The Progression of Covid Within the United States

A state by state breakdown over the past six months

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This article tracks the progression of Covid-19 over the past six months on a state-by-state basis and provides a framework for interpreting these curves by including curves for seven other countries. While 52 states and territories are covered here, it turns out that there are just three basic stories told by the curves.

THE WORLD

In order to have a frame of reference for understanding the progression of Covid-19 within the U.S. we will begin with graphs showing the progression in some other countries. The values plotted for each country are the cumulative number of confirmed cases of Covid-19 per thousand population. These values were computed at the end of each calendar week. When these weekly per capita values are plotted for each of the 26 weeks between March 1 and August 29 we end up with the running records shown in Figure 1. These curves allow us to compare levels between countries and also to see how these levels are changing over time. In this way we can see where the pandemic is growing rapidly and where it has been slowed down.

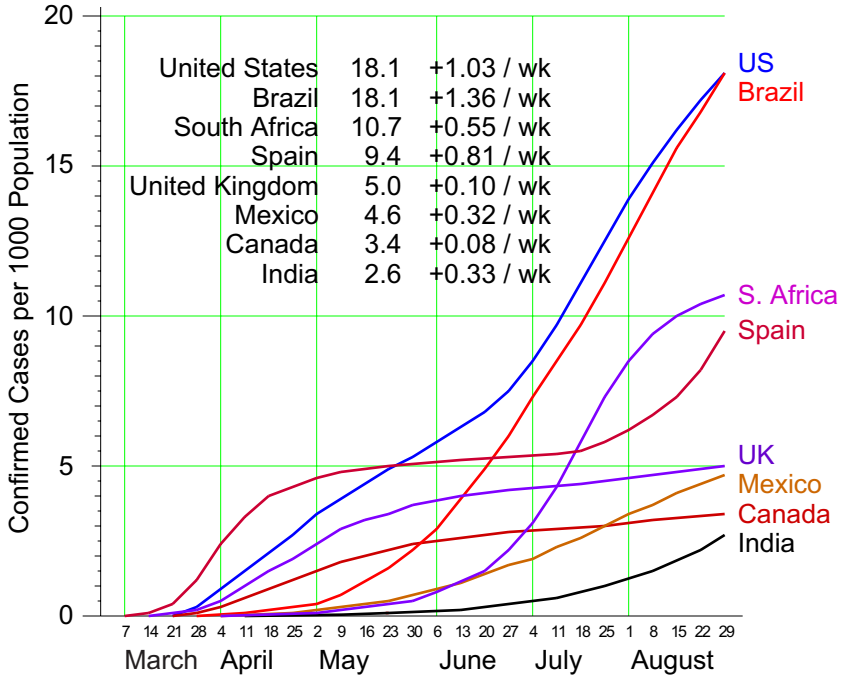

Figure 1: The Progression of Covid Over Spring and Summer for Eight Countries

The table embedded in Figure 1 lists the number of Covid cases per 1000 population as of

August 29 (the end points of the curves) followed by the average rate at which this per capita Covid number was changing during the month of August. This latter number approximates the slope of the curve at the right side of the graph.

India and Mexico show curves with a fixed growth rate that are typical for the early stages of an epidemic. They are presently growing at the rate of approximately 0.3 cases per thousand each week. In contrast, both Canada and the UK show curves that have been flattened out. Canada and the UK have learned how to slow the growth of Covid. As a result their curves are growing at 0.08 cases per thousand each week and 0.1 cases per thousand each week.

The curve for Spain tells a different story. While Spain was caught in the early rapid spread of Covid, they managed to flatten their curve during May and June. However they have been struggling with a second wave of infection. Over the summer Spain went from 5.1 cases per 1000 to 9.4 cases per 1000, and Covid is continuing to spread at about 0.8 cases per thousand each week.

While South Africa has a higher number of cases per thousand than does Spain, they have shown some flattening of their curve during August. At current rates Spain is likely to overtake South Africa soon.

While both Brazil and the U.S. have 18.1 cases per thousand, Brazil has the steeper curve which grew at the rate of 1.36 cases per thousand each week during August. Based on this, the U.S. is likely to soon loose its position as the second most infected nation in the world. (In what follows we will see how some states are working to keep this from happening.)

The U.S. curve became markedly steeper in June. During the month of August the U.S. per capita Covid count grew an average of 1.036 cases per thousand each week.

Figure 2 lists 19 additional countries, their total number of Covid cases per thousand as of Aug. 29, and their rates of growth per week over the month of August.

Argentina	8.81	+1.14 /wk	Japan	0.52	+0.06/wk
Australia	1.02	+0.09/wk	Norway	1.99	+0.06/wk
Columbia	11.73	+1.47/wk	Peru	19.38	+1.66/wk
Egypt	1.02	+0.01/wk	Philippines	1.97	+0.27/wk
France	3.99	+0.29/wk	Russia	6.82	+0.25/wk
Germany	2.90	+0.09/wk	S. Korea	0.38	+0.03/wk
Indonesia	0.62	+0.05/wk	Sweden	8.58	+0.17/wk
Iran	4.52	+0.20/wk	Switzerland	4.85	+0.18/wk
Israel	12.61	+1.16/wk	Turkey	3.23	+0.11/wk
Italy	4.39	+0.07/wk			

Figure 2: Per Capita Covid Numbers and Growth Rates for 19 Countries

The 27 countries in Figures 1 and 2 accounted for 81.2% of the number of confirmed Covid-19 cases worldwide. It is instructive to note that the per capita Covid counts for 24 of these countries fall between South Korea's 0.38 per thousand and Israel's 12.61 per thousand. At more than 3.5 standard deviations above the average, the U.S., Brazil, and Peru all qualify as outliers.

Thus, the patterns in the graph tell a story. In the following sections we will look at the progression of Covid in the fifty states and two territories. Fortunately, these 52 curves can be grouped by their shapes into three major categories.

EFFECTIVE INTERVENTIONS

We begin with six states that have demonstrated what effective interventions can do. These states were all hit by the rapid growth of Covid in the Spring, and they all responded by dramatically flattening their curves over the Summer. As seen in Figure 3, these states are New York, New Jersey, Massachusetts, Connecticut, and to a lesser extent, Hew Hampshire and Vermont.

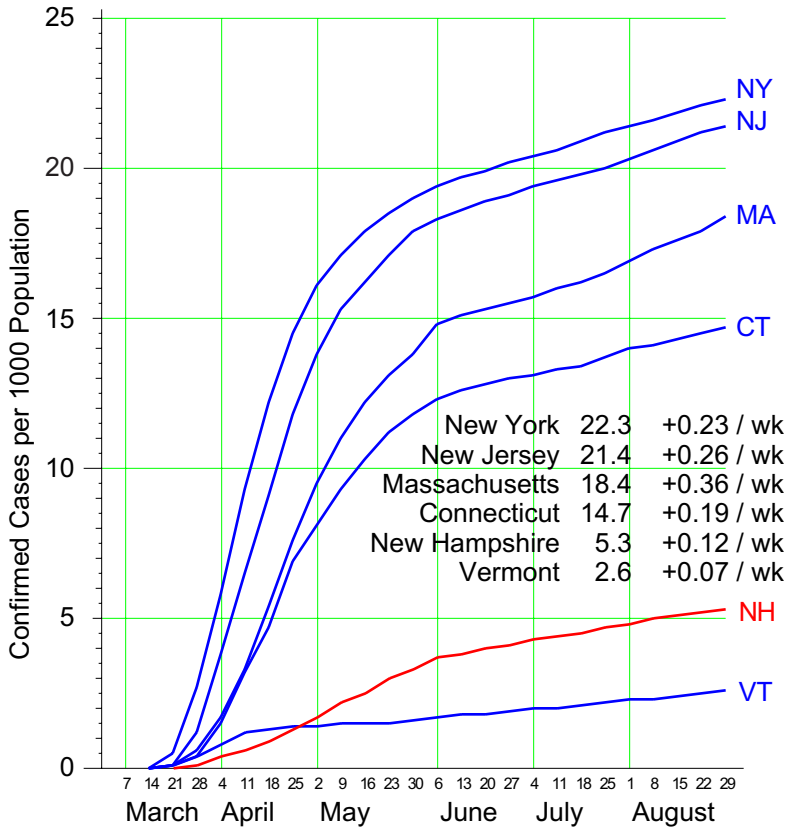

Figure 3: Rapid Growth Followed by Effective Interventions

The national average is 18.1 cases per thousand, and three of the states in Figure 4 are above average. However, it is the growth rates that are impoetant here. The national average growth rate is 1.03 new cases per thousand each week. All six states have growth rates that are less than one-third of the national average, which demonstrates what can be done.

Figure 4 shows six more regions that had had a period where their growth plateaued before continuing to grow at the end of the Summer. Howeveer, these six regions still have growth rates that range that are below the national average.

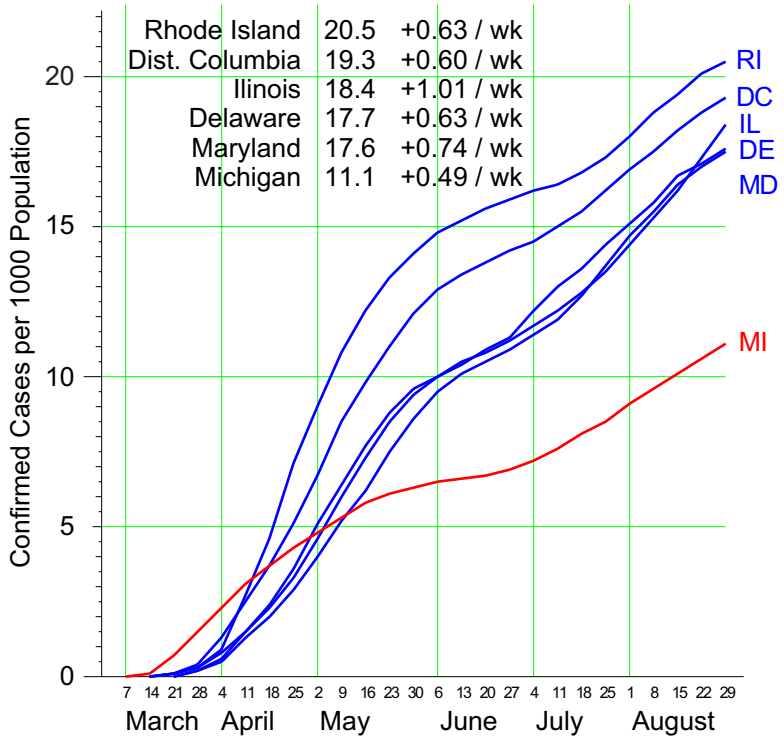

Figure 4: Rapid Growth Followed by Partially Effective Interventions

Among the twelve regions in Figures 3 and 4, only Illinois has a growth rate that comes close to the national average. This tells us that in all but one of these regions Covid is spreading more slowly than it is in the U.S. as a whole.

Figures 3 and 4 show that the known interventions work to slow the spread on Covid-19. They work in large states, and they work in small states, but the interventions have to be maintained to be fully effective. They require continued practice on a wide-spread basis.

STEADY GROWTH

Figure 5 shows ten states where, in spite of their ups and downs, the pandemic has progressed at a fairly steady rate.

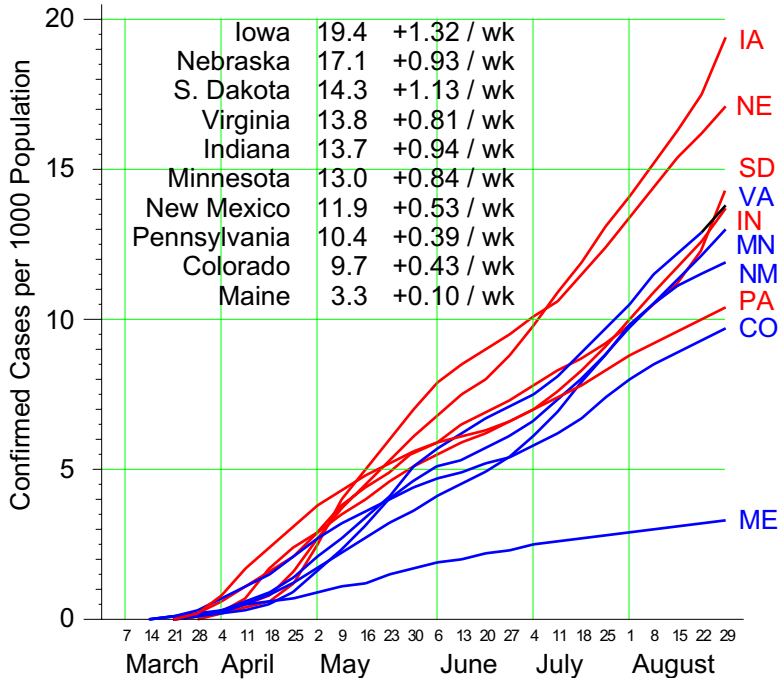

Figure 5: Ten States with Steady Growth

Maine, with 3.3 cases per thousand is quite similar to Hew Hampshire and Vermont from Figure 3, although without the pronounced flattening seen in the other two states. Maine had a growth rate of 0.1 new cases per thousand per week. Virginia, Minnesota, New Mexico, Pennsylvania, Colorado had growth rates that were below the national average of 1.03 new cases per thousand each week. This does not happen by accident. The slow but steady growth shown by these six states suggests that at least some interventions were used on a wide enough basis to keep the pandemic from showing its typical exponential growth pattern.

Indiana and Nebraska had growth rates just slightly below the national average in August. South Dakota and Iowa had growth rates that were above the national average. They als oshow an upturn in the last week of August, suggesting the possibility of an increased growth rate. While none of these ten steady-growth states show the plateau effect seen in the twelve effective-intervention states, at least to date they have managed to avoid letting the pandemic run unchecked.

UNCHECKED GROWTH

The third story is one of unchecked growth. The curves in this group are all characterized by a distinct upward bend during the Summer months. Figure 6 shows eight regions that show this characteristic bend even though their overall per capita Covid numbers are relatively low.

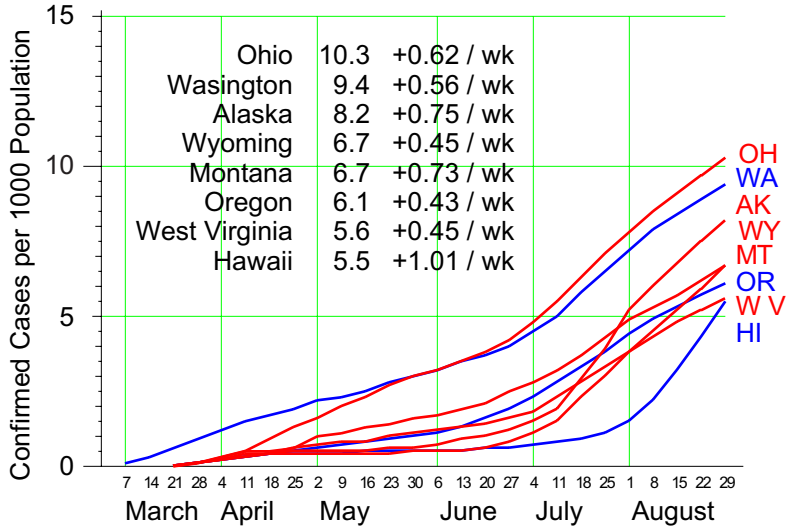

Figure 6: Slow Growth followed by Rapid Growth

While the total number of cases in Ohio had made it up to the level of one percent of the population (10 cases per thousand), the rest of these regions had lower per capita Covid numbers.

The first seven states in the table in Figure 6 have rather low growth rates even after the increase in July. Only Hawaii has a growth rate that is anything like the U.S. average growth rate, but we should note that this occurred only after five months of almost no growth. Some of these low numbers are due to definite containment efforts within these states. In other cases these low numbers may have come from a combination of relative isolation, low population densities, and concerted efforts within the state. Nevertheless, the growth rate has increased in each of the states in Figure 6 even if that growth is not quite as unchecked as we see in the following figures.

Eleven additional regions with unchecked growth are shown in Figure 7. These regions show larger changes than those in Figure 6.

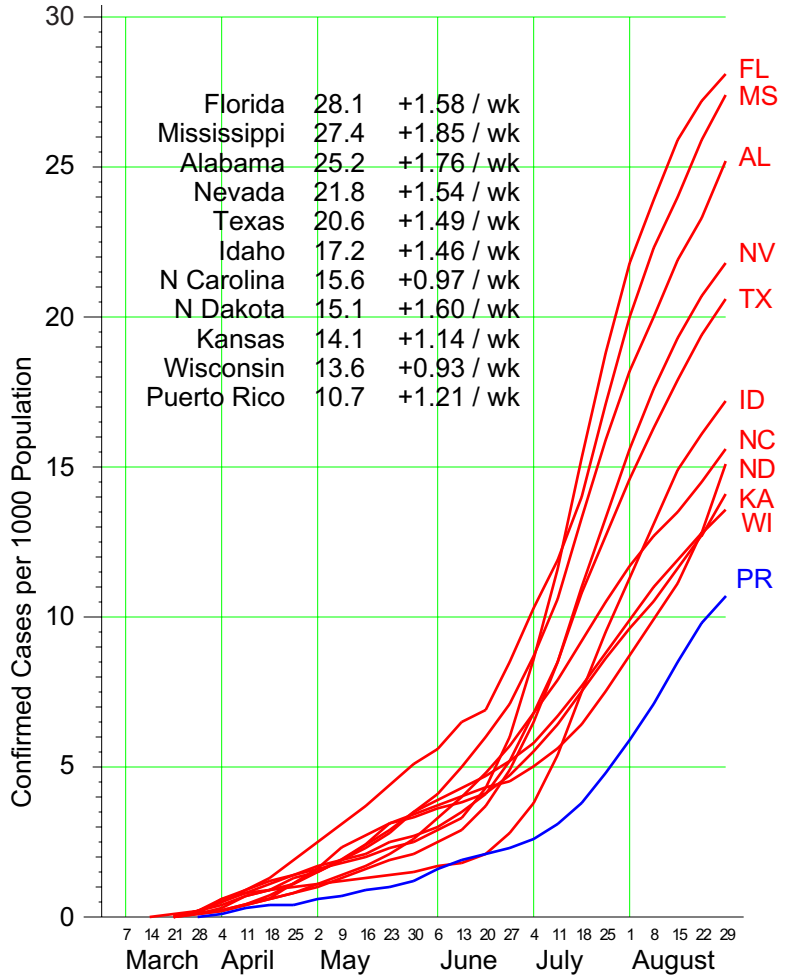

Figure 7: Eleven More States with Unchecked Growth

These eleven regions in Figure 7 have Covid totals that range from 1% of their population to almost 3% of their populations. If we consider North Carolina's growth rate of 0.97 new cases per thousand each week to be effectively the same as the national average, then Covid was spreading as fast or faster than the national average in ten of these eleven regions. Only Wisconsin had a below average growth rate.

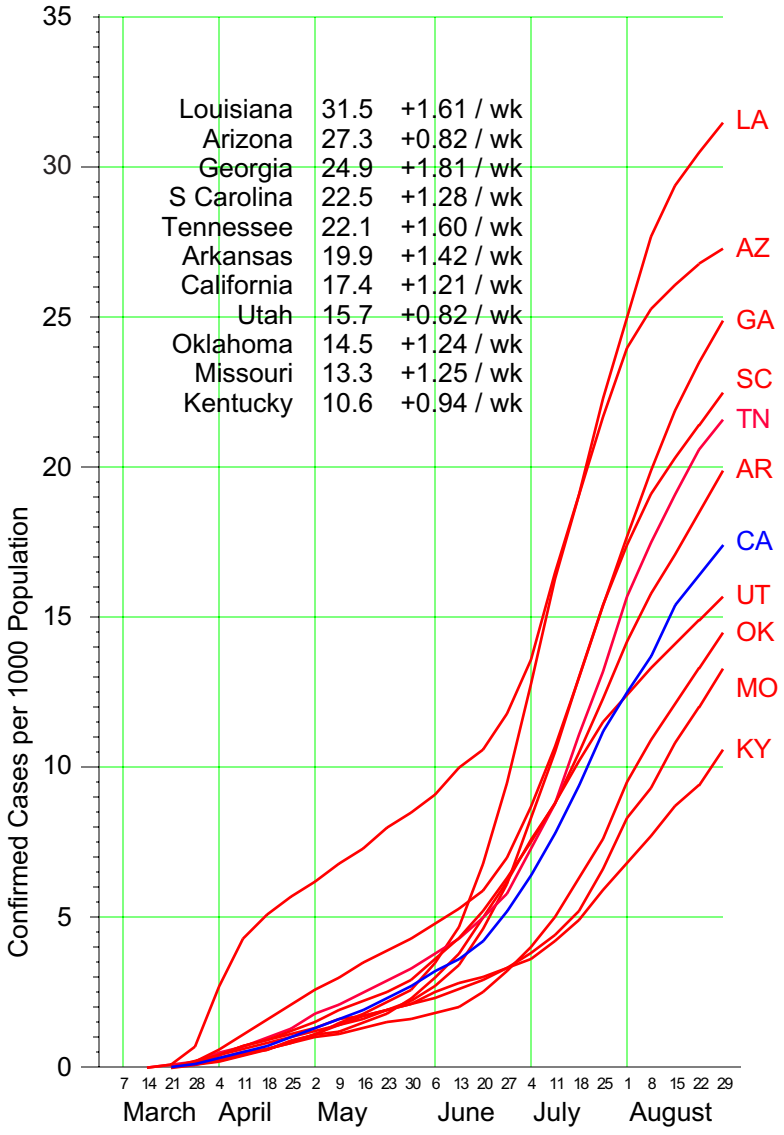

Figure 8: Eleven More States with Unchecked Growth

Figure 8 shows the remaining eleven states with unchecked growth. Once again the total numbers of Covid cases range from 1% of the state's population to over 3% of the population. In eight of these states the growth rate exceeds the national average. Only Arizona, Utah, and Kentucky had below average growth rates.

Figures 6, 7, and 8 show a total of 30 states and territories that have the distinctive pattern of unchecked growth. Nine of these states not only had higher per capita Covid numbers than Brazil but also had higher growth rates. These states are outpacing Brazil are Florida, Mississippi, Alabama, Nevada, Texas, Louisiana, Georgia, Tennessee, and Arkansas.

Two other states had higher per capita Covid numbers than Brazil. These are Arizona and South Carolina. And two other states had growth rates in August that exceeded that of Brazil. These are Idaho and North Dakota.This combination of widespread unchecked growth with high numbers of confirmed Covid cases suggests that this pandemic is far from over.

SUMMARY

We have identified 12 effective-intervention regions, 10 steady-growth states, and 30 unchecked-growth regions. *The differences between these three groups are entirely due to differences in behavior.*

Covid is going to spread. The only question is whether it is going to spread quickly or slowly. When it spreads quickly the health-care system can become overloaded, resulting in increased deaths. When it spreads slowly the outcomes are better health care, fewer deaths, and the ability to use contact tracing.

So what conclusions can we draw from the records of these states and territories? We have seen that where the known, non-medical interventions are widely practiced the growth of Covid can be stopped or slowed dramatically. As demonstrated by the curves, this has happened, to a greater or lesser degree, in 12 regions: New York, New Jersey, Massachusetts, Connecticut, New Hampshire, Vermont, Rhode Island, D.C., Illinois, Delaware, Maryland, and Michigan. Among these only Illinois has a growth rate that exceeds the average for the U.S. as a whole.

An additional seven states have low per capita Covid numbers. These are Maine, Wyoming, Oregon, Hawaii, Montana, Alaska, and West Virginia. Among these only Hawaii has a growth rate that is equivalent to the national average. These states seem to have benefited by virtue of their efforts, their isolation, and their lower population densities.

The remaining 33 states and territories all had per capita Covid numbers that fell in the range of 1% to 3% of their populations. Twenty-seven of these had growth rates greater than or equal to the national average of 0.1% of their population per week. In spite of these high levels of infection and these wide-spread high growth rates, the graphs in Figures 5, 6, 7, and 8 show no evidence of any sustained interventions that were effective in slowing the growth of Covid-19. It is like they are not even trying.

We found that 24 of the 26 countries in Figures 1 and 2 had per capita Covid numbers below 12.6. If we define this level of infection as world-class, then only 17 of the 52 U.S. states and territories would qualify as world-class. The other 35 states and territories are more highly infected than 90% of the other countries in the world.

Yet the SARS-CoV-2 virus cannot spread on its own. It is primarily spread via aerosols from one person to another while they are close to each other. This is what makes face masks, hand-washing, and social-distancing effective. But they are only effective to the extent that they are used.

FOOD FOR THOUGHT

Of the 30 states in the unchecked-growth category, 25 were red states in 2016 (83%). Of the 12 states in the effective-intervention category, 10 were blue states in 2016 (83%).

Without leadership, nothing gets accomplished.

Acknowledgment

The source data used in preparing this article came from the European CDC (© ECDC 2005-2020) and the COVID Tracking Project at The Atlantic (CC BY-NC-4.0). Both sources were used under their blanket provisions allowing for journalistic coverage with citation.