



# Learning to live with COVID: The role of epidemiology and the importance of primary prevention

Jennifer St. Sauver, MPH, PhD  
Mayo Clinic  
Division of Epidemiology  
Rochester, Minnesota, USA

# Disclosures

- Current research projects funded by:
  - Mayo Clinic Research Committee
  - National Institute on Aging
  - Industry:
    - Exact Sciences
    - Moderna

# Overview

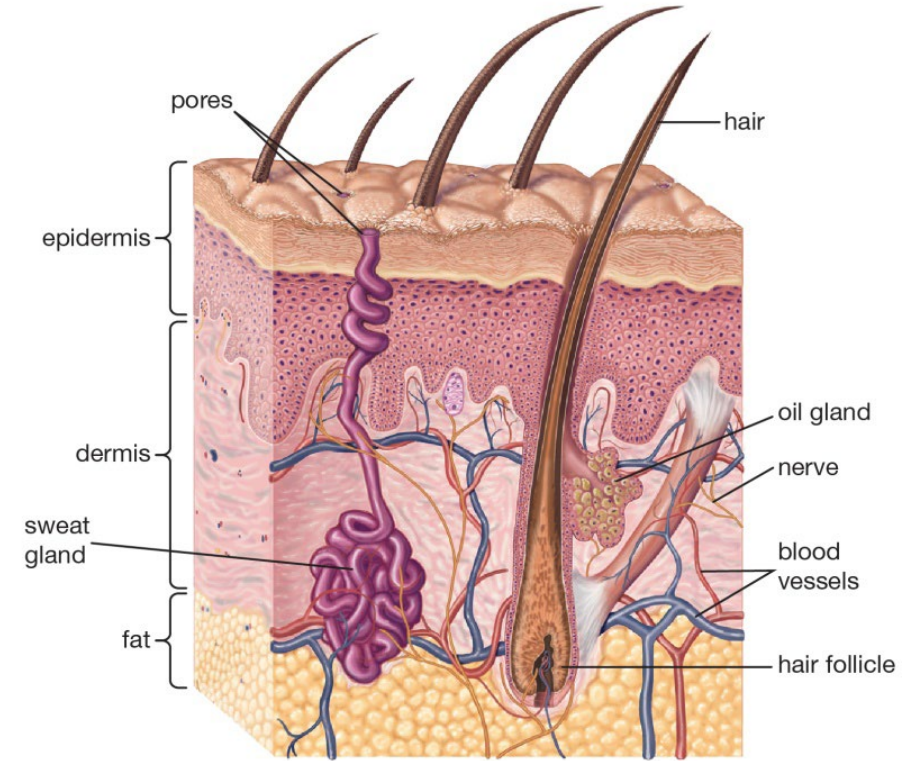
- Relationship between population health, public health, epidemiology and prevention strategies
- COVID pandemic in our region
  - Rochester Epidemiology Project (REP)
- Prevention strategies
  - Masking and distancing
  - Healthy behaviors
    - Food choices, physical activity, smoking, alcohol use
  - Vaccination



# Learning objectives

- To understand:
  1. How epidemiology and public health intersect in COVID prevention strategies
  2. How the COVID pandemic has evolved in southeastern MN and southwestern WI
  3. Prevention strategies as the pandemic evolves
    - Masking and social distancing
    - Role of healthy behaviors in primary prevention
      - Food choices, physical activity, smoking, alcohol use, sleep
    - Vaccination

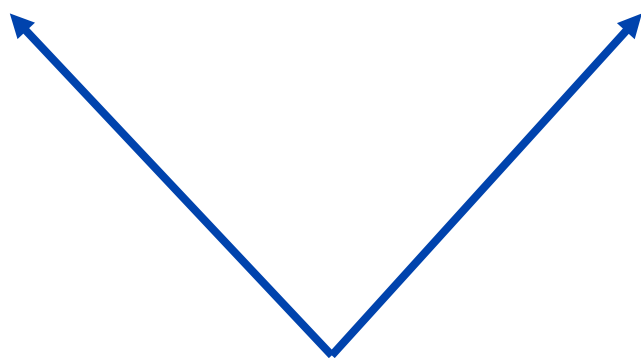
# What is Epidemiology?



© 2013 Encyclopædia Britannica, Inc.



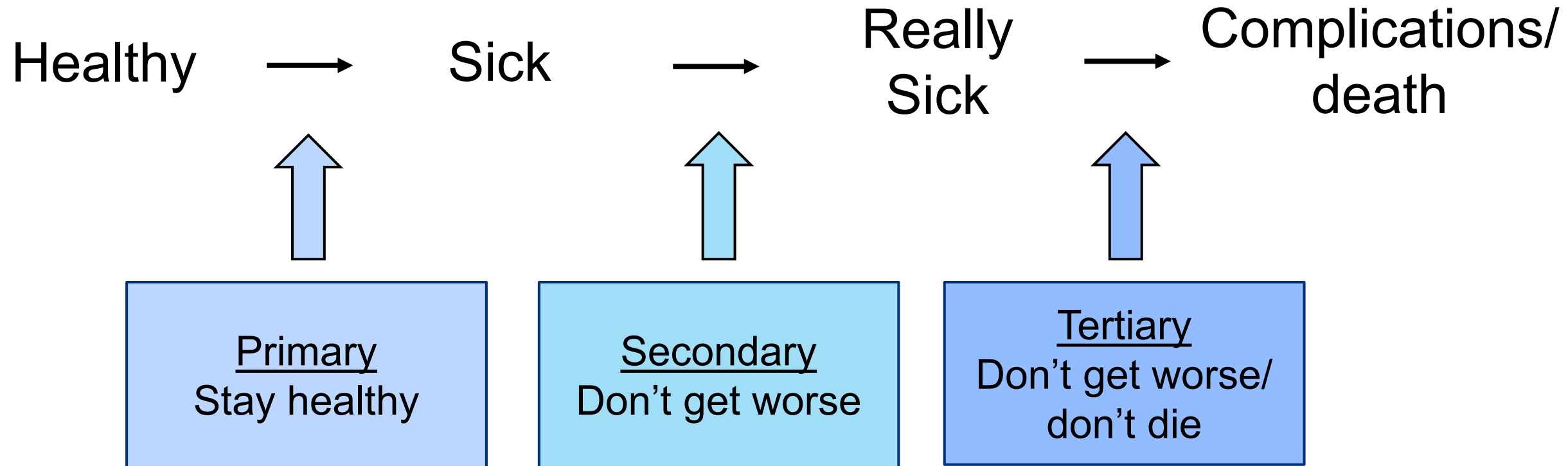
Population health  $\longleftrightarrow$  Public health



Epidemiology

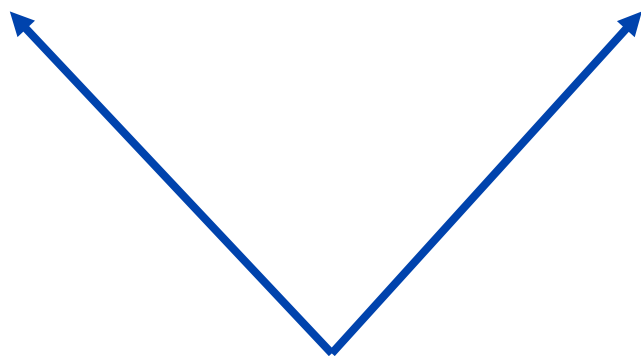


# Population health and public health prevention strategies





Population health  $\longleftrightarrow$  Public health

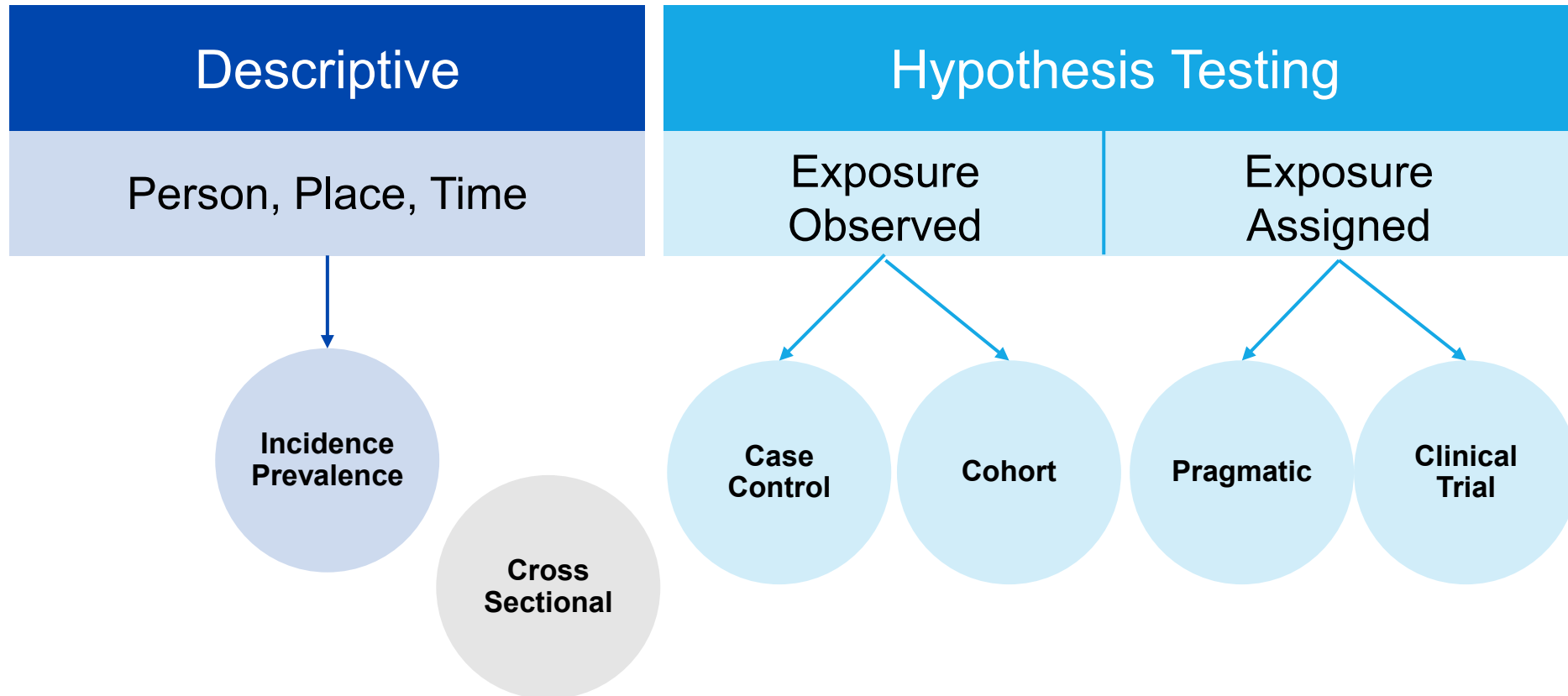


Epidemiology





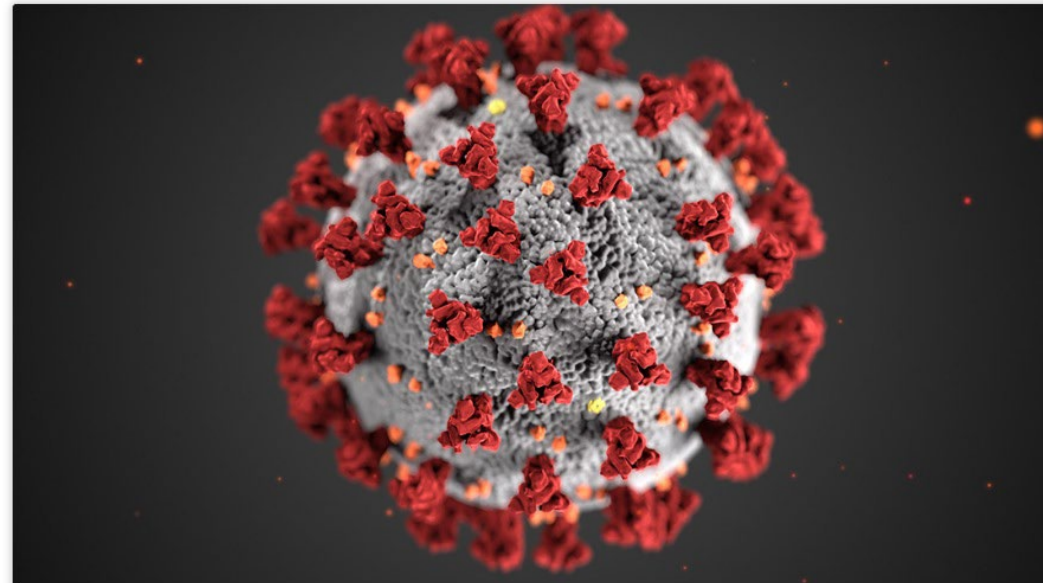
# Epidemiology Toolkit



# January 20, 2020

- “CDC confirms the first U.S. laboratory-confirmed case of COVID-19 in the U.S. from samples taken on January 18 in Washington state.”

CDC Museum COVID-19 Timeline

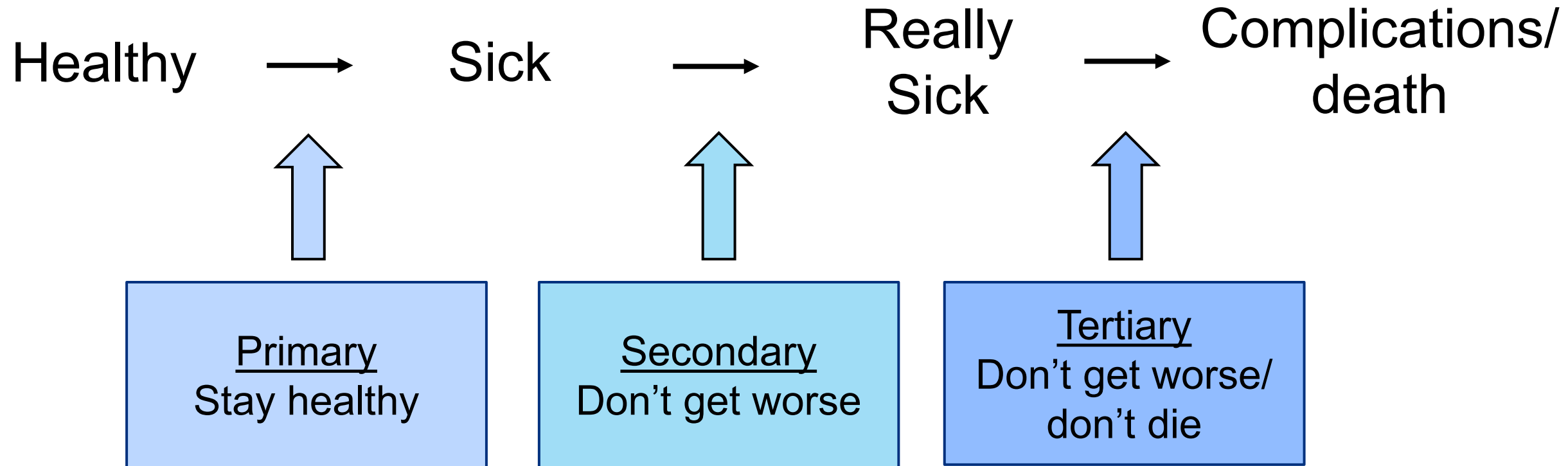


This timeline provides information about select moments in the COVID-19 pandemic in the United States and around the world beginning from its known origins to today.

# So many questions

- How does it spread?
- How quickly does it spread?
- How do we stop it from spreading?
- How do we figure out who has it?
- Who is going to get really sick?
- How do we treat people who get sick?
- Can we get rid of it?

# Population health and public health prevention strategies



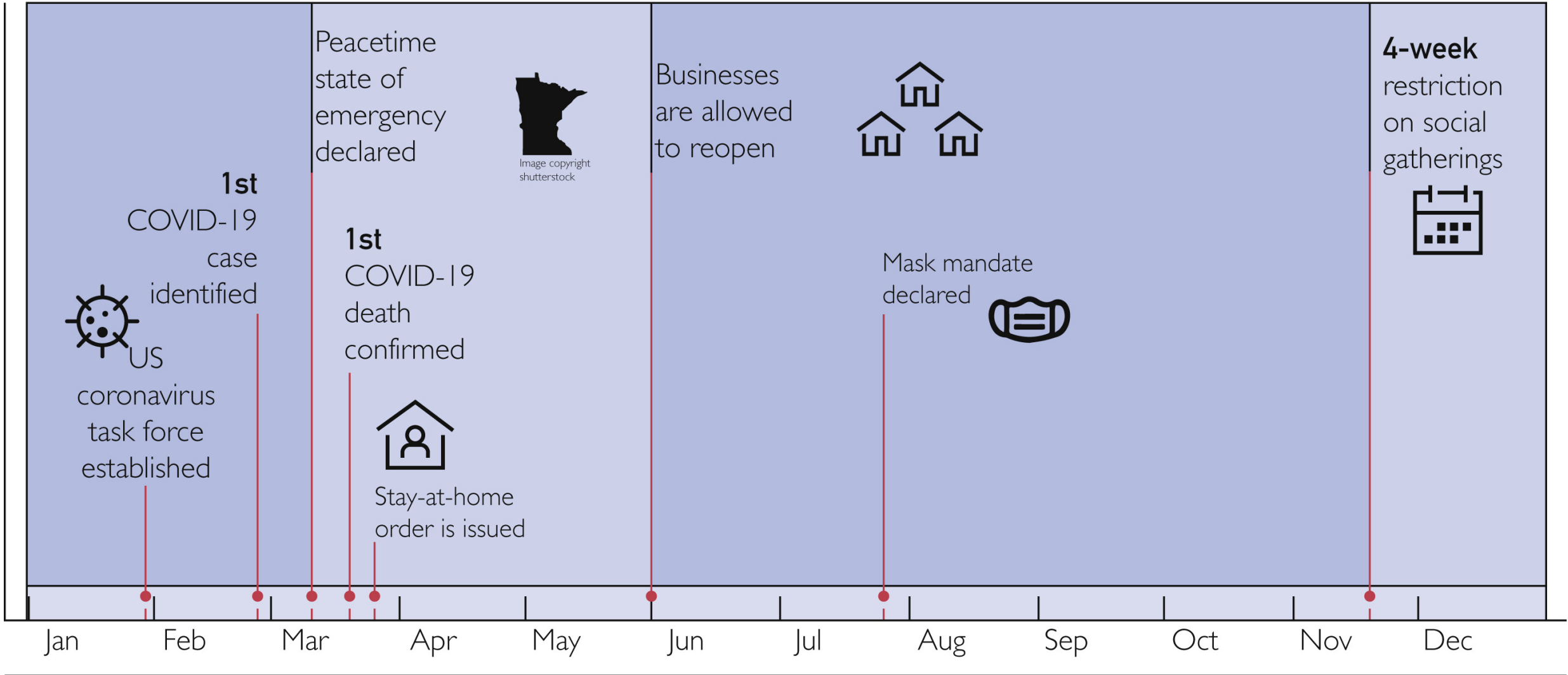


**Pre-lockdown**  
(Jan 01 - Mar 11)

**1st lockdown**  
(Mar 12 - May 31)

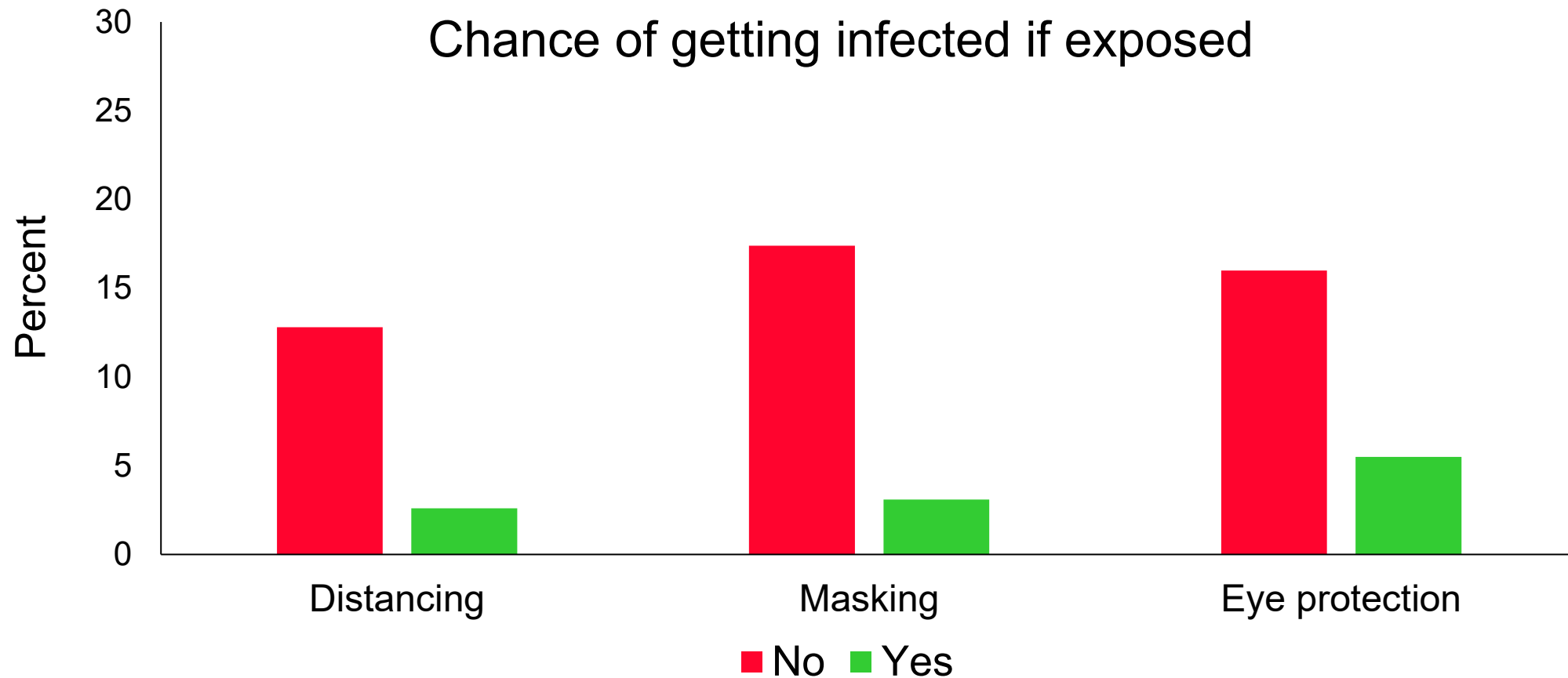
**Between lockdowns**  
(Jun 01 - Nov 20)

**2nd lockdown**  
(Nov 21 - Dec 31)



2020

# Masking and social distancing – does it even work?



# Downsides

- Social distancing
  - Economic costs
  - Educational costs
  - Social isolation
    - Increase in substance use and mental health issues
    - Isolation in elderly population
- Masking
  - Discomfort, skin conditions, communication issues

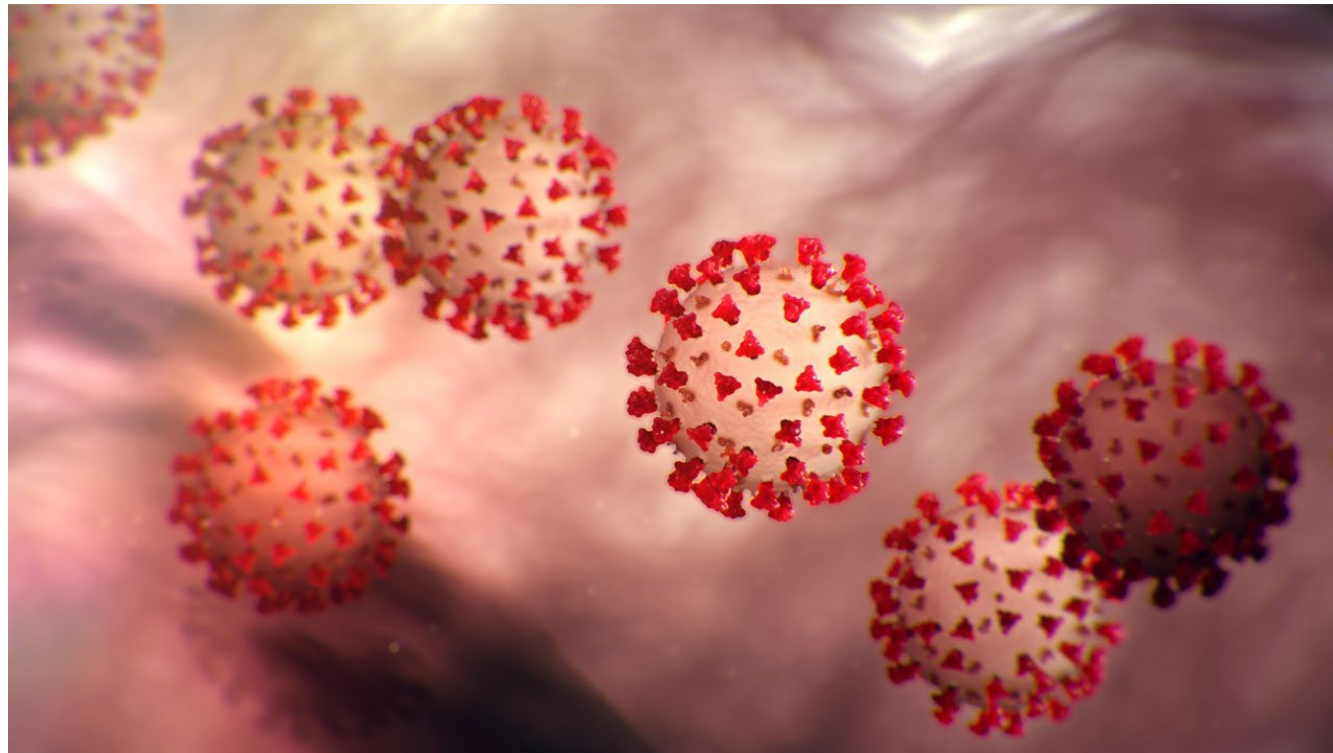


# So many questions

- How does it spread? – **Respiratory transmission**
- How quickly does it spread? - **Fast**
- How do we stop it from spreading? - **Masking and social distancing**
- **How do we figure out who has it?**
- **Who is going to get really sick?**
- **How do we treat people who get sick?**
- Can we get rid of it?

# Project Goal

- Identify risk factors for severe infections – especially in younger people

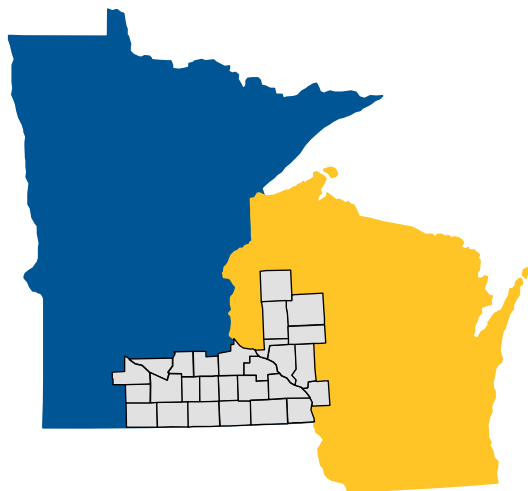


# Approach

- **Data source:** Rochester Epidemiology Project (REP)
  - Research partnership between Mayo Clinic, Olmsted Medical Center, Olmsted County Public Health Services, and Zumbro Valley Health
    - Share medical record information for research
    - <https://rochesterproject.org/>

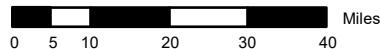
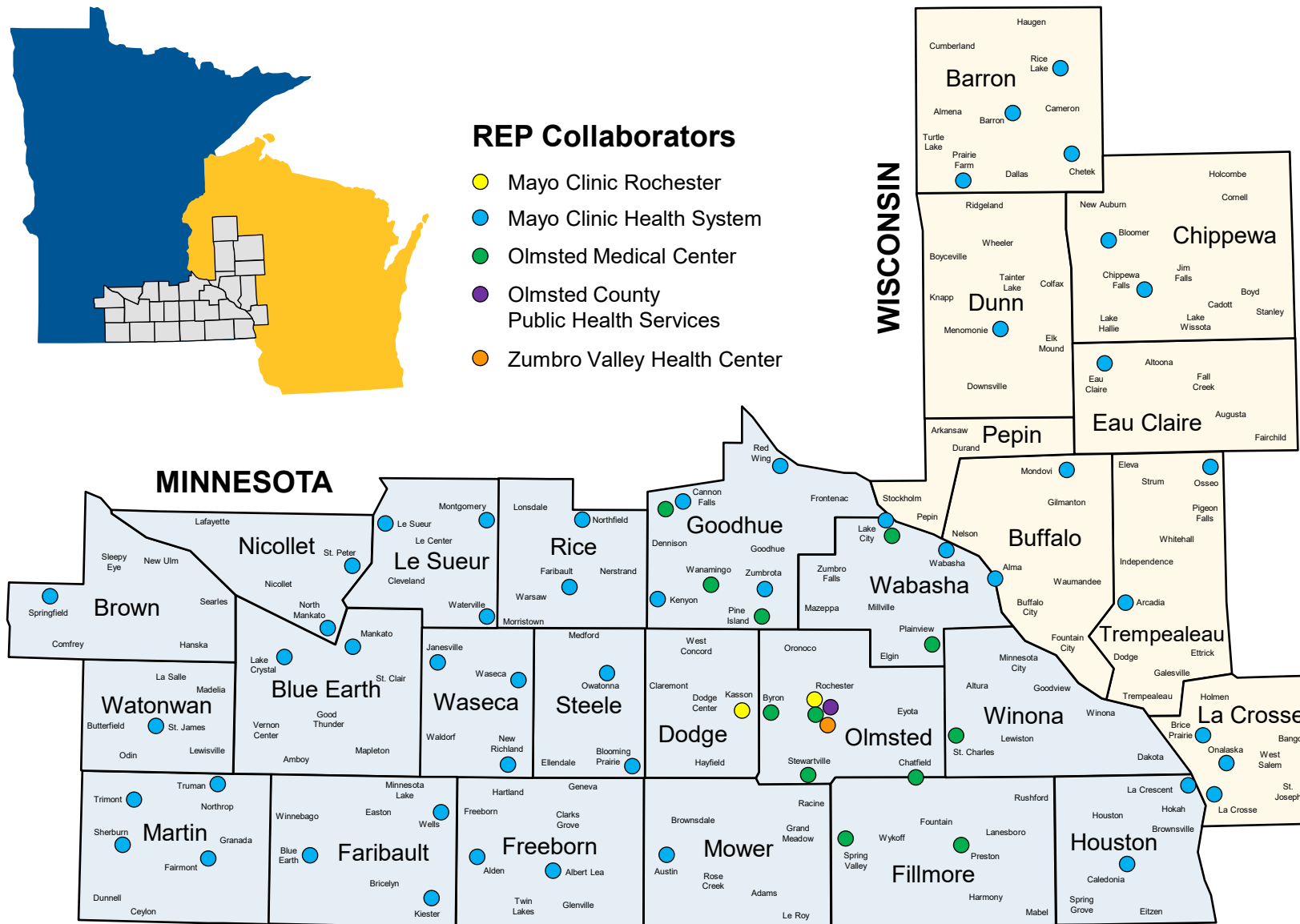


# Map of care providers



## REP Collaborators

- Mayo Clinic Rochester
- Mayo Clinic Health System
- Olmsted Medical Center
- Olmsted County Public Health Services
- Zumbro Valley Health Center



# Approach

- **Data source:** Rochester Epidemiology Project (REP)
- **Study population:** Persons living in a 27-county region of south-eastern MN and west-central WI
  - March 1 – September 30, 2020 (pre-surge)
- **Definition of severe infection:** Hospitalization or death due to COVID-19

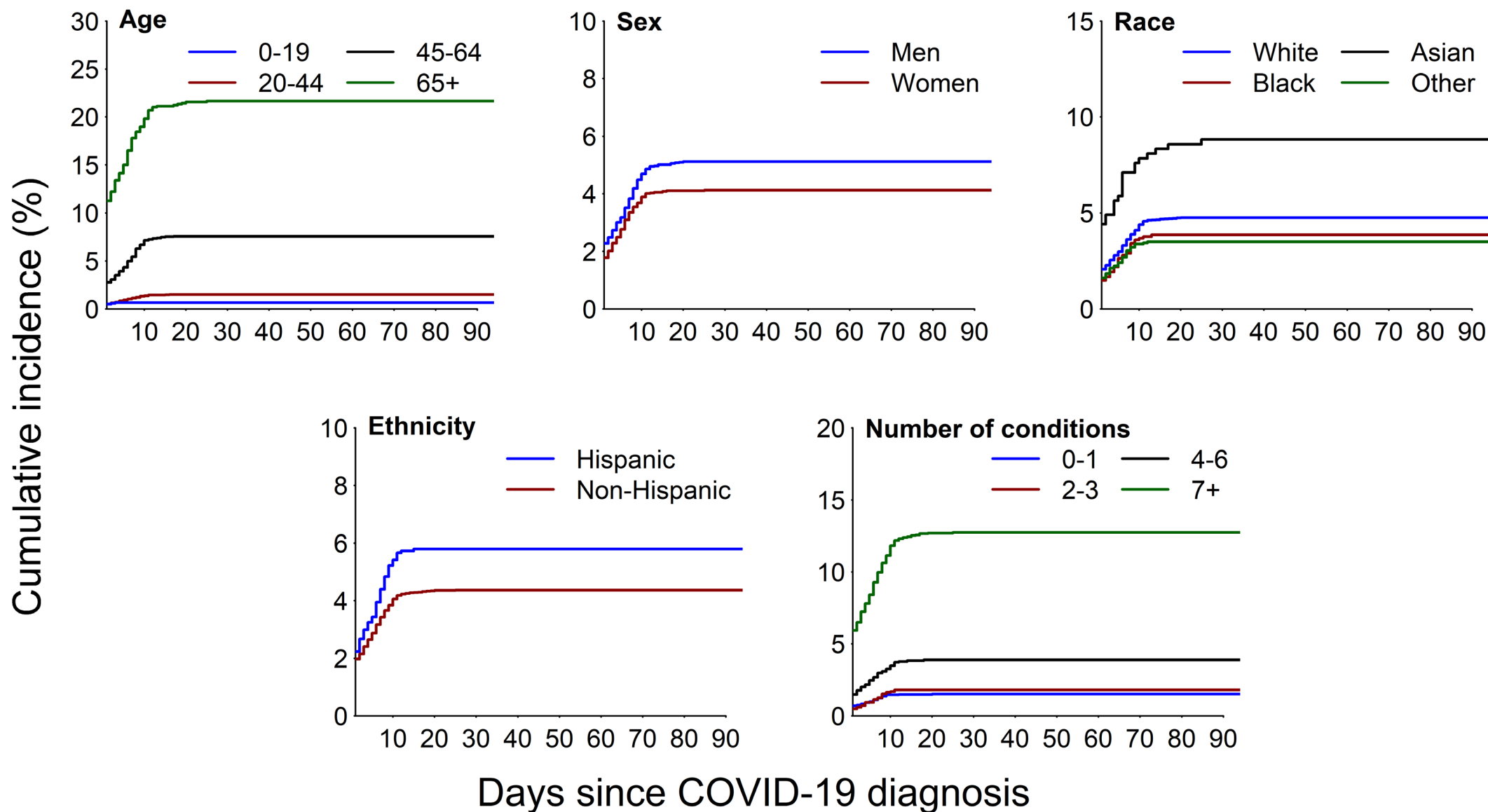


# Results

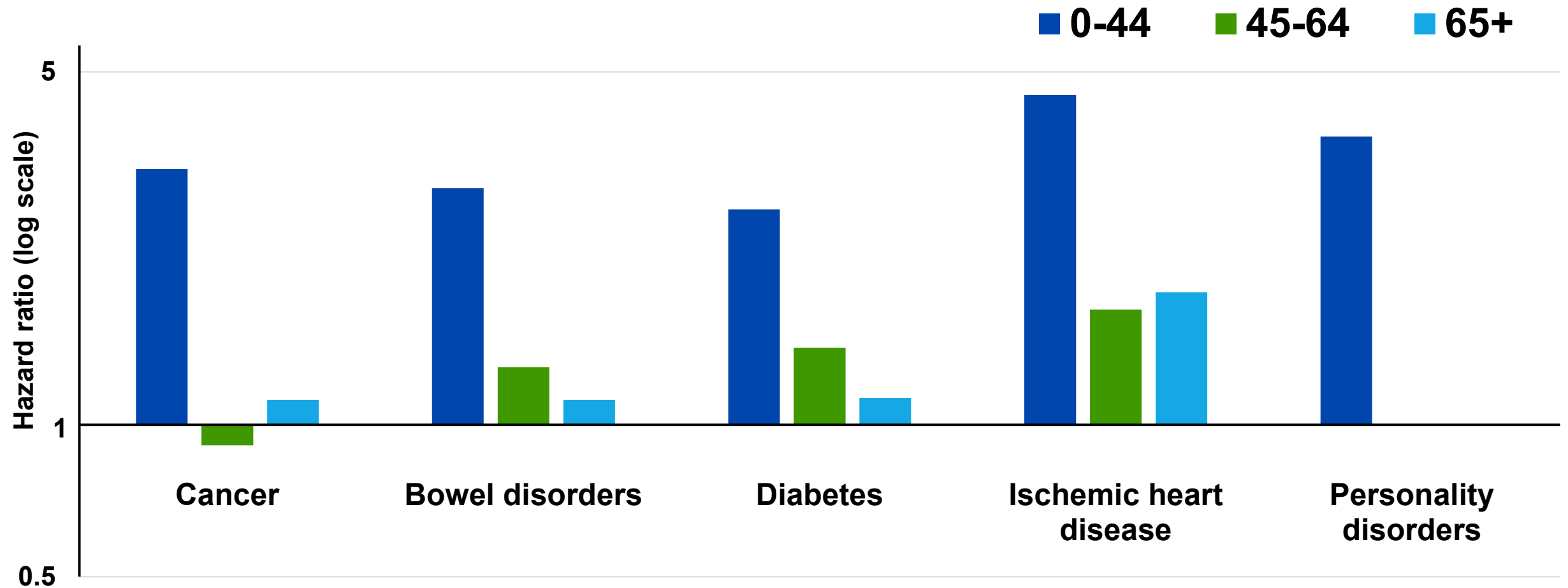
- 9,928 infections
  - 456 hospitalizations (4.6%)
  - 72 deaths (0.7%)
  - 474 severe infections (4.8%)



**Figure 1.** Cumulative incidence of **hospitalizations** among persons with COVID-19 infections by demographic characteristics and number of chronic conditions.



# Risk of severe COVID-19 infection in 3 age groups: 0-44 years, 45-64 years, and 65+ years

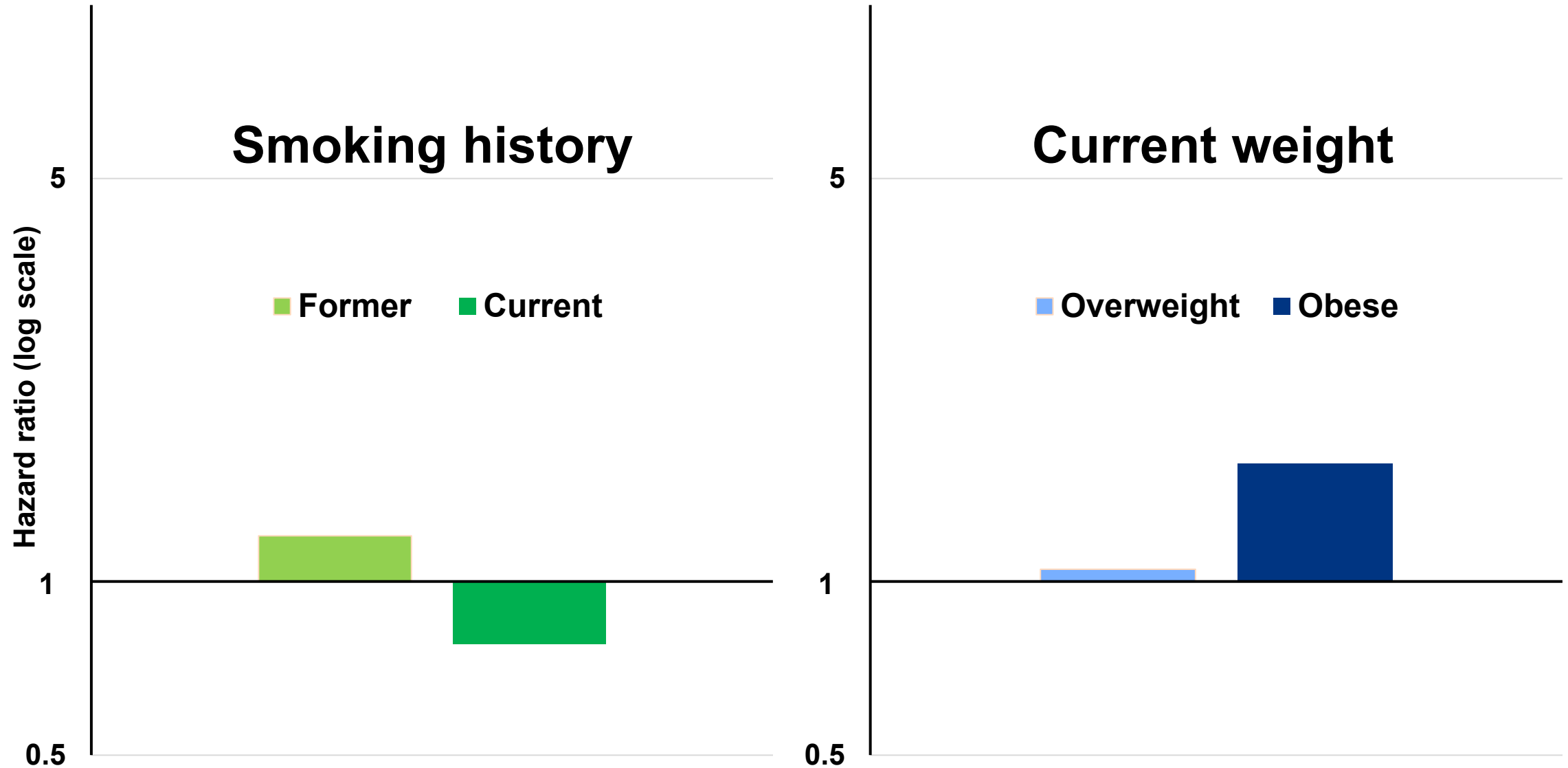




# Role of healthy behaviors

- Maintain a healthy weight
  - Exercise regularly
  - Eat a healthy diet
- Don't smoke
- Moderate alcohol consumption
- Get enough sleep

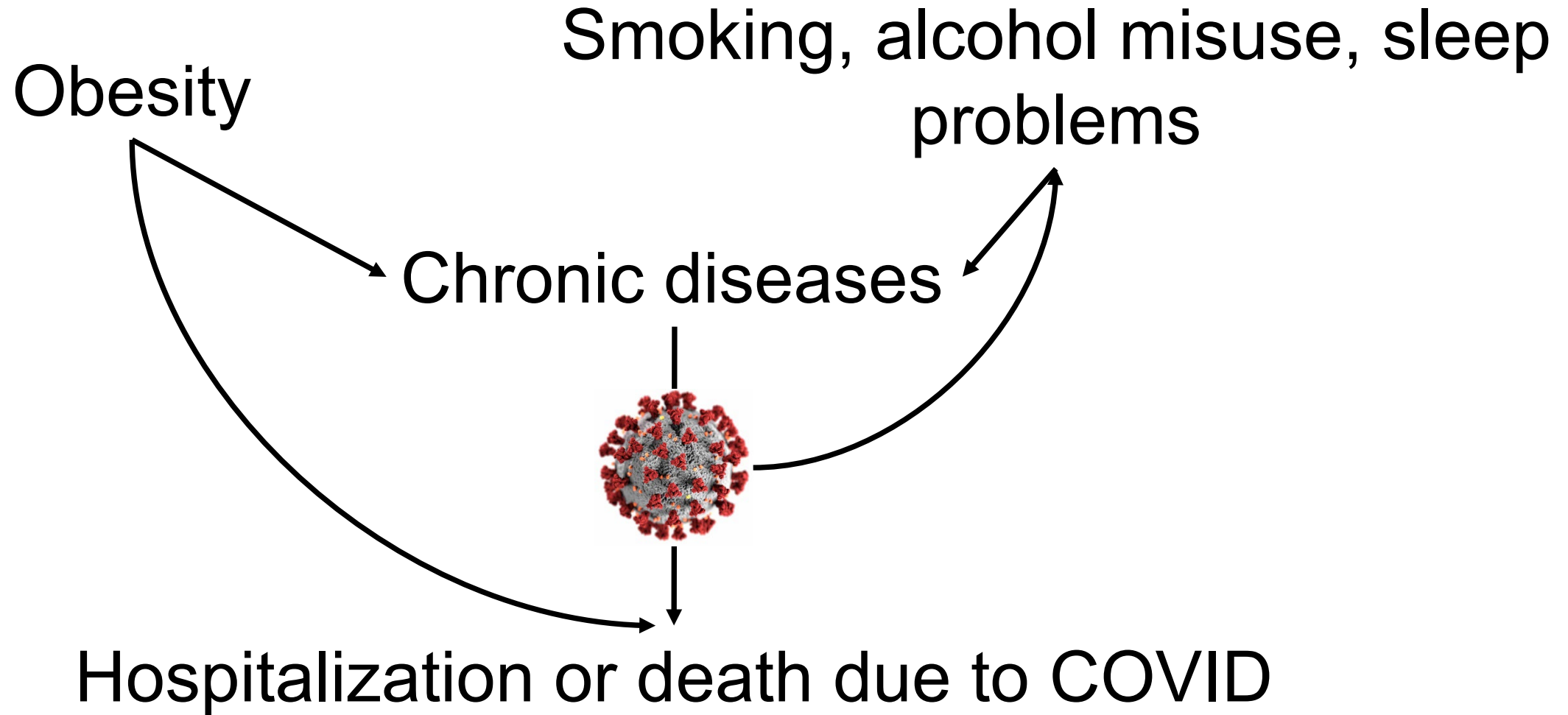
# Risk of severe COVID-19 infection in smokers and persons with obesity



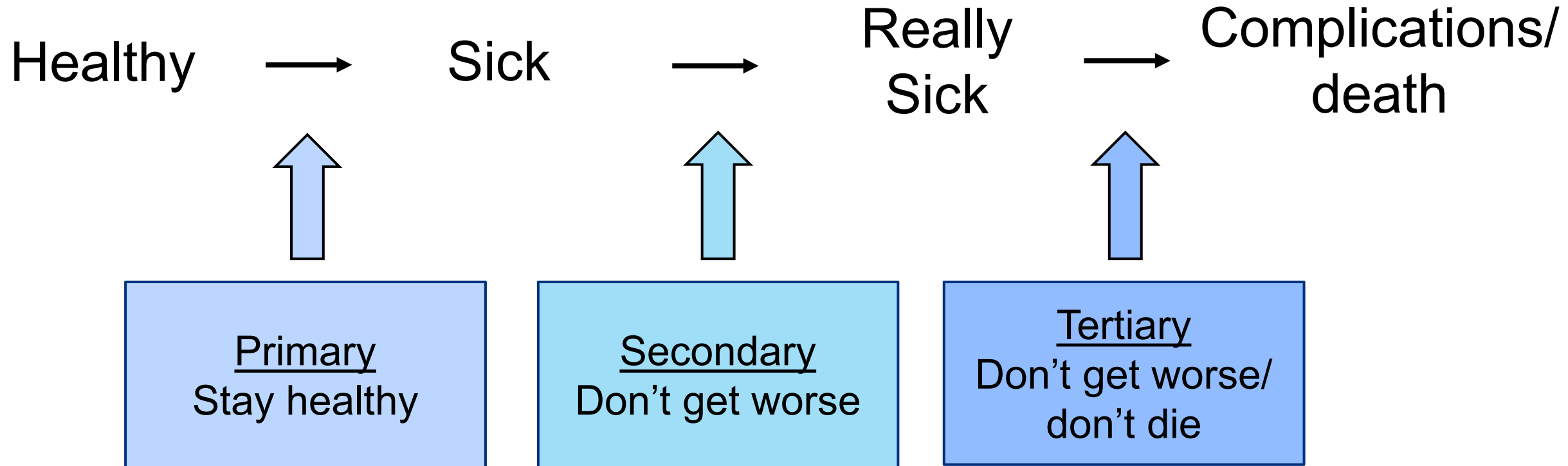
# Role of healthy behaviors and COVID

- Don't smoke
  - Limited associations with poor outcomes
- Maintain a healthy weight
  - Exercise regularly
  - Eat a healthy diet
    - Living with obesity is associated with poor outcomes
- Moderate alcohol consumption
  - No direct link, but consumption increased during the pandemic
- Get enough sleep
  - No direct link, but sleep problems prevalent in persons who had COVID

# Role of healthy behaviors and COVID



# Population health and public health prevention strategies



Try STAT+ Today

STAT





CORONAVIRUS

HEALTH

BIOTECH

PHARMA

 **Black Friday Preview Sale**  
Mattress Firm Rochester 

BREAKING NEWS

## Covid-19 vaccine from Pfizer and BioNTech is strongly effective, early data from large trial indicate

By MATTHEW HERPER [@matthewherper](#)

NOVEMBER 9, 2020

[Reprints](#)





Your Weekend Briefing

Here's what you need to know about the week's top stories.



Listen to 'The Sunday Read'

Lovers in Auschwitz, reunited.

Got a confi

The Times w  
to share mes

### U.S. Begins Shipping Vaccine as Virus Rages On

- The first doses left a Pfizer facility in Michigan early Sunday, kicking off the most ambitious inoculation campaign in U.S. history.
- The effort to ship the vaccine to all 50 states comes as the country's coronavirus death toll approaches 300,000. Here's the latest.

Live 28m ago



Pool photo by Morry Gash

- Photos
- U.S. Curve
- World Cases



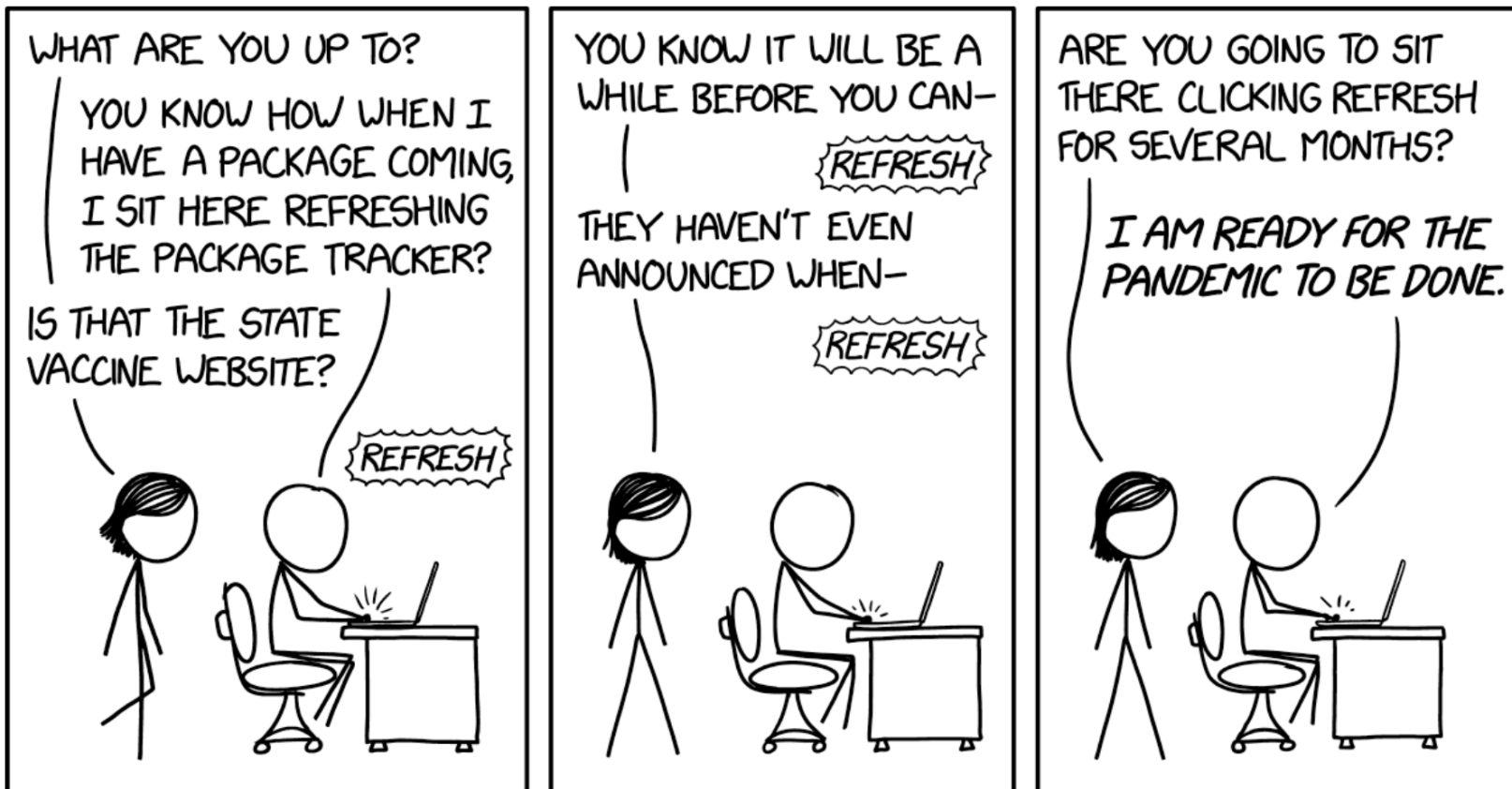
NEW: Sandra Lindsay, a critical care nurse in Queens, today became the first person to receive the COVID-19 vaccine in New York.



Critical care nurse first to receive COVID vaccine in New York  
"It didn't feel any different from taking any other vaccine," she said.  
axios.com



# VACCINE TRACKER





## Appointments

Appointment Date:  
**Fri, Apr 2, 2021**

Arrival Time:  
**1:20 PM CDT**

### COVID-19 Vaccination Visit

Department of Family Medicine, West  
Campus Building, in Austin, Minnesota

**West Campus Building, First Floor Desk 1**

**Appointment is Today**  
PreCheck-In is complete. See you soon.

[VIEW](#)

## Appointments

Appointment Date:  
**Fri, Apr 2, 2021**

Arrival Time:  
**1:20 PM CDT**

### COVID-19 Vaccination Visit

Department of Family Medicine, West  
Campus Building, in Austin, Minnesota

West Campus Building, First Floor Desk 1

#### Appointment is Today

PreCheck-In is complete. See you soon.

VIEW

**LIVE** Updated 18 minutes ago

## Covid-19 Live Updates: F.D.A. to Authorize Pfizer Vaccine for Adolescents by Early Next Week

New York, New Jersey and Connecticut will let most businesses fully reopen in mid-May and New York City will return to 24-hour subway service. But the virus continues to rage across the world: A lack of oxygen has led to a wave of deaths in India on Sunday.

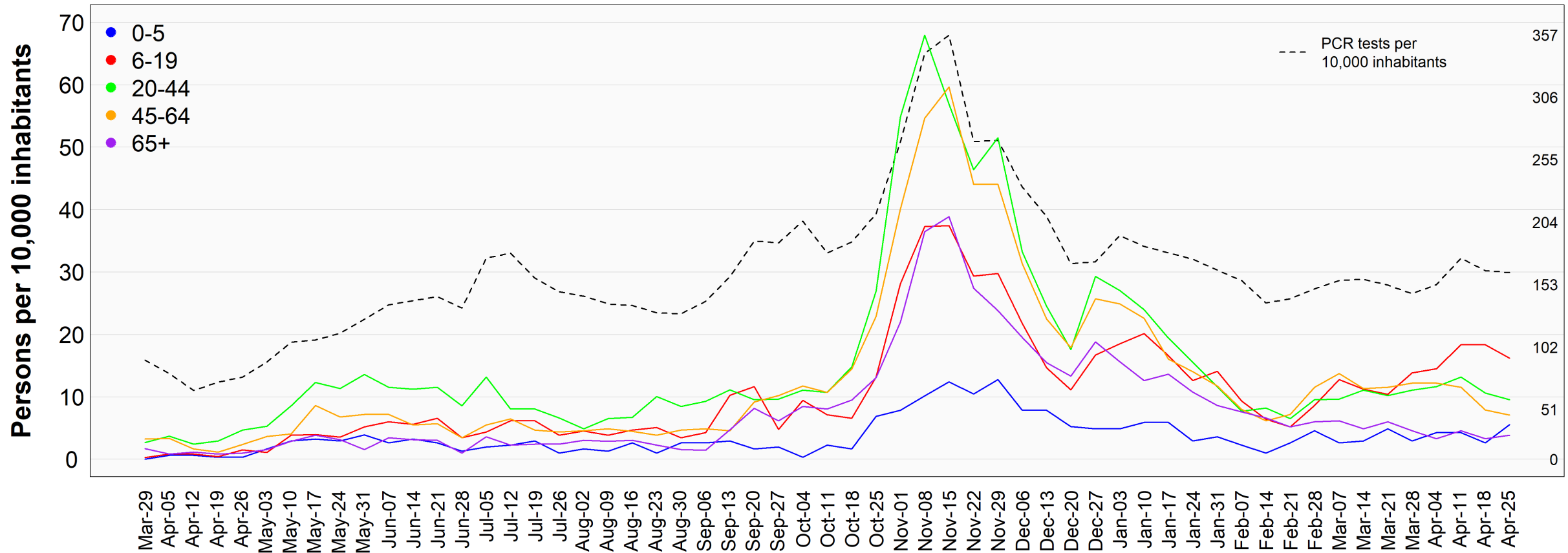
**RIGHT NOW** The European Union recommends opening travel to foreigners.

#### Here's what you need to know:

- The F.D.A. is set to authorize the Pfizer-BioNTech vaccine for those 12-15 years old by early next week.
- N.Y., N.J. and Connecticut will let many businesses fully reopen in mid-May and N.Y.C.'s subway will resume 24-hour service.
- Deaths mount during an oxygen shortage in India, and a high court intervenes.

# Evolution of a pandemic

COVID-19 positive tests in the 9-county region of southeast Minnesota



Notes:

Positive tests include PCR and/or Ab. Each person is counted only once across all weeks (unique persons). In case of multiple positive tests, the earliest date is used.

The 9-county population is an estimation of July 2020 (0-5 = 30,610; 6-19 = 72,969; 20-44 = 119,423; 45-64 = 96,085; 65+ = 69,704).

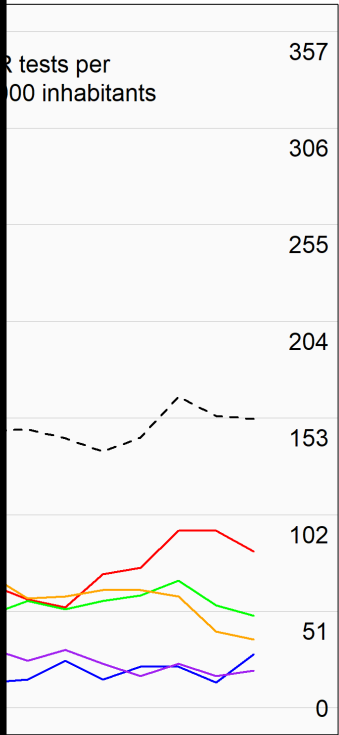
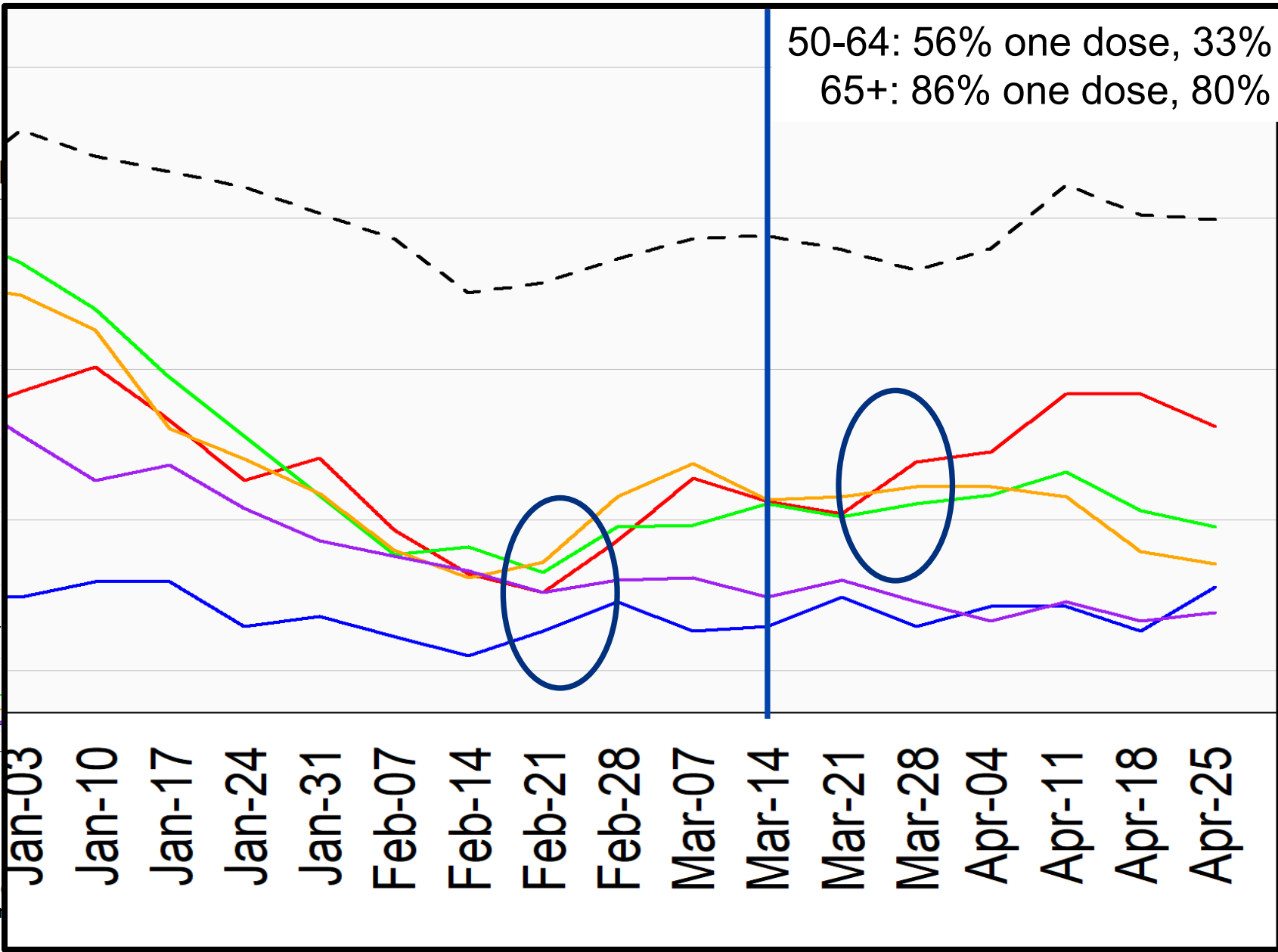
Persons per 10,000 inhabitants

COVID-19

- 0-5
- 6-19
- 20-44
- 45-64
- 65+

70  
60  
50  
40  
30  
20  
10  
0

Mar-29  
Apr-05  
Apr-12  
Apr-19  
Apr-26

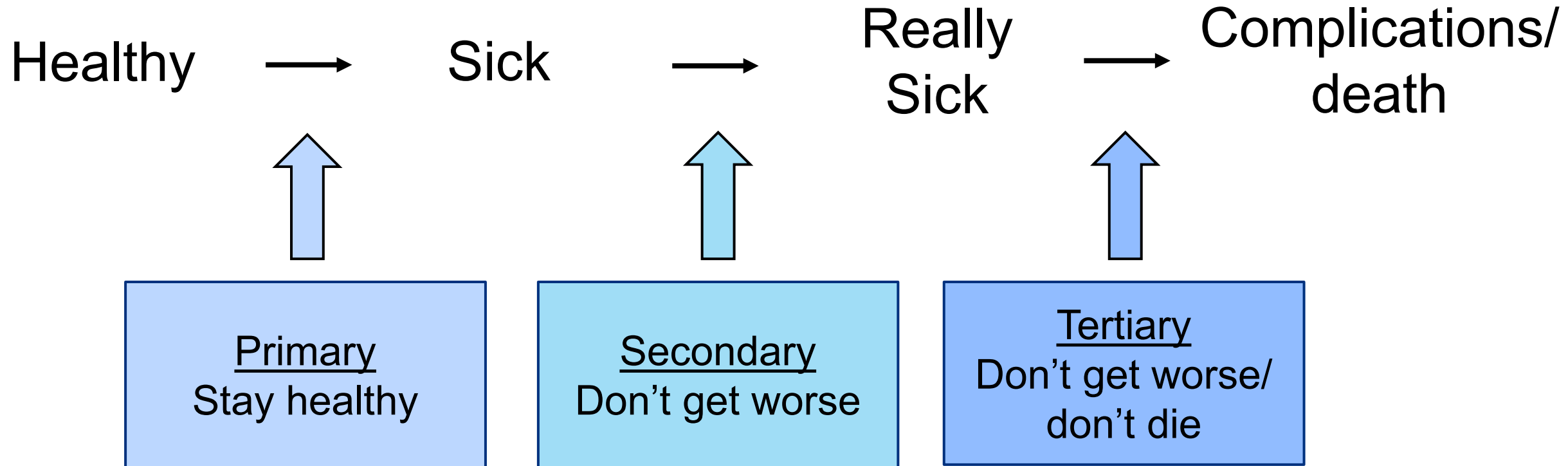


Notes:  
Positive tests include P  
The 9-county population

# Current vaccine effectiveness information

- Protection varies depending on the circulating strain(s)
- Some protection against symptomatic infection
  - 35-72% within 1-3 months\*
  - 12-69% within 4-6 months\*
- Good protection against hospitalization and death
  - 68-92% protection after second dose\*
  - Varies based on age, comorbidities

# Population health and public health prevention strategies



# So many questions

- How does it spread? – **Respiratory transmission**
- How quickly does it spread? - **Fast**
- How do we stop it from spreading? - **Masking and social distancing**
- How do we figure out who has it? – **Rapid, cheap, widely available testing**
- Who is going to get really sick? – **More likely: older, living with obesity, more chronic diseases, specific diseases in younger people**
  - **Less likely: vaccinated**
- How do we treat people who get sick? – **New medications, standard hospital protocols**

Can we get rid of it?

Not yet.



# Where are we now?

- May 19, 2022
  - US reaches over 1 million deaths due to COVID
- August, 2022
  - Deaths
    - US: 1,038,819
    - Minnesota: 13,014
    - Wisconsin: 13,255





Health Information

Grants & Funding

News & Events

Research & Training

COVID-19

COVID.gov

NIH Research information | Español

NIH staff guidance (NIH Only)

Home » News & Events » News Releases

## NEWS RELEASES

Media Advisory

Tuesday, July 5, 2022

# COVID-19 was third leading cause of death in the United States in both 2020 and 2021

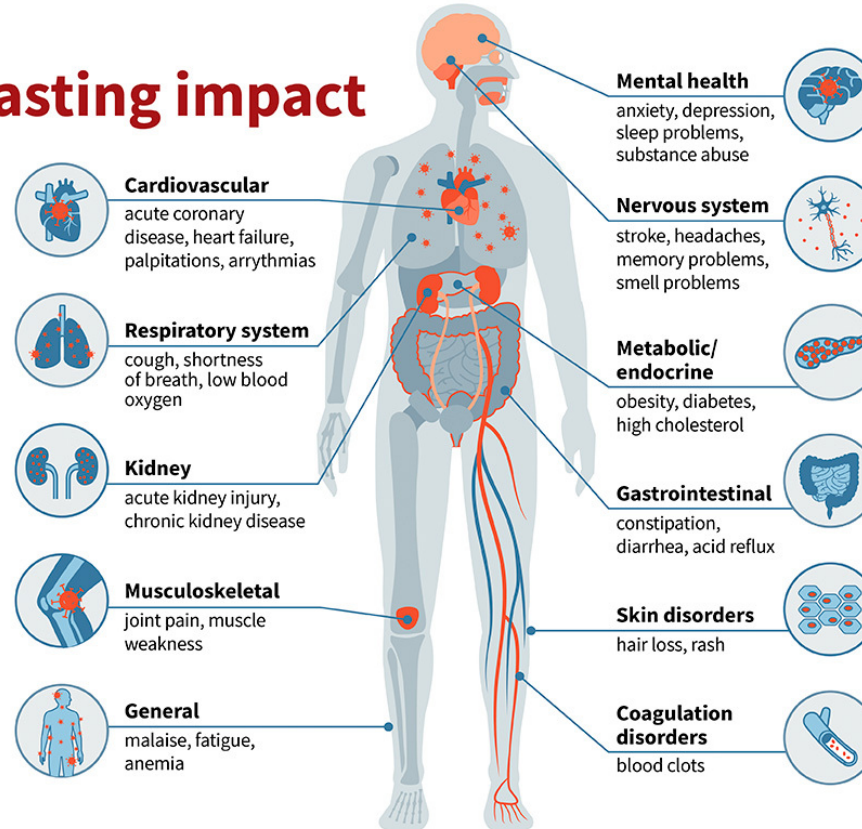
# Long COVID

- 1 in 8 people may continue to experience symptoms 90-150 days post infection\*
  - Multiple systems may be affected+
- **Still a lot to learn**

## COVID-19: Lasting impact

Even those survivors with mild initial cases can have wide-ranging health issues for six months or more.

WashU researchers link many diseases with COVID-19, signaling long-term complications for patients and a massive health burden for years to come.



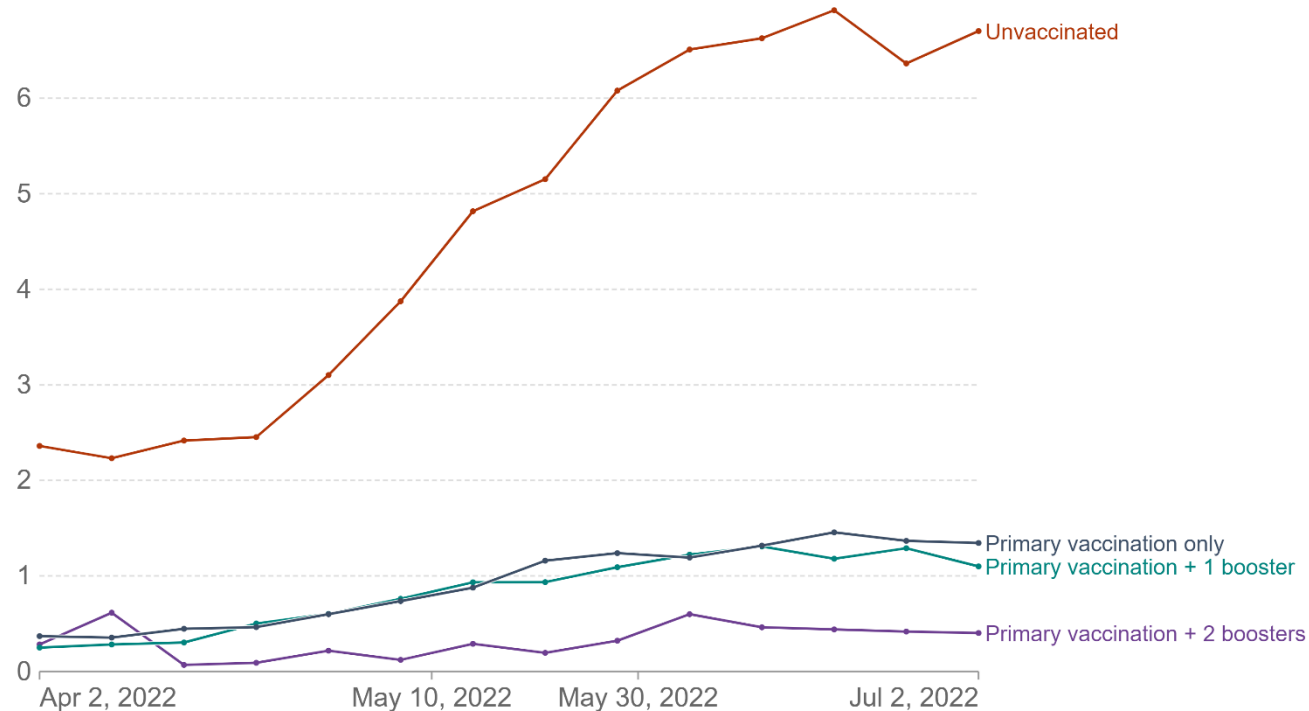
\*Ballering et al, *Lancet*, 2022

+ Al-Aly et al, *Nature*, 2021

# Good news

- Vaccination estimated to prevent over 240,000 deaths and 1.1 million hospitalizations in the US\*

United States: COVID-19 weekly death rate by vaccination status, All ages  
Death rates are calculated as the number of deaths in each group, divided by the total number of people in this group. This is given per 100,000 people.



Source: CDC COVID-19 Response, Epidemiology Task Force

OurWorldInData.org/coronavirus • CC BY

Note: Unvaccinated people have not received any dose. Partially-vaccinated people are excluded. The mortality rate for the 'All ages' group is age-standardized to account for the different vaccination rates of older and younger people.

# Good news

- Persons who are vaccinated at a lower risk of long COVID\*

# Where are we now?

- Percent fully vaccinated (2+ doses)
  - US: 67.4%
    - 65+ years: 92%
  - Minnesota: 67.4%
    - 65+ years: 93.4%
  - Wisconsin: 61.6%
    - 65+ years: 82.3%

# So, now what?

- Primary prevention strategies
  - Masking/social distancing
    - If you're sick, stay home
    - Mask if you have symptoms
- Secondary prevention strategies
  - Maintain a healthy weight
  - Healthy behaviors indirectly reduce risk
  - Get vaccinated
    - Boosters combat waning immunity
    - New vaccines will target multiple strains

# So, now what?

- Recognize that this is new to everyone, and the situation will continue to change
  - What you do today may differ tomorrow, next week, next month, or next year





# Thank you!

- **Mayo Clinic**

- Quantitative Health Sciences
  - Division of Epidemiology
    - REP
    - Survey Research Center
  - Division of Biostatistics
- Kern Center for the Science of Health Care Delivery
- Laboratory Medicine and Pathology

- **Community Partners**

- Olmsted County Health Housing and Human Services
  - Olmsted County Public Health Services
- Olmsted Medical Center
- Zumbro Valley Health Center

# Questions?



Improving health globally by studying health locally  
**A Minnesota and Wisconsin Collaboration**

# References

1. CDC Museum COVID-19 Timeline. 2022. (Accessed 09/07/2022, 2022, at <https://www.cdc.gov/museum/timeline/covid19.html#:~:text=January%2020%2C%202020,January%2018%20in%20Washington%20state.>)
2. Prevention: Levels of Preventive Strategies. Columbia University College of Physicians & Surgeons 2008. (Accessed 09/07/2022, 2022, at [https://edblogs.columbia.edu/pcore/prevention/prevention-preventive-services/.](https://edblogs.columbia.edu/pcore/prevention/prevention-preventive-services/))
3. Lopes GS, Manemann SM, Weston SA, et al. Minnesota COVID-19 Lockdowns: The Effect on Acute Myocardial Infarctions and Revascularizations in the Community. *Mayo Clin Proc Innov Qual Outcomes* 2022;6:77-85.
4. Chu DK, Akl EA, Duda S, et al. Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. *Lancet* 2020;395:1973-87.
5. St Sauver JL, Lopes GS, Rocca WA, et al. Factors Associated With Severe COVID-19 Infection Among Persons of Different Ages Living in a Defined Midwestern US Population. *Mayo Clin Proc* 2021;96:2528-39.
6. Andrews N, Stowe J, Kirsebom F, et al. Covid-19 Vaccine Effectiveness against the Omicron (B.1.1.529) Variant. *N Engl J Med* 2022;386:1532-46.
7. Chemaitelly H, Ayoub HH, AlMukdad S, et al. Duration of mRNA vaccine protection against SARS-CoV-2 Omicron BA.1 and BA.2 subvariants in Qatar. *Nat Commun* 2022;13:3082.
8. Link-Gelles R, Levy ME, Gaglani M, et al. Effectiveness of 2, 3, and 4 COVID-19 mRNA Vaccine Doses Among Immunocompetent Adults During Periods when SARS-CoV-2 Omicron BA.1 and BA.2/BA.2.12.1 Sublineages Predominated - VISION Network, 10 States, December 2021-June 2022. *MMWR Morb Mortal Wkly Rep* 2022;71:931-9.
9. Shiels MS, Haque AT, Berrington de Gonzalez A, Freedman ND. Leading Causes of Death in the US During the COVID-19 Pandemic, March 2020 to October 2021. *JAMA Intern Med* 2022;182:883-6.
10. Al-Aly Z, Xie Y, Bowe B. High-dimensional characterization of post-acute sequelae of COVID-19. *Nature* 2021;594:259-64.

# References (cont)

11. Ballering AV, van Zon SKR, Olde Hartman TC, Rosmalen JGM, Lifelines Corona Research I. Persistence of somatic symptoms after COVID-19 in the Netherlands: an observational cohort study. *Lancet* 2022;400:452-61.
12. Vilches TN, Moghadas SM, Sah P, et al. Estimating COVID-19 Infections, Hospitalizations, and Deaths Following the US Vaccination Campaigns During the Pandemic. *JAMA Netw Open* 2022;5:e2142725.
13. Notarte KI, Catahay JA, Velasco JV, et al. Impact of COVID-19 vaccination on the risk of developing long-COVID and on existing long-COVID symptoms: A systematic review. *EClinicalMedicine* 2022;53:101624.