THE COLOR OF COVID-19

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Massachusetts General Hospital/

Harvard Medical School

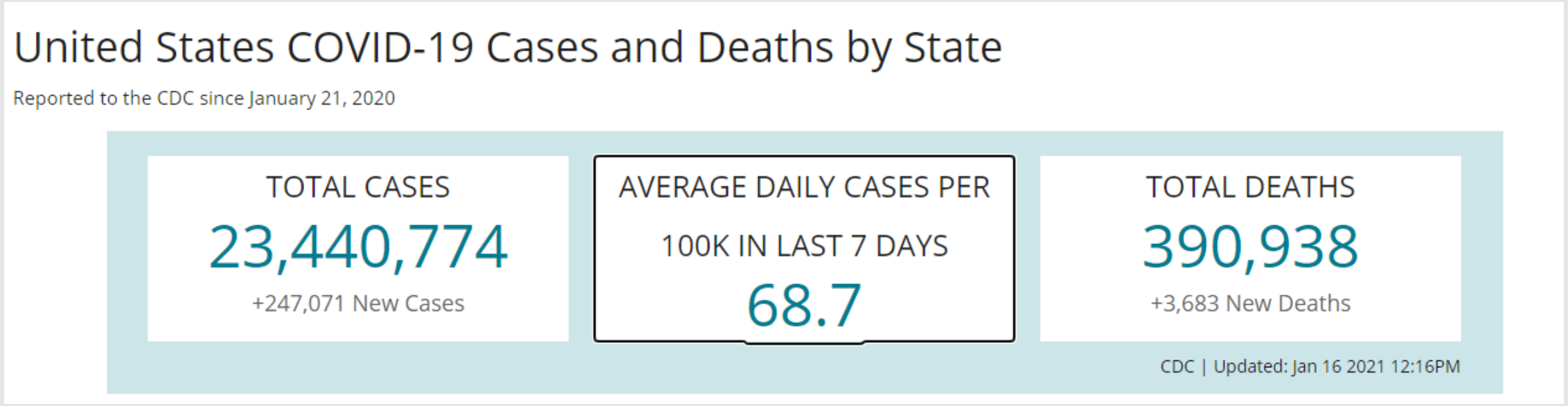
Disclosures

- Advisor- GoodRx, Calibrate, Novo Nordisk
- Research- Amazon

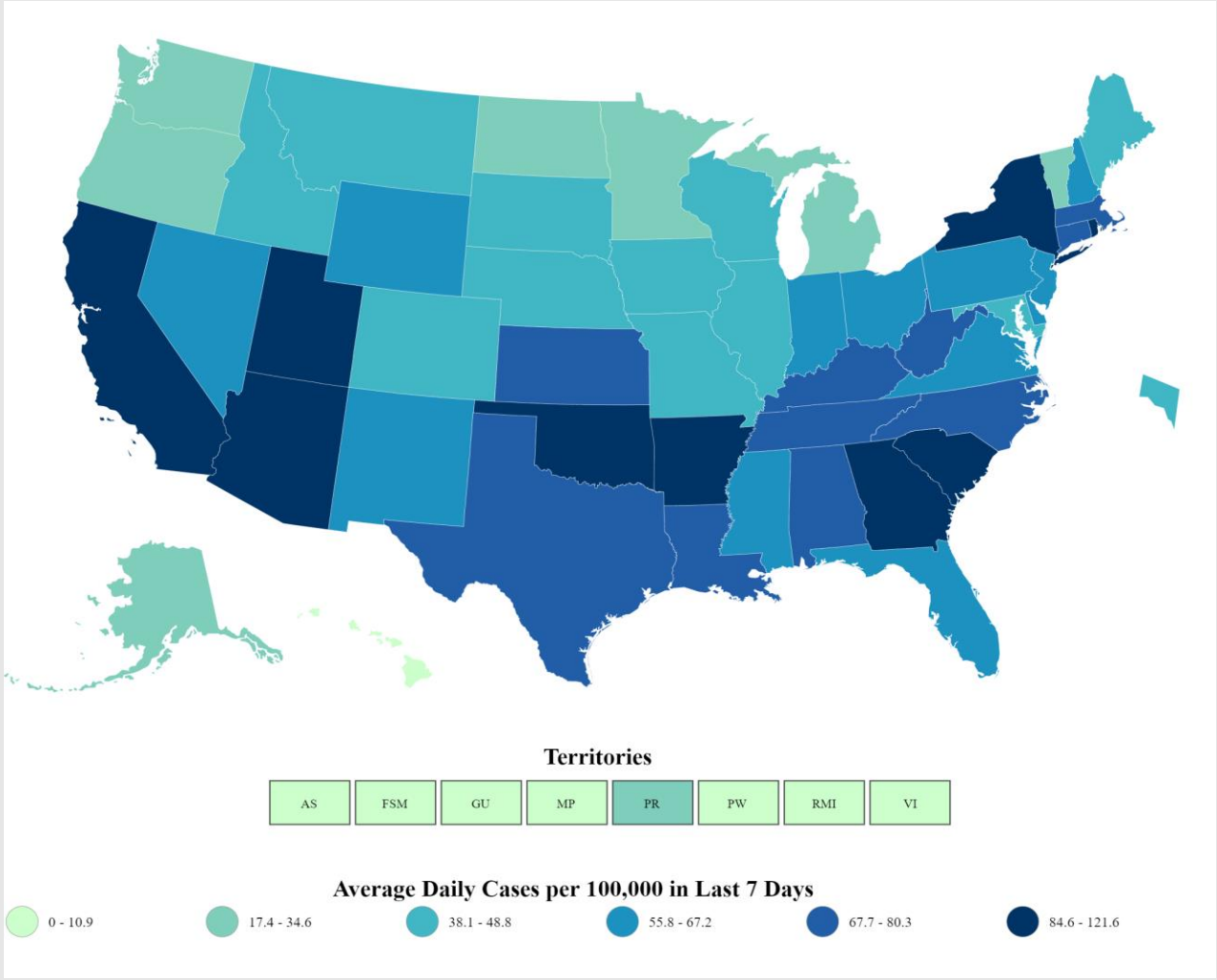
Objectives

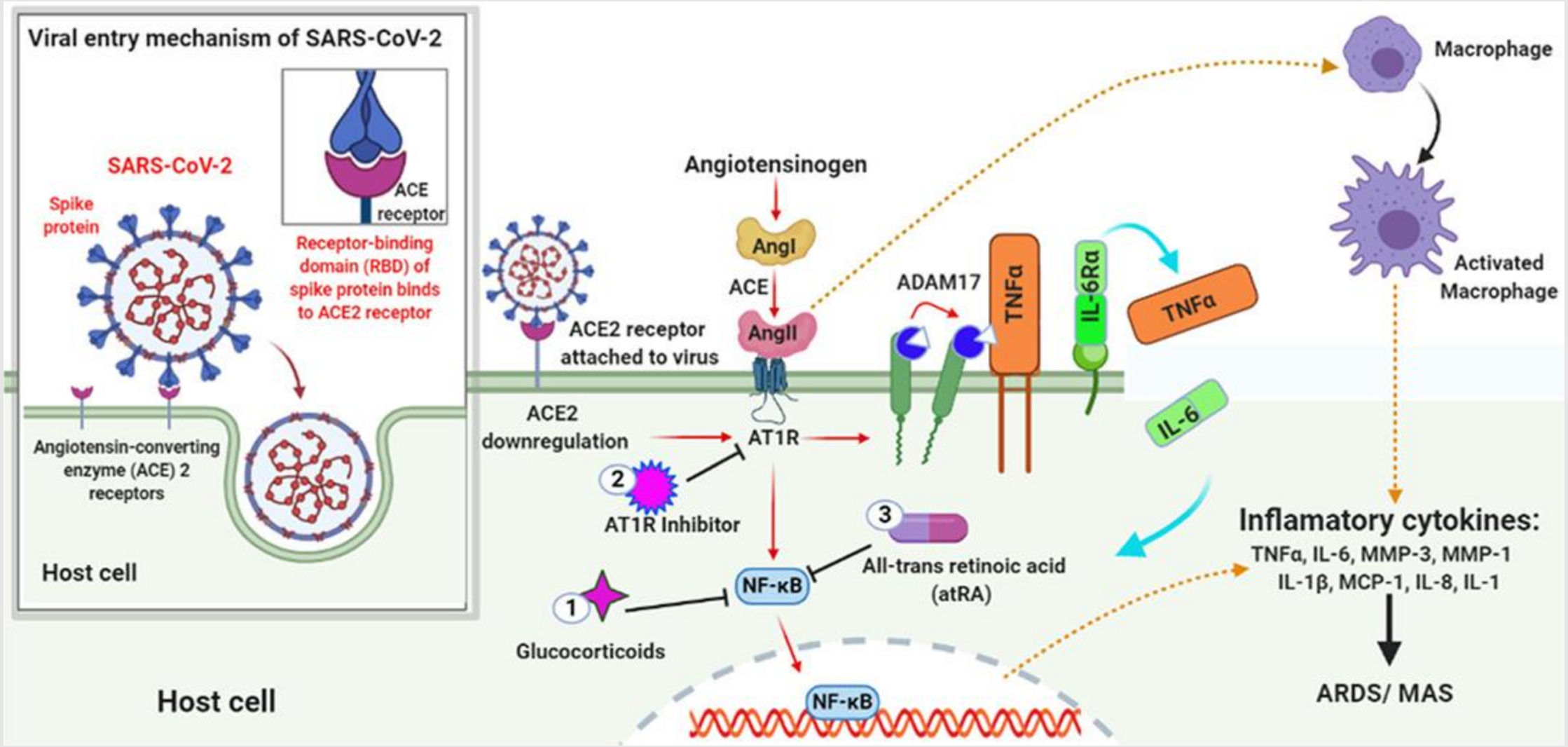
- Explore the prevalence of COVID-19 in minority and majority groups in the US
- Explore the interrelationship of COVID-19, obesity, inflammation, and racial/ethnic minorities
- Discuss strategies to mitigate the severity of COVID-19 in racial/ethnic minorities with obesity

United States COVID-19 Cases and Deaths by State



US COVID-19 Average Daily Case Rate in Last 7 Days, by State/Territory (cases per 100K)

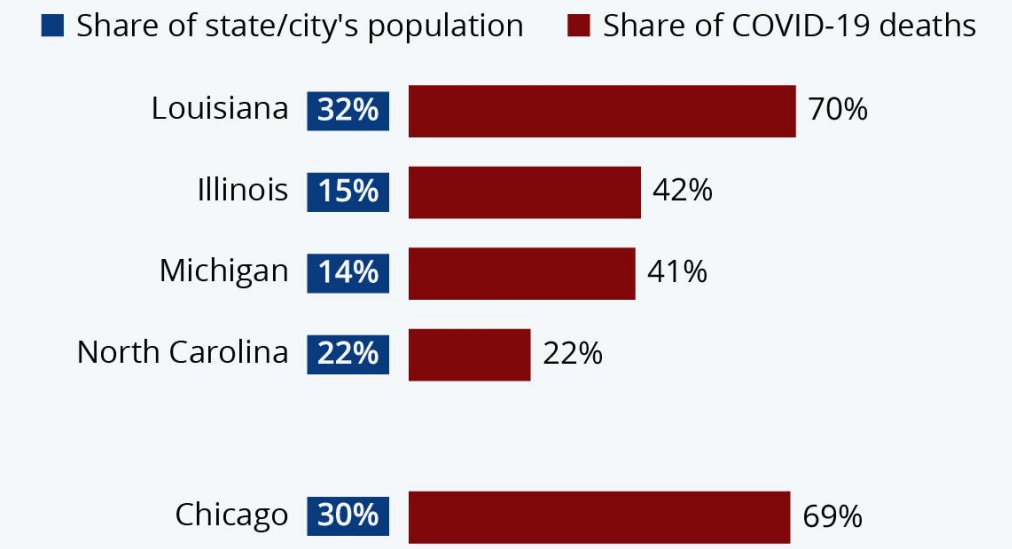




Life Sci. 2020 Sep 1;256:117905. doi: 10.1016/j.lfs.2020.117905.

COVID-19's Devastating Impact On African Americans

African American share of state/city populations and COVID-19 deaths (as of Apr 06, 2020)

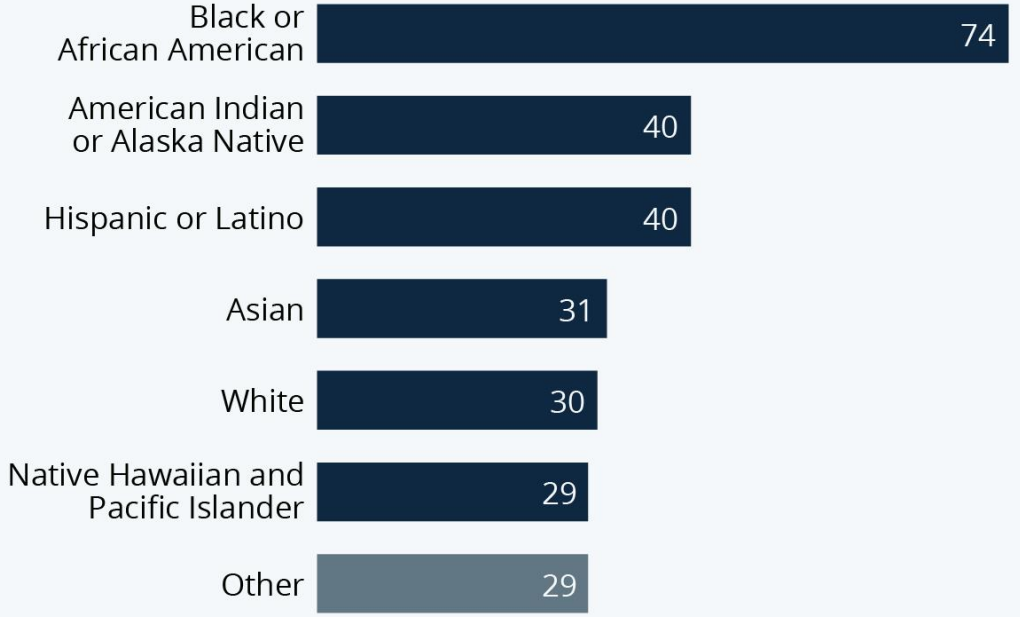


Sources: 2010 Census, respective state/city health departments

statista

The Pandemic's Racial Disparity

Covid-19 deaths per 100,000 people in the U.S. by race or ethnicity (as of July 30, 2020)

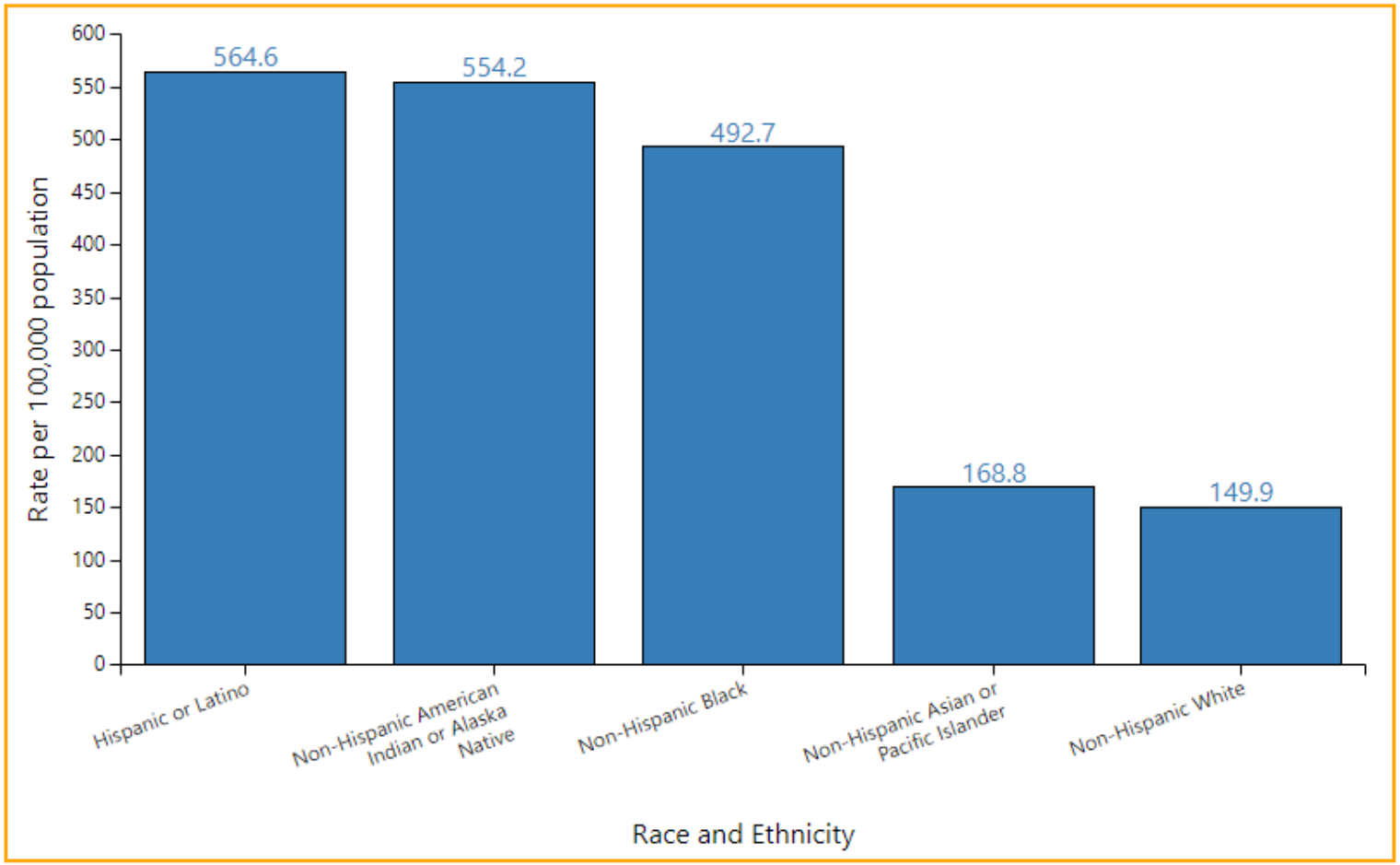


Source: The COVID Tracking Project

statista

https://www.statista.com/chart/21364/african-american-share-of-covid-19-deaths/
https://www.statista.com/chart/22430/coronavirus-deaths-by-race-in-the-us/

Age-adjusted COVID-19-associated hospitalization rates by race and ethnicity — COVID-NET, March 1–December 5, 2020



Confirmed COVID-19 Cases and Deaths in US Correctional and Detention Facilities By State

Overall | Cases | Deaths

1,205
Affected Facilities

420,793
Total Cases

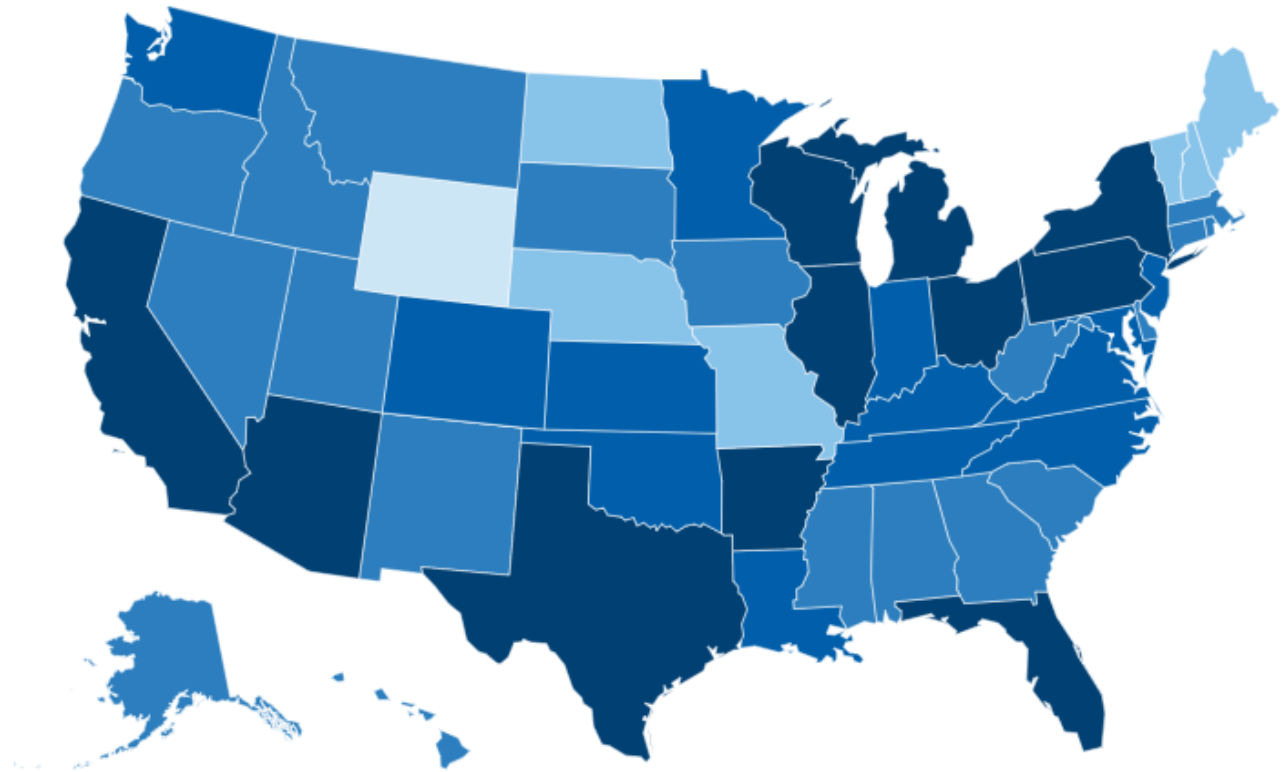
342,622
Total Resident Cases

78,171
Total Staff Cases

2,127
Total Deaths

2,007
Total Resident Deaths

120
Total Staff Deaths



Jurisdiction	Cases	Deaths	Facilities
California*	74,995	203	78
Texas	40,713	268	119
Michigan	26,856	133	41
Florida*	24,201	213	12
Illinois	16,877	13	42
New York*	16,028	73	55
Pennsylvania*	15,407	90	38
Arizona*	14,778	53	21
Wisconsin	12,932	0	42
Ohio	12,114	146	30
Arkansas*	10,277	1	2
Colorado	9,335	26	25
North Carolina	9,275	67	57
Virginia	8,750	52	41
Tennessee	8,221	40	22
Kentucky	8,177	60	19
Kansas	7,252	18	11
New Jersey	7,152	52	20

Last updated 17-Jan-21

Total Number of Cases A: 0-100 B: 101-1,000 C: 1,001-5,000 D: 5,001-9,999 E: 10,000+

31-Mar-20
Reported data from

15-Jan-21
Data Through

Table 3. Odds Ratios for Hospitalization among 3481 Covid-19–Positive Patients.*

Variable	Model 1	Model 2	Model 3
		odds ratio (95% CI)	
Race: black vs. white	1.71 (1.46–1.99)	2.35 (1.97–2.80)	1.96 (1.62–2.37)
Age, in 5-yr units	—	1.34 (1.30–1.37)	1.29 (1.25–1.33)
Sex: female vs. male	—	0.57 (0.49–0.66)	0.56 (0.48–0.65)
Charlson Comorbidity Index score	—	—	1.05 (1.00–1.10)
Residence in low-income area: yes vs. no	—	—	1.22 (1.04–1.43)
Insurance			
Medicare vs. commercial	—	—	1.73 (1.39–2.14)
Medicaid vs. commercial	—	—	1.65 (1.29–2.12)
Other vs. commercial	—	—	0.91 (0.70–1.20)
Obesity: yes vs. no	—	—	1.43 (1.20–1.71)

* Model 1 is the unadjusted race-only model; model 2 includes race with the additional covariates of age and sex; and model 3 includes race with the additional covariates of age, sex, Charlson Comorbidity Index score, residence in a low-income area, insurance plan, and obesity.

NEJM 2020 Jun 25;382(26):2534-2543. doi: 10.1056/NEJMsa2011686.

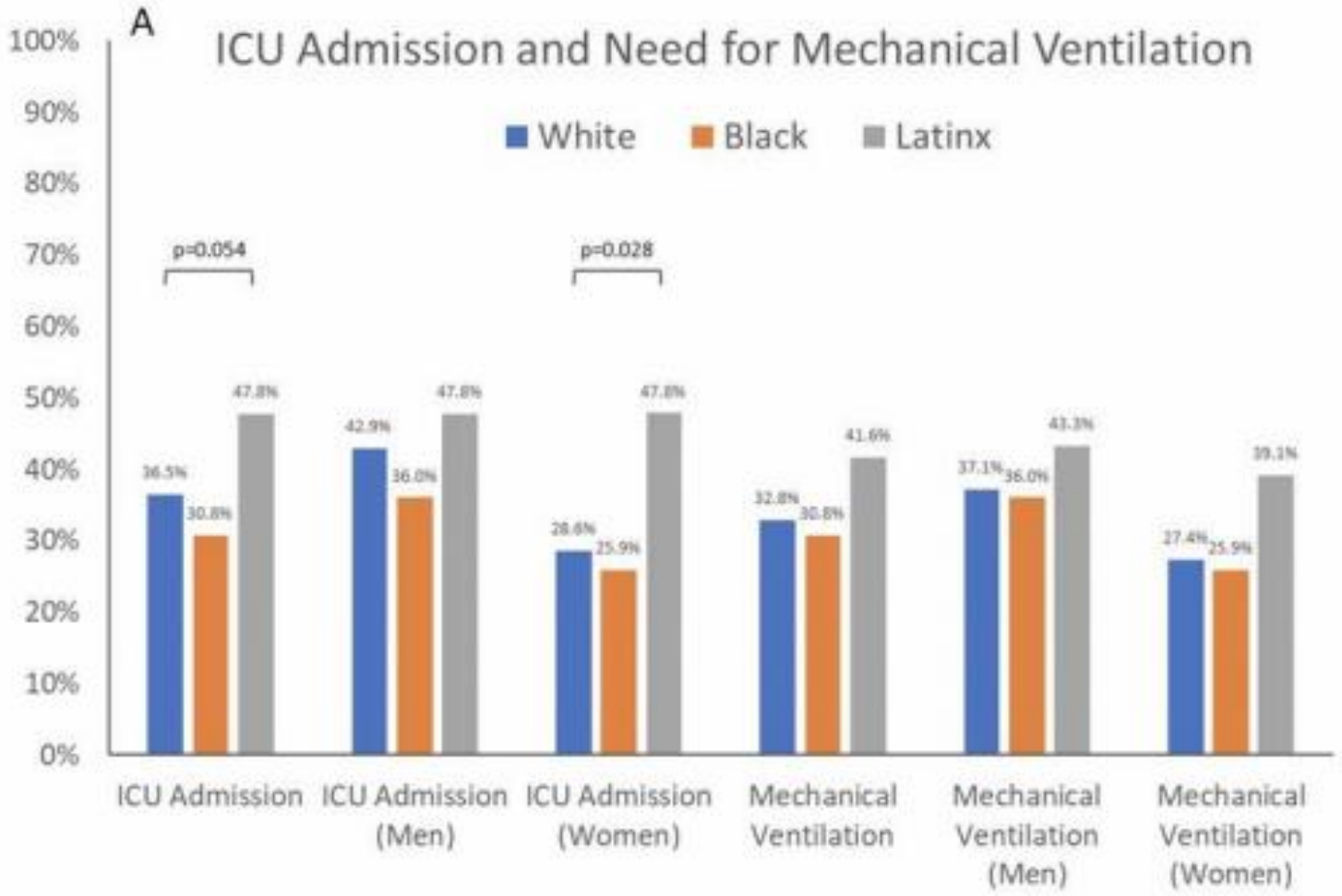
Table 4. Hazard Ratios for In-Hospital Death among 1382 Patients Hospitalized for Covid-19.*

Variable	Model 1	Model 2	Model 3	Model 4
		hazard ratio (95% CI)		
Race: black vs. white	0.78 (0.62–0.99)	1.08 (0.84–1.38)	1.14 (0.88–1.49)	0.89 (0.68–1.17)
Age, in 5-yr units	—	1.18 (1.13–1.23)	1.19 (1.13–1.24)	1.18 (1.13–1.24)
Sex: female vs. male	—	0.63 (0.50–0.79)	0.62 (0.49–0.78)	0.88 (0.68–1.13)
Charlson Comorbidity Index score	—	—	0.99 (0.94–1.03)	0.99 (0.95–1.04)
Residence in low-income area: yes vs. no	—	—	0.84 (0.67–1.06)	0.89 (0.71–1.13)
Obesity: yes vs. no	—	—	1.05 (0.83–1.34)	0.99 (0.77–1.27)
Respiratory rate ≥24 breaths/min	—	—	—	2.00 (1.34–2.99)
Absolute lymphocyte count <1000/μl	—	—	—	1.33 (1.01–1.74)
Platelet count <150,000/μl	—	—	—	1.26 (1.00–1.60)
Creatinine >1.5 mg/dl	—	—	—	1.32 (1.02–1.71)
Aspartate aminotransferase >40 U/liter	—	—	—	1.28 (0.97–1.68)
Bilirubin ≥1.2 mg/dl	—	—	—	1.17 (0.88–1.55)
Venous lactate >2.2 mmol/liter	—	—	—	1.64 (1.26–2.13)
Procalcitonin >0.25 ng/ml	—	—	—	1.40 (1.06–1.84)
C-reactive protein >8.2 ng/ml	—	—	—	1.01 (0.49–2.08)

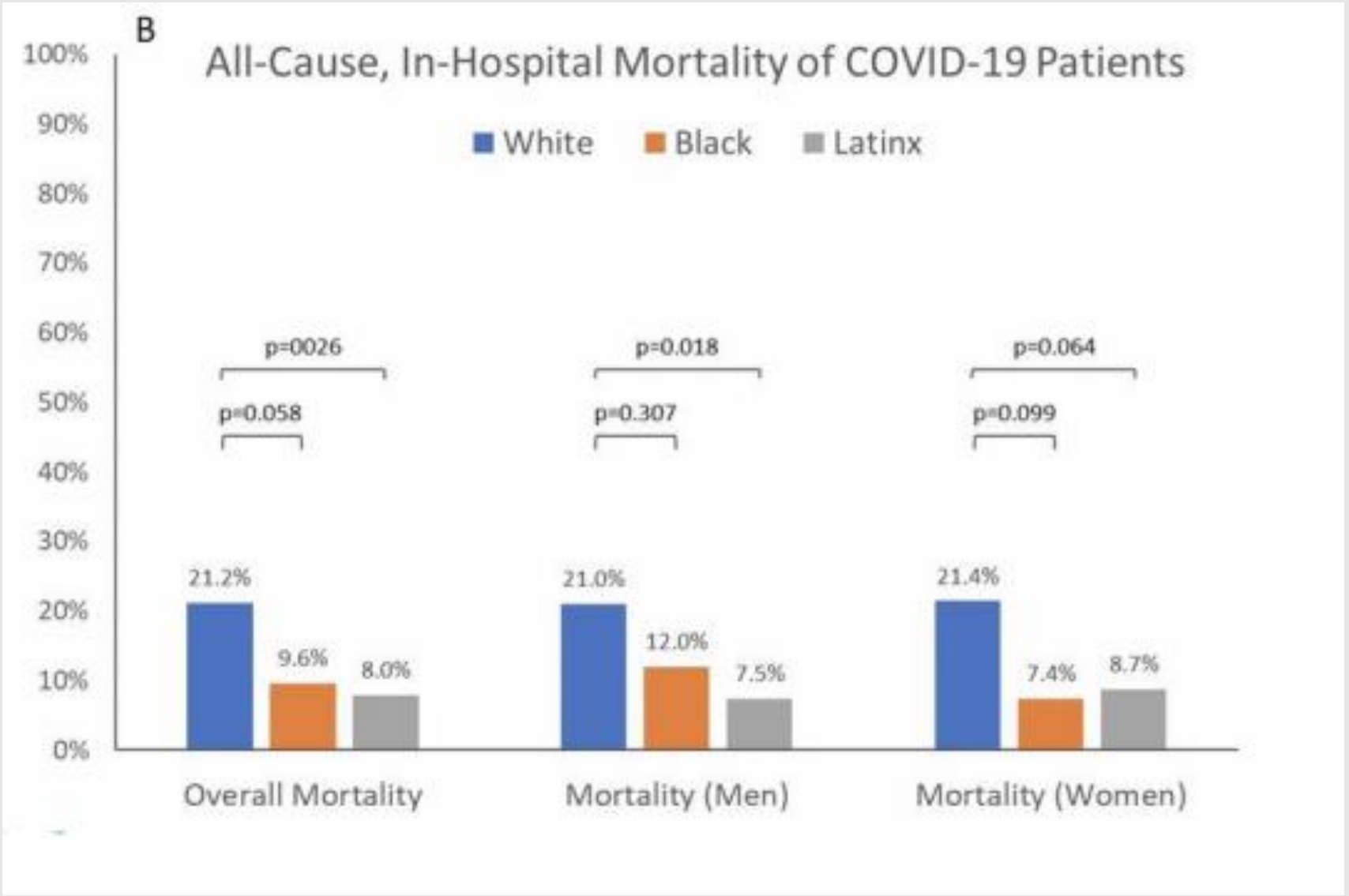
* Model 1 is the unadjusted race-only model; model 2 includes race with the additional covariates of age and sex; model 3 includes race with the additional covariates of age, sex, Charlson Comorbidity Index score, residence in a low-income area, and obesity; and model 4 includes race with the additional covariates of age, sex, Charlson Comorbidity Index score, residence in a low-income area, obesity, and indicators for baseline vital signs and laboratory measures above or below predefined clinical thresholds (respiratory rate; levels of aspartate aminotransferase, venous lactate, creatinine, bilirubin, procalcitonin, and C-reactive protein; and counts of lymphocytes and platelets). Multiple imputation was used to estimate missing values for BMI; levels of venous lactate, procalcitonin, and C-reactive protein; and lymphocyte count.

NEJM 2020 Jun 25;382(26):2534-2543. doi: 10.1056/NEJMsa2011686.

Figure 1

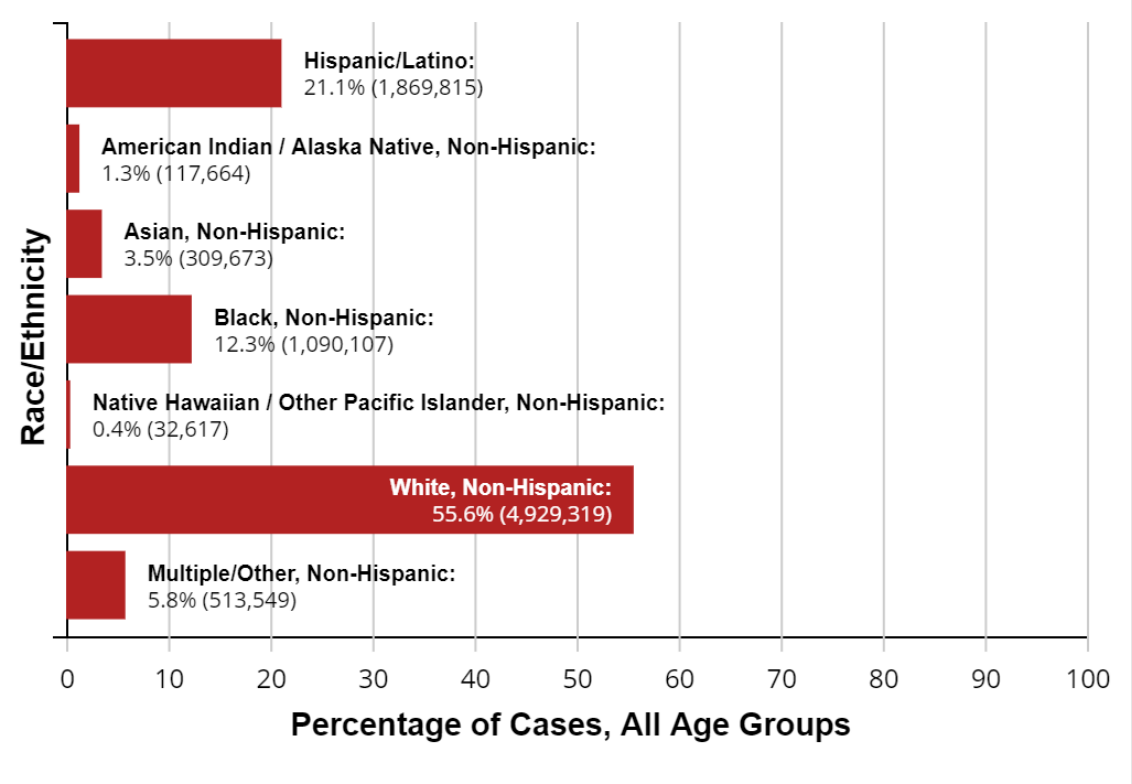


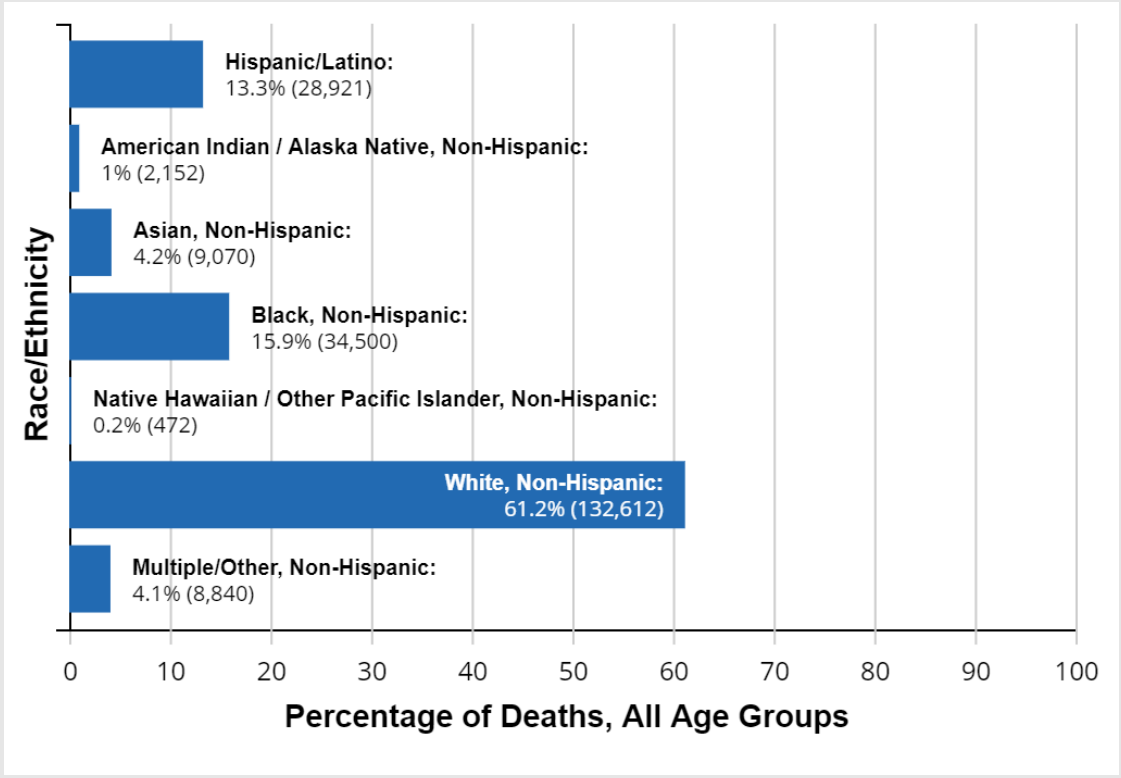
Clin Infect Dis 2020 Aug 22;ciaa1245. doi: 10.1093/cid/ciaa1245.



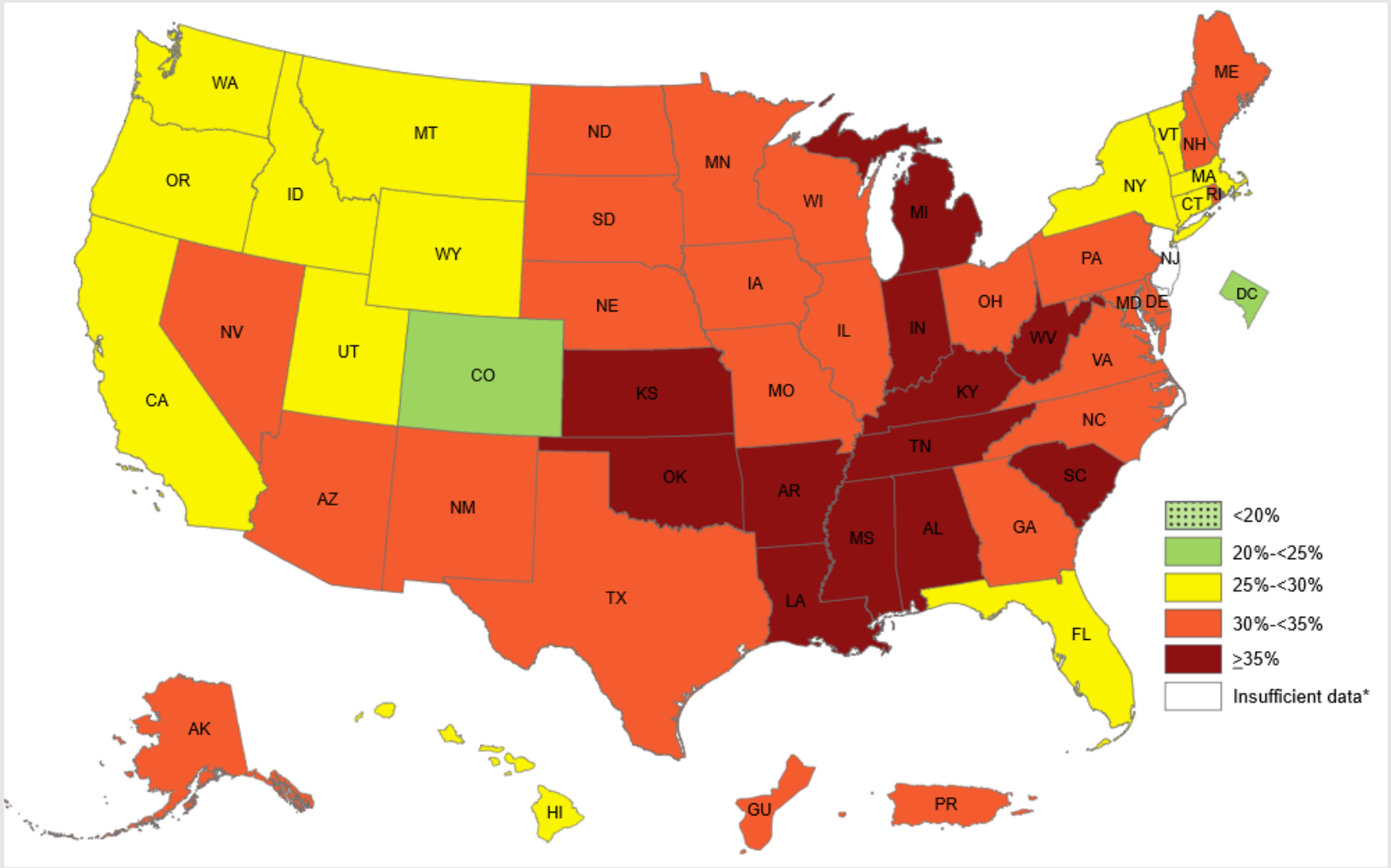
Clin Infect Dis 2020 Aug 22;ciaa1245. doi: 10.1093/cid/ciaa1245.

Cases and Deaths of COVID-19 (current)



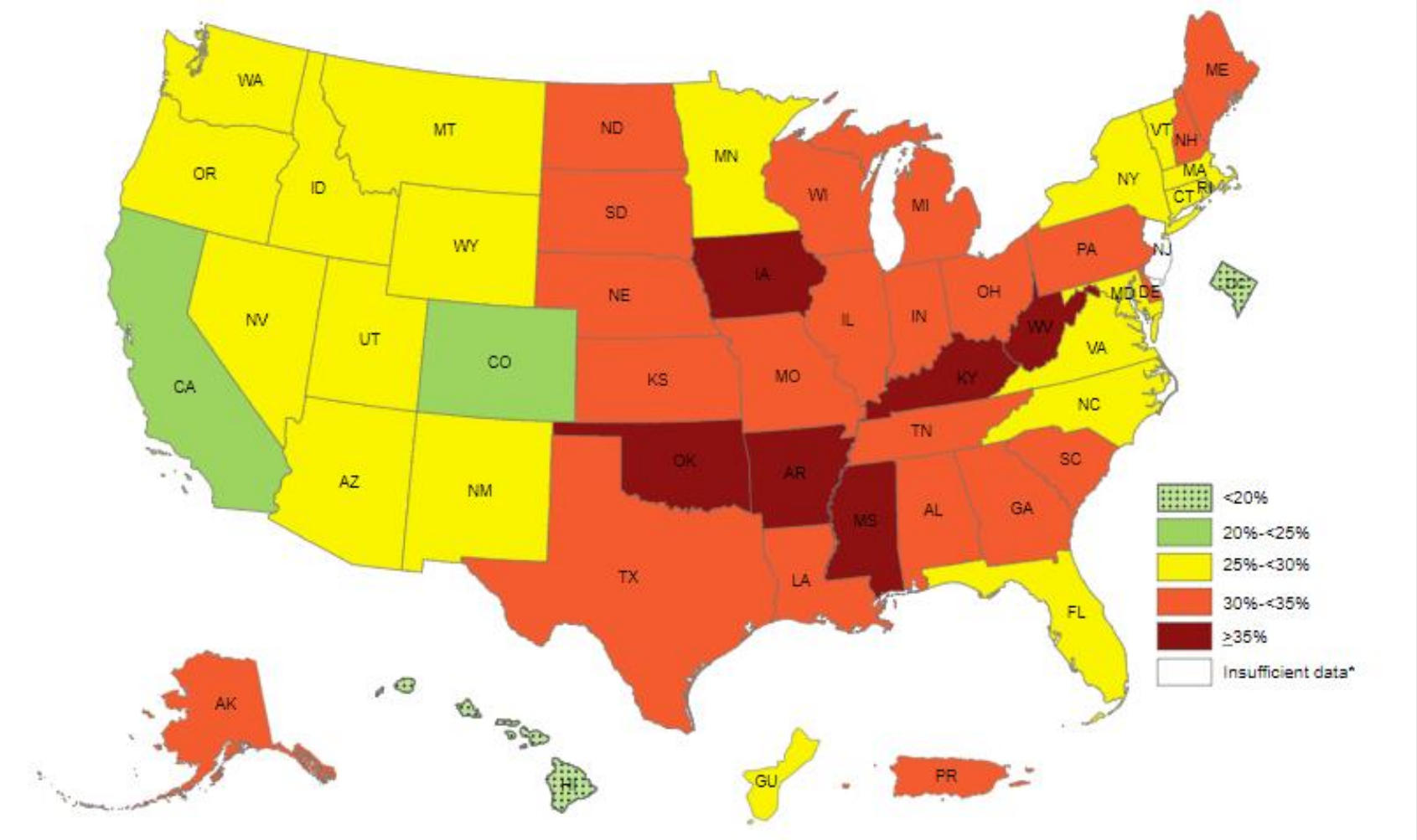


Prevalence† of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2019



Prevalence† of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2019

Non-Hispanic White Adults



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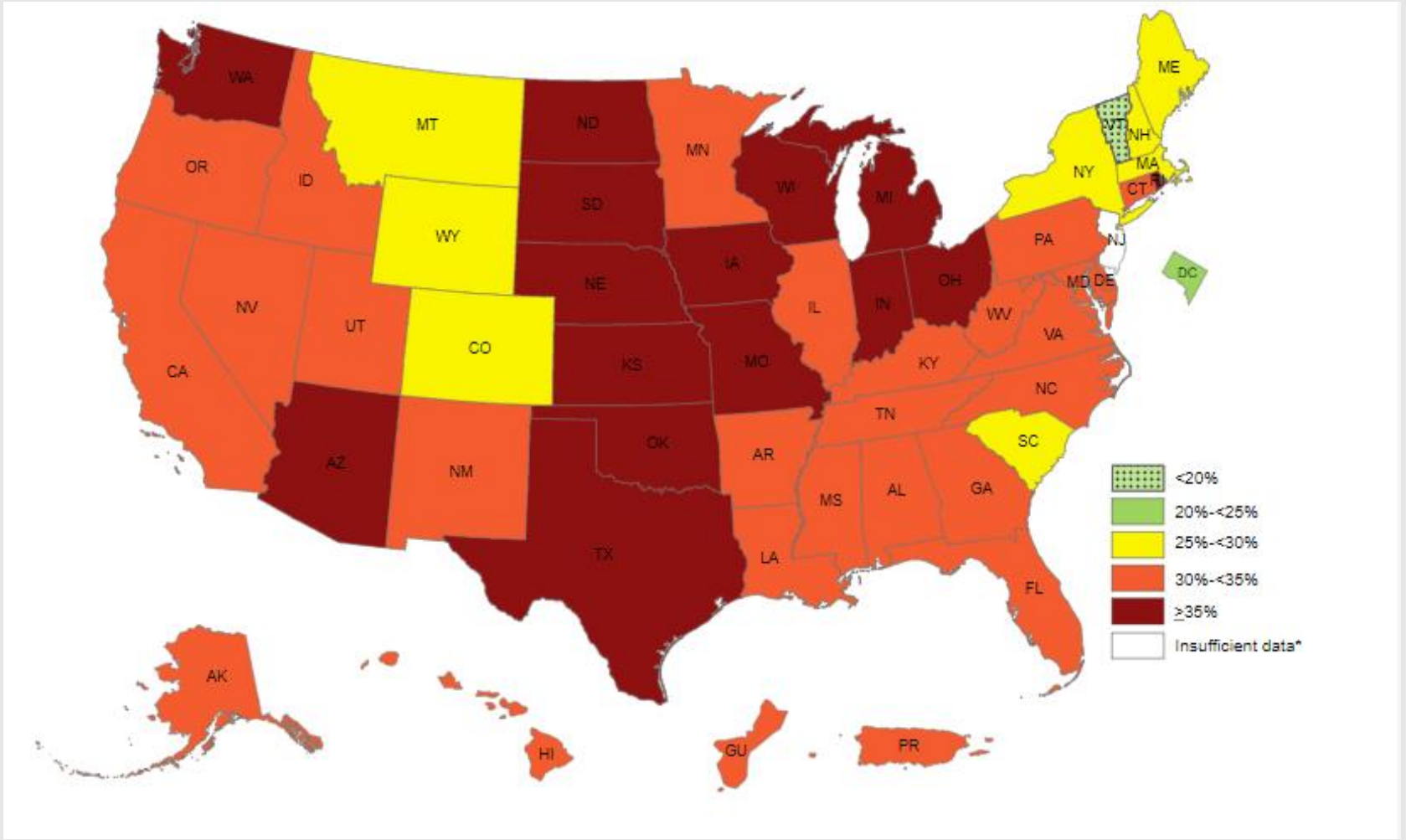
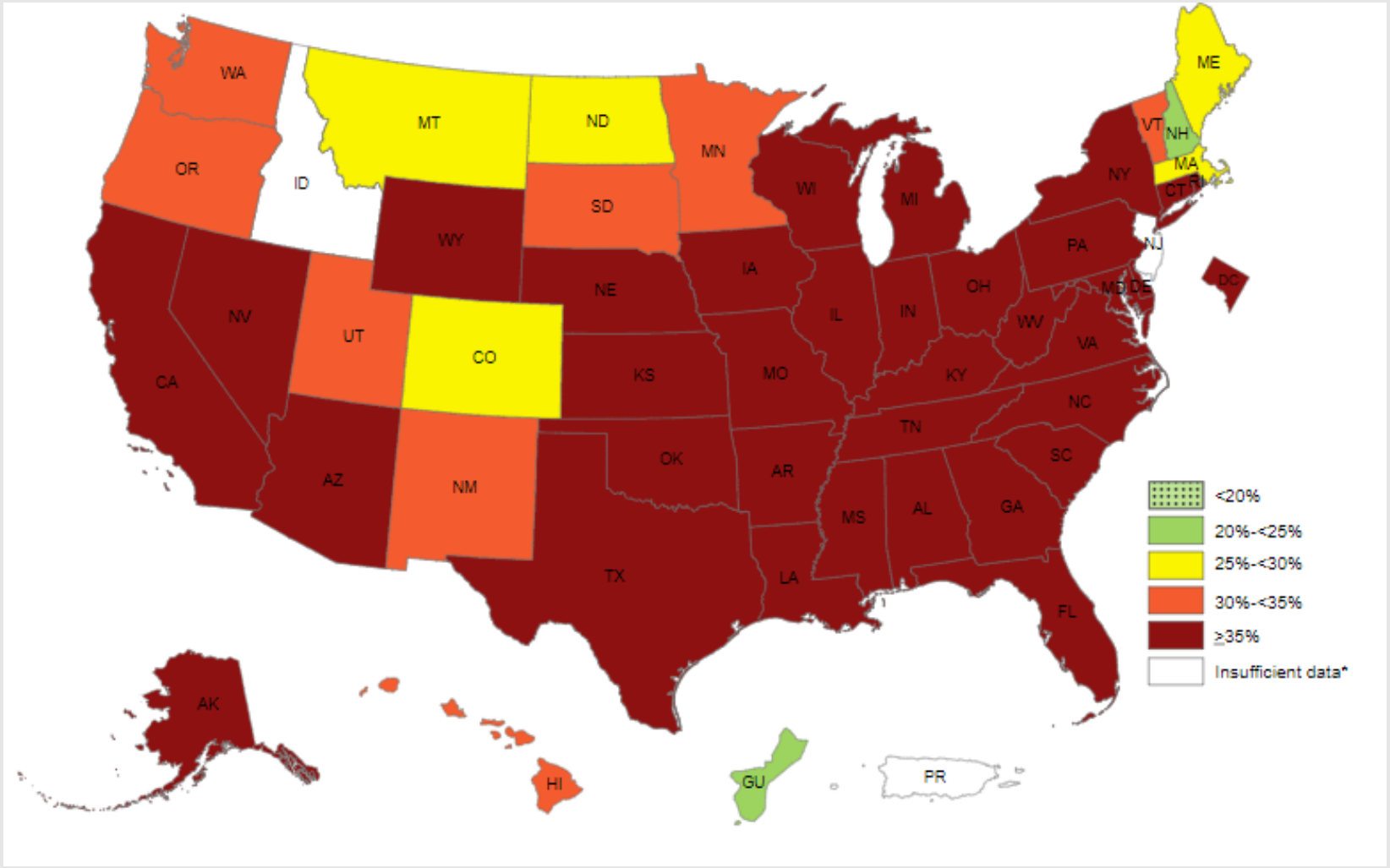
Hispanic Adults



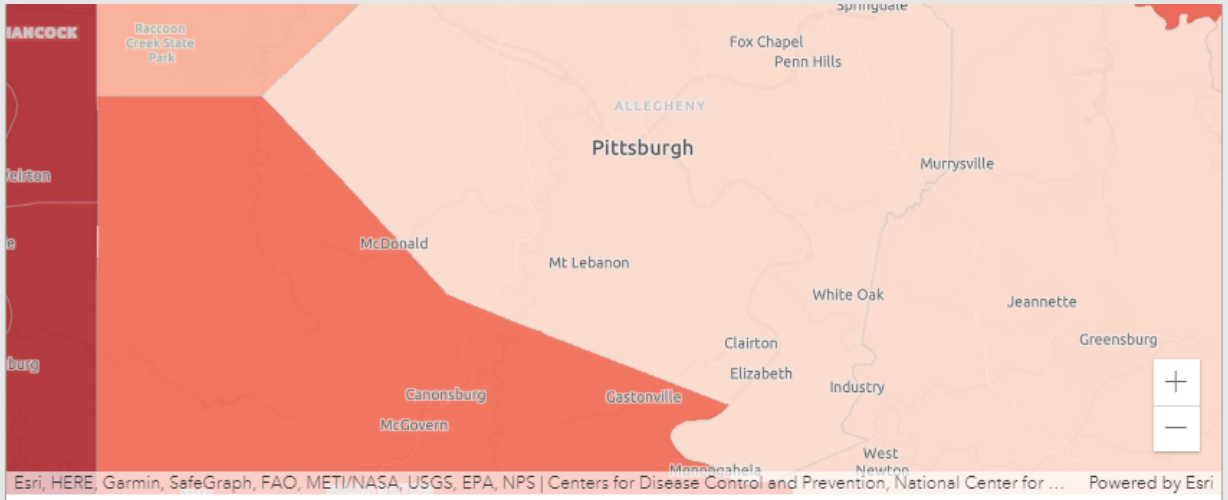
Prevalence† of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2019

Non-Hispanic Black Adults



Selected Chronic Conditions with COVID-19 in Allegheny County, PA

- Allegheny, PA
- Armstrong, PA
- Beaver, PA
- Butler, PA
- Indiana, PA
- Washington, PA
- Westmoreland, PA
- Brooke, WV
- Hancock, WV



Note: Zoom in on the map to select a county and view its indicators, or select the magnifying glass in the top right corner of the map to enter a county name and view the indicators.

ever been told by a doctor.

Any condition

41.7 %

estimated number: 413,499

2018 county population estimate for adults 18 years and above was 990,703.

Any | Gauge

Allegheny, PA

Chronic kidney disease

2.9 %

estimated number: 28,884

Allegheny, PA

COPD

6.8 %

estimated number: 66,908

Allegheny, PA

Heart disease

6.8 %

estimated number: 67,212

Allegheny, PA

Diagnosed diabetes

10.3 %

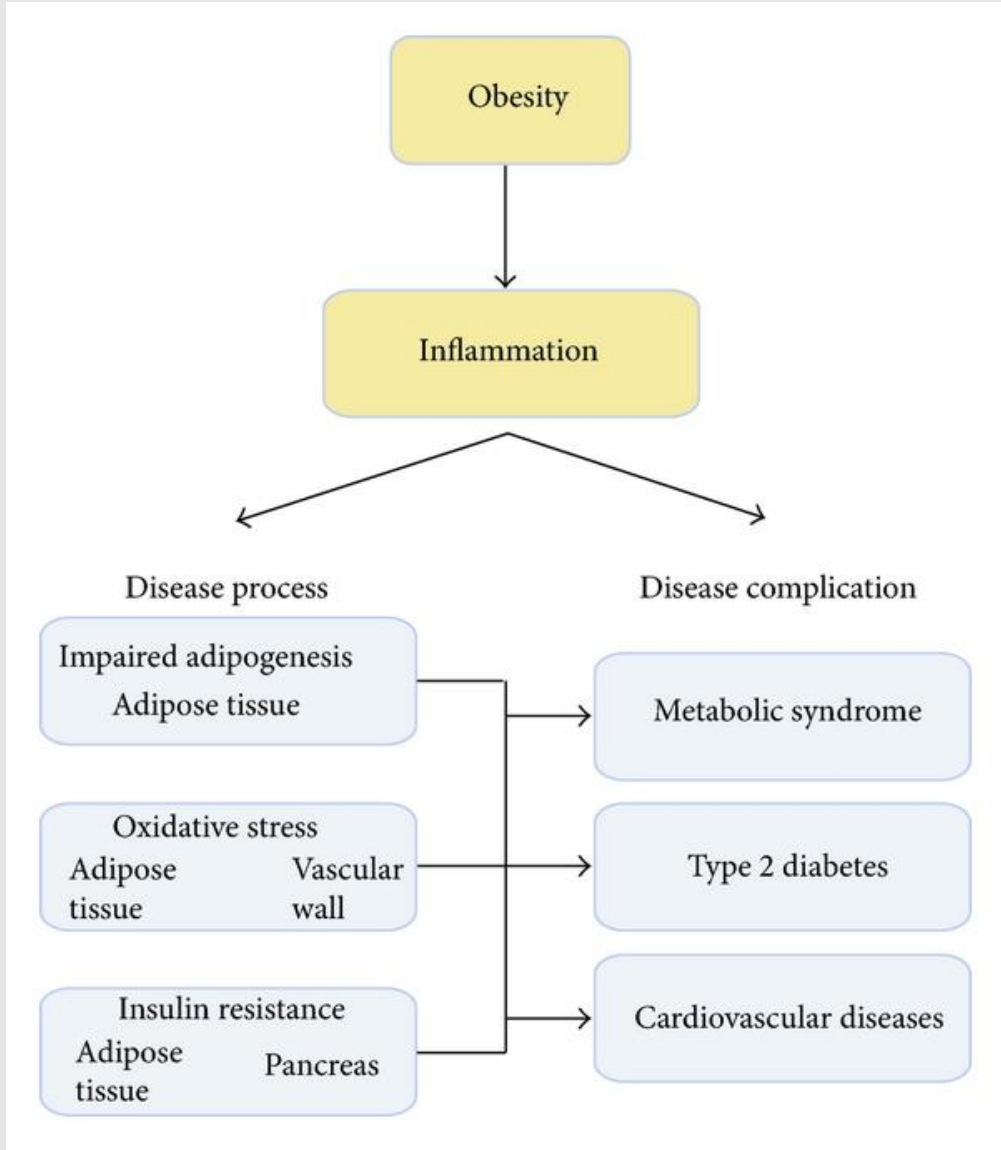
estimated number: 101,890

Allegheny, PA

Obesity (BMI>=30)

31.9 %

estimated number: 316,034



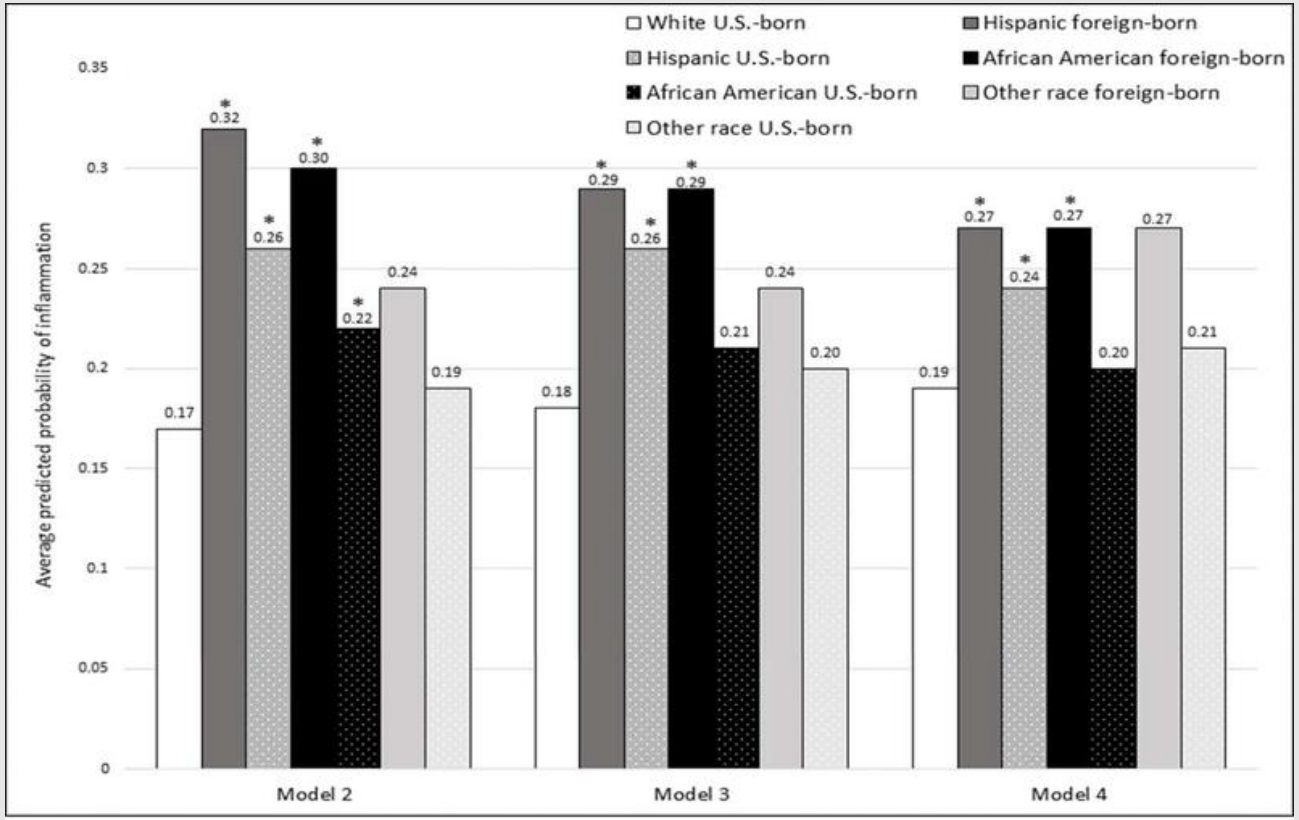
Scientifica (Cairo). 2012. PMID: 24278677

Weighted child CRP Children ages 2–10 years with valid CRP data ≤10 mg/L, NHANES 1999–2010. N=6652

	C-Reactive Protein (CRP)		
	Mean (mg/L)	Std. Error	% low-grade inflammation (CRP 1–10mg/L)
Full sample	0.83	0.02	21%
By child race/ethnicity, parent nativity			
Non-Hispanic white, U.S.-born parent	0.68	0.03	17%
Hispanic, foreign-born parent	1.18	0.06	31%
Hispanic, U.S.-born parent	0.93	0.05	26%
African American, foreign-born parent	0.90	0.11	26%
African American, U.S.-born parent	0.92	0.04	22%
Other race, foreign-born parent	0.90	0.15	22%
Other race, U.S.-born parent	0.76	0.11	19%

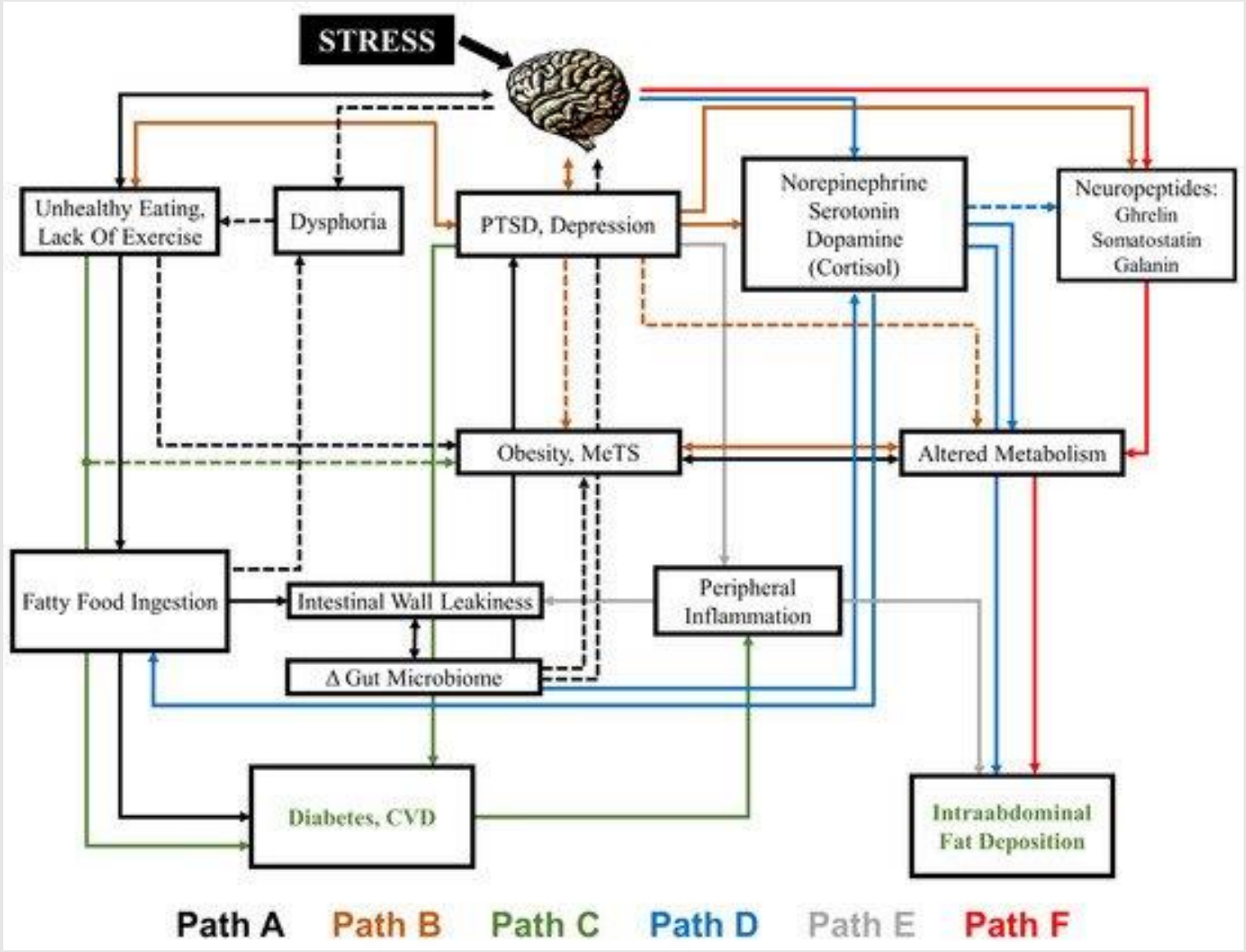
J Health Soc Behav. 2018;59(3):411-428. doi:10.1177/0022146518784592

Predicted probabilities of low-grade inflammation (CRP >1 mg/L) by child race/ethnicity/parent nativity.



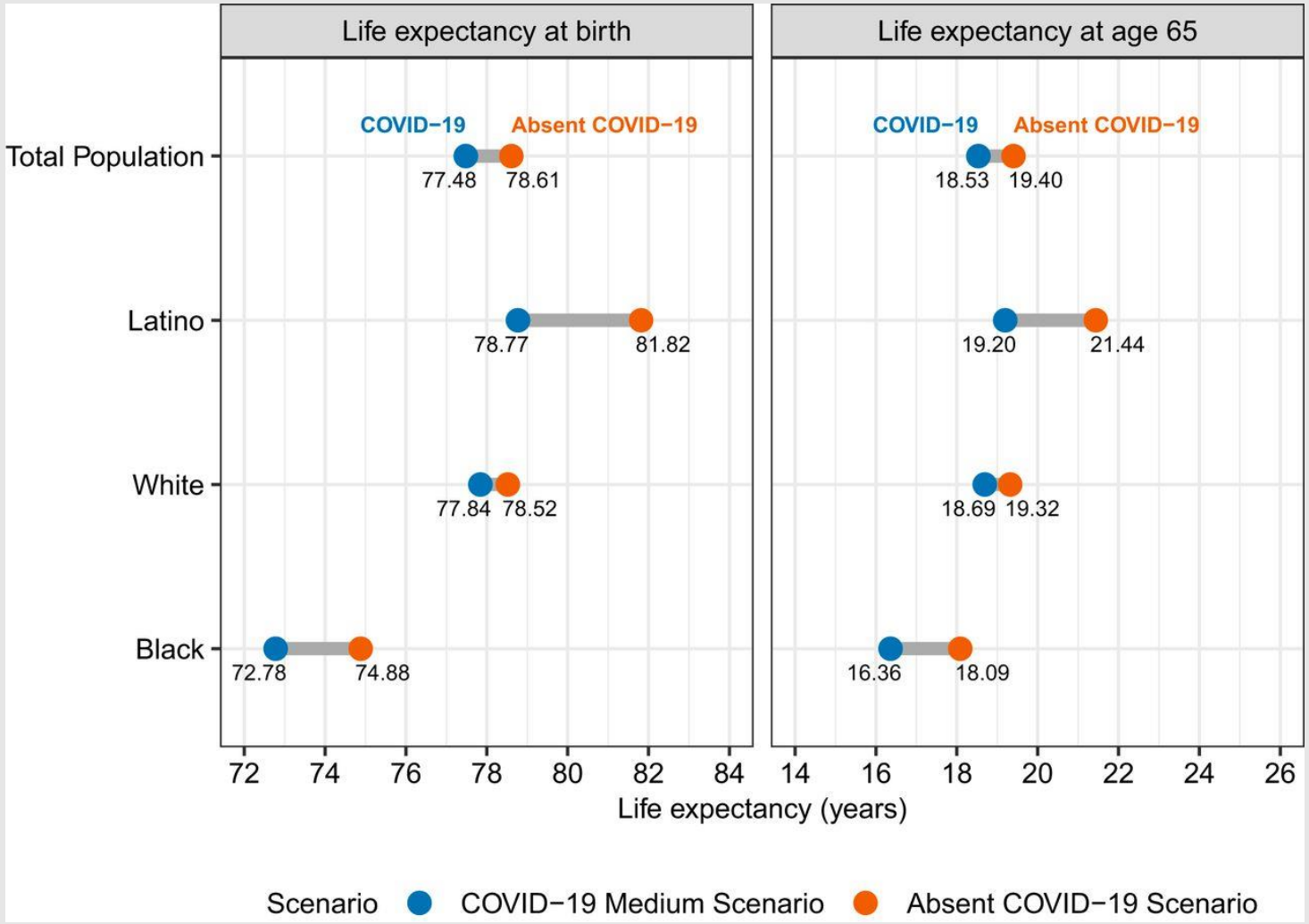
*Significantly different from white children at p<.05. Results calculated using imputed data.

J Health Soc Behav. 2018;59(3):411-428. doi:10.1177/0022146518784592



Nutrients. 2020 Aug 13;12(8):2428. doi: 10.3390/nu12082428.

Life expectancy projections for 2020 by race and ethnicity in the absence of COVID-19 and under the medium scenario.



Theresa Andrasfay, and Noreen Goldman PNAS 2021;118:5:e2014746118

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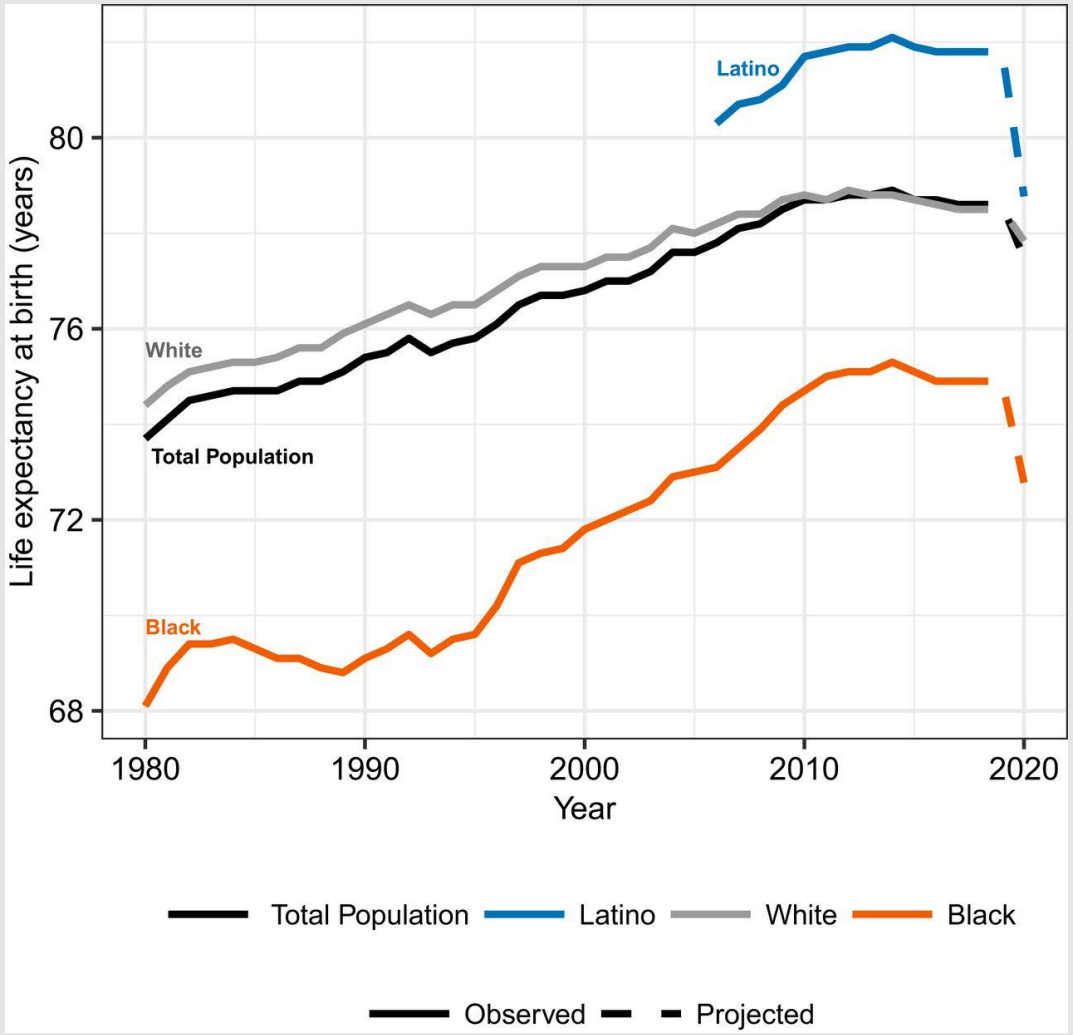
Trends in life expectancy at birth by race and ethnicity: 1980–2020.



Theresa Andrasfay, and Noreen Goldman PNAS 2021;118:5:e2014746118

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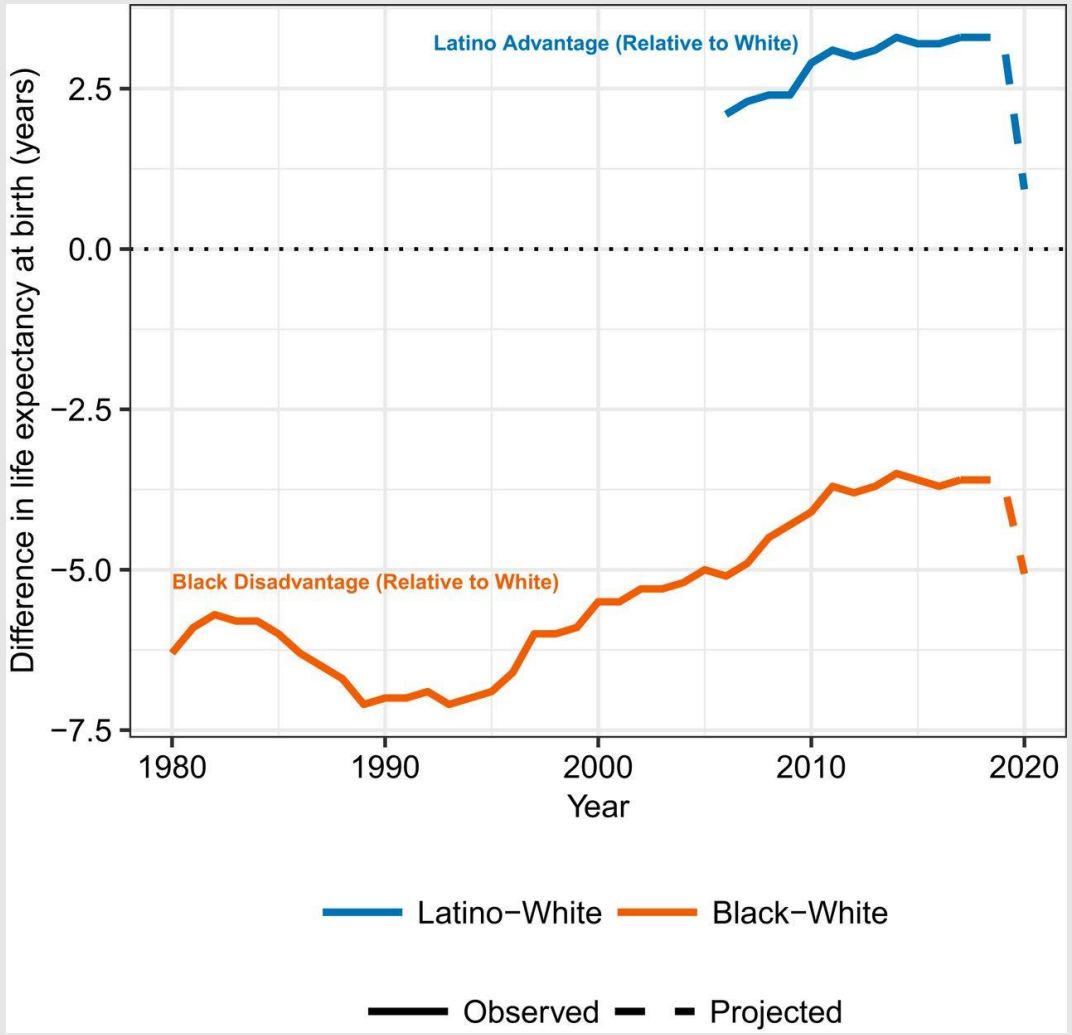
Trends in racial and ethnic differences in life expectancy at birth: 1980–2020.



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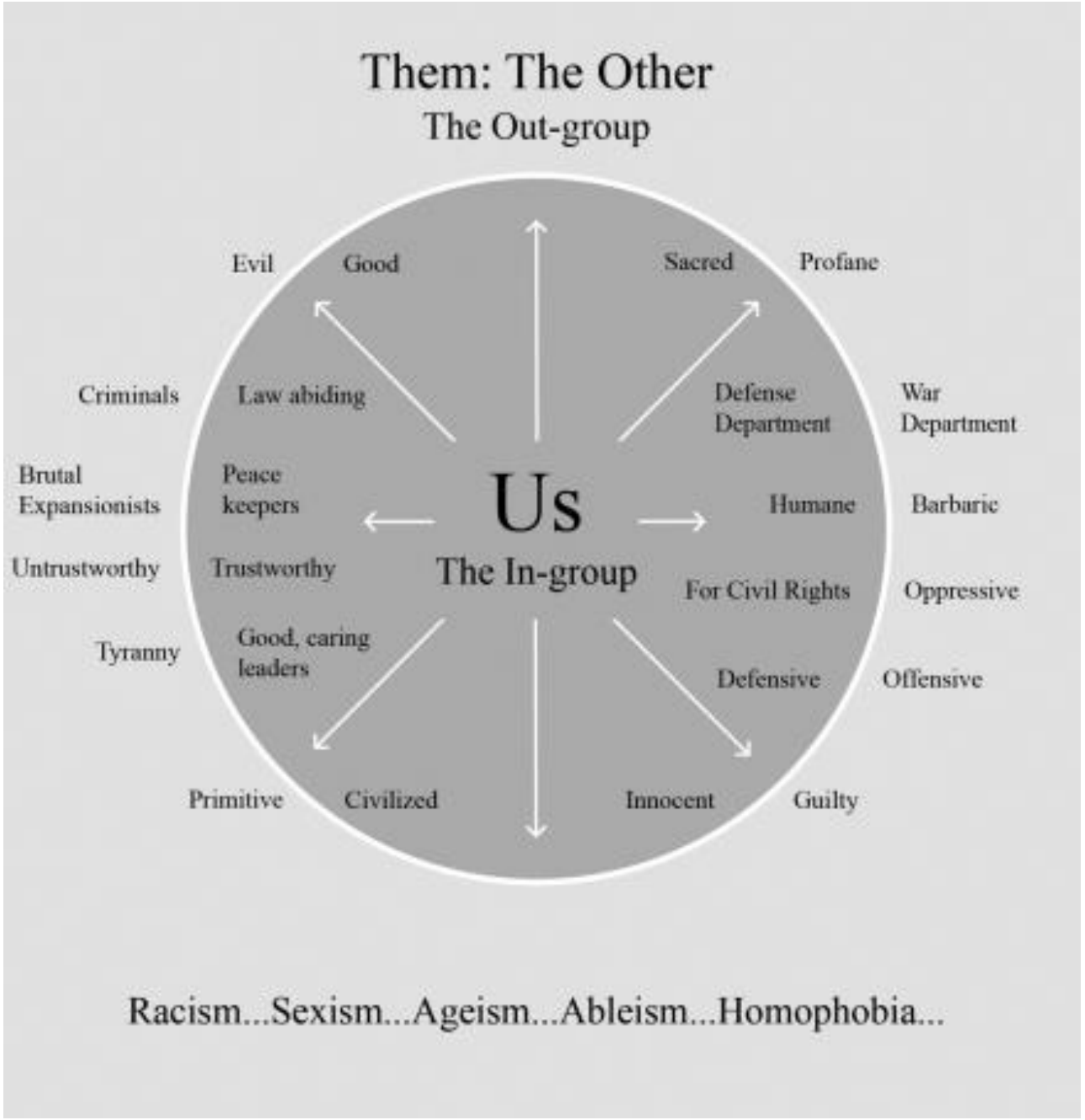


Attributes to In/Out Group Membership

Gonzales E and colleagues. J Gerontol Soc Work. 2021 Jan 11:1-15. doi: 10.1080/01634372.2020.1870604. PMID: 33427584

COVID-19, Social Determinants of Health, and Race

- Based on publicly available data from through October 28. 2020
- Evaluated clinical covariates and social determinants of health at the county level
- Counties with higher death rates:
  - Higher proportion of Black residents
  - Higher levels of adverse social determinants of health
- A one percentage point increase in the following caused increase in COVID death rates:
  - Black residents- 0.9% (95% CI 0.5%–1.3%)
  - uninsured adults- 1.9% (95% CI 1.1%–2.7%)
  - low birthweight- 7.6% (95% CI 4.4%–11.0%)
  - adults without high school diploma- 3.5% (95% CI 2.5%–4.5%)
  - incarceration rate- 5.4% (95% CI 1.3%–9.7%)
  - Without internet- 3.4% (95% CI 2.5%–4.2%)

Dalsania AK et al.. J Racial Ethn Health Disparities. 2021 Jan 5:1–8. doi: 10.1007/s40615-020-00952-y. PMID: 33403652; PMCID: PMC7785288.

Does tailoring COVID-19–related public health messages to race/ethnicity improve Black and Latinx individuals' knowledge and information-seeking behavior?

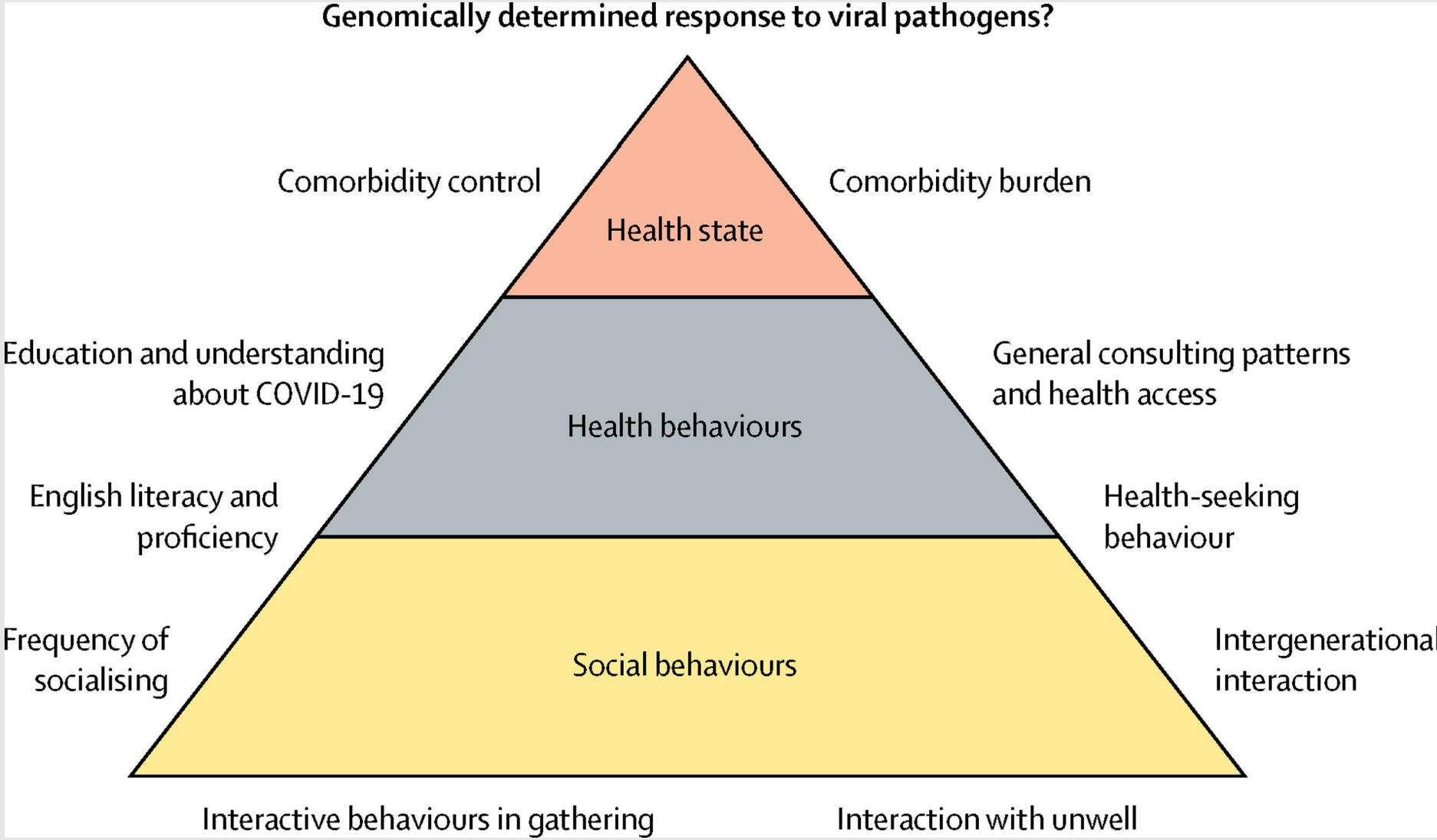
Annals of Internal Medicine

Alsan M, Stanford FC, Banerjee A, et al. Comparison of knowledge and information-seeking behavior following general COVID-19 public health messages and messages tailored for Black and Latino communities: A randomized controlled trial. Ann Intern Med. 2020. [Epub ahead of print]. doi:10.7326/M20-6141 http://dx.doi.org/10.7326/M20-6141
© 2020 American College of Physicians

Disparities, Obesity, and COVID-19

- Economic Status
- Underlying Health Conditions
- Household Crowding
- Pathophysiologic Differences in Inflammation

Int J Obes (Lond). 2020 Sep;44(9):1807-1809.



The Lancet 2020 3951421-1422DOI: (10.1016/S0140-6736(20)30922-3)

COVID-19 and Race/Ethnicity

- Obesity and ethnicity are additive, multiplicative, mediators or confounders—and the degree to which obesity increases risk independent from its many comorbidities—have significant implications for our medical and public health response.

Int J Obes (Lond). 2020 Sep;44(9):1807-1809.

Thank You For Your Time

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@askdrfatima