration purposes only. Timeline is highly-dependent on the underlying assumptions. Results will likely vary from these projections.

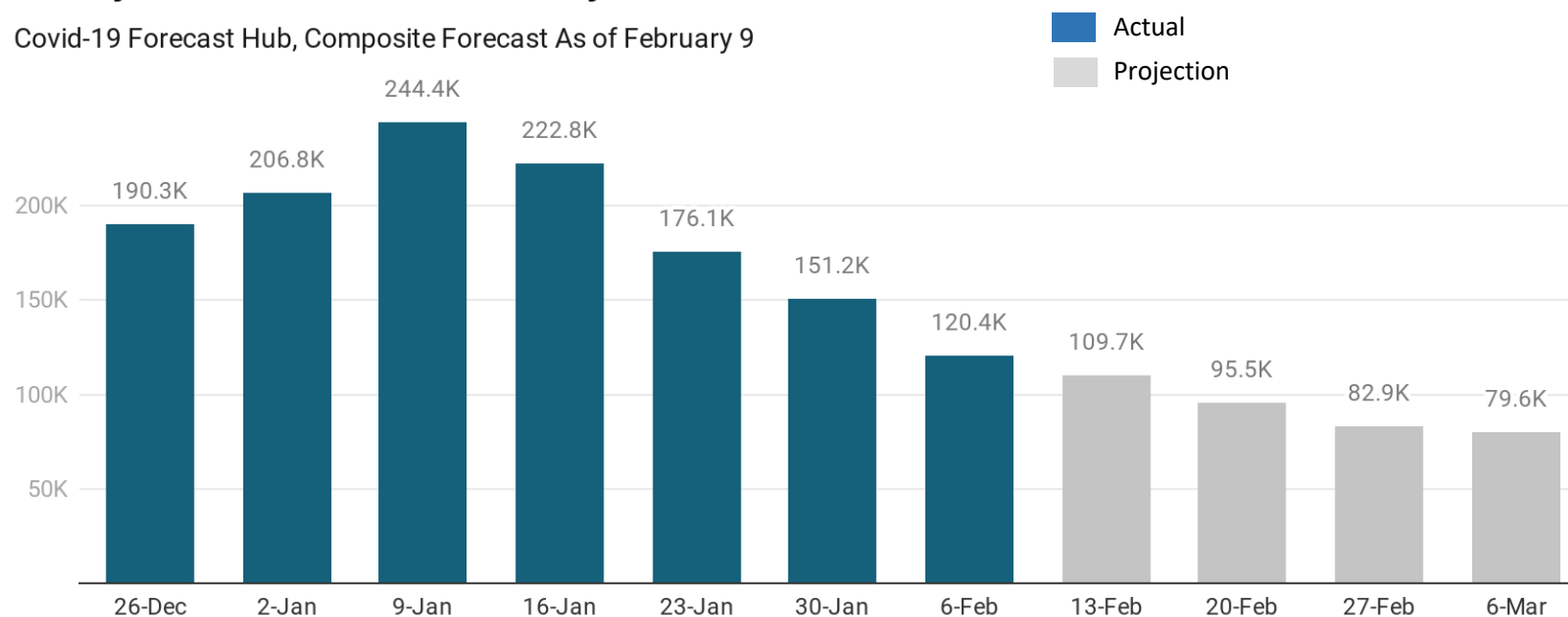
Covid-19 "Vital Signs"

Covid-19 Cases: Ensemble Forecast

Projected new cases drop each week during the four-week forecast period

Newly-Detected Cases Per Day

Covid-19 Forecast Hub, Composite Forecast As of February 9



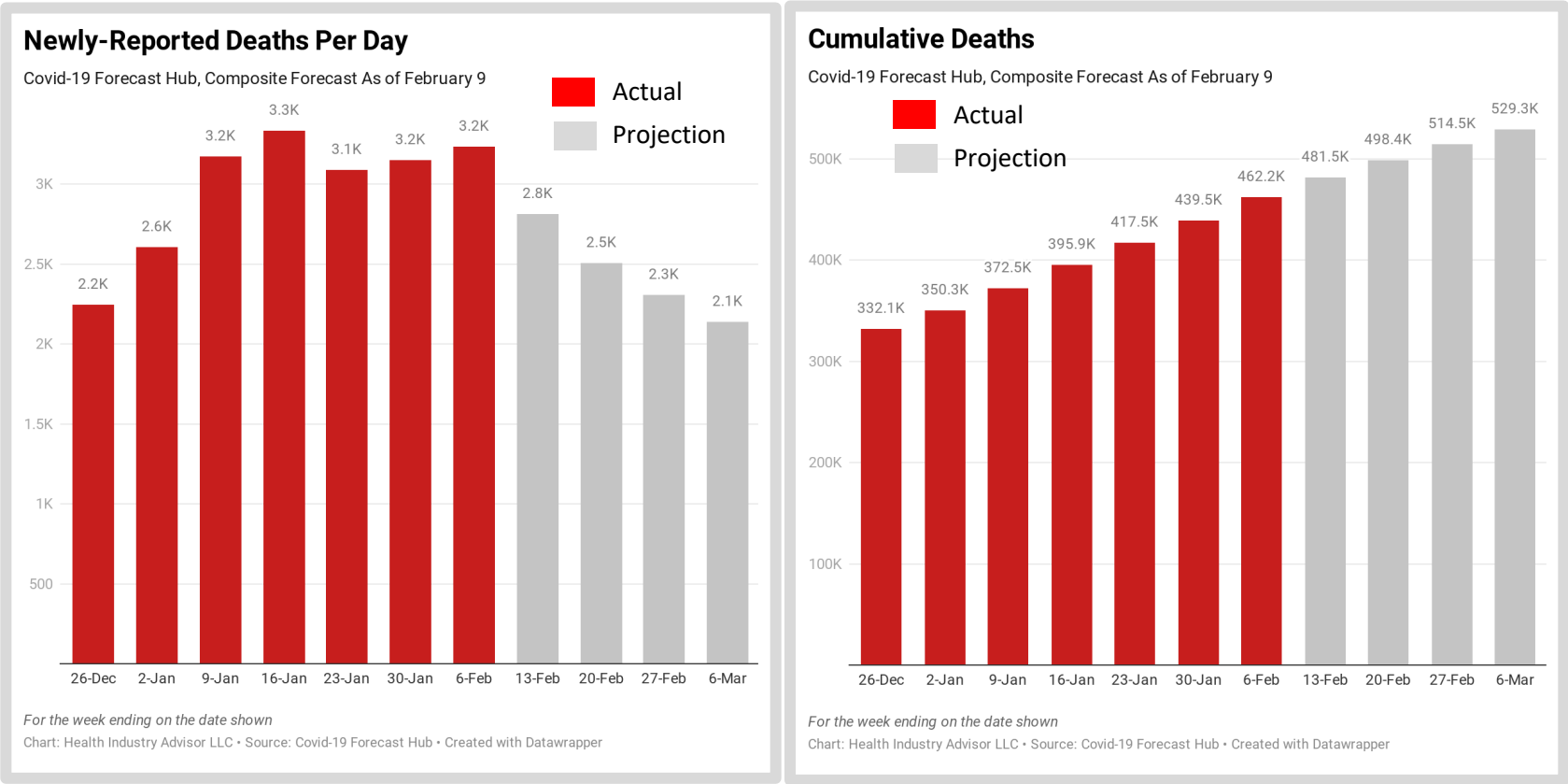
For the week ending on the date shown

Chart: Health Industry Advisor LLC • Source: Covid-19 Forecast Hub • Created with Datawrapper

<https://viz.covid19forecasthub.org>

Death Projections – Ensemble Forecast

Projected daily deaths fall each week of the forecast period; Cumulative deaths with Covid-19 surpass 500k near the end of February



<https://viz.covid19forecasthub.org>

Covid-19 "Vital Signs"

Estimated Infections IHME Projection

IHME projects estimated infections to rise beginning next week through the end of March - but, not to return to recent peak levels. Estimated infections drop throughout April and May

Estimated Infections

Institute for Health Metrics and Evaluation (IHME) Model, as of February 4

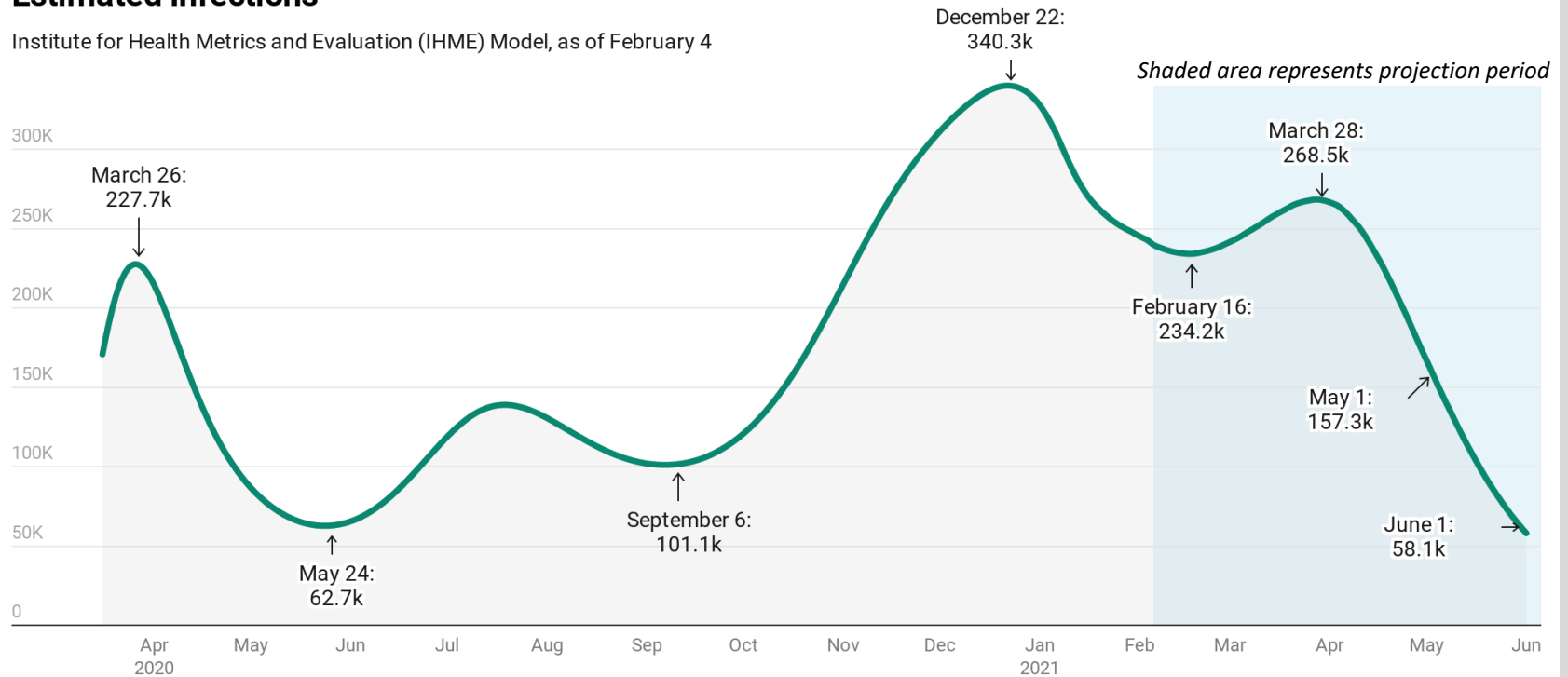


Chart: Health Industry Advisor LLC • Source: IHME • Created with Datawrapper

Covid-19 "Vital Signs"

Covid-19 Inpatients – IHME Projections

IHME envisions Covid-19 inpatient days to continue falling. Of note, actual Covid-19 patient days fell further already than IHME projected just five days ago

Covid-19 Inpatient Beds

Institute for Health Metrics and Evaluation (IHME) Model, as of February 4

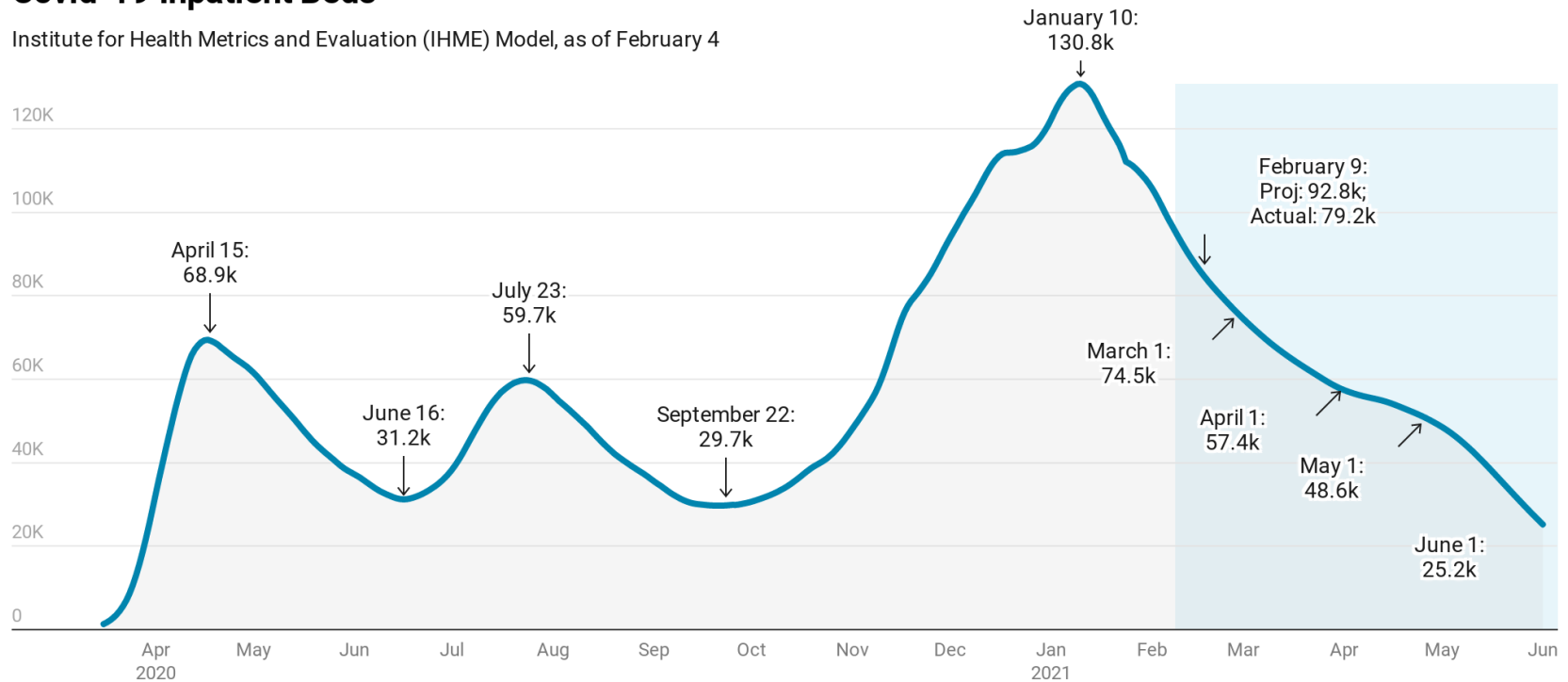


Chart: Health Industry Advisor LLC • Source: IHME • Created with Datawrapper

Covid-19 "Vital Signs"

Deaths With Covid-19: IHME Projection

IHME expects deaths with Covid-19 to continue falling through the end of May. Of note, deaths over the past seven days are already lower than IHME's projection made just five days ago

Covid-19 Deaths

Institute for Health Metrics and Evaluation (IHME) Model, as of February 4

— IHME Forecast Deaths •• 7_Day Avg Deaths

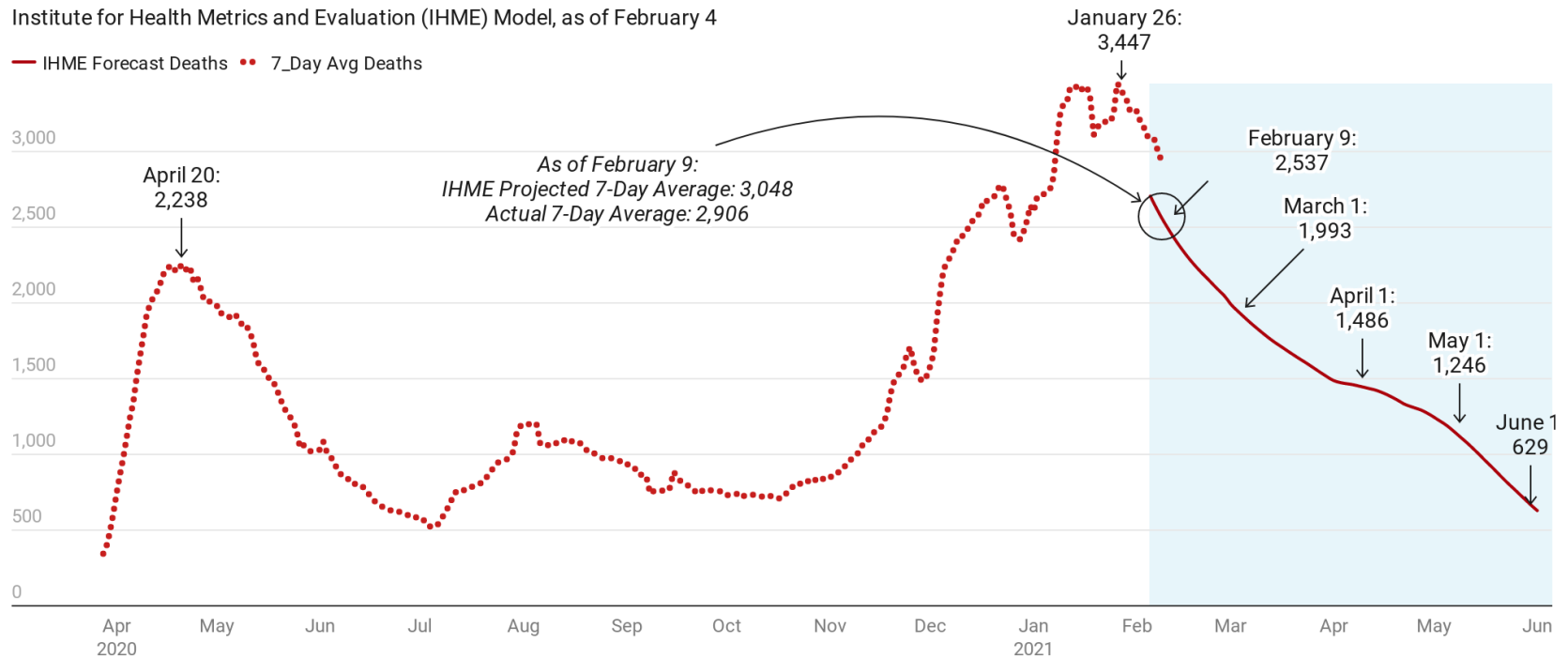


Chart: Health Industry Advisor LLC • Source: IHME • Created with Datawrapper

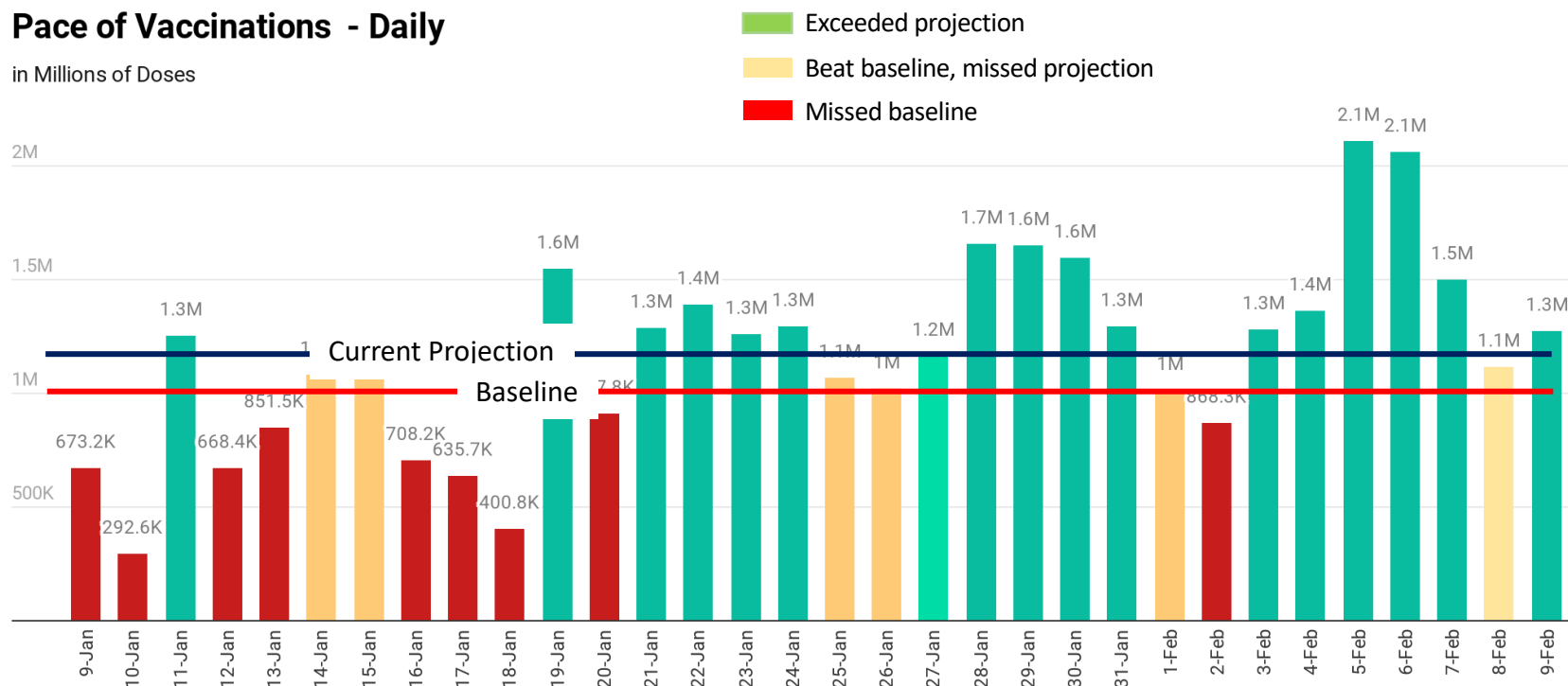
Covid-19 "Vital Signs"

Pace of Vaccinations

Vaccinations surpassed our Current Projection on eleven of the past fourteen days; Two of the three "misses" occurred during last week's widespread snowstorm.

Pace of Vaccinations - Daily

in Millions of Doses



Baseline: 100 Million Doses in 100 Days Current Projection: Ramped-Up Vaccinations; Additional 100M Pfizer and Moderna doses; and JNJ vaccine available on 3/1

Chart: Health Industry Advisor LLC • Source: Bloomberg • Created with Datawrapper

“Current projection” is from Health Industry Advisor’s vaccination model, reflecting recent developments: increase pace of vaccinations; increase in Pfizer and Moderna doses to 300 million each; and anticipated availability of JNJ vaccine

Vaccine Tracking

To date, the US has administered 44.4 million doses, with 10.2 million people receiving two pokes.

Vaccination Progress

Most Recent Four Weeks

First Doses Second Doses

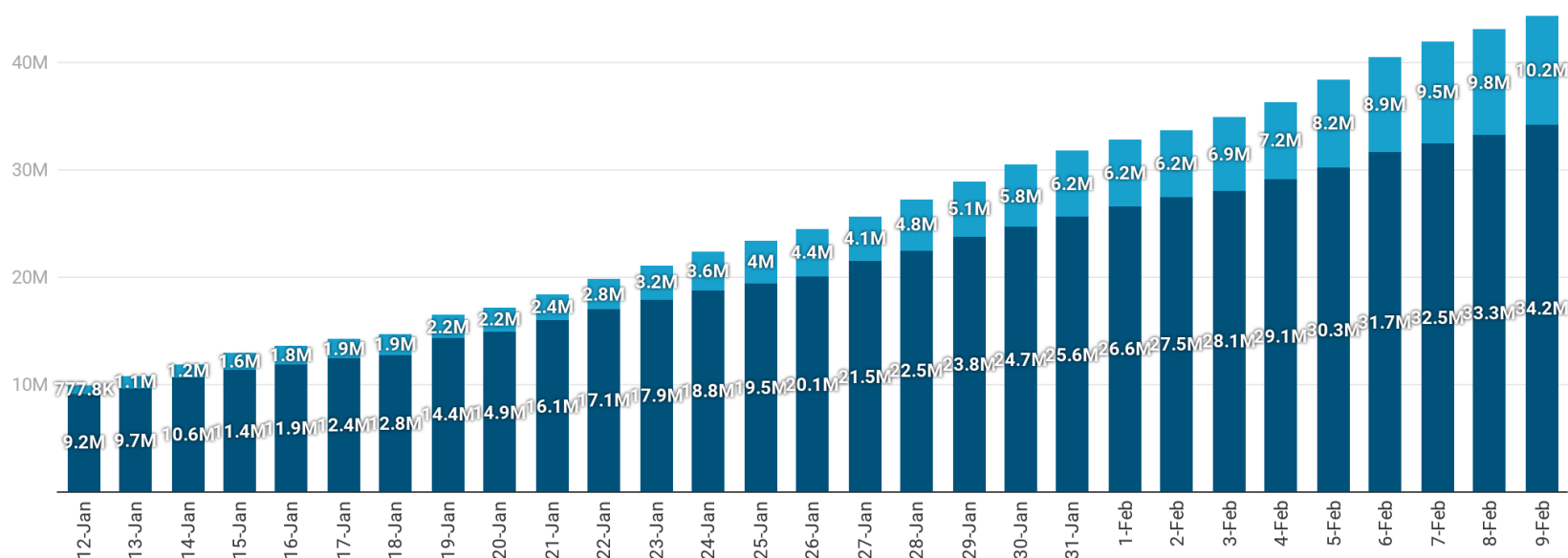


Chart: Health Industry Advisor LLC • Source: CDC, Bloomberg • Created with Datawrapper

Vaccine data from: [Centers for Disease Control and Prevention](#) and [Bloomberg Vaccine Tracker](#)



Vaccines Distributed v. Unused

The US is delivering more shots to arms lately, while the number of doses queued for use has steadied.

Doses Distributed v. Administered

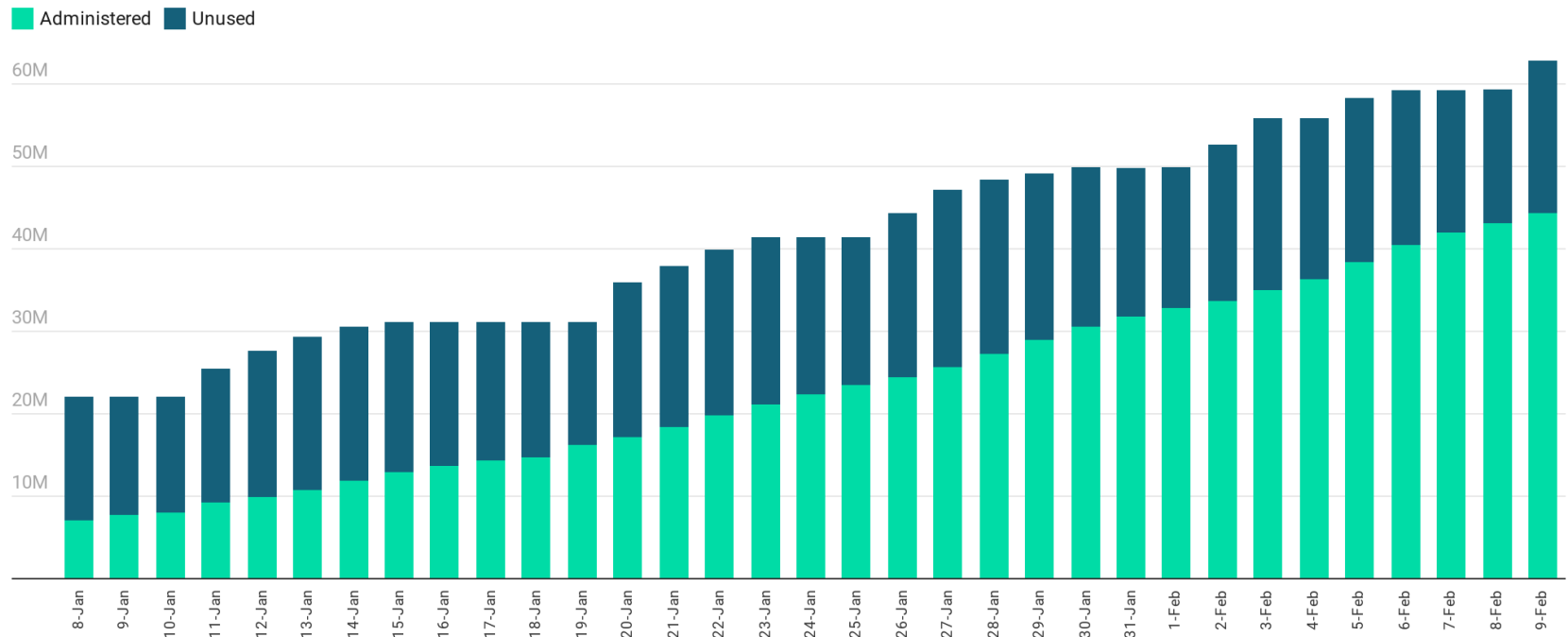


Chart: Health Industry Advisor LLC • Source: Bloomberg • Created with Datawrapper

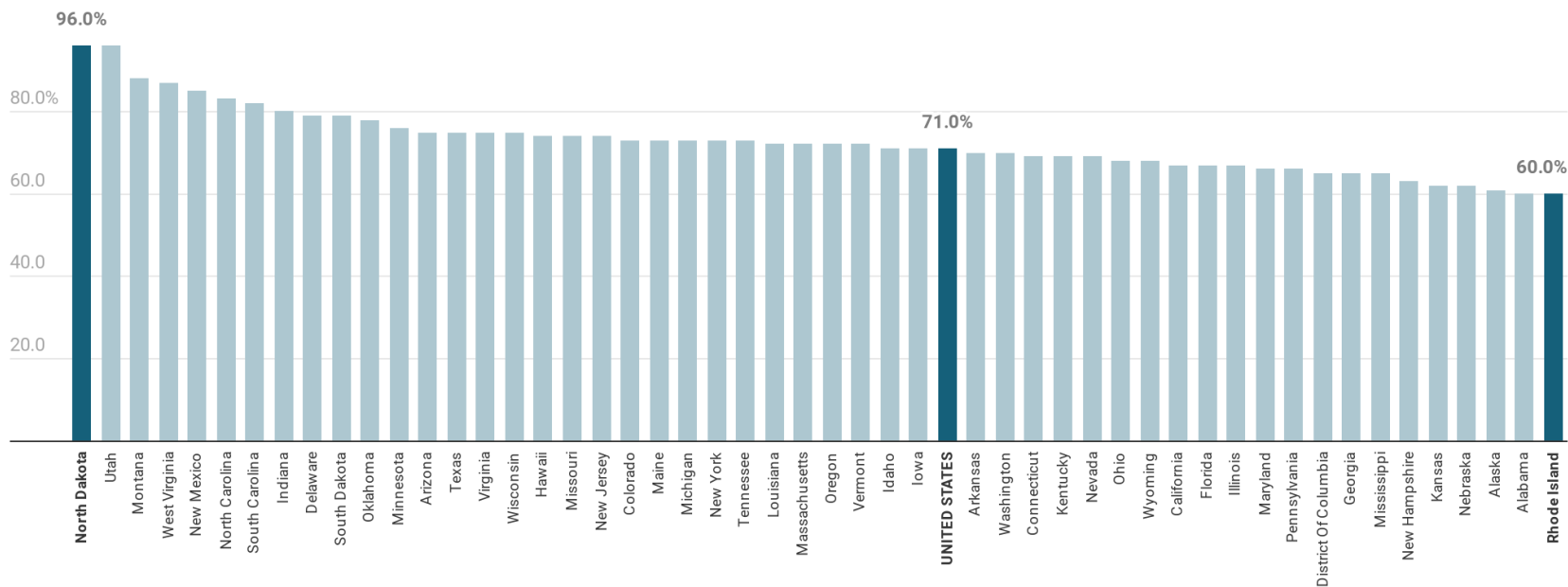
Covid-19 "Vital Signs"

Vaccines Distributed v. Administered

The US administered seven-in-ten of all doses distributed. North Dakota and Utah perform best, administering nearly all available doses; Rhode Island and Alabama administered 60% of available doses.

% of Allocated Supply Used

As of February 9



Doses include both first and second doses; Second doses represent about 12% of all doses nationally

Chart: Health Industry Advisor LLC • Source: Bloomberg • Created with Datawrapper

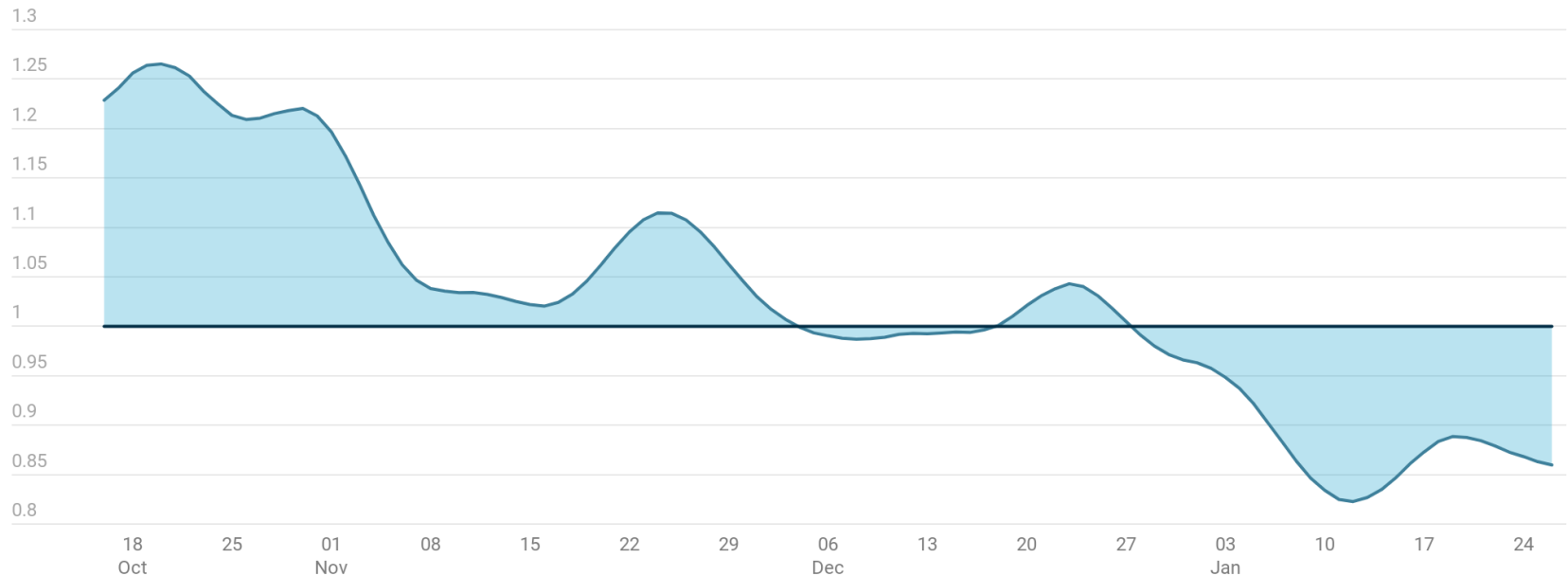
Reproduction Rate (R_t) – Gu* Model

Gu's estimate of R_t remained below 1.0 for the thirtieth straight day. This rate declined each of the most recent seven days reported.

Reproduction Rate (R_t) - US

*Youyang Gu: Covid-19projections.com

Youyang Gu Estimate, October 16, 2020 - January 26, 2021



R_t is an estimate of how many additional people a single person will infect

Chart: Health Industry Advisor LLC • Source: Youyang Gu • Created with Datawrapper

Covid-19 "Vital Signs"

Estimated Daily Infections & New Case Rates

Estimated new infections and reported cases are plunging in the US. Note that estimated actual infections were much higher in November and December than detected cases, reflecting the high test-positivity during that time. This implies that actual infections are dropping much faster than reported cases.

- Two models:
- Youyang Gu: <https://covid19-projections.com>
- Yale School of Public Health: <https://covidestim.org>
- Gu model lags by two weeks

Estimated Daily Infections v. Detected Cases

Gu & Yale/Harvard Schools of Public Health Models

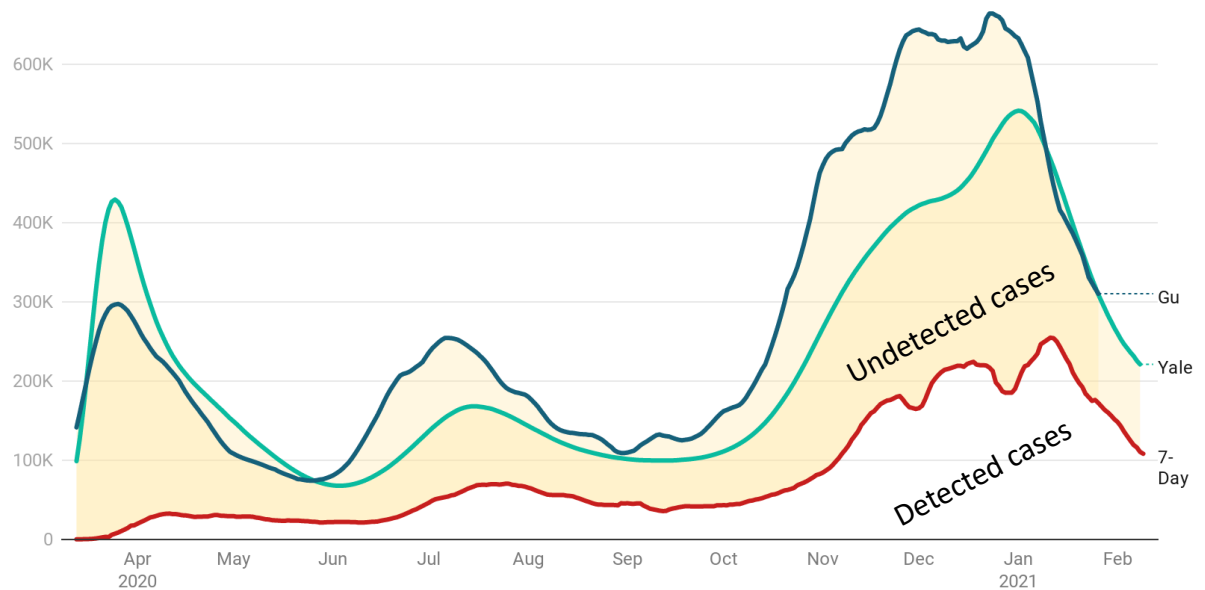


Chart: Health Industry Advisor LLC • Source: Youyang Gu, Yale School of Public Health • Created with Datawrapper

Covid-19 "Vital Signs"

Week-Over-Week Changes in New Cases

On a week-over-week basis, US and worldwide new cases sank each of the past twenty-six days

Week-Over-Week Changes in Newly-Detected Cases: USA v. Worldwide

7-Day Moving Average, As of February 9

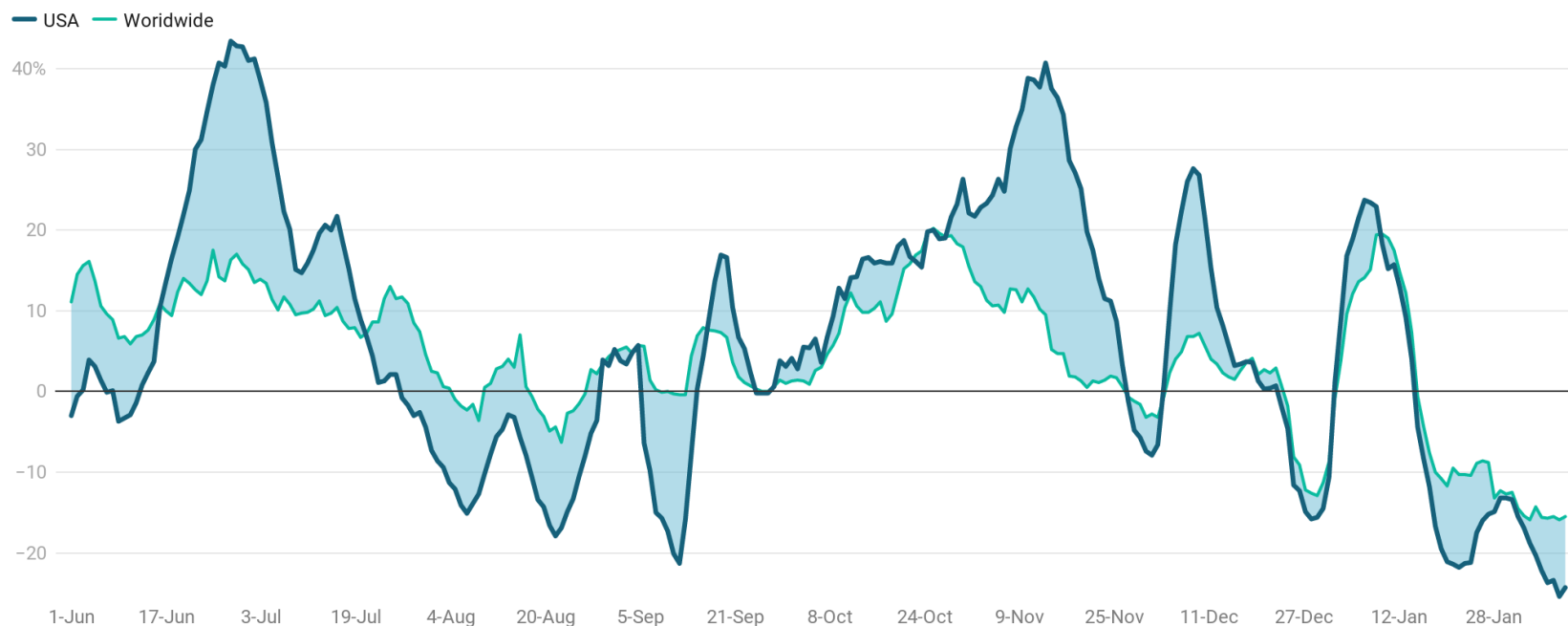


Chart: Health Industry Advisor LLC • Source: worldometers.info • Created with Datawrapper

Covid-19 "Vital Signs"

Newly Detected Cases / Million

Many hard-hit countries welcomed declining case rates in the past several weeks. Israel's case rate moderated yet remains high. Countries tied to new variants boast either declining (South Africa, UK and US) or low rates (Brazil)

Newly Detected Cases Per Million

7-Day Moving Average

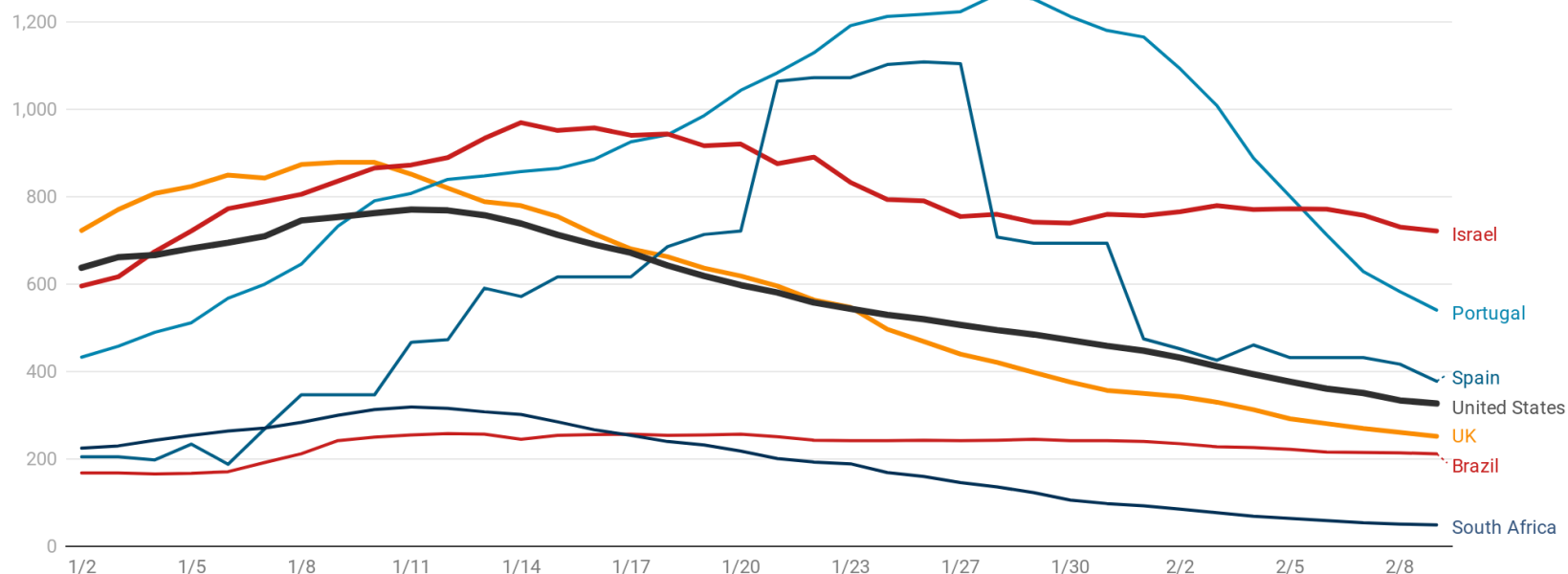


Chart: Health Industry Advisor LLC • Source: worldometers.info • Created with Datawrapper

Newly Detected Cases / Million - US

Newly detected cases (7-day average) in the US declined for the twenty-ninth straight day – plunging a remarkable 58% in that time. This rate lags those posted everyday since November 6.

Newly-Detected Cases / Million - US

7-Day Moving Average

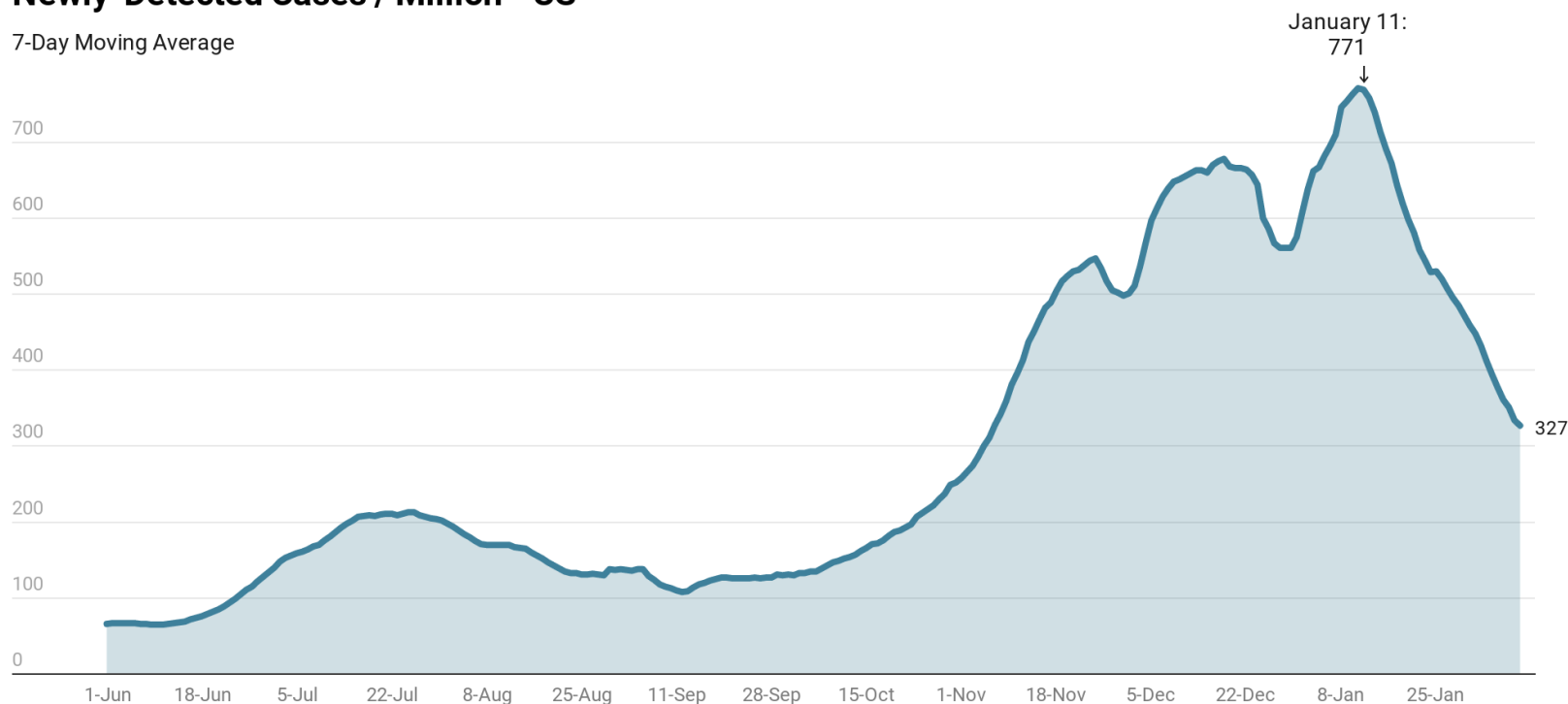


Chart: Health Industry Advisor LLC • Source: worldometers.info • Created with Datawrapper

Newly Detected Cases Per Day

Worldwide and in the US, 7-day new case rates receded during each of the past three weeks

Newly Detected Cases Per Day

As of February 9

United States Outside the US

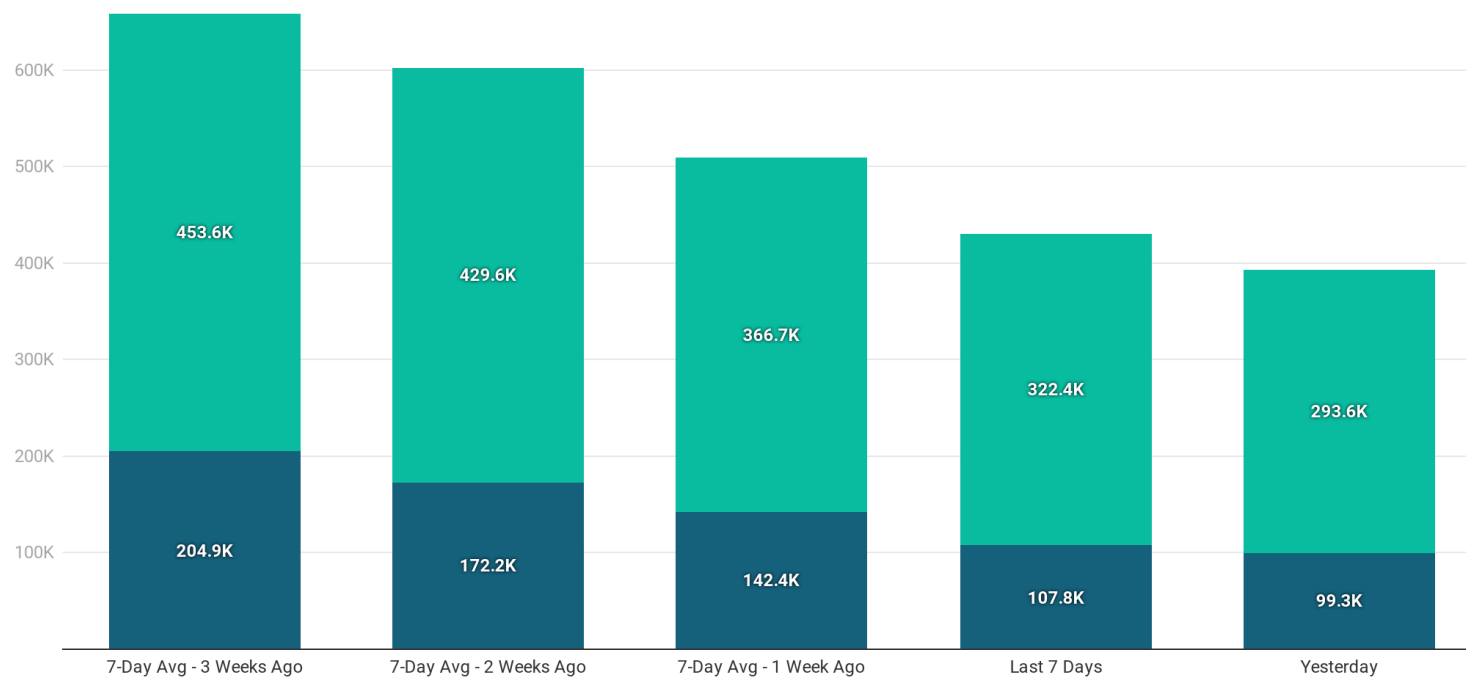


Chart: Health Industry Advisor LLC • Source: worldometers.info • Created with Datawrapper

Covid-19 "Vital Signs"

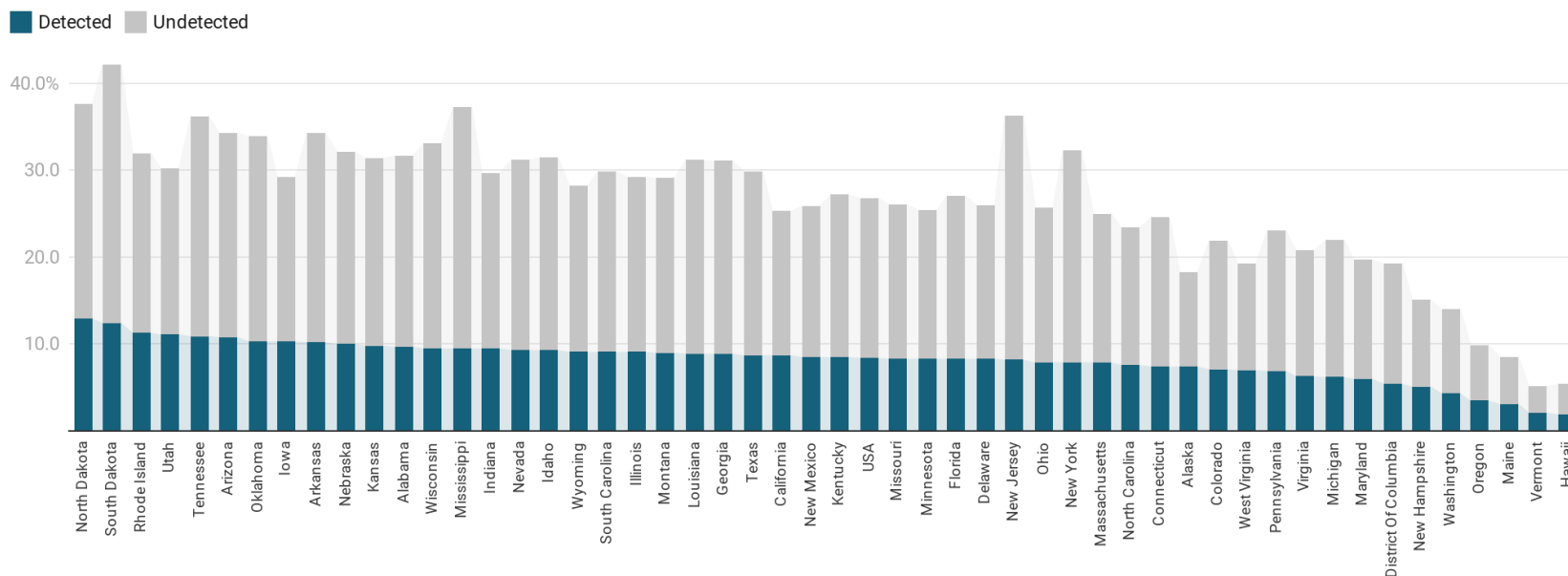
Infection Prevalence By State

South Dakota outpaces every other state in estimated infection prevalence, followed by North Dakota, Mississippi, New Jersey, Tennessee, and New York. Maine, Vermont and Hawaii occupy the tail-end of this ranking.

Infection Prevalence

*Youyang Gu: Covid-19projections.com

% of Population Infected - Detected & Undetected, As of February 9



Undetected Estimate from Youyang Gu Model - estimates are 14 days in arrears due to model design

Chart: Health Industry Advisor LLC • Source: Bloomberg • Created with Datawrapper

Covid-19 "Vital Signs"

Estimated Immunity Levels By State

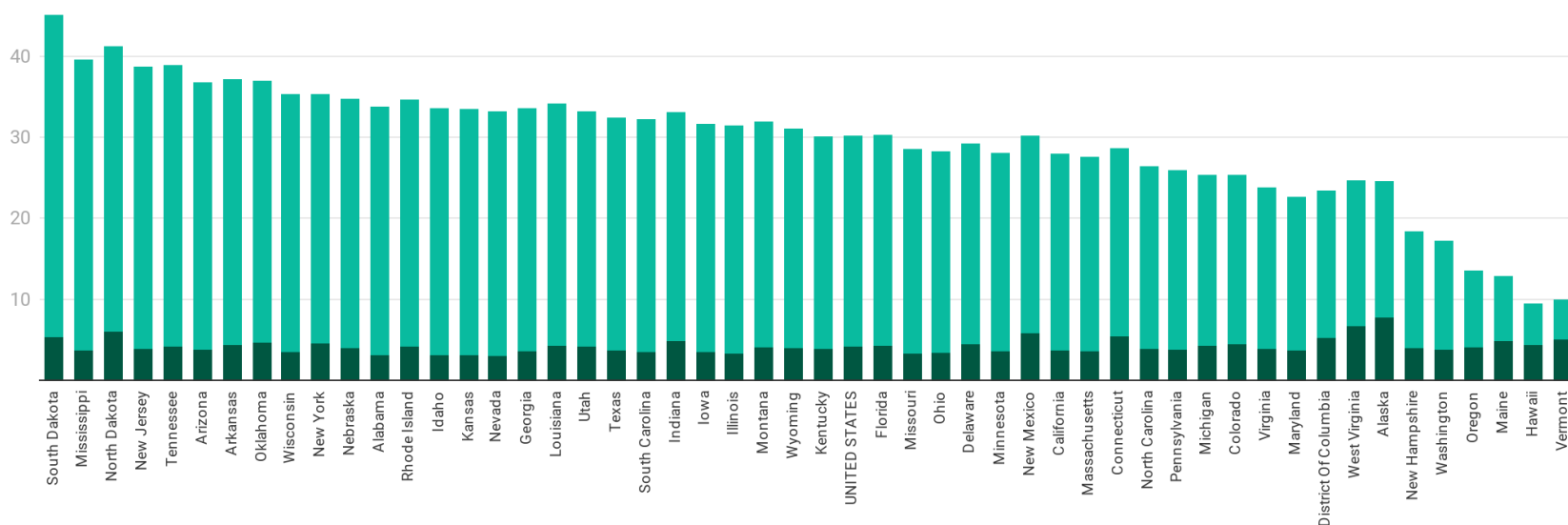
An estimated four-in-ten residents of North and South Dakota enjoy immunity from Covid-19; for the US, it is three-in-ten. In Hawaii and Vermont, nine-in-ten residents are not immune from infection.

Estimated Immunity Levels

*Youyang Gu: Covid-19projections.com

As of February 9

■ Via Vaccine ■ Via Infection



2-week lag from infection or vaccination to immunity. Based on Gu's mean infection estimates

Chart: Health Industry Advisor LLC • Created with Datawrapper

Covid-19 "Vital Signs"

New Cases / Million

Much of the US rebounded from the high infection rates seen early in January. Parts of the country, however, still suffer from rates higher than seen in the Summer and Fall, 2020.

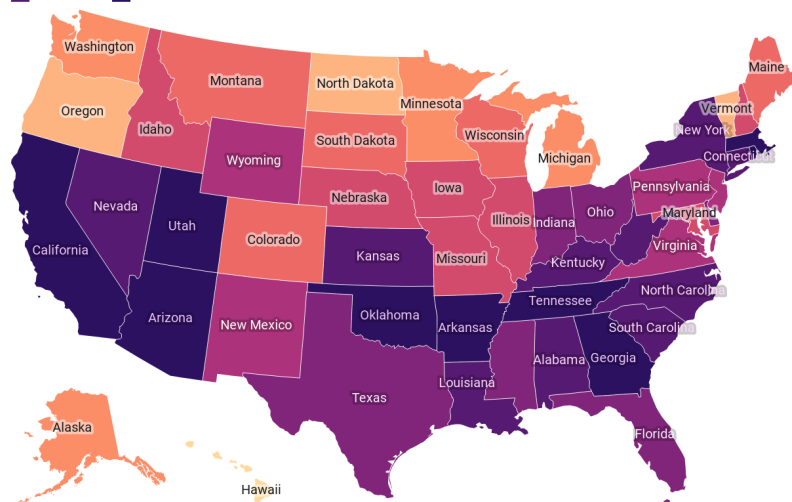
January 12

February 9

New Cases / Million

7-Day Moving Average, As of January 12

< 100 100-200 200-300 300-400 400-500 500-600 600-700 700-800
800-900 ≥ 900

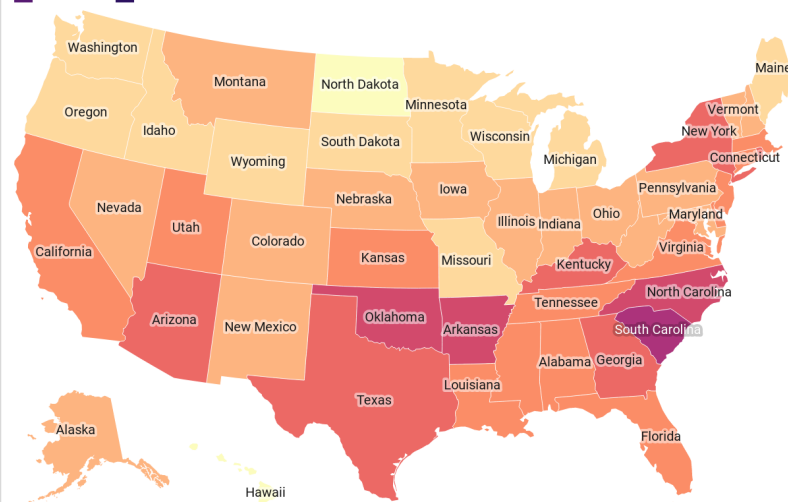


Map: Health Industry Advisor LLC • Created with Datawrapper

New Cases / Million

7-Day Moving Average, As of February 9

< 100 100-200 200-300 300-400 400-500 500-600 600-700 700-800
800-900 ≥ 900



Map: Health Industry Advisor LLC • Created with Datawrapper

Note the change in scale from previous reports. This was done to better depict the changing case rates.

Covid-19 "Vital Signs"

Covid-19 Hospitalizations

Covid-19 hospitalizations plunged over the past month, with 53,000 fewer patients yesterday than on January 6 (40%). Yesterday's Covid-19 census fell to its lowest point since November 17. ICU and ventilator days declined each of the past three weeks.

Hospitalized Covid-19 Patients

Compared to Same Day, Prior Weeks, As of February 9

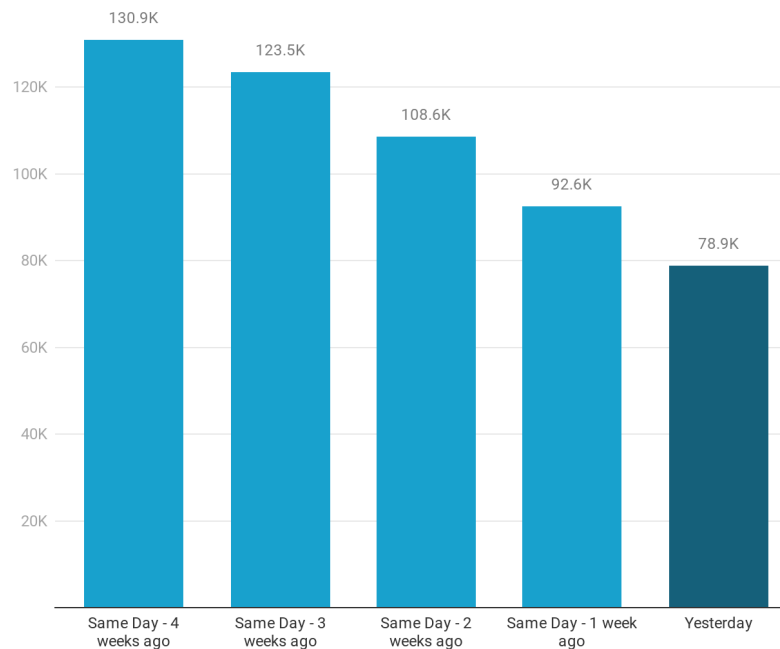


Chart: Health Industry Advisor LLC • Source: The Atlantic • Created with Datawrapper

Covid-19 Patients in the ICU

Compared to Same Day, Prior Weeks, As of February 9

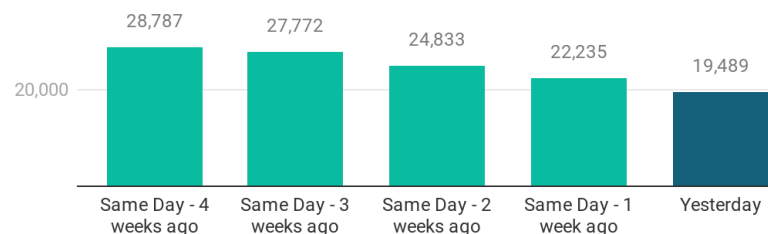


Chart: Health Industry Advisor LLC • Source: The Atlantic • Created with Datawrapper

Covid-19 Patients on Ventilators

Compared to Same Day, Prior Weeks, As of February 9

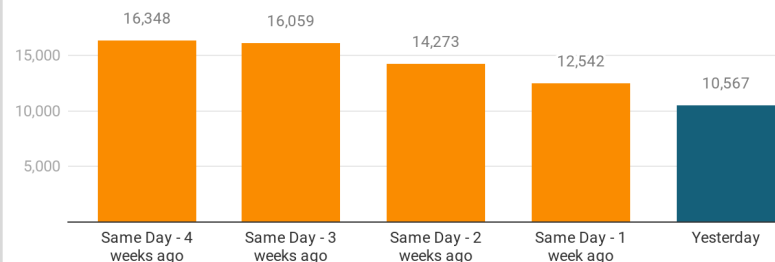


Chart: Health Industry Advisor LLC • Source: The Atlantic • Created with Datawrapper

Covid-19 "Vital Signs"

Covid-19 Hospitalizations

Covid-19 hospital census plunged in the past four weeks. Covid-19 patients occupied 25% of US beds yesterday versus 42% four weeks ago.

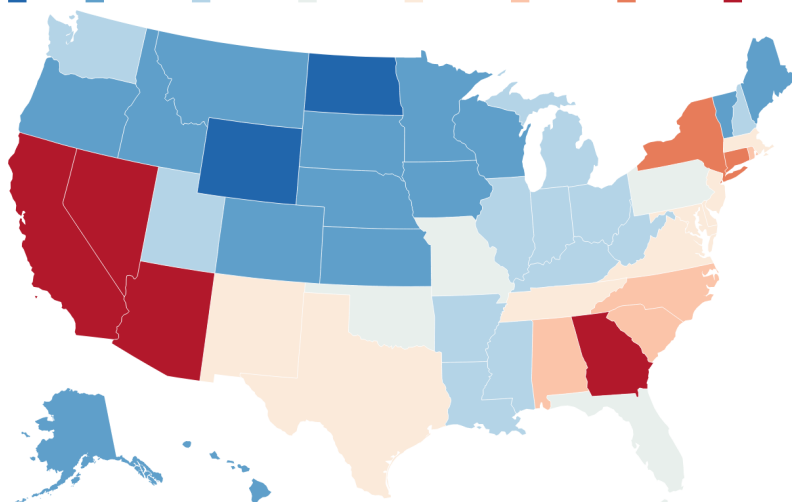
January 12

February 9

Covid-19 Patients As % of All Inpatient Beds

As of January 12

■ < 10% ■ 10%–20% ■ 20%–30% ■ 30%–40% ■ 40%–50% ■ 50%–60% ■ 60%–70% ■ ≥ 70%

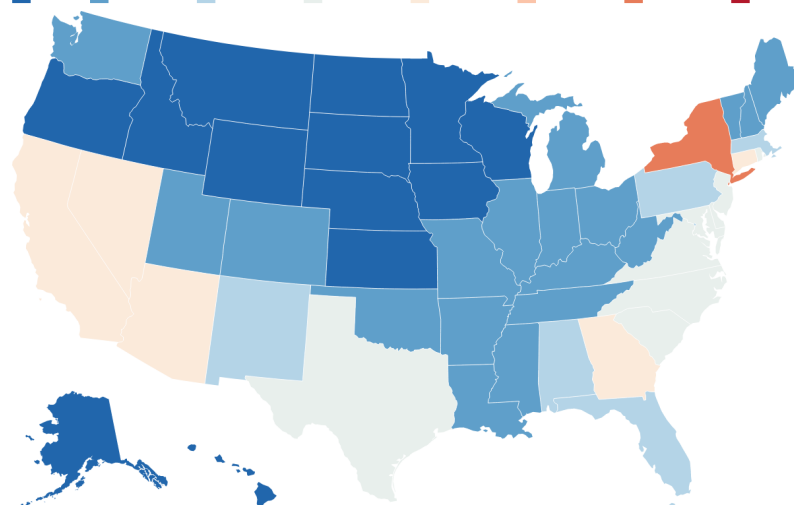


Map: Health Industry Advisor LLC • Source: The Atlantic's Covid Tracking Project • Created with Datawrapper

Covid-19 Patients As % of All Inpatient Beds

As of February 9

■ < 10% ■ 10%–20% ■ 20%–30% ■ 30%–40% ■ 40%–50% ■ 50%–60% ■ 60%–70% ■ ≥ 70%



Map: Health Industry Advisor LLC • Source: The Atlantic's Covid Tracking Project • Created with Datawrapper

Covid-19 "Vital Signs"

Testing (US)

Test volume for the past seven days dropped from each of the prior three weeks – are fewer people fearing a recent exposure? The test-positive rate improved over the three preceding weeks.

Tests / Million / Day (US)

As of February 9

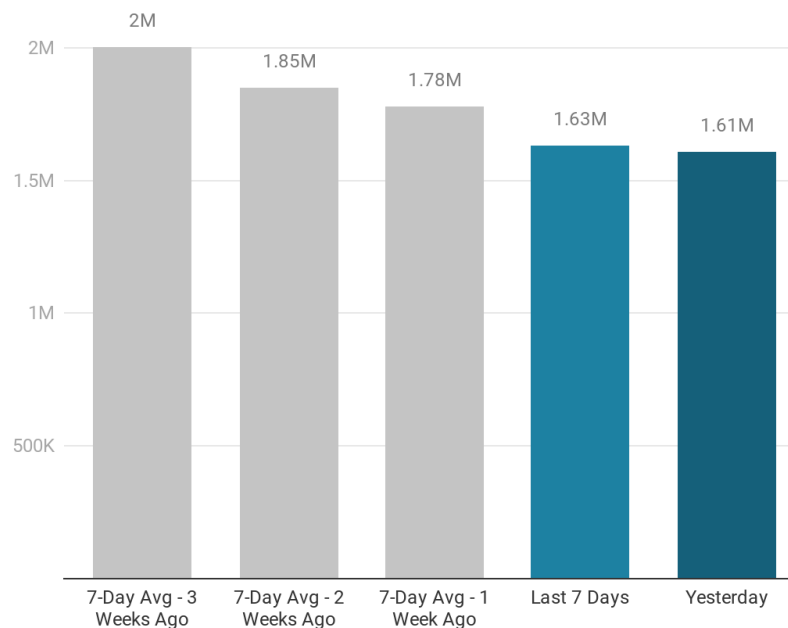


Chart: Health Industry Advisor LLC • Source: The Atlantic • Created with Datawrapper

Test-Positivity Rate

As of February 9

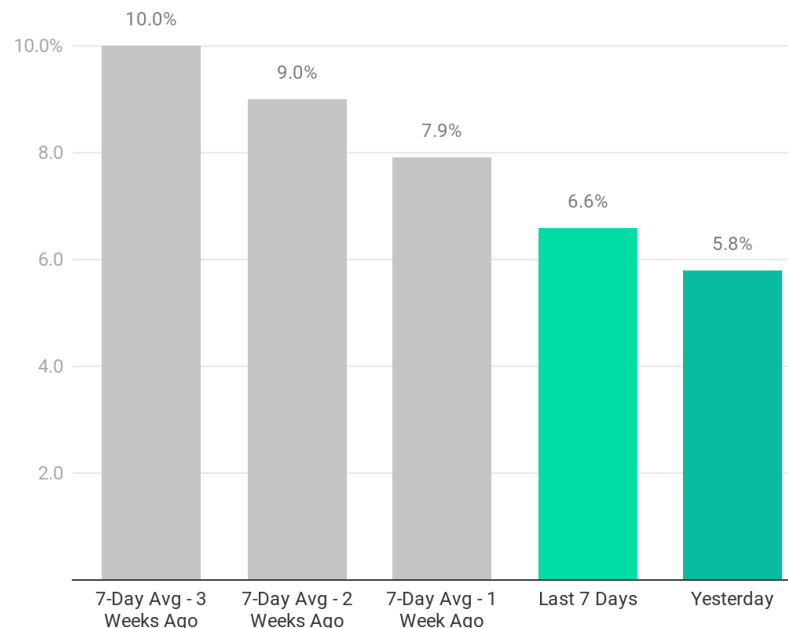
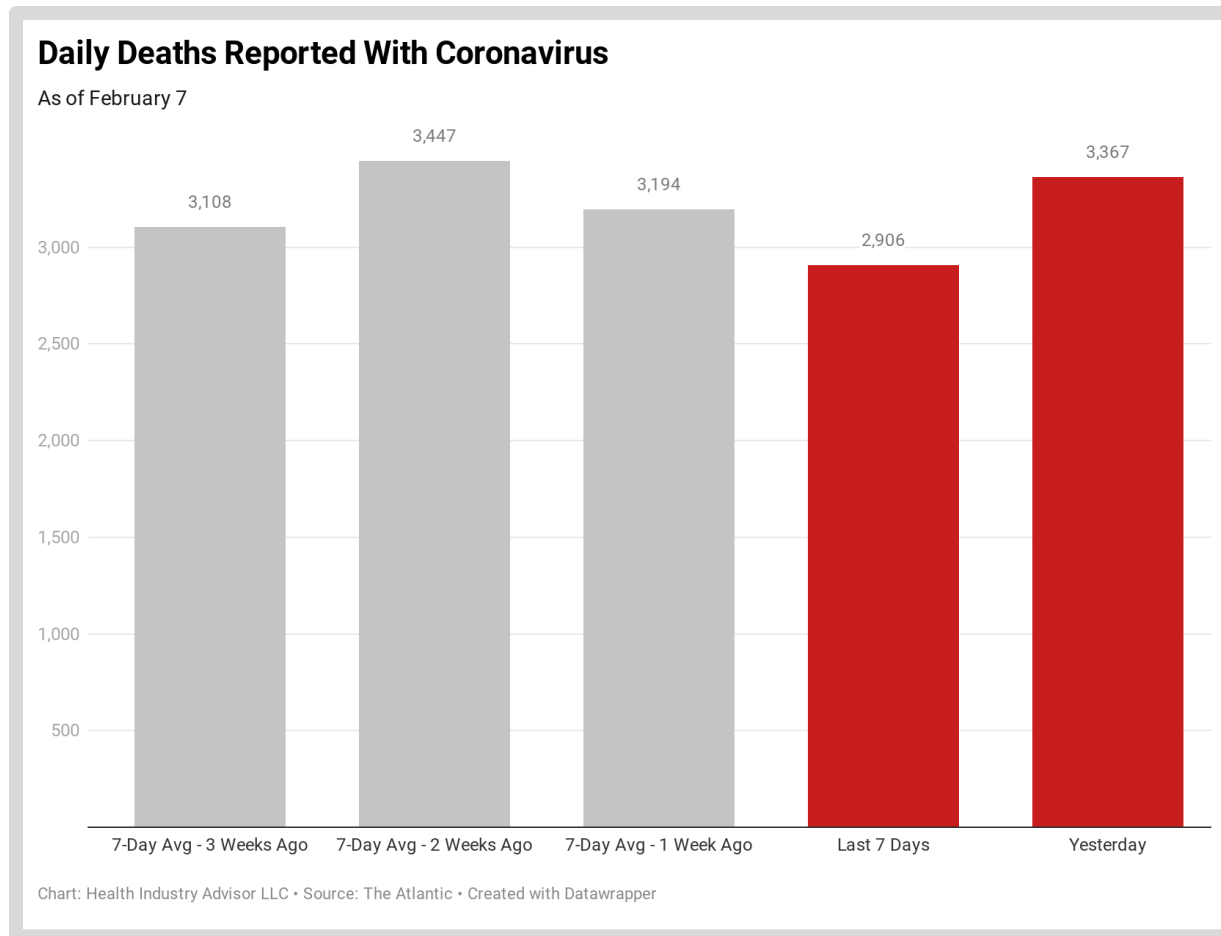


Chart: Health Industry Advisor LLC • Source: The Atlantic • Created with Datawrapper

Deaths Reported With Coronavirus

The 7-day average death rate crept lower than it has been for each of the prior three weeks.



Sources

The following data sources are accessed on a daily or weekly basis

- The Atlantic's Covid Tracking Project: <https://covidtracking.com>
- Worldometers.info: <https://www.worldometers.info/coronavirus/>
- Centers for Disease Control and Prevention, National, Regional, and State Level Outpatient Illness and Viral Surveillance <https://gis.cdc.gov/grasp/fluview/fluportaldashboard.html>
- Centers for Disease Control and Prevention, COVID-19 Laboratory-Confirmed Hospitalizations https://gis.cdc.gov/grasp/COVIDNet/COVID19_5.html
- Centers for Disease Control and Prevention, COVID Data Tracker <https://www.cdc.gov/covid-data-tracker/index.html#mobility>
- Centers for Disease Control and Prevention, Vaccines, <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html>
- Institute for Health Metrics and Evaluation, COVID-19 estimate downloads <http://www.healthdata.org/covid/data-downloads>
- New York Times, Covid-19 data <https://github.com/nytimes/covid-19-data>
- COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University <https://github.com/CSSEGISandData/COVID-19>
- COVID-19 Projections Using Machine Learning, <https://covid19-projections.com>
- Covid-19 Forecast Hub, <https://viz.covid19forecasthub.org>
- Oliver Wyman Pandemic Navigator, <https://pandemicnavigator.oliverwyman.com/forecast?mode=country®ion=United%20States&panel=mortality>
- [Rt.live](https://rt.live)
- Yale School of Public Health & Harvard TH Chan School of Public Health, <https://covidestim.org>
- Bloomberg Vaccine Trackers, <https://www.bloomberg.com/graphics/covid-vaccine-tracker-global-distribution/?sref=Z0b6TmHW>