A microscopic image showing numerous yellow, spherical virus particles clustered together, with some blue and purple structures visible in the background.

COVID-19: the city virus and the country virus*

2020 NIH Rural Health Day

Thursday, November 19, 2020

Marshall E. Bloom, M.D.

Associate Director for Scientific Management

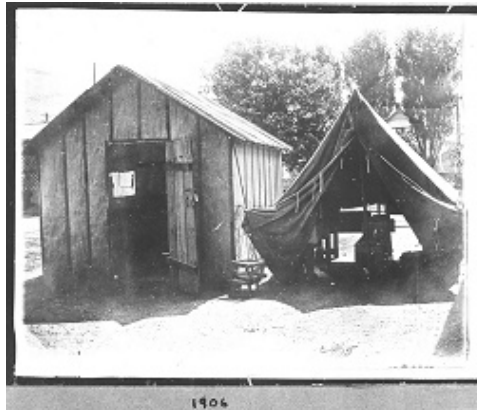
Rocky Mountain Laboratories/NIAID/NIH

Hamilton, MT 59840

* With apologies to Aesop (Αἴσωπος)

RML: A Century of Emerging Infectious Disease Research

1907



Rocky Mountain
Spotted Fever

1942



Yellow Fever

2009



Ebolavirus

RML: A Century of Emerging Infectious Disease Research

1907

1942

2009



Rocky Mountain
Spotted Fever

Yellow Fever

Ebolavirus

RML: A Century of Basic and Applied Infectious Disease Research

1907

1942

2009



Rocky Mountain
Spotted Fever

Yellow Fever

Ebolavirus

RML: A Century of Emerging Infectious Disease Research

1907

1942

2009



Rocky Mountain
Spotted Fever

Yellow Fever

Ebolavirus

RML: A Century of Emerging Infectious Disease Research

1907

1942

2009



Rocky Mountain
Spotted Fever

Yellow Fever

Ebolavirus

Rocky Mountain Laboratories Today!



- NIAID Division of Intramural Research
- Hamilton, Montana
- 36 acres
- Ca. 500 staff members
- 3 NIAID Intramural Laboratories
- 20 Principal Investigators
- Focus on emerging infectious diseases: viral, bacterial and prion
- BSL-2/3/4 facilities

A microscopic image showing a large cluster of yellow, spherical virus particles with a textured surface. These particles are surrounded by various other cellular structures, including blue and purple elongated shapes, all set against a dark background.

COVID-19: the city virus*

* With apologies to Aesop (Αἴσωπος)

JAMA

The Journal of the American Medical Association

Published online
January 23, 2020

Viewpoint

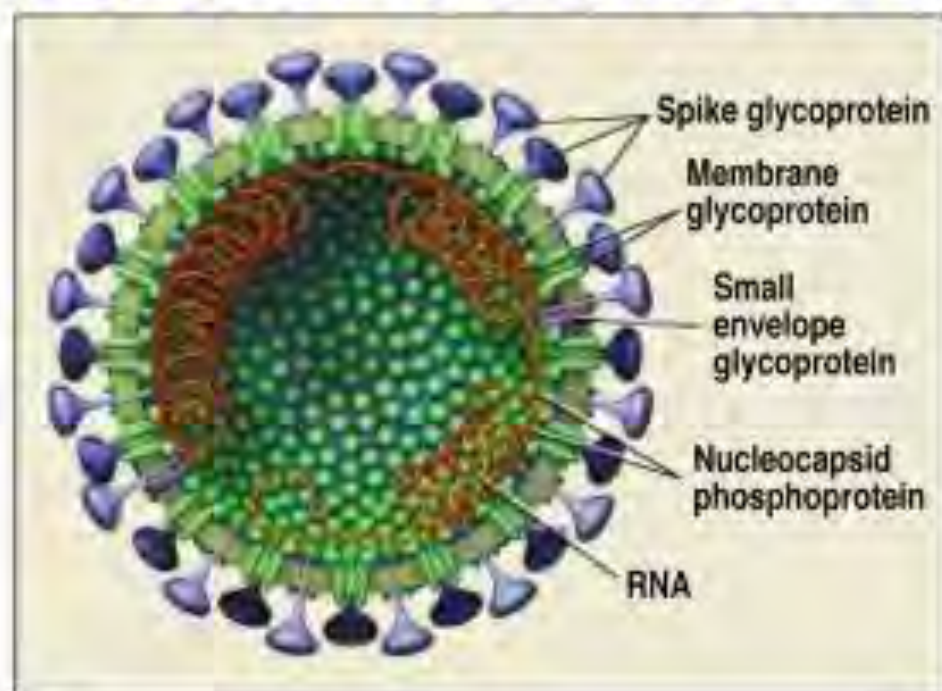
Coronavirus Infections—More Than Just the Common Cold

CI Paules, HD Marston and AS Fauci

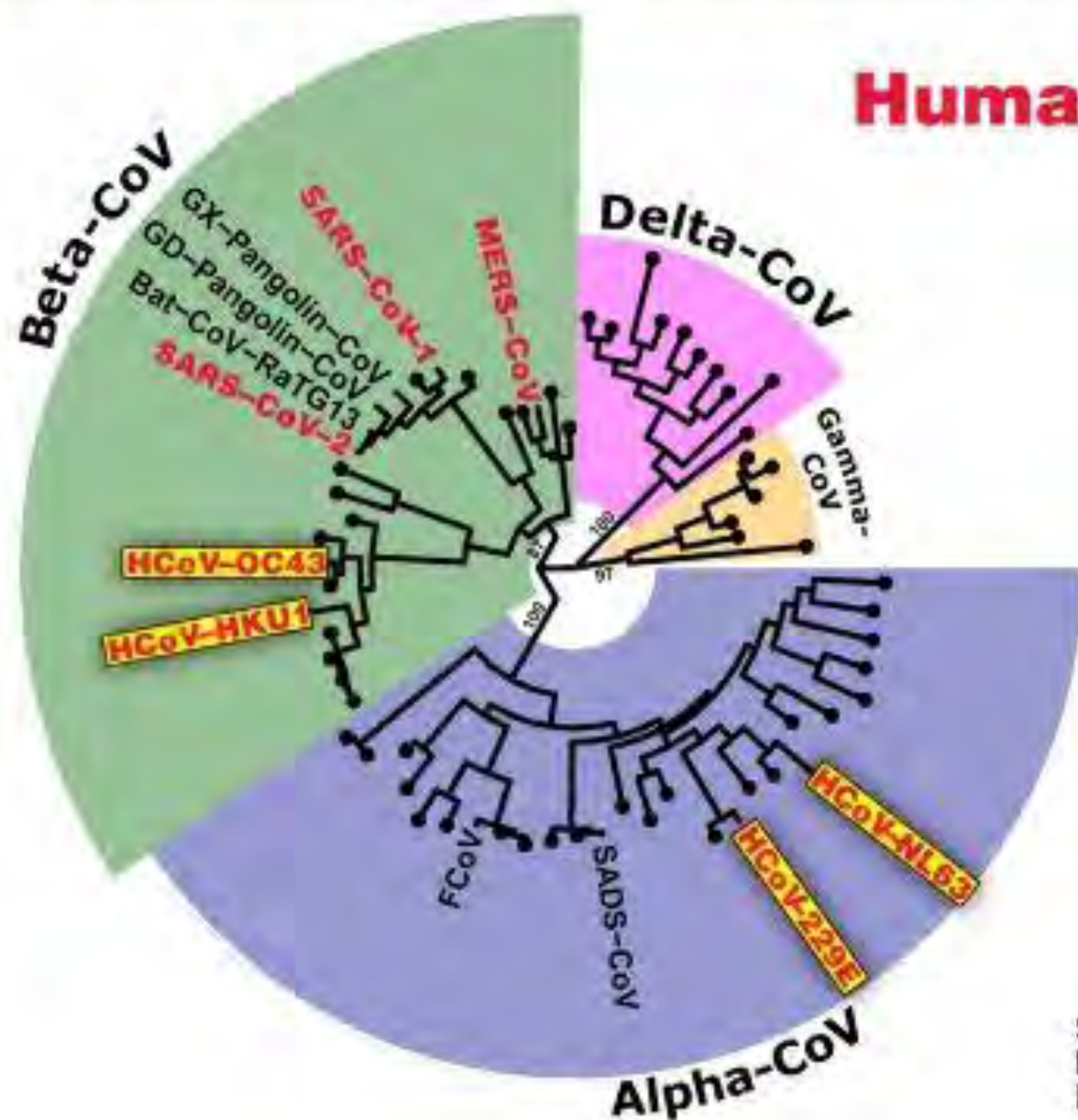
Coronaviruses

- Enveloped, positive-strand RNA viruses
- Largest genome size of any RNA virus (~30 kilobases)
- 4 genera: alpha, beta, delta, and gamma
 - Alpha and beta infect humans
- Wide host range – bats as reservoir for many
- Primarily cause respiratory illness in humans, GI illness in animals

Coronavirus Structure



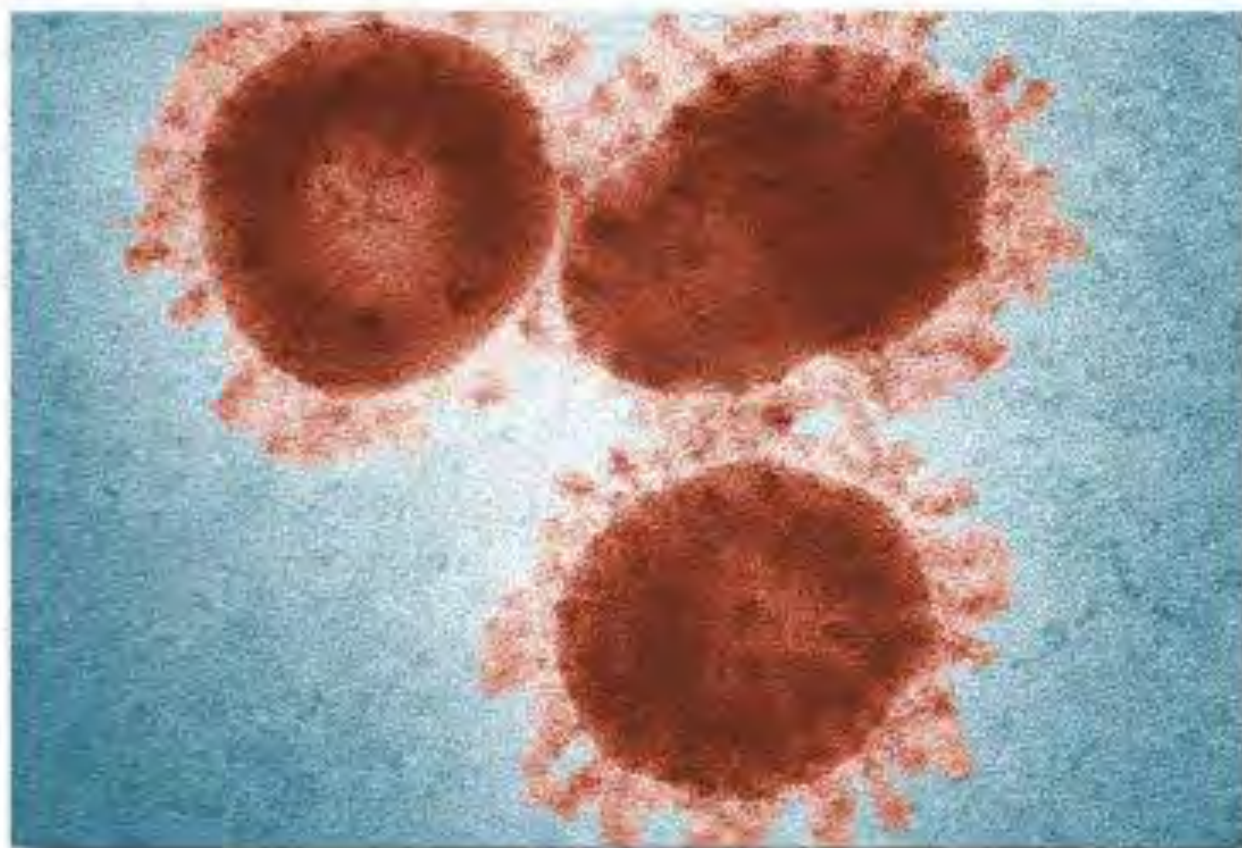
Coronavirus Phylogenetic Tree



Human coronaviruses

Source: SM Gygil, PhD, NIAID. Based on 440 bp nucleotide sequences of RNA-dependent RNA polymerase.

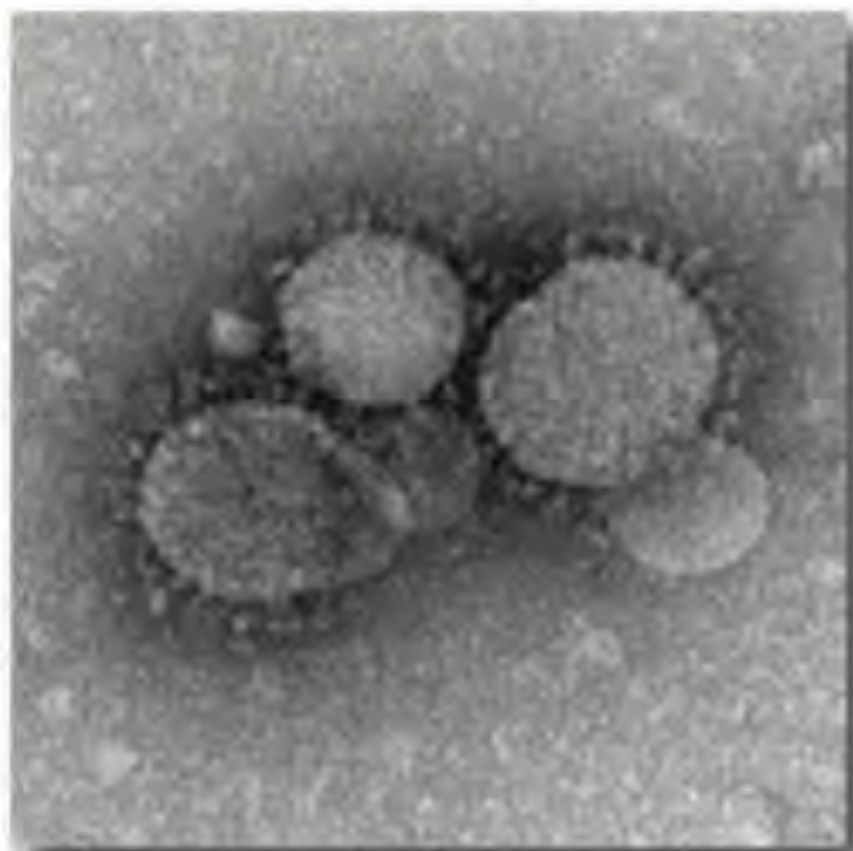
Severe Acute Respiratory Syndrome (SARS) (2002–2003)



Credit: CDC

AS Fauci/NIAID

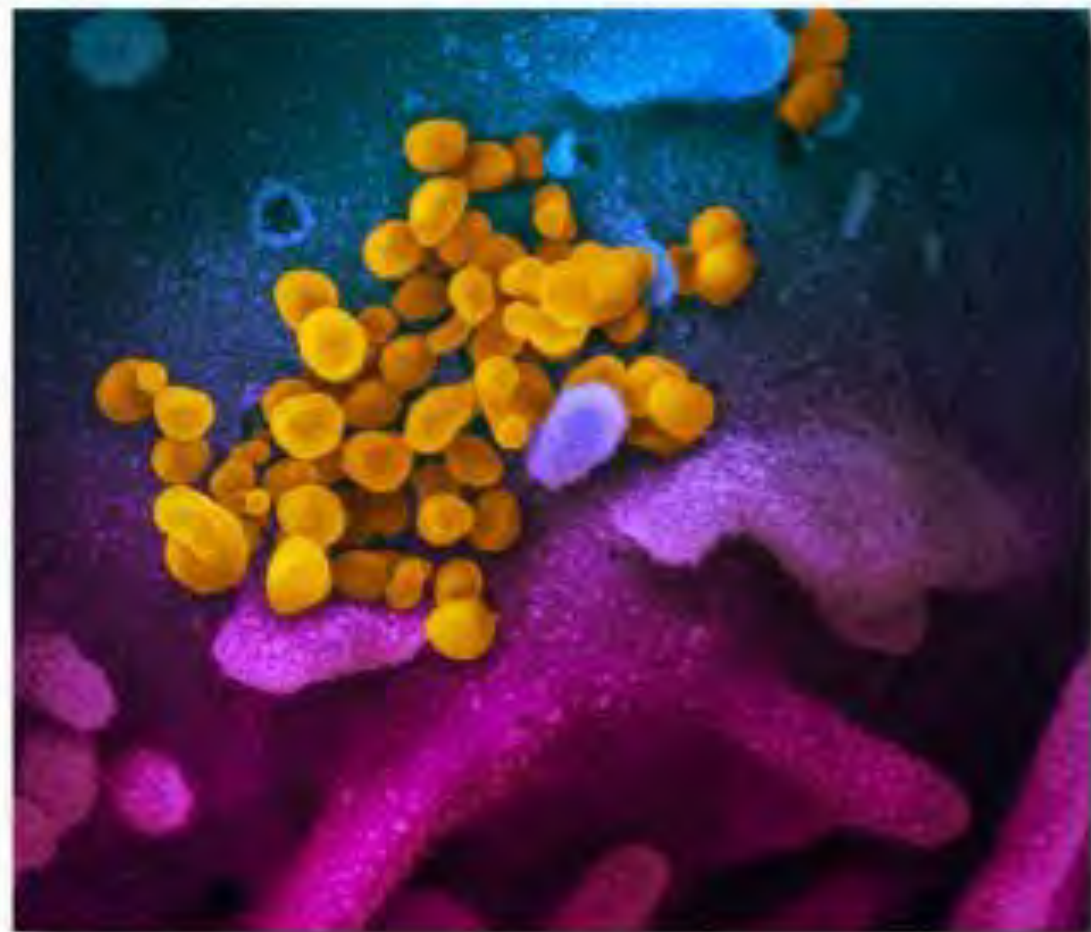
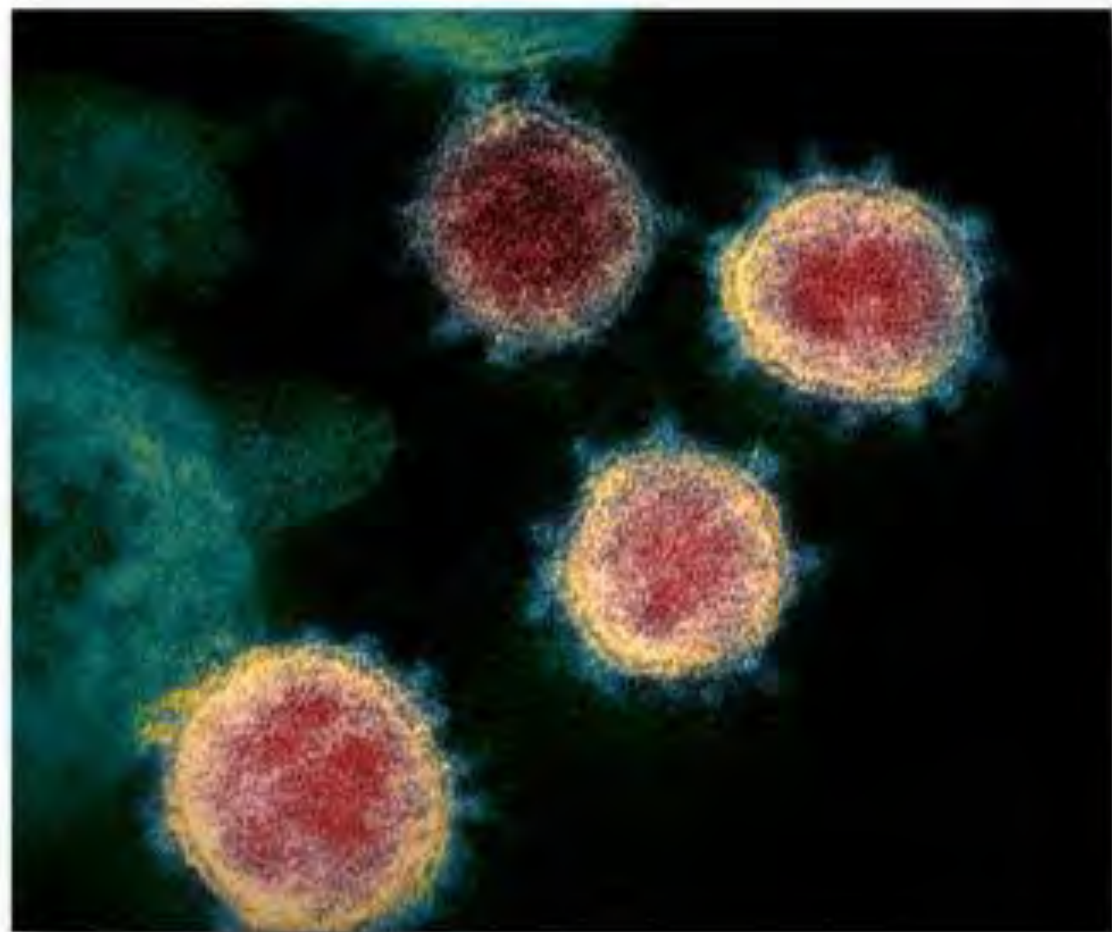
Middle East Respiratory Syndrome (MERS) (2012–present)



Credit: CDC

AS Fauci/NIAID

Coronavirus Disease 2019 (COVID-19) (December 2019 – Present)



Where did COVID-19 Originate?

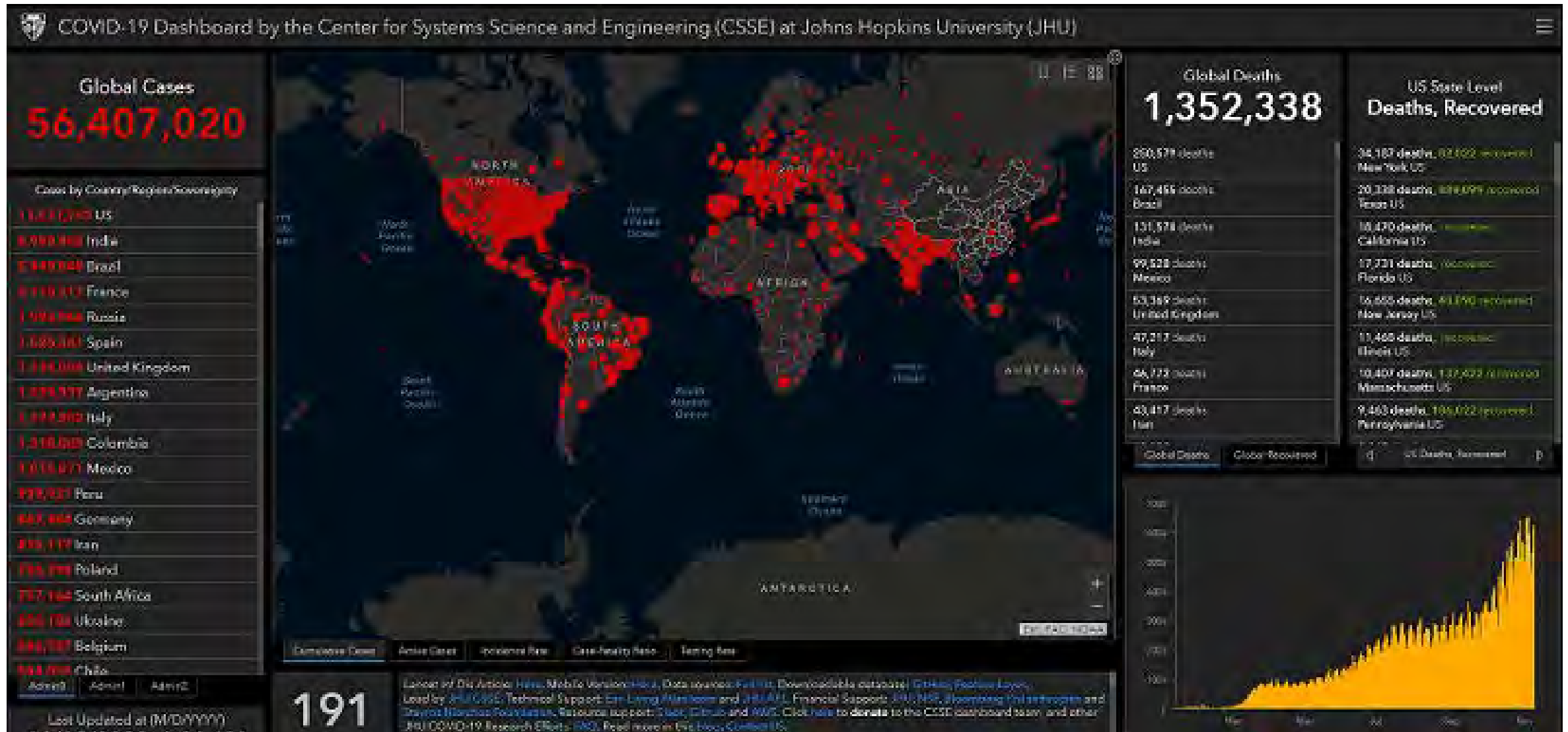


Pangolin?



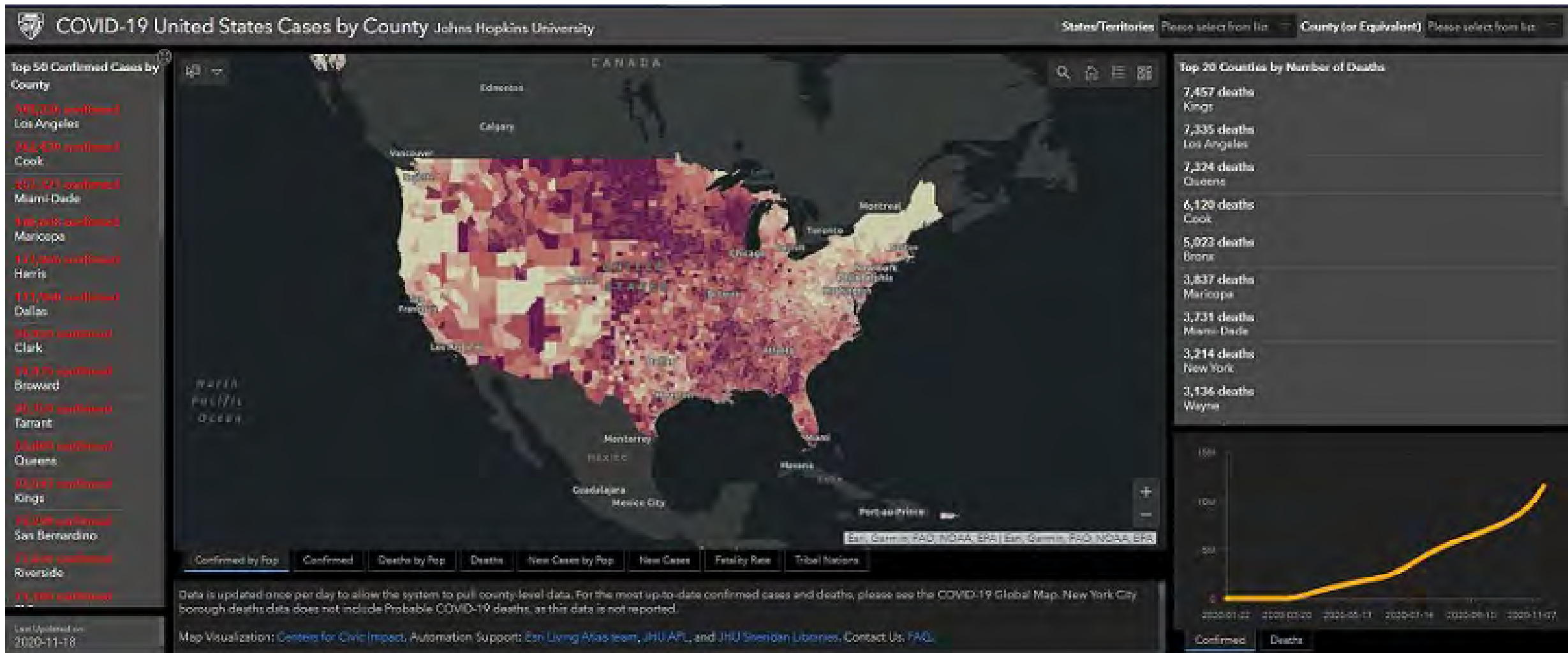
Horseshoe bat?

COVID-19 World Dashboard – Thurs., Nov. 19



Credit: JHU CSSE

COVID-19 US Dashboard – Weds., Nov. 18



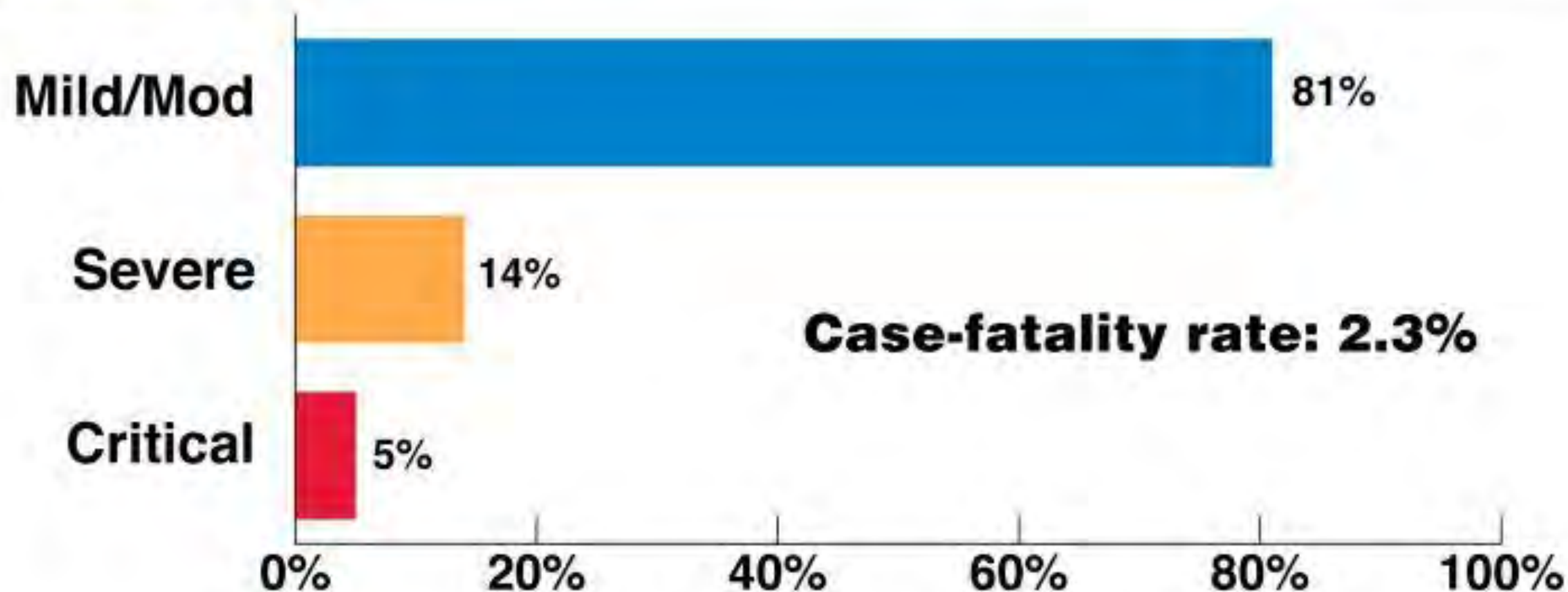
Credit: JHU CSSE

COVID-19 Clinical Presentation

- Fever 83-99%
- Loss of taste/smell* ca. 85
- Cough 59-82
- Fatigue 44-70
- Anorexia 40-64
- Shortness of breath 31-40
- Myalgia 11-35
- Other non-specific symptoms: sore throat, nasal congestion, headache, diarrhea, nausea, vomiting

* Preceding onset of respiratory symptoms

Spectrum of Disease Among 44,672 Individuals with Confirmed COVID-19, China



Source: Z Wu & JM McGoogan, *JAMA* 323:1239, 2020.

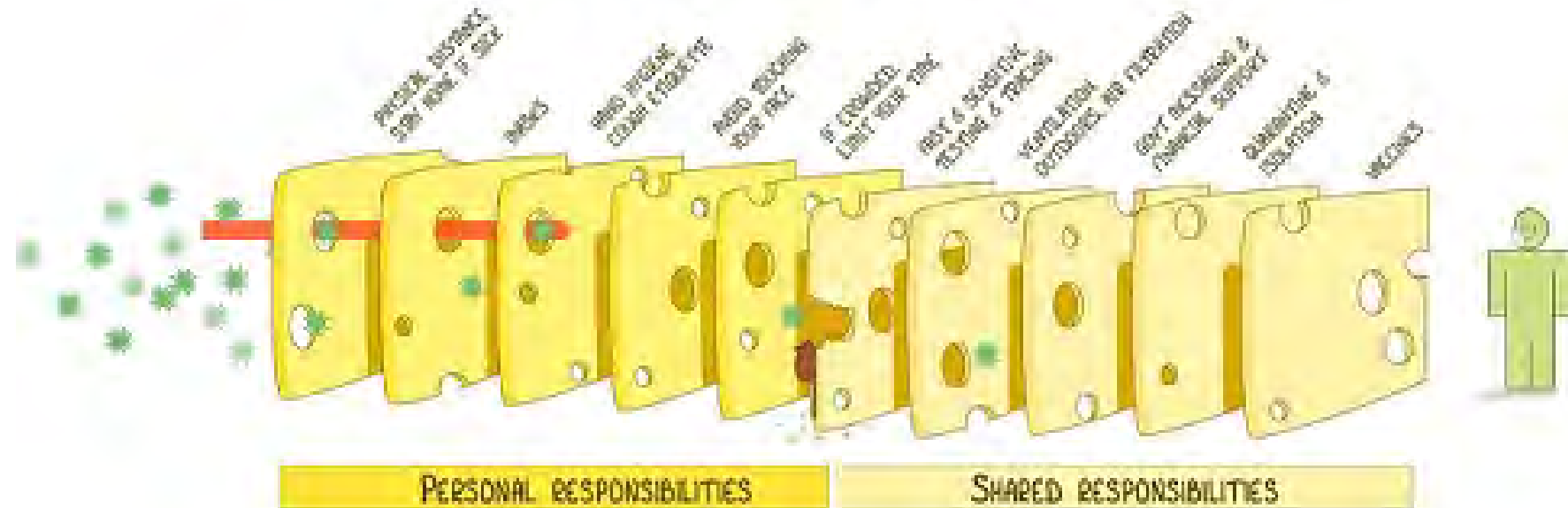
COVID-19 Medical Countermeasures.....

- Diagnostics
- Vaccines
- Monoclonal antibodies
- Blood derived products
- New antiviral drugs
- Repurposed drugs
- Immunomodulators
- Adjunct therapies

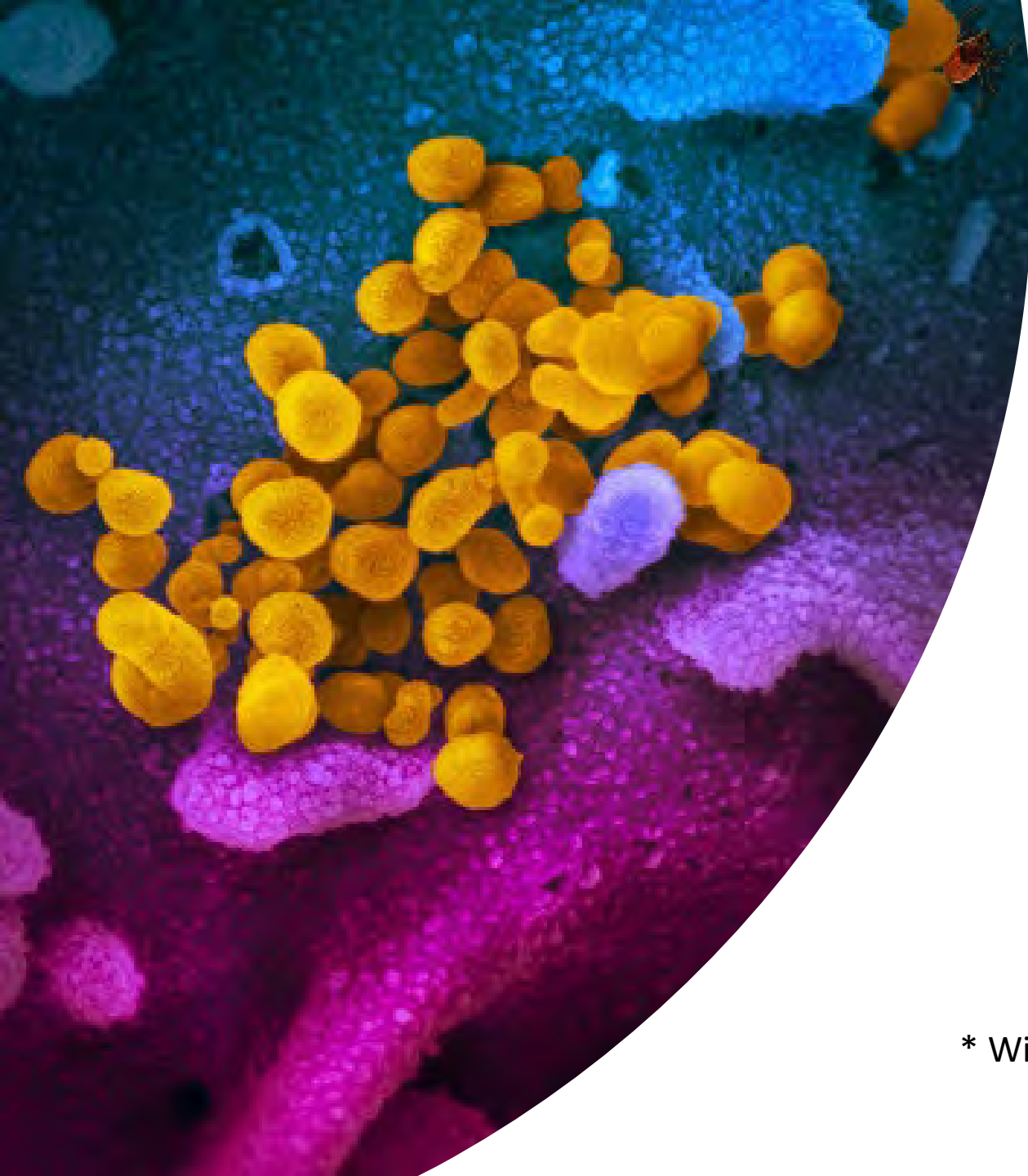
In the Meantime and Beyond.....

THE SWISS CHEESE RESPIRATORY VIRUS PANDEMIC DEFENCE

RECOGNISING THAT NO SINGLE INTERVENTION IS PERFECT AT PREVENTING SPREAD



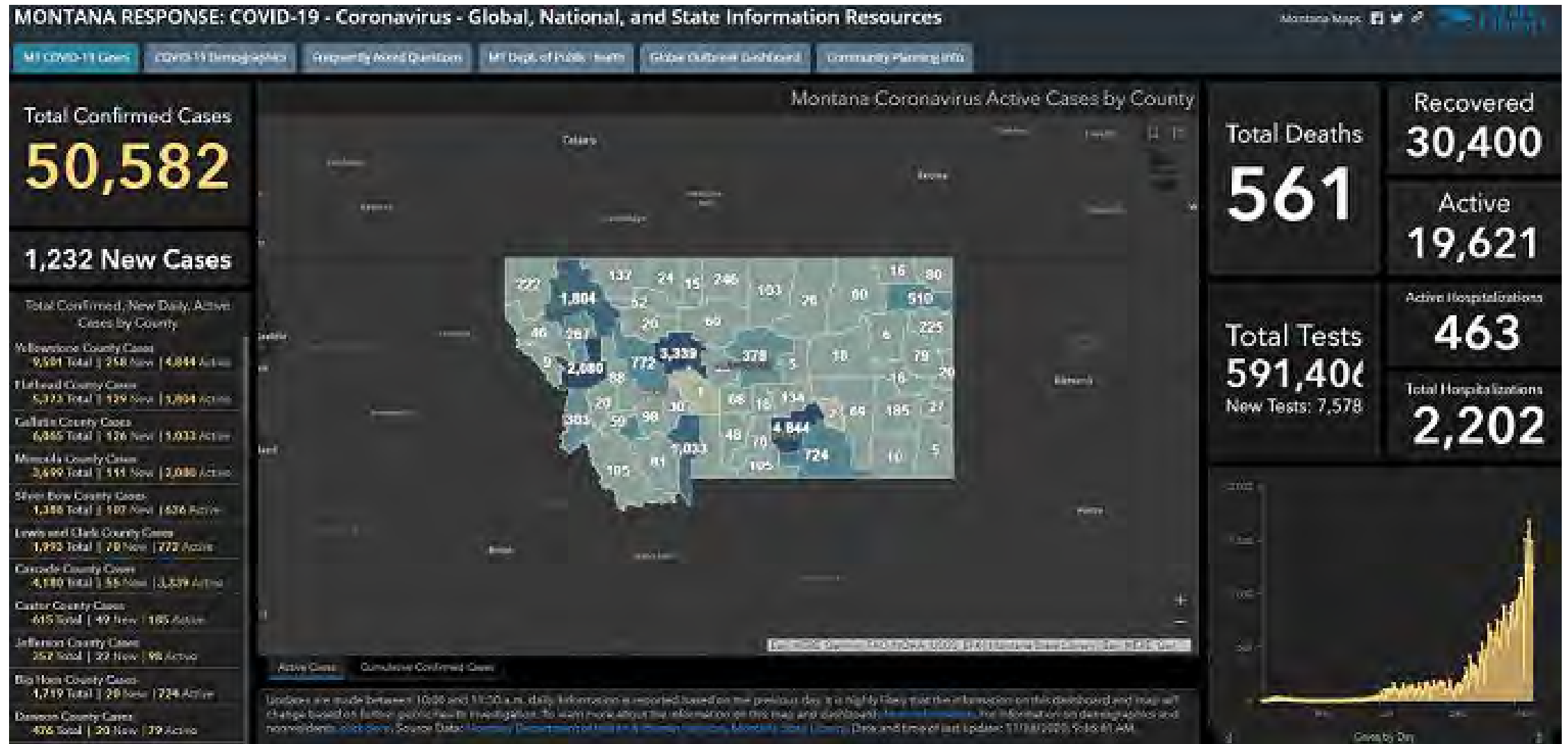
EACH INTERVENTION (LAYER) HAS IMPERFECTIONS (HOLES).
MULTIPLE LAYERS IMPROVE SUCCESS.



COVID-19: the country virus*

* With apologies to Aesop (Αἴσωπος)

COVID-19 Montana Dashboard – Weds., Nov 18



Credit: MT DHHS, MT State Library

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Find the latest updates
and information on the
COVID-19 pandemic at
www.bitterrootstar.com



'The Best at Local!'
Bitterroot Star



Volume XXXVI, Number 13

www.bitterrootstar.com

Wednesday, October 14, 2020

Plenty to go around



COVID numbers continue to soar

By Michael Howell

The pandemic is surging nationally, across the state and locally.

Last month the number of active COVID-19 cases in Ravalli County grew steadily from a low of three on September 8th to 23 active cases by the end of the month. Ten days later, on Friday, October 9, the number of active cases reported by the Ravalli County Health Department had grown to 65. The next day, an additional 24 new cases were added.

The usual minimal demographic information was lacking from this special report.

The valley's schools are feeling the impact as one after the other has closed for a short period over Covid-related incidents and implemented building sanitization procedures.

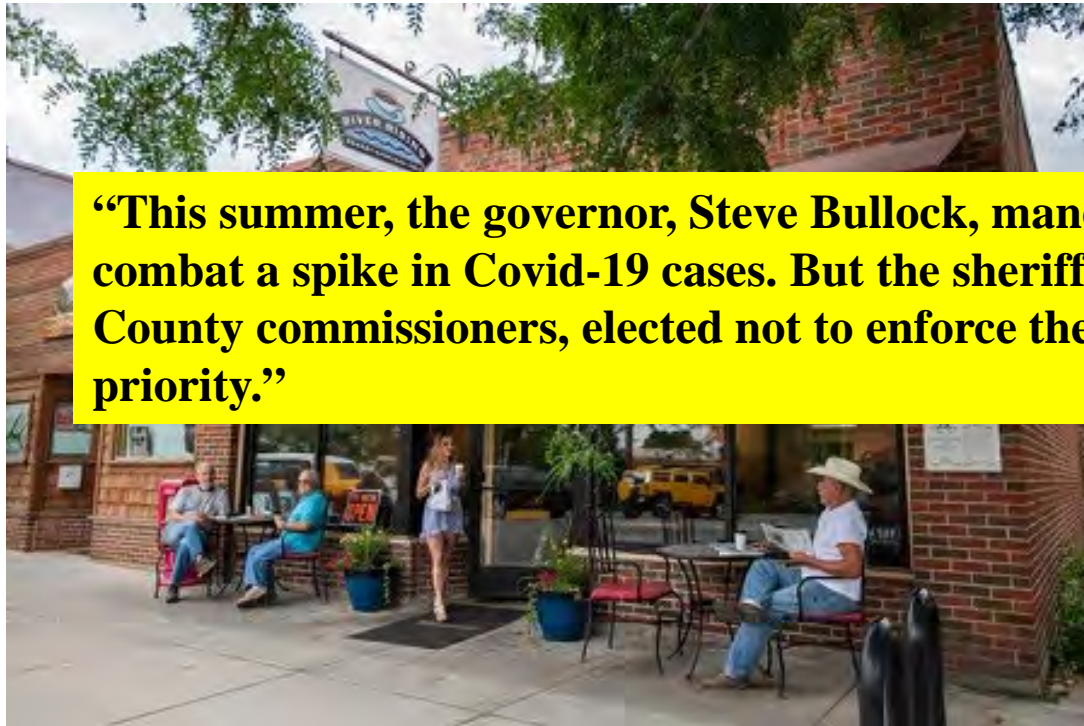
Hamilton High School was shut down last Thursday while some contact tracing took place over a recent case of COVID-19. School District Superintendent Tom Kunt said that it was their first time dealing with the County Public Health Department over a

“Mask Mandate? In a Montana Town, It ‘Puts Us at Odds With Customers’”
– *New York Times*, Oct. 19, 2020



“Mask Mandate? In a Montana Town, It ‘Puts Us at Odds With Customers’”

– New York Times, Oct. 19, 2020



“This summer, the governor, Steve Bullock, mandated face coverings in public spaces to combat a spike in Covid-19 cases. But the sheriff in Hamilton, backed up by the Ravalli County commissioners, elected not to enforce the order, saying individual rights took priority.”



Two County Health Officials Resign Over Local COVID-19 Response

by AARON BOLTON • JUL 20, 2020



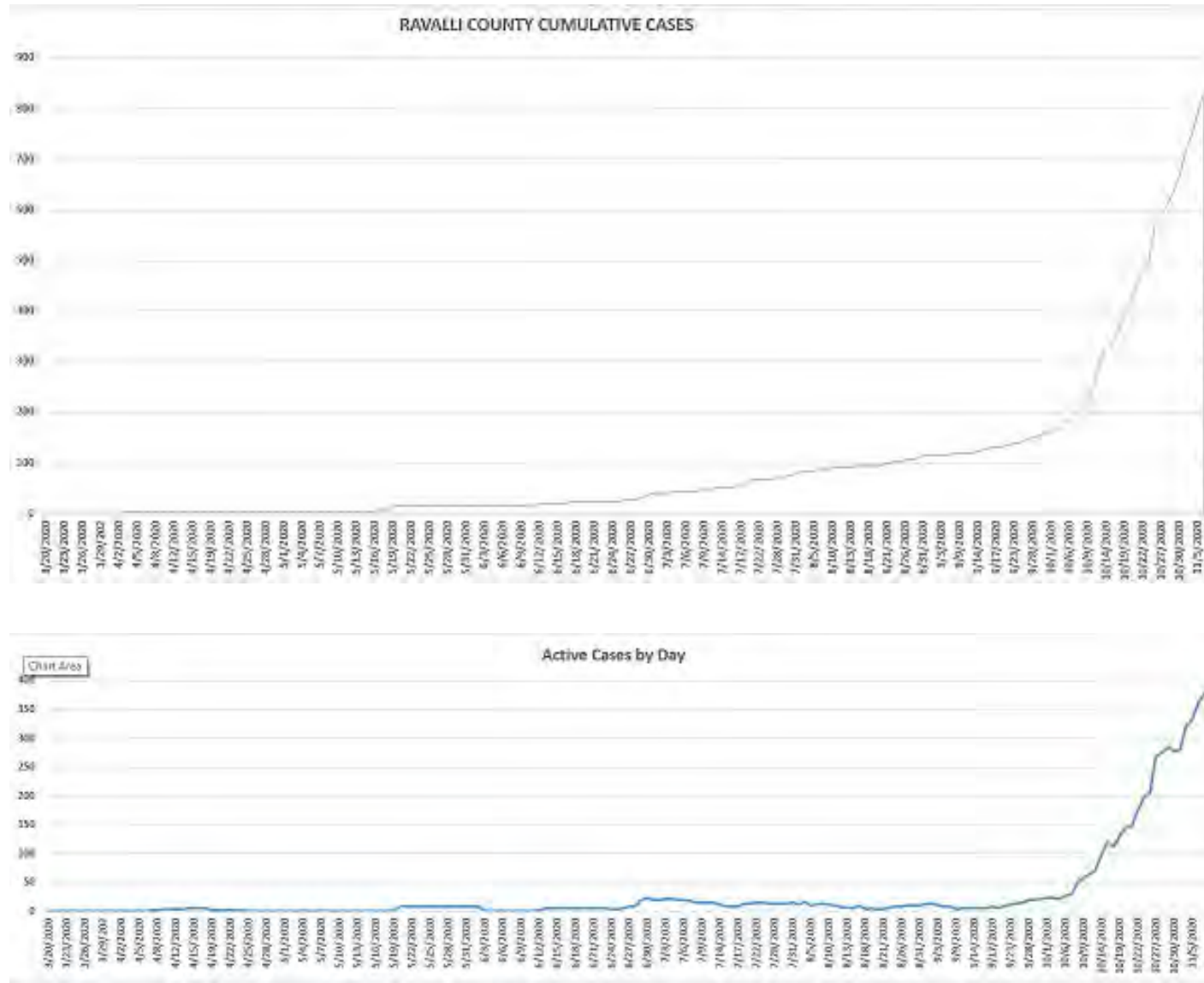
stock



Two Rural Health Officials Announce Resignations Over Local COVID-19 Response

Over the past month, health officers in two rural Montana counties have resigned over disagreements with county officials and residents over local coronavirus response plans.

Ravalli County COVID-19 timeline



Credit: Roger LaFerriere, RML/NIAID

Ravalli County: The Obvious Outcome

CORONAVIRUS ↗

A Montana County Is So Swamped by COVID They've Run Out of Teachers, Hospital Beds

'BRINK OF DISASTER'

"This is a real threat, and it is getting worse daily—there is no exaggeration in saying that," doctors in the mountainous Ravalli County wrote.



Pilar Melendez
Reporter

Updated Nov. 11, 2020 8:52PM ET | Published Nov. 11, 2020 5:15PM ET



Challenges for Underserved Rural and Urban communities

- Transportation
- Food deserts
- Education/Literacy
- Air quality
- Geography/Topography
- Housing
- Language preference
- Access to medical/hospital
- Poverty/Unemployment
- Structural Racism & Xenophobia
- Social isolation
- Physical violence
- Infrastructure (e.g, Broadband)
- Classism
- Homophobia

Challenges for Underserved Rural and Urban communities

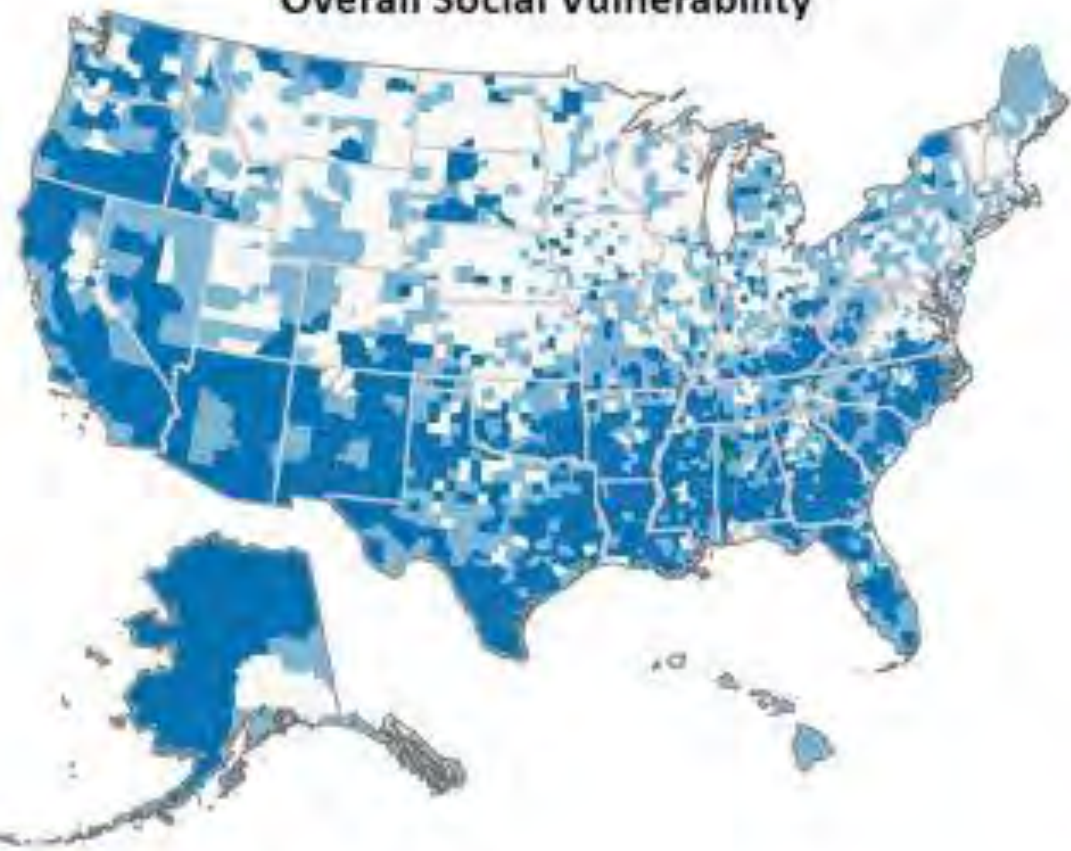
- Transportation
- Food deserts
- Employment
- These factors are combined into categories and ranked to define a "Social Vulnerability Index."
- Geography/Topography
- Housing
- Language preference
- Access to medical/hospital
- Poverty/Unemployment
- Structural Racism & Xenophobia
- Infrastructure (e.g, Broadband)
- Classism
- Homophobia



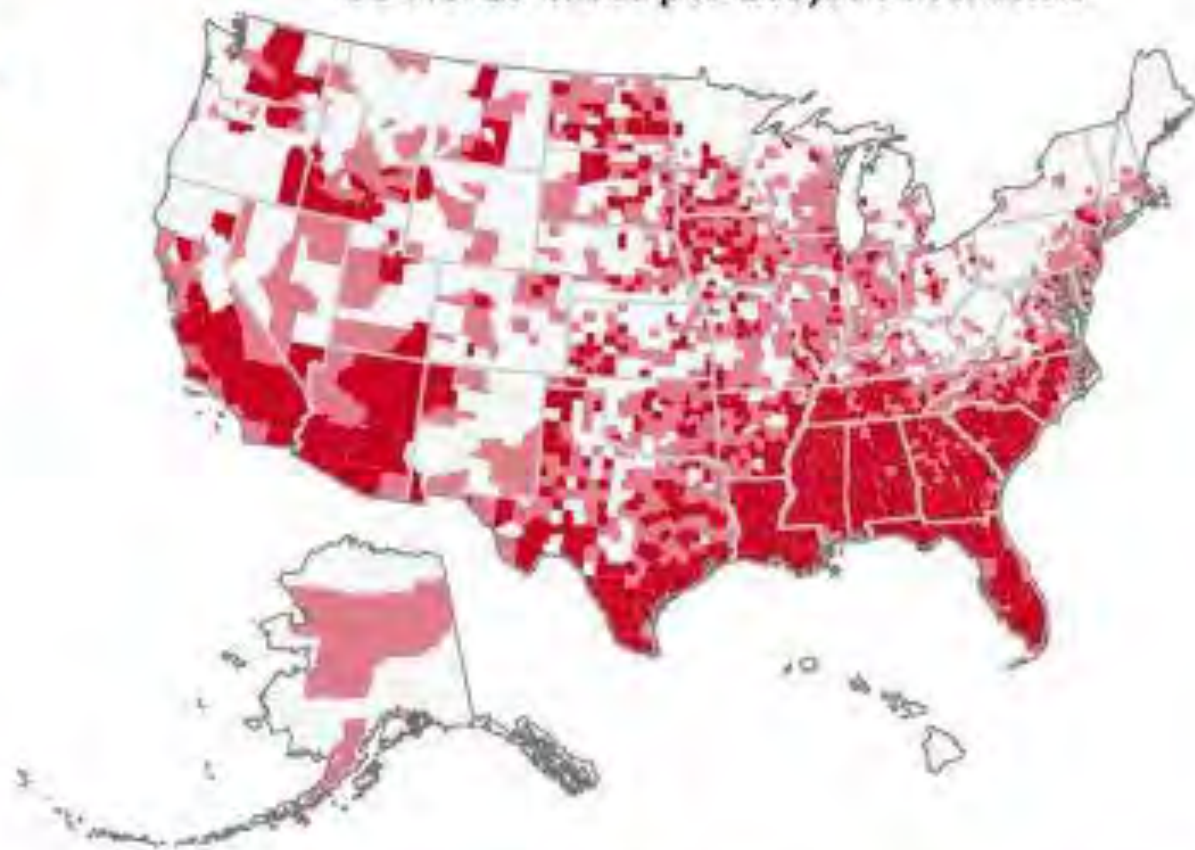
COVID-19 Incidence and Overall Social Vulnerability by U.S. County As of September 15, 2020



Overall Social Vulnerability



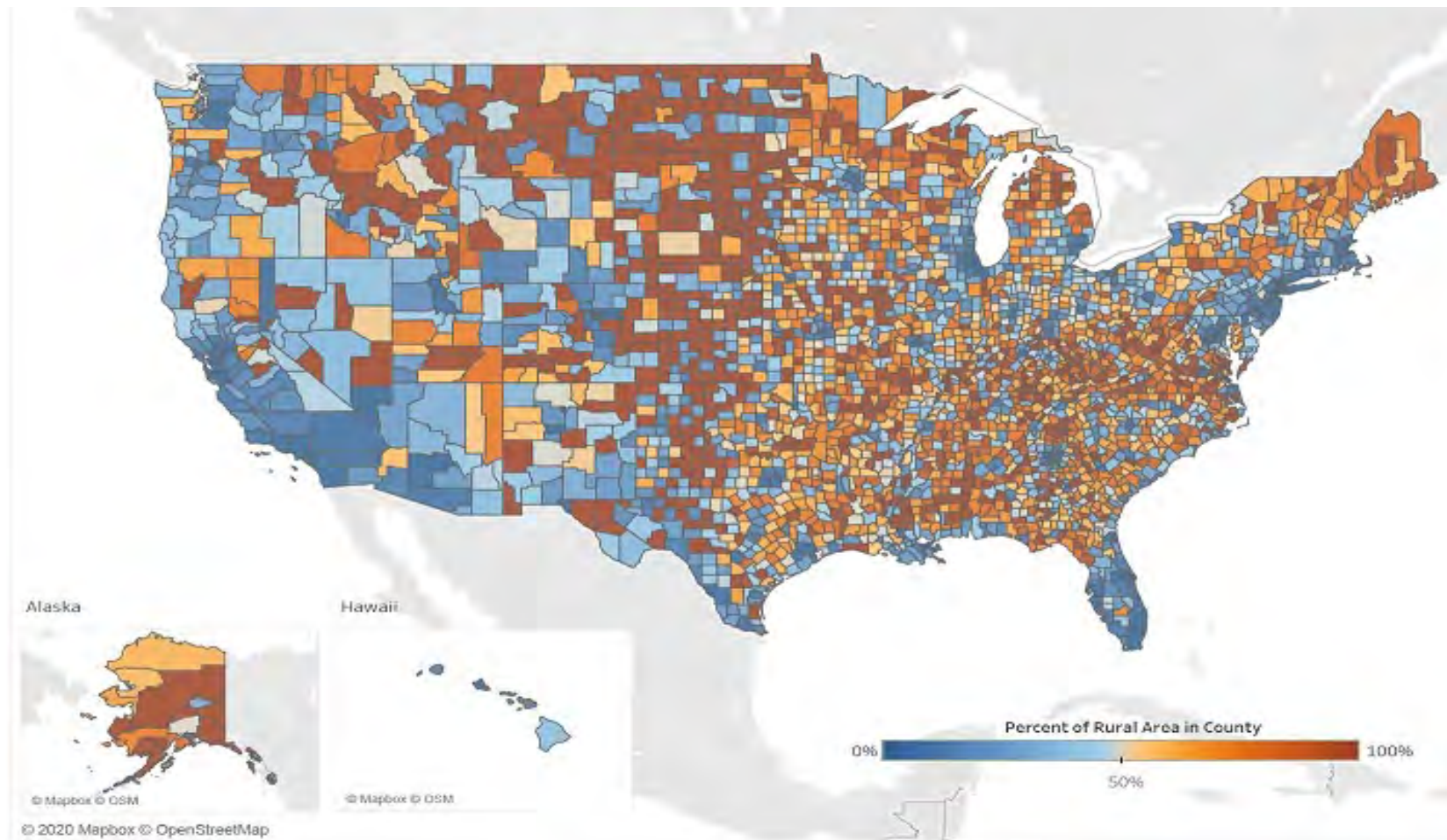
COVID-19 cases per 100,000 residents



Data sources:
COVID-19 case data from USA Facts, September 15, 2020
CDC SVI 2018 for the U.S. at county level

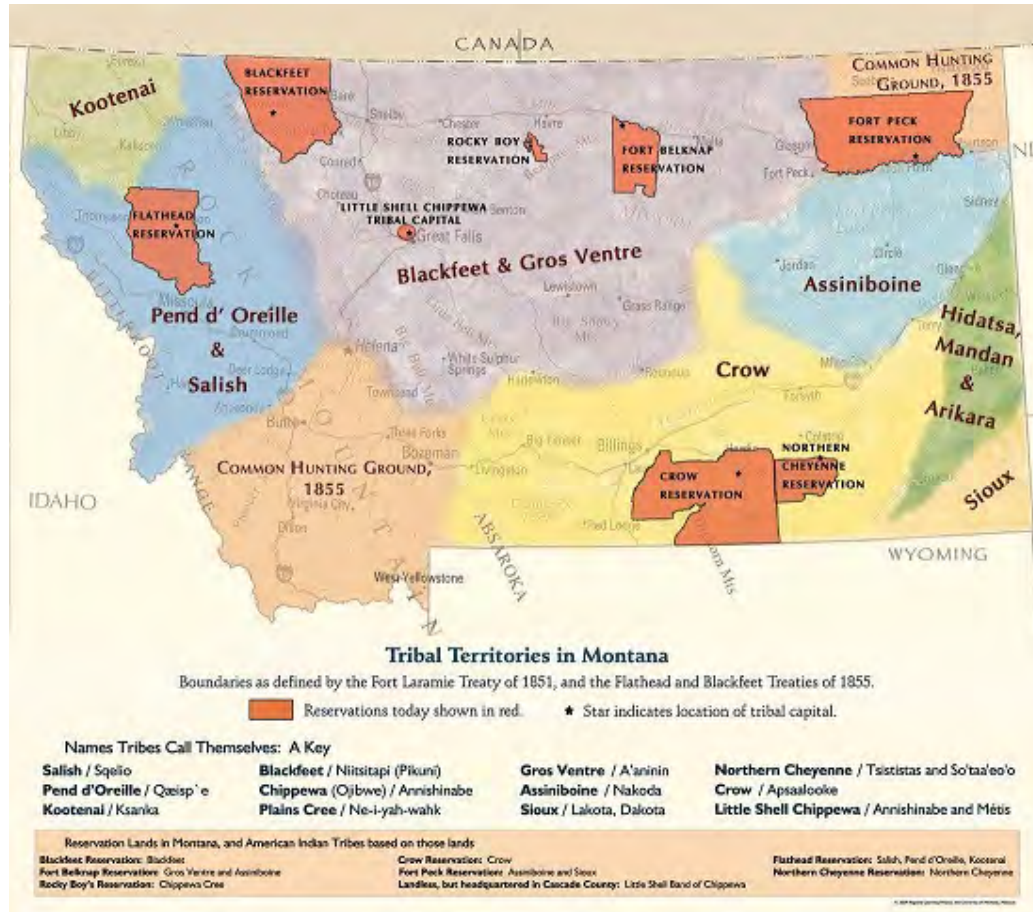
The distribution of confirmed COVID-19 cases is complex and depends on a combination of many interacting factors, including socioeconomic conditions, underlying health, healthcare access, and testing capacity, among others. A single variable, as shown on this map, is only part of the story and should be interpreted carefully.

Figure 4. Rurality by County in United States, 2019



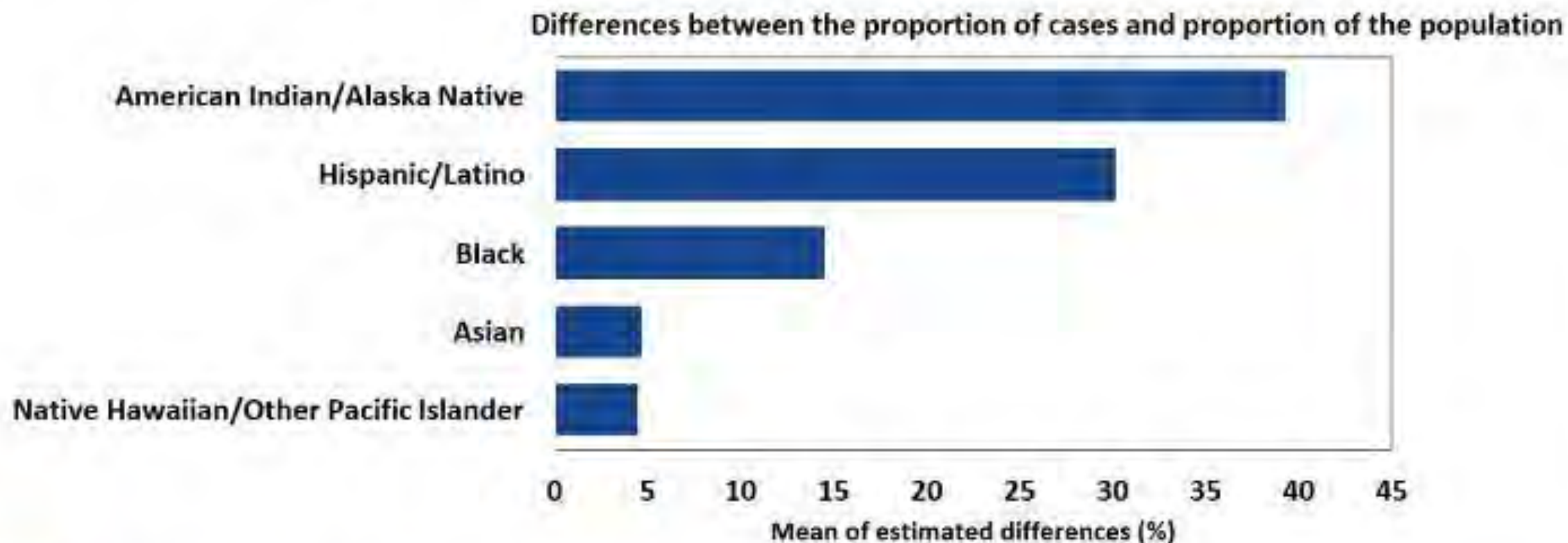
Source: Federal Communications Commission 2019 Fixed Broadband Deployment datafile. Notes: Rurality is defined by decennial census population at the county-level.

COVID-19 in Indian Country: A Devastating Impact



Northern Cheyenne Reservation, Sheridan, WY
Credit: Billings Gazette, Oct. 18, 2020.

Among 79 U.S. counties identified as a hotspot, June 5–18, 2020, 76 counties had a disproportionately high number of cases among racial and ethnic minority groups.



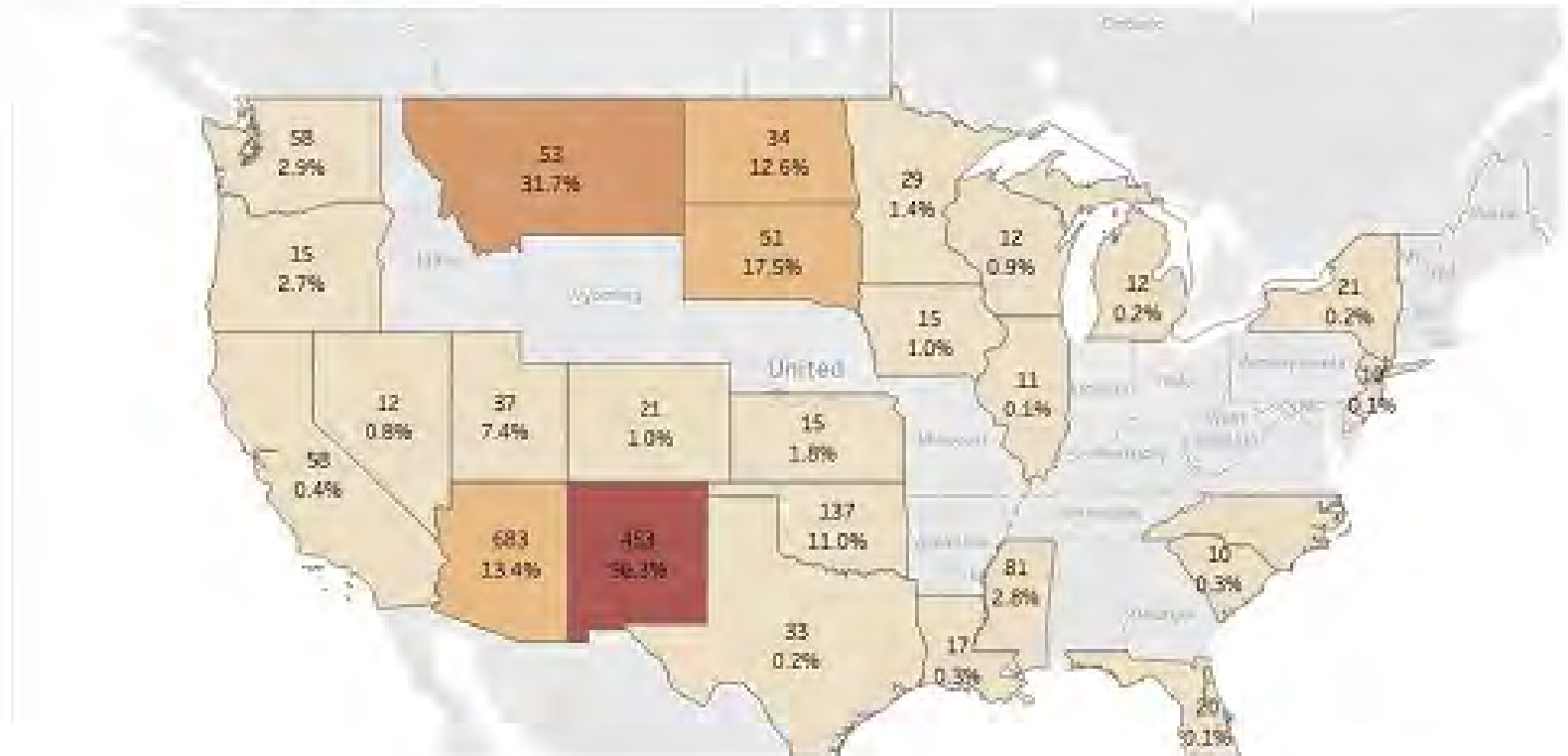
* The mean of the estimated differences between the proportion of cases in a given racial/ethnic group and the proportion of persons in that racial/ethnic group in the overall population among all counties with disparities identified by the analysis.

Moore et al, COVID-19 State, Tribal, Local, and Territorial Response Team, August 2020 <https://www.cdc.gov/mmwr/volumes/69/wr/mm6933a1.htm>



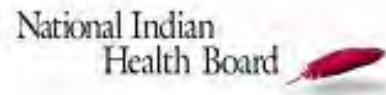
COVID-19 in Indian Country: A Devastating Impact

CDC Provisional Death Count of AI/AN, 2,039 reported on October 14, 2020, Number and % of Total Deaths that are AI/AN Deaths.



Credit: National Indian Health Board, Oct. 15, 2020.

COVID-19 in Indian Country: "*the enemy that can't be seen*" *



August 6, 2020

The Honorable Donald J. Trump
President of the United States
The White House
1600 Pennsylvania Ave NW
Washington DC, 20500

Re: Tribal COVID-19 Health Policy Priorities

Dear President Trump,

On behalf of the National Indian Health Board (NIHB), and the 574 sovereign federally-recognized American Indian and Alaska Native (AI/AN) Tribal Nations we serve, we write to urge you to prioritize the following Tribal health policy priorities as your Administration works with Congress on this next COVID-19 pandemic relief package. We also request that your Administration use these Tribal COVID-19 health policy priorities as the agenda for the next regularly scheduled bi-weekly White House teleconference on COVID-19 with Tribal leaders and officials, next scheduled for Thursday August 13, 2020. The Tribal COVID-19 health policy priorities we urge your Administration to prioritize and advance in negotiations with Congress are as follows:

Minimum \$1 billion investment in water and sanitation/sewage infrastructure across Indian and Tribal health clinics and Tribal Communities

Approximately 6% of AI/AN households lack running water and sewage, compared to less than 1% of households nationwide.¹ On Navajo Nation, roughly 30% of homes lack access to a municipal water supply, making the cost of water for Navajo households roughly 71 times higher than in urban areas. In Alaska, over 3,300 rural Alaskan homes across 30 predominately Alaskan Native Villages lack running water and sewage, forcing use of "honey buckets," a five gallon paint bucket with a toilet seat, that are disposed in environmentally hazardous sewage lagoons. Honey buckets are also used in some clinics!

Special problems

- Scattered populations, multi-generational housing
- Lack of municipal water supplies
- Lack of adequate sewage infrastructure
- Lack of communication and connectivity
- Serious co-morbidities, e.g., obesity, diabetes, poverty
- Strained tribal health resources
- CARES Act funding

* Credit: Billings Gazette, Oct. 18, 2020

COVID-19 in Indian Country: "*the enemy that can't be seen*" *

"...many great resources from the state and federal level, but this has to be dealt with on the community level,.... we just have to wait until the enemy passes."

- Lane Spotted Elk, Northern Cheyenne Tribal Council*

Dear President Trump,

On behalf of the National Indian Health Board (NIHB), and the 574 sovereign federally-recognized American Indian and Alaska Native (AI/AN) Tribal Nations we serve, we write to urge you to prioritize the following Tribal health policy priorities as your Administration works with Congress on this next COVID-19 pandemic relief package. We also request that your Administration use these Tribal COVID-19 health policy priorities as the agenda for the next regularly scheduled bi-weekly White House teleconference on COVID-19 with Tribal leaders and officials, next scheduled for Thursday August 13, 2020. The Tribal COVID-19 health policy priorities we urge your Administration to prioritize and advance in negotiations with Congress are as follows:

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- Strained tribal health resources
- CARES Act funding

* Credit: Billings Gazette, Oct. 18, 2020

COVID-19 in Indian Country: "*the enemy that can't be seen*"

"We look at what happened to our people all those years back, when the small pox came through. There are so many things going on now that parallel what happened back then."

– Scott Kipp, Jr., Blackfeet Tribal Council Vice Chair*

Indian and Alaska Native (AI/AN) Tribal Nations we serve, we write to urge you to prioritize the following Tribal health policy priorities as your Administration works with Congress on this next COVID-19 pandemic relief package. We also request that your Administration use these Tribal COVID-19 health policy priorities as the agenda for the next regularly scheduled bi-weekly White House teleconference on COVID-19 with Tribal leaders and officials, next scheduled for Thursday August 13, 2020. The Tribal COVID-19 health policy priorities we urge your Administration to prioritize and advance in negotiations with Congress are as follows:

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connectivity

- Serious co-morbidities, e.g., obesity, diabetes, poverty
- Strained tribal health resources
- CARES Act funding

* Credit: KPAX.com, Nov. 15, 2020

COVID-19 devastating

Country: a



Rotting Face

Smallpox and the
American Indian



R. G. Robertson



Reservation, Sheridan, WY
, Oct. 18, 2020.

Acknowledgements.

- Dr. Anthony Fauci, Director NIAID
- Greg Folkers, NIAID
- Ms. Susie Parsons, OSM, RML, DIR, NIAID
- Steve Bullock, Governor of Montana
- Dr. Greg Holzman, Montana State Health Officer
- Colleagues in Montana Department of Health & Human Services
- Friends in several Montana Tribal Nations
- I am supported by the NIAID Division of Intramural Research (DIR).

Acknowledgements.

- Dr. Anthony Fauci, Director
- Greg Folkers, NIAID
- Ms. Susie Parsons, OIA
- Steve Bullock, Governor
- Dr. Greg Holzman, MCH
- Colleagues in Montana
- Friends in several Montana communities
- I am supported by the



Human Services

Medical Research (DIR).