

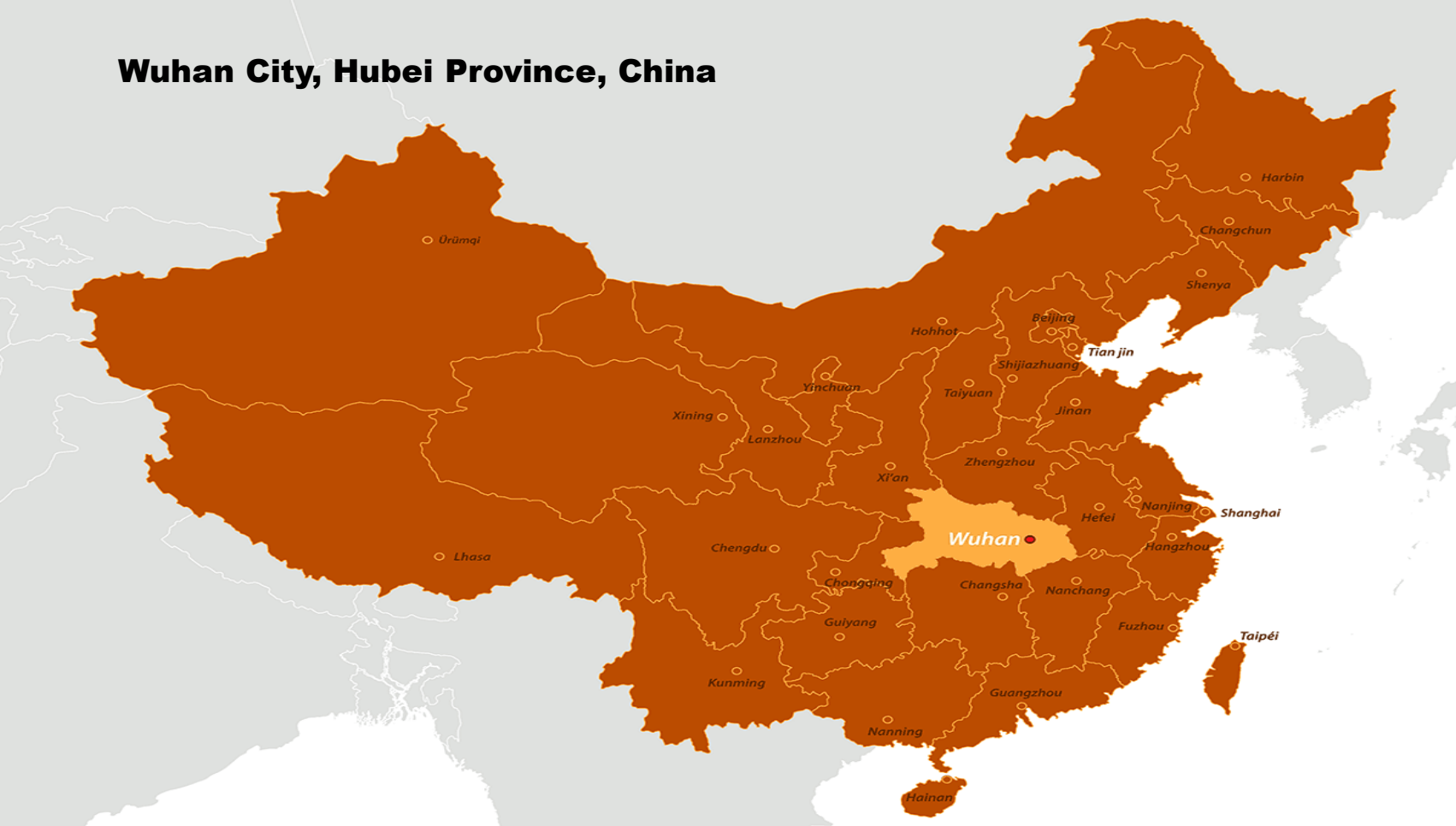


Alumni  
Exchange

# COVID-19: Looking Back and Looking Forward

Ronald C. Hershov, MD  
Director, Epidemiology & Biostatistics  
UIC School of Public Health  
September 30, 2020

# Wuhan City, Hubei Province, China



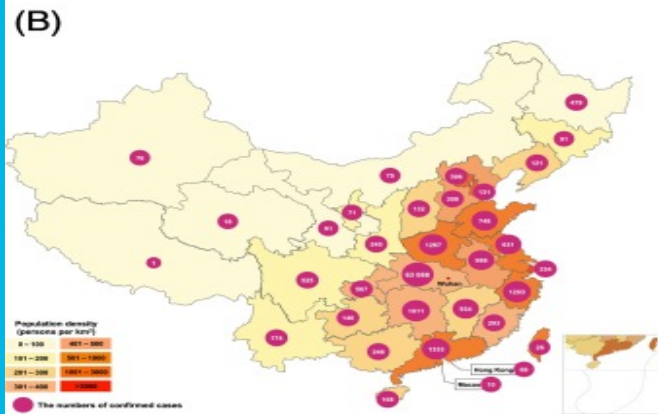
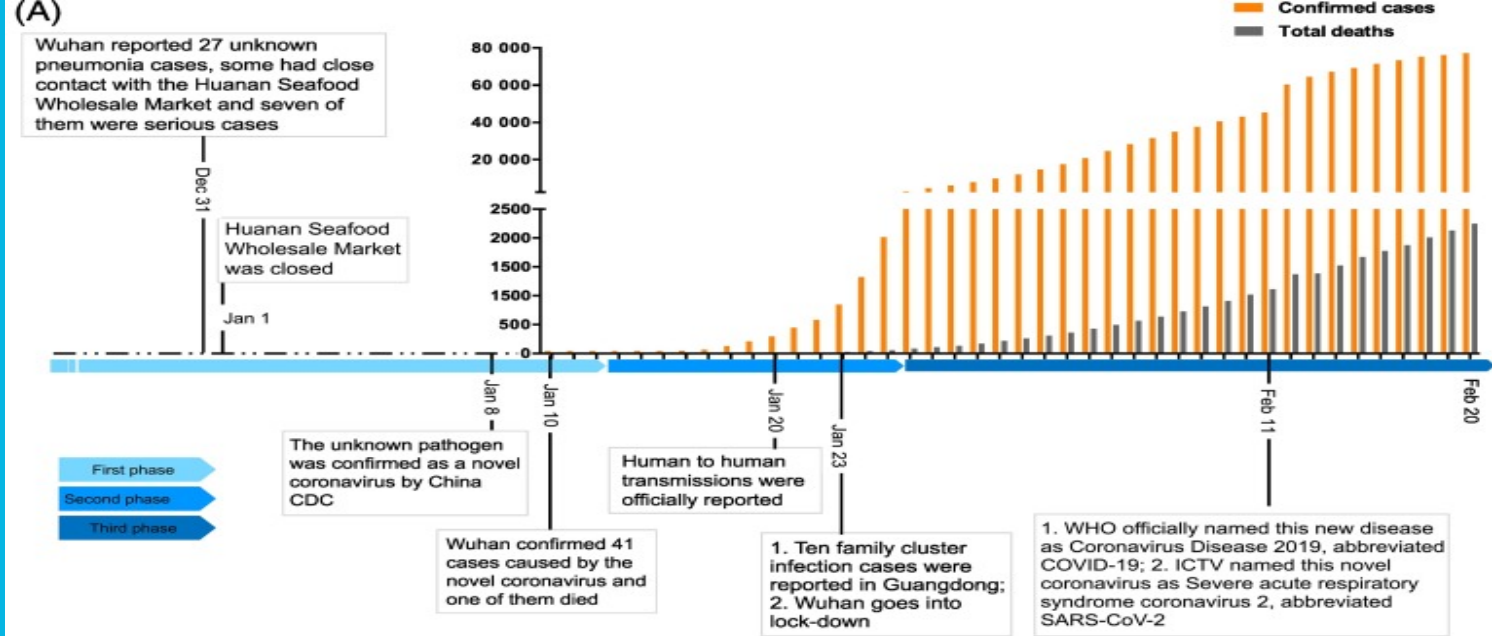


Alumni  
Exchange

# Early Descriptions of the Wuhan Epidemic

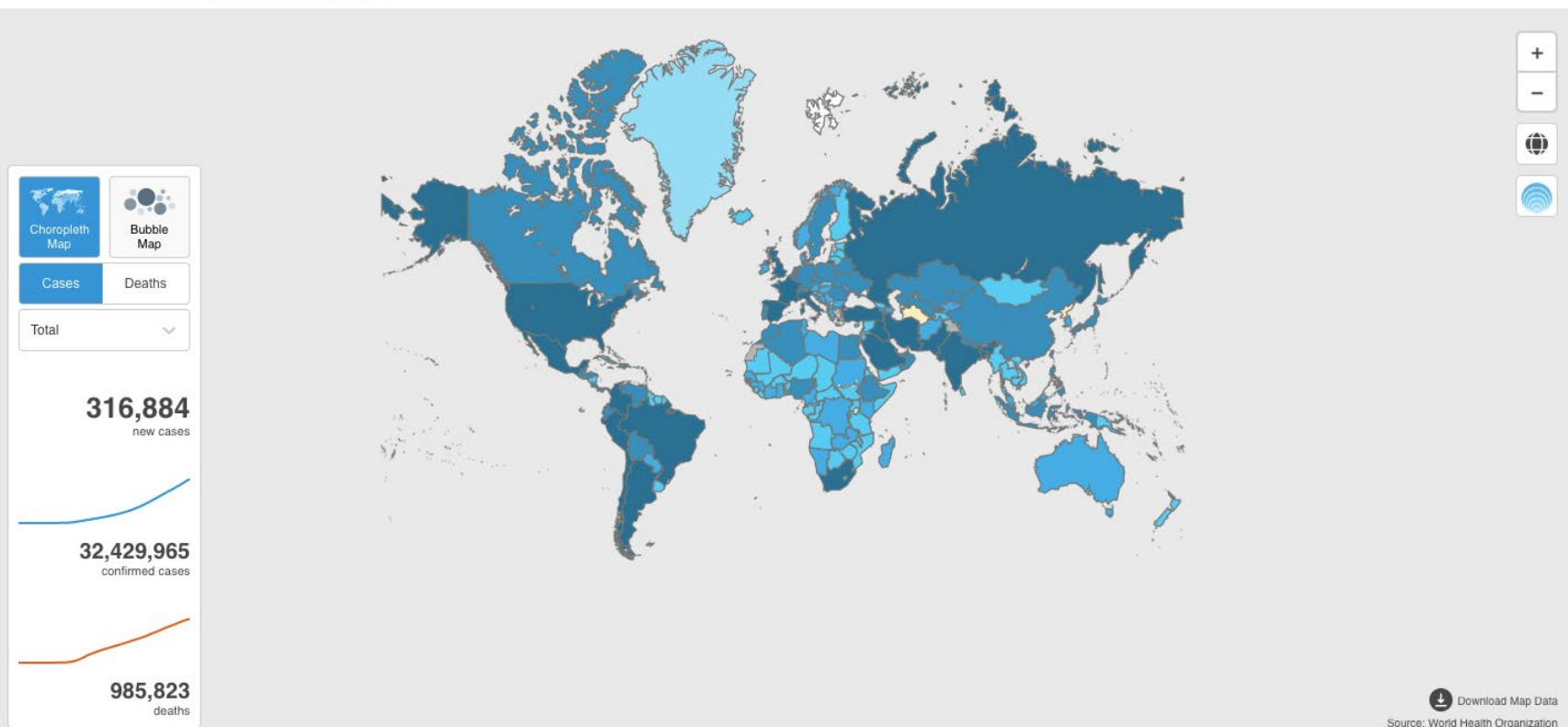
**Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study @Lancet**

- 49/99 (49%) had a history of exposure to the Huanan seafood market.
- Average age was 55.5 years (SD 13.1), including 67 M & 32 F
- Manifestations
  - Fever (82 [83%] patients)
  - Cough (81 [82%] patients)
  - Shortness of breath (31 [31%] patients)
  - Muscle ache (11 [11%] patients)
  - Confusion (nine [9%] patients)
  - Headache (eight [8%] patients),



## WHO Coronavirus Disease (COVID-19) Dashboard

Data last updated: 2020/9/26, 2:15pm CEST

[Overview](#)[Data Table](#)[Explore](#)[Download Map Data](#)

Source: World Health Organization

Globally, as of **2:15pm CEST, 26 September 2020**, there have been **32,429,965 confirmed cases** of COVID-19, including **985,823 deaths**, reported to WHO.



USA

7,009,216

TOTAL CASES

+50,584 New Cases

CDC | Updated: Sep 26 2020

12:16PM

USA

203,180

TOTAL DEATHS

+851 New Deaths

CDC | Updated: Sep 26 2020

12:16PM

USA

303,792

Cases in Last 7 Days

CDC | Updated: Sep 26 2020

12:16PM

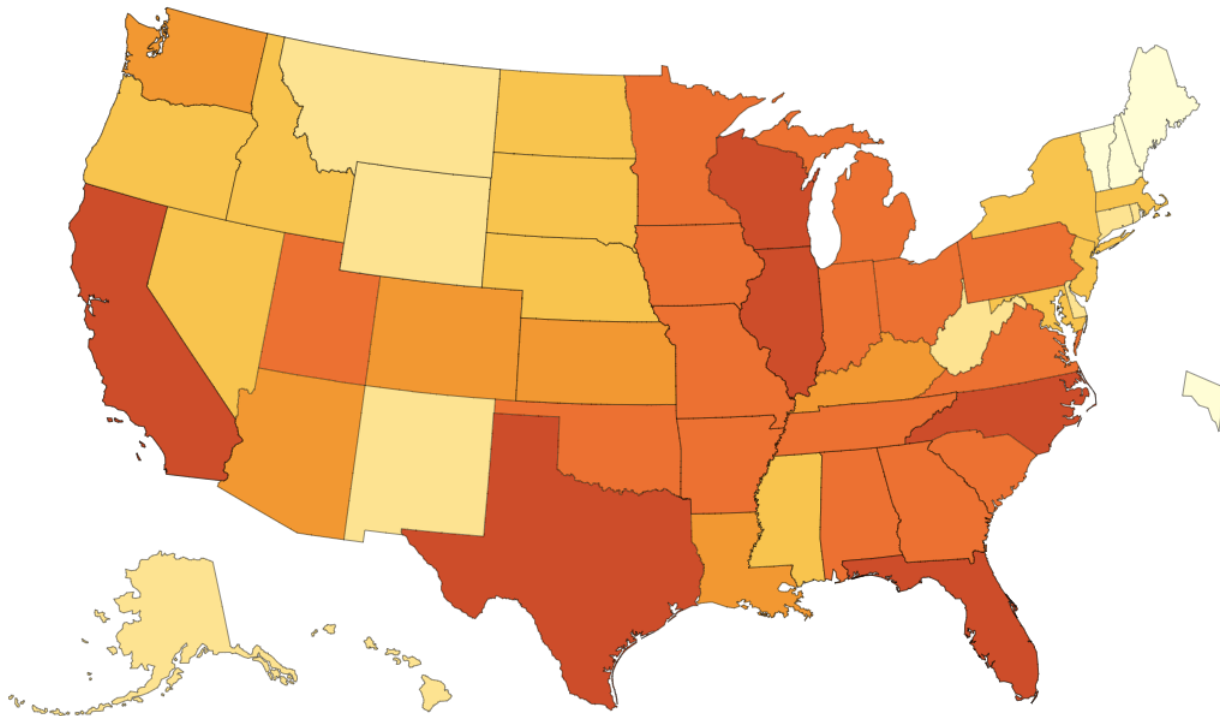
Cases in Last 7 Days by State/Territory



State/Territory	Cases in Last 7 Days
Texas	41,678
California	24,209
Florida	17,073

Cases in Last 7 Days	Total Cases	Cases per 100,000	Deaths in Last 7 Days	Total Deaths	Deaths per 100,000
----------------------	-------------	-------------------	-----------------------	--------------	--------------------

US COVID-19 Cases Reported to the CDC in the Last 7 Days, by State/Territory



Territories

AS	FSM	GU	MP	PR	PW	RMI	VI
----	-----	----	----	----	----	-----	----



# COVID-19 Health Inequalities

Alumni  
Exchange

- African American, Latin-X, and American Indian populations bear a disproportionate burden of Incidence, hospitalization, and death
- These populations experience rates of hospitalization 4.5-5.5 times higher than whites
- UIC Chi-Tracers Program will attempt to ameliorate these disparities.



Alumni  
Exchange

# Postulated Causes of Higher Death Rates in Communities of Color

- Lack of access to health care and health insurance results in higher prevalence of less well-controlled chronic illnesses
- Obesity, hypertension, diabetes, chronic obstructive pulmonary disease leads to higher risk of death
- Non-medical threats to health are also higher: food and housing insecurity, toxic environmental exposures
- Riskier jobs including providing care at long-term care facilities
- More likely to get care in safety-net facilities that may be overwhelmed by COVID-related surges in demand for acute care

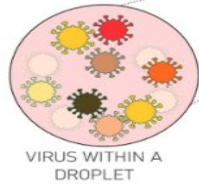
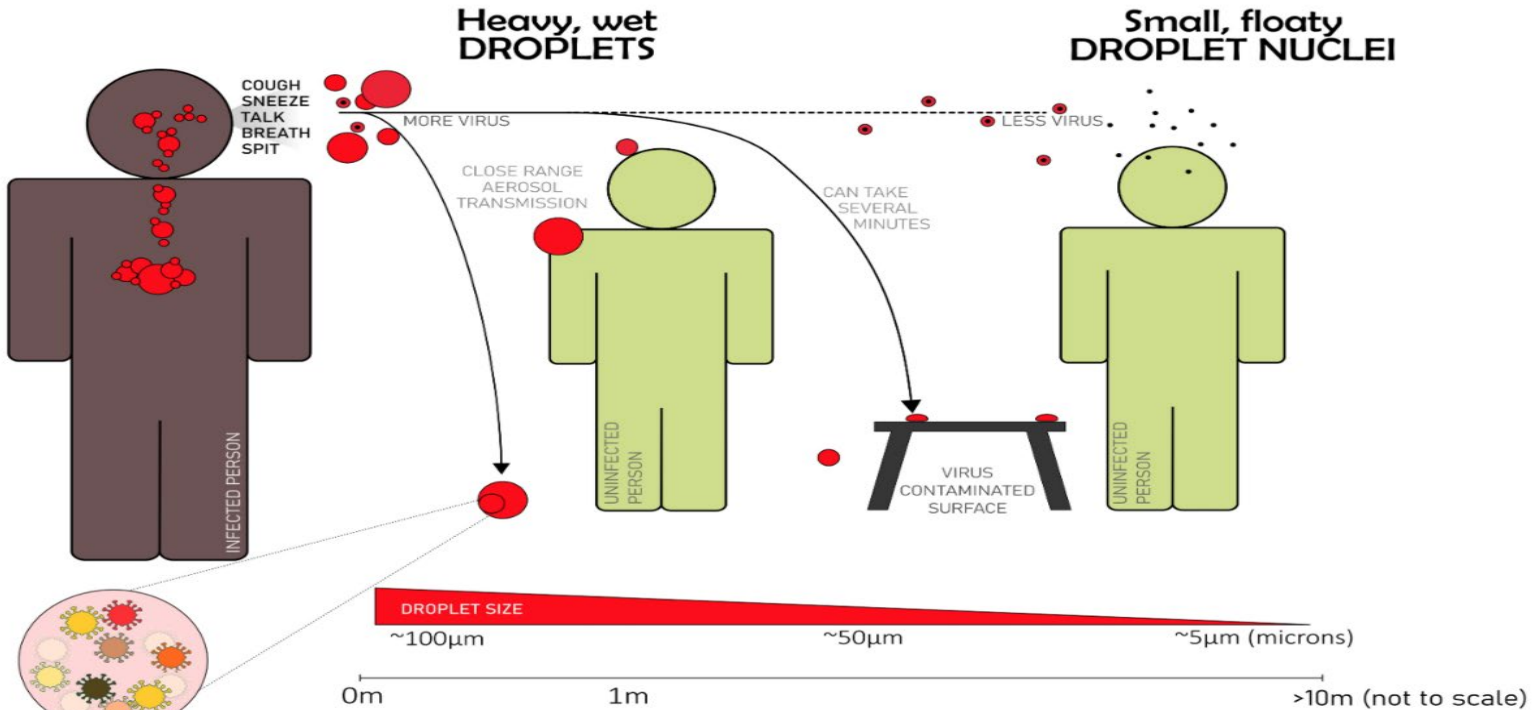




Alumni  
Exchange

# Explosive Growth in Knowledge: Transmission

- Early in the pandemic: Droplet Transmission and Fomite Transmission thought to be pre-eminent modes of transmission
- Currently: Fomites not a major mode of transmission, Droplet Transmission still important and growing evidence that smaller aerosols play a major role in transmission.



measles virus (measles) influenza virus (flu) rhinovirus (common cold) MERS-coronavirus (MERS)	PROBABLY
? novel coronavirus (2019-nCoV ARD)	PROBABLY NOT YET CLEAR

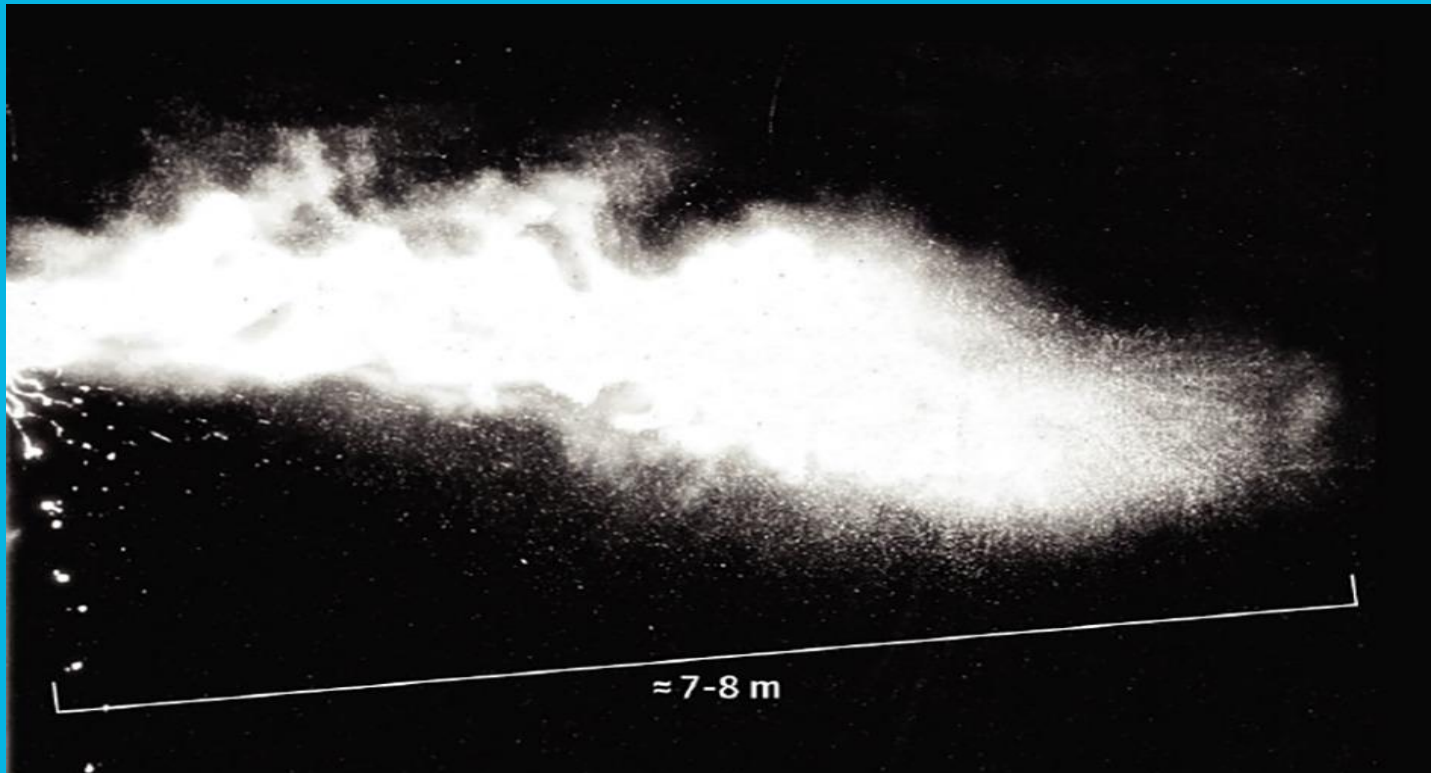
**Short range still imaging of stages of sneezing, revealing the liquid droplets from the 1942 Jennison experiment.<sup>5</sup> Reproduced with permission .**



Nicholas R Jones et al. BMJ 2020;370:bmj.m3223



Long range video imaging over 8 m of the multiphase turbulent cloud (gas cloud containing liquid droplets of all sizes) from natural human violent emission such as a sneeze, revealing a range of the cloud, and its droplet concentrated payload, of up to 7-8 m.



Nicholas R Jones et al. BMJ 2020;370:bmj.m3223



# Growing Evidence for Aerosol Transmission



Alumni  
Exchange

- Droplets are important in coughing and sneezing, but growing evidence suggests that in activities like talking, aerosols may be more important
- Contextual factors play a role: ventilation, indoor vs outdoor
- Studies of clusters suggest a role for aerosolization
  - Choir practice: 1 symptomatic person transmitted to 32
  - Other clusters in fitness gyms, boxing matches, call centres, churches (singing, panting, talking loudly)
- Regardless, distance is still important: smoke analogy

Home / News / Health News

# CDC Takes Down Guidance on Airborne Coronavirus Transmission

The agency said the guidance, which was quietly issued on Friday, was a draft version of proposed changes that was posted in error.

By **Cecelia Smith-Schoenwalder**, Staff Writer Sept. 21, 2020, at 2:26 p.m.



# Inconsistent Guidance From CDC



Alumni  
Exchange

- Friday Sept 18<sup>th</sup>: CDC website updated:
  - “growing evidence that droplets and airborne particles can remain suspended in the air and be breathed in by others, and travel distances beyond 6 feet (for example, during choir practice, in restaurants, or in fitness classes)... This is thought to be the main way the virus spreads.”
- Monday, September 21<sup>st</sup>: Reverts to old guidance: “virus is spread mainly from person-to-person” and does not mention the possibility of it being airborne.
- WHO acknowledged increasing evidence about airborne transmission in July, but has maintained its stance the virus is primarily spread by large droplets that are emitted through coughs and sneezes.



Alumni  
Exchange

# The Importance of Facial Masking

- At first, US recommendations did not include the need for facial masking
- Use in China and other Asian countries suggested efficacy
- Asymptomatic and pre-symptomatic transmission were important transmission drivers
- Asymptomatic infection was estimated to occur 40% of the time with viral shedding equivalent to symptomatic persons
- Universal facial masking seen as way of interrupting asymptomatic transmission



# Potential Additional Rationale for Facial Masking: “Variolation”



Alumni  
Exchange

- Hypothesized that masking, in addition to reducing transmission, may reduce the severity of COVID-19 in those infected despite mask wearing
- Ingrained theory that the severity of a disease is related to the size of the viral inoculum received
  - High dose of COVID-19 can overwhelm and dysregulate the immune system
- Masking can reduce the inoculum size
- The Variolation hypothesis holds that by reducing inoculum size, milder or asymptomatic infection will result from COVID-19 acquired through a mask

# Evidence for the Variolation Hypothesis



## Alumni Exchange

- Animal model: Syrian Hamster- simulated mask wearing, less likely to be infected, but if infected had milder disease than non-mask wearing hamsters
- Argentinian cruise ship – passengers provided with surgical masks: rate of asymptomatic infection 81%, vs 20% in previous outbreaks w/o universal masking
- Food processing plants: employees issued masks, > 500 became infected, (95% asymptomatic)
- Moreover, evidence emerging that even asymptomatic infection, induces strong cell-mediated immunity
- Needed studies: Studies comparing the strength and durability of immune response in persons with asymptomatic vs symptomatic infection

A photograph of a protest held in front of a large, white, domed state capitol building. The central focus is a large, white, rectangular sign with handwritten text. The word 'FREEDOM' is written in red, while 'NO LOCKDOWN MASKS TESTS VACCINE' is written in blue. The sign is held by a person whose back is to the camera. To the left, another person in a blue cap and white shirt is visible. In the background, there are several American flags and other protesters. The scene is set outdoors on a clear, sunny day.

**FREEDOM**  
**NO**  
**LOCKDOWN**  
**MASKS**  
**TESTS**  
**VACCINE**



Alumni  
Exchange

# Vaccine Update

- Several ongoing coronavirus-vaccine trials could announce game-changing results next month
- Public concern that political pressure could lead to the premature approval of vaccine
- AstraZeneca, Pfizer, and Moderna released their protocols describing how tests are being conducted

# Concerns about the Role of Politics



Alumni  
Exchange

- Pew Research survey shows that proportion willing to receive an available vaccine decreased from 72% in May to 51% in September
- Three quarters thought the U.S. would approve a vaccine before safety and efficacy established
- Prior FDA-issued EUAs for hydroxychloroquine and convalescent plasma fuel skepticism, Framing as “Warp Speed” unfortunate
- Vaccine trial protocol for the Pfizer vaccine allows for early evaluation of results after just 32 infection events.
  - Although efficacy measurable at that point, safety and duration of protection cannot be measured
- ? Public hearing for EUA determinations for vaccines



Alumni  
Exchange

## Concerns about Adverse Events

- Media reports transverse myelitis in the AstraZeneca (AZ) trial, AZ releases no data on participant condition or receipt of vaccine vs placebo
- AZ admits to a second, earlier case with symptoms of transverse myelitis (participant subsequently diagnosed with MS)
- Maintaining confidentiality vs lack of transparency and loss of public confidence
- Plans for robust, longer-term, post licensure vaccine safety monitoring will need to be visible

# Considerations for Vaccine Rollout



Alumni  
Exchange

- Nat'l Academy of Medicine Committee advising ACIP
- Prioritize persons most at risk (health care workers, nursing home residents, prison inmates and workers, persons with underlying health conditions, people from communities of color) or
- Prioritize reducing transmission by prioritizing public workforce, essential workers, students, young people who may be more likely to spread infection to others

# COVID on College Campuses



Alumni  
Exchange

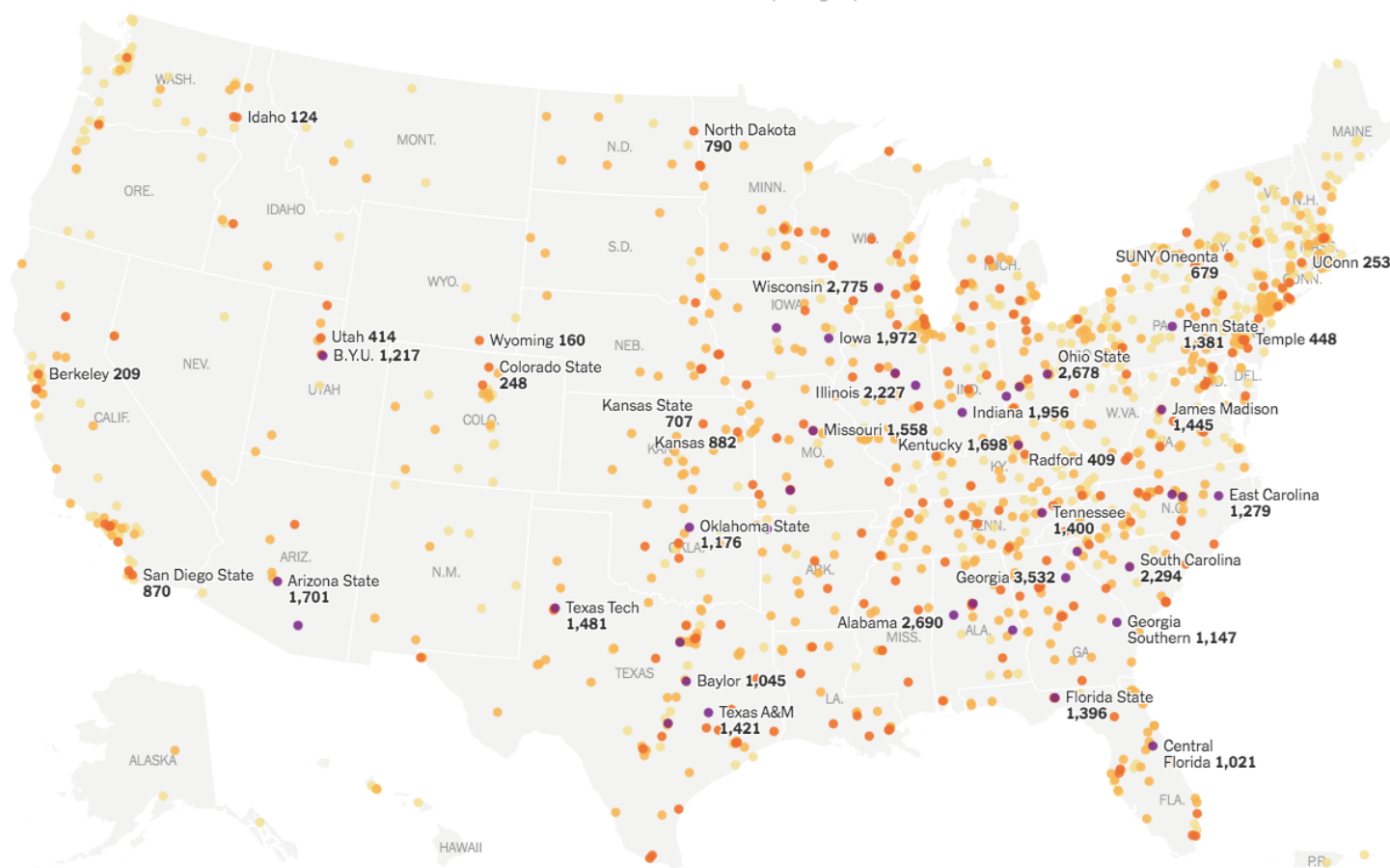
- NY Times Survey of more than 1600 American Colleges (9/25/2020)
- 130,000 cases and 70 deaths since the pandemic began
- 35 colleges with at least 1,000 cases
- U Alabama – 2690 cases
- UNC – 1199 cases
- Notre Dame – 704 cases
- University of Illinois at Urbana-Champaign- 2,227
- UIC- 108 cases



## Colleges with coronavirus cases since the pandemic began

● 1,000 or more cases ● 100-999 cases ● 10-99 cases ● Fewer than 10 cases

Double-click to zoom into the map. Drag to pan.





Alumni  
Exchange

# The UIC Re-opening

- Partial Re-opening (11,000 students, 7000 employees)
- Social Compact: A civic responsibility to protect the UIC community
  - Social Distancing/Avoiding crowds
  - Hand hygiene
  - Face masks
- ◆ Surveillance Testing Program
- ◆ Contact Tracing



Alumni  
Exchange

# The UIC COVID Contact Tracing and Epidemiology Program (UIC-CCTEP)

- The CCTEP Model
- Director of Contact Tracing: Ellen Stein, MS
- Research Data Scientist: Jocelyn Vaughn, MS
- 17 Student Contact Tracers
  - School of Public Health
  - College of Nursing
  - Anthropology
  - College of Social Work
  - College of Applied Health Sciences (OT)
  - Undergraduate Campus

# UIC-CCTEP



Alumni  
Exchange

- Contact Tracing since August 31<sup>st</sup>
  - Several cluster investigations linked to small social gatherings, mainly in off-campus housing ( 2-25 persons)
  - 13,168 Saliva Tests performed, 69 infected persons identified – overall positivity rate 0.52%
  - No evidence of transmission beyond initial cases and their contacts
- Health Ambassador Role:
  - Prevention Messaging
  - Facilitating Health Activities (flu vaccination)
  - Observational Studies of adherence to prevention measures



Alumni  
Exchange

# Thank You!

For more information please go  
to: [publichealth.uic.edu](http://publichealth.uic.edu)

SCHOOL OF  
PUBLIC HEALTH



Alumni  
Exchange

SCHOOL OF  
PUBLIC HEALTH



Alumni  
Exchange

# Meat Packing Plants

- Frequent site of outbreaks
- High levels of worker contagion
- Poor ventilation
- Cramped working conditions
- Background noise (which leads to shouting)
- Low compliance of mask wearing



Alumni  
Exchange

# A more nuanced view of transmission risk?

- Physical distance could vary by graded levels of risk
- Variations by setting, occupancy level, contact time, and whether face coverings are worn
- In the highest risk situations (poor ventilation, high occupancy, prolonged contact time, no face coverings, i.e. bars or night clubs), physical distancing beyond 6 feet should be considered and minimizing occupancy time.
- More research necessary
  - Cut-off durations of exposure
  - Detailed studies of airflow patterns with respect to infected person
  - Patterns and properties of respiratory emissions during different physical activities



Type and level of group activity	Low occupancy			High occupancy		
	Outdoors and well ventilated	Indoors and well ventilated	Poorly ventilated	Outdoors and well ventilated	Indoors and well ventilated	Poorly ventilated
<b>Wearing face coverings, contact for short time</b>						
Silent	Low	Low	Low	Low	Low	Medium
Speaking	Low	Low	Low	Low	Low	Medium
Shouting, singing	Low	Low	Medium	Medium	Medium	High
<b>Wearing face coverings, contact for prolonged time</b>						
Silent	Low	Low	Medium	Low	Medium	High
Speaking	Low	Low	Medium	Medium	Medium	High
Shouting, singing	Low	Medium	High	Medium	High	High
<b>No face coverings, contact for short time</b>						
Silent	Low	Low	Medium	Medium	Medium	High
Speaking	Low	Medium	Medium	Medium	High	High
Shouting, singing	Medium	Medium	High	High	High	High
<b>No face coverings, contact for prolonged time</b>						
Silent	Low	Medium	High	Medium	High	High
Speaking	Medium	Medium	High	High	High	High
Shouting, singing	Medium	High	High	High	High	High

**Risk of transmission**  
 Low ■ Medium ■ High ■

\* Borderline case that is highly dependent on quantitative definitions of distancing, number of individuals, and time of exposure

Fig 3 | Risk of SARS-CoV-2 transmission from asymptomatic people in different settings and for different occupation times, venting, and crowding levels (ignoring variation in susceptibility and viral shedding rates). Face covering refers to those for the general population and not high grade respirators. The grades are indicative of qualitative relative risk and do not represent a quantitative measure. Other factors not presented in these tables may also need to be taken into account when considering transmission risk, including viral load of an infected person and people's susceptibility to infection. Coughing or sneezing, even if these are due to irritation or allergies while asymptomatic, would exacerbate risk of exposure across an indoor space, regardless of ventilation

# A Spectrum of Risk

## COVID-19 Risk Index

Risk levels for exposure vary based on four main factors:



**Enclosed space**



**Duration of interaction**



**Crowds**  
Density of people + challenges for social distancing



**Forceful exhalation**  
Sneezing, yelling, singing, and coughing

### Low

**Walking outdoors**  
With or without pets

**Staying at home**  
Alone or with members of your household

**Picking up takeout food, coffee, or groceries from stores**  
*Risks: Potential crowding*

**Running or biking**  
Alone or with another person

*Risks: Close contact or potential clustering of people*

**Outdoor picnic or porch dining**  
With non-household people and physical distancing

*Risks: Prolonged and active*

**When near people, wear a mask**



### Medium

**Medical office visit**  
*Risks: Indoor, close contact, potential clustering of people, high-touch surfaces*

**Dentist appointment**  
*Risks: Indoor, close contact, potential clustering of people, patient not wearing a mask*

**Taking a taxi or a ride-sharing service**  
*Risks: Dependency on frequency of cleaning, duration of ride, and number of passengers*

**Museum**  
*Risks: Indoor, close contact, potential clustering of people*

**Visiting hospital emergency department**  
*Risks: Indoor, potential clustering of people*

**Playing "distanced" sports outside**  
Ex: Tennis or golf

**Grocery shopping**  
*Risks: Indoor, close contact, potential clustering of people, high-touch surfaces*

**Retail shopping**  
*Risks: Indoor, close contact, potential clustering of people*

**Outdoor restaurant dining**  
*Risks: Close contact, potential clustering of people, challenge to wear a mask during eating*

### Medium / High

**Exercising at a gym**  
*Risks: Indoor, close contact, potential clustering of people, high-touch surfaces, difficulty to wear a mask, high respiratory rate*

**Hair/nail salon and barbershops**  
*Risks: Prolonged close contact, difficult to wear a mask*

**Working in an office**  
*Risks: Indoor, close contact, potential clustering of people*

**Indoor restaurant or coffee shop**  
*Risks: Indoor, prolonged close contact, potential clustering of people, difficult to wear mask while eating and drinking*

**Exercising at a gym**  
*Risks: Indoor, close contact, potential clustering of people, high-touch surfaces, difficulty to wear a mask, high respiratory rate*

**Working in an office**  
*Risks: Indoor, close contact, potential clustering of people*

### High

**Indoor party**  
*Risks: Indoor, prolonged close contact, potential clustering of people*  
**Additional risks:** alcohol use of inebriated, shared beverages, coughing

**Air travel**  
*Risks: Enclosed space, prolonged close contact, potential clustering of people, high-touch surfaces, and high-touch surfaces*

**Concert**  
*Risks: Enclosed space, prolonged close contact, potential clustering of people, high-touch surfaces, and high-touch surfaces*

**Movie theater or live theater**  
*Risks: Enclosed space, prolonged close contact, potential clustering of people, high-touch surfaces*

**Bars and nightclubs**  
*Risks: Enclosed space, prolonged close contact, potential clustering of people, high respiratory rate, and high-touch surfaces*

**Playing contact sports**  
Football, basketball, soccer, etc.  
*Risks: Prolonged close contact, potential clustering of people, high respiratory rate, unable to wear a mask*

**Public transportation**  
Subway or bus  
*Risks: Enclosed space, prolonged close contact, potential clustering of people, and high-touch surfaces*

**Religious services**  
*Risks: Enclosed space, prolonged close contact, potential clustering of people, high-touch surfaces, and high-touch surfaces*

**Watching sports**  
*Risks: Prolonged close contact, potential clustering of people, high-touch surfaces, and high-touch surfaces*

**REOPEN INTELLIGENTLY.  
REOPEN SAFELY.**

# What is **herd immunity**? how it works



Healthy,  
non-vaccinated

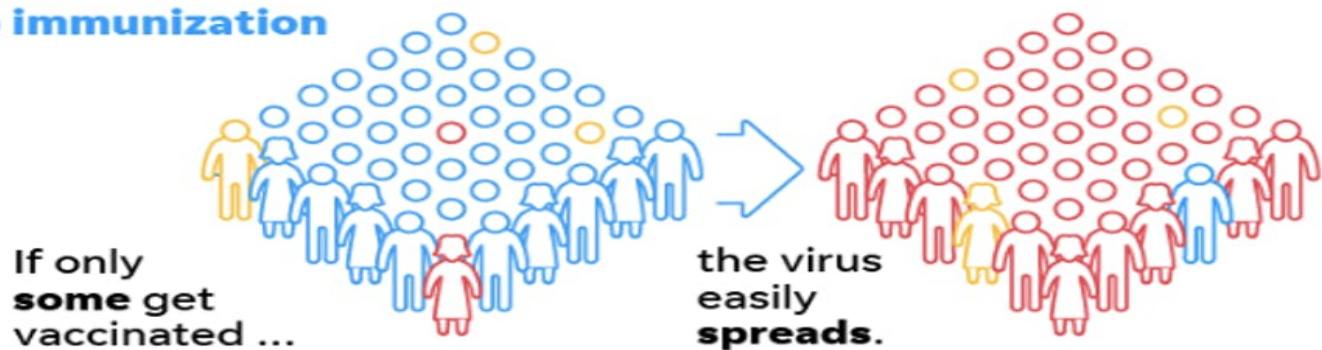


Healthy,  
vaccinated



Not vaccinated,  
contagious

## No immunization



## With immunization





Alumni  
Exchange

## Concerns about Vaccine Trial Goals

- Trials designed to test whether vaccines reduce symptomatic cases of COVID-19
- Critics argue that a trial designed to detect prevention of severe disease and death would be more relevant
- Such a trial would have needed more subjects and more time



Alumni  
Exchange

# Fauci on Vaccines

- September 27<sup>th</sup>: Americans will begin to be vaccinated in November and December
- Different vaccines for different populations (e.g. elderly persons)

# Vaccines: Key Remaining Questions



Alumni  
Exchange

- When will the public be able to have confidence in available vaccines? → vaccine promotion efforts targeting clinicians and general public
- When will vaccine uptake be high enough to enable a return to prepandemic conditions?
- When will the vaccine be available and how will the rollout be organized when vaccine is still in relatively short supply?

# To Guard Against Mistaken Conclusions We Must:

- Couple data with SES markers, indicators of economic inequality
- Understand the effect of “weathering” or advanced aging caused by bodily wear and tear, responses to external stressors, especially racial discrimination
- Understand the unequal distribution of COVID-testing, Preventive Services, and respiratory hazards and toxic sites (environmental injustice)
- Understand impact of food insecurity, housing instability, and limited access to transportation

# Potential Solutions

- Change policies that keep structural racism in place and promote education on how the health field perpetuates social inequality and how that relates to health disparities.
- New policies are needed to increase economic empowerment and educational opportunities for low income communities
- Community programs that build stable and supportive structures as part of pandemic recovery efforts
- Health systems need to build trust in vulnerable communities to counteract generations of mistreatment, unethical experimentation, and criminal neglect of minority communities.
- Targeted intervention to address social risk factors