

Equity mapping: Visualizing community vulnerability to COVID- 19 and vaccine access

U.S. Public Health Accompaniment Unit
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Context for these materials

This deck is intended to provide guidance for community leaders in the use of mapping processes that proactively engage community members in the co-creation of vaccination information resources and vaccination opportunities.

Mapping and visualization are discussed here in relation to COVID-19 vaccines and developing equitable systems for vaccine distribution. The concepts and the tools discussed are applicable to other health issues, and relevant for strengthening community engagement outside of the current pandemic context.

The ideas presented in this deck reflect the latest public health thinking and scientific evidence as of September 2021. However, the COVID-19 landscape is changing dramatically daily, and so must our recommendations over time.

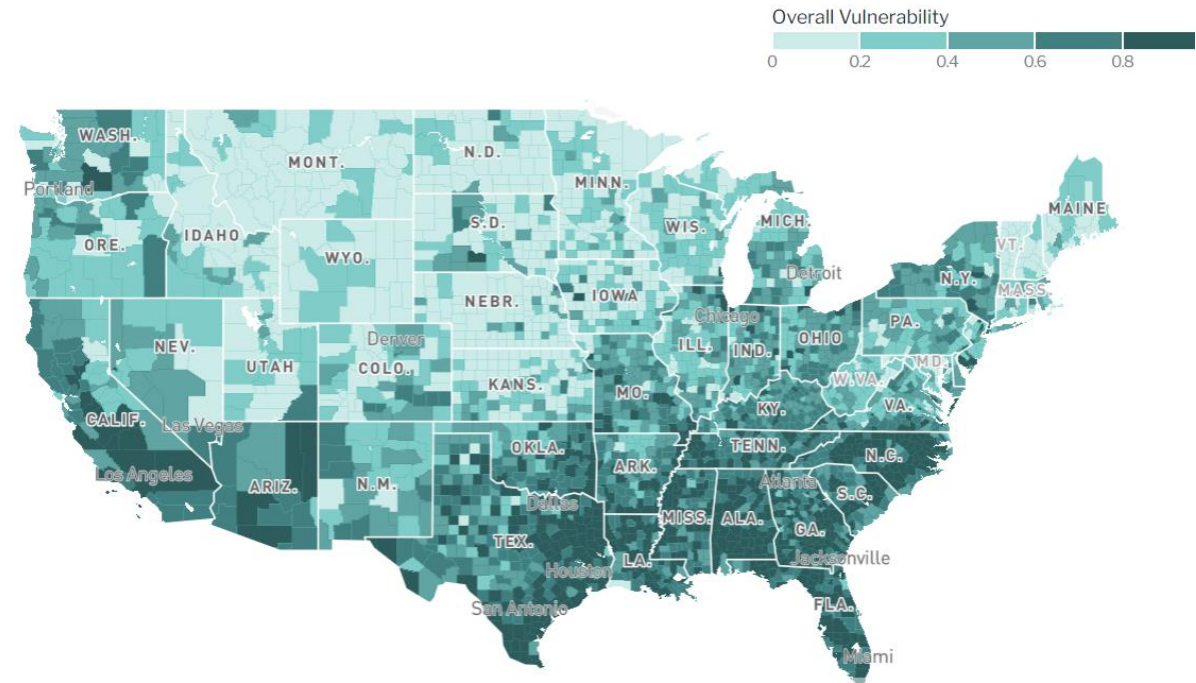
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Strategic planning for equitable vaccine access

Deployment of COVID-19 vaccine in the United States has again highlighted the pervasive [inequity](#) of our health system, leaving the most vulnerable communities more likely to experience severe health and economic consequences as a result of under-vaccination.

For vaccine rollout to be efficient and equitable, distribution plans must be:

- Evidence-based
- Community-driven
- Inclusive of resource opportunities and constraints



Source: [Surgo Ventures](#)

From abstraction to reality: transforming data through mapping

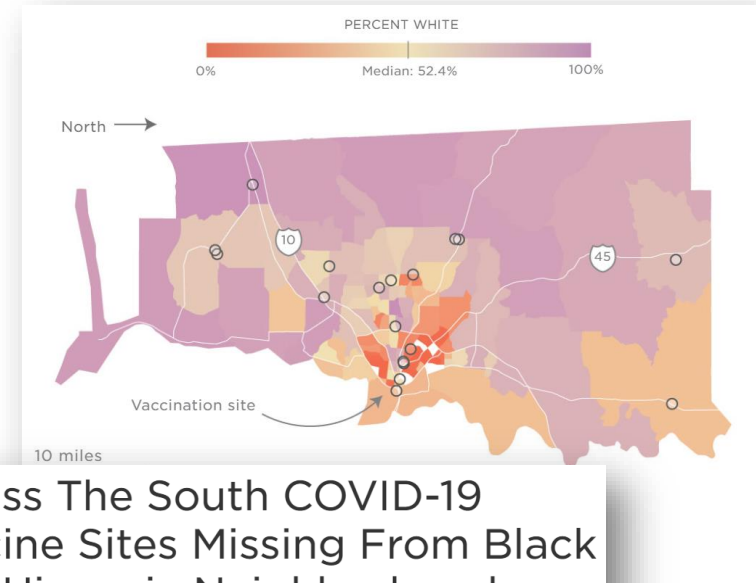
Mapping is an accessible data visualization approach that can be used to **spark discussion and drive collaborative planning** among community stakeholders with the shared goal of improving vaccine access.

Visualizing equity and access through mapping can:

- Illuminate key aspects of vaccine supply and demand
- Highlight where health care and community resources are situated
- Visually represent patterns of historical and structural marginalization

Readily available mapping tools paired with deliberate and inclusive processes can enhance transparency in decision-making and elicit community insights.

Mapping adds visual context to quantitative data, highlighting the spatial reality for vulnerable communities versus where resources are located.



Across The South COVID-19 Vaccine Sites Missing From Black And Hispanic Neighborhoods

Overview of mapping process: 4 steps to drive equitable vaccine distribution

1. Plan

*Convene
stakeholders.
Identify priorities.*

2. Map

*Synthesize
available data.
Generate
visuals.*

3. Engage

*Collaboratively
explore results.
Identify areas of
vulnerability and
discuss solutions.*

4. Act

*Deploy resources.
Follow up with
further analysis.*

Mapping process in detail

Plan

Map

Engage

Act

Convene stakeholders

- Community members
- Community-based organizations
- Local Health Department
- Faith-based organizations
- Health systems (FQHC, hospitals)
- Retail Pharmacy
- Local transit, housing

Synthesize equity and access data

Demographic data:

- Race and Ethnicity
- Age
- Population density

Infrastructure data:

- Current and planned vaccination sites
- Transit routes
- Walkability
- Community resources

Explore data and facilitate discussion

- Vaccine site clusters and gaps
- Multiple perspectives of vulnerability
- Layered perspectives

Deploy resources

- Mobile units
- Pop-up clinics
- At-home vaccination
- Transportation opportunities
- Social and medical resources

1. Determine priority analyses with community stakeholders

Plan

1 What are the anticipated vaccine access issues in your community?

- Inadequate public transportation and infrastructure
- Scarcity of vaccination locations, vaccine allotments
- Vaccine hesitancy
- Limited community engagement

2 What demographic and social factors exacerbate barriers to access?

- Poverty
- Advanced age and mobility
- Co-morbidities
- Work environment

3 What assets exist in the community?

- Vaccination sites & testing infrastructure
- CBOs, Faith-based organizations
- Places of worship, public spaces (e.g. libraries)

Data requirements for mapping

- **Quality:** trustworthy data sources that include your geographical area of focus (e.g., ACS, surveys from systematic CHW outreach, etc.)
- **Relevance:** data sufficiently represents phenomena of interest (e.g., low-SES as proxy for resource-constrained)
- **Actionability:** Indicators representing resources, vulnerability, vaccine information, and vaccine outcomes can be modified through intervention

Consider different data when using mapping platforms or creating custom maps

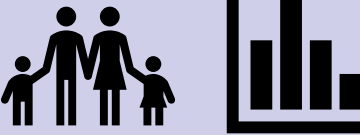

Start simple—examine single dimensions of access and vulnerability, and expand analyses as additional questions arise

Ready-made resources:

- [Surgo Ventures](#)
- [RTI](#)
- [Westhealth Vaxmap](#)
- [Johns Hopkins](#)
- [RxOpen](#)
- [Vaccine allocation](#)
- [Google maps](#)

Do it yourself tools:

- [ArcGIS](#)
- [Shiny R Studio](#)
- [Excel](#)
- [Google maps](#)

 Centralized, systematic data	US Census	Social Vulnerability Index (SVI)
	COVID-19 cases, mortality	COVID-19 Community Vulnerability Index (CCVI)
 Community-generated data	Vaccine locations	Places of worship
	Transportation hubs/routes	Schools
	Community health outreach locations	Health care facilities
		Libraries, community centers

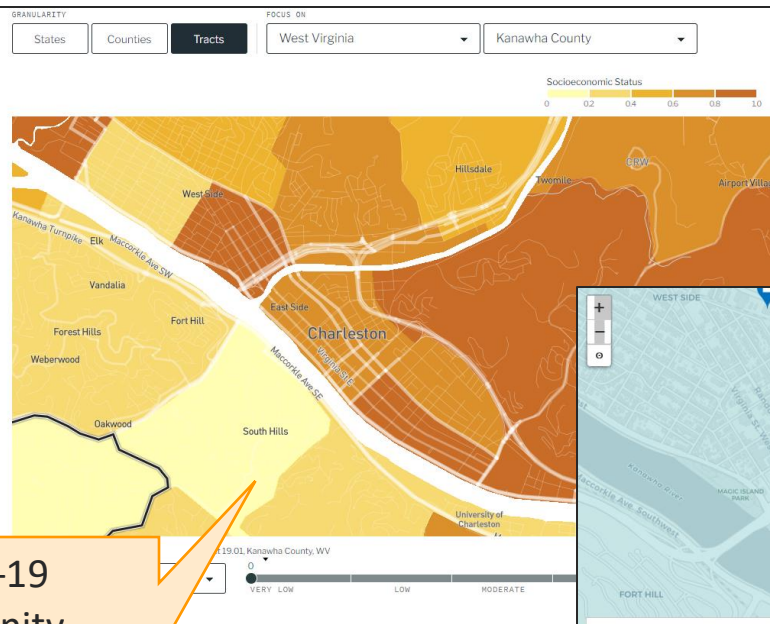
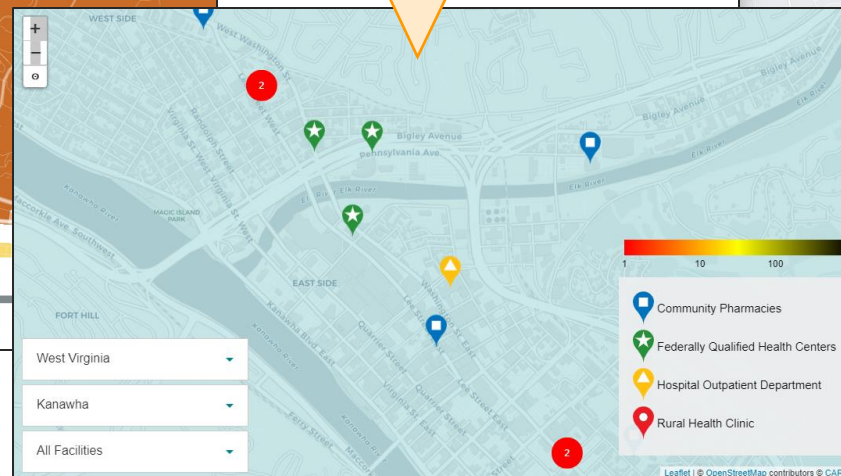
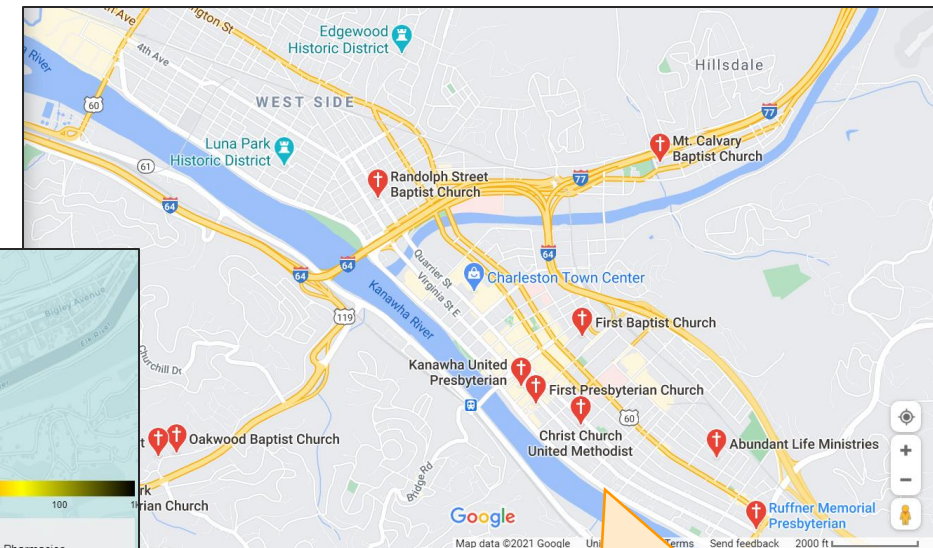
2. Use existing tools to generate maps

Map

Facilities able to
administer vaccines
[Westhealth Vaxmap](#)

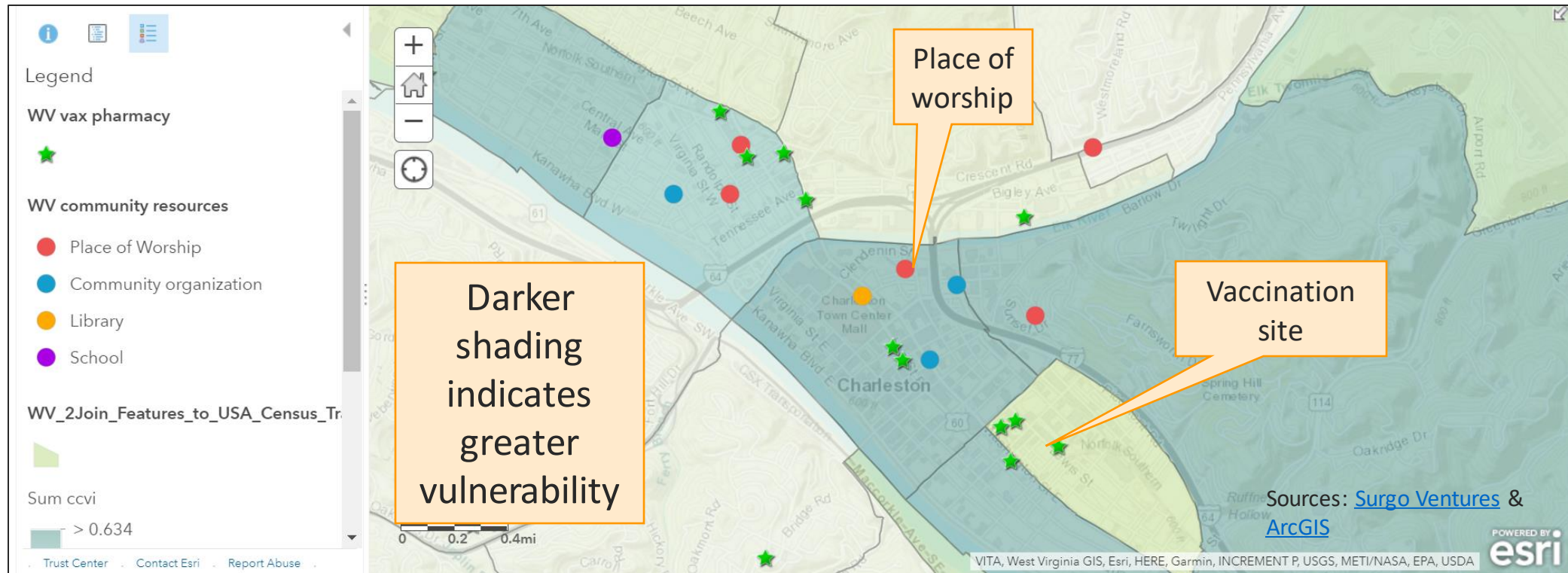
Places of worship
[Google maps](#)

COVID-19
Community
Vulnerability Index
(CCVI)
[Surgo Ventures](#)



Or compile data to generate custom visuals

Map



3. Explore maps with community members



Engage

What features stand out?

- Disparities and/or trends in vulnerability and access, between and across map locations
- Resource clusters and gaps (vaccination sites, community infrastructure)
- Proximity of community resources within areas of varying demographic and social make-up

What isn't visualized?

Community members can highlight access opportunities and barriers that don't show up on initial visualization (e.g., current community outreach initiatives, CHW coverage, trustworthiness of clinics, unsafe areas for walking, etc.)

What interventions should occur? Where?

Community engagement:

- Areas under-represented
- Areas where information has been inconsistently available, and hesitancy may be a factor

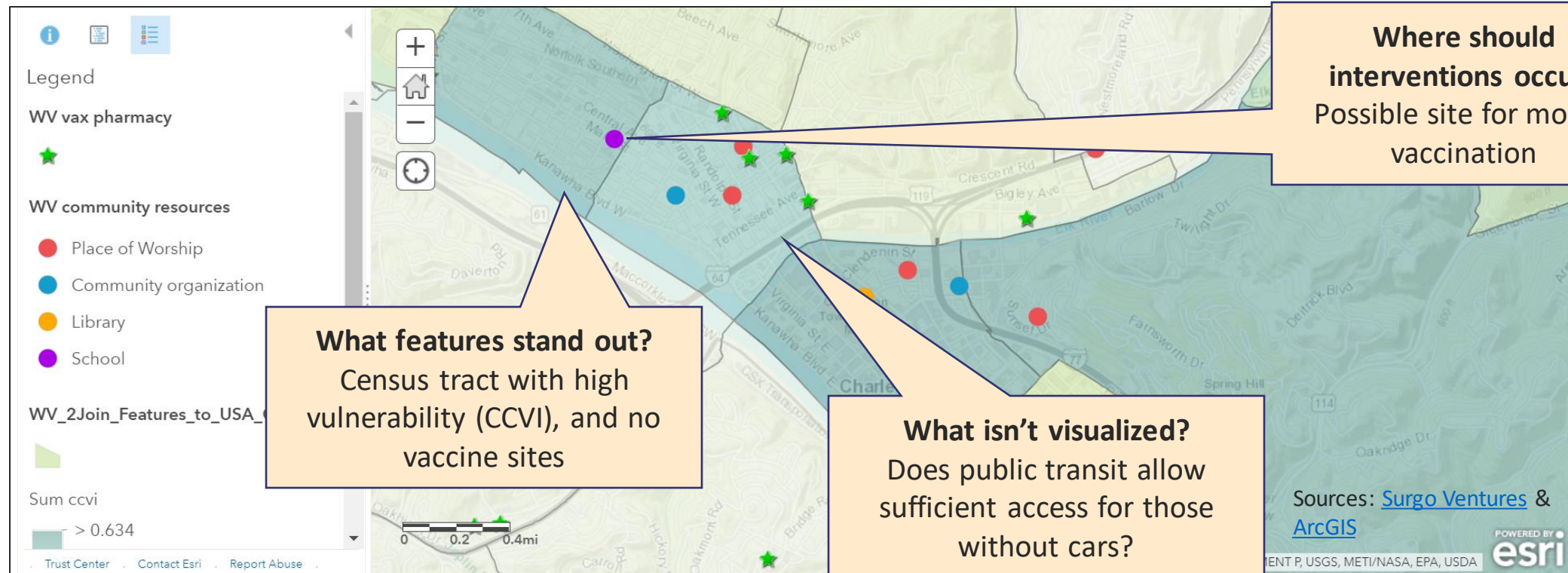
Vaccine sites:

- Pharmacy and health care “deserts”
- Co-location with social care resources

Collaborate with epidemiologists to increase accuracy and consistency of analyses, and to help ensure alignment between stakeholders.

Explore mapped resources and gaps with community members

Engage



From questions to collaboration: Integrating community voices in data analysis

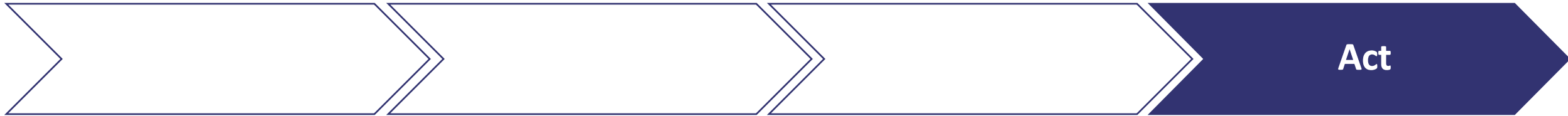
Including community members in mapping exploration and discussions ensures that:

- **Data is subject to diverse interpretations**
- **Decision-making is transparent, and accountable to community interests**
- **Planned initiatives and trade-offs are proactively workshopped and socialized**

Mapping and other visuals used in planning equitable vaccination can be discussed alongside other information during:

- Community town halls
- CBO-hosted webinars
- Ongoing community outreach by
- trusted messengers

4. Determine course of action based on shared insights



Prioritize solutions:

- Community outreach
- Vaccine site establishment and operations
- Social and medical resource coordination with vaccine sites

Coordinate efforts:

- Leverage community and faith-based organization outreach mechanisms, and infrastructure
- Determine roles and responsibilities among government, technical, medical, and community partners based on experience working in the community

How can accountability be ensured?

- Encourage decision-making authorities to utilize maps AND include community perspectives in their creation and interpretation
- Revisit maps at subsequent public fora, highlighting resource allocation changes or on-going implementation challenges

Data considerations and interpretation of results

Assess the quality of your data:

- **Reliability:** Who is the publisher? What sources have they used?
- **Relevance:** When was the dataset last updated?
- **Completeness:** How comprehensive is the dataset?
- **Equity:** Is your data disaggregated? Along which dimensions?

Determine scale of your analysis:

- At what level are you examining and interpreting vaccine access information?
- At what level do you need data for your analysis (e.g., state, county, census tract)?

Orient towards action: Will the results yield useful information? Is mapping going to drive decision-making, or is it purely a thought exercise?

Interpret critically: Patterns or gradients of vulnerability, and perceived distance to resources may be artificially enhanced in some maps and not accurately reflect real-life disparities or access barriers

The screenshot shows a document from the National Forum on COVID-19 Vaccine. The title is 'Using Data and Maps to Inform Vaccine Distribution and Implementation'. It includes an accessible link, a summary of the report's purpose, and a list of tips for using data to improve vaccination program success. The tips are: 1. Determine the size of the population to reach, 2. Ensure equitable access, and 3. Map the distribution of the population. There are also references and additional resources listed at the bottom.

NATIONAL FORUM ON COVID-19 VACCINE

Using Data and Maps to Inform Vaccine Distribution and Implementation

Accessible link: www.cdc.gov/covid/bocof/forum

To improve vaccination among populations of interest, jurisdictions must know where these groups of people are located to ensure they provide access to vaccination services. Create visual maps that show information such as employment locations for the critical infrastructure workforce category or places where people congregate, such as community centers or churches. This can help you plan COVID-19 vaccination clinics, especially for satellite, temporary, or off-site clinics.

4. Consider vaccination barriers for the population. Barriers to vaccination include transportation/drive time, vaccination site hours of operation, and ease of sign-up. Once barriers have been identified for your population, you can map based on demographic characteristics at the county level or lower.

5. Overlay the maps of the population to reach with vaccination providers.

Tips for Using Data to Improve Vaccination Program Success

- 1. Determine the size of the population to reach.**
 - » Reach out to partner agencies and organizations, including the emergency management agency, labor department, chamber of commerce, business healthcare coalitions, chronic disease/nutrition programs, community-based organizations, and faith-based organizations, to help accurately estimate of the size of the population group.
 - » Use electronic health records or administrative data to estimate the size and location of your population of interest.
- 2. Ensure equitable access.** Use mapping tools like CDC's [Social Vulnerability Index](#) or the [Mapping Medicare Disparities Tool](#) to identify areas with health disparities. This can help you determine where additional providers might be needed and the best way to use existing infrastructure as vaccination sites.
- 3. Map the distribution of the population.** Ask the questions below to start identifying what map is needed.
 - » Where are the vaccine distribution hubs?
 - » Where are the vaccination points such as clinics, pharmacies, and mass vaccination centers?
 - » Where are the providers, and what is their capacity?
 - » Where are vaccination points within or near your ZIP code?
 - » Where are the populations that are disproportionately affected?
 - » Where are your populations of interest for each vaccination phase?

References

CDC | [Vaccination Playbook](#) (see Section 4, Appendix G)
CDC | [Vaccination Playbook Annex](#) (see page 8)
CDC | [Vaccination Implementation Strategies to Consider for Populations Recommended to Receive Initial Doses of COVID-19 Vaccine Implementation](#)

Additional Resources

CDC | [Social Vulnerability Index \(SVI\)](#)
CDC | [Cartographic Guidelines for Public Health](#)
Esri | [COVID-19 GIS Hub](#)
Esri | [COVID-19 Vaccine Distribution Tools](#)
GIS | [The Potential role of GIS in COVID-19 Vaccine Distribution](#)

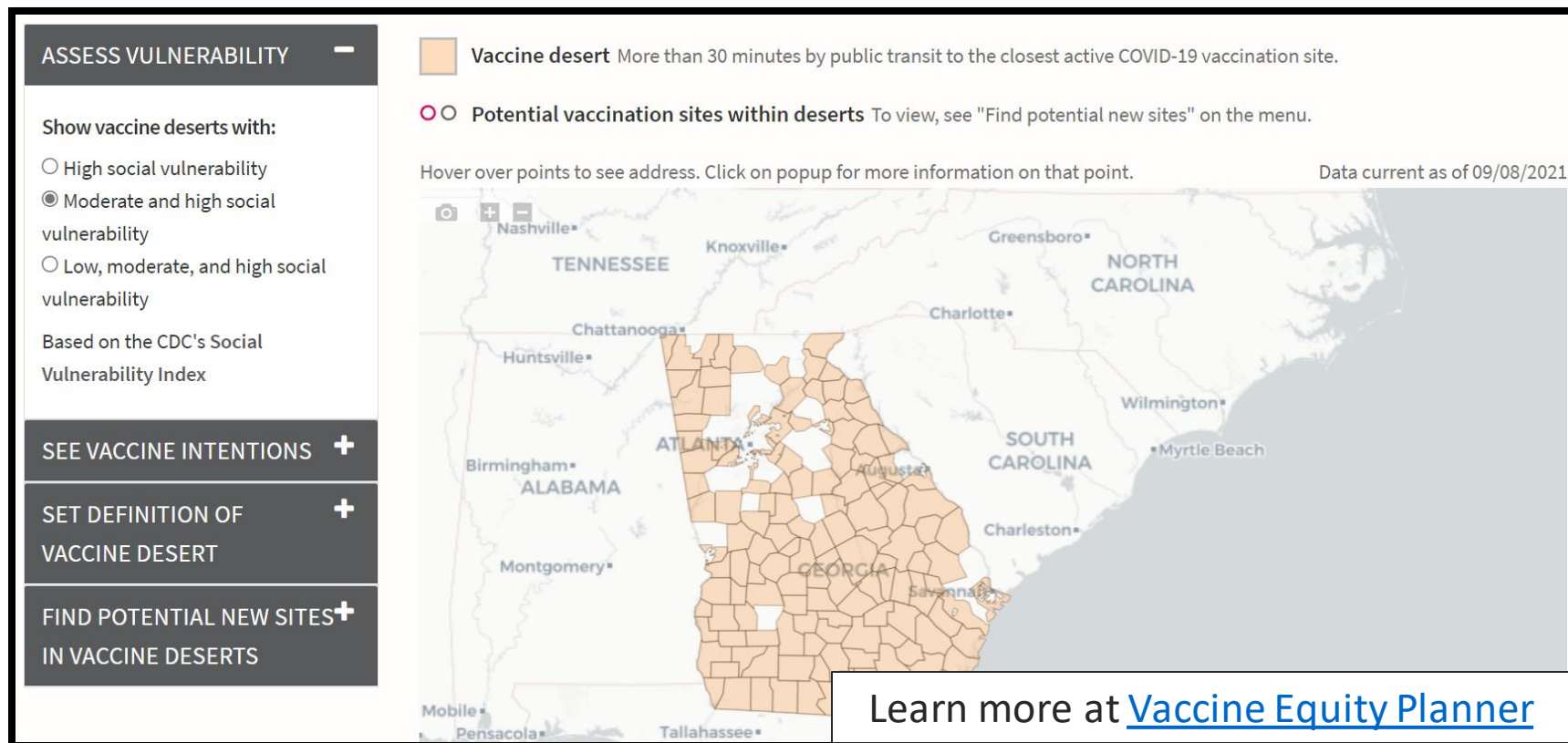
U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Platforms for mapping

Using existing tools for visualizing resources and gaps

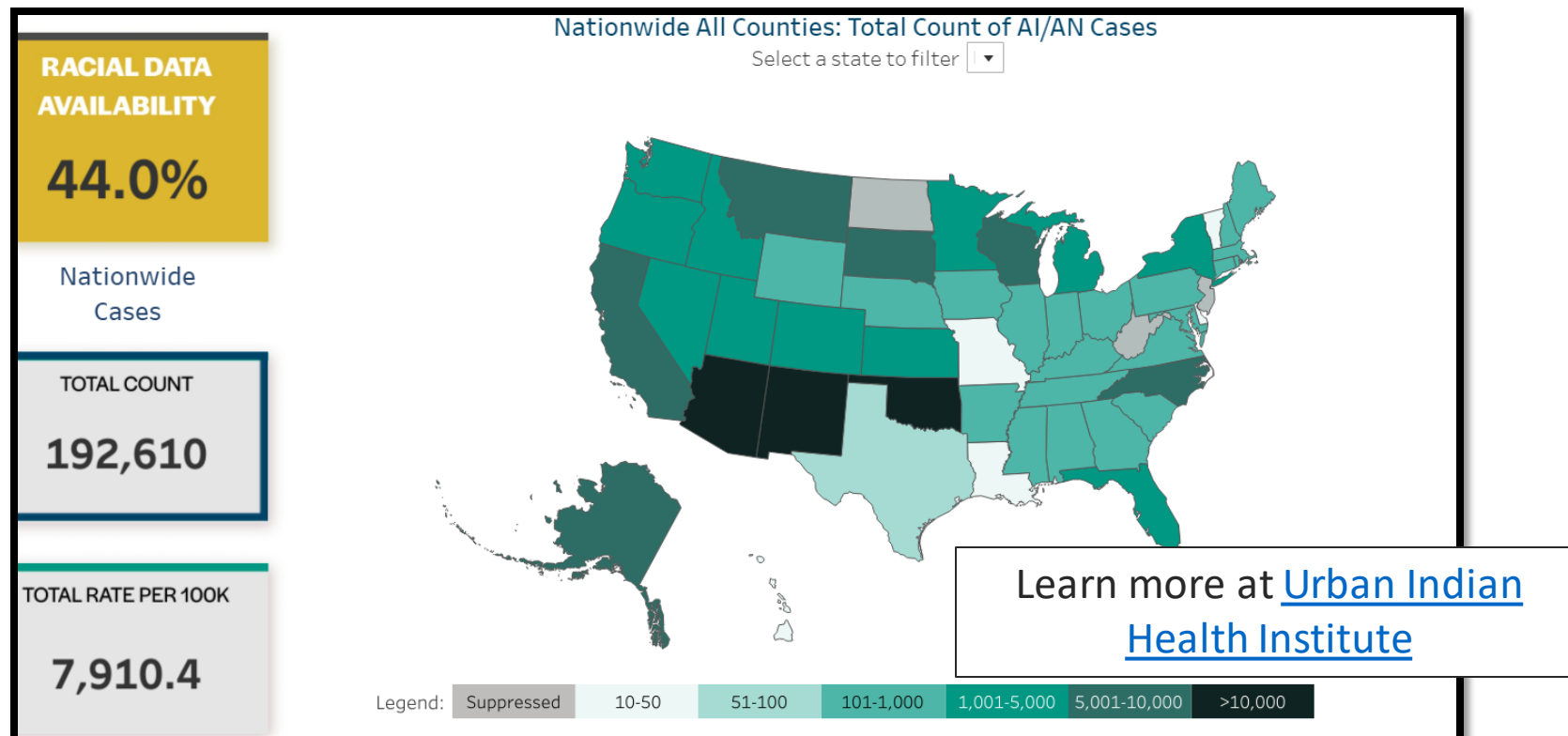
Using existing tools: Mapping Vaccine Desserts

This platform displays vaccine desserts. Such information can help with prioritizing equitable vaccine outreach and identifying gaps in vaccine deployment. Different dimensions of vaccine deserts can be visualized at state and zip code levels.



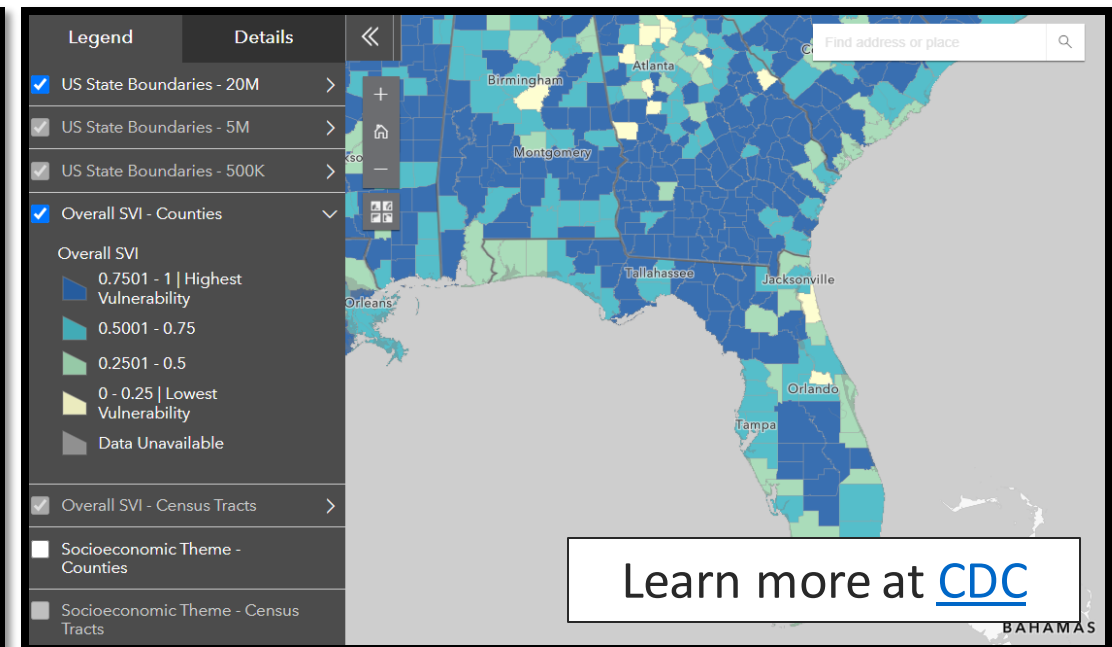
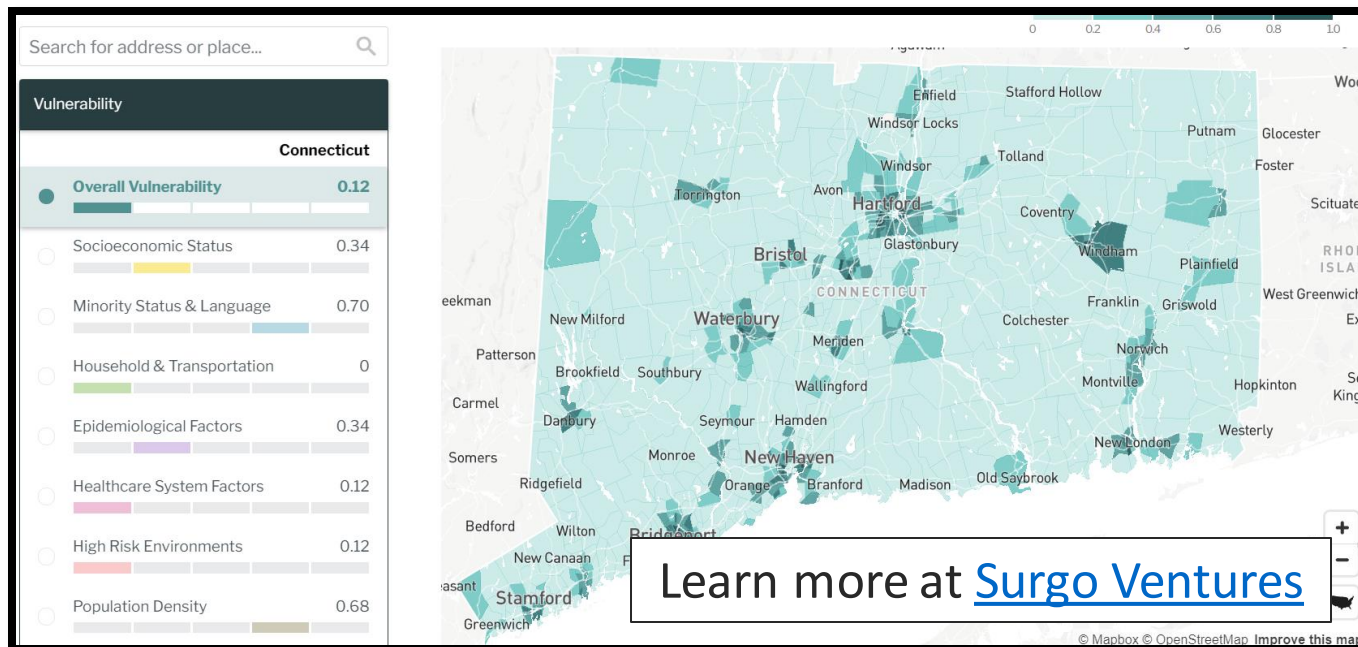
Using existing tools: COVID-19 among American Indians/Alaskan Natives

This platform displays COVID-19 disease burden among American Indians/Alaskan Natives across multiple dimensions (cases, deaths, etc.). Information can be visualized by state, county, or census tract.



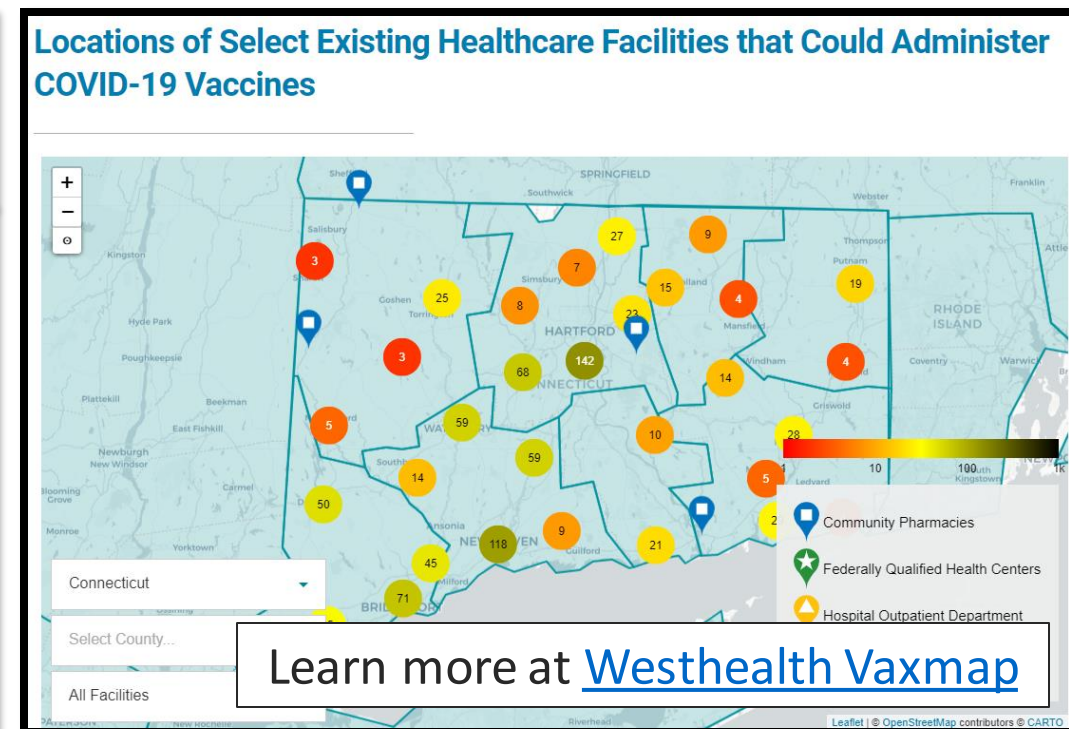
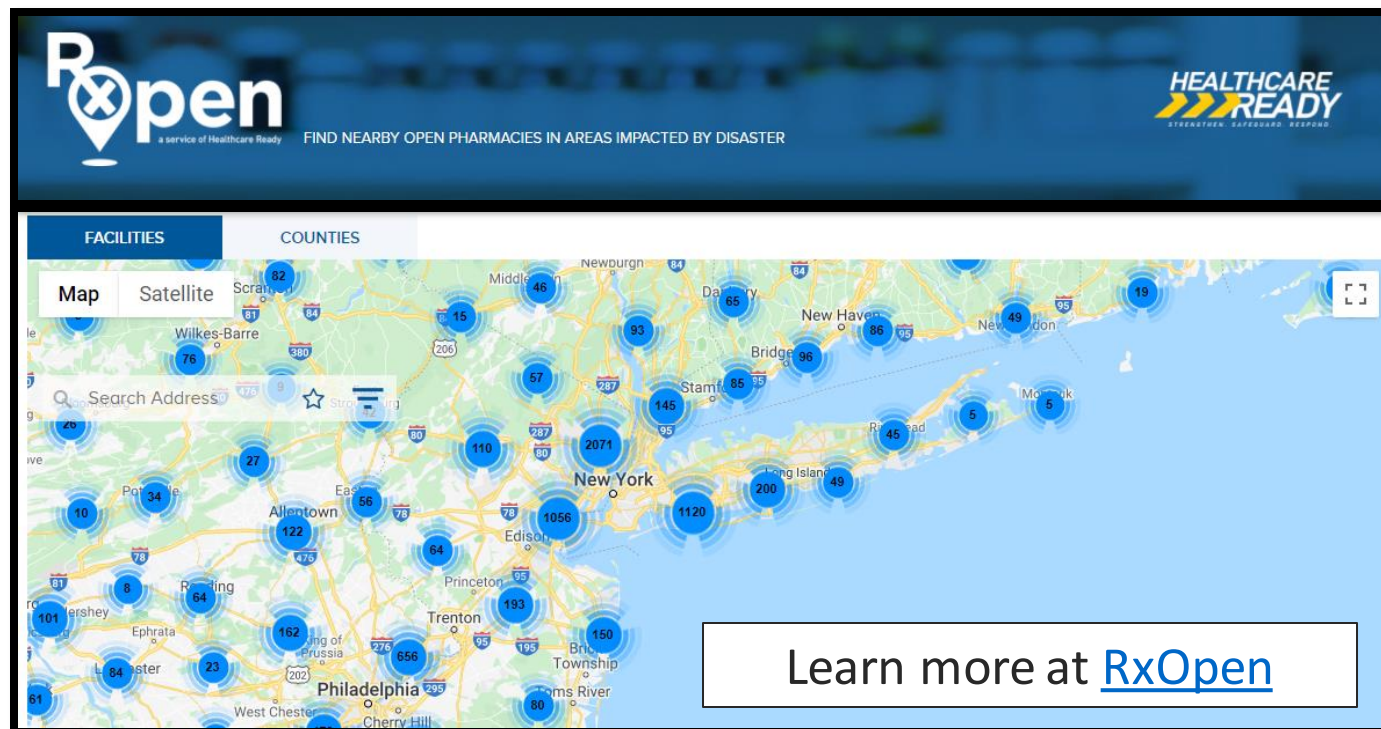
Using existing tools: Mapping community vulnerability

These platforms display social vulnerability. Such information can help with prioritizing vaccine distribution locations and deploying outreach efforts. Different dimensions of vulnerability can be visualized at state, county, or census tract level.



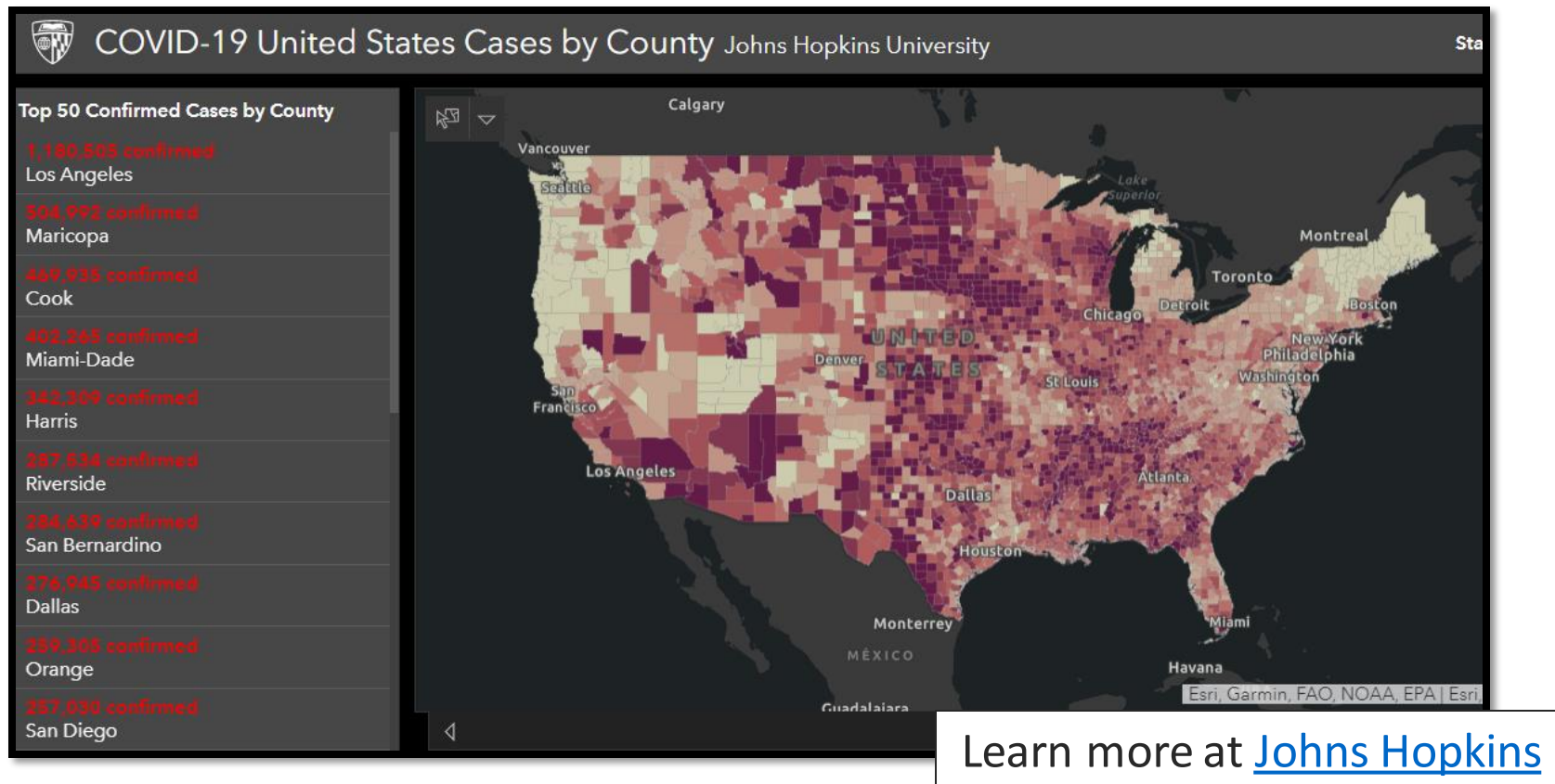
Using existing tools: Vaccine site locations

These platforms display vaccine sites. Quantity and distribution of sites can be estimated for various geographic levels, and specific locations can be identified at the street level by zooming in.



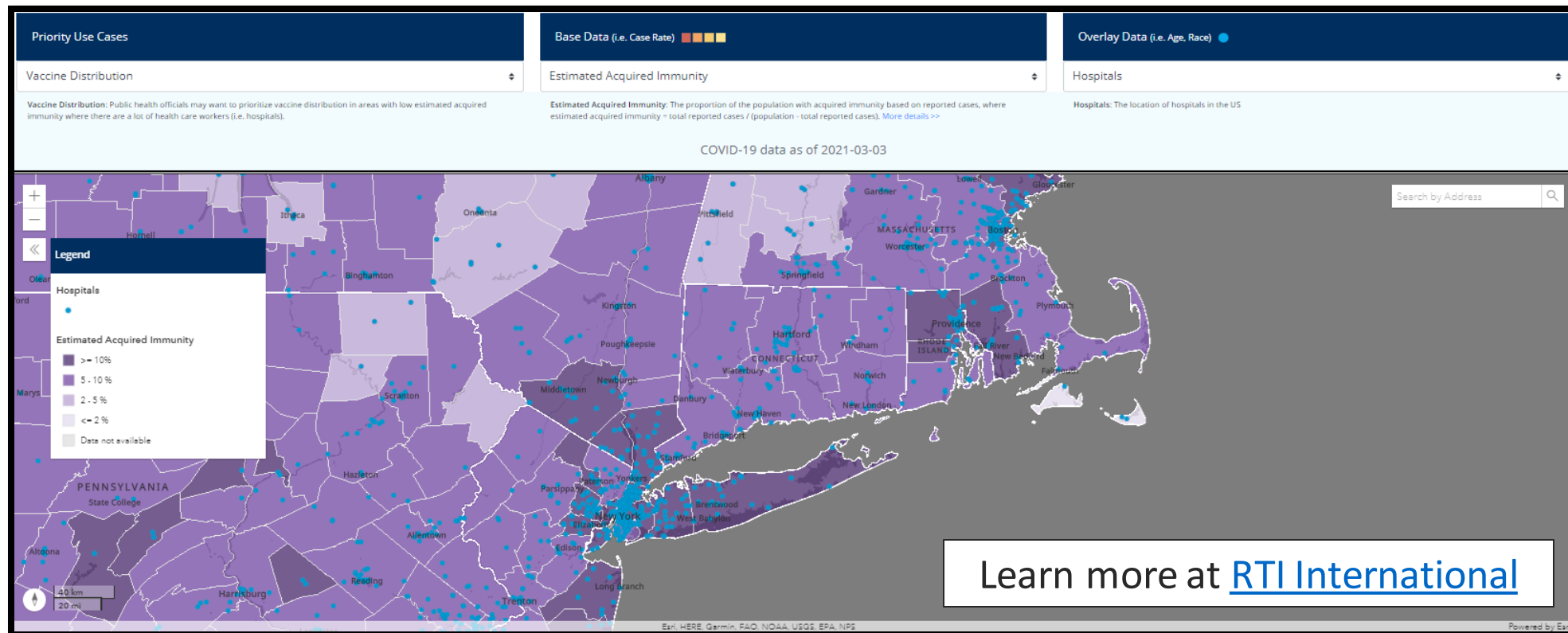
Using existing tools: COVID-19 information

This platform displays COVID-19 disease burden across multiple dimensions (cases, deaths, etc.). Information can be visualized by state, county, or census tract.



Using existing tools: Integrated perspectives

This platform integrates vulnerability, COVID-19 statistics, and vaccine infrastructure data. Users can visualize where vaccine sites are located relative to disease burden and vulnerability and highlight possible gaps.



Thank You!

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