Health Industry Advisor, llc

"Strategic Guidance in an Era of Unprecedented Change"

COVID-19 Dashboard

Issue # 60

Wednesday, May 27, 2020

Day's Highlights

"Strategic Guidance in an Era of Unprecedented Change"

Measure	Desired Change	Yesterday in the U.S.
Number of Tests	Increase	Averaged 370,000 tests per day on Monday and Tuesday
Test-Positivity Rate	Decline	4.9% test-positive for last 2 days; 5.6% for past 7 days
Number of Cases	Plateau	New Cases down 4.5% week-over-week
Deaths % of Total Cases	Decline	5.8%
Number of Deaths / 1M Population	Plateau	303.8
Recoveries : Death	Increase	4.77

- Deaths (confirmed and probable) from the virus surpassed 100,000 yesterday. (Note: The COVID Tracking Report puts the death count at 93,093; this site seems to use a more conservative definition of confirmed deaths only.) Still, the death rate per case dropped slightly to 5.8% from 6.0% on May 17. There have been fewer than 770 deaths each of the past 3 days, after recording >1,000 each of the previous 6 days
- Yesterday, we reported on the demographics of confirmed coronavirus deaths in New York City, indicating the death rate to be highest among the elderly, those with known health conditions and Blacks/African Americans and Hispanic/Latinos (details included in today's report)
- Dr. Avik Roy, writing in Forbes.com yesterday, shared his analysis that nursing homes and long-term care facilities accounted for 43% of U.S. deaths, despite representing only 0.6% of the population
- Only the District of Columbia, Missouri, Maryland, Minnesota and Virginia are reporting test-positive rates > 10% for the past week. The World Health Organization has suggested that this rate needs to be <10% for testing to reasonably estimate the true prevalence of the virus
- With several states re-opening, we are monitoring testing and infection rates to determine if, when and how much impact relaxation has on renewed spread of the virus. Here, we focus on Florida, Georgia and Wisconsin:
  - Wisconsin's infection rate – on a 7-day moving average basis - has been increasing since the Governor's executive orders were ruled unconstitutional by the state's Supreme Court
  - Its testing rate also increased significantly during this time. Thus, it is unclear how much of the case increase is due to increased testing v. increased infections
  - Further, Wisconsin's rate of new infections has now declined on 4 consecutive days.
  - Test-positive and new infection rates in all three states remain relatively low.

ANALYSIS OF DEATHS BY AGE AND UNDERLYING HEALTH CONDITION

New York City

Analysis of Deaths By Age and Underlying Health Condition

- Using data from NYC Coronavirus Disease 2019 (COVID-19), we analyzed the deaths from coronavirus in New York City by:
  - Age
  - Ethnicity
  - Underlying Health Conditions
- New York City represented 11.5% of all U.S. cases and 21.3% of U.S. deaths, as of May 23
- All three factors were significant in understanding deaths from the virus:
  - 48.6% of deaths were of persons >74 years old; 72.5% >64 years old
  - Blacks/African Americans and Hispanic/Latino had higher age-adjusted deaths per capita than whites and Asian/Pacific Islanders, at all age cohorts
  - Known underlying health conditions were present in >78% of all deaths at every age cohort (for most of the remaining 22%, it was unknown as to whether the person had an underlying health condition)
- Graphics illustrating these factors are provided on the following page

New York City

Analysis of Deaths By Age and Underlying Health Condition

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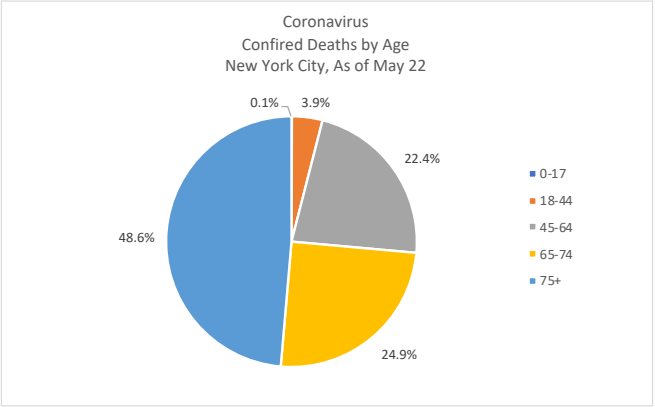
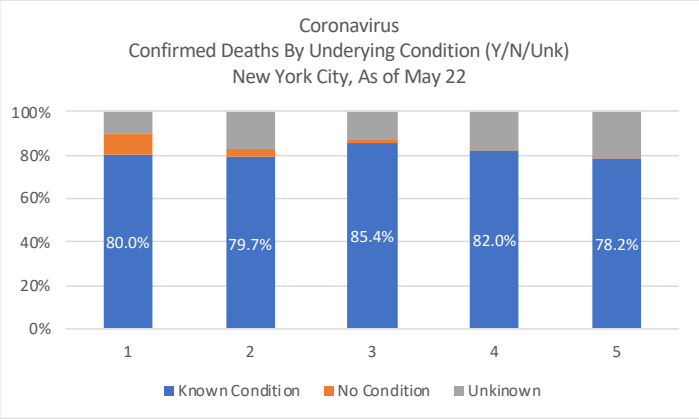
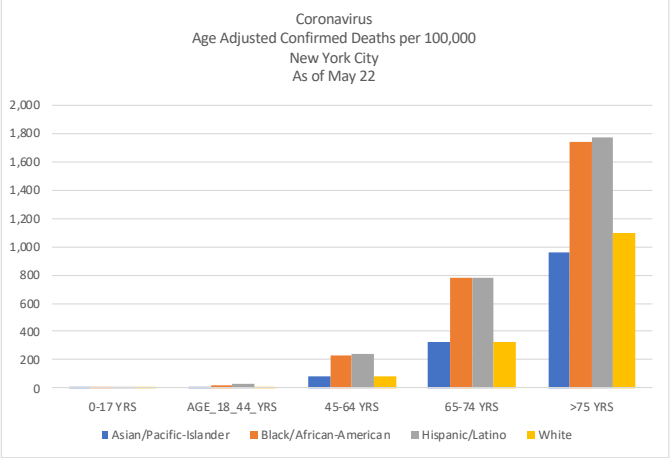
	NYC	US	NYC %
Total Cases	194,667	1,686,436	11.5%
Deaths			
Confirmed	16,403		
Probable	4,735		
Total	21,138	99,300	21.3%
Death Rate	10.9%	5.9%	







Source: Analysis by Health Industry Advisor LLC
NYC Coronavirus Disease 2019 (COVID-19) Data
https://www1.nyc.gov/site/doh/covid/covid-19-data-deaths.page
Data as of May 22, 2020

COUNTRY-BY-COUNTRY INFORMATION

Countries Included

- In Mid-March, we began tracking the twenty countries with the most coronavirus cases; in mid-April, we expanded it to the thirty countries with the most cases
- Since that time, 18 countries have moved ahead of South Korea in total cases
- We continue to track the 30 countries, which still account for 88.2% of the more than 5 million total cases worldwide
- Case and death information is sourced from the worldometers.info, which is accessed daily; analysis by Health Industry Advisor LLC

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Country-by-Country

Comparative Statistics

"Strategic Guidance in an Era of Unprecedented Change"

As of May 26

Country	Total Cases	Rank	Cases per 1M Population	Rank2	Deaths	Rank3	Death Rate	Rank4	Deaths per 1 Million Population	Rank5	5-day Moving Average Case Growth Rate	Rank6	Tests per 1M Population	Rank7	New Daily Infections Per 1M Population (5-Day M.A.)	Rank8
USA	1,725,275	(1)	5,212	(3)	100,572	(1)	5.8%	(14)	303.8	(9)	1.3%	(13)	46,951	(10)	66.8	(6)
Austria	16,557	(29)	1,838	(23)	643	(26)	3.9%	(20)	71.4	(18)	0.2%	(25)	45,680	(11)	3.7	(25)
Belgium	57,455	(19)	4,957	(5)	9,334	(7)	16.2%	(1)	805.3	(1)	0.4%	(18)	68,663	(2)	20.5	(15)
Brazil	392,360	(2)	1,846	(22)	24,549	(6)	6.3%	(12)	115.5	(14)	4.8%	(3)	4,104	(25)	81.0	(4)
Canada	86,647	(13)	2,296	(16)	6,639	(11)	7.7%	(10)	175.9	(12)	1.3%	(12)	39,857	(14)	28.5	(10)
Chile	77,961	(15)	4,078	(6)	806	(25)	1.0%	(28)	42.2	(21)	6.2%	(1)	26,237	(16)	212.1	(1)
China	82,992	(14)	58	(30)	4,634	(13)	5.6%	(15)	3.2	(29)	0.0%	(30)		N/A	0.0	(30)
Ecuador	37,355	(21)	2,117	(19)	3,203	(19)	8.6%	(9)	181.5	(11)	1.1%	(14)	6,049	(24)	25.9	(11)
France	182,722	(7)	2,799	(13)	28,530	(4)	15.6%	(2)	437.1	(5)	0.1%	(27)	21,217	(20)	4.2	(24)
Germany	181,288	(8)	2,164	(18)	8,498	(8)	4.7%	(18)	101.4	(16)	0.3%	(21)	42,922	(13)	5.9	(22)
India	150,793	(10)	109	(29)	4,344	(15)	2.9%	(22)	3.1	(30)	5.0%	(2)	2,267	(26)	4.6	(23)
Iran	139,511	(11)	1,661	(24)	7,508	(10)	5.4%	(16)	89.4	(17)	1.5%	(10)	9,979	(23)	25.4	(12)
Ireland	24,735	(26)	5,009	(4)	1,615	(21)	6.5%	(11)	327.1	(8)	0.3%	(20)	66,053	(4)	14.0	(16)
Israel	16,757	(27)	1,936	(20)	281	(28)	1.7%	(26)	32.5	(22)	0.1%	(28)	59,337	(6)	1.6	(27)
Italy	230,555	(6)	3,813	(9)	32,955	(3)	14.3%	(3)	545.1	(4)	0.2%	(24)	58,540	(7)	9.1	(20)
Japan	16,623	(28)	131	(28)	846	(24)	5.1%	(17)	6.7	(25)	0.2%	(22)	2,183	(28)	0.3	(29)
Mexico	71,105	(17)	551	(25)	7,633	(9)	10.7%	(7)	59.2	(19)	4.7%	(4)	1,752	(29)	21.6	(14)
Netherlands	45,578	(20)	2,660	(14)	5,856	(12)	12.8%	(5)	341.8	(7)	0.4%	(19)	18,966	(21)	11.1	(19)
Pakistan	57,705	(18)	261	(26)	1,197	(23)	2.1%	(25)	5.4	(26)	3.7%	(5)	2,227	(27)	8.9	(21)
Peru	129,751	(12)	3,935	(7)	3,788	(18)	2.9%	(21)	114.9	(15)	3.6%	(6)	26,597	(15)	131.1	(2)
Portugal	31,007	(24)	3,041	(12)	1,342	(22)	4.3%	(19)	131.6	(13)	0.7%	(16)	67,622	(3)	22.1	(13)
Russia	362,342	(3)	2,417	(15)	3,807	(17)	1.1%	(27)	25.4	(23)	2.7%	(8)	62,774	(5)	59.5	(7)
Saudi Arabia	76,726	(16)	2,204	(17)	411	(27)	0.5%	(29)	11.8	(24)	3.3%	(7)	16,375	(22)	69.2	(5)
Singapore	32,343	(23)	5,529	(2)	23	(30)	0.1%	(30)	3.9	(28)	1.6%	(9)	21,253	(19)	86.7	(3)
South Korea	11,225	(30)	219	(27)	269	(29)	2.4%	(24)	5.2	(27)	0.2%	(26)	50,363	(9)	0.4	(28)
Spain	283,339	(4)	6,060	(1)	27,117	(5)	9.6%	(8)	580.0	(2)	0.2%	(23)	76,071	(1)	13.9	(17)
Sweden	34,440	(22)	3,410	(11)	4,125	(16)	12.0%	(6)	408.4	(6)	1.4%	(11)	23,659	(17)	51.5	(8)
Switzerland	30,761	(25)	3,592	(10)	1,915	(20)	6.2%	(13)	223.6	(10)	0.0%	(29)	43,373	(12)	2.4	(26)
Turkey	158,762	(9)	1,882	(21)	4,397	(14)	2.8%	(23)	52.1	(20)	0.7%	(17)	22,239	(18)	12.1	(18)
UK	265,227	(5)	3,907	(8)	37,048	(2)	14.0%	(4)	545.7	(3)	1.1%	(15)	54,255	(8)	34.5	(9)

Note: China does not report test volumes

VIRUS PROGRESSION BY COUNTRY

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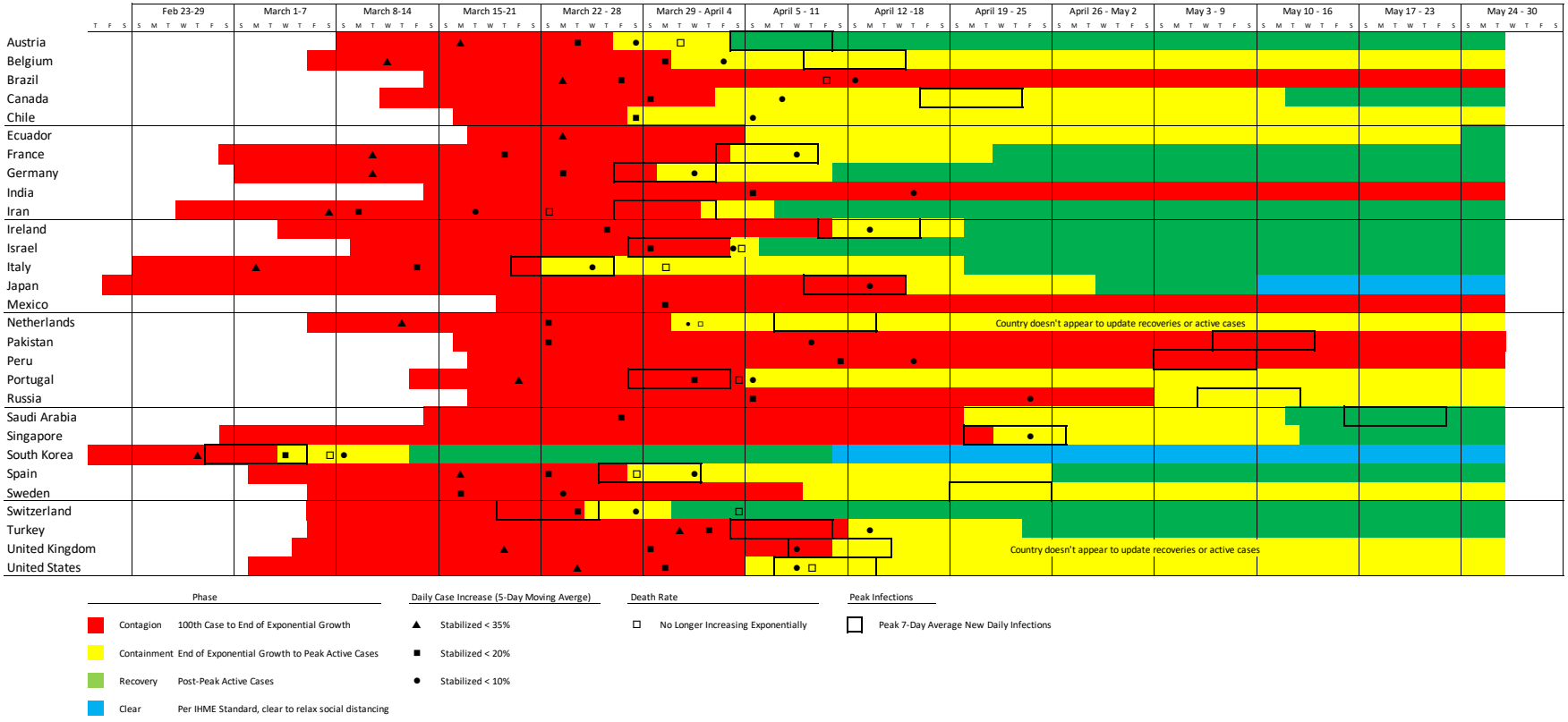
Country-by-Country

Virus Progression

"Strategic Guidance in an Era of Unprecedented Change"

This graphic illustrates when the country first recorded 100 total cases (start of the "contagion" phase); when growth stopped following an exponential pattern (start of the "containment" phase); and, when peak total cases were recorded (start of the "recovery" phase). It uses symbols to indicate when average daily case growth rates fell (and were sustained) below certain benchmarks, as well as when deaths stopped growing exponentially.



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Country-By-Country
Listing of Countries By Total Cases

Countries making large upward movements are highlighted

When we first expanded our tracking to 30 countries in mid-April, they represented the most countries with cases in the world. Since that time, Austria, Israel, Japan and South Korea have dropped in the rankings. These countries have moved up:

- **Afghanistan**
- **Argentina**
- **Bangladesh**
- **Belarus**
- **Columbia**
- **Denmark**
- **Dominican Republic**
- **Indonesia**
- **Kuwait**
- **Poland**
- **Qatar**
- **Panama**
- **Philippines**
- **Romania**
- **Serbia**
- **South Africa**
- **UAE**
- **Ukraine**

The original 30 still account for 88% of all cases worldwide.

	Total Cases							
Rank	Country	24-May	Rank	Country	6-May	Rank	Country	27-Apr
1	USA	1,725,275	1	USA	1,263,092	1	USA	1,010,356
2	Brazil	392,360	2	Spain	253,682	2	Spain	229,422
3	Russia	362,342	3	Italy	214,457	3	Italy	199,414
4	Spain	283,339	4	UK	201,101	4	France	165,842
5	UK	265,227	5	France	174,191	5	Germany	158,758
6	Italy	230,555	6	Germany	168,162	6	UK	157,149
7	France	182,722	7	Russia	165,929	7	Turkey	112,261
8	Germany	181,288	8	Turkey	131,744	8	Iran	91,472
9	Turkey	158,762	9	Brazil	126,611	9	Russia	87,147
10	India	150,793	10	Iran	101,650	10	China	82,830
11	Iran	139,511	11	China	82,883	11	Brazil	66,501
12	Peru	129,751	12	Canada	63,496	12	Canada	48,500
13	Canada	86,647	13	Peru	54,817	13	Belgium	46,687
14	China	82,992	14	India	52,987	14	Netherlands	38,245
15	Chile	77,961	15	Belgium	50,781	15	India	29,451
16	Saudi Arabia	76,726	16	Netherlands	41,319	16	Switzerland	29,164
17	Mexico	71,105	17	Saudi Arabia	31,938	17	Peru	28,669
18	Pakistan	57,705	18	Switzerland	30,060	18	Portugal	24,070
19	Belgium	57,455	19	Ecuador	29,420	19	Ecuador	23,240
21	Netherlands	45,578	20	Portugal	26,182	20	Ireland	19,648
23	Ecuador	37,355	21	Mexico	26,025	21	Sweden	18,926
25	Sweden	34,440	22	Sweden	23,918	22	Saudi Arabia	18,811
26	Singapore	32,343	23	Pakistan	23,214	23	Israel	15,555
28	Portugal	31,007	24	Chile	23,048	24	Austria	15,274
29	Switzerland	30,761	25	Ireland	22,248	25	Mexico	14,677
30	Ireland	24,735	26	Singapore	20,198	26	Singapore	14,423
39	Israel	16,757	29	Israel	16,310	27	Pakistan	13,915
40	Japan	16,623	31	Austria	15,684	28	Chile	13,813
41	Austria	16,557	32	Japan	15,253	29	Japan	13,614
49	S. Korea	11,225	38	S. Korea	10,806	35	South Korea	10,738
	Others	668,249		Others	356,176		Others	263,943
	World	5,678,146			3,817,382		World	3,062,515
	30 countries' share	88.2%			90.7%			91.4%

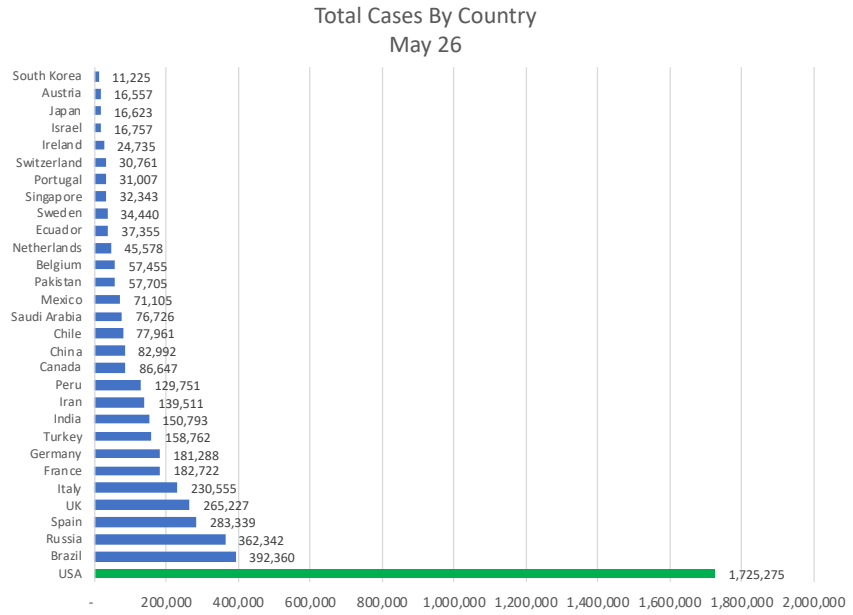
Country-by-Country

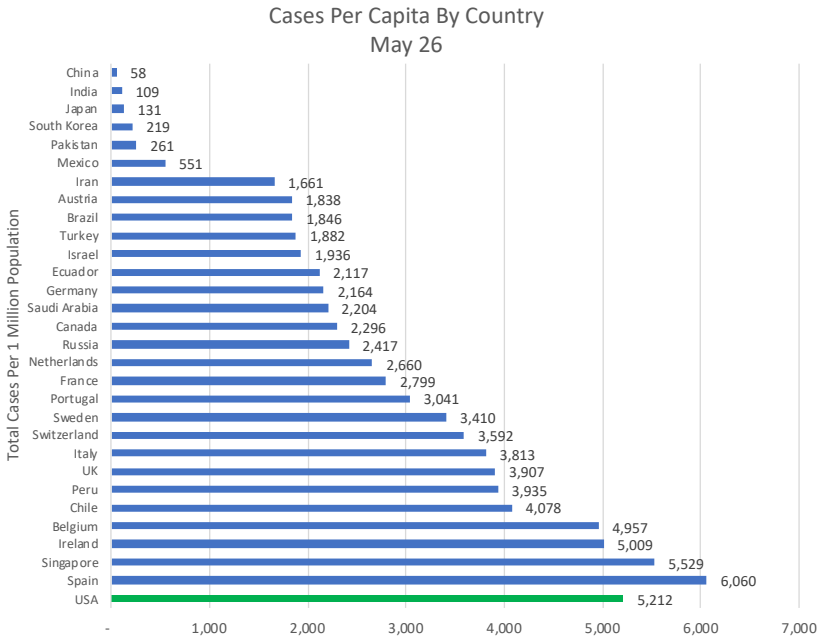
Cases & Cases Per Capita

"Strategic Guidance in an Era of Unprecedented Change"

Brazil, Chile, India, Mexico, Pakistan, Peru, Russia and Saudi Arabia are moving up in the ranks of most cases; Austria, Israel, Japan and South Korea are dropping

Cases per capita remain the highest in European countries, Singapore and the US.





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Country-by-Country

Deaths Per Cases & Per Capita

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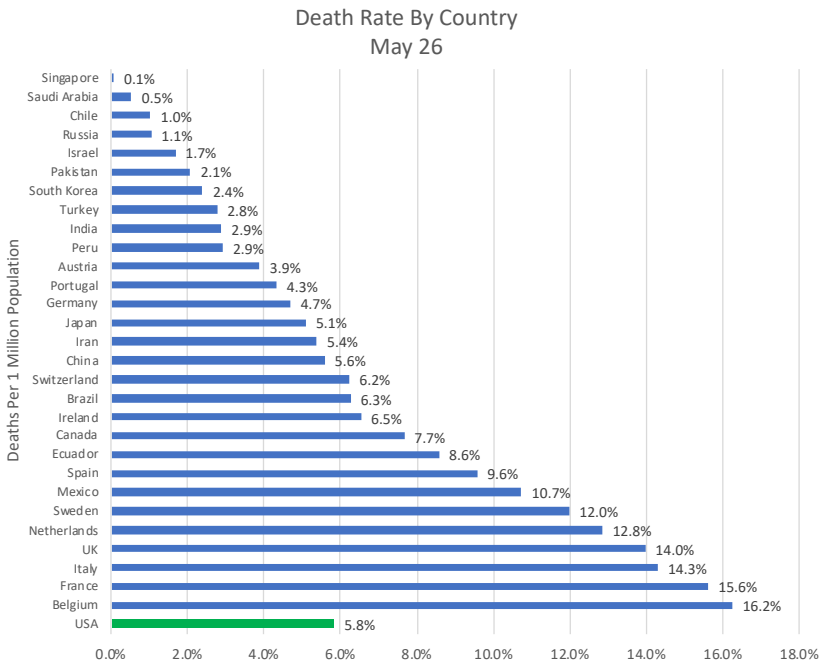
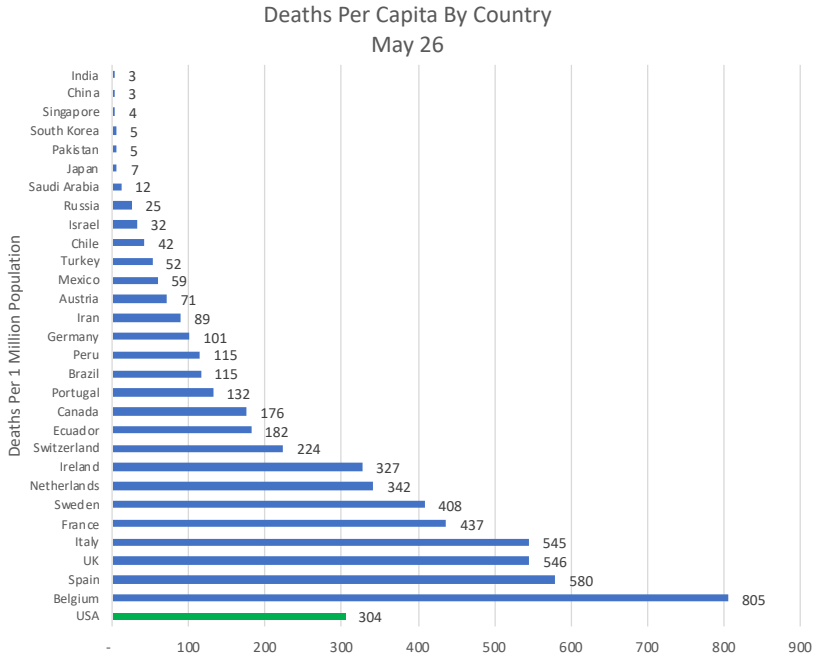
Death rates per case and per capita are the highest in Belgium, France, Italy, Spain and the UK. Rates in the US are in the middle of this group of countries





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Country-by-Country

Tests Per Capita & Case Growth Rate

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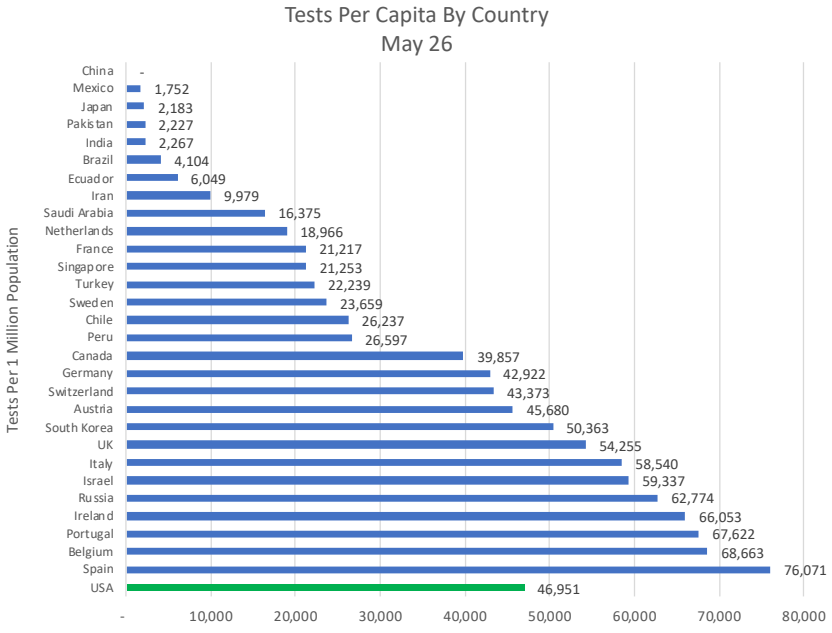
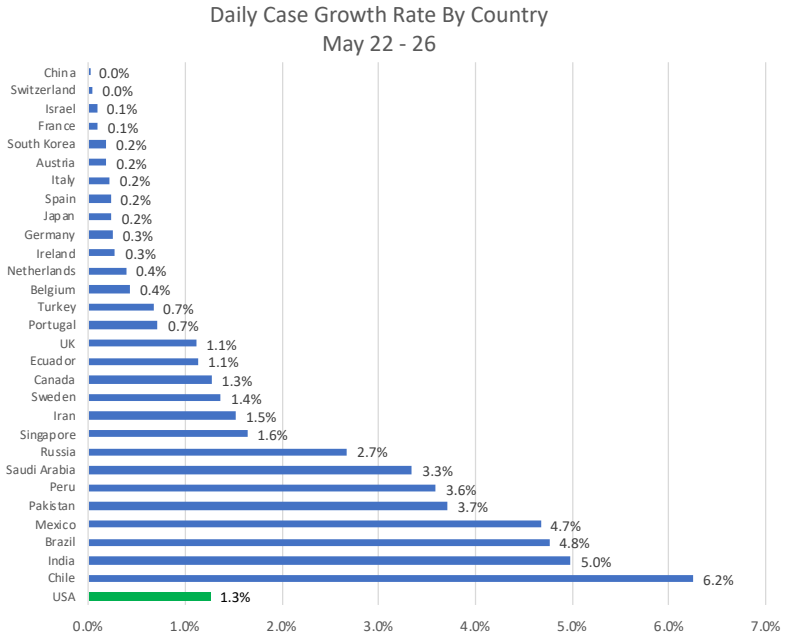
Testing per capita varies widely among these countries. The US, while ramping up testing over the past several weeks, still lags that of many European countries.

Case growth among the hardest-hit countries has fallen sharply over the past month; relatively high in Brazil, Chile, India, Mexico, and Peru





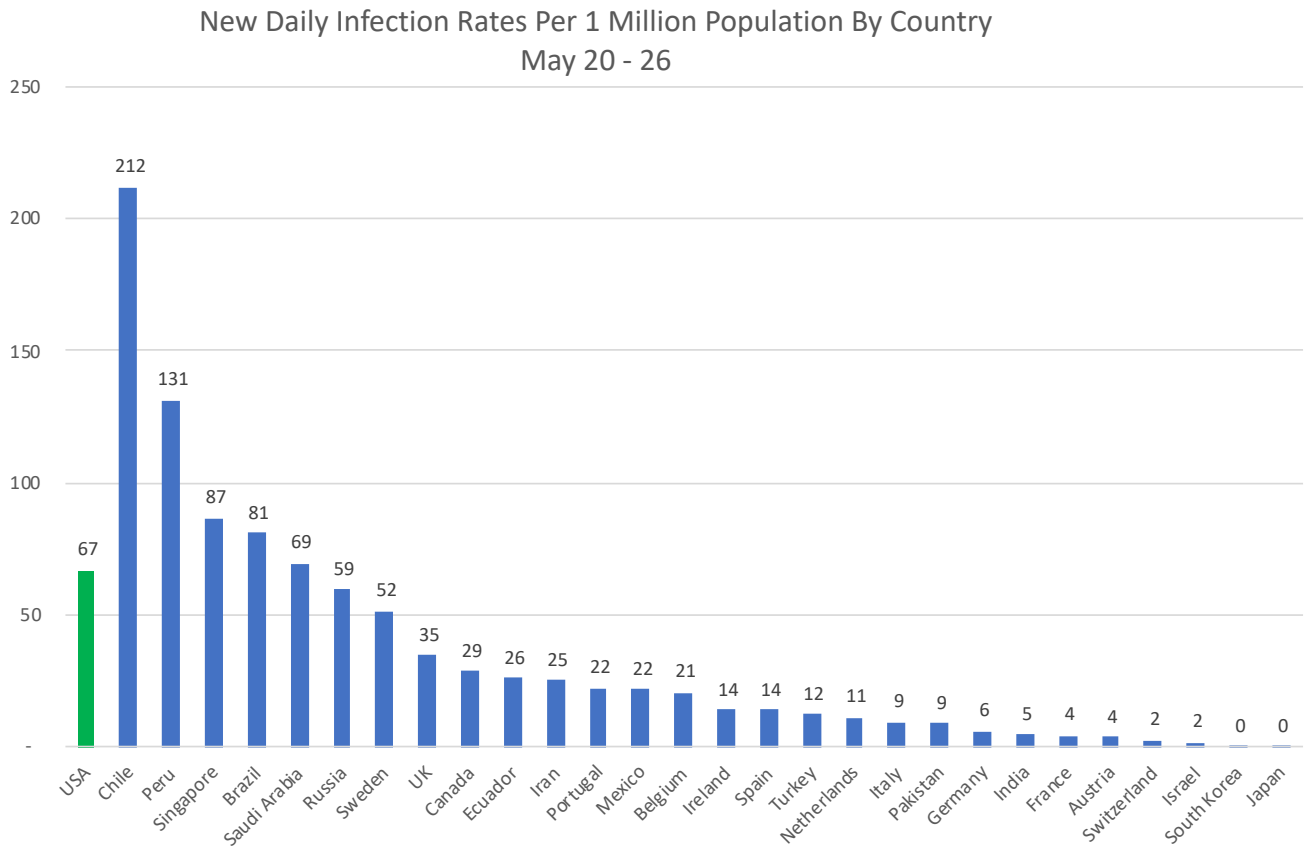
Country-by-Country

New Daily Infection Rate

"Strategic Guidance in an Era of Unprecedented Change"

New daily infection rates are declining in most of the hardest-hit countries.

Even in countries with newly-emerging virus-spread - Brazil, India, Mexico and Saudi Arabia - infection rates appear relatively low. Chile and Peru are the exceptions.



UNITED STATES & STATE-BY-STATE INFORMATION

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State-by-State

Comparative Statistics

"Strategic Guidance in an Era of Unprecedented Change"

As of May 26

State	Total Cases	Rank	Cases per 1M Population	Rank2	Deaths	Rank3	Death Rate	Rank4	Deaths per 1 Million Population	Rank5	5-day Moving Average Case Growth Rate	Rank6	Tests per 1M Population Past 7 days	Rank7	New Daily Cases Per 1M Population (5-Day M.A.)	Rank8
Alabama	15,650	(25)	3,191.8	(24)	580	(25)	3.7%	(33)	118.3	(25)	3.3%	(2)	1,055	(30)	95.4	(14)
Alaska	411	(51)	561.8	(49)	10	(51)	2.4%	(43)	13.7	(50)	0.4%	(47)	1,676	(9)	2.3	(49)
Arizona	16,783	(23)	2,305.8	(36)	807	(20)	4.8%	(19)	110.9	(27)	1.8%	(18)	572	(44)	43.5	(34)
Arkansas	6,180	(38)	2,047.8	(38)	119	(40)	1.9%	(46)	39.4	(45)	2.5%	(7)	855	(35)	59.5	(25)
California	99,776	(4)	2,525.2	(33)	3,852	(7)	3.9%	(30)	97.5	(29)	2.5%	(8)	1,291	(21)	57.7	(26)
Colorado	24,565	(17)	4,265.7	(19)	1,352	(16)	5.5%	(12)	234.8	(14)	1.2%	(37)	612	(43)	51.7	(29)
Connecticut	41,303	(12)	11,584.8	(6)	3,769	(8)	9.1%	(2)	1,057.1	(3)	1.0%	(39)	1,596	(11)	115.1	(10)
Delaware	9,066	(32)	9,310.3	(7)	335	(33)	3.7%	(34)	344.0	(12)	1.6%	(26)	1,582	(12)	151.0	(4)
District Of Columbia	8,334	(35)	11,808.7	(5)	440	(29)	5.3%	(13)	623.5	(5)	1.4%	(33)	543	(45)	182.2	(1)
Florida	52,255	(9)	2,433.0	(34)	2,259	(11)	4.3%	(25)	105.2	(28)	1.4%	(31)	1,379	(17)	35.3	(38)
Georgia	43,983	(11)	4,142.5	(20)	1,895	(14)	4.3%	(26)	178.5	(16)	1.6%	(25)	1,840	(7)	69.0	(21)
Hawaii	643	(49)	454.1	(50)	17	(49)	2.6%	(42)	12.0	(51)	-0.1%	(51)	540	(46)	0.2	(51)
Idaho	2,699	(43)	1,506.1	(45)	81	(42)	3.0%	(39)	45.2	(43)	1.3%	(35)	266	(50)	17.8	(46)
Illinois	113,195	(3)	8,932.8	(8)	4,923	(6)	4.3%	(24)	388.5	(10)	2.0%	(15)	1,861	(5)	171.0	(2)
Indiana	32,078	(16)	4,764.8	(16)	2,004	(13)	6.2%	(8)	297.7	(13)	1.4%	(32)	879	(33)	71.6	(20)
Iowa	17,704	(22)	5,611.3	(13)	478	(27)	2.7%	(41)	151.5	(21)	1.8%	(20)	1,239	(22)	106.6	(11)
Kansas	9,264	(31)	3,179.9	(25)	210	(37)	2.3%	(44)	72.1	(37)	1.3%	(34)	707	(40)	45.3	(32)
Kentucky	8,951	(33)	2,003.5	(40)	394	(31)	4.4%	(23)	88.2	(31)	1.6%	(28)	507	(48)	28.2	(42)
Louisiana	38,068	(14)	8,188.8	(9)	2,701	(9)	7.1%	(6)	581.0	(7)	0.8%	(42)	1,935	(4)	93.1	(15)
Maine	2,109	(45)	1,568.9	(42)	79	(43)	3.7%	(31)	58.8	(39)	2.4%	(9)	1,459	(13)	39.1	(36)
Maryland	47,687	(10)	7,887.8	(10)	2,333	(10)	4.9%	(18)	385.9	(11)	1.8%	(19)	1,083	(28)	145.1	(5)
Massachusetts	93,693	(5)	13,482.0	(3)	6,473	(3)	6.9%	(7)	931.4	(4)	0.8%	(43)	1,409	(16)	118.6	(9)
Michigan	55,104	(8)	5,517.7	(14)	5,266	(4)	9.6%	(1)	527.3	(8)	0.6%	(45)	878	(34)	39.4	(35)
Minnesota	21,960	(19)	3,893.9	(21)	908	(19)	4.1%	(28)	161.0	(18)	3.8%	(1)	1,217	(23)	124.9	(7)
Mississippi	13,731	(27)	4,613.7	(17)	652	(23)	4.7%	(20)	219.1	(15)	2.4%	(10)	1,443	(14)	97.3	(12)
Missouri	12,616	(29)	2,055.6	(37)	696	(22)	5.5%	(11)	113.4	(26)	1.6%	(24)	144	(51)	29.2	(41)
Montana	479	(50)	448.2	(51)	17	(49)	3.5%	(35)	15.9	(49)	0.0%	(50)	653	(42)	1.1	(50)
Nebraska	12,619	(28)	6,523.4	(11)	153	(38)	1.2%	(49)	79.1	(35)	2.0%	(13)	1,334	(20)	130.9	(6)
Nevada	7,998	(36)	2,596.6	(32)	396	(30)	5.0%	(17)	128.6	(24)	2.0%	(14)	1,661	(10)	44.2	(33)
New Hampshire	4,231	(41)	3,111.7	(26)	214	(36)	5.1%	(16)	157.4	(19)	1.5%	(30)	1,425	(15)	53.6	(28)
New Jersey	157,015	(2)	17,677.5	(2)	11,197	(2)	7.1%	(4)	1,260.6	(2)	0.5%	(46)	1,861	(6)	96.5	(13)
New Mexico	7,130	(37)	3,400.4	(22)	325	(34)	4.6%	(21)	155.0	(20)	2.0%	(17)	2,708	(1)	63.9	(22)
New York	373,622	(1)	19,205.8	(1)	29,451	(1)	7.9%	(3)	1,513.9	(1)	0.4%	(48)	2,250	(3)	80.7	(18)
North Carolina	24,454	(18)	2,331.6	(35)	801	(21)	3.3%	(36)	76.4	(36)	2.9%	(5)	1,189	(25)	62.8	(23)
North Dakota	2,457	(44)	3,224.1	(23)	54	(46)	2.2%	(45)	70.9	(38)	2.0%	(16)	1,710	(8)	86.8	(17)
Ohio	33,075	(15)	2,829.6	(28)	2,012	(12)	6.1%	(9)	172.1	(17)	1.8%	(22)	755	(38)	49.9	(30)
Oklahoma	6,137	(39)	1,550.9	(43)	318	(35)	5.2%	(14)	80.4	(34)	1.6%	(27)	751	(39)	23.4	(44)
Oregon	3,967	(42)	940.6	(48)	148	(39)	3.7%	(32)	35.1	(46)	0.8%	(44)	536	(47)	8.2	(47)
Pennsylvania	72,876	(6)	5,692.6	(12)	5,194	(5)	7.1%	(5)	405.7	(9)	1.0%	(40)	656	(41)	60.8	(24)
Rhode Island	14,210	(26)	13,413.7	(4)	634	(24)	4.5%	(22)	598.5	(6)	0.9%	(41)	2,443	(2)	169.8	(3)
South Carolina	10,416	(30)	2,023.0	(39)	446	(28)	4.3%	(27)	86.6	(32)	2.1%	(11)	1,045	(31)	37.7	(37)
South Dakota	4,653	(40)	5,259.7	(15)	50	(47)	1.1%	(51)	56.5	(40)	1.8%	(21)	1,184	(26)	91.7	(16)
Tennessee	20,965	(21)	3,068.1	(27)	343	(32)	1.6%	(47)	50.2	(42)	2.0%	(12)	1,200	(24)	54.1	(27)
Texas	57,744	(7)	1,991.5	(41)	1,563	(15)	2.7%	(40)	53.9	(41)	1.5%	(29)	376	(49)	34.8	(39)
Utah	8,620	(34)	2,688.7	(31)	101	(41)	1.2%	(50)	31.5	(47)	1.8%	(23)	1,095	(27)	49.1	(31)
Vermont	967	(47)	1,549.7	(44)	54	(46)	5.6%	(10)	86.5	(33)	0.4%	(49)	1,335	(19)	5.3	(48)
Virginia	39,342	(13)	4,609.2	(18)	1,236	(17)	3.1%	(38)	144.8	(22)	2.9%	(4)	1,078	(29)	120.5	(8)
Washington	21,209	(20)	2,785.2	(29)	1,086	(18)	5.1%	(15)	142.6	(23)	1.2%	(38)	778	(36)	29.5	(40)
West Virginia	1,854	(46)	1,037.4	(47)	74	(44)	4.0%	(29)	41.4	(44)	3.0%	(3)	760	(37)	27.2	(43)
Wisconsin	15,863	(24)	2,724.5	(30)	517	(26)	3.3%	(37)	88.8	(30)	2.7%	(6)	1,365	(18)	73.1	(19)
Wyoming	850	(48)	1,468.7	(46)	13	(50)	1.5%	(48)	22.5	(48)	1.2%	(36)	901	(32)	18.3	(45)
United States	1,725,275		5,212.3		100,572		5.8%		303.8		1.3%		1,153		66.8	

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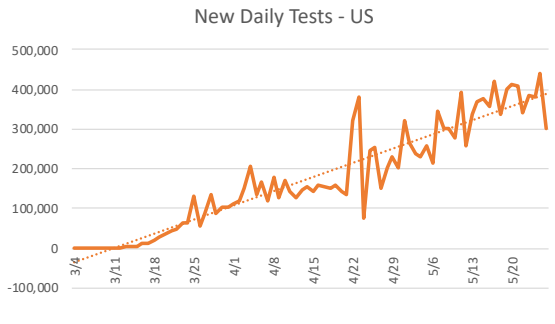
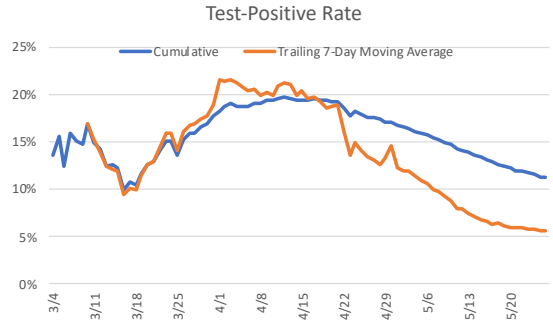
United States

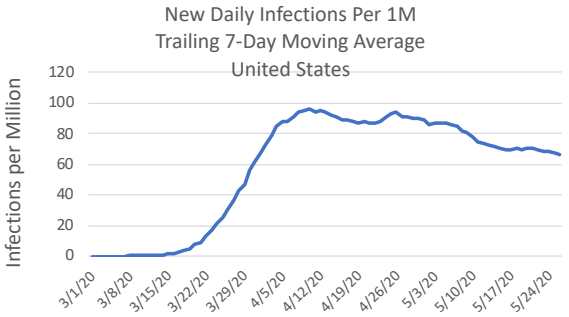
Overall Statistics

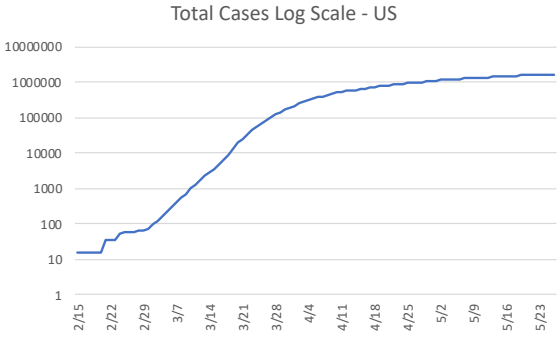
"Strategic Guidance in an Era of Unprecedented Change"

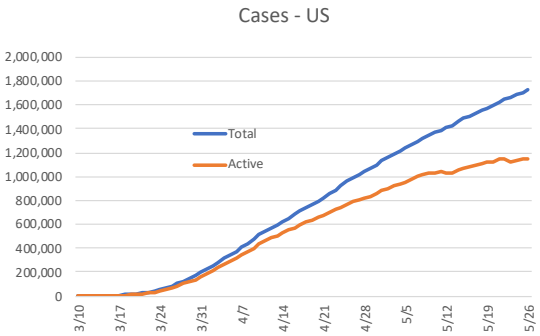
With significantly increased testing, the US is now meeting the WHO standard of <10% test-positives. This suggests that asymptomatic cases are being captured and that we have a better view of true infection rates.
Further, new daily infections continue to decline; the death rate seems to have stabilized.

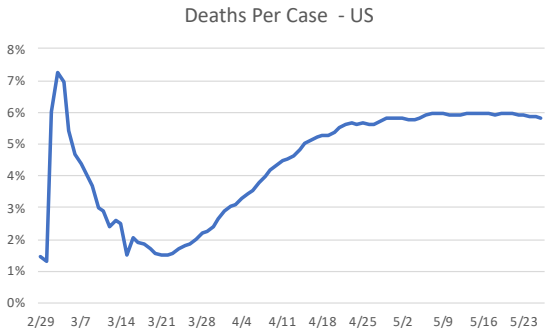












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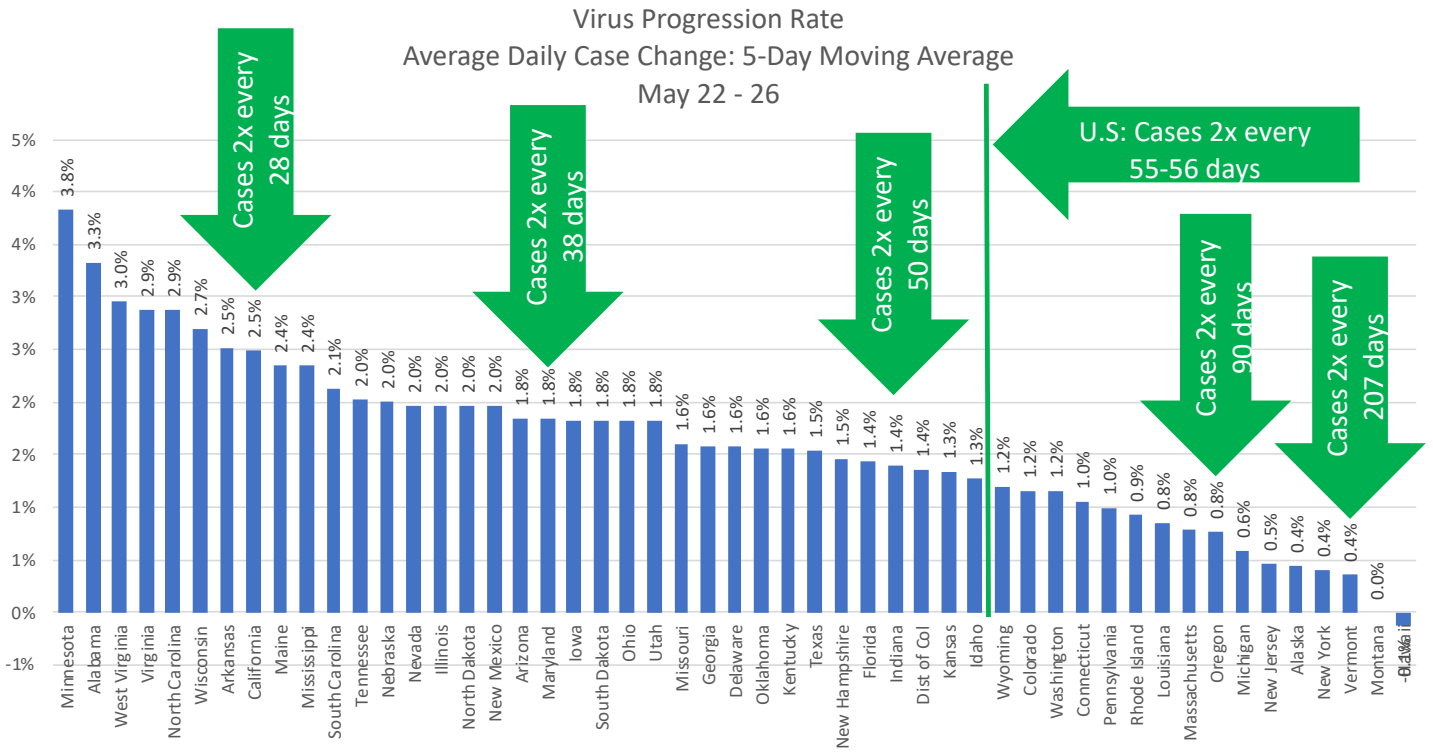
State-by-State

Average Daily Case Growth

"Strategic Guidance in an Era of Unprecedented Change"

Just 1 month ago, cases in every state were doubling every 1 – 3 weeks.
Now, they would take from 18 days to ∞ to double



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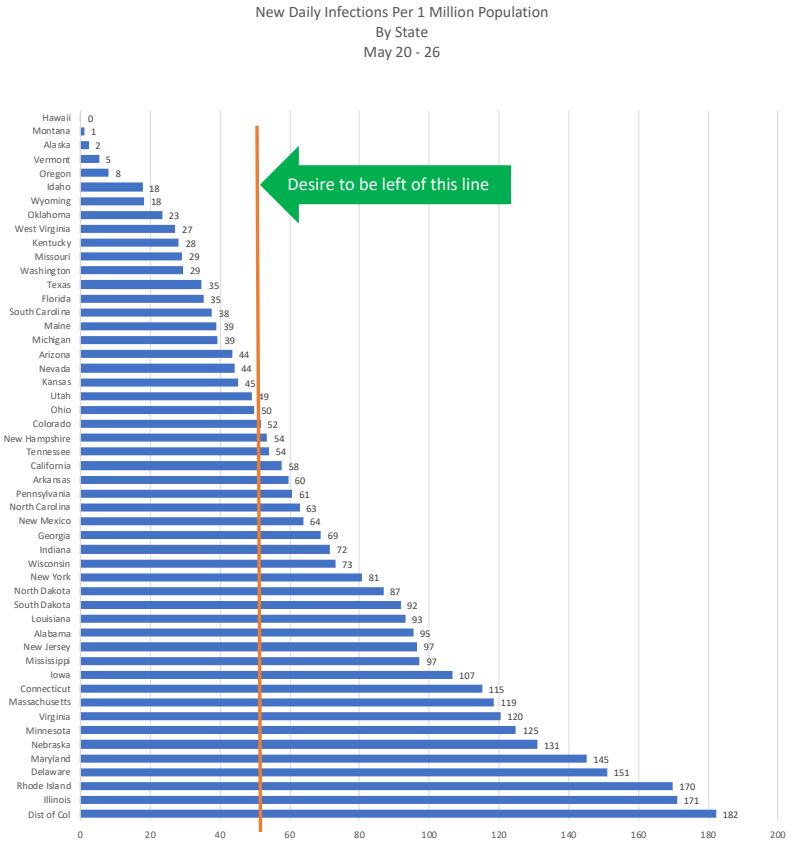
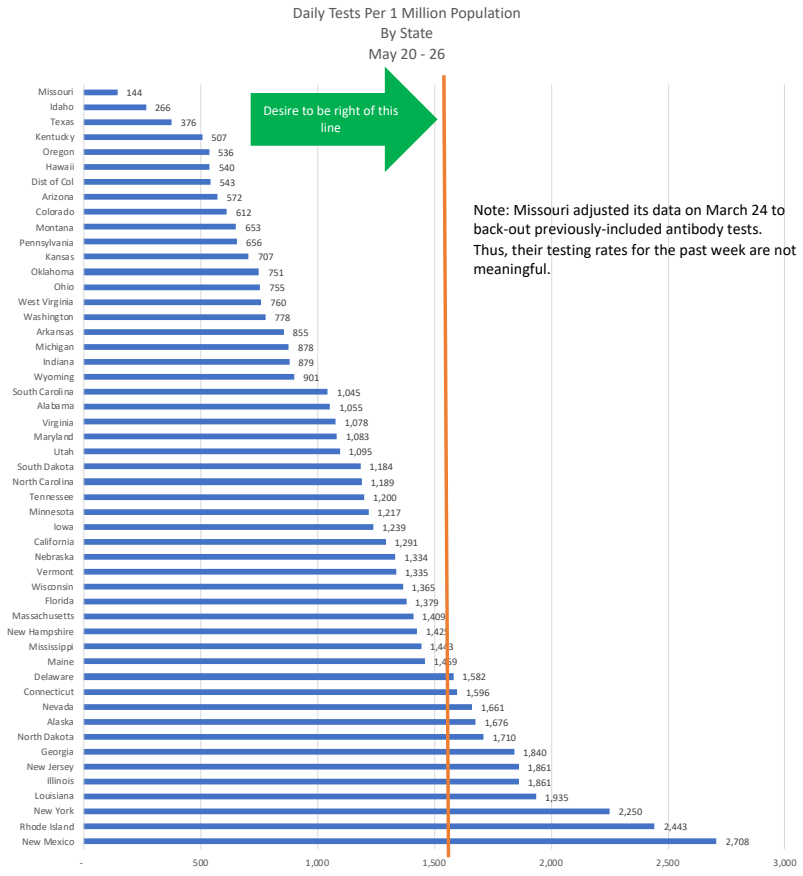
State-by-State

New Daily Infections & Tests Per Capita

"Strategic Guidance in an Era of Unprecedented Change"





Note: Missouri adjusted its data on March 24 to back-out previously-included antibody tests. Thus, their testing rates for the past week are not meaningful.

State-by-State

Cases & Deaths Per Capita

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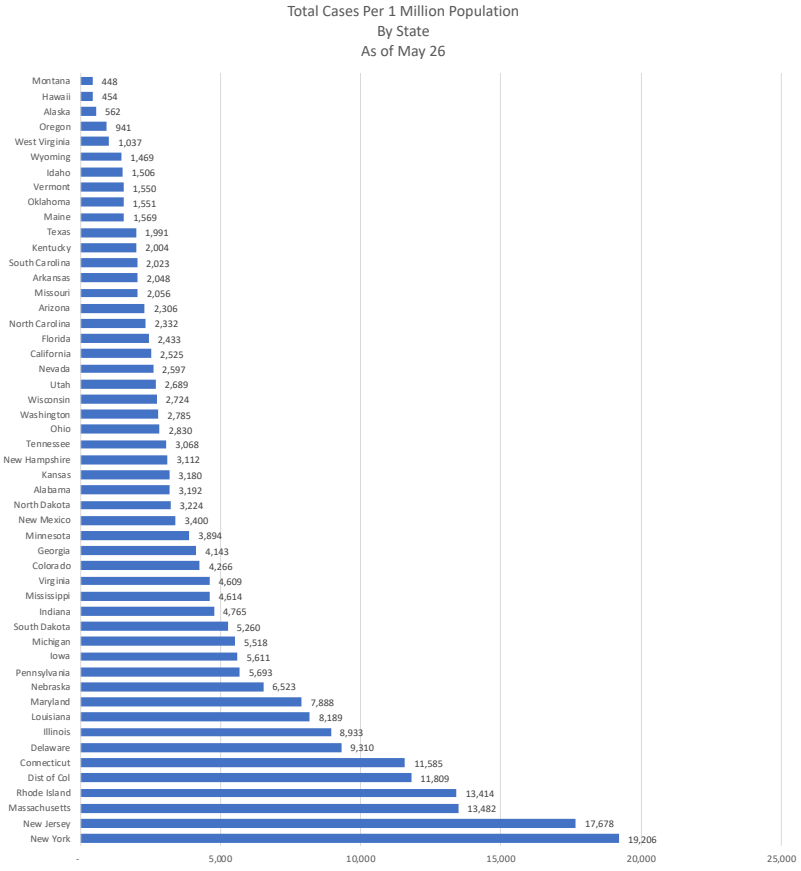

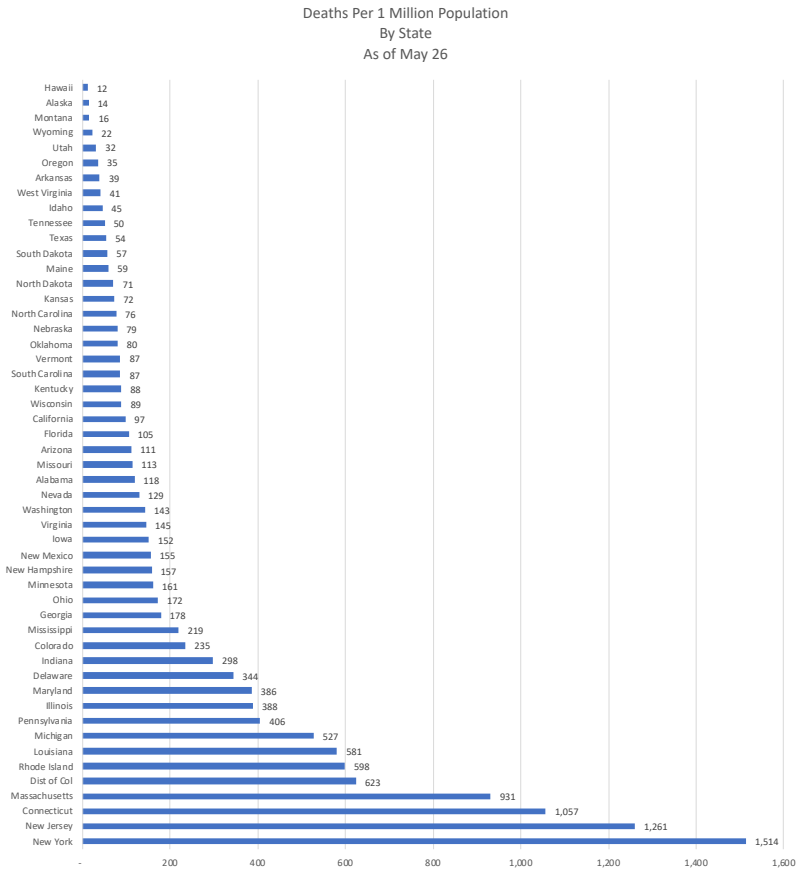

State-by-State

Which States Are Performing Sufficient Tests?

"Strategic Guidance in an Era of Unprecedented Change"

The World Health Organization suggested that the test-positive rate should be 10% or lower, for testing to be sufficient to assess the true prevalence of the virus. All except 3 states met this guideline for the past week (these 3 are close).

STATE-BY-STATE READINESS FOR RELAXING RESTRICTIONS

Readiness For Relaxing Restrictions

We recently modified the tests/capita metric in two ways: first, we changed to tests/capita past 2 weeks (v. cumulative); second, we adopted the Harvard based study of susceptible-infected-recovered model (SEIR) identification of a goal of 2.7% of population tested per week; and, a minimum of 1520 tests per 1 million population. This will serve as a more challenging standard.

- We recently introduced a scorecard to provide a snapshot of each state's readiness for relaxing restrictions on businesses and individuals.
- To portray readiness we have incorporated the following measures into to the scorecard, (along with the rationale for the scoring within each measure):
  - Tests/Capita – last 14 days; indicates testing robustness; grading quintiles based on Harvard study using susceptible-infected-recovered model (SEIR) 2.7% of population tested per week, 1%, 0.7%, 0.35%, all others
    - Direction – whether test volume increased/stayed level, or decreased the past 2 weeks v. prior two weeks
  - Test-Positive Rate – indicates whether testing is identifying sufficient numbers of non-infected persons; grading based on comparison to best reported in the world (South Korea, Australia, New Zealand), next group of countries (Canada, Germany, Denmark), then, next 3 levels set to differentiate among states
    - Direction – whether test positive rate increased/stayed level, or past 2 weeks v. prior two weeks
  - New Infections / 1 Million – indicates how quickly the virus is spreading; grading based on: rate proposed by IHME for ending social distancing, top ten, top 20, top 25 among the countries we track, then all others
    - Direction – whether new infection per capita rate increased/stayed level, or past 2 weeks v. prior two weeks
  - Influenza-Like Illness – Using CDC-reported data, indicates whether the state's visits for influenza the past week were above or below CDC baseline for the state's region
    - Direction – whether the % visits for influenza the last 3 weeks increased or decreased the past 3 weeks v. the prior 3 weeks
  - Hospital Resources – using IHME projections, whether the state is pre- or post- peak projected hospital resource needs due to the virus; and the 5 of peak resources projected to be needed today. Grading based on current need at <45% of peak, 45-60%, 60-75%, 75-85%, and all others.
- On the following pages, we portray state-by-state readiness on various dates.
- **These scorecards are for informational purposes only. The measures and grading used are not based on any scientific standard and should not be considered a substitute for public health considerations or other clinical or economic judgement. States may elect to move faster or slower than the scorecard might otherwise indicate.**

Readiness For Relaxing Restrictions

Highlights:

- Progress has been made in several states, on both testing volumes and test-positive rates
  - Most states are still testing far below the minimum 152 daily tests per 1 million population cited in a recent NY Times article; and the higher standard of 2.7% of the population tested weekly (386 daily per 1 million, as suggested by a recent Kaiser Family Foundation article. Both articles referenced Harvard researchers as the source of these metrics
  - Test-positive rates in many states, however, are below or close to the 10% threshold suggested by Dr. Maria Van Kerkhove of the World Health Organization, as indicative of sufficient testing to have reasonable visibility to true infection rates
- As we have progressed past the peak flu season in many states, that "constraint" on re-opening is diminishing
- With the relaxing of restrictions in many states, the Institute for Health Metrics and Evaluation's (IHME) projections of these states' hospital resources needs have increased significantly in the past week. Note: these metrics consider hospital resource needs, however, they do not consider capacity

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State-By-State

Relative "Readiness" For Relaxing Restrictions

"Strategic Guidance in an Era of Unprecedented Change"

Change over past week

May 26

State	Tests / Capita		Test-Positive Rate		New Infections / 1 Million		Influenza-Like Illness		Hospital Resources
	#	Direction	#	Direction	#	Direction	Baseline	Direction	
Alabama		✓		✓		✗	✓	✓	
Alaska		✓		✓		✓	✓	✓	
Arizona		✓		✓		✗	✓	✓	
Arkansas		✓		✓		✗	✓	✗	
California		✓		✓		✗	✓	✓	
Colorado		✓		✓		✓	✓	✓	
Connecticut		✓		✓		✓	✓	✓	
Delaware		✓		✓		✓	✓	✓	
District Of Co		✓		✓		✓	✗	✓	
Florida		✓		✓		✗	✗	●	
Georgia		✓		✓		✓	✓	✓	
Hawaii		✓		✓		✓	✓	✓	
Idaho		✓		✓		✗	✗	✗	
Illinois		✓		✓		✓	✓	✓	
Indiana		✓		✓		✓	✓	✓	
Iowa		✓		✓		✓	✓	✓	
Kansas		✓		✓		✓	✓	✓	
Kentucky		✓		✓		✓	✓	✓	
Louisiana		✓		✓		✗	✓	✓	
Maine		✓		✗		✗	✓	✓	
Maryland		✓		✗		✓	✗	✓	
Massachuset		✓		✓		✓	✓	✓	
Michigan		✓		✓		✓	✓	✓	
Minnesota		✓		✗		✗	✗	✓	
Mississippi		✓		✓		✗	✓	✓	
Missouri		✓		✓		✓	✓	✓	
Montana		✓		✓		✗	✓	✓	
Nebraska		✓		✓		✓	✓	✓	
Nevada		✓		✓		✗	✓	✓	
New Hampsh		✓		✓		✓	✓	✓	
New Jersey		✓		✓		✓	✓	✓	
New Mexico		✓		✓		✓	✓	✓	
New York		✓		✓		✓	✓	✓	
North Carolin		✓		✓		✗	✓	✓	
North Dakota		✓		✓		✗	✓	✓	
Ohio		✓		✓		✓	✓	✓	
Oklahoma		✓		✓		✓	✓	✓	
Oregon		✓		✓		✓	✓	✓	
Pennsylvania		✓		✓		✓	✓	✓	
Rhode Island		✓		✓		✗	✓	✓	
South Carolin		✓		✓		✗	✓	✓	
South Dakota		✓		✓		✓	✓	✗	
Tennessee		✓		✓		✓	✓	✓	
Texas		✓		✓		✓	✓	✓	
Utah		✓		✓		✓	✓	✓	
Vermont		✓		✓		✓	✓	✗	
Virginia		✓		✓		✗	✓	✓	
Washington		✓		✓		✓	✓	✓	
West Virginia		✓		✓		✗	✓	✓	
Wisconsin		✓		✓		✗	✗	✗	
Wyoming		✓		✓		✗	✓	✓	

May 19

State	Tests / Capita		Test-Positive Rate		New Infections / 1 Million		Influenza-Like Illness		Hospital Resources
	#	Direction	#	Direction	#	Direction	Baseline	Direction	
Alabama		✓		✓		✗	✓	✓	
Alaska		✓		✓		✓	✓	✓	
Arizona		✓		✓		✗	✓	✓	
Arkansas		✓		✓		✓	✓	✓	
California		✓		✓		✗	✓	✓	
Colorado		✓		✓		✓	✓	✓	
Connecticut		✓		✓		✓	✗	✓	
Delaware		✓		✓		✗	✓	✗	
District Of Columbia		✓		✓		✓	✓	✓	
Florida		✓		✓		✓	✗	●	
Georgia		✓		✓		✓	✓	✓	
Hawaii		✓		✓		✓	✓	✓	
Idaho		✓		✓		✓	✓	✓	
Illinois		✓		✓		✓	✓	✓	
Indiana		✓		✓		✓	✓	✓	
Iowa		✓		✓		✓	✓	✗	
Kansas		✓		✗		✓	✓	✓	
Kentucky		✓		✓		✓	✗	✗	
Louisiana		✓		✓		✓	✗	✓	
Maine		✓		✗		✗	✓	✓	
Maryland		✓		✗		✗	✓	✓	
Massachusetts		✓		✓		✓	✓	✓	
Michigan		✓		✓		✓	✓	✓	
Minnesota		✓		✗		✗	✓	✗	
Mississippi		✓		✗		✓	✓	✓	
Missouri		✓		✓		✓	✓	✓	
Montana		✓		✓		✓	✓	✓	
Nebraska		✓		✗		✗	✓	✓	
Nevada		✓		✓		✓	✓	✓	
New Hampshire		✓		✓		✓	✓	✓	
New Jersey		✓		✓		✗	✓	✓	
New Mexico		✓		✓		✗	✓	✓	
New York		✓		✓		✗	✓	✓	
North Carolina		✓		✓		✓	✗	✓	
North Dakota		✓		✓		✓	✗	✓	
Ohio		✓		✓		✓	✓	✗	
Oklahoma		✓		✓		✓	✓	✓	
Oregon		✓		✓		✓	✗	✓	
Pennsylvania		✓		✓		✓	✓	✓	
Rhode Island		✓		✓		✗	✓	✗	
South Carolina		✓		✓		✓	✓	✓	
South Dakota		✓		✓		✓	✗	✓	
Tennessee		✓		✓		✓	✓	✓	
Texas		✓		✓		✗	✓	✓	
Utah		✓		✓		✓	✓	✓	
Vermont		✓		✓		✓	✓	✓	
Virginia		✓		✓		✗	✓	✓	
Washington		✓		✓		✓	✓	✓	
West Virginia		✓		✓		✓	✗	✗	
Wisconsin		✓		✓		✗	✗	✓	
Wyoming		✓		✓		✓	✗	✗	

Legend and sources provided on 2nd following page

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State-By-State

Relative "Readiness" For Relaxing Restrictions

"Strategic Guidance in an Era of Unprecedented Change"

Progress over past month

May 26

State	Tests / Capita		Test-Positive Rate		New Infections / 1 Million		Influenza-Like Illness		Hospital Resources
	#	Direction	#	Direction	#	Direction	Baseline	Direction	
Alabama									
Alaska									
Arizona									
Arkansas									
California									
Colorado									
Connecticut									
Delaware									
District Of Co									
Florida									
Georgia									
Hawaii									
Idaho									
Illinois									
Indiana									
Iowa									
Kansas									
Kentucky									
Louisiana									
Maine									
Maryland									
Massachusett									
Michigan									
Minnesota									
Mississippi									
Missouri									
Montana									
Nebraska									
Nevada									
New Hampsh									
New Jersey									
New Mexico									
New York									
North Carolin									
North Dakota									
Ohio									
Oklahoma									
Oregon									
Pennsylvania									
Rhode Island									
South Carolin									
South Dakota									
Tennessee									
Texas									
Utah									
Vermont									
Virginia									
Washington									
West Virginia									
Wisconsin									
Wyoming									

April 26

State	Tests / Capita		Test-Positive Rate		New Infections / 1 Million		Influenza-Like Illness		Hospital Resources
	#	Direction	#	Direction	#	Direction	Baseline	Direction	
Alabama									
Alaska									
Arizona									
Arkansas									
California									
Colorado									
Connecticut									
Delaware									
District Of Columbia									
Florida									
Georgia									
Hawaii									
Idaho									
Illinois									
Indiana									
Iowa									
Kansas									
Kentucky									
Louisiana									
Maine									
Maryland									
Massachusetts									
Michigan									
Minnesota									
Mississippi									
Missouri									
Montana									
Nebraska									
Nevada									
New Hampshire									
New Jersey									
New Mexico									
New York									
North Carolina									
North Dakota									
Ohio									
Oklahoma									
Oregon									
Pennsylvania									
Rhode Island									
South Carolina									
South Dakota									
Tennessee									
Texas									
Utah									
Vermont									
Virginia									
Washington									
West Virginia									
Wisconsin									
Wyoming									

Legend and sources provided on following page

State-By-State

Relative "Readiness" For Relaxing Restrictions

"Strategic Guidance in an Era of Unprecedented Change"

Legend:

Time period	Tests per Capita: per 1M, Average last 2 weeks	Direction: last 14 days v prior 2 weeks	Test-Positive Rate: last 7 days	Direction: last 14 days v prior 2 weeks	New Daliy Infection Rate: per 1M, last 7 days	Direction: last 14 days v prior 2 weeks	Baseline: CDC Baseline by region	Direction: last 14 days v prior 2 weeks	Hospital Resources: As of 4/26
	>3,850		<=2%		<10				<45% of Peak
	1520 - 3,850		2-10%		10-50				45-60% of Peak
	1,501 - 3,850		10-14%		50-100				60-75% of Peak
	501 - 1,500		14-18%		100-150				75-85% of peak
	<750		>18%		>150				>85% of Peak or Pre-Peak
✓		Up		Down		Down by 40%	Below Baseline	Down	
!						Down by 10%		N/A	
✗		Down		Up		Down <10% or Up	Above Baseline	Up	

Sources:

Influenza guidelines and data from Centers fo Disease Control (https://gis.cdc.gov/grasp/fluview/fluportaldashboard.html), accessed April 30 - May 24, 2020
Test data from Covid Tracking Project (https://covidtracking.com/), accessed March 21-May 27, 2020
Hospital resource Need projections from Institure for Health Metrics and Evaluation (), accessed April 30- May 24, 2020
Infection rate data from worldometer.info, accessed March 21-May 27, 2020

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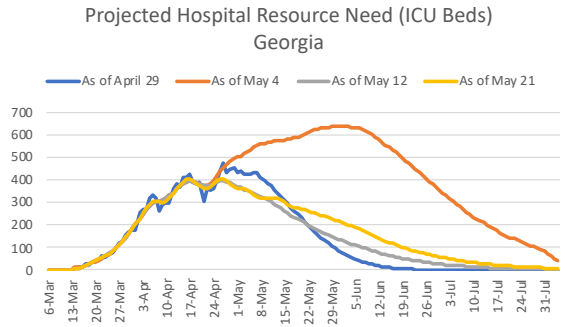
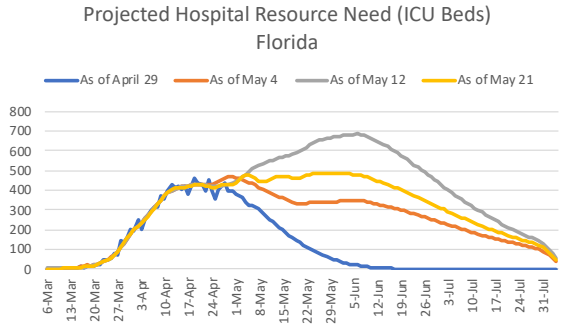
Impact of Relaxing Social Distancing

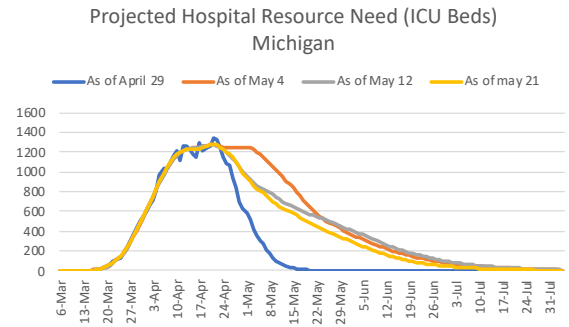
IHME's Hospital Resource Need Projections Are Sensitive to Relaxing Restrictions

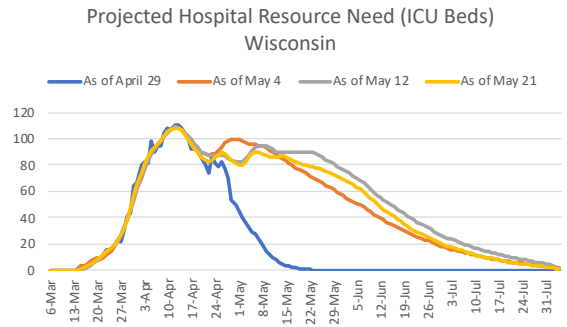
"Strategic Guidance in an Era of Unprecedented Change"

The Institute for Health Metrics and Evaluation (IHME) regularly updates projections of hospital resource needs. Comparing their projections from April 29, May 2, 12 and 21 indicates how much relaxing restrictions factors into these projections. Consider how much the projections changed in May:









Note: ICU beds were selected as representative of the three metrics that IHME uses: total beds, ICU beds and ventilators. HIA does not vouch for the accuracy of these projections; in our limited experience, they seem to over-state actual needs.

MONITORING THE IMPACT OF RELAXING RESTRICTIONS

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State-By-State

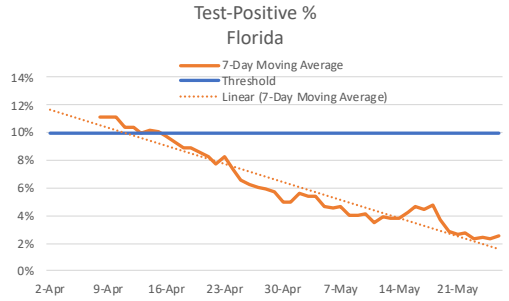
Impact of Relaxing Restrictions

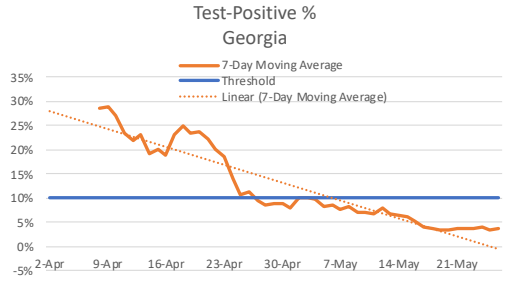
"Strategic Guidance in an Era of Unprecedented Change"

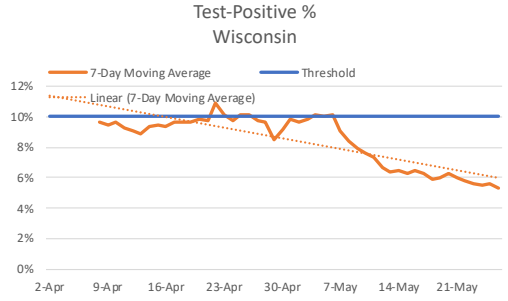
With several states re-opening, we are monitoring testing and infection rates to determine if, when and how much impact relaxation has on renewed spread of the virus. Here, we focus on Florida, Georgia and Wisconsin

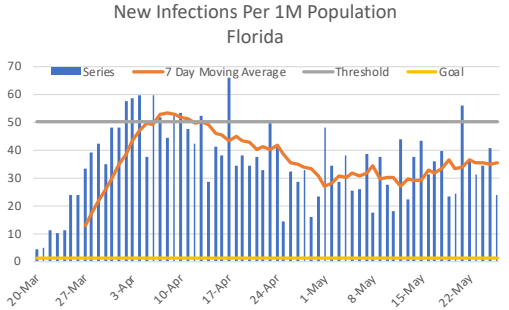
Wisconsin's infection rate – on a 7-day moving average basis - has been increasing since the Governor's executive orders were ruled unconstitutional. Its testing rate also increased significantly during this time . Thus, it is unclear how much of the case increase is due to increased testing v. increased infection. Further, the rate of new infections has now declined on 4 consecutive days.

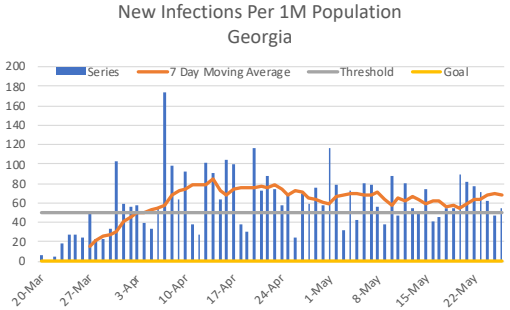
Test-positive and new infection rates in all three states remain relatively low.

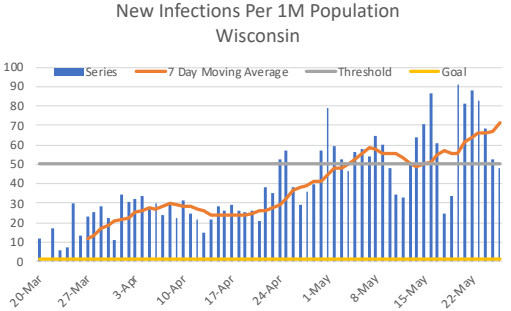












VIRUS PROGRESSION: ROADMAP TO RECOVERY

Virus Progression

The graphic on the following two pages illustrates when the state first recorded 100 total cases (start of the "contagion" phase); when growth stopped following an exponential pattern (start of the "containment" phase); and, when peak total cases were recorded (start of the "recovery" phase). It uses symbols to indicate when average daily case growth rates fell (and were sustained) below certain benchmarks, as well as when deaths stopped growing exponentially.

A state is not shaded green until active cases appear to have peaked.

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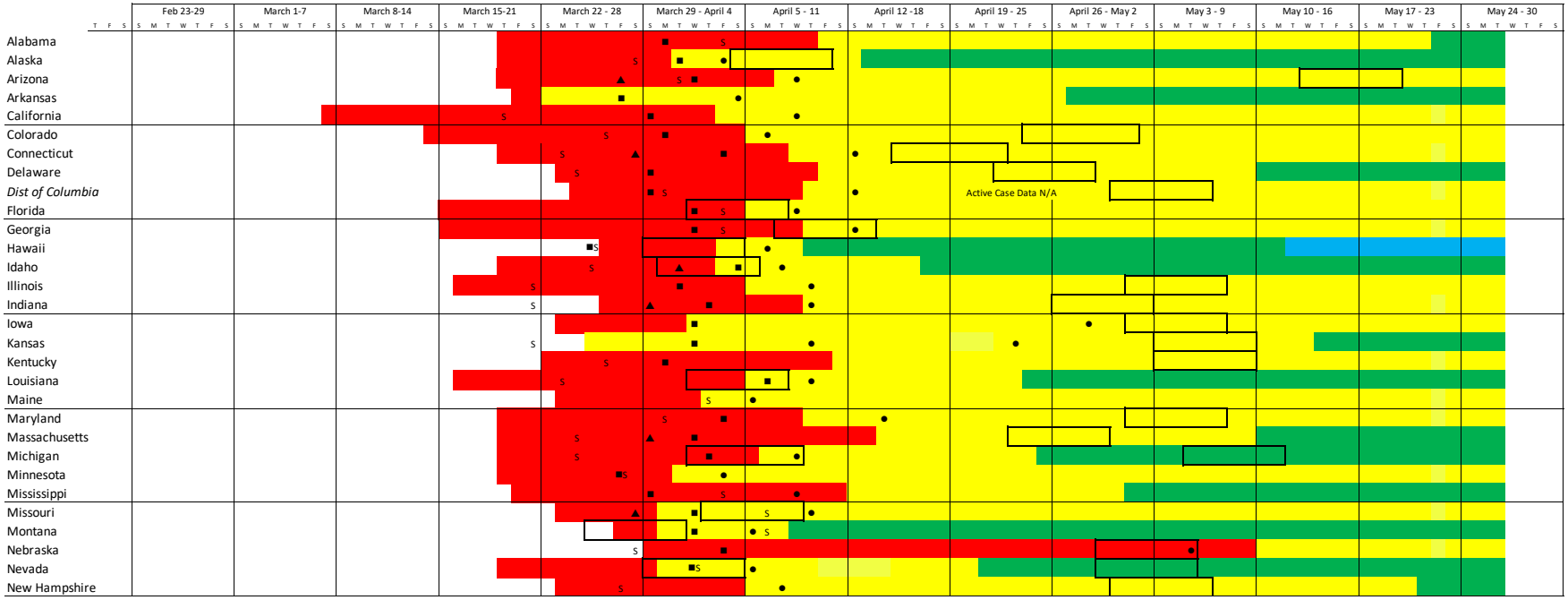
State-by-State

Virus Progression – *1 of 2*

"Strategic Guidance in an Era of Unprecedented Change"



Legend on following page

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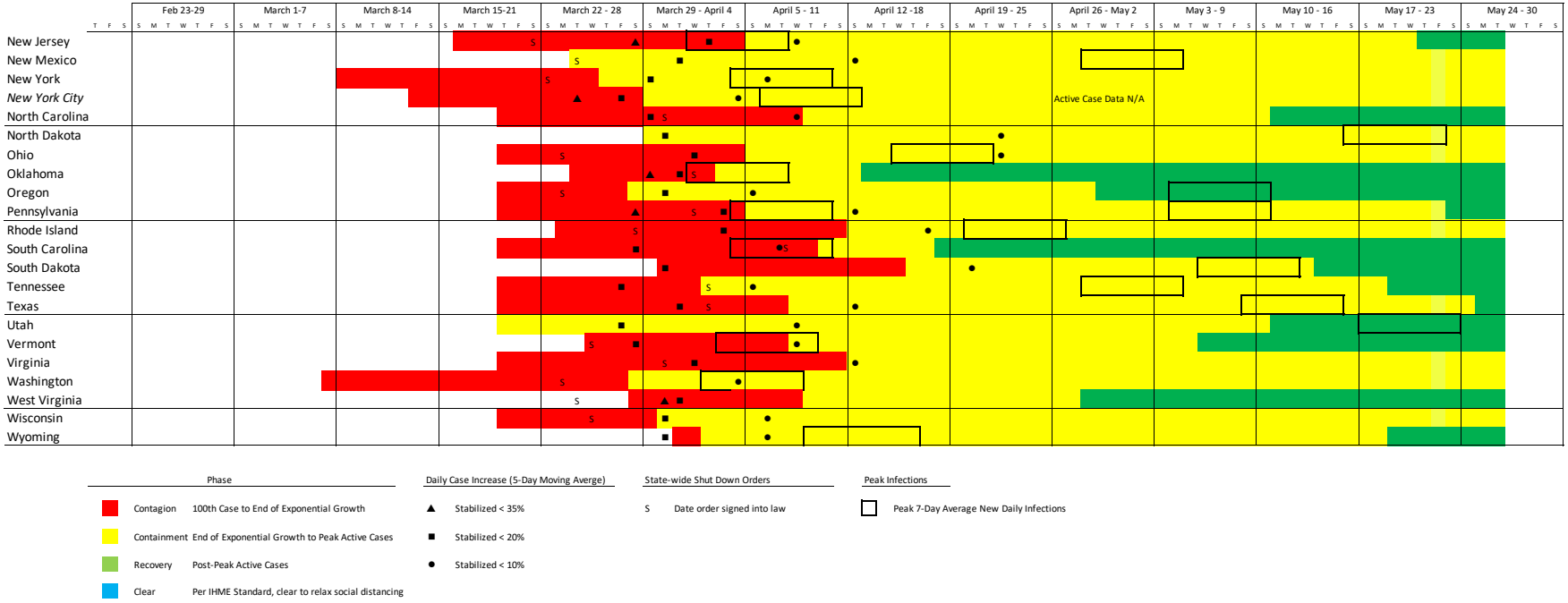
State-by-State

Virus Progression – *2 of 2*

"Strategic Guidance in an Era of Unprecedented Change"

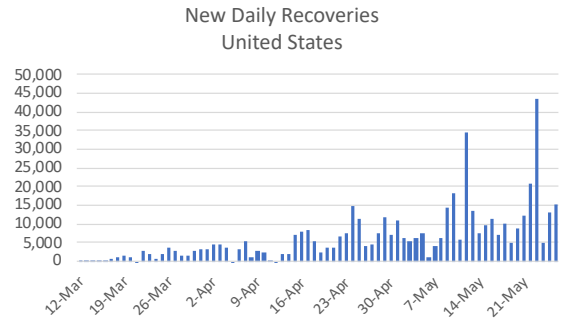


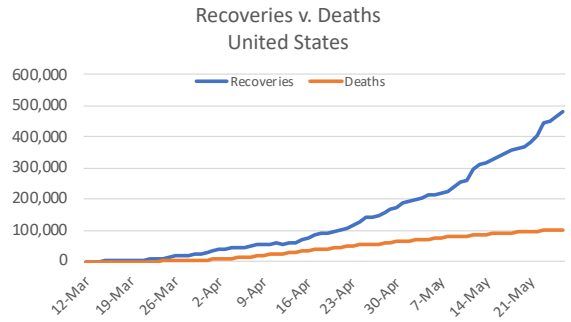
UNDER-REPORTED RECOVERIES? POSSIBLE LAG IN STATE REPORTING

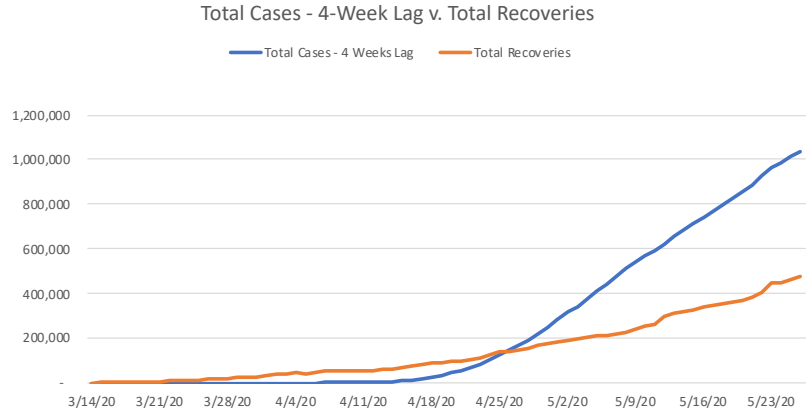
United States

Recoveries

"Strategic Guidance in an Era of Unprecedented Change"







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Recoveries

Reporting of Recoveries Seems to Be Lagging

"Strategic Guidance in an Era of Unprecedented Change"

Which states seem to be lagging in reporting?

At this point, we should be expecting far more recoveries in the U.S.

Comparing the reported recoveries to Total Cases 4 weeks ago*, this shortfall is ~350-450k

State	Recoveries	Expected Recoveries Low	High
Alabama	7,951	5,400	6,075
Alaska	362	281	316
Arizona	70	5,558	6,253
Arkansas	4,332	2,502	2,814
California	20,840	36,930	41,547
Colorado	1,722	11,453	12,884
Connecticut	6,622	21,050	23,681
Delaware	4,802	3,660	4,118
District Of Columbia	1,080	3,195	3,595
Florida	8,514	26,277	29,561
Georgia	697	19,883	22,369
Hawaii	593	487	548
Idaho	2,100	1,562	1,757
Illinois	3,615	38,482	43,292
Indiana	1,954	13,270	14,929
Iowa	9,855	5,101	5,738
Kansas	3,961	2,862	3,219
Kentucky	3,115	3,500	3,938
Louisiana	28,700	21,829	24,557
Maine	1,318	832	936
Maryland	3,283	16,090	18,102
Massachusetts	32,549	46,642	52,472
Michigan	33,168	31,410	35,336
Minnesota	15,523	3,345	3,763
Mississippi	9,401	5,074	5,708
Missouri	3,046	5,901	6,638
Montana	441	361	406
Nebraska	349	2,699	3,037
Nevada	5,852	3,844	4,325
New Hampshire	2,550	1,608	1,809
New Jersey	13,907	91,085	102,470
New Mexico	2,564	2,379	2,677
New York	64,866	241,160	271,305
North Carolina	14,954	7,791	8,765
North Dakota	1,551	793	892
Ohio	6,014	13,415	15,092
Oklahoma	4,825	2,728	3,069
Oregon	1,894	1,908	2,147
Pennsylvania	41,602	36,013	40,514
Rhode Island	1,084	6,341	7,133
South Carolina	6,043	4,588	5,162
South Dakota	3,528	1,850	2,082
Tennessee	13,334	8,042	9,047
Texas	36,405	20,937	23,554
Utah	5,346	3,474	3,909
Vermont	848	690	776
Virginia	5,227	11,471	12,905
Washington	5,954	11,074	12,458
West Virginia	1,180	876	986
Wisconsin	9,405	5,031	5,660
Wyoming	607	429	482
United States	479,969	828,612	932,189

* - 4 weeks is the presumed time from infection-onset to recovery referenced by many states

Low = 80% of Total Cases 4 week ago
High = 90% of Total Cases 4 week ago

- States seemingly up-to-date with reporting recoveries
- States only reporting~ 1/2 expected recoveries
- States well-behind in reporting recoveries

STATE TEST, INFECTION AND CASE TRENDS

Test, New Daily Infection and Active Case Trends

Graphics relevant to judging how far a state has progressed against the virus are provided on the following pages for:

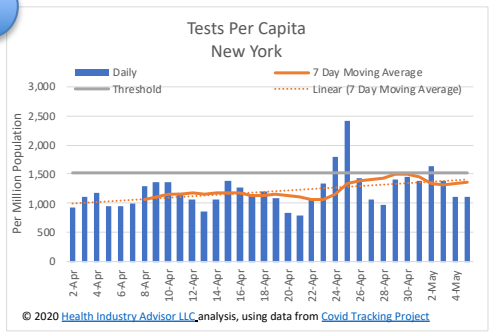
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina

Test, New Daily Infection and Active Case Trends

How to "read" these charts:

- Chart 1 – Desire to see tests per capita:
  - Above the threshold
  - Increasing or stable
- Chart 2 - Desire to see Test-Positive %:
  - Below the threshold
  - Declining or stable
- Chart 3 - Desire to see New Infections Per Capita:
  - Below the threshold
  - Declining or stable
- Chart 4 - Desire to see Active Cases:
  - Declining

1



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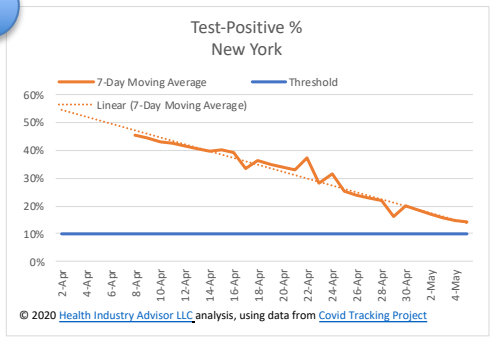

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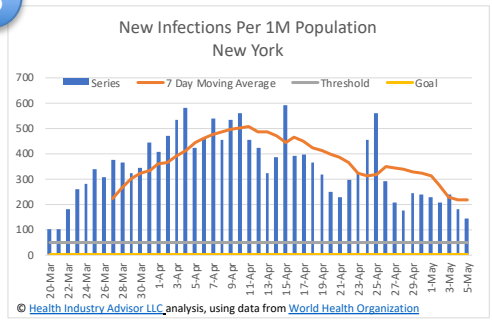

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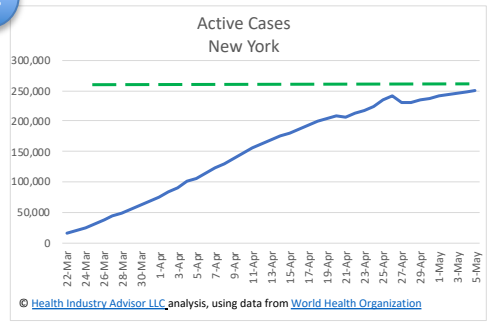
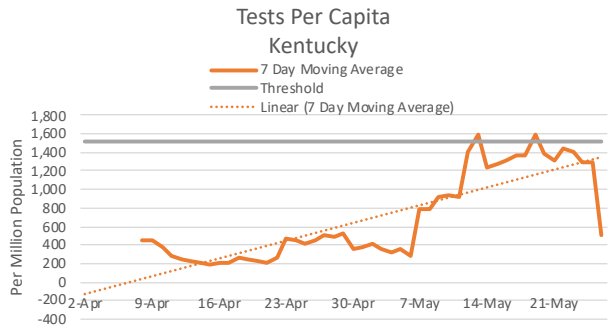
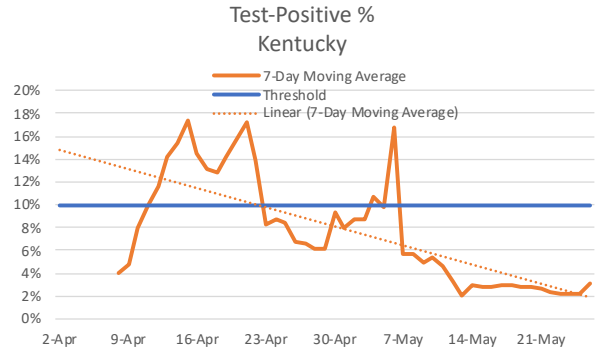
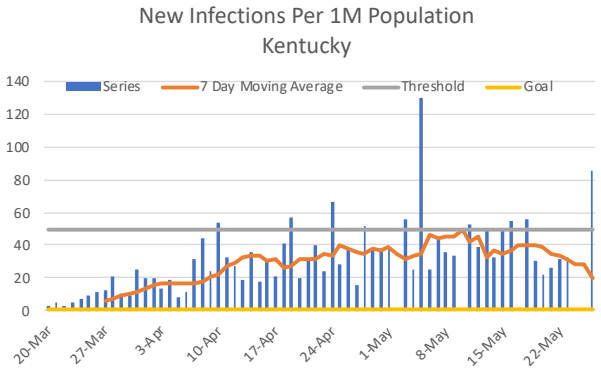
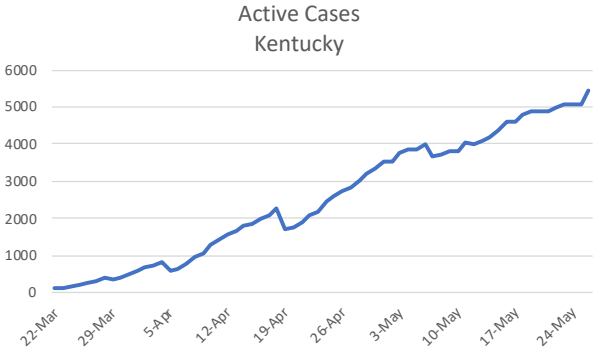


Test, New Daily Infection and Active Case Trends





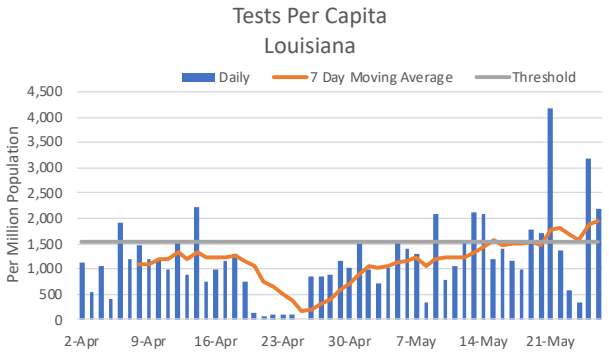


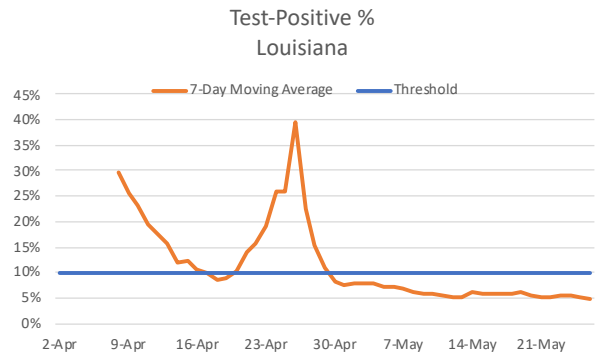


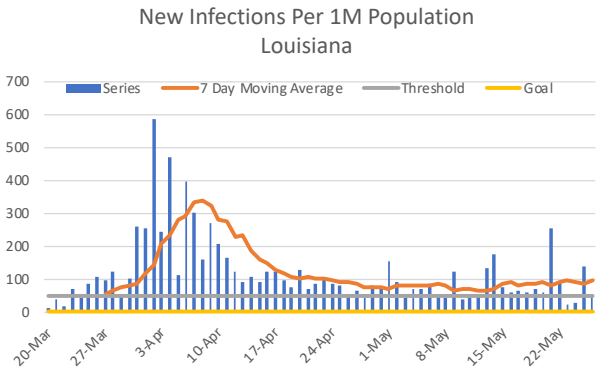
State-by-State

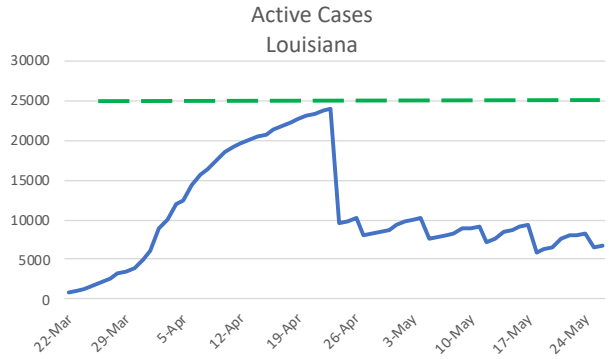
Test, New Daily Infection and Active Case Trends

"Strategic Guidance in an Era of Unprecedented Change"

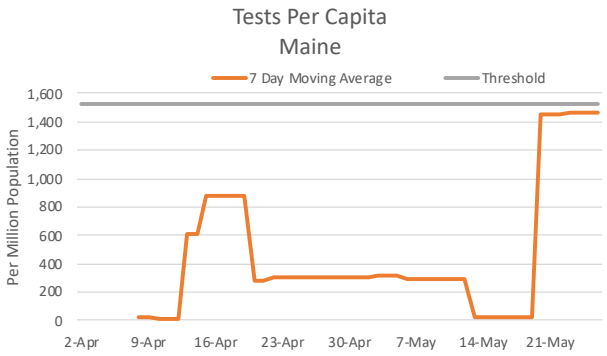


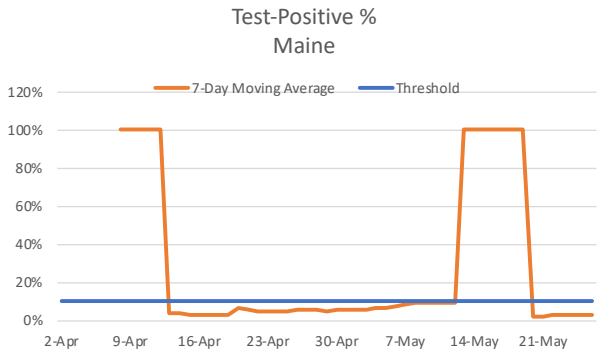


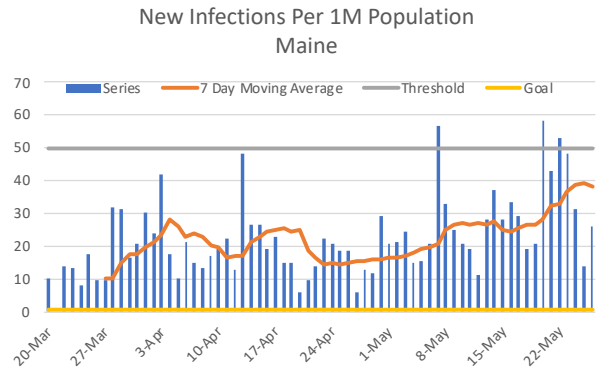


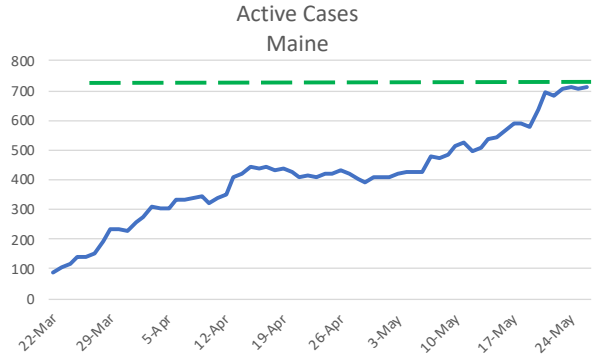


Test, New Daily Infection and Active Case Trends

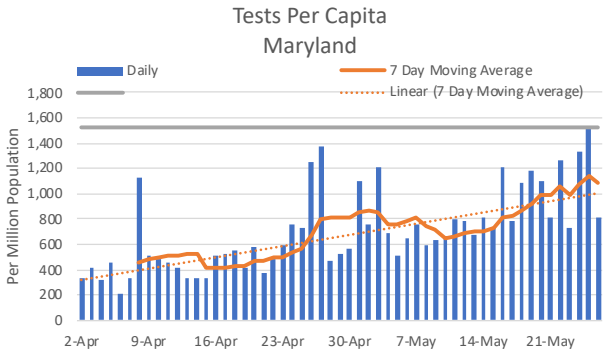


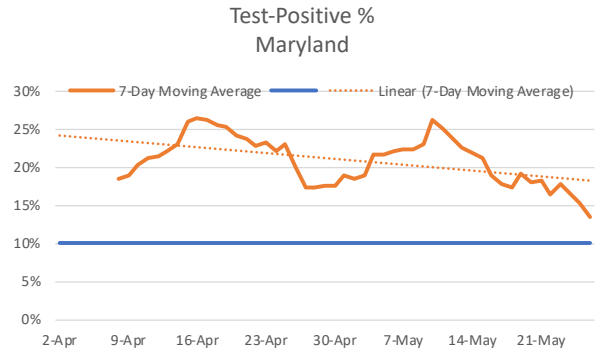


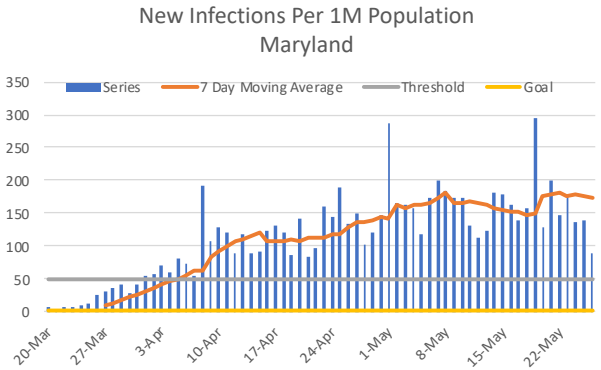


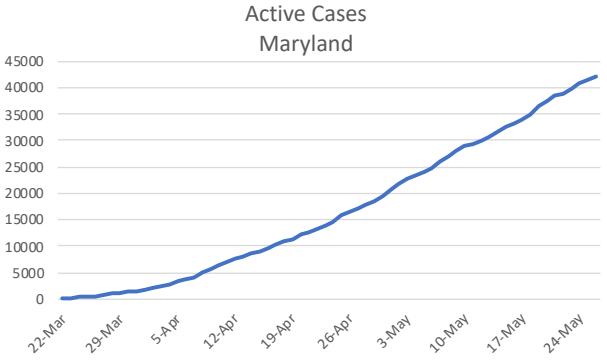


Test, New Daily Infection and Active Case Trends



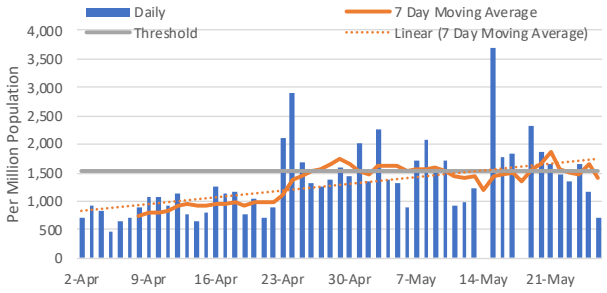




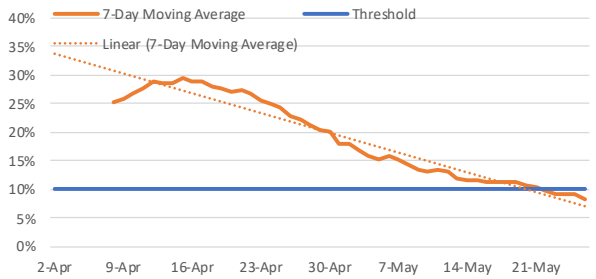


Test, New Daily Infection and Active Case Trends

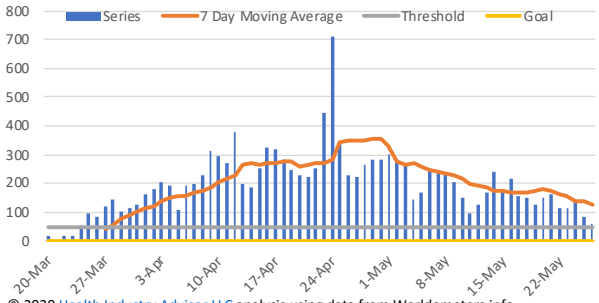
Tests Per Capita
Massachusetts



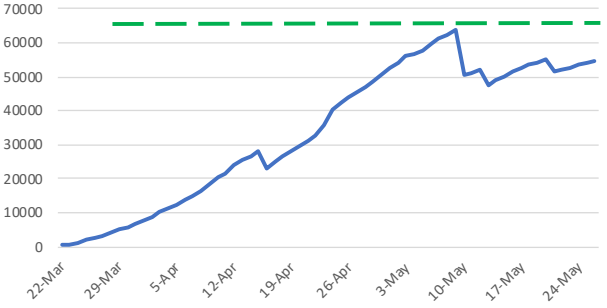
Test-Positive %
Massachusetts



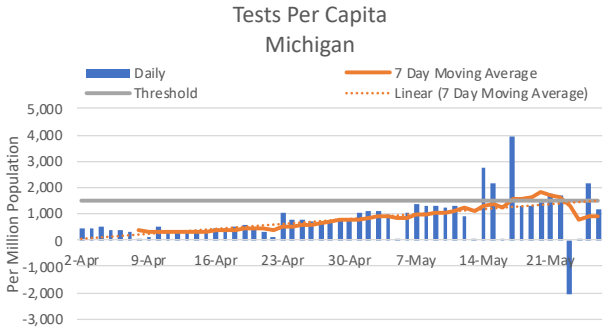
New Infections Per 1M Population
Massachusetts

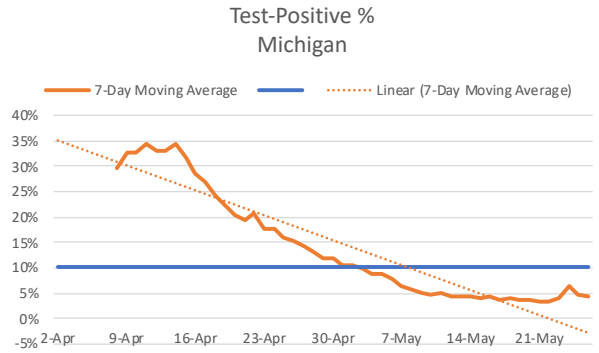


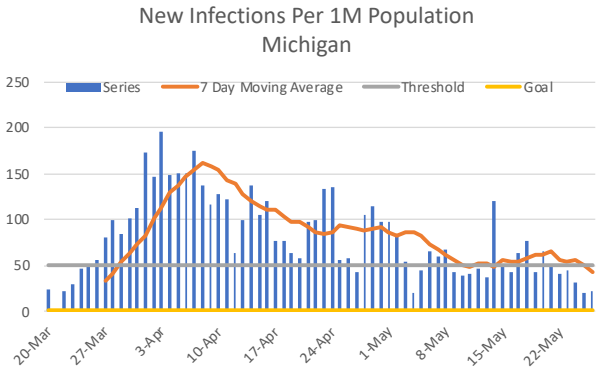
Active Cases
Massachusetts

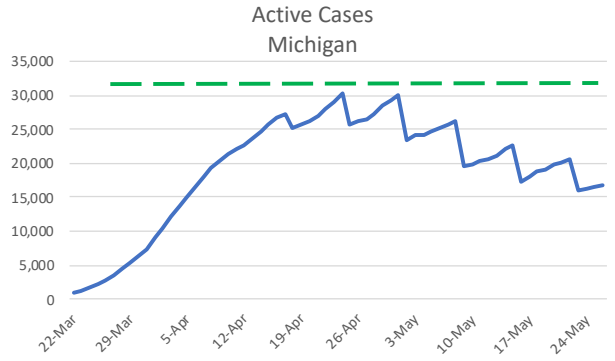


Test, New Daily Infection and Active Case Trends









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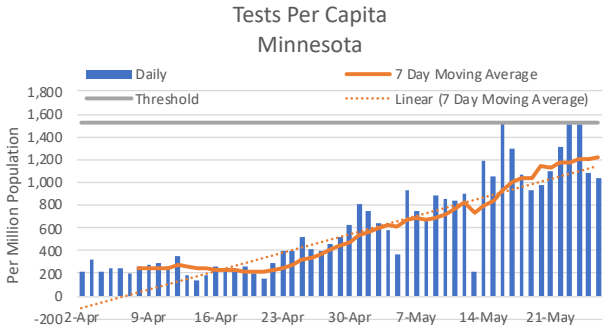

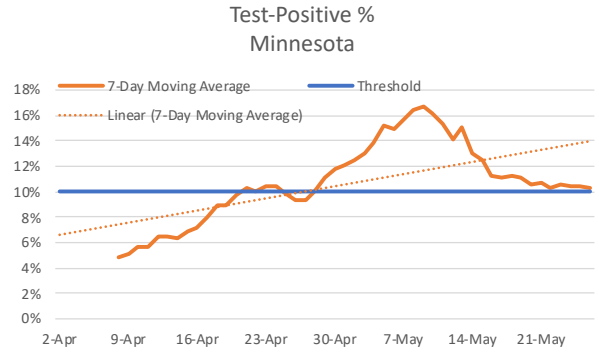

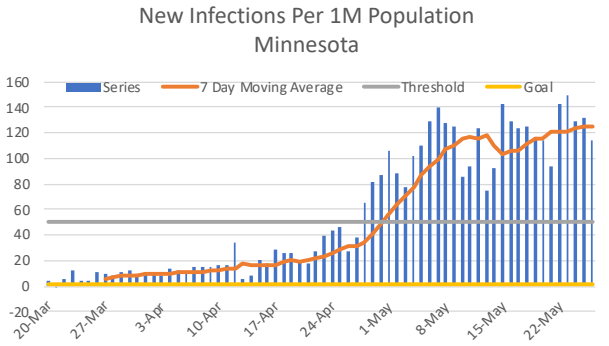

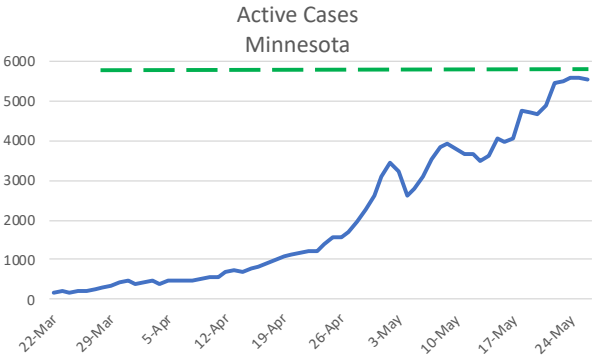

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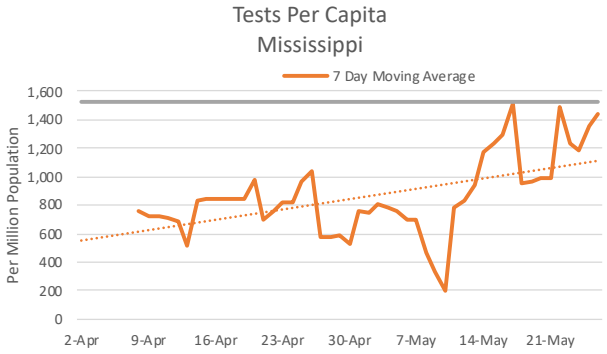

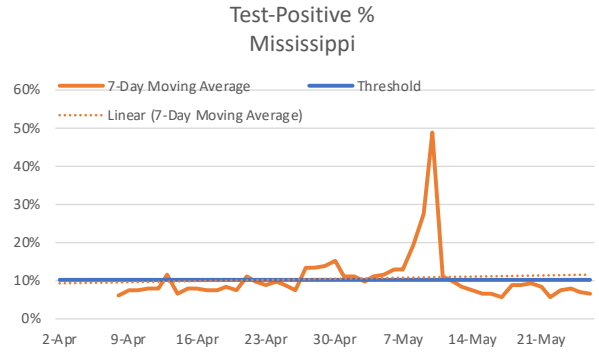

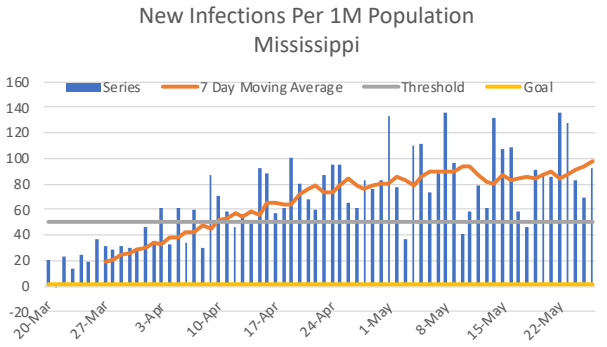

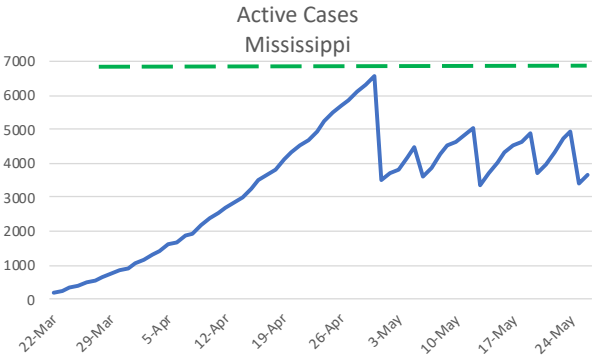

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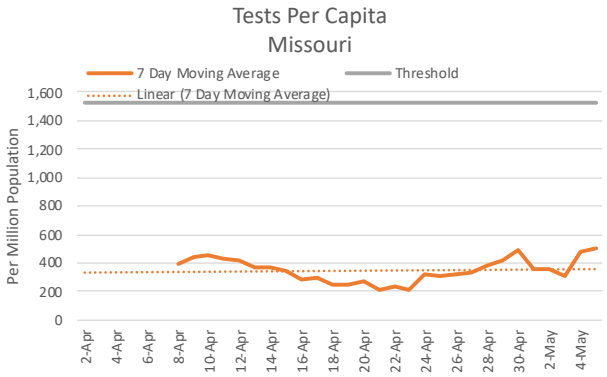

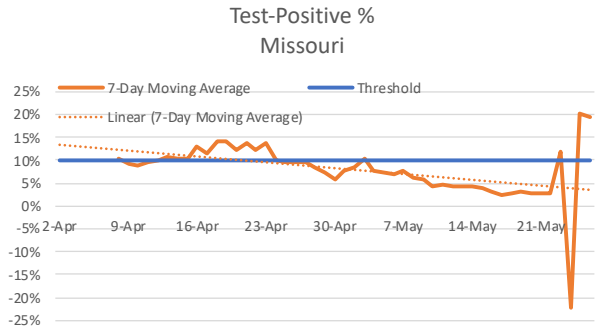

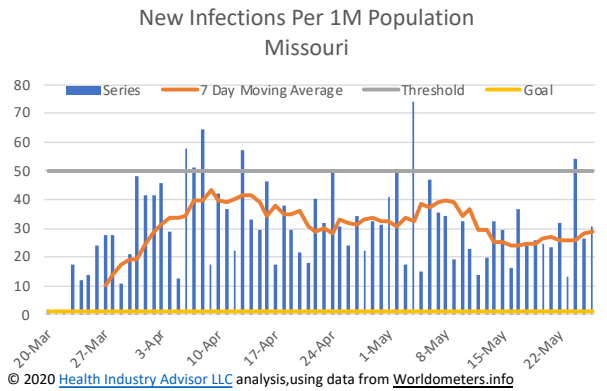

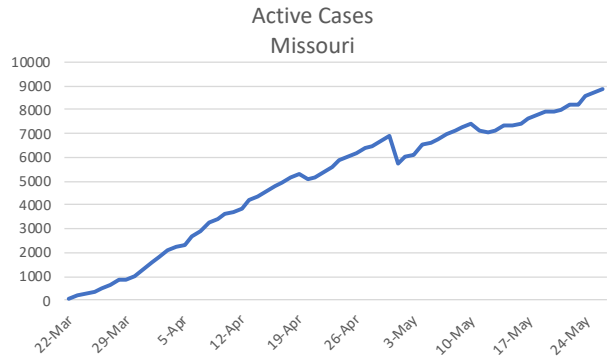

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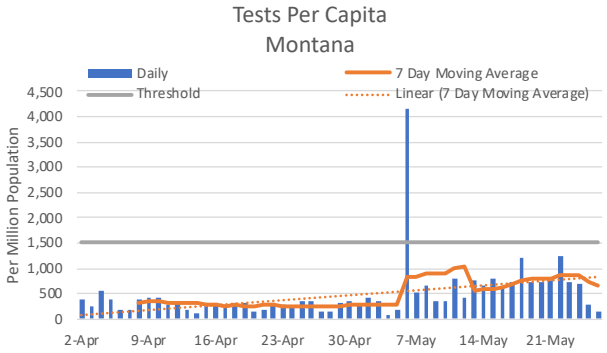

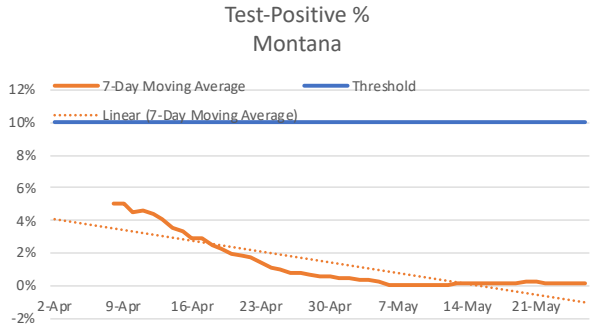

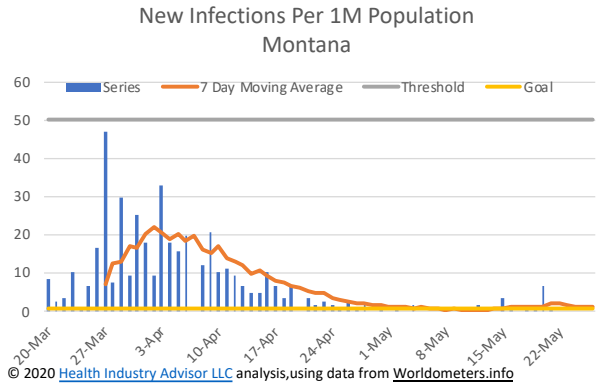

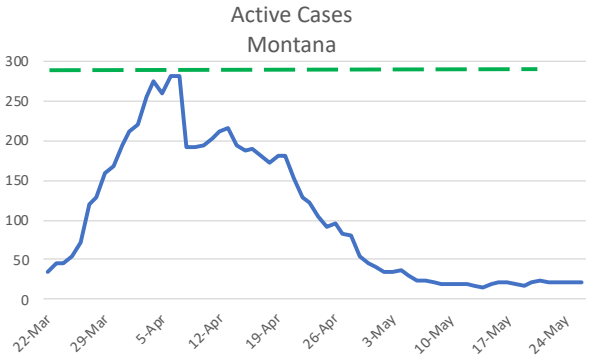

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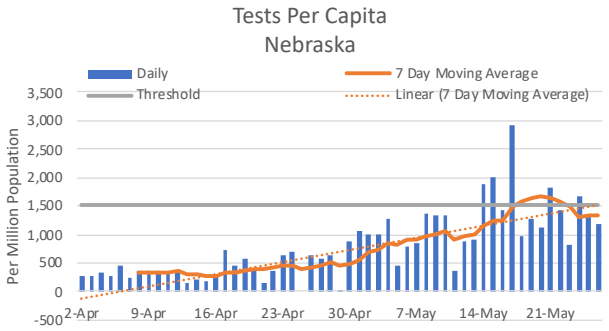

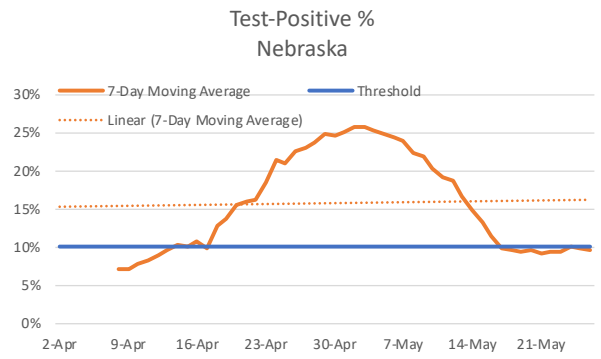

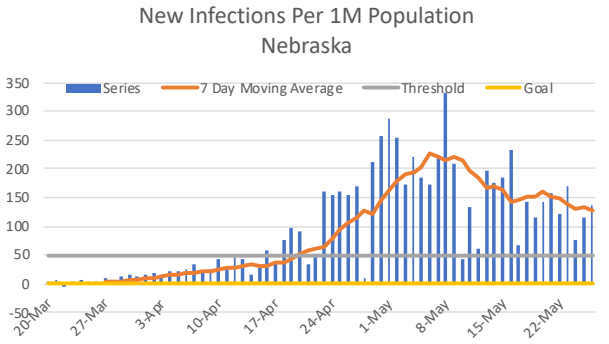

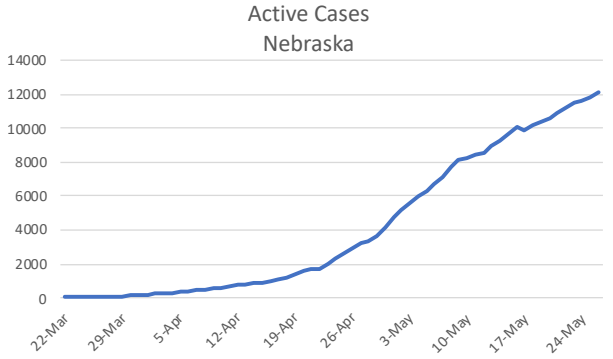

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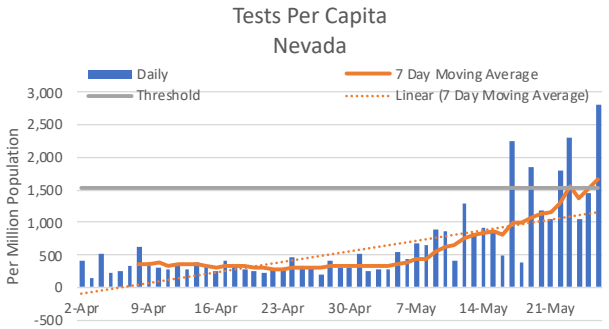

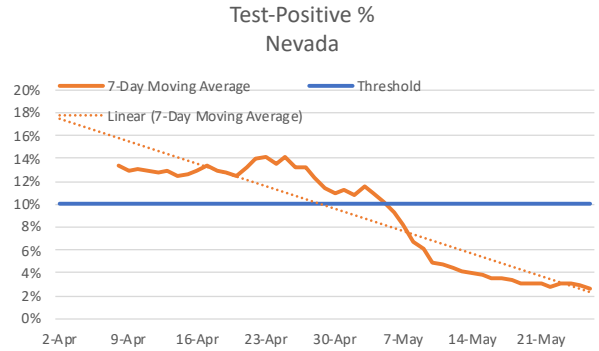

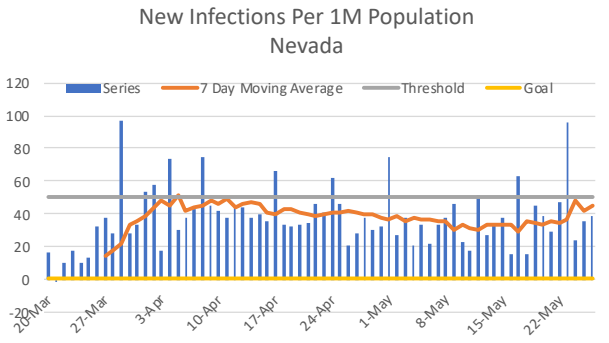

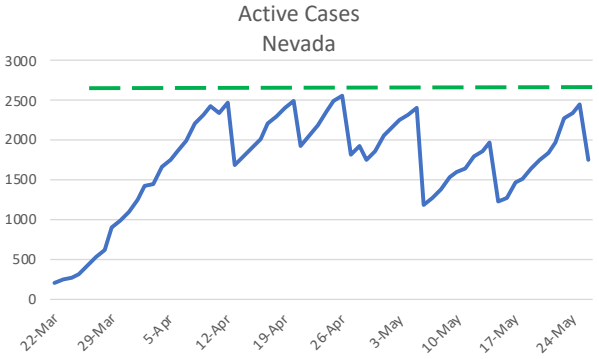

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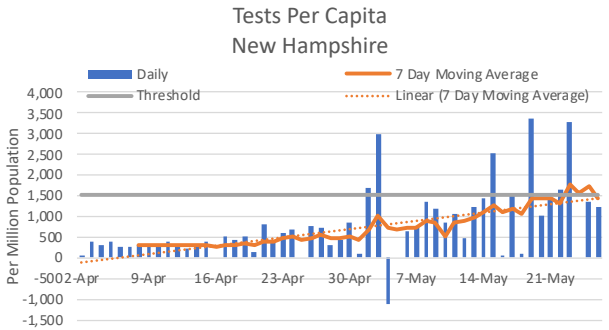

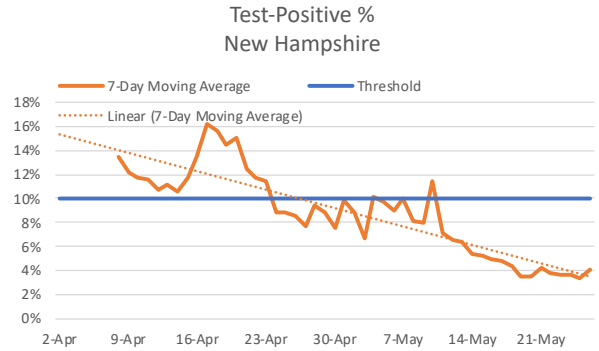

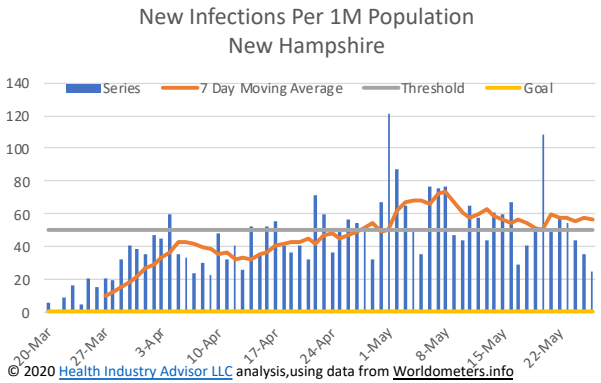

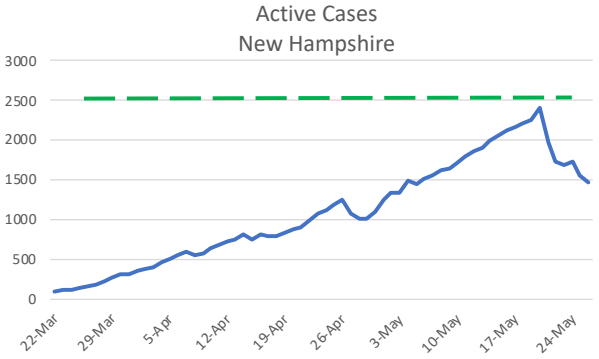

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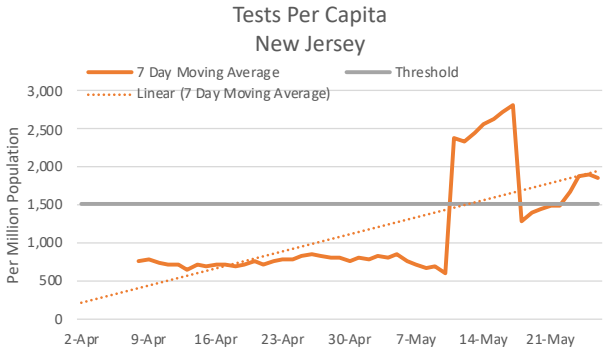

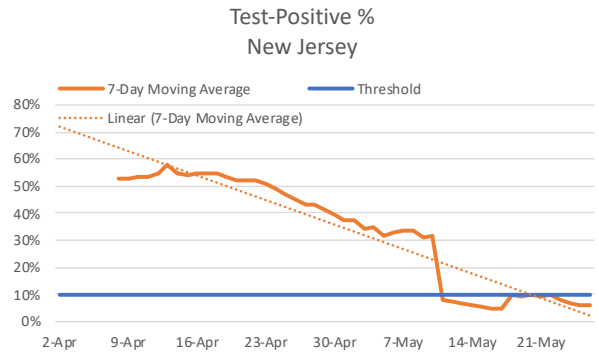

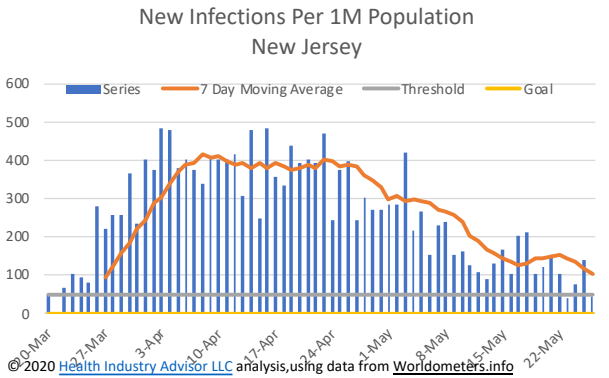

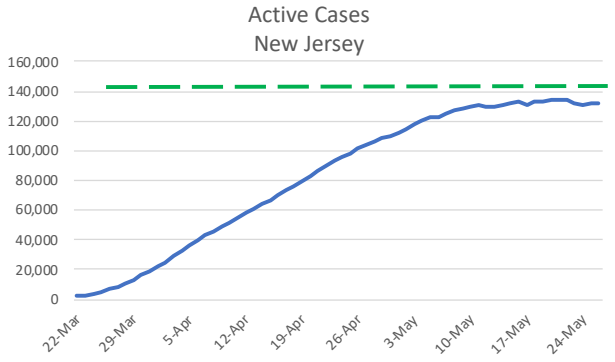

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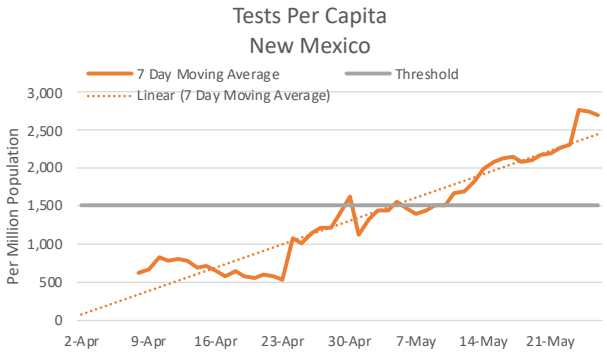

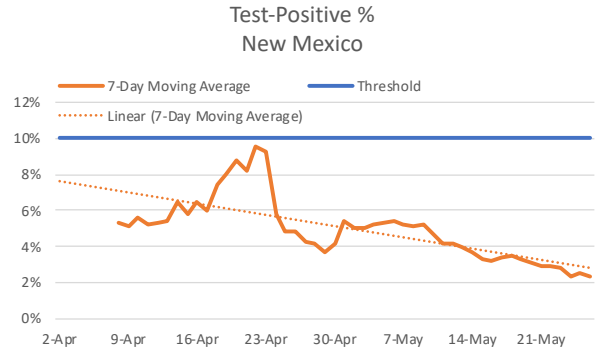

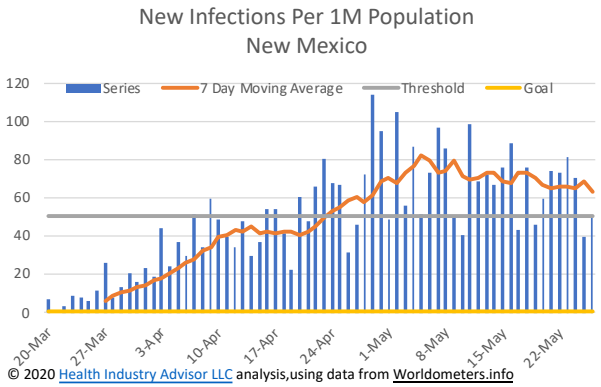

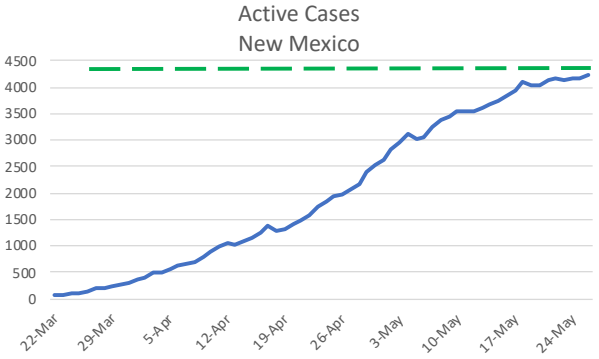

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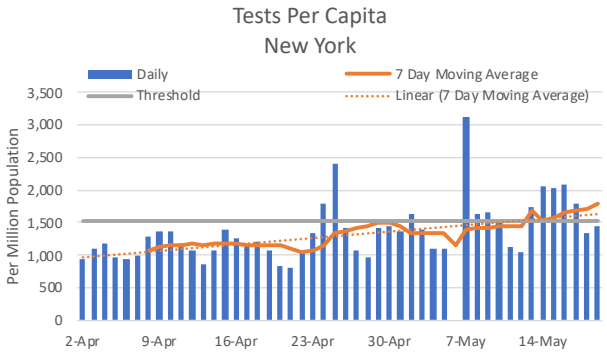

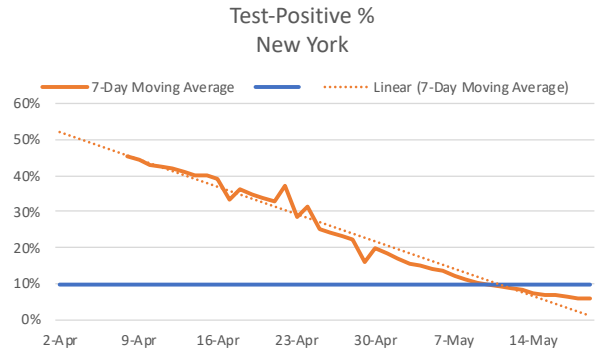

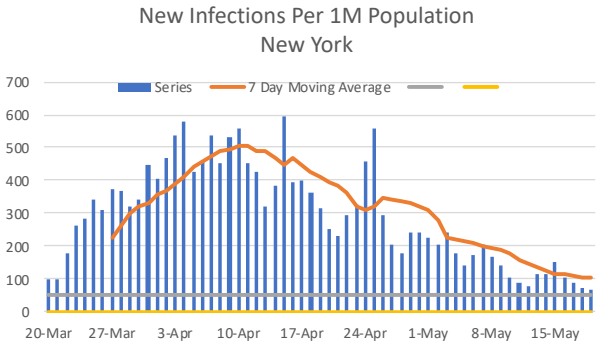

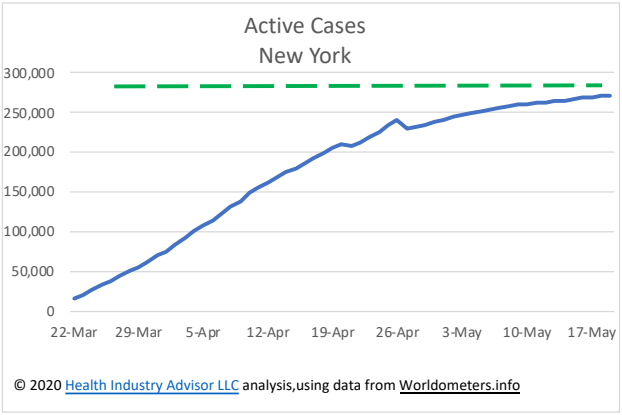

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