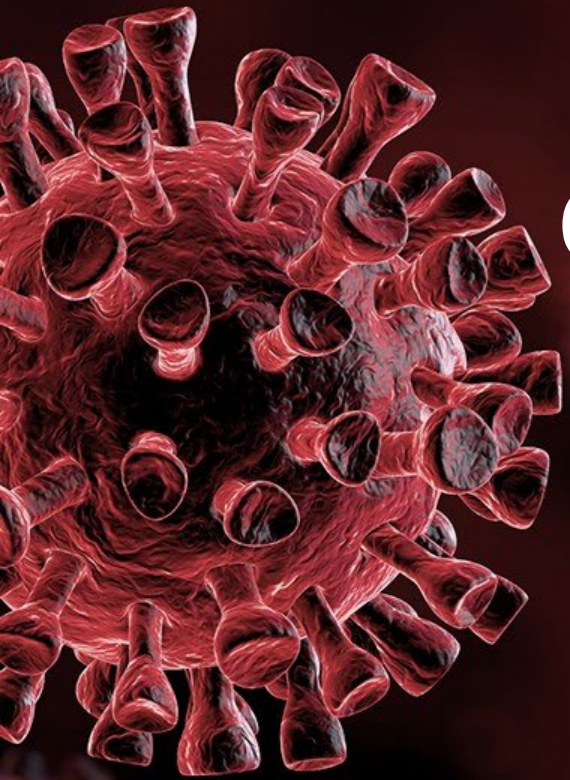
NORTHEAST
BUSINESS GROUP ON HEALTH



COVID-19 Update

Dr Mark Cunningham-Hill
Medical Director NEBGH

Monday August 10th

The Mike DeWine Cure?

- Initially tested positive and then over the next 3 days had 2 negative RT-PCR tests
- Gov Mike DeWine took the Quidel Corporation's antigen test
  - Sofia SARS Antigen Fluorescent Immunoassay (FIA) qualitative detection of nucleocapsid protein from SARS-CoV-2
  - Results in 15 minutes
- Why the sudden change in result:
  - Accuracy compared to a PCR test (not done their own sensitivity/specificity) – false negatives more likely …. But false positives also possible
  - Potential contamination at test center – Case western parking lot RNC test center
  - Conspiracy theory!

What are the most important metrics

- Typical metrics that are used
  - 14-day new cases and deaths trend
  - New cases per 100K or per million (averaged over a 3 to 7-day period)
  - Deaths per 100K or million (averaged over a 3 to 7-day period)
  - COVID-19 test positivity rate (averaged over a 3 to 7-day period)
  - Testing % of target
  - R_0 or R_t rate
  - ICU/Hospital bed capacity
  - Contact tracing capability

Case Fatality Ratio

$$\text{Case Fatality Ratio (CFR)} = \frac{\text{Number of deaths from disease}}{\text{Number of confirmed cases of disease}} \times 100$$

$$\text{Case Fatality Ratio (CFR)} = \frac{160{,}157}{4{,}888{,}070} \times 100 = 3.28\%$$

$$\text{Case Fatality Ratio (CFR)} = \frac{\text{Number of deaths from disease}}{\text{Number of deaths from disease + Number of recovered cases}} \times 100$$

$$\text{Case Fatality Ratio (CFR)} = \frac{160{,}157}{160{,}157 + 1{,}598.624} \times 100 = 9.1\%$$

For comparison CFR for influenza estimated at 0.1%

Infection Fatality Ratio

$$\text{Infection Fatality Ratio (IFR)} = \frac{\text{Number of deaths from disease}}{\text{Number of infected individuals}} \times 100$$

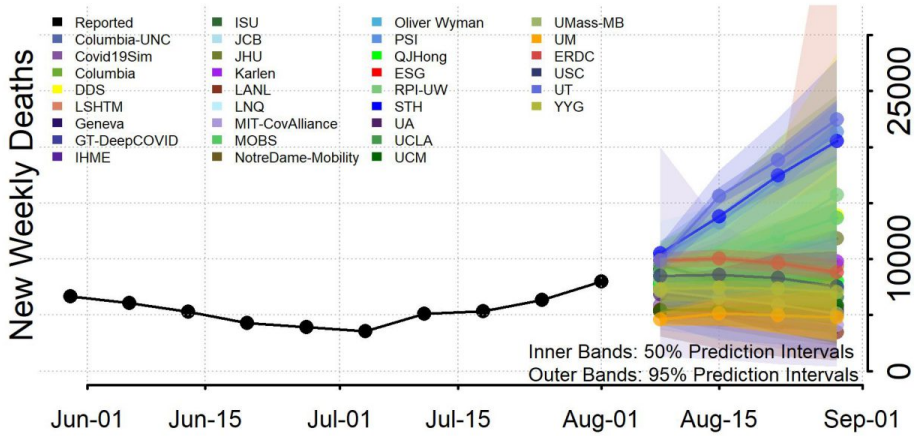
$$\text{Infection Fatality Ratio (IFR)} = \frac{160{,}157}{?????????} \times 100$$

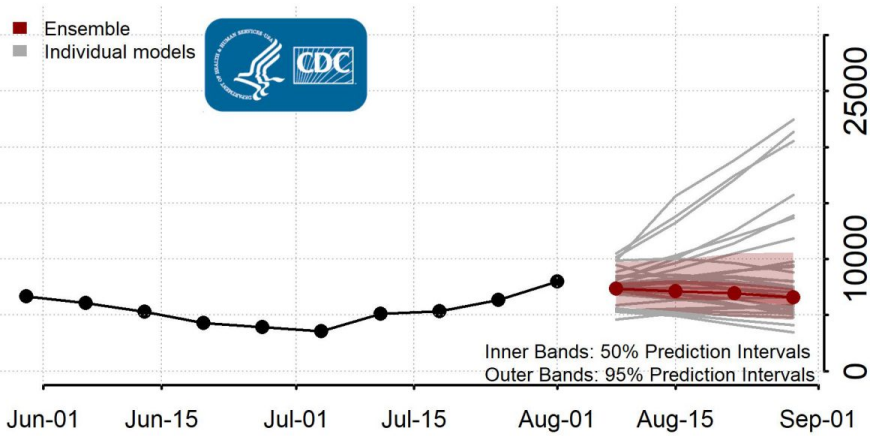
CDC Latest Estimate of Infection Fatality Ratio (IFR) is 0.65%*

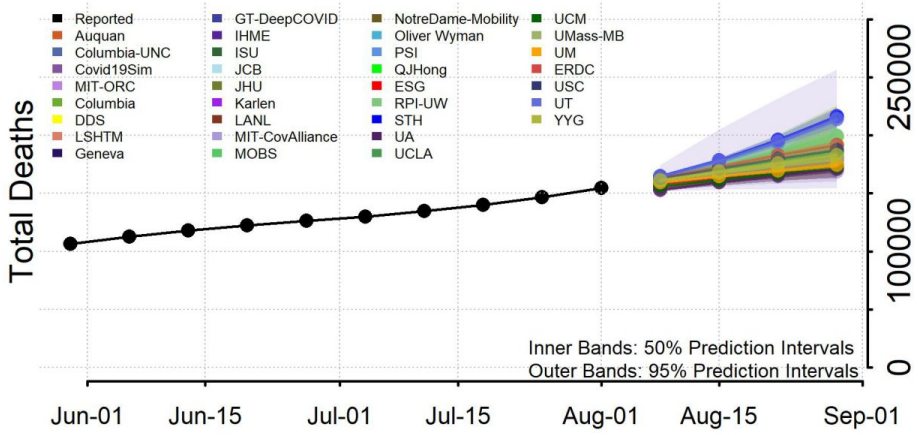
Experts estimate 40-70% of worlds population could become infected

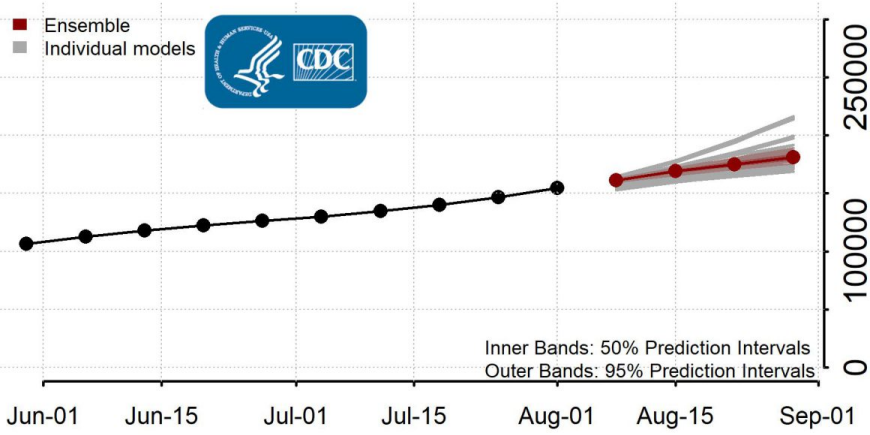
* https://www.cdc.gov/coronavirus/2019-ncov/hcp/planning-scenarios.html

National Forecast

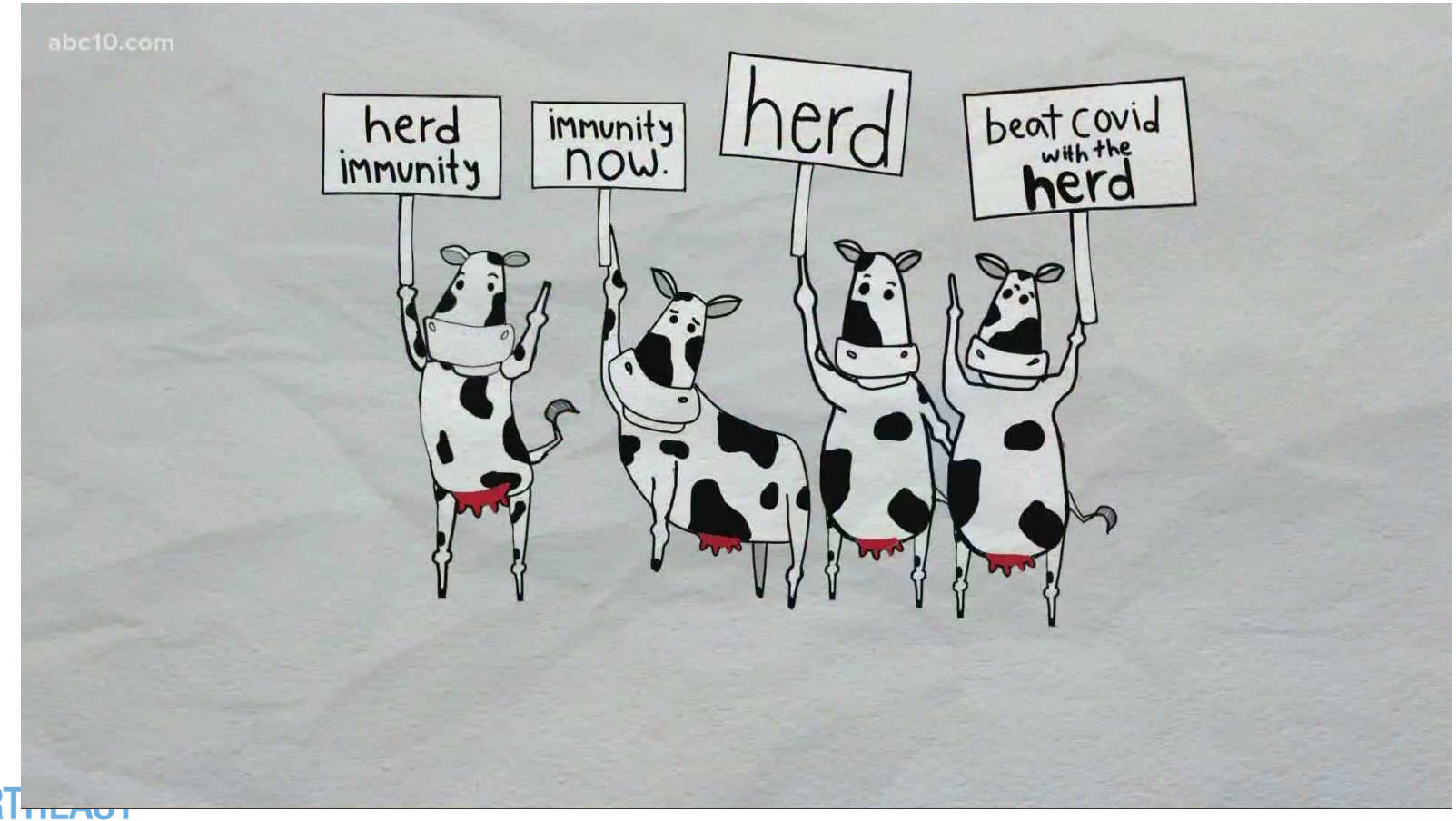




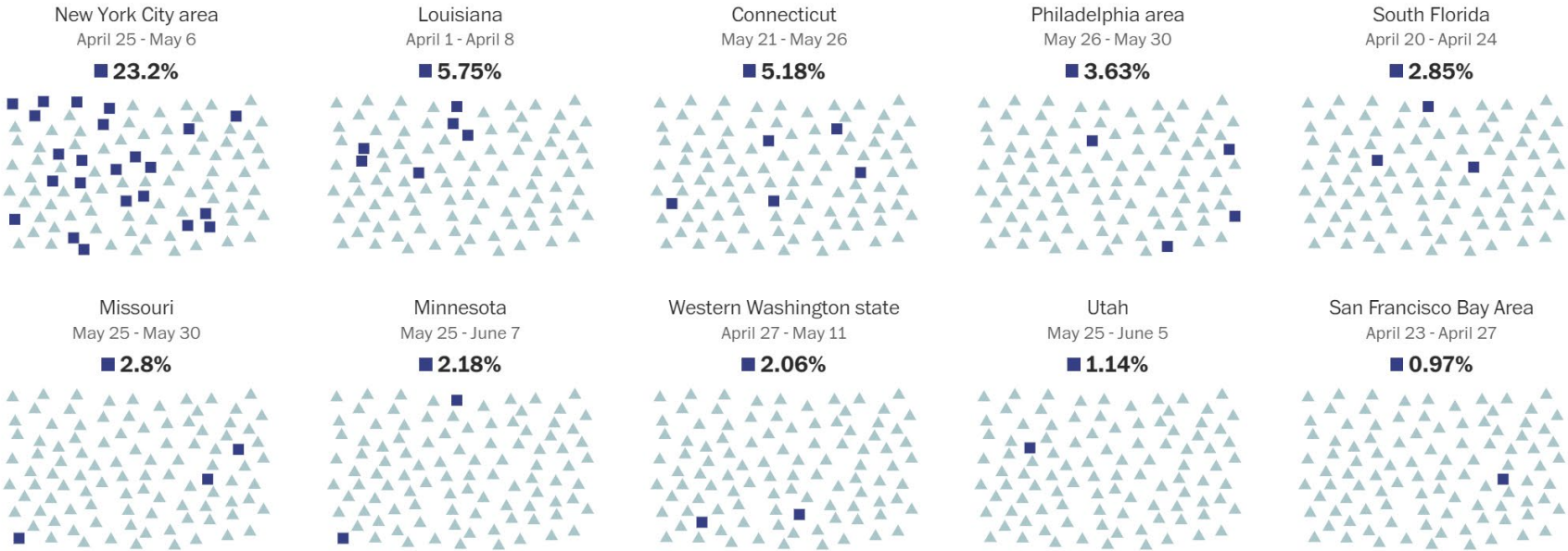




Herd Immunity



Estimates vary 40-80% to get herd immunity



Graphic courtesy of the Washington Post
https://www.washingtonpost.com/graphics/2020/health/coronavirus-herd-immunity-simulation-vaccine/

Coronavirus herd immunity threshold vs. modeled seroprevalence estimates

Graphic courtesy of the Washington Post
https://www.washingtonpost.com/graphics/2020/health/coronavirus-herd-immunity-simulation-vaccine/

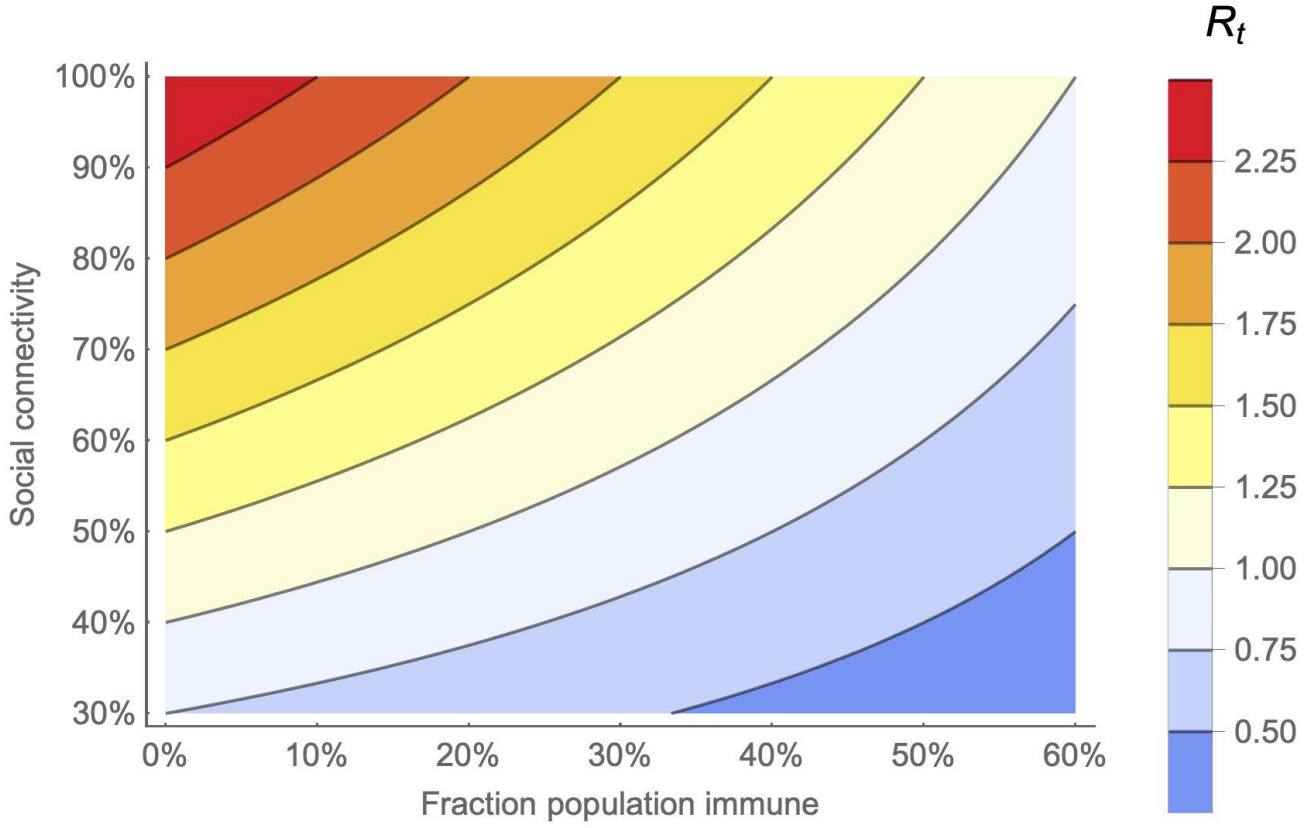
	Seroprevalence
Herd immunity	60.0%
United States	9.1

State	Seroprevalence
New Jersey	19.4%
Louisiana	18.7
Arizona	18.5
Mississippi	17.8
Georgia	16.8
Florida	15.0
Alabama	13.0
Massachusetts	12.9
Connecticut	11.7
New York	11.6
Nevada	11.6
Rhode Island	11.5
Maryland	11.0
South Carolina	10.8
District of Columbia	10.7
Illinois	9.2
Delaware	8.9

State	Seroprevalence
Tennessee	8.6%
Iowa	8.0
Texas	7.5
California	7.4
Missouri	7.4
North Carolina	7.0
Arkansas	7.0
New Mexico	6.9
Minnesota	6.6
Oklahoma	6.4
Virginia	6.4
Indiana	6.2
Nebraska	6.0
Ohio	5.8
Michigan	5.8
Wisconsin	5.8
Kentucky	5.5

State	Seroprevalence
Pennsylvania	5.4%
Colorado	5.3
Idaho	5.0
Kansas	4.6
Washington	4.5
Utah	4.4
South Dakota	4.2
North Dakota	4.1
New Hampshire	2.8
Oregon	2.7
Alaska	2.3
Montana	1.9
West Virginia	1.7
Wyoming	1.6
Maine	1.6
Vermont	1.1
Hawaii	0.9

Rt vs population immunity vs social connectivity



What is the cost in deaths?

U.S. population
328 million
×
Herd immunity threshold
60% (.60)
Drag
=
Cases to reach herd immunity
197 million

Cases to reach herd immunity
197 million
×
Fatality rate
0.6% (.006)
Drag
=
Deaths to reach herd immunity
1.18 million

Reported covid-19 deaths in the United states as of Aug. 7
157 thousand

Each circle equals 50,000 deaths

Deaths to reach herd immunity
1.18 million

U.S. population
328 million
×
Herd immunity threshold
40% (.40)
Drag
=
Cases to reach herd immunity
131 million

Cases to reach herd immunity
131 million
×
Fatality rate
0.6% (.006)
Drag
=
Deaths to reach herd immunity
787 thousand

Reported covid-19 deaths in the United states as of Aug. 7
157 thousand

Each circle equals 50,000 deaths

Deaths to reach herd immunity
787 thousand

What is the cost in deaths?

U.S. population
328 million
×
Herd immunity threshold
80% (.80)
Drag
=
Cases to reach herd immunity
262 million

Cases to reach herd immunity
262 million
×
Fatality rate
0.3% (.003)
Drag
=
Deaths to reach herd immunity
787 thousand

Reported covid-19 deaths in the United states as of Aug. 7
157 thousand

Each circle equals 50,000 deaths

Deaths to reach herd immunity
787 thousand

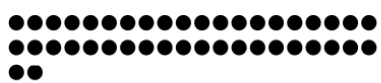
U.S. population
328 million
×
Herd immunity threshold
80% (.80)
Drag
=
Cases to reach herd immunity
262 million

Cases to reach herd immunity
262 million
×
Fatality rate
0.8% (.008)
Drag
=
Deaths to reach herd immunity
2.10 million

Reported covid-19 deaths in the United states as of Aug. 7
157 thousand

Each circle equals 50,000 deaths

Deaths to reach herd immunity
2.10 million

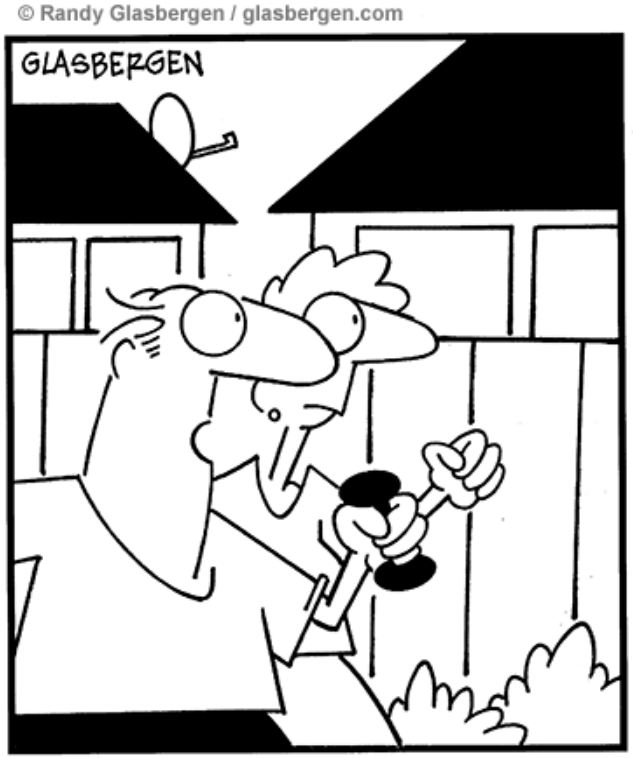


Over 90% recover so what's the big deal?

- Many COVID-19 patients continue to have symptoms weeks and months after their diagnosis:
  - Fatigue, muscle and joint pains
  - Trouble thinking clearly
  - Loss of sense of smell
  - Long term damage to the heart, lungs, kidneys, and brain
- Hospitalized patients may have the most long-term issues
  - Study in Italy found 87% of hospitalized patients were still having issues after 2 months
  - The COVID Symptom Study found 10-15% of people had ongoing symptoms, even some mild cases
  - Two studies that people can participate in:
    - The COVID Symptom Study https://covid.joinzoe.com/us
    - The CORAL study https://www.thecoralstudy.com/participate

Years of life lost (YLL)

- As most people dying with COVID-19 are older with underlying long-term conditions (LTCs) are we just bringing forward the inevitable by months or a year?
- What's the big deal?



"Of course I think about death. I'd like to die young at a very old age."

Years of life lost (YLL)

- Standard WHO life tables, YLL per COVID-19 death was 14 for men and 12 for women
- After adjustment for LTCs, the mean YLL was 13 for men and 11 years for women

	Men				Women			
Multimorbidity count	50-59	60-69	70-79	80+	50-59	60-69	70-79	80+
0	35.81	26.78	18.43	11.02	35.28	25.50	17.70	10.42
1	35.03	26.09	17.58	10.05	34.83	25.59	17.13	8.92
2	29.67	22.07	14.72	8.15	29.06	21.35	14.20	7.19
3	25.01	19.05	12.50	6.59	26.27	18.08	11.98	5.85
4	23.55	16.28	10.64	4.95	20.44	15.58	9.97	4.52
5	19.39	13.43	8.61	3.51	16.88	11.61	8.23	3.54
6	-	6.24	7.04	2.42	17.67	10.09	6.44	2.70
7	-	7.99	6.32	2.03	-	7.96	4.83	2.32
8	-	6.60	4.79	1.65	-	6.23	3.94	1.85
9	-	5.97	3.95	1.40	-	-	3.04	1.58
10	-	-	2.62	1.17	-	2.81	2.55	1.22
11	-	-	-	1.40	-	-	2.05	1.20

https://wellcomeopenresearch.org/articles/5-75

Years of life lost (YLL)

- Harvard study - estimates that more than 138,000 years of potential human life have been lost **before** age 65
  - Black Americans lost, collectively, 45,777 years of life
  - Hispanics and Latinos lost 48,204
  - White Americans lost 33,446

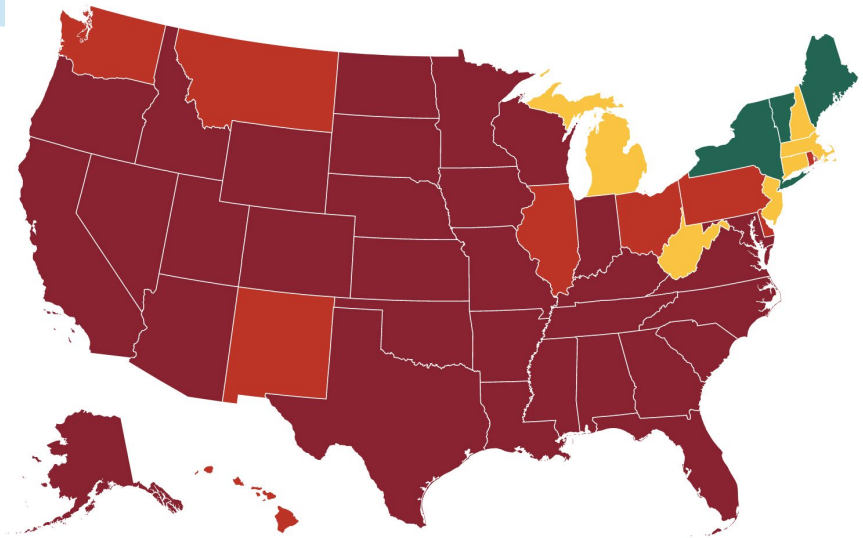
Table 2: Years of potential life lost with age 65 cutoff (YPLL65) and age-standardized YPLL65 rate per 100,000 by race/ethnicity, with age-standardized YPLL65 rate ratios and rate differences per 100,000, COVID-19 related deaths in the United States, February 1-May 20, 2020

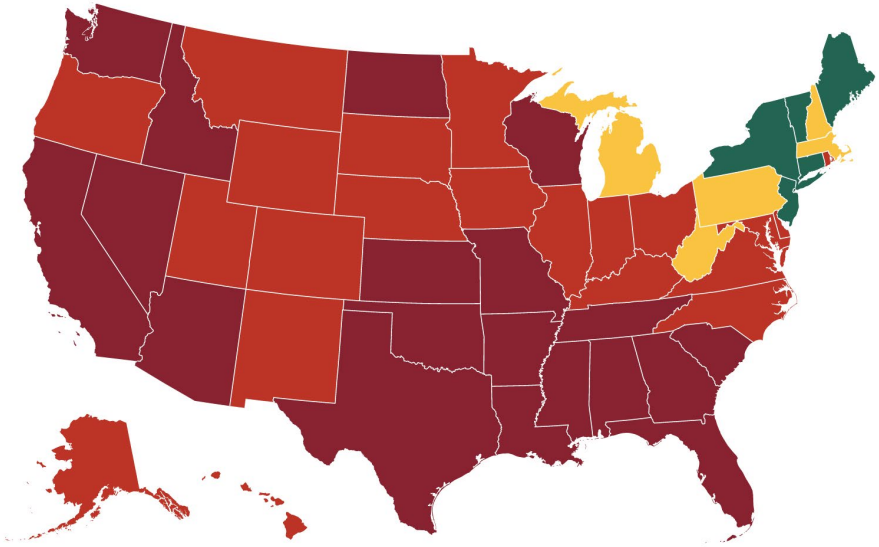
Race/ethnicity	YPLL65	Age-standardized YPLL65 rate per 100,000	Age-standardized YPLL65 rate ratio	Age-standardized YPLL65 rate difference per 100,000
Non-Hispanic White	33,446 (32,061 to 34,832)	18.9 (16.6, 21.2)	1.00 (reference)	0.0 (reference)
Non-Hispanic Black	45,777 (44,023 to 47,531)	127.6 (114.4, 140.9)	6.7 (6.7, 6.8)	108.7 (95.3, 122.2)
Non-Hispanic American Indian or Alaska Native	1,745 (1,371 to 2,119)	75.4 (30.6, 120.2)	4.0 (3.9, 4.0)	56.5 (11.6, 101.3)
Non-Hispanic Asian or Pacific Islander	8,905 (8,156 to 9,654)	50.1 (39.2, 61.0)	2.6 (2.6, 2.7)	31.2 (20.0, 42.3)
Hispanic or Latino	48,204 (46,328 to 50,080)	101.3 (91.2, 111.4)	5.4 (5.3, 5.4)	82.4 (72.0, 92.7)

https://www.hsph.harvard.edu/news/hsph-in-the-news/how-many-years-of-life-lost-due-to-covid-more-than-138000/

What does this all mean?

- We should be taking this pandemic very seriously
- Continue with masks and social distancing
- Continue with some restrictions on activity:
  - Maybe more targeted than blanket lock-downs
  - School reopening's bring with them challenges





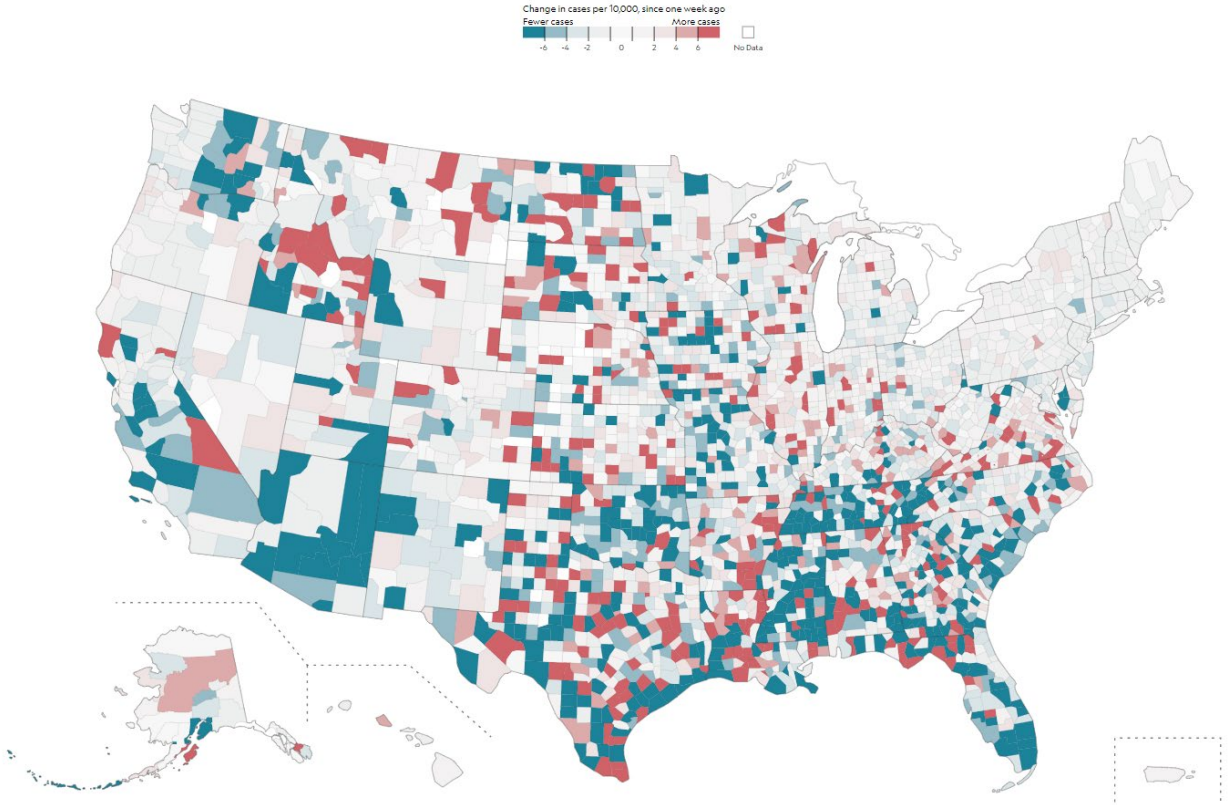
Uncontrolled Spread | Trending Poorly | Caution Warranted | Trending Better

1 week ago

Uncontrolled Spread | Trending Poorly | Caution Warranted | Trending Better

This week

Improving trends …..




Questions