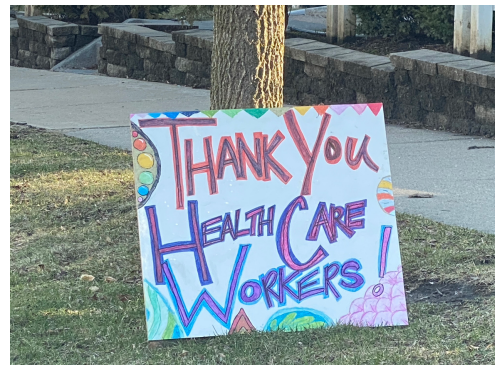
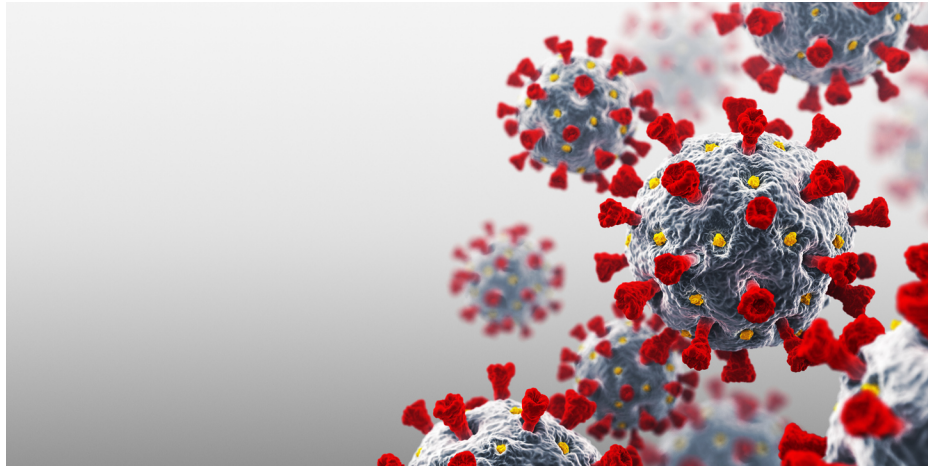
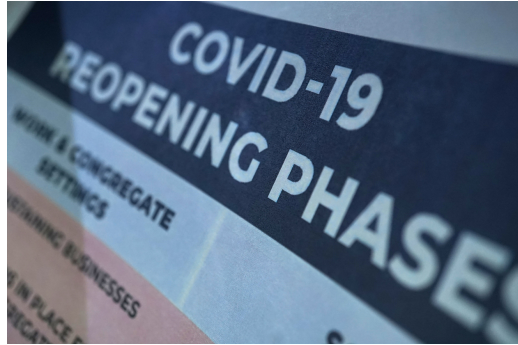




COVID-19 Report

Issue # 154

Friday, September 4, 2020

- Estimated total infections and projected deaths
 - If you have been following regularly, you are already aware that we often reference MIT-trained data scientist Youyang Gu's COVID-19 model projections. Gu uses a machine-based learning approach to provide dynamic updates to his model of estimated total infections and deaths with the coronavirus
 - Gu's model provides estimates of total infections, addressing the gap cited by the CDC that reported infection rates via testing are understated by 8x or more
 - **Gu estimates total infections in the United States of 48.4 million as of September 2 (with a range of 35.5M-60.1M), versus the 6.3 million currently reported;** He projects that an additional 20% or 5.1M new infections by November 1
 - He estimates an additional 34k deaths by November 1 (with a range of 21k-53k additional deaths; This is in sharp contrast to the additional 69k deaths by November 1 projected by the Institute for Health Metrics and Evaluation (IHME)
 - **Several states seem to have neared or reached a plateau in the implied infection rate (total estimated infections / population), including Colorado, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Pennsylvania, and Vermont.** Many of these states were generally hit hard earlier in the pandemic
 - Several other states were part of a mid-summer wave of infections. These states may be starting to see a plateau: Arizona, California, Florida, Georgia and Texas
 - States that are more-recently part of a wave of new infections - Alabama, Hawaii, Iowa, Kansas, Mississippi, Missouri, North Dakota, South Carolina, South Dakota and Tennessee - are still experiencing rising implied infection rates
- Newly reported cases and infection rates
 - **New daily cases were down 5.7% on a week-over-week basis, as of yesterday**
 - New cases yesterday were the lowest they have been on a Thursday in the past ten weeks
 - **New infection rates, on a 7-day average basis, declined again yesterday; These are now at the lowest point since June 28**
 - **This new infection rate has declined 40% since July 22**
 - The shift in new infection intensity from the Southeast and West to Iowa and the Dakotas continued yesterday
- Deaths with coronavirus
 - **The daily average deaths (7-day average) have been declining for three weeks. Yesterday's 7-day average deaths were the lowest since July 22**
 - Fewer deaths were reported yesterday than for any Thursday in the past 7 weeks
- Healthcare resource use
 - Stress on the healthcare system continued to ease yesterday; **hospital COVID-19 census declined for the 36th time in the past 42 days; this census is down by 40% during this period**
 - **ICU census of COVID-19 patients also declined, this for the 34th time in the past 42 days; this census is down by 34% during this period**
 - **ER visits for COVID-19-like illnesses, as a % of total ER visits, are down more than 60% since early July**

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 12 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

[*Source: “Estimating True Infections: A Simple Heuristic to Measure Implied Infection Fatality Rate”, Youyang Gu, July 29, 2020 \(Updated September 2\)](#)

New Infections

Youyang Gu Projections, As of September 2

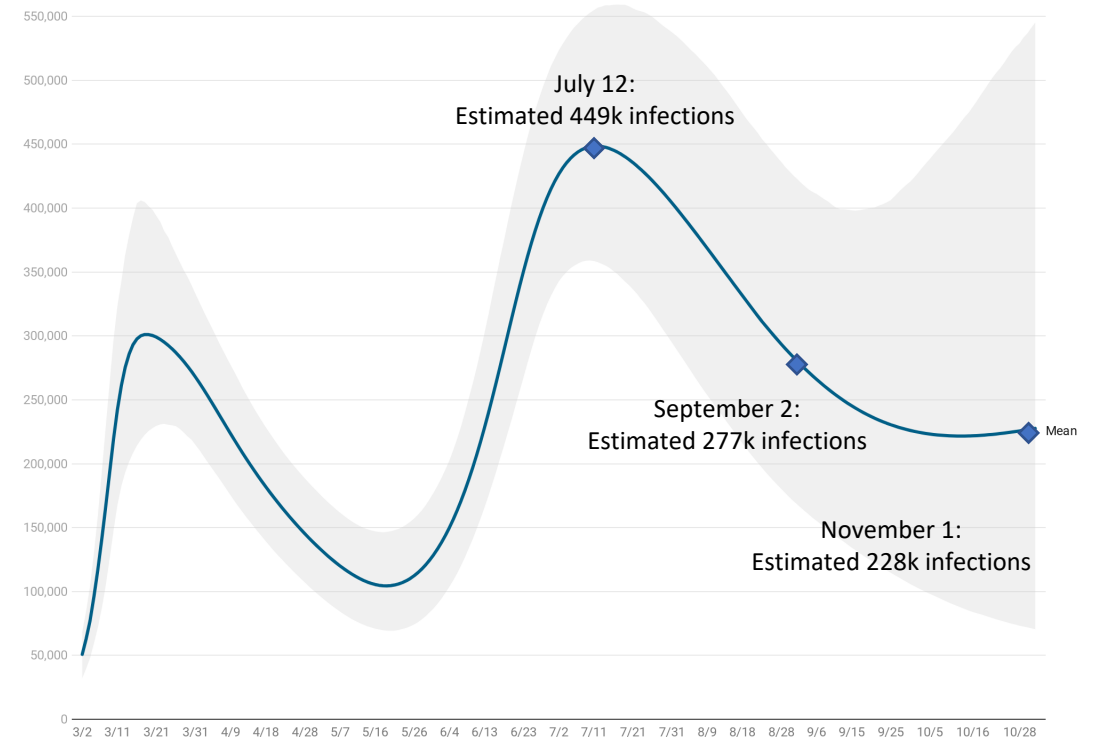


Chart: Health Industry Advisor LLC • Source: <https://covid19-projections.com> • Created with Datawrapper

Youyang Gu Projections, as of September 2

Daily infection rate peaked on July 12; estimated to have declined ~40% since, with another ~20% by November 1

Estimated total infections projected to increase by 22% by November 1

New Infections

Youyang Gu Projections, As of September 2

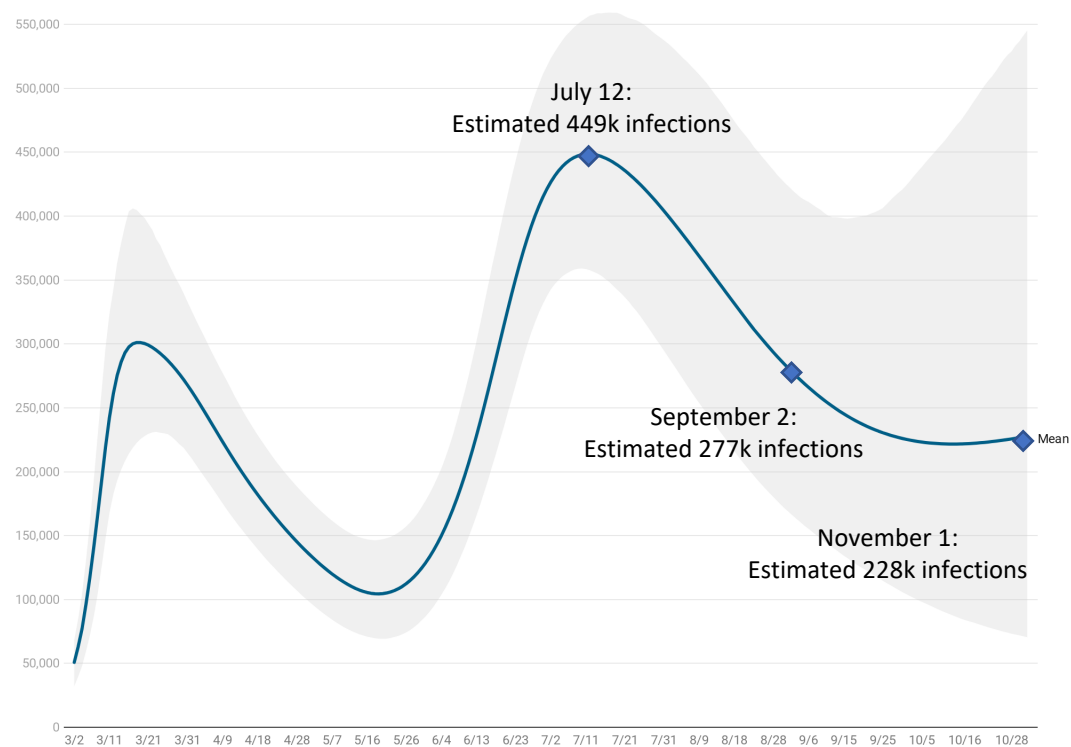


Chart: Health Industry Advisor LLC • Source: <https://covid19-projections.com> • Created with Datawrapper

Total Estimated Infections

Youyang Gu Projections, As of September 2

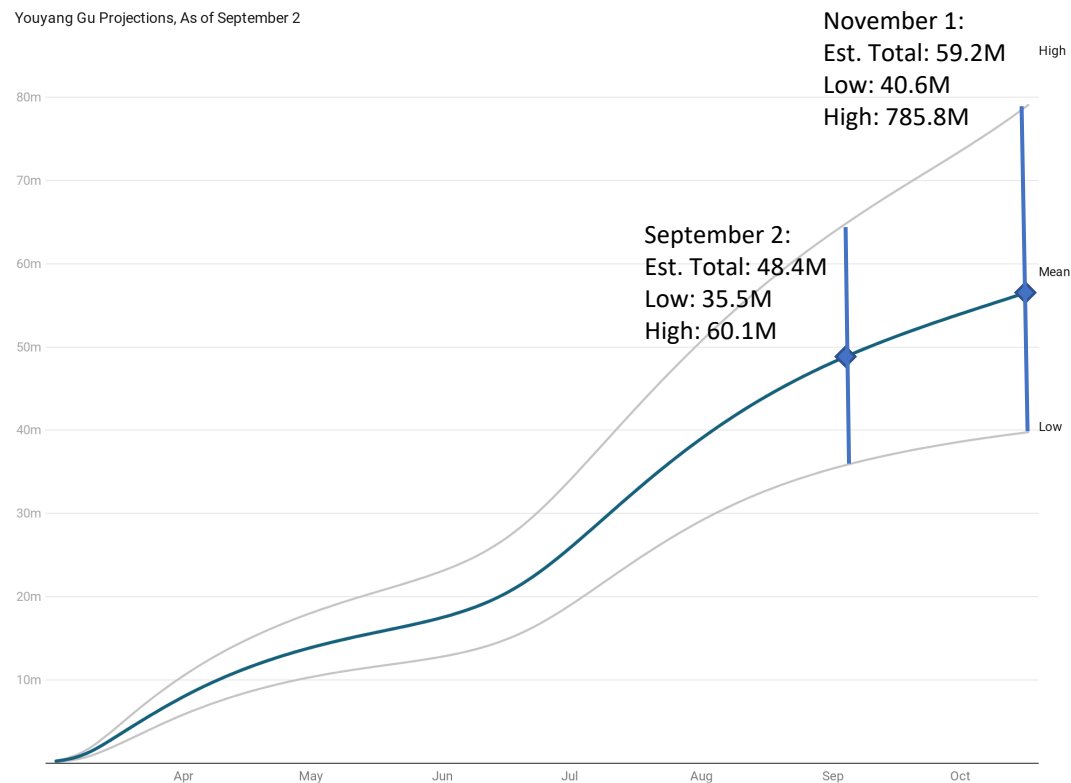


Chart: Health Industry Advisor LLC • Source: <https://covid19-projections.com> • Created with Datawrapper

Deaths With Coronavirus

Youyang Gu Projections, As of September 2

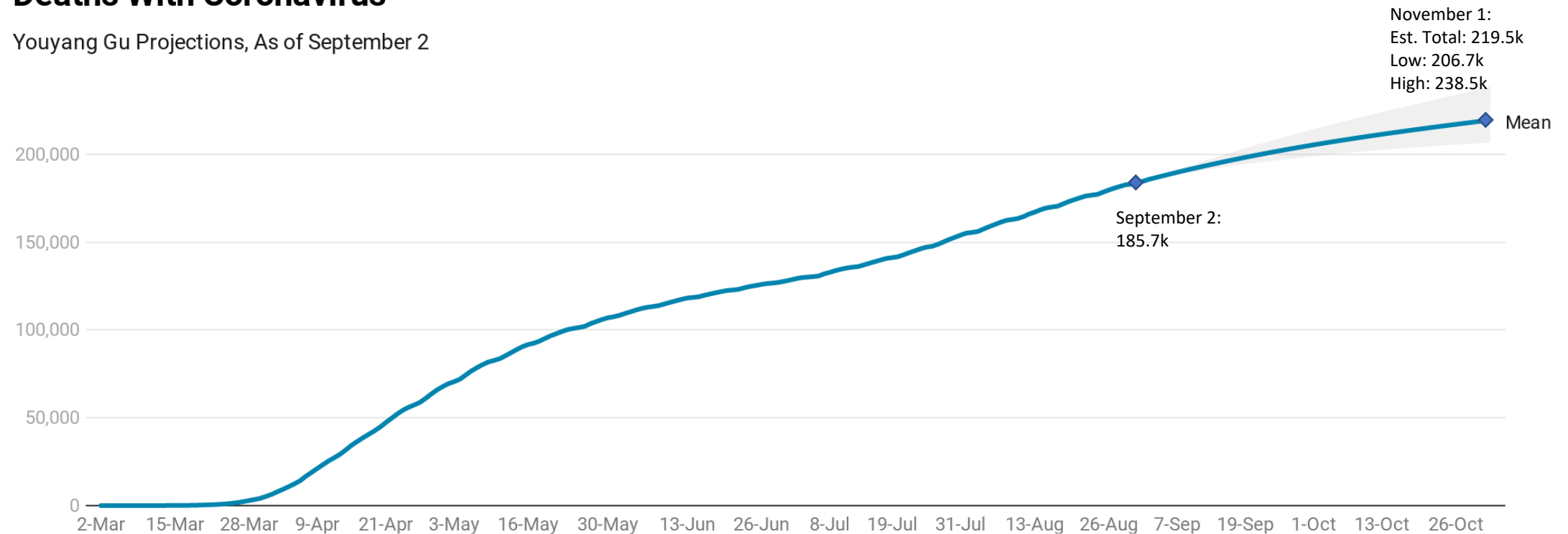


Chart: Health Industry Advisor LLC • Source: <https://covid19-projections.com> • Created with Datawrapper

Youyang Gu Projections, as of September 2

Implied infection rates may have plateaued in Colorado, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Pennsylvania, and Vermont

Implied Infection Rate - States That Have Plateaued

Youyang Gu's Projections, As of September 2

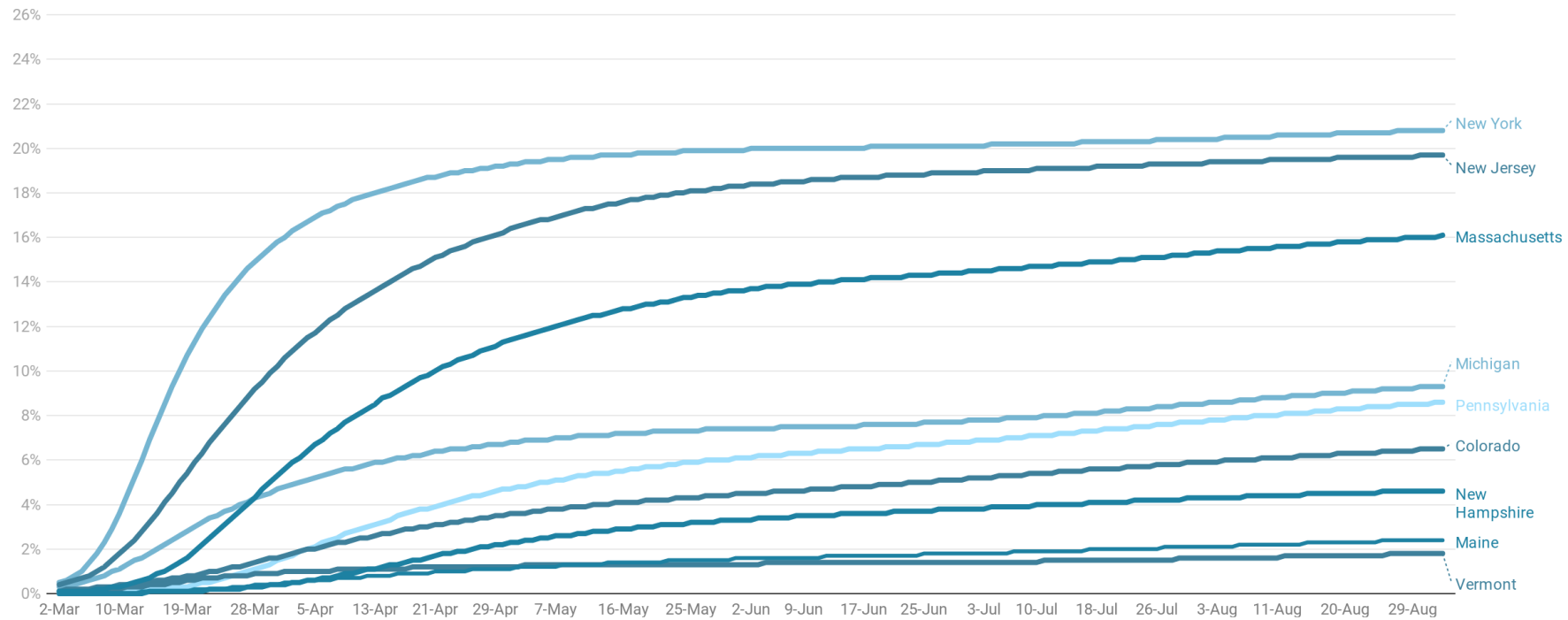


Chart: Health Industry Advisor LLC • Source: <https://covid19-projections.com> • Created with Datawrapper

Youyang Gu Projections, as of September 2

Arizona, California, Florida, Georgia and Texas were part of the more-recent wave of new infections

Are implied infection rates in these states starting to plateau?

Implied Infection Rate - States In Wave 2

Youyang Gu's Projections, As of September 2

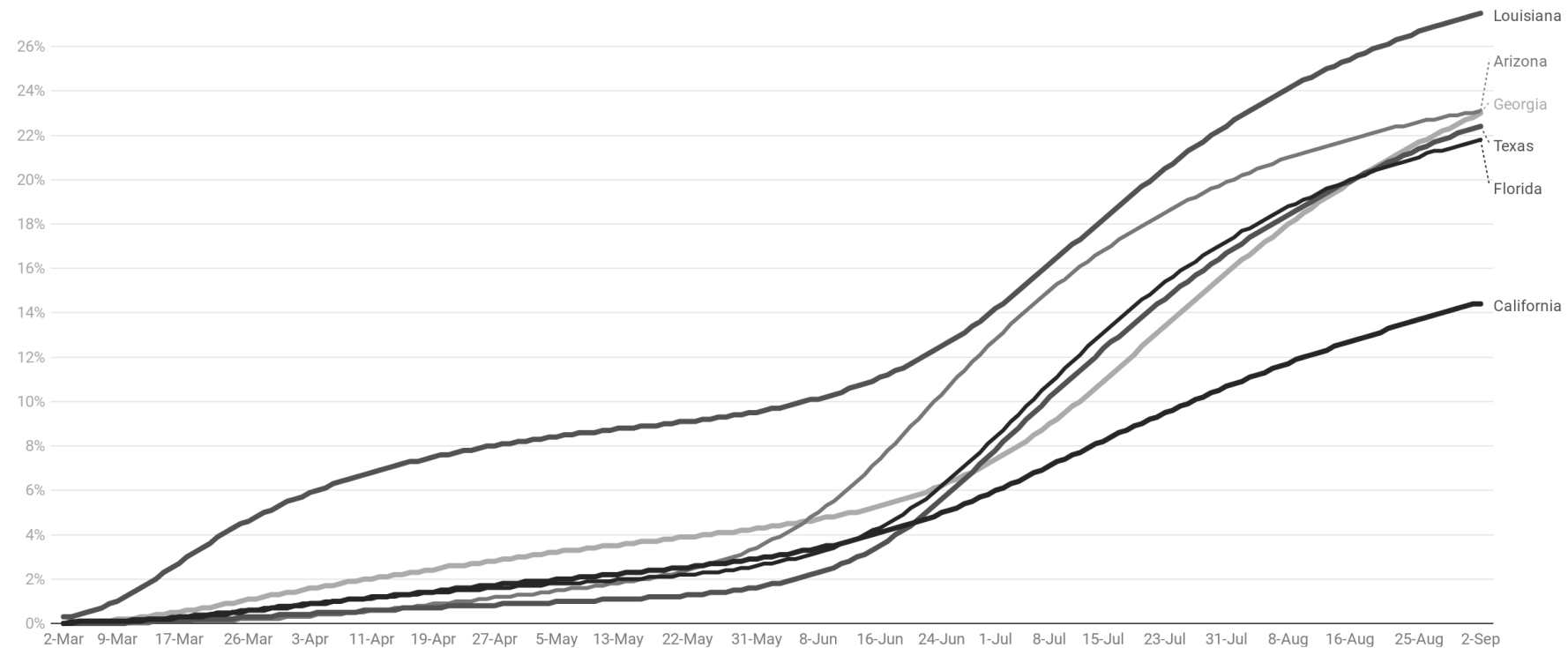


Chart: Health Industry Advisor LLC • Source: <https://covid19-projections.com> • Created with Datawrapper

Youyang Gu Projections, as of September 2

Alabama, Hawaii, Iowa, Kansas, Mississippi, Missouri, North Dakota, South Carolina, South Dakota and Tennessee are part of latest wave of new infections
Implied infection rates in these states appear to be rising

Implied Infection Rate - Current/Recent "Hot Spots"

Youyang Gu's Projections, As of September 2

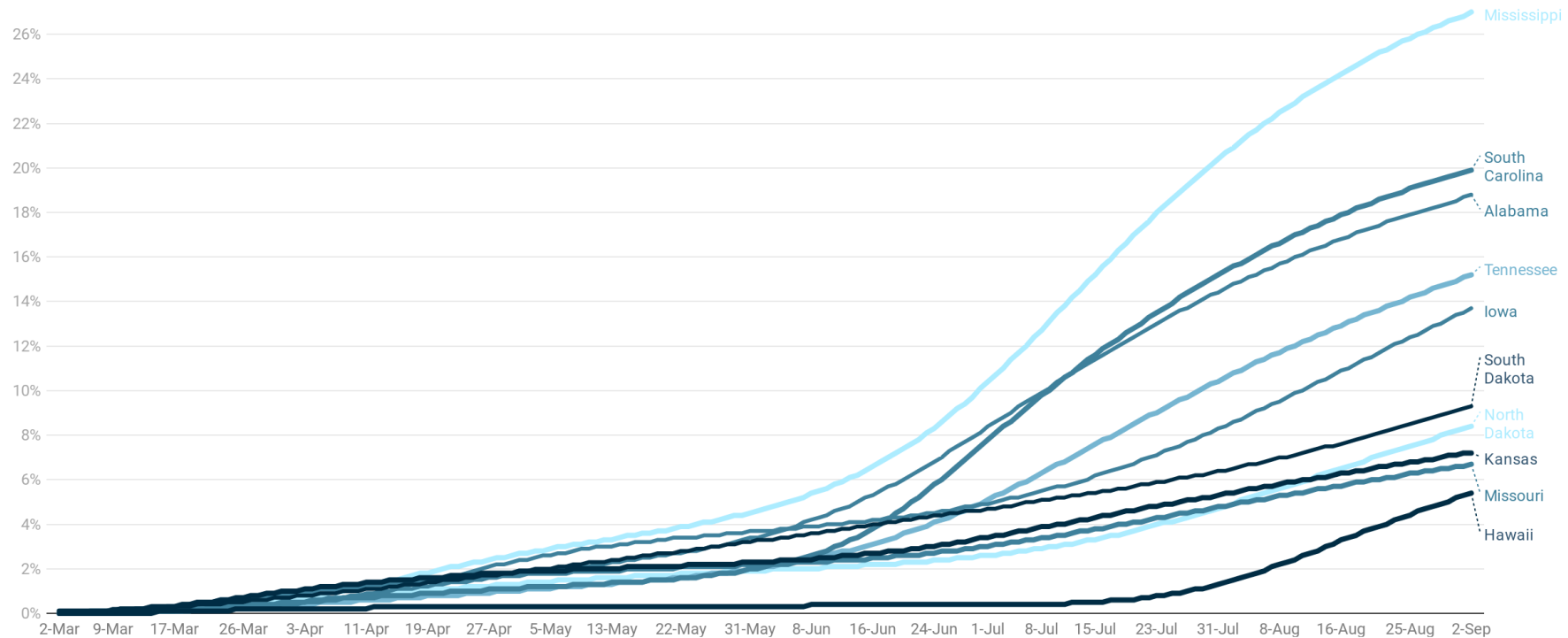
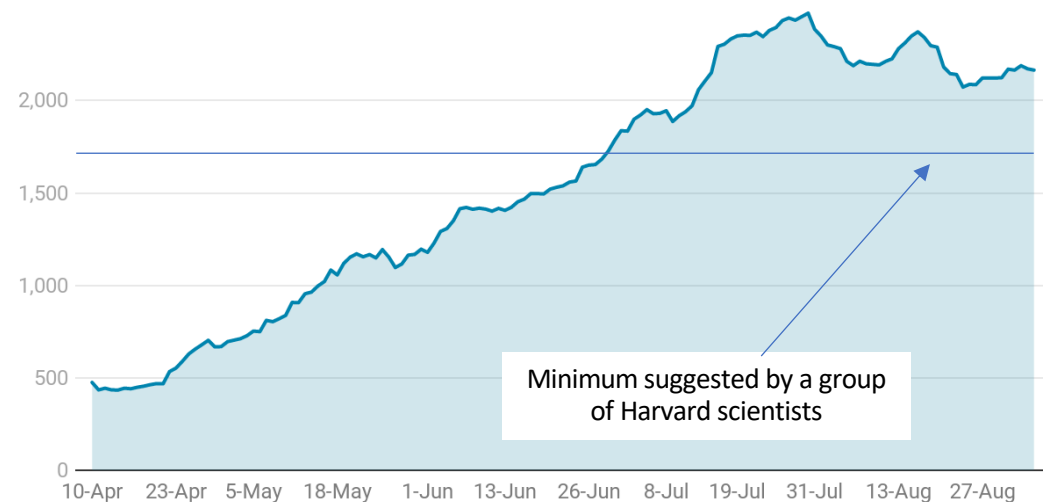


Chart: Health Industry Advisor LLC • Source: <https://covid19-projections.com> • Created with Datawrapper

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 September 3

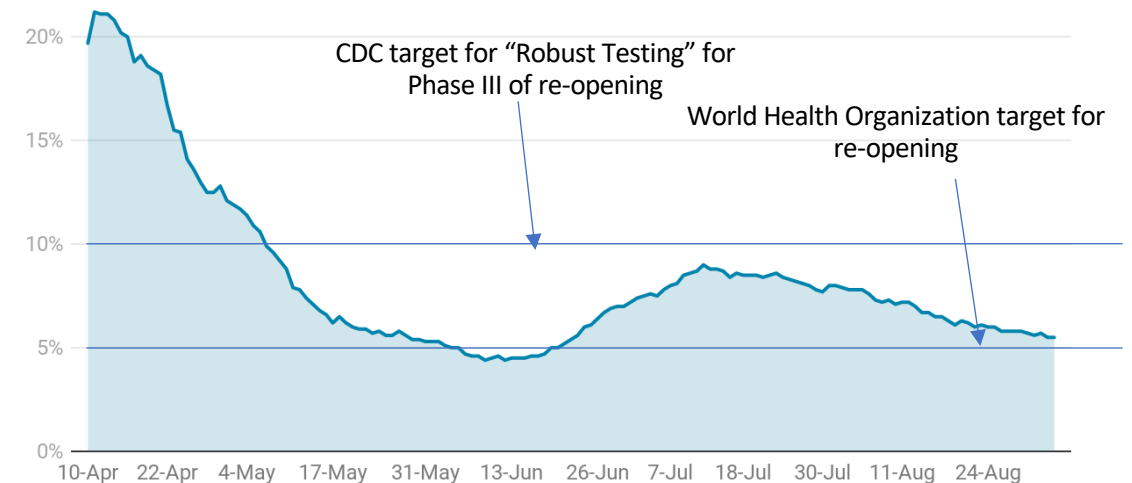


Health Industry Advisor LLC analysis

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 September 3



Health Industry Advisor LLC analysis

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

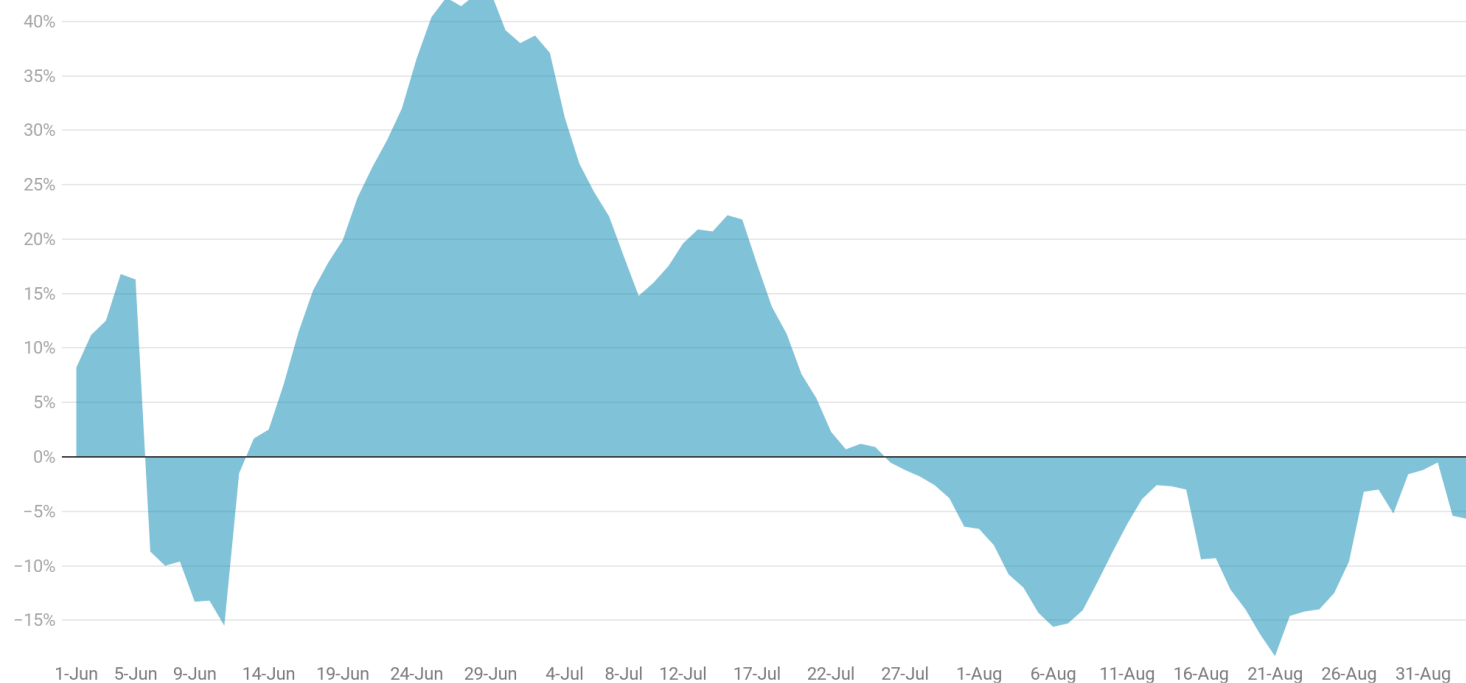
Note: On August 11, North Carolina made a significant adjustment, removing 220,000 tests from their YTD totals. We manually removed this negative adjustment from the August 11 data to better reflect actual testing for that date

Note: Due to a computer glitch, Washington batch-reported on August 26 all its negative test results from August 1-25. We "smoothed" the data, by applying a constant test-positive rate to estimate the negative tests by day for this period

Week-over-week, new cases are down by 5.7%; New cases haven't increased week-over-week in six weeks

Week-Over-Week Change In New Cases

Through September 3



Health Industry Advisor LLC analysis

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

New Daily Cases

Through September 3

Thursdays Highlighted

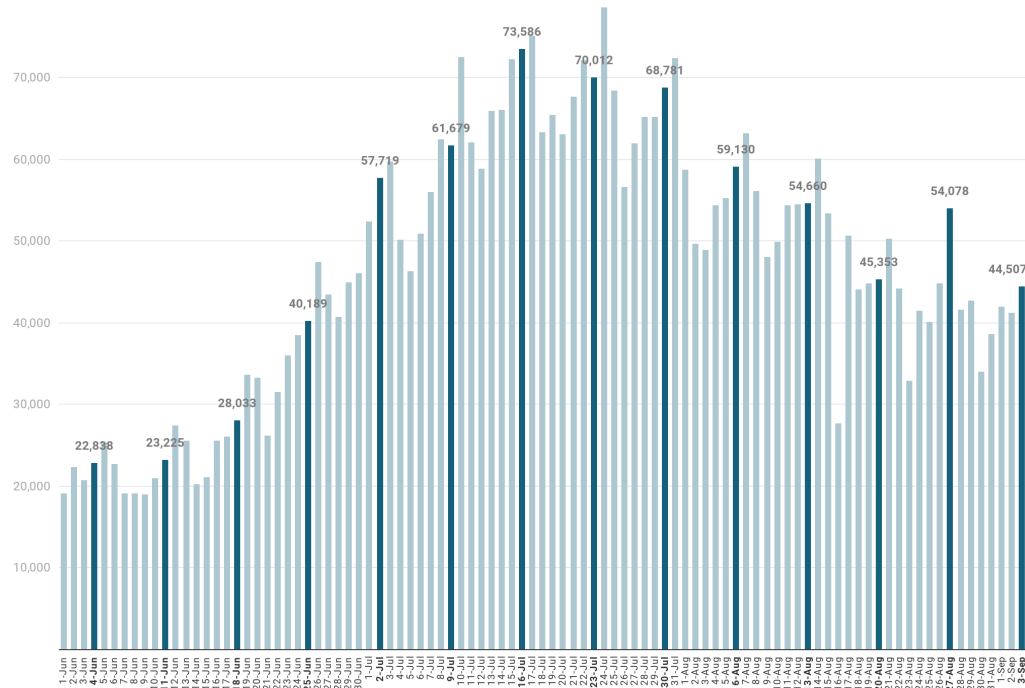


Chart: Health Industry Advisor LLC • Source: eorlometers.info • Created with Datawrapper

Newly Reported Deaths

Through September 3

Thursdays Highlighted

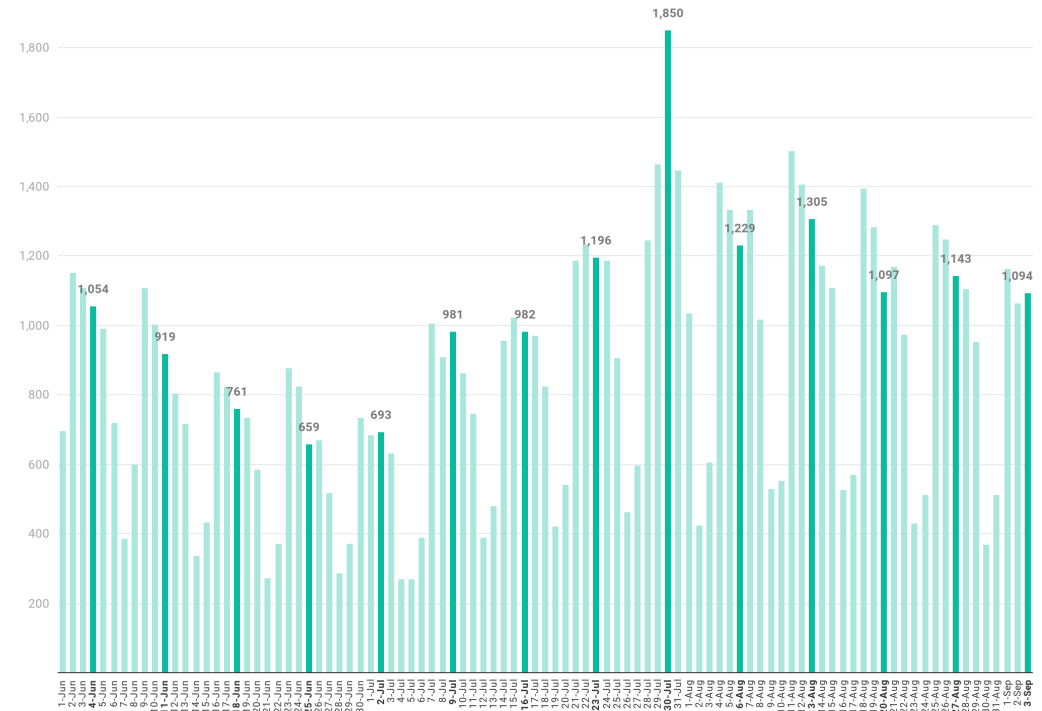


Chart: Health Industry Advisor LLC • Source: eorlometers.info • Created with Datawrapper

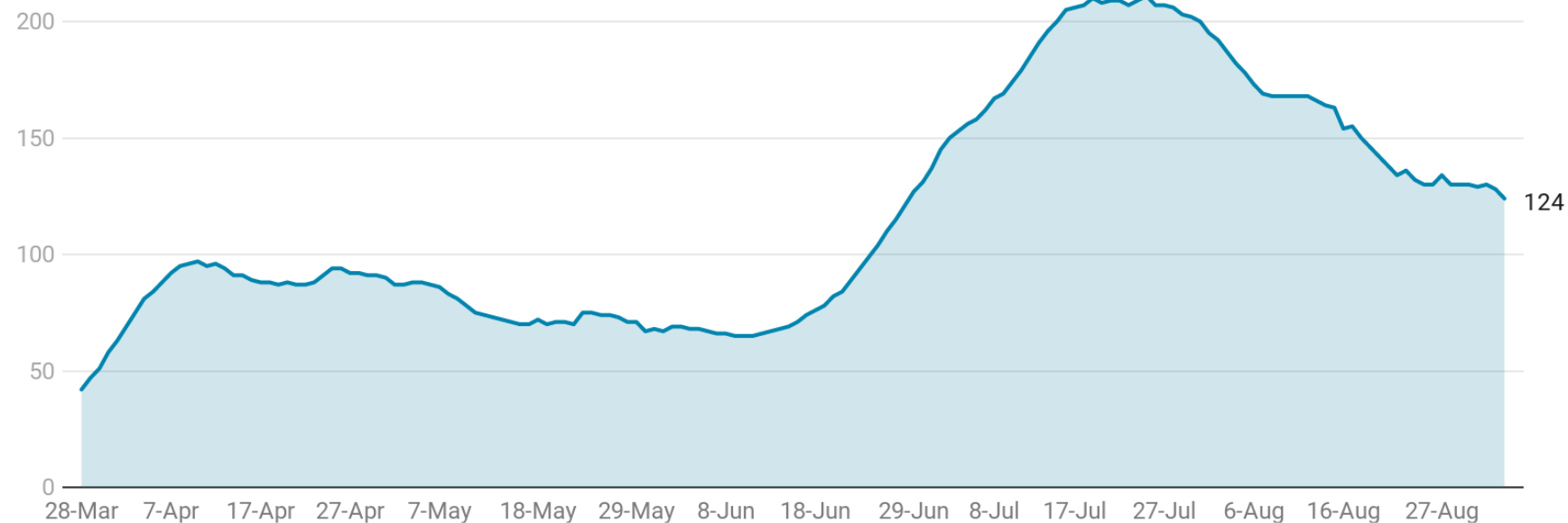
Note the daily pattern: new cases are typically low on Sunday, then increase each day through the week. While we have been noting this for the past few weeks, researchers from MIT, Boston University and Harvard Medical School confirmed this in [a report published by CIDRAP on August 17](#)

New infections per capita* dropped again yesterday, to its lowest point since June 28

Rate has dropped 40% since July 22

New Infections Per 1 Million Population - United States

Trailing 7-Day Moving Average, Through September 3



Health Industry Advisor LLC analysis

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

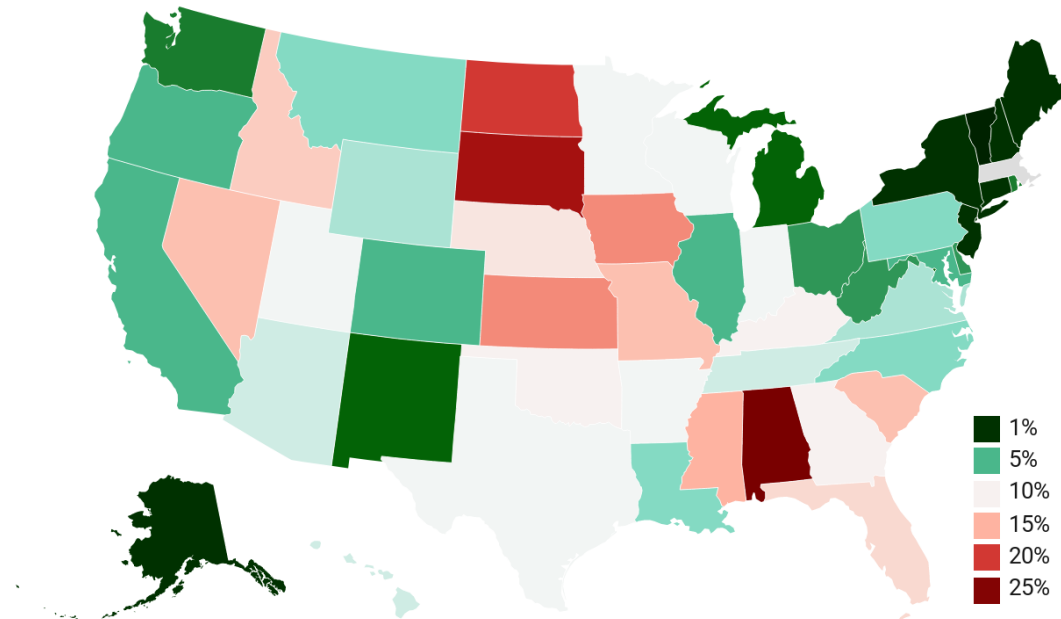
* - per million per day, trailing 7-day moving average

State-By-State – Testing & New Infections per Capita

As infection rates* have eased across the Southeast and West, the Upper Midwest is now experiencing accelerating infections. Rates are particularly high and increasing in Iowa and the Dakotas

Test-Positive Rate

Trailing 7-Day Moving Average, As of September 3

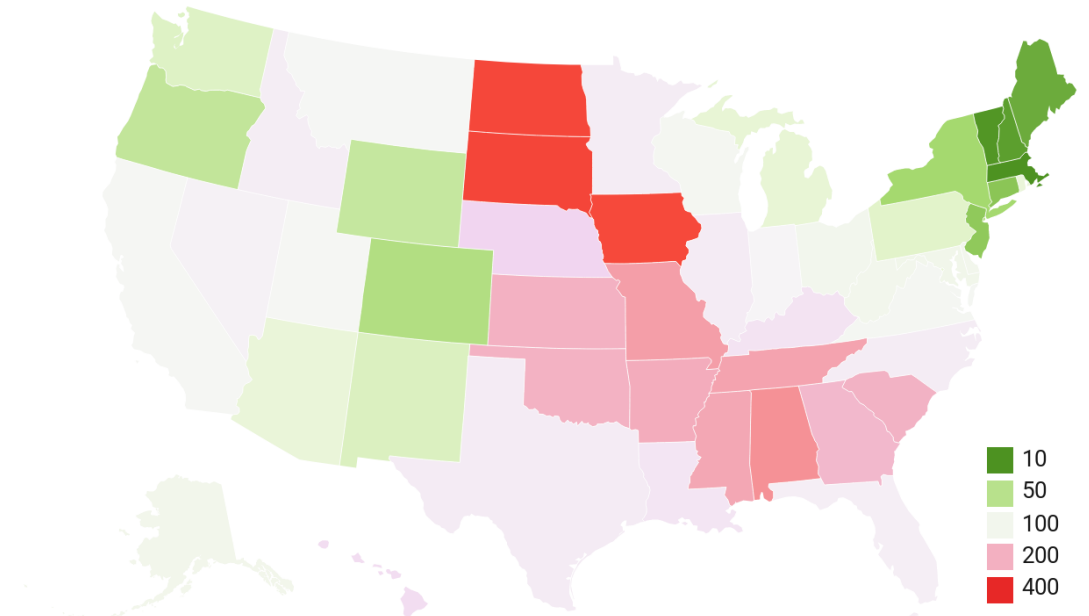


Health Industry Advisor LLC analysis

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

New Daily Infections Per 1 Million Population

Trailing 7-Day Moving Average, As of September 3



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

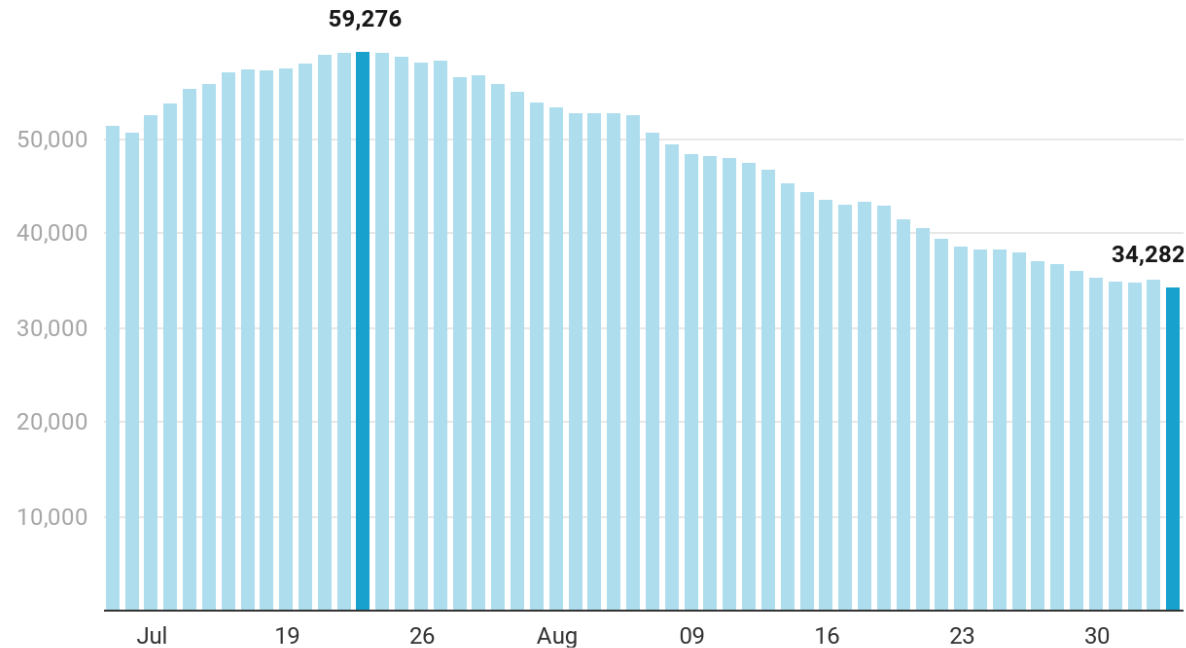
* - per million per day, trailing 7-day moving average

United States

COVID-19 inpatient declined again yesterday, for only the 36th time in 42 days
This census has dropped 42% during this time

Hospital Census: COVID-19 Patients

As of September 3



Florida data first available on July 10

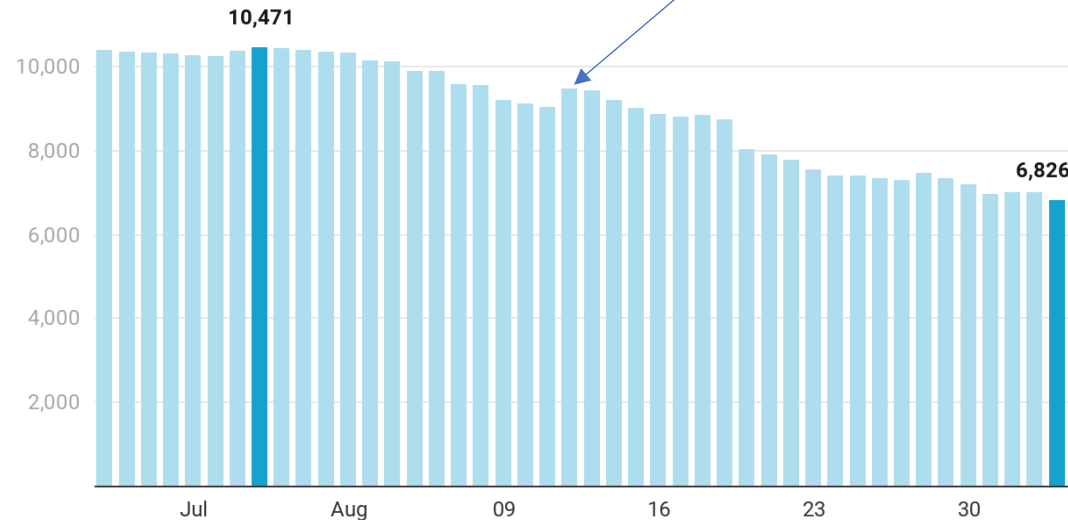
Chart: Health Industry Advisor LLC • Source: the Atlantic's Covid Tracking Project • Created with Datawrapper

Stress on ICU beds and ventilators continues to ease:

Daily ICU census has declined >30% since mid-July

Recently, % of inpatients in the ICU or on ventilators are both steady or decreasing
... even as census declines

COVID-19 ICU Census

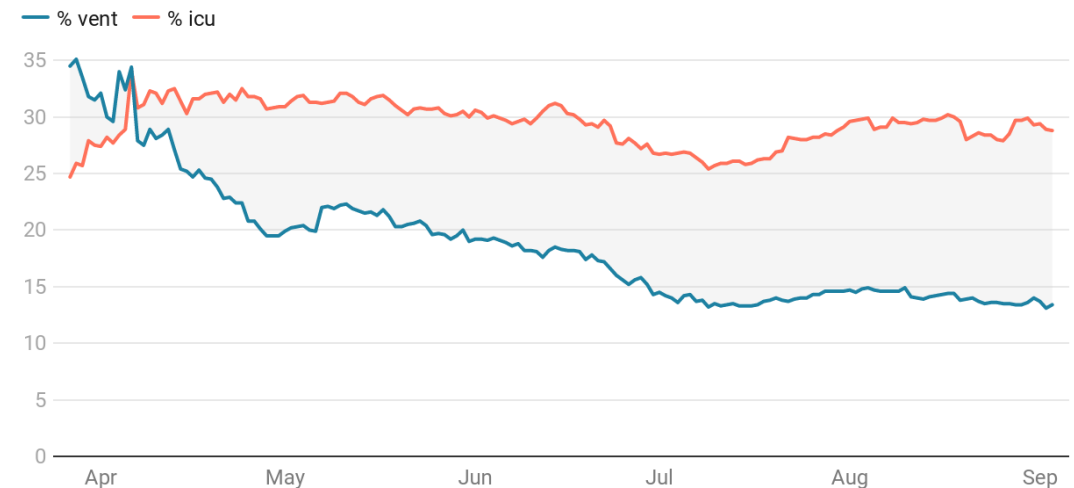


For states reporting these data: AZ, CA, ID, IL, IN, IA, KS, KY, ME, MD, MA, MI, MN, MS, NV, NJ, NY, NC, OH, OK, OR, RI, SC, TX, UT, VA, WI & WY

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

Severity of Hospitalized Patients

% of patients on ventilators and in the ICU, As of September 3

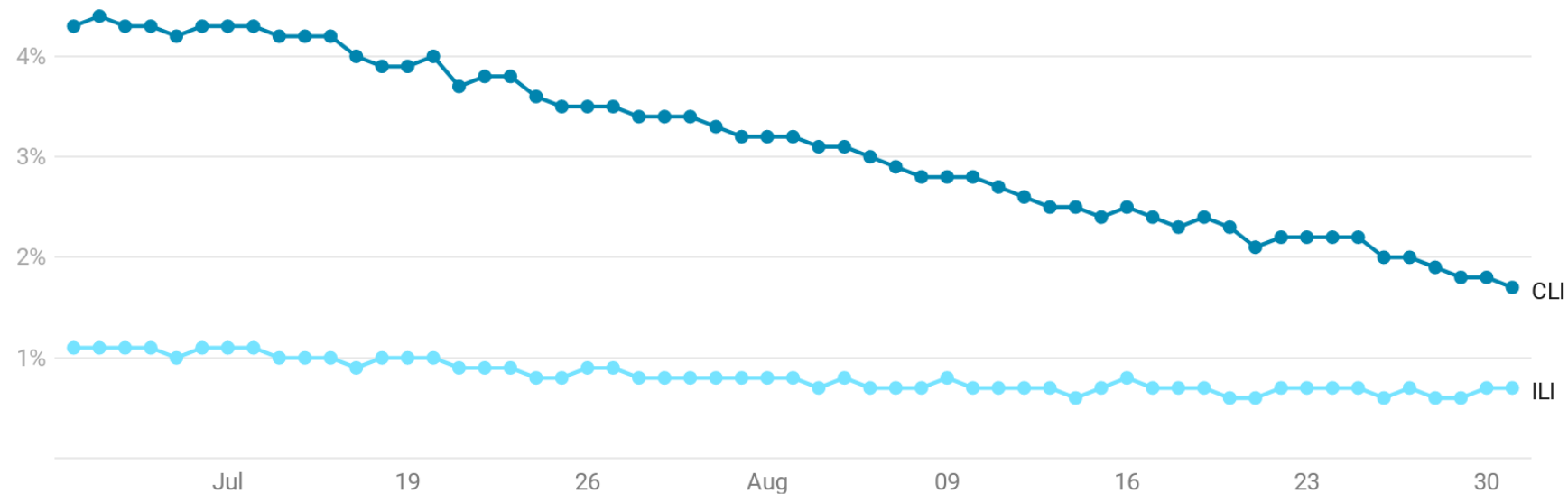


Health Industry Advisor LLC analysis

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

% of Emergency Department Visits for COVID-Like Illness (CLI) and Influenza-Like Illness (ILI)

As of August 31



Health Industry Advisor LLC analysis

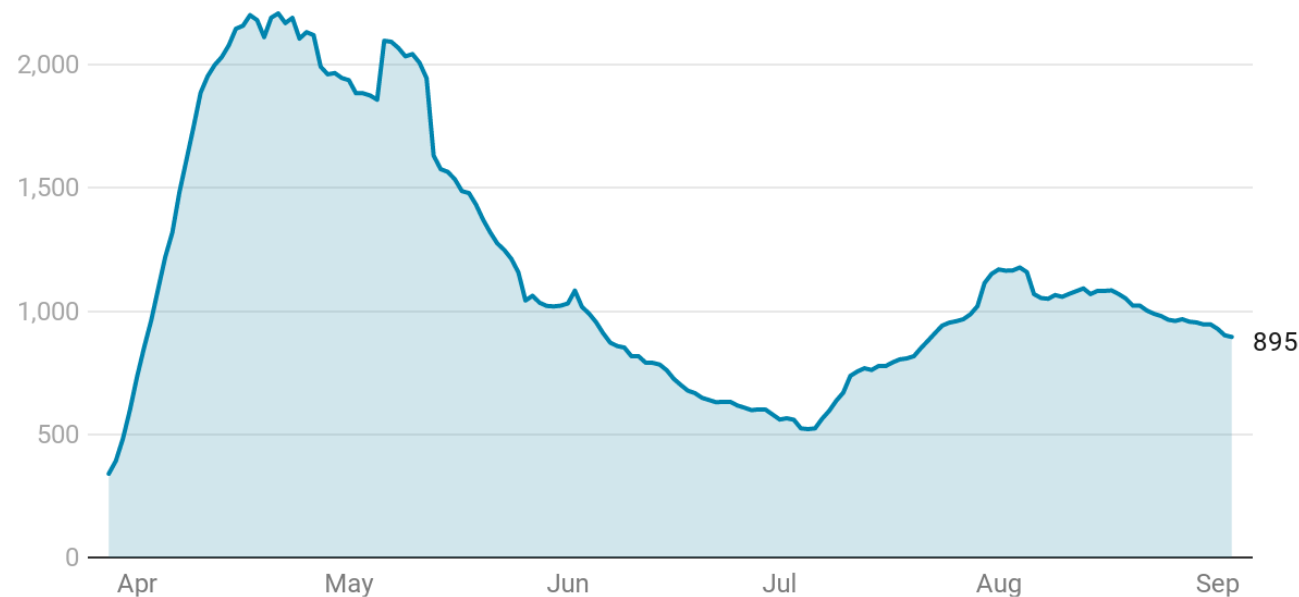
Chart: Health Industry Advisor LLC • Source: Centers for Disease Control • Created with Datawrapper

United States – Deaths with Coronavirus

7-day average deaths have been declining for past three weeks – now, at lowest 7-day average rate since July 22

Deaths Reported With Coronavirus in the U.S.

Trailing 7-Day Moving Average, As of September 3



Health Industry Advisor LLC analysis

Chart: Health Industry Advisor LLC • Source: worldometers.info • 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>