Update on SeroHub:
https://covid19serohub.nih.gov/

Neal Freedman on behalf of the NCI/CDC/NIAID Covid-19 SeroHub Team

Key contributors:

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Engineering: Anna Lu, Adil Asheer, Aniekan Essiet, Cary Coulter, Cameron Crouch, Bill Dyer, Vivek Ramani, Zuly Yushannuo
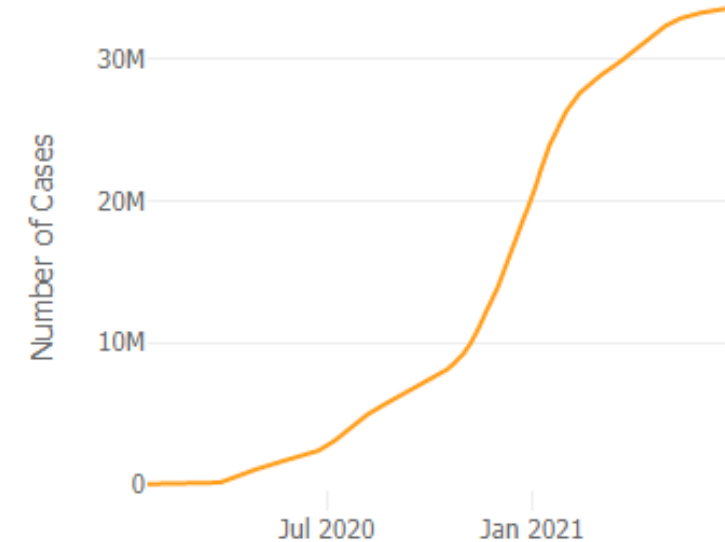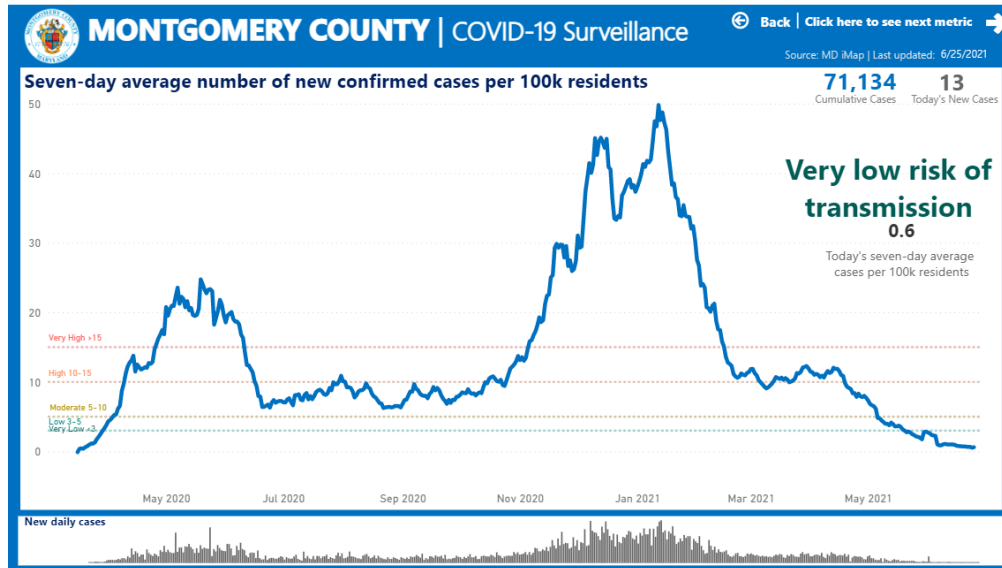
Study Abstraction: Konuralp Bayrak, Xiangning Bu, Christina Coppola, Rebecca Fuchs, Cindy Winter

Background: diagnosed cases are only a subset of the true incidence of SARS-CoV-2 infection

https://www.montgomerycountymd.gov/covid19/data/#dashboard

https://coronavirus.jhu.edu/data/cumulative-cases

CDC has estimated 1 in 4.3 COVID-19 cases reported through March 2021

https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/burden.html

What was the need?*

Seroprevalence studies provide insight into the true cumulative incidence of exposure

Numerous seroprevalence studies have been conducted in the US, with different designs, antibody tests, and populations.

Project arose out of discussions within HHS, particularly CDC and NIH

Need for an interactive database to identify studies and integrate them together to capture infection trends over time and in different geographic areas of the US.

*Highlighted at May 7, 2020 COVID-19 Serology Studies Workshop (https://www.cell.com/immunity/pdfExtended/S1074-7613(20)30267-3)

Leverages expertise gained from the NCI Clinical Trials Reporting Program: https://www.cancer.gov/about-nci/organization/ccct/ctrp

COVID-19 SeroHub
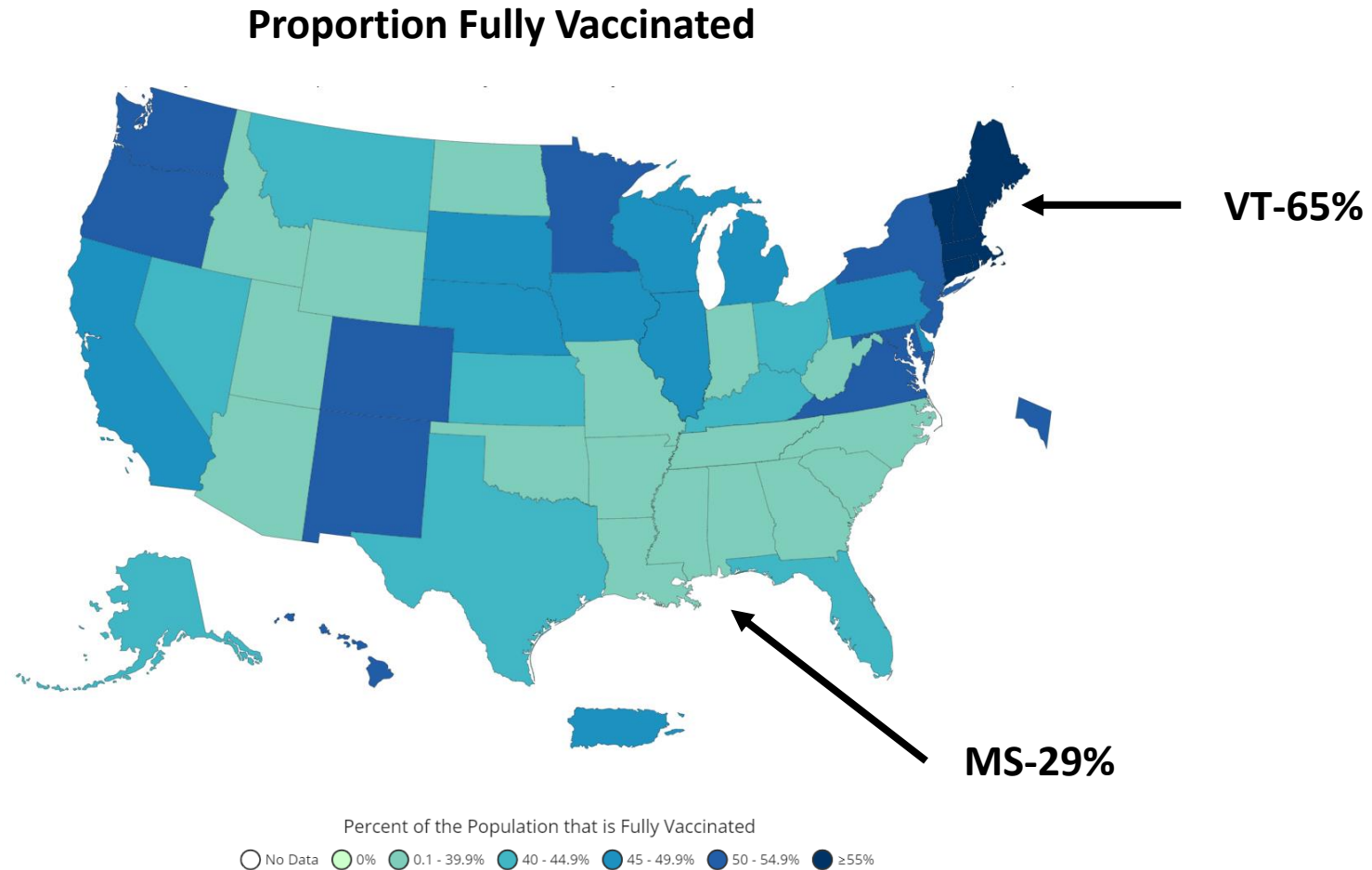
AIMS:

1) Develop a transparent and publicly accessible repository to systematically document and track SARS-CoV-2 seroprevalence studies in the United States

2) Develop a harmonized way to catalog and store study information and seroprevalence results

3) Develop an interactive dashboard to visualize and compare seroprevalence results by geography, calendar time, and other key factors.

Continued importance of seroprevalence studies in an era of vaccination

Proportion Fully Vaccinated

VT-65%

MS-29%

Percent of the Population that is Fully Vaccinated

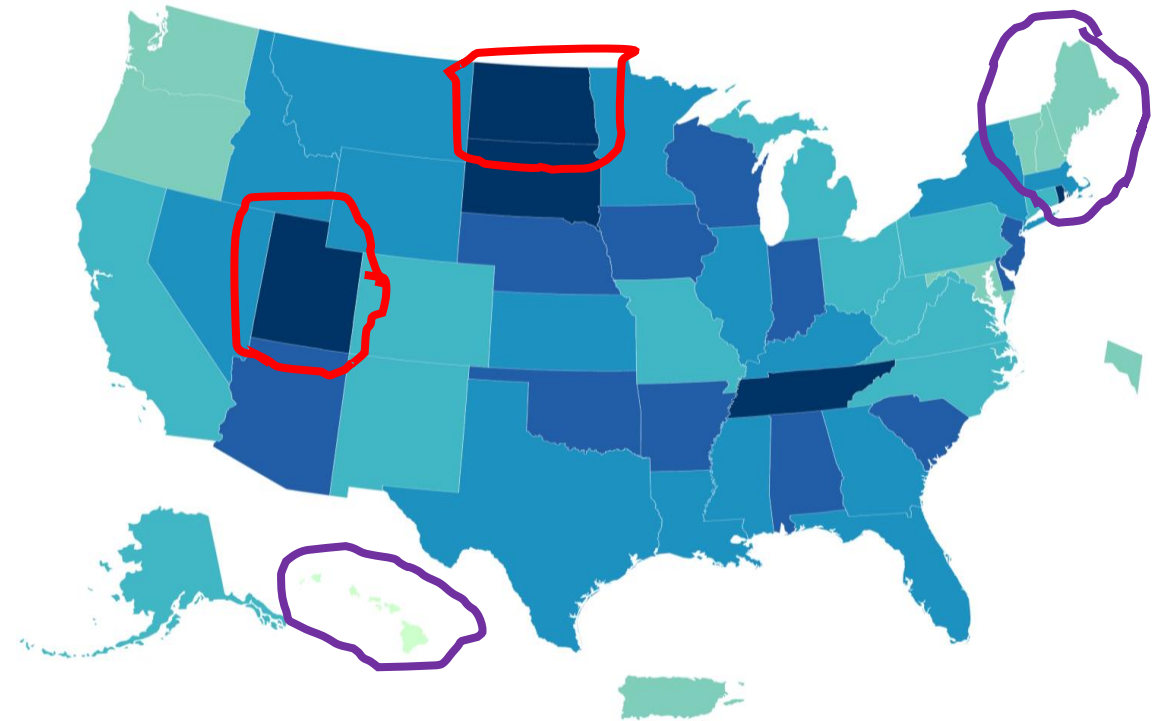◯ No Data ◯ 0% ◯ 0.1 - 39.9% ◯ 40 - 44.9% ◯ 45 - 49.9% ◯ 50 - 54.9% ◯ ≥55%

https://covid.cdc.gov/covid-data-tracker/#datatracker-home

Continued importance of seroprevalence studies in an era of vaccination

Proportion Fully Vaccinated
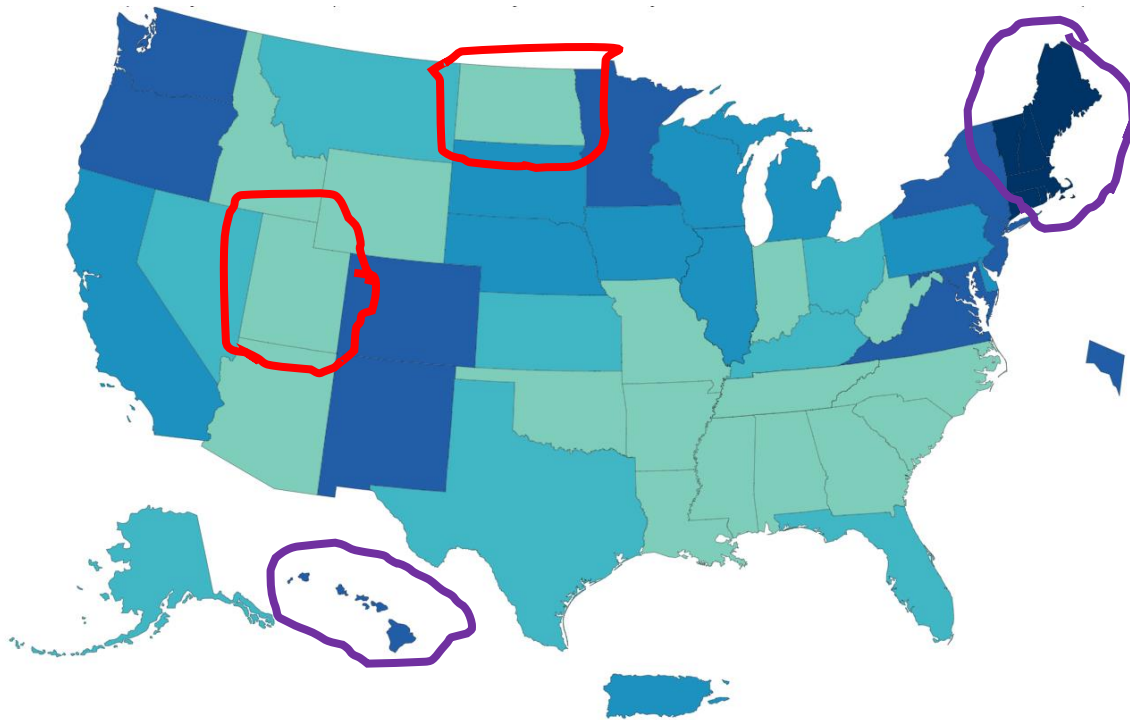
COVID-19 case rate per 100,000

Percent of the Population that is Fully Vaccinated

○ No Data ○ 0% ○ 0.1 - 39.9% ○ 40 - 44.9% ○ 45 - 49.9% ● 50 - 54.9% ● ≥55%

Case Rate per 100,000

Data not available ● 0.000 - 3.667k ● 3.909k - 7.643k ● 7.963k - 10.03k ● 10.29k - 10.97k ● 11.18k - 12.26k ● 12.69k - 14.52k ●

https://covid.cdc.gov/covid-data-tracker/#datatracker-home

Seroprevalence studies also give insight the contributions of natural immunity and vaccine-induced immunity

Nucleocapsid

Spike glycoprotein (S)

Membrane protein (M)

Envelope (E)

RNA

Hemagglutinin esterase-dimer
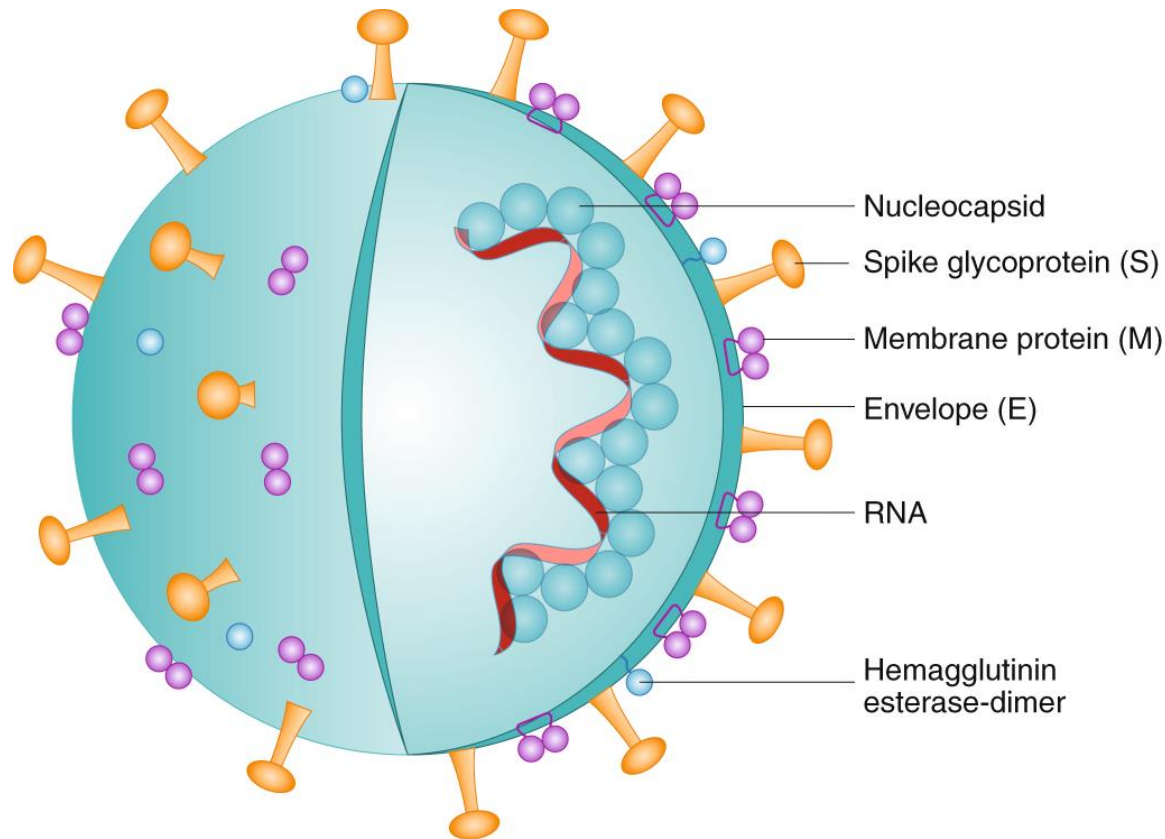
Large effort to develop good serology tests

Good antibody tests have been developed against both spike and nucleocapsid

Vaccines target spike (at least so far)

Distinguish natural immunity (spike + nucleocapsid) from vaccine-induced immunity (spike)

Many seroprevalence studies have been initiated worldwide

Very large national studies (such as CDC Commercial Laboratory Seroprevalence Survey)

County-based studies

Studies among special populations (health care workers, pregnant women, athletic organizations, first responders)

Findings from studies published in a variety of ways
   peer-reviewed journals, pre-print servers, websites, press releases

Variability in study objectives; study and test methodologies

No standardized way to share plans, methods, and results

Population Point Prevalence of SARS-CoV-2 Infection Based on a Statewide Random Sample — Indiana, April 25–29, 2020

On July 21, 2020, this report was posted online as an MMWR Early Release.

Please note: This report has been corrected. An erratum has been published.

Nir Menachemi, PhD[1,2]; Constantin T. Yiannoutsos, PhD[1]; Brian E. Dixon, PhD[1,2]; Thomas J. Duszynski, MPH[1]; William F. Fadel, PhD[1]; Kara K. Wools-Kaloustian, MD[3]; Nadia Unruh Needleman, MS[1]; Kristina Box, MD[4]; Virginia Caine, MD[5]; Connor Norwood, PhD[6]; Lindsay Weaver, MD[4]; Paul K. Halverson, DrPH[1] (View author affiliations)

View suggested citation

Summary

What is already known about this topic?

No state has conducted a random sample study to determine the population prevalence of SARS-CoV-2 infection at a given point in time.

What is added by this report?

In a random sample of Indiana residents aged ≥12 years, the estimated prevalence of current or previous SARS-CoV-2 infection in late April 2020 was 2.79%. Among persons with active infection, 44% reported no symptoms.

What are the implications for public health practice?

The number of reported cases represents an estimated one of 10 infections. Given that many persons in Indiana remain susceptible, adherence to evidence-based public health mitigation measures (e.g., social distancing, consistent and correct use of face coverings, and hand hygiene) is needed to reduce surge in hospitalizations and prevent morbidity and mortality from COVID-19.

Article Metrics

Altmetric:

633

- News (50)
- Blogs (7)
- Policy documents (1)
- Twitter (252)
- Facebook (4)
- Reddit (1)

Citations: 1

Views: 15,912

Views equals page views plus PDF downloads

Metric Details

Tables

Table 1

Table 2
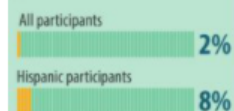
References

Related Materials

PDF [104K]

Indiana survey found higher rates of COVID-19 infection among Hispanic/Latino participants in April*

To slow spread in minority communities:

Evidence of current or previous infection

All participants **2%**

Hispanic participants **8%**

Everyone should
- ✓ Social distance
- ✓ Wash hands frequently
- ✓ Wear cloth face coverings

Communities can
- ✓ Involve local leaders
- ✓ Provide language-appropriate education
- ✓ Increase testing and contact tracing
- ✓ Decrease workplace exposures

Morbidity and Mortality Weekly Report (*MMWR*)

CDC

Estimated Community Seroprevalence of SARS-CoV-2 Antibodies — Two Georgia Counties, April 28–May 3, 2020

Holly M. Biggs, MD[1]; Jennifer B. Harris, PhD[1]; Lucy Breakwell, PhD[1]; F. Scott Dahlgren, MSPH[1]; Glen R. Abedi, MPH[1]; Christine M. Szablewski, DVM[2,3]; Jan Drobeniuc, MD, PhD[1]; Nirma D. Bustamante, MD[1,3]; Olivia Almendares, MSPH[1]; Amy H. Schnall, MPH[1]; Zunera Gilani, PhD[1]; Tiffany Smith, MPH[1]; Laura Gieraltowski, PhD[1]; Jeffrey A. Johnson, PhD[1]; Kristina L. Bajema, MD[1,3]; Kelsey McDavid, MPH[1]; Ilana J. Schafer, DVM[1]; Vickie Sullivan, MPH[1]; Lili Punkova, MS[1]; Alexandra Tejada-Strop, MS[1]; Raiza Amiling, MPH[1]; Claire P. Mattison, MPH[1]; Margaret M. Cortese, MD[1]; S. Elizabeth Ford, MD[2,4]; Lynn A. Paxton, MD[2,5]; Cherie Drenzek, DVM[2]; Jacqueline E. Tate, PhD[1]; CDC Field Surveyor Team (View author affiliations)

View suggested citation

Summary

What is already known about this topic?

SARS-CoV-2 infection in persons who are asymptomatic or not tested might not be recognized by case-based and syndromic surveillance; therefore, the population prevalence of past infection might be unknown.

What is added by this report?

A community seroprevalence survey, conducted in two counties in metropolitan Atlanta during April 28–May 3, using a two-stage cluster sampling design and serologic testing, estimated that 2.5% of the population had antibodies to SARS-CoV-2.

What are the implications for public health practice?

Serologic surveillance can complement case-based and syndromic surveillance. At the time of this survey, most of the two-county population had not been previously infected with SARS-CoV-2, highlighting the importance of continued mitigation measures to prevent infection, including social distancing, consistent and correct use of face coverings, and hand hygiene.

Transmission of SARS-CoV-2, the virus that causes coronavirus disease 2019 (COVID-19), is ongoing in many communities throughout the United States. Although case-based and syndromic surveillance are critical for monitoring the pandemic, these systems rely on persons obtaining testing or reporting a COVID-19–like illness. Using serologic tests to detect the presence of

Article Metrics

Altmetric:

215

News (14)
Blogs (3)
Policy documents (1)
Twitter (126)
Facebook (2)

Mendeley (123)

Citations: 29

Views: 11,908
Views equals page views plus PDF downloads

Metric Details

Tables

to add notes

CDC Nationwide Commercial Lab Seroprevalence Survey

https://covid.cdc.gov/covid-data-tracker/#national-lab

https://covid.cdc.gov/covid-data-tracker/#nationwide-blood-donor-seroprevalence

ONLINE FIRST   FREE
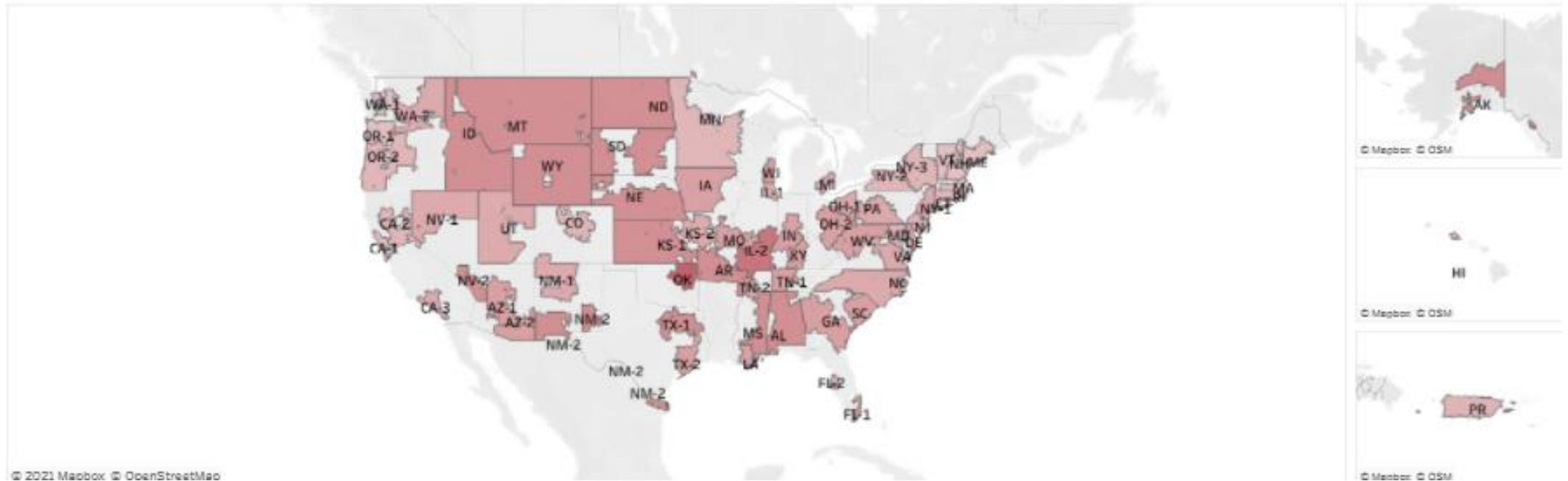
Prevalence of SARS-CoV-2 Infection Among Health Care Workers in a Tertiary Community Hospital

Allen Jeremias, MD, MSc[1]; James Nguyen, MD[1]; Joseph Levine, MD[1]; et al

» Author Affiliations | Article Information

Figure. Health Care Workers Who Tested Positive for SARS-CoV-2 Antibodies by Job Title and Department
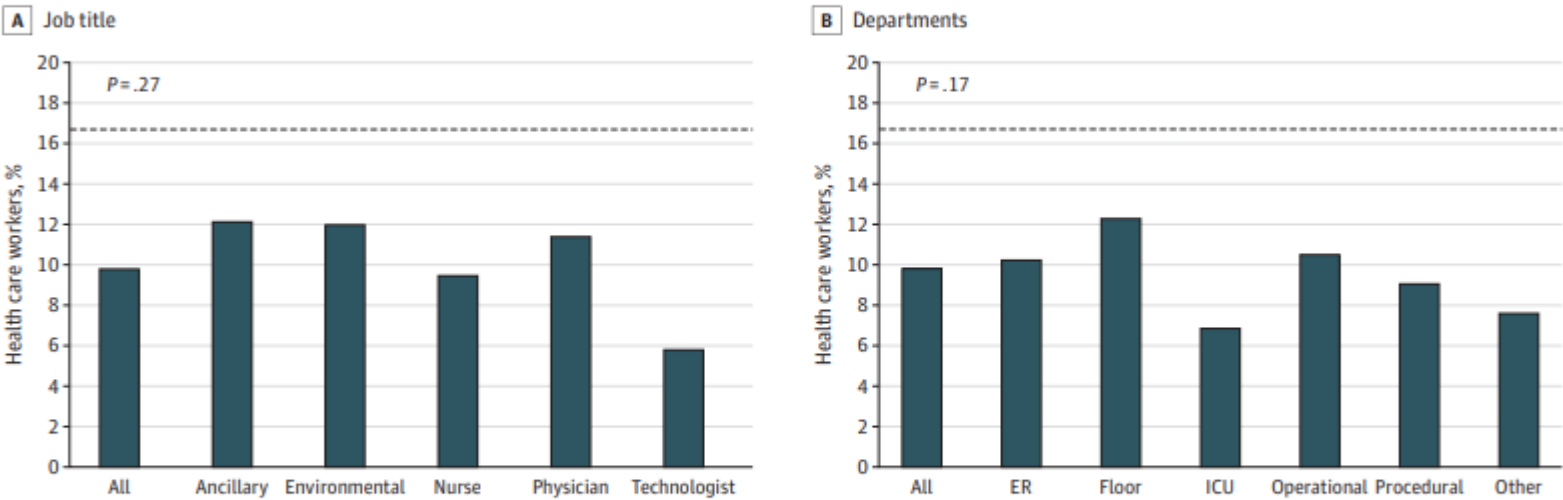

Percentage of employees who tested positive for antibodies based on job title (A) and department (B). The dotted line indicates the general population on Long Island. A total of 1699 employees were surveyed, including 322 in ancillary services, 100 in environmental health, 1043 nurses, 79 physicians, and 155 technologists. Of the 1699 employees, 88 worked in the emergency room (ER), 489 on the hospital floor, 321 in the intensive care unit (ICU), 400 in operational services (ie, employees who rotate through all areas of the hospital), 243 in procedural services (eg, operating room, cardiac procedures, diagnostic radiology procedures, endoscopy), and 158 in other services.

Figure 2: Prevalence of SARS-CoV-2 antibodies in sampled population of dialysis patients, by state
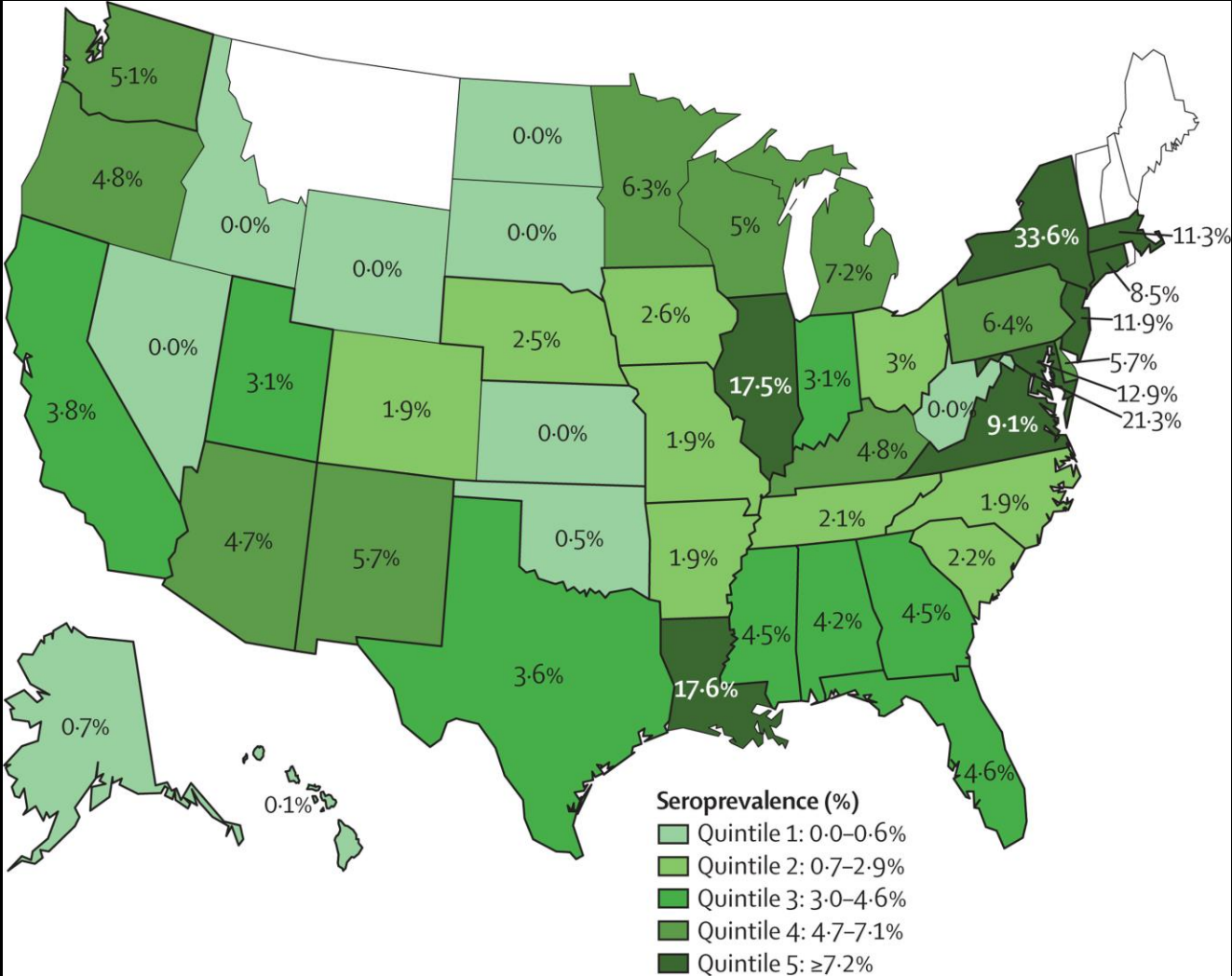
Prevalence of SARS-CoV-2 antibodies in a large nationwide sample of patients on dialysis in the USA: a cross-sectional study
The Lancet DOI: (10.1016/S0140-6736(20)32009-2)
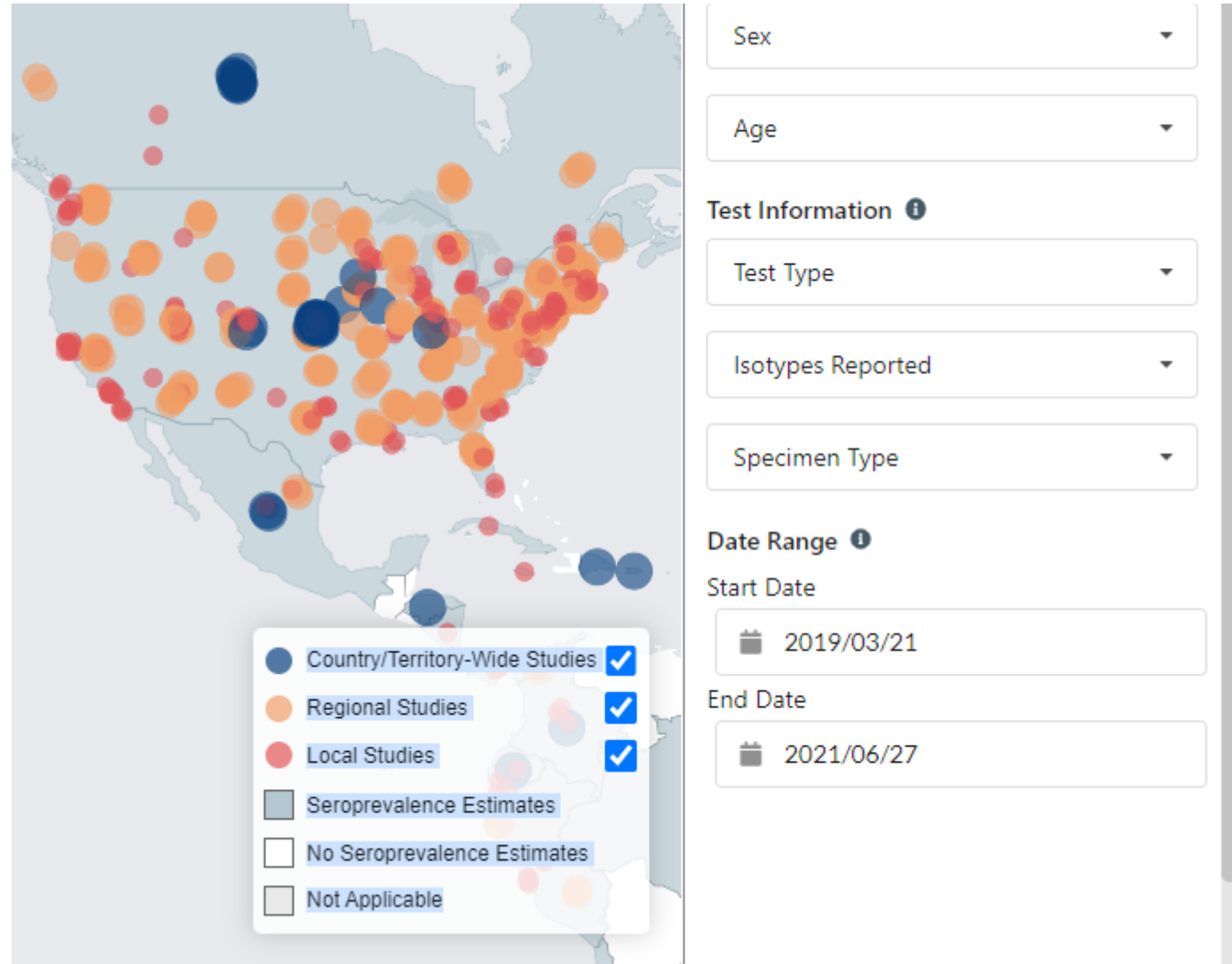
A number of efforts have been conducted to track seroprevalence studies

Traditional meta-analyses

SeroTracker (https://serotracker.com)

Our goal: how has seroprevalence has changed in the US overtime by geographic region and population

What we do

Identify seroprevalence studies via

>MedRxiv, PubMed, LITCOVID, Serotracker, journal TOCs

>Suggestions through our website (**Study Submission Template**)

Determine relevancy

Studies/papers are extracted for Common Data Elements

Reach out to study authors, if necessary (*e.g.* no collection dates)

Stringent quality control processes

SOPs for study identification, extraction of study data, quality control of data entry

SeroHub: Captured data fields

Title, organization, authors, contact information

Objectives

Population

Sampling methodology

Location (s)

Collection period(s) and frequency

Test information (sample type, manufacturer, test name, test type, EUA authorized, antibody isotypes, target antigen(s), sensitivity, specificity)

Has data been released? If so, where is it located

Seroprevalence results by geography, date, and demographic determinants

SeroHub: Behind the scenes processing

Store study data, test information, and seroprevalence results

Some studies have complicated designs (multiple sample populations and study sites, serial collections, multiple serology tests used ...)

Each seroprevalence result is tagged with information about sample collection date, population, test used, and demographic data

Easy to use visualization tools to help users view results and conduct simple and more sophisticated analyses

Interactive seroprevalence tool, study map, search functions, study pages, download data directly and via API

https://covid19serohub.nih.gov/

Next Steps

Continuing to abstract and enter studies into SeroHub

Nationwide Blood Donor Seroprevalence Survey (spike & nucleocapsid)

Nucleocapsid and spike comparisons will be available in more and more studies

Thank you!

Please share your feedback, suggestions, and contribute studies!