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 Rocky Mountain Spotted Fever
1942 Yellow Fever
2009 Ebolavirus
2012 MERS pandemic
RML: A Century of Basic and Applied Infectious Disease Research

1907
Rocky Mountain Spotted Fever

1942
Yellow Fever

2009
Ebolavirus

2014 West African ebolavirus pandemic
RML: A Century of Emerging Infectious Disease Research

1907  Rocky Mountain Spotted Fever
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2009  Ebolavirus
2016  zikavirus pandemic
RML: A Century of Emerging Infectious Disease Research

1907  Rocky Mountain Spotted Fever
1942  Yellow Fever
2009  Ebolavirus
2020 COVID-19 pandemic

National Institute of Allergy and Infectious Diseases
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
COVID-19: the city virus*

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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

AS Fauci/NIAID
Coronavirus Phylogenetic Tree

Human coronaviruses

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

Credit: CDC
Middle East Respiratory Syndrome (MERS) (2012–present)

Credit: CDC
Coronavirus Disease 2019 (COVID-19) (December 2019 – Present)
Where did COVID-19 Originate?

Pangolin?

Horseshoe bat?
COVID-19 World Dashboard – Thurs., Nov. 19
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

Multiple sources: WHO, NEJM
Spectrum of Disease Among 44,672 Individuals with Confirmed COVID-19, China

- Mild/Mod: 81%
- Severe: 14%
- Critical: 5%

Case-fatality rate: 2.3%

COVID-19 Medical Countermeasures......

• Diagnostics
• Vaccines
• Monoclonal antibodies
• Blood derived products
• New antiviral drugs
• Repurposed drugs
• Immunomodulators
• Adjunct therapies
In the Meantime and Beyond......

COVID-19: the country virus*

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COVID-19 Montana Dashboard – Weds., Nov 18

Total Confirmed Cases: 50,582
1,232 New Cases

Total Deaths: 561
Recovered: 30,400
Active: 19,621
Active Hospitalizations: 463
Total Tests: 591,406
New Tests: 7,578
Total Hospitalizations: 2,202

Credit: MT DHHS, MT State Library
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 sanitation 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 Korn said that it was their first time dealing with the County Public Health Department over a public health scenario, and their
“Mask Mandate? In a Montana Town, It ‘Puts Us at Odds With Customers’”
“Mask Mandate? In a Montana Town, It ‘Puts Us at Odds With Customers’”

“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

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: The Obvious Outcome

Coronavirus

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

"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 5:18PM ET

Credit: The Daily Beast, Nov. 11, 2020
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

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These factors are combined into categories and ranked to define a “Social Vulnerability Index.”

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
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.

Differences between the proportion of cases and proportion of the population

- American Indian/Alaska Native
- Hispanic/Latino
- Black
- Asian
- Native Hawaiian/Other Pacific Islander

* 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/mm6933e1.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.

COVID-19 in Indian Country: “the enemy that can’t be seen”*

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*

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

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

“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*

Approximately 60% of AI/AN households lack running water and sewage, compared to less than 1% of households nationwide. In Navajo Nation, roughly 30% of homes lack access to a municipal water supply, making the cost of water for Navajo households roughly 21 times higher than in urban areas. In Alaska, over 3,000 rural Alaska Native 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!
COVID-19 in Indian Country: a devastating impact

Northern Cheyenne Reservation, Sheridan, WY

Rotting Face
Smallpox and the American Indian

R. G. Robertson
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