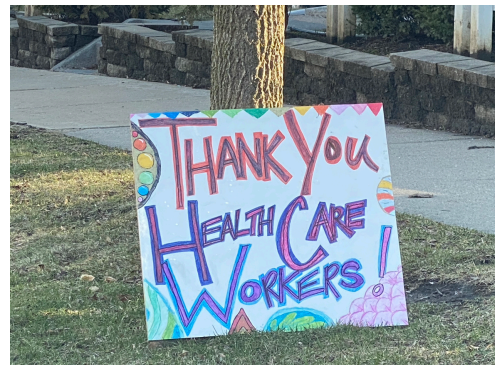
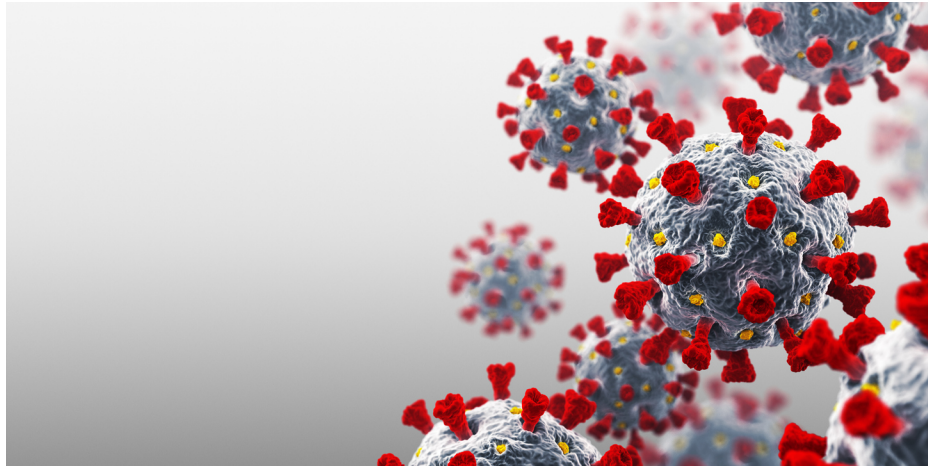
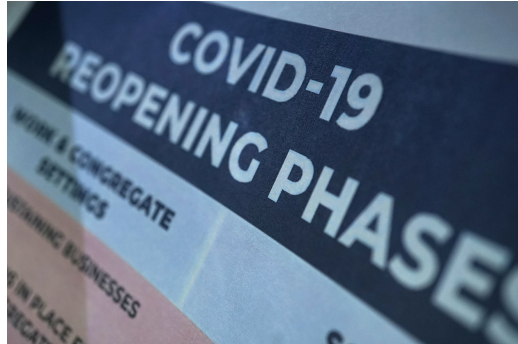




COVID-19 Report

Issue # 144

Monday, August 24, 2020

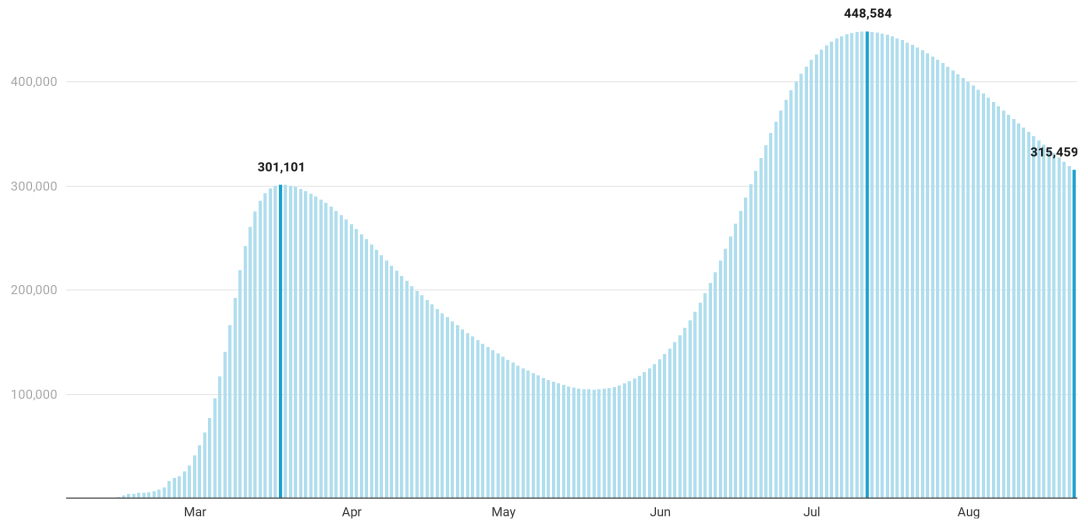
- We begin by re-visiting the estimates of true infections in the United States, as well as projections of infections and deaths. We have cited the machine-learning based model developed by MIT-trained data scientist Youyang Gu. Gu has developed quite a national following, aided by his willingness to open-source his model and to welcome critique. Further, he updates his projections dynamically, based on daily mortality data
 - **Gu estimates the true infection rate is about 14% of the population** (with a range from 10-18%) versus reported rate (via testing) of <1.8%; **By November, he projects the rate to be 19%** (range of 13-28%)
- Using his projection model, we observe two well-accepted waves of infection spread in the United States and a third possibly already underway:
 - Wave 1: March/April - Connecticut, Massachusetts, New Jersey, New York and Rhode Island (and, to a lesser degree, Delaware, Illinois, Michigan and Pennsylvania)
 - Wave 2: June/July - Arizona, Florida, Georgia, Mississippi, Nevada, South Carolina and Texas
 - Wave 3 - August/? - Arkansas, California, Indiana and Tennessee
- Notably, Louisiana "straddled" Waves 1 and 2, with infection spreads in certain parishes in Wave 1 and in others during Wave 2
- California, widely-associated with Wave 2, seems to be more closely tracking Wave 3
- Next, we review Gu's projections of deaths with the coronavirus in the United States:
 - **Gu projects another 50,000 deaths by November** - to 227k, with a range of 208k-254k
 - Gu's projection and estimated infections would place the **implied infection fatality rate currently at 0.38% (and, failing)**
- Pivoting to the current picture of virus progression in the United States. First on cases and new infections:
 - New cases on Saturday were the fewest for a Saturday in 8 weeks; on Sunday, they were the fewest for a Sunday in 7 weeks
 - **Week-over-week, new cases were down 17%**
 - New infections per capita for the past week fell to its lowest level since June 30. This rate has fallen 37% off its peak experienced during the third week of July
- **Fourteen states experienced an increasing infection rate last week compared to the prior week.** Mississippi has the dubious distinction of having the highest rate for the past week, and it increased week-over-week. Nevada, North Dakota, Tennessee and Texas have the next highest rates; of these however, only North Dakota experienced an increasing rate week-over-week
- **South Dakota set a new high for its new infection rate last week; it had been 126 days since its previous high mark**
- **Health resource utilization continues to ease:**
 - Hospital COVID-19 census has been declining since late July; on a week-to-week comparison, this census has declined 30% in the past 4 weeks
 - ICU census has similarly declined, beginning in mid-July; on a week-to-week comparison, this census is down 20% in the past 3 weeks
 - ER visits for COVID-19-like illness are at their lowest % since June 11
- Testing provides a mixed picture:
 - Test volume on Sunday was its lowest for any day since July 6; **on a week-over-week basis, tests were down 12%**
 - **Test-positive rates, however, are improving: This rate for the past week was as low as it has been since June 19-25**
- Recoveries from the virus are increasing:
 - There are 25% more persons recovered from the virus than considered active cases
 - Recoveries outnumber deaths now by 17.5:1
- Deaths with the virus are trending better:
 - **For the past week, deaths averaged fewer than 1,000 per day and were the lowest since July 22-28**
 - Deaths per reported case have fallen to < 3.1%
 - Using Gu's estimated of true infections, the implied infection fatality rate, as stated above, would be ~0.38%

CDC report suggests that infection rate is higher than reported: How many true infections are there in the United States?

- True infection rates are unknown, due to poor availability of testing; low and asymptomatic cases, etc.
- Gu* hypothesizes a model that incorporates test-positive rates
- Gu concludes:
 - Infection rate in US peaked on July 11 at ~450,000 new daily cases – higher than ~300,000 mini-peak in March
 - Implied infection fatality rate dropped from 1% in March to 0.6% in May to 0.25% in July (cumulative 0.38%), due to:
 - Lower median age
 - Improved treatments
 - Better protection of vulnerable persons
 - Earlier detection
 - Infections slow after reaching 10-35% population prevalence – *presuming that effective infection mitigation efforts are maintained*. Effective herd immunity is lower now than in March/April

Estimated New Daily Infections - Gu Model Projections

United States, As of August 22



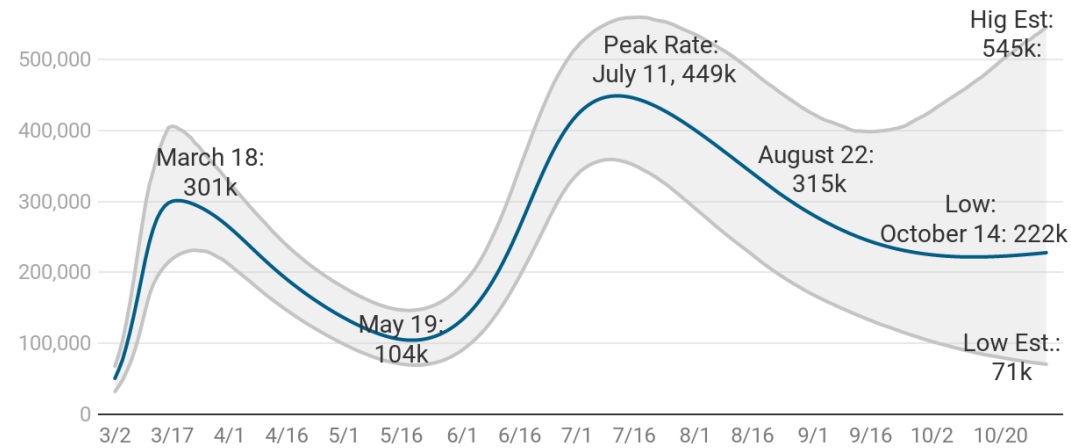
True New Infections - daily confirmed cases $\times (16 \times (\text{positivity rate})^{0.5} + 2.5)$
Chart: Health Industry Advisor LLC • Source: Youyang Gu • Created with Datawrapper

[*Source: "Estimating True Infections: A Simple Heuristic to Measure Implied Infection Fatality Rate", Youyang Gu, July 29, 2020 \(Updated August 5\)](#)

New Daily Infections / Million

Gu Estimates, As of August 22

— Low — High — Mean

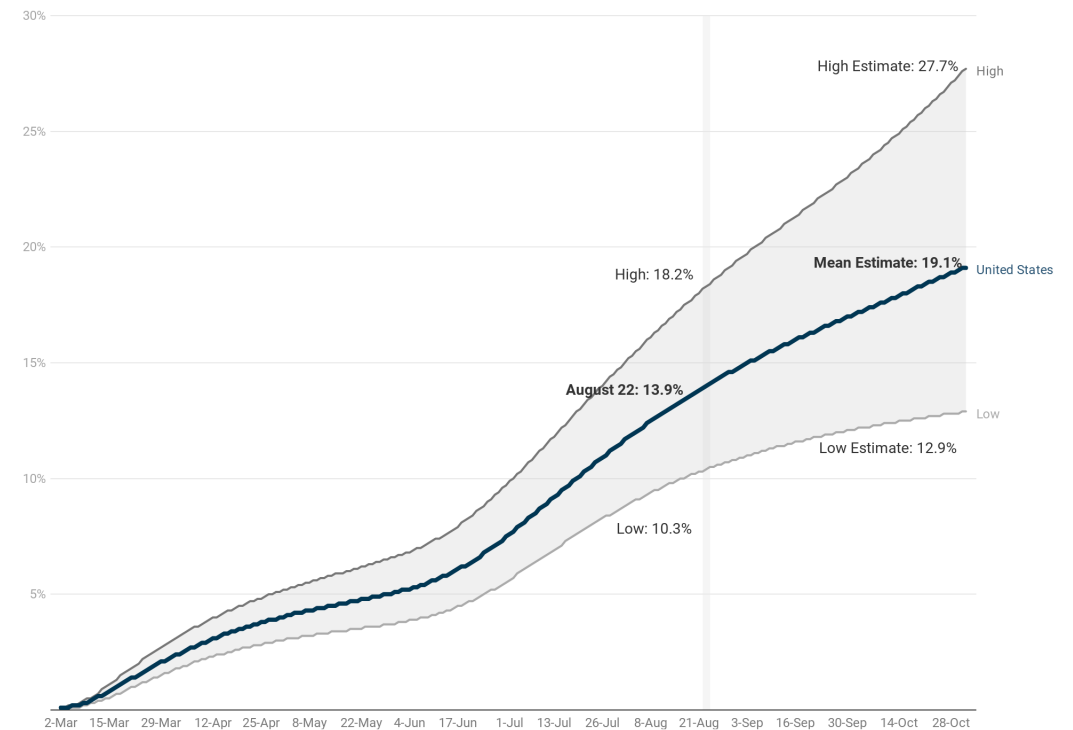


From: Gu, Youyang, "Estimating True Infections: A Simple Heuristic to Measure Implied Infection Fatality Rate"

Chart: Health Industry Advisor LLC • Created with Datawrapper

Estimated Infection Prevalence

Gu Projection Model, As of August 22



From: Gu, Youyang, "Estimating True Infections: A Simple Heuristic to Measure Implied Infection Fatality Rate"

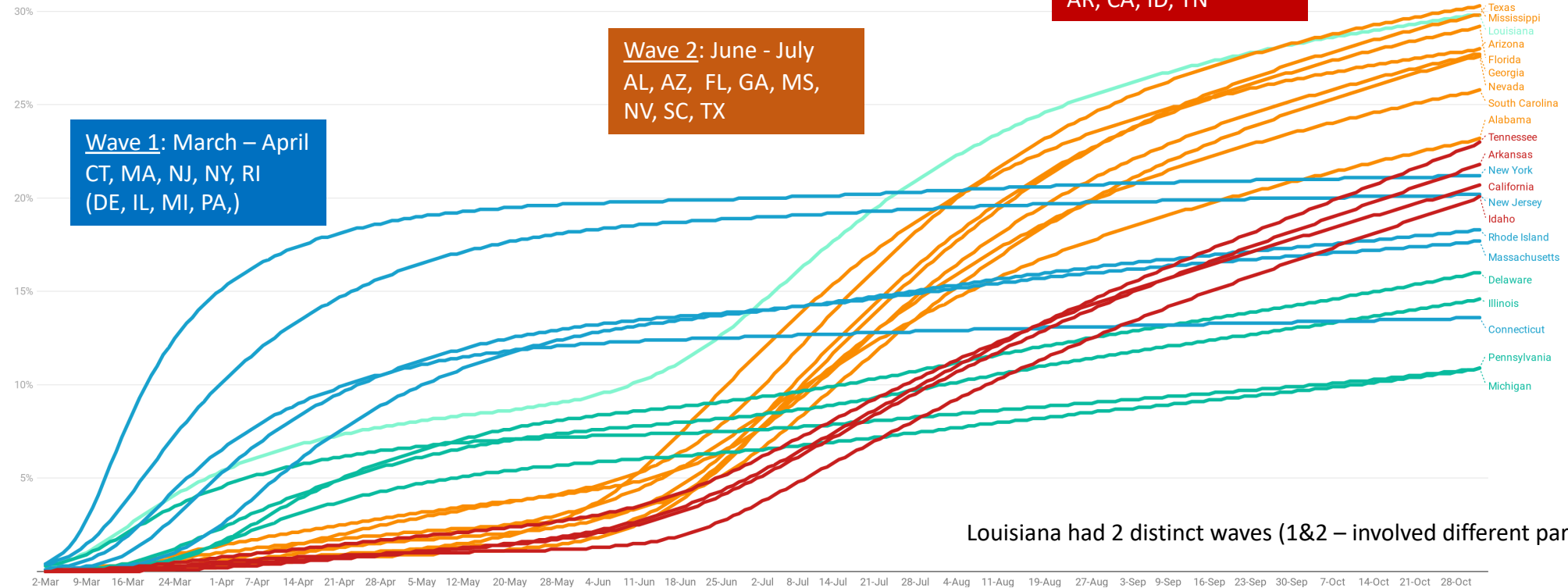
Chart: Health Industry Advisor LLC • Created with Datawrapper

Youyang Gu Projections, as of August 22

A Third Wave? First wave occurred in March/April; Second Wave, which was more intense, began in July and is beginning to taper; Third wave, began in August, with no tapering in sight

Estimated Infections - Three Waves?

Using Mean Gu Estimate, As of August 22



From: Gu, Youyang "Estimating True Infections: A Simple Heuristic to Measure Implied Infection Fatality Rate"
 Chart: Health Industry Advisor LLC • Source: https://github.com/youyanggu/covid19_projections/tree/master/implied_ifr • Created with Datawrapper

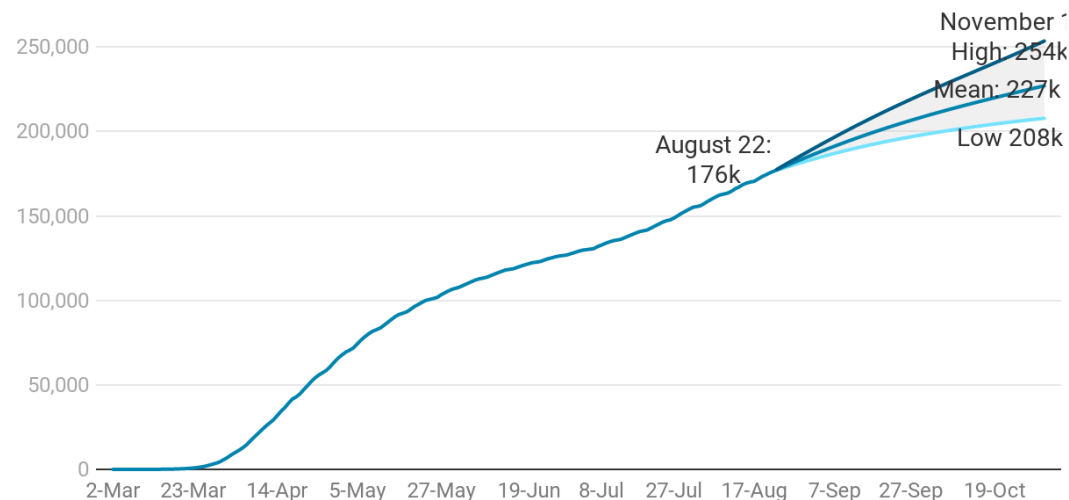
Youyang Gu Projections, as of August 22

Gu projects daily deaths to continue to slide – to ½ the August 1 rate & ¼ the April 18 rate

Still, mean estimate is for another 50,000 deaths by November (Range: 32k-68k)

Projected Coronavirus Deaths in the United States

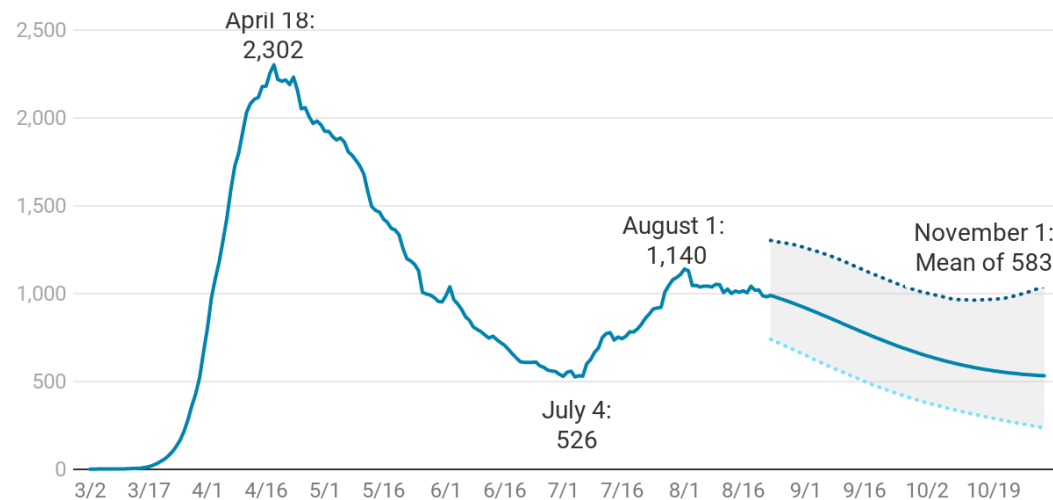
Gu's Projection, As of August 22



From Gu, Youyang "Estimating True Infections: A Simple Heuristic to Measure Implied Infection Fatality Rate"
Chart: Health Industry Advisor LLC • Created with Datawrapper

Daily Deaths

Trailing 7-Day Moving Average Historically, Gu's Estimated Mean Projection, As of August 22



From: Gu, Youyang, "Estimating True Infections: A Simple Heuristic to Measure Implied Infection Fatality Rate"
Chart: Health Industry Advisor LLC • Created with Datawrapper

This Past Weekend's Experience— New Cases & Deaths

New cases were the fewest on a Saturday in 8 weeks; fewest on a Sunday in 7 weeks

Deaths were the fewest on a Friday in Saturday in 3 weeks; fewest on a Sunday in 4 weeks

New Cases

Through August 23

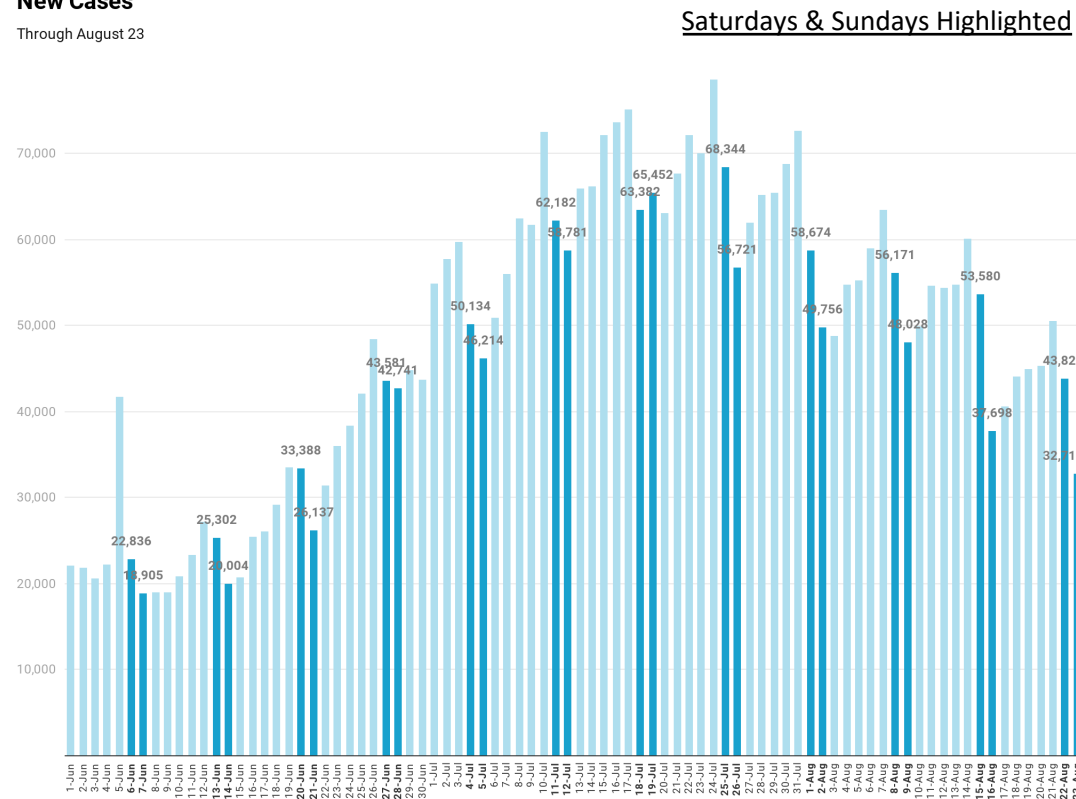


Chart: Health Industry Advisor LLC • Source: eoridometers.info • Created with Datawrapper

Daily Deaths Reported

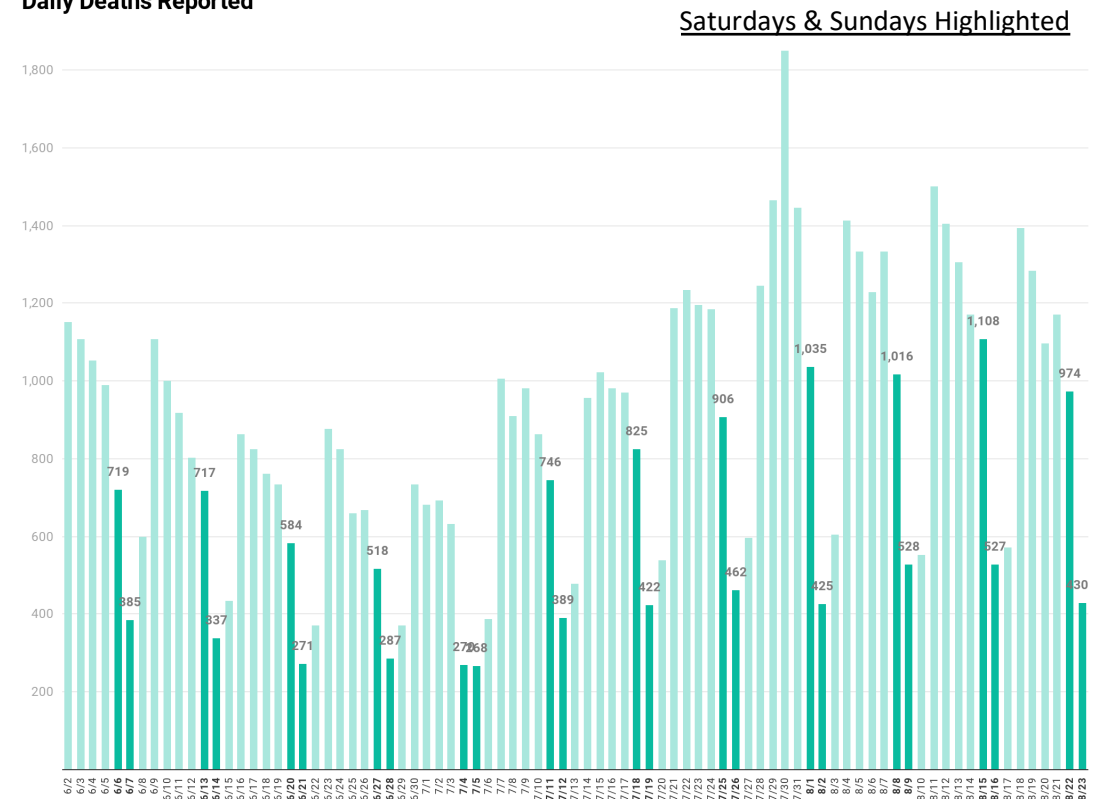


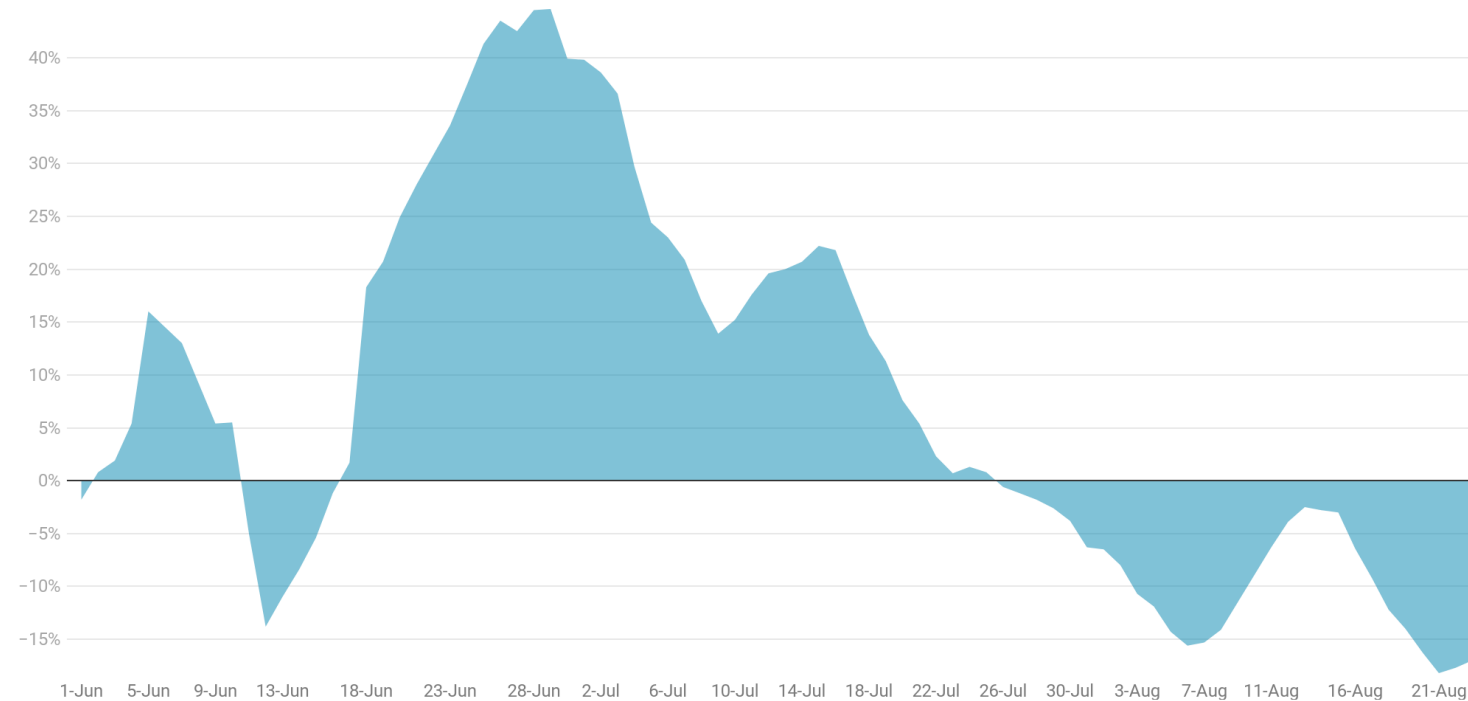
Chart: Health Industry Advisor LLC • Created with Datawrapper

Note the daily pattern: new cases are typically low on Sunday, then increase each day through the week. While we have been noting this for the past few weeks, researchers from MIT, Boston University and Harvard Medical School confirmed this in [a report published by CIDRAP on August 17](#)

United States
Week-over-week, new cases are down 17%

Week-Over-Week Change In New Cases

Through August 23

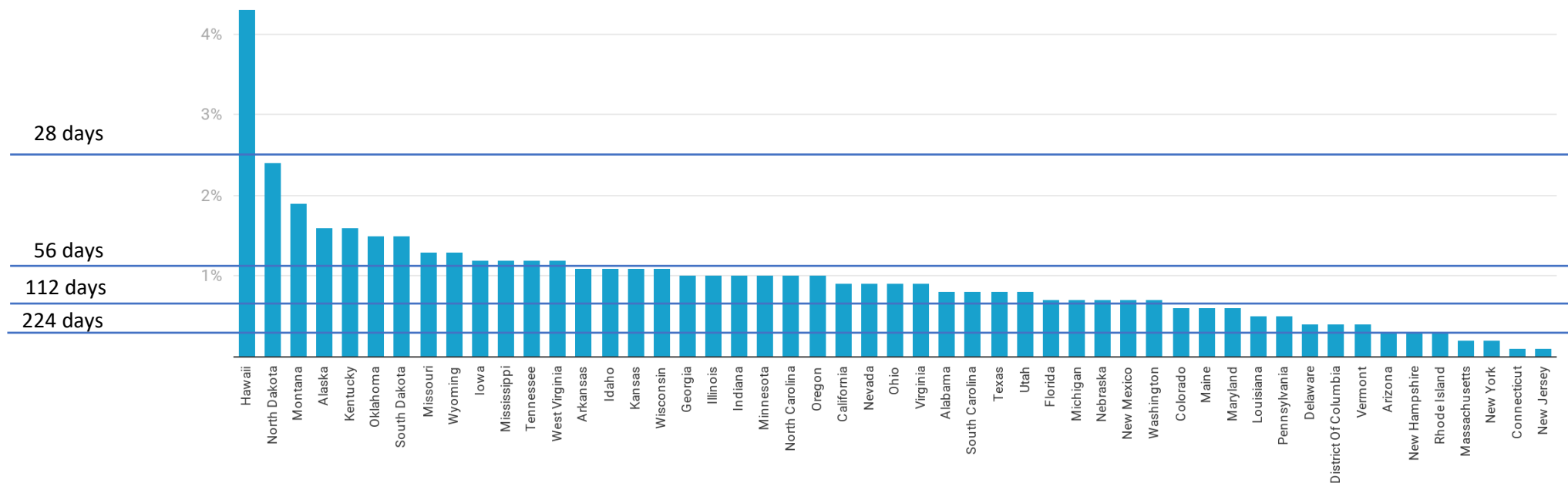


Health Industry Advisor LLC analysis

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

Growth Rate in Total Cases

Trailing 5-Day Moving Average, Through August 23



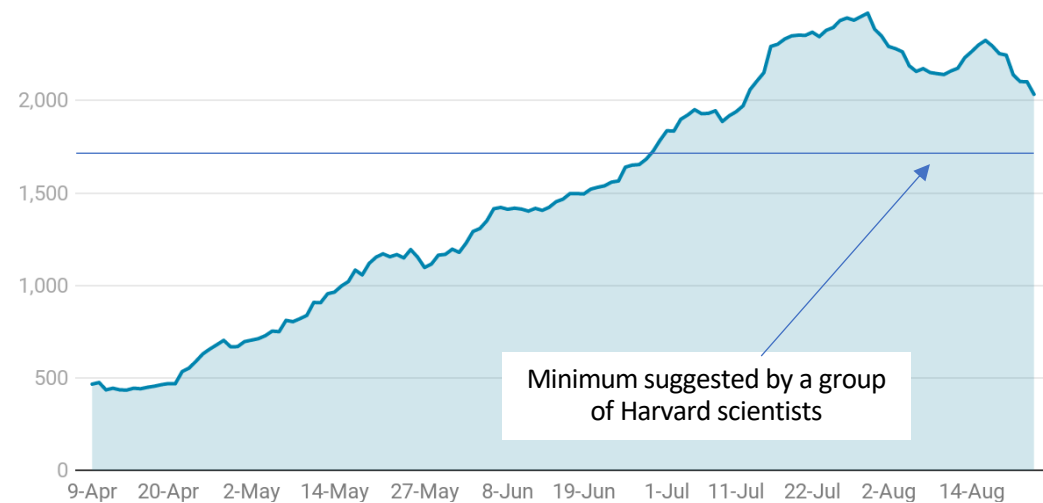
Health Industry Advisor LLC analysis

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

Testing refers to tests for active infection, as reported via state health agencies; does not reflect antibody testing for prior infection

Daily Tests Per 1 Million - United States

Trailing 7-Day Moving Average, As of August 23

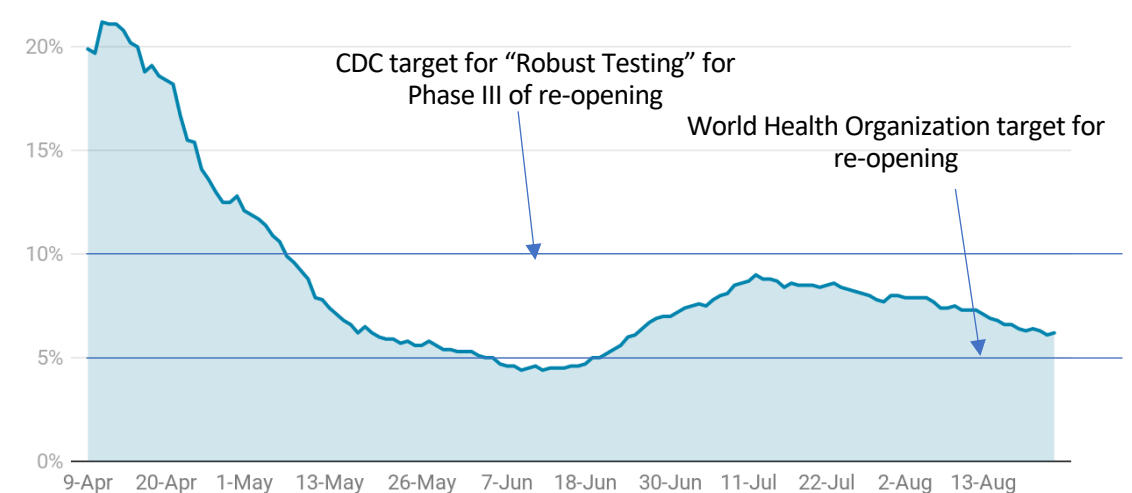


Health Industry Advisor LLC analysis

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

Test-Positive Rate - United States

Trailing 7-Day Moving Average, As of August 23



Health Industry Advisor LLC analysis

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

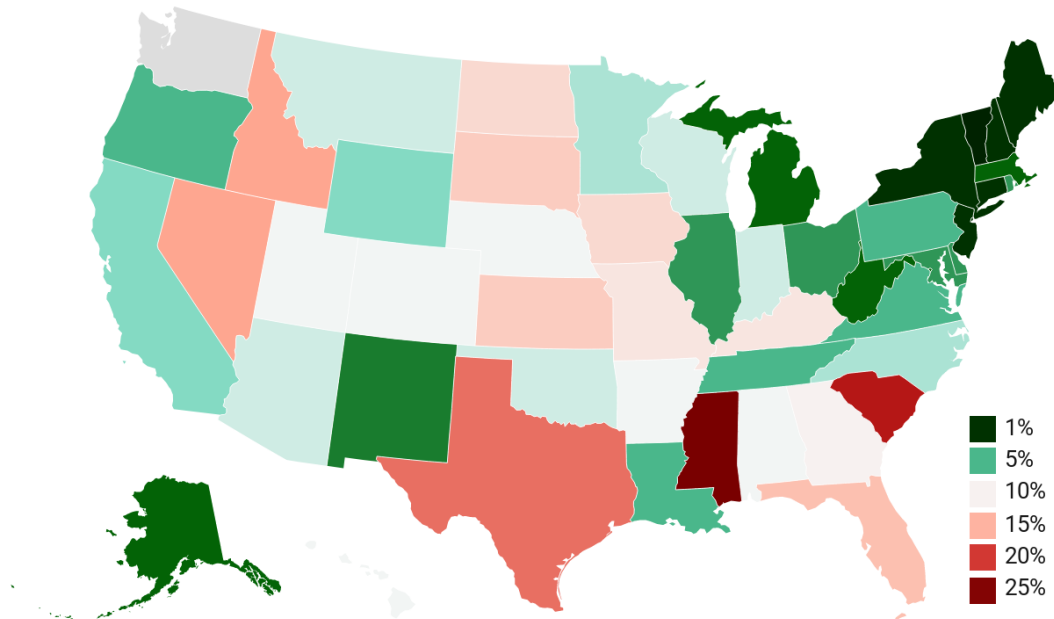
Note: On August 11, North Carolina made a significant adjustment, removing 220,000 tests from their YTD totals. We manually removed this negative adjustment from the August 11 data to better reflect actual testing for that date

Note: Due to a computer glitch, Washington has only reported positive results since August 1. Therefore, test-positive rates from that point forward are slightly overstated by ~0.1%

Testing refers to tests for active infection, as reported via state health agencies; does not reflect antibody testing for prior infection

Test-Positive Rate

Trailing 7-Day Moving Average, As of August 23



Health Industry Advisor LLC analysis

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

Week-Over-Week Change in Test-Positive Rate

Trailing 7-Day Moving Average, As of August 23 v August 16

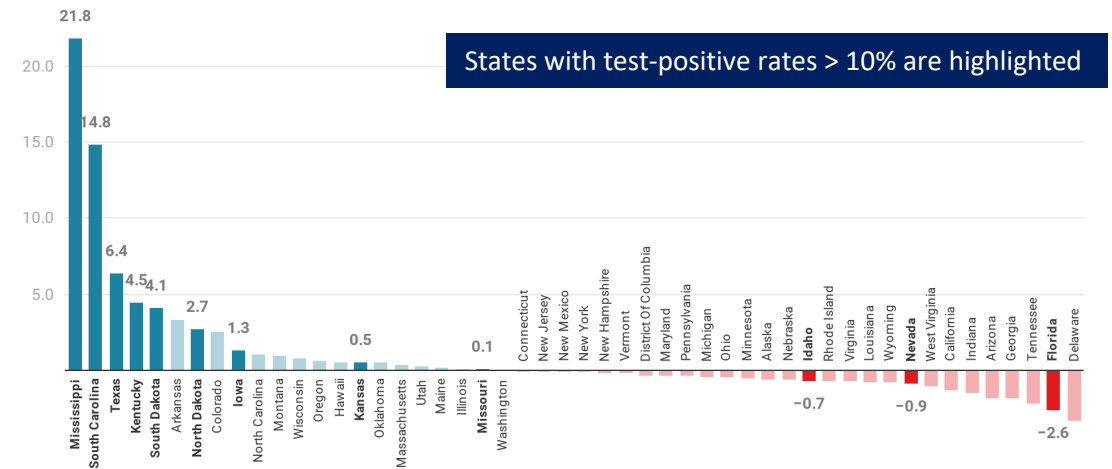
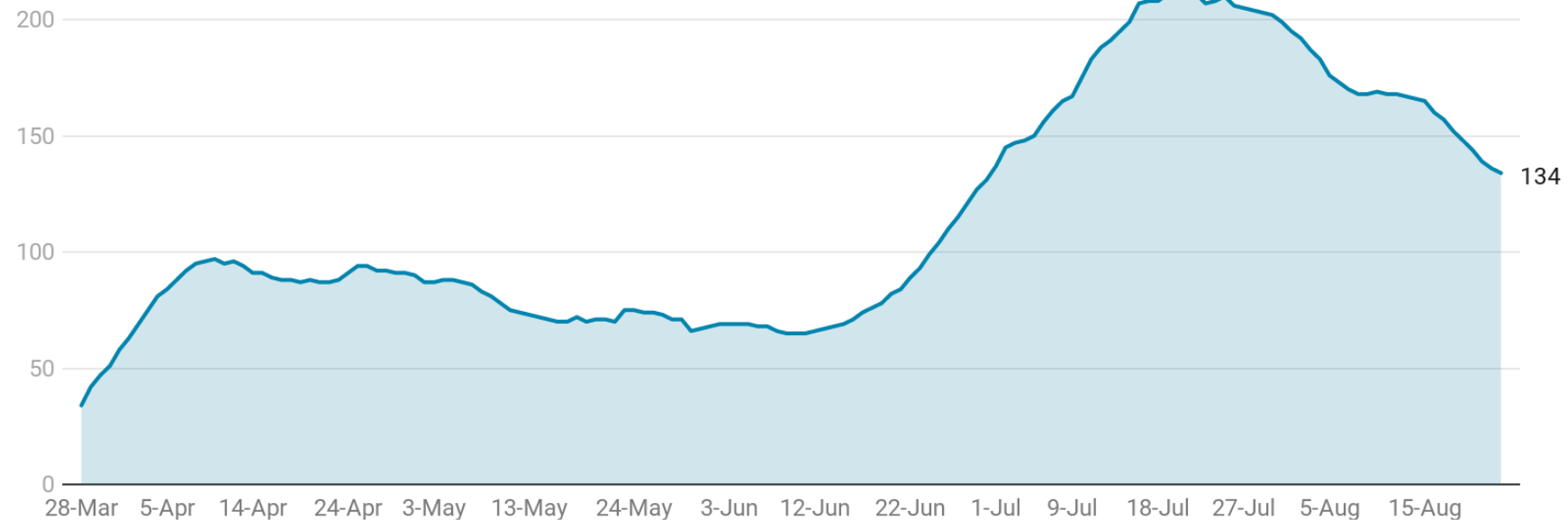


Chart: Health Industry Advisor LLC • Source: The Atlantic's Covid Tracking Projects • Created with Datawrapper

Note: Due to a computer glitch, Washington has only reported positive results since August 1.

New Infections Per 1 Million Population - United States

Trailing 7-Day Moving Average, Through August 23



Health Industry Advisor LLC analysis

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

ng average

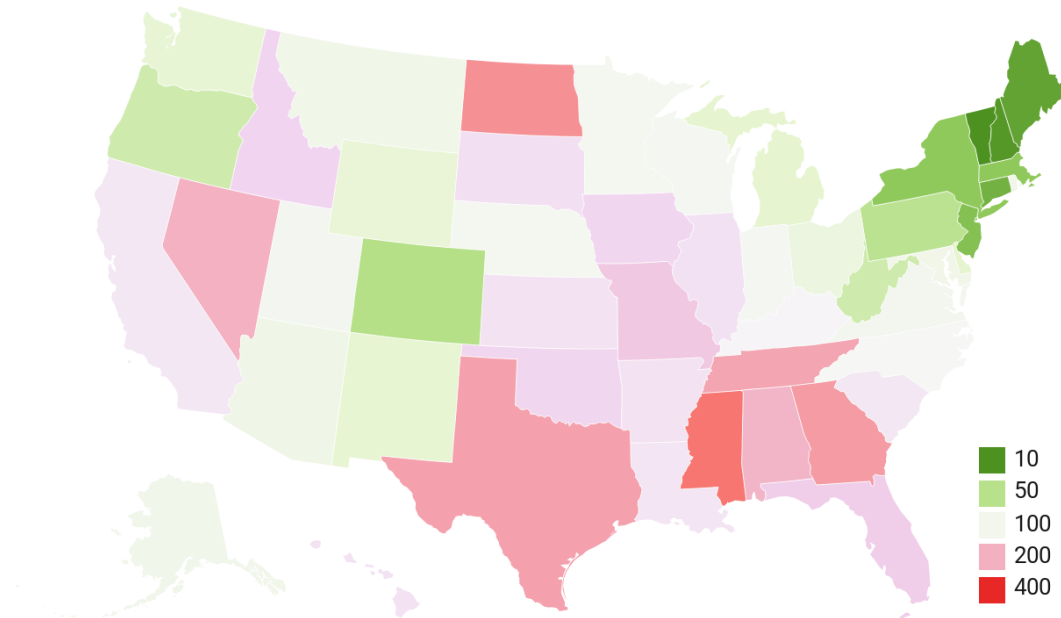
State-By-State

New Infection rates remain high in parts of the South and West but, have eased markedly in the past three weeks

Except for Mississippi and North Dakota, the states with the highest infection rates saw a declining rate last week

New Daily Infections Per 1 Million Population

Trailing 7-Day Moving Average, As of August 23



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

Week-Over-Week Change in New Daily Infections / Million

Trailing 7-Day Moving Average, August 23 v. August 16

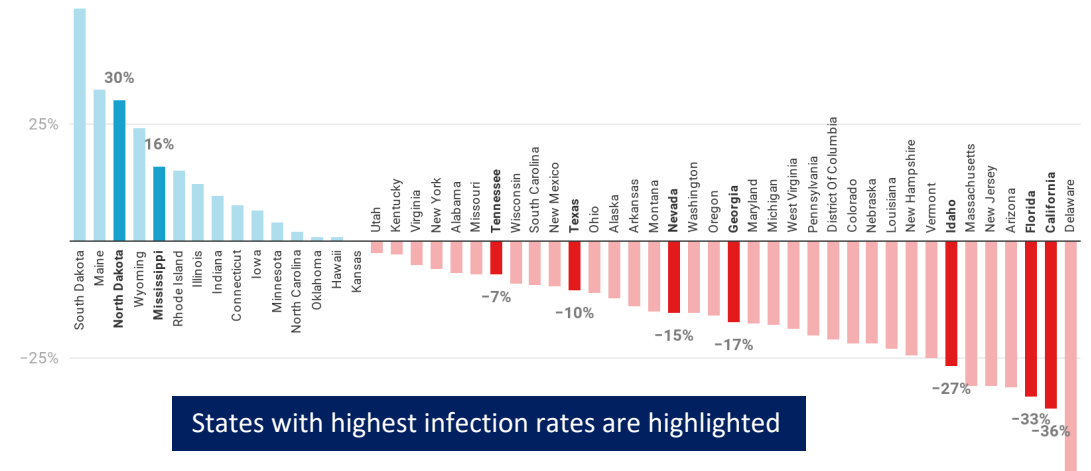
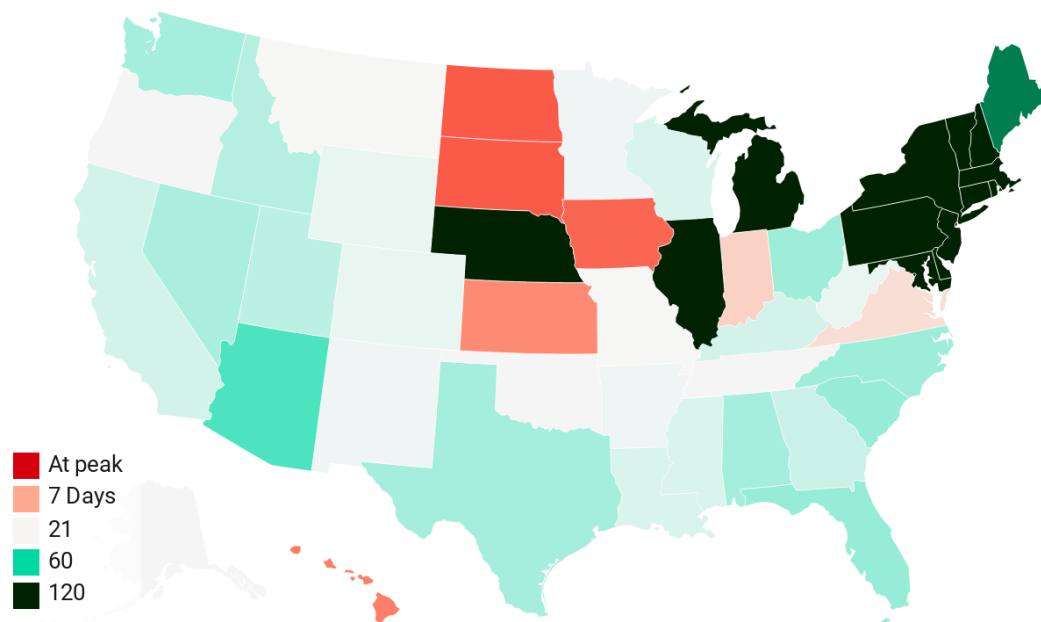


Chart: Health Industry Advisor LLC • Created with Datawrapper

Most states are three weeks or more past their peak new infection rate
Hawaii, Iowa, North Dakota and South Dakota's current rates are at or near
highs (South Dakota hit a new high on Saturday – 126 days after prior high)

Days Since Peak New Infections Per Capita

Trailing 7-Day Moving Average, As of August 23



Health Industry Advisor LLC analysis

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

New Daily Infections / Million - Current Rate as % of Peak

Trailing 7-Day Moving Average, As of August 23

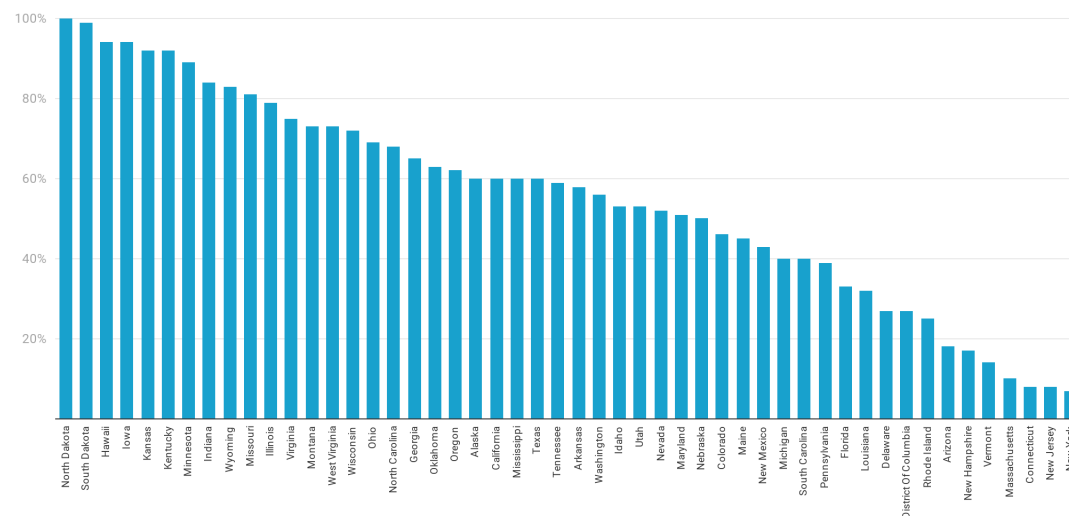
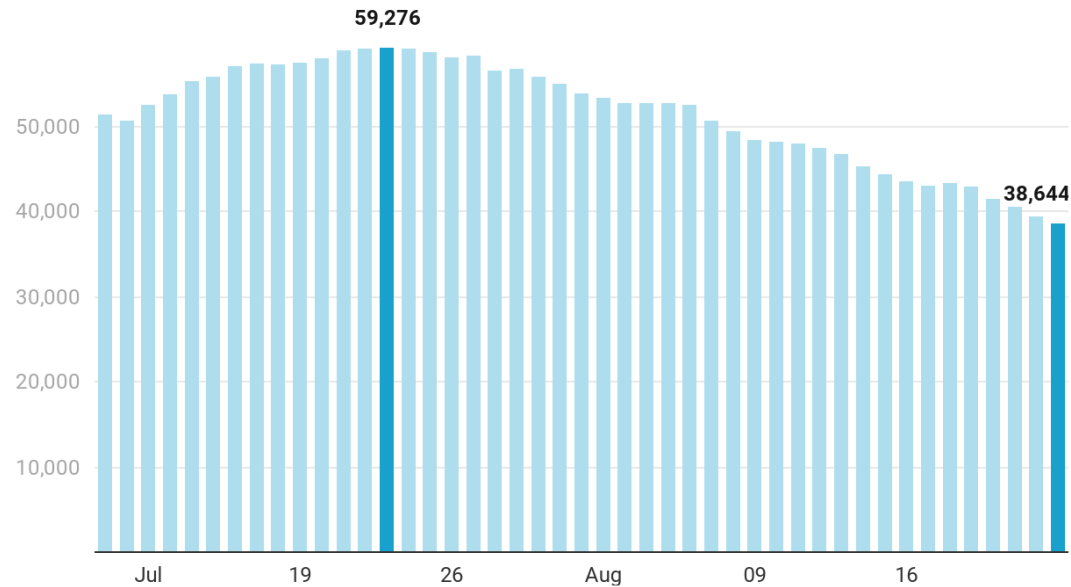


Chart: Health Industry Advisor LLC • Created with Datawrapper

Hospital Census: COVID-19 Patients

As of August 23

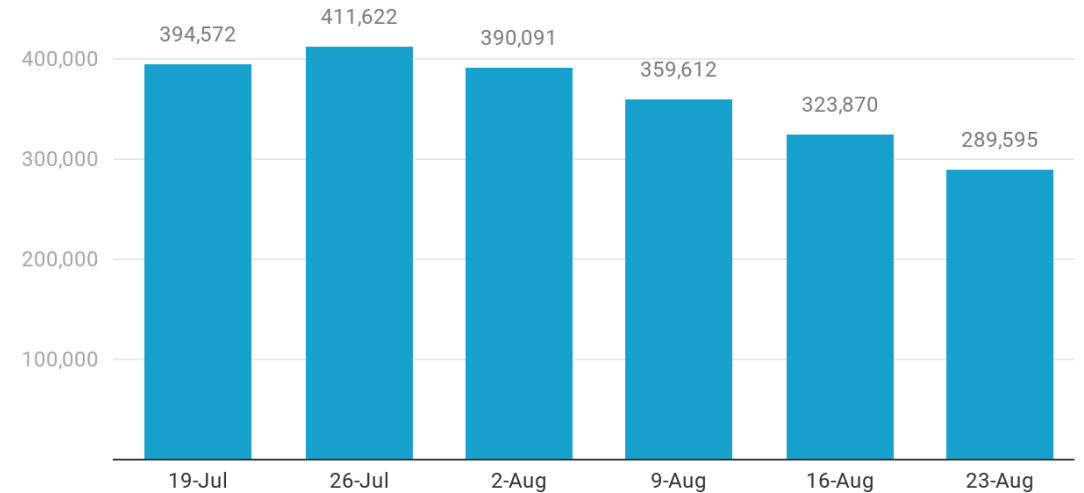


Florida data first available on July 10

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

Weekly Inpatient Days COVID-19 - United States

For the 7 days ending on date shown

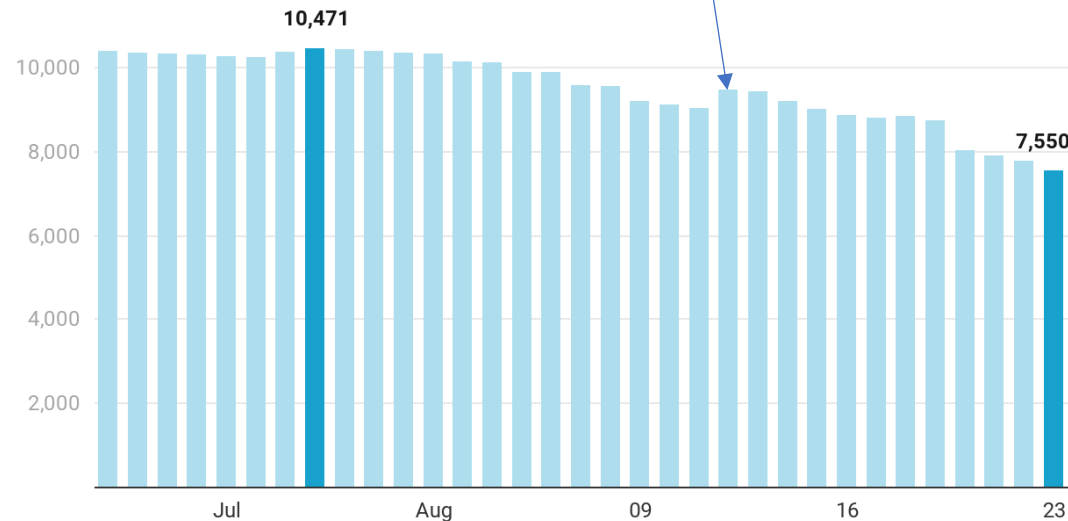


The following states started reporting data on: HI, 7/14; KS, 7/25

Chart: Health Industry Advisor LLC • Source: New York Times • Created with Datawrapper

Stress on ICU beds continues to ease: Daily census has declined since mid-July Weekly census is down 20% this month

COVID-19 ICU Census

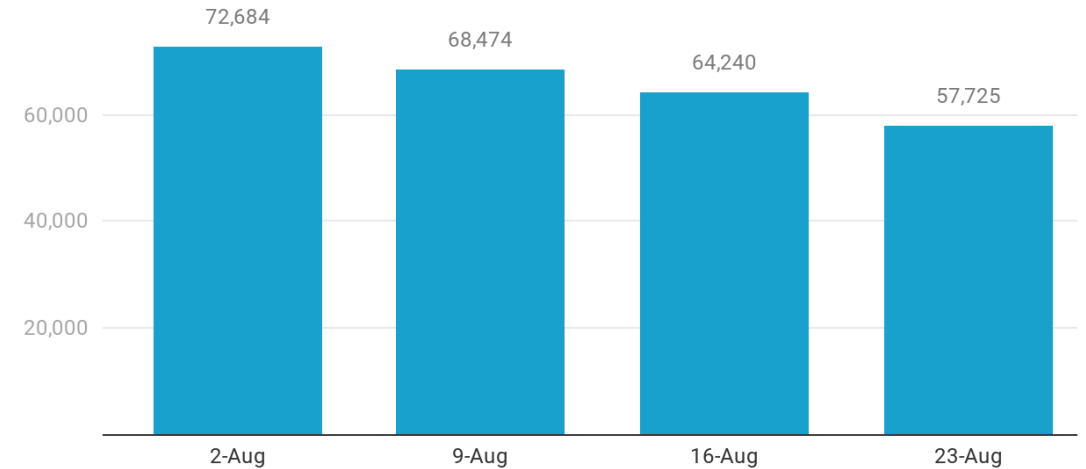


For states reporting these data: AZ, CA, ID, IL, IN, IA, KS, KY, ME, MD, MA, MI, MN, MS, NV, NJ, NY, NC, OH, OK, OR, RI, SC, TX, UT, VA, WI & WY

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

Weekly ICU Census COVID-19 - United States

For the 7 days ending on date shown

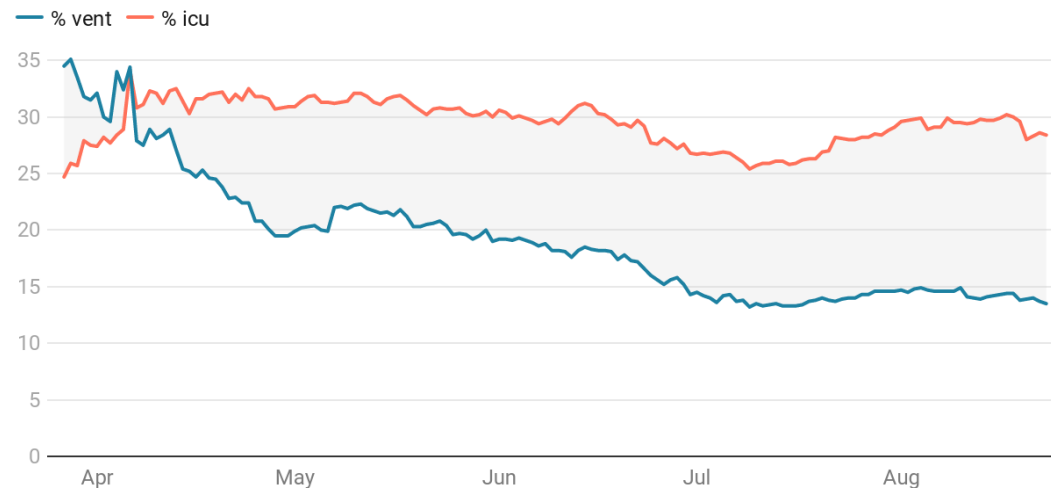


The following states started reporting data on: HI, 7/30; ND, 8/19; SC, 7/28; TN, 8/12. The following states do not report: AL, AK, AR, CO, CT, FL, GA, LA, MO, MT, NE, NH, NM, PA, SD, VT, WA

Chart: Health Industry Advisor LLC • Source: New York Times • Created with Datawrapper

Severity of Hospitalized Patients

% of patients on ventilators and in the ICU, As of August 23

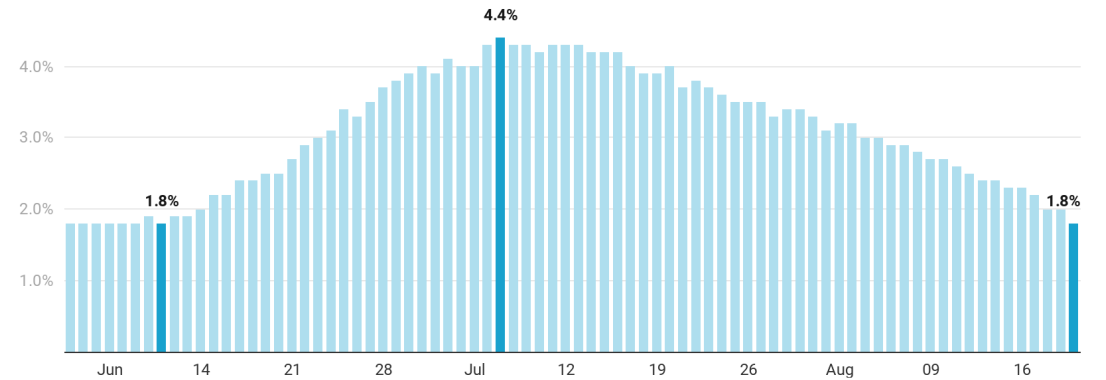


Health Industry Advisor LLC analysis

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

% of Emergency Department Visits for COVID-Like Illness

As of August 20



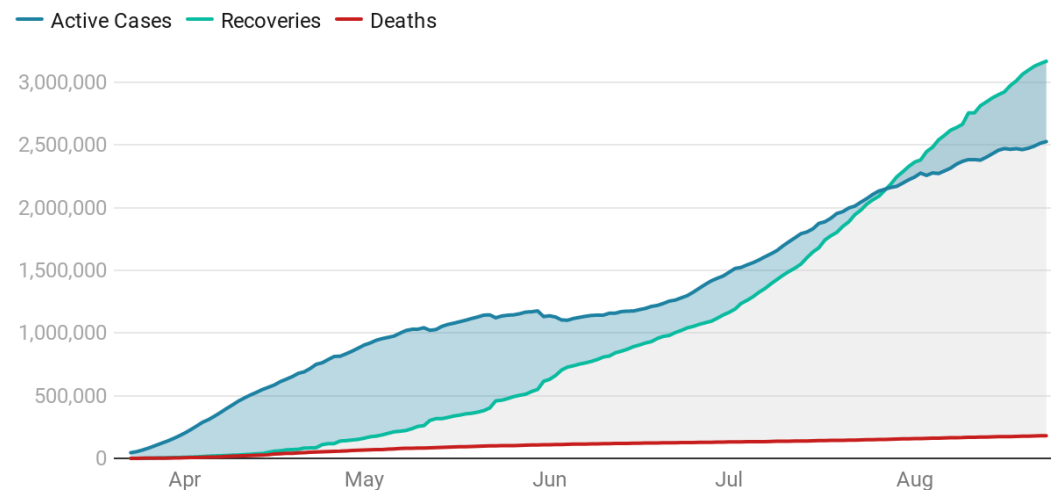
Health Industry Advisor LLC analysis

Chart: Health Industry Advisor LLC • Source: Centers for Disease Control • Created with Datawrapper

Nearly 3.2 million have recovered from the coronavirus in the U.S. -
25% more recoveries than active cases at this point
More than 17.5 recovered persons for each death

Active Cases v. Recoveries & Deaths

Through August 23

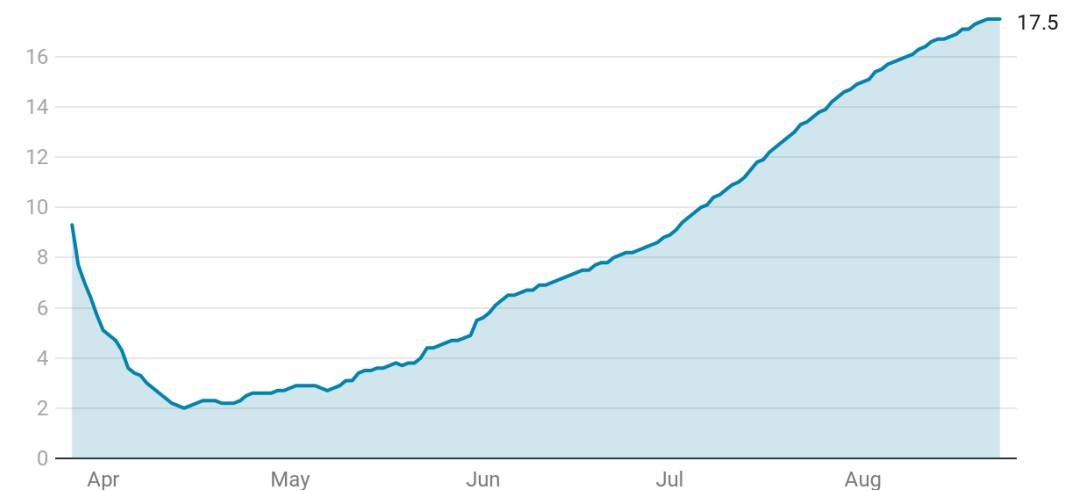


Health Industry Advisor LLC analysis

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

Recoveries: Deaths - United States

As of August 23



Health Industry Advisor LLC analysis

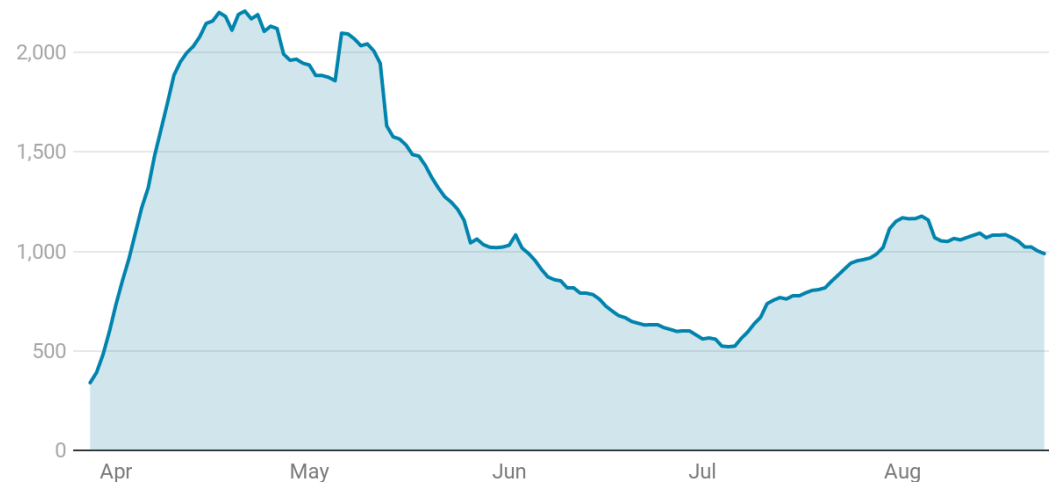
Chart: Health Industry Advisor LLC • Source: worldometers.info • Created with Datawrapper

Deaths for the past week lowest since July 22-28

Deaths per reported case now <3.1% (0.38% based on Gu's estimated of true infections)

Deaths Recorded With Coronavirus in the U.S.

Trailing 7-Day Moving Average, As of August 23

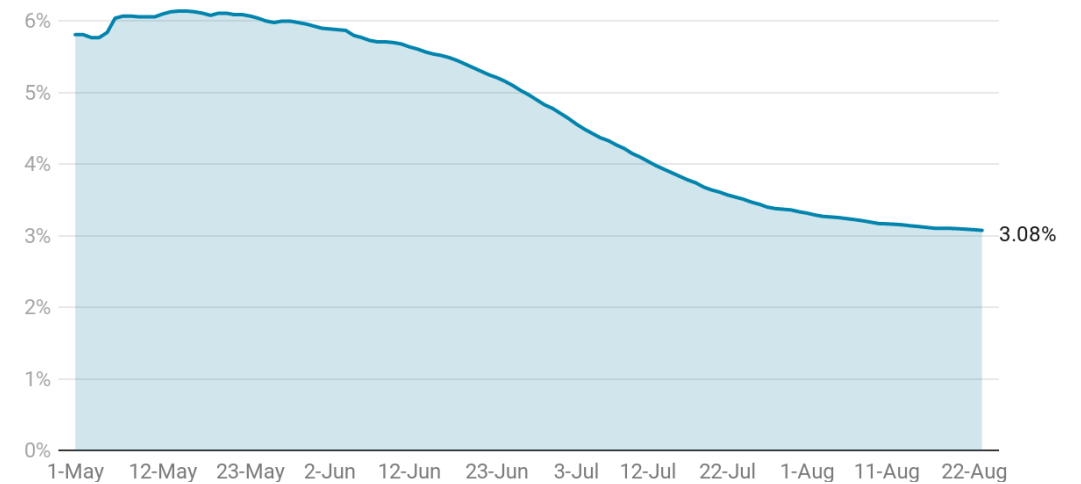


Health Industry Advisor LLC analysis

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

Deaths Per Case

As of August 23



Health Industry Advisor LLC analysis

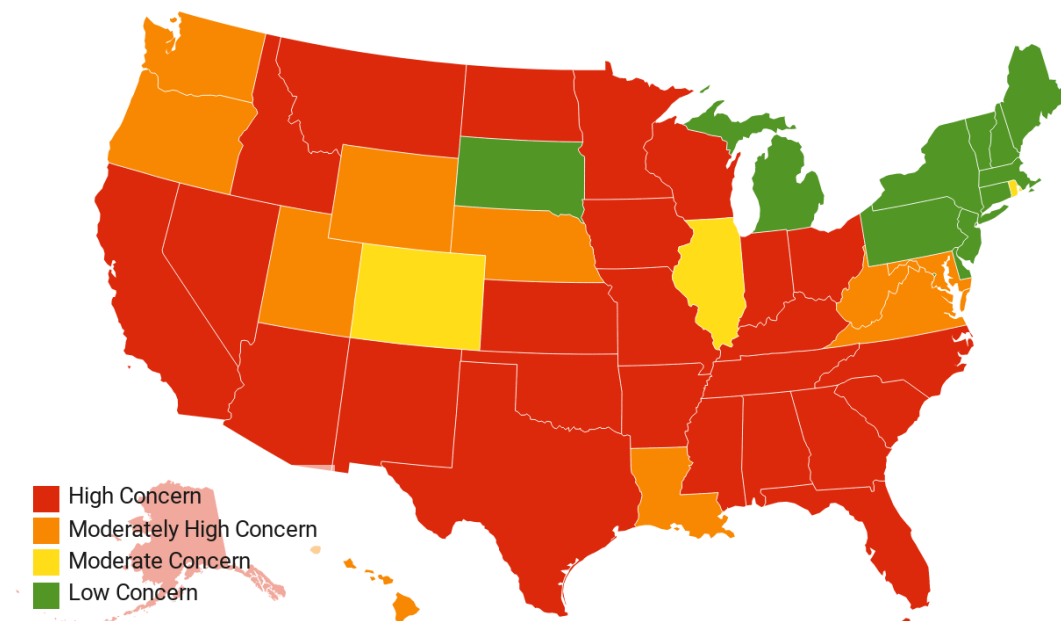
Chart: Health Industry Advisor LLC • Source: worldometers.info • Created with Datawrapper

State-By-State – Multi-Factor Scorecard

The map has improved in August: Arizona, Colorado and New Mexico are now “Green”; Louisiana, Ohio and Washington are “Yellow”; Alabama, Delaware, Indiana, Minnesota, Montana, Tennessee and Wisconsin are now “Orange”; Illinois and Rhode Island slipped to “Orange”; South Dakota slipped to “Red”

Scorecard

As of July 31

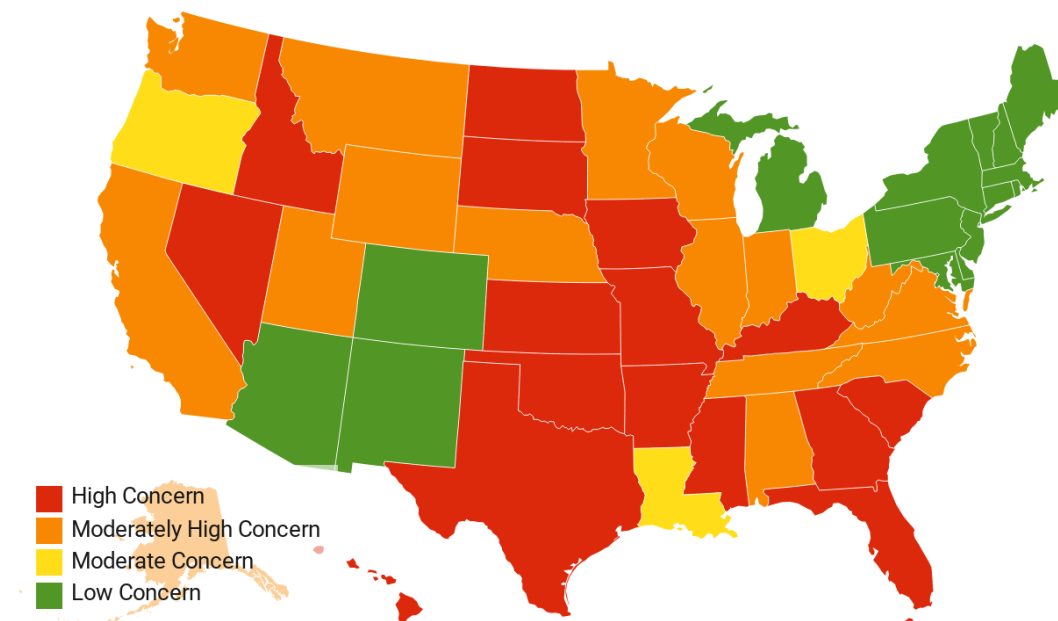


Scoring based on new infection, test-positive, hospitalization and case growth rates

Map: Health Industry Advisor LLC • Created with Datawrapper

Scorecard

As of August 23



Scoring based on new infection, test-positive, hospitalization and case growth rates

Map: Health Industry Advisor LLC • Created with Datawrapper

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, National, Regional, and State Level Outpatient Illness and Viral Surveillance <https://gis.cdc.gov/grasp/fluview/fluportaldashboard.html>
- Centers for Disease Control, COVID-19 Laboratory-Confirmed Hospitalizations https://gis.cdc.gov/grasp/COVIDNet/COVID19_5.html
- Centers for Disease Control, COVID Data Tracker <https://www.cdc.gov/covid-data-tracker/index.html#mobility>
- 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>