

Geography of vulnerability: COVID-19 Community Vulnerability Index

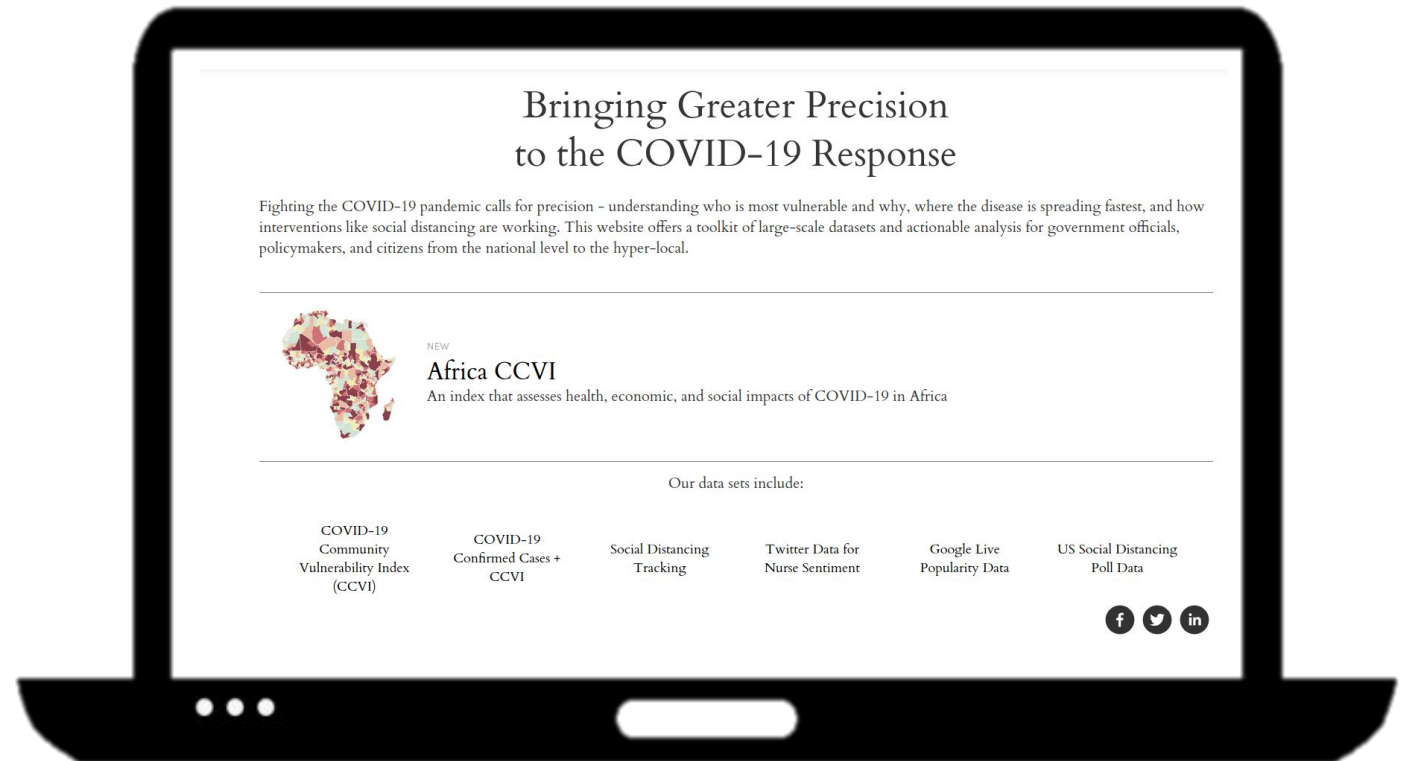
Fall Meeting of the Geographical Sciences Committee
October 27, 2020

Peter Smittenaar
Director of Data Science & AI

**Surgo brings precision to solutions
that save and improve lives by
integrating behavioral science, data
science, and artificial intelligence.**

We have rapidly pivoted to develop a breadth of tools to support COVID-19 response

- COVID-19 Community Vulnerability Index (CCVI)
- Hyper-local toolkit to guide policy makers
- Supporting coalitions and extensive networks of partners
- Equitable vaccine distribution and vaccine uptake risk
- Africa CCVI
- Africa COVID-19 self-check, hotspot mapping



The COVID-19 Community Vulnerability Index (CCVI) is the cornerstone of our U.S. work

March 2020: How do we get ahead of the virus rather than rely on patchy surveillance data?

Vulnerable communities have “a limited ability to mitigate, treat, and delay transmission of COVID-19, and to reduce its economic and social impact.”

Who and Where are the most vulnerable?

Why?

How do we respond?

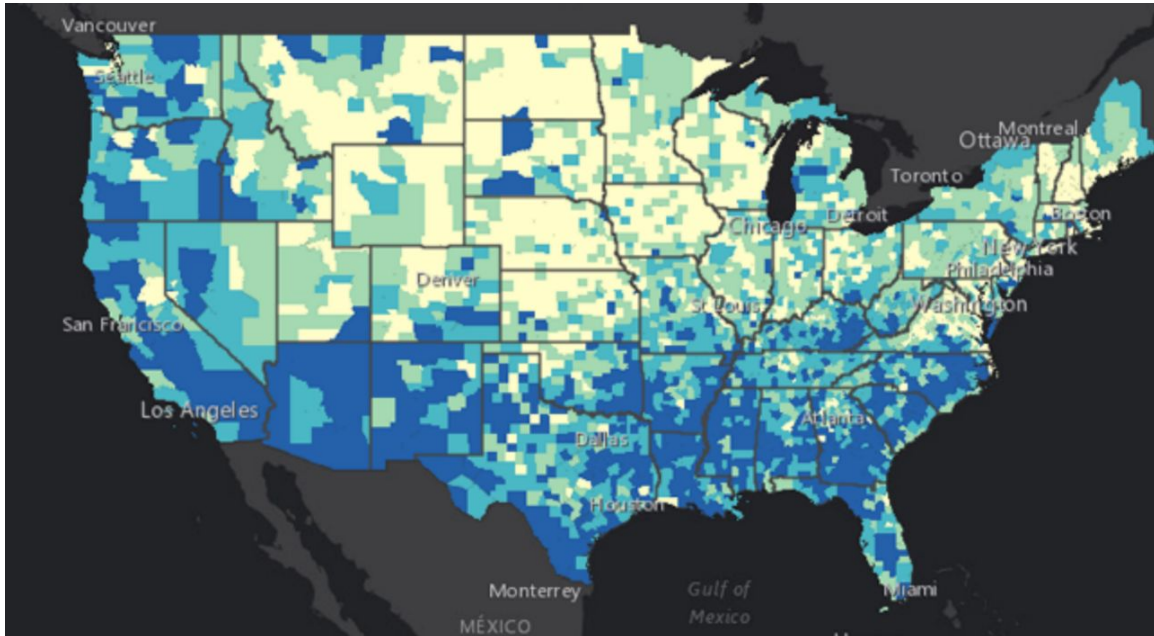


“I think we need to use geography to explore social and spatial inequality and inform public health interventions.”

Elisabeth D. Root

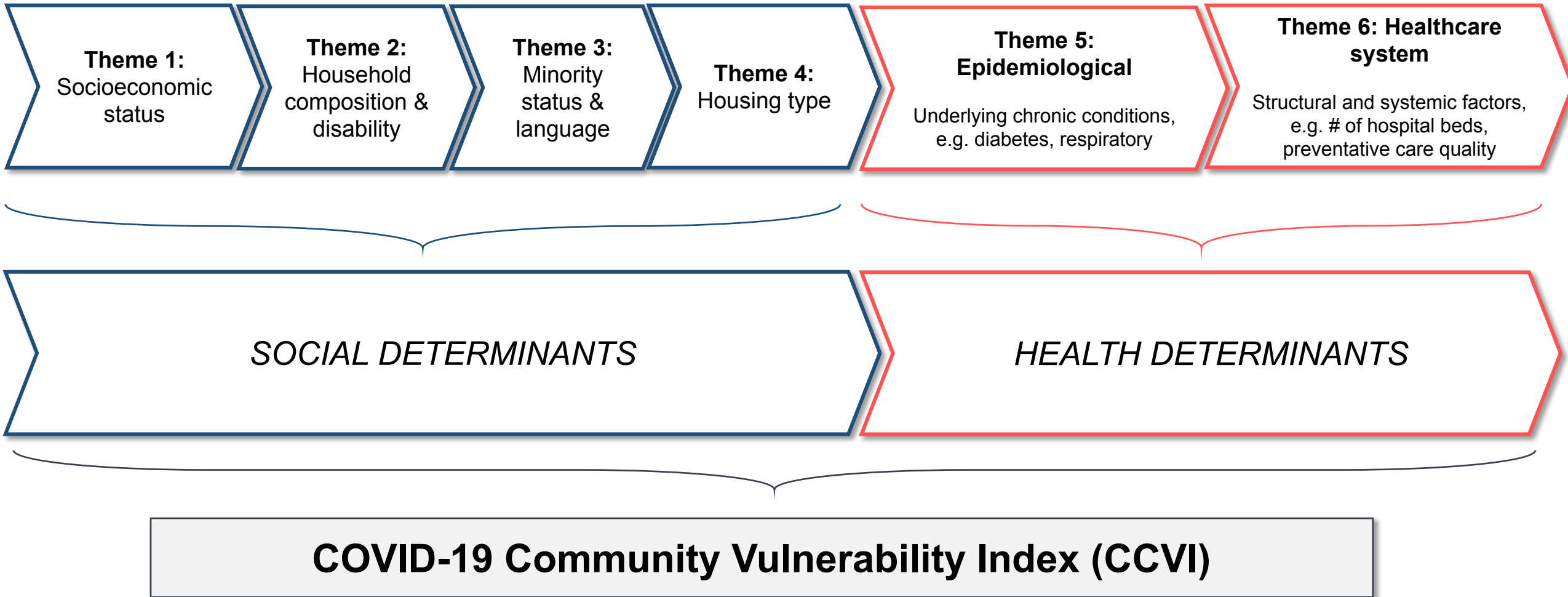
CDC index only measures social vulnerabilities

Social Vulnerability Index (SVI) missed important COVID-19 factors



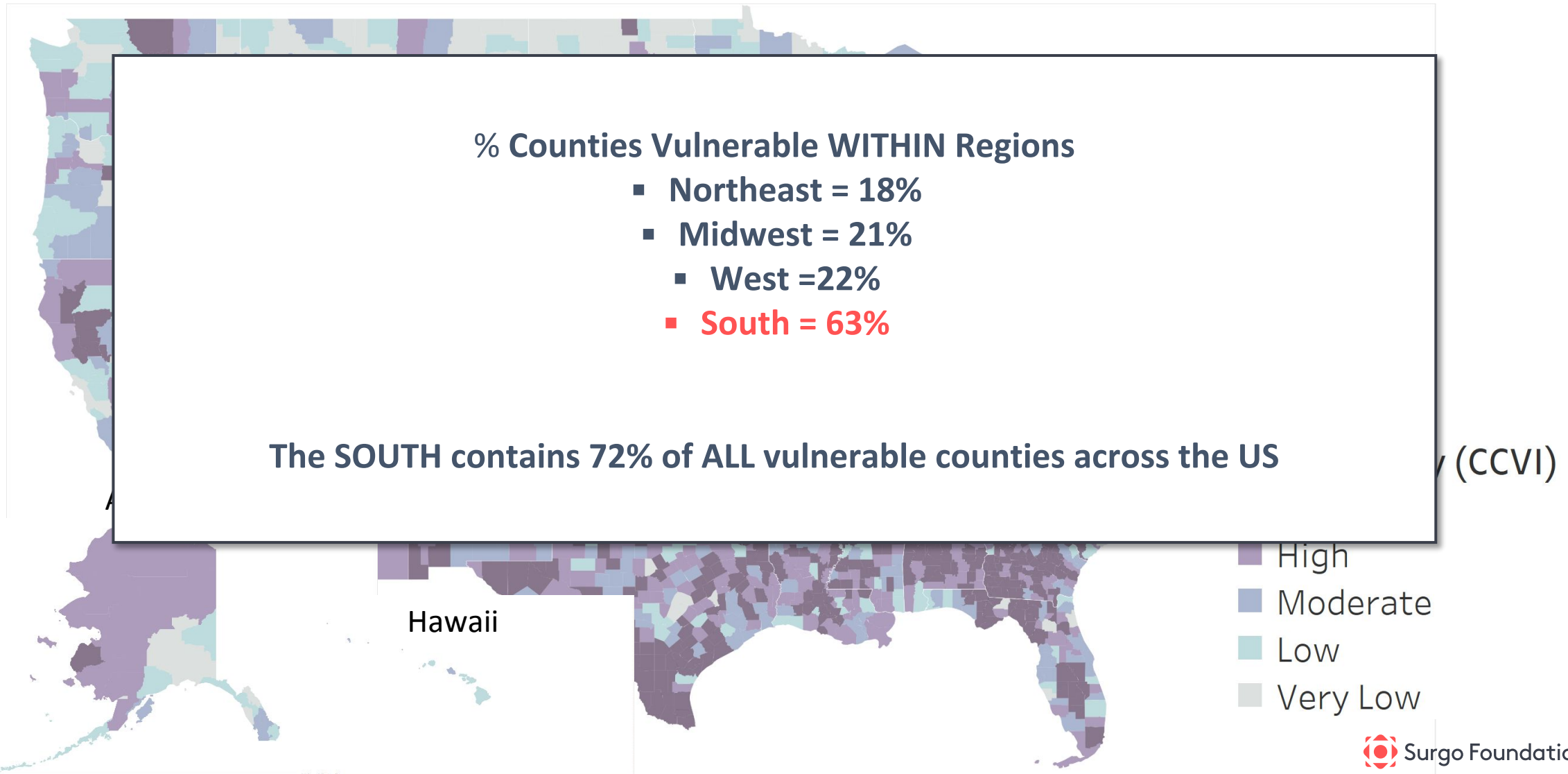
- Not COVID-19 specific
- Known high-risk factors missing:
 - Pre-existing conditions
 - High population density
 - Health-care system capacity

A modular index tailored to COVID-19

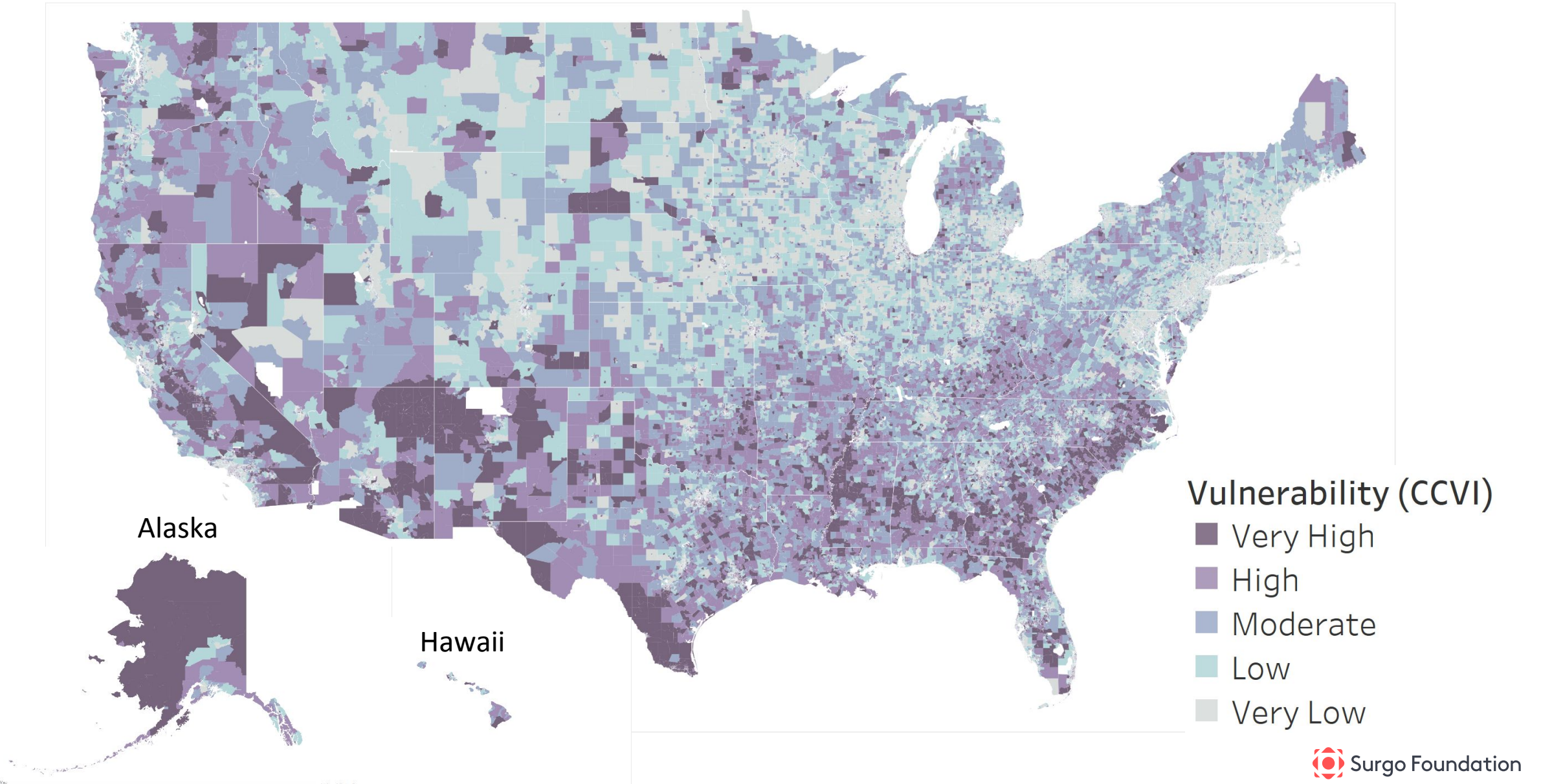


34 factors equally weighted across 6 themes. Themes 1-4 from CDCs SVI. Factors represented as percentiles in each geographic level (e.g. census tract) and ranked against all others. Each variable aggregated into individual themes and each theme is aggregated to the final CCVI.

Vulnerable communities cluster together, though are found across the US



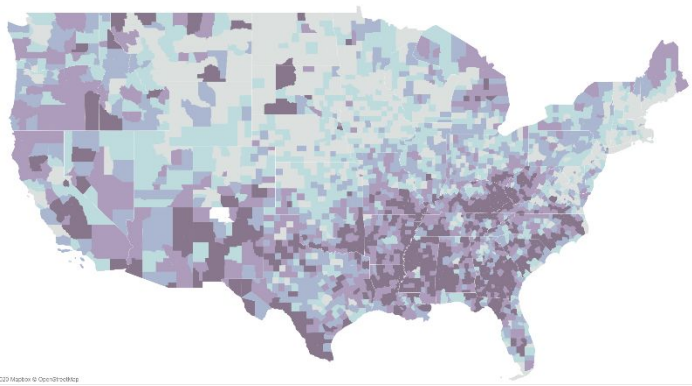
... and similarly at the census tract level



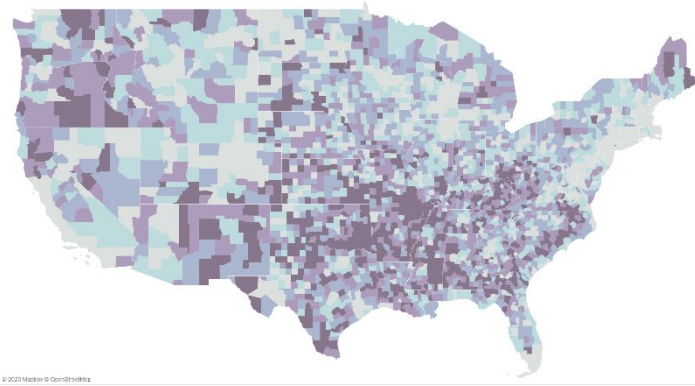
Communities are vulnerable for different reasons

And therefore need different types of support

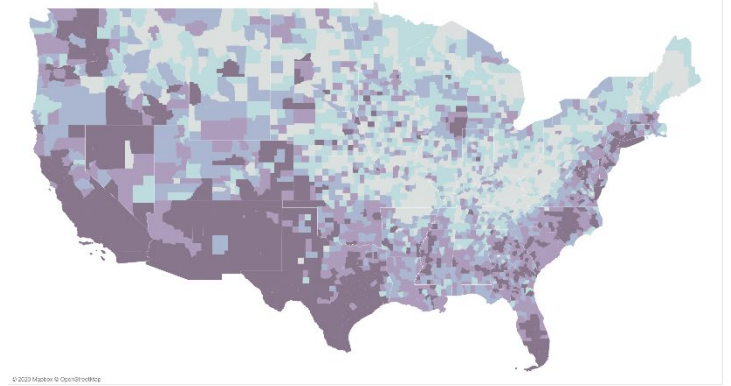
Socio-economic



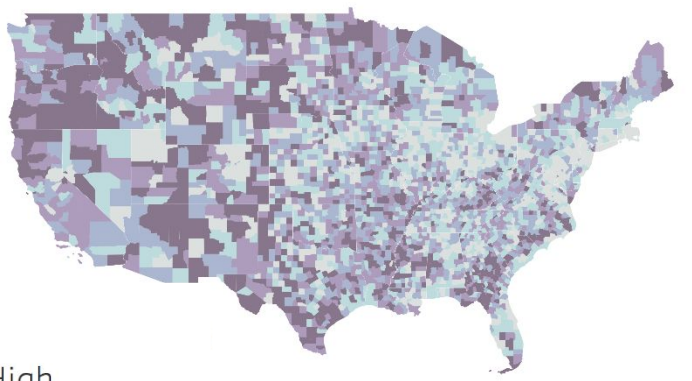
Household Composition & Disability



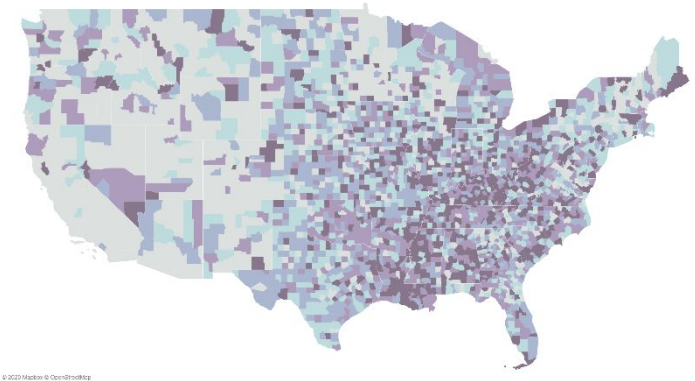
Minority Status & Language



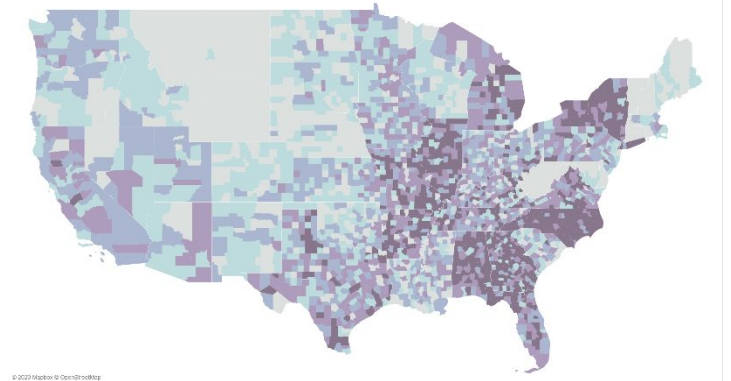
Housing Type & Transport



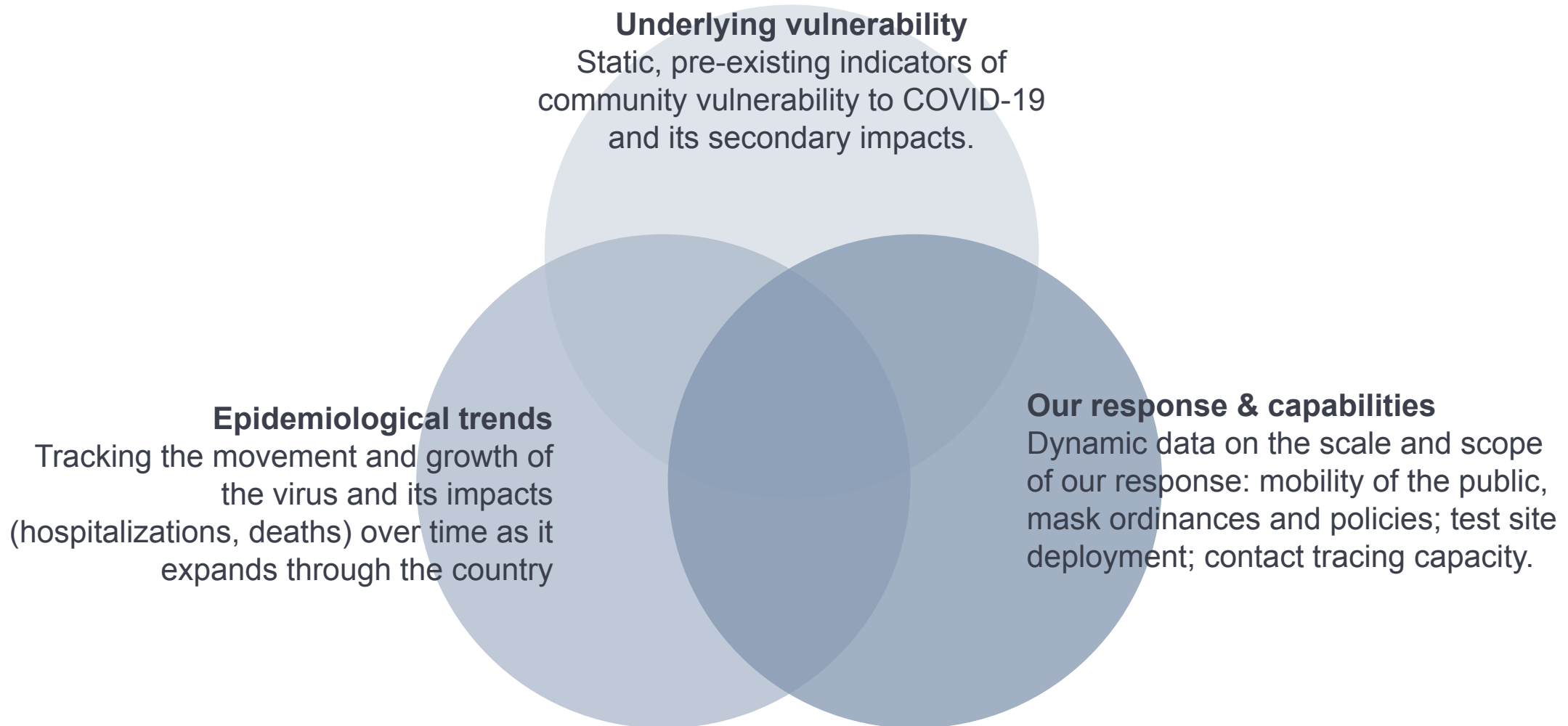
Epi Factors



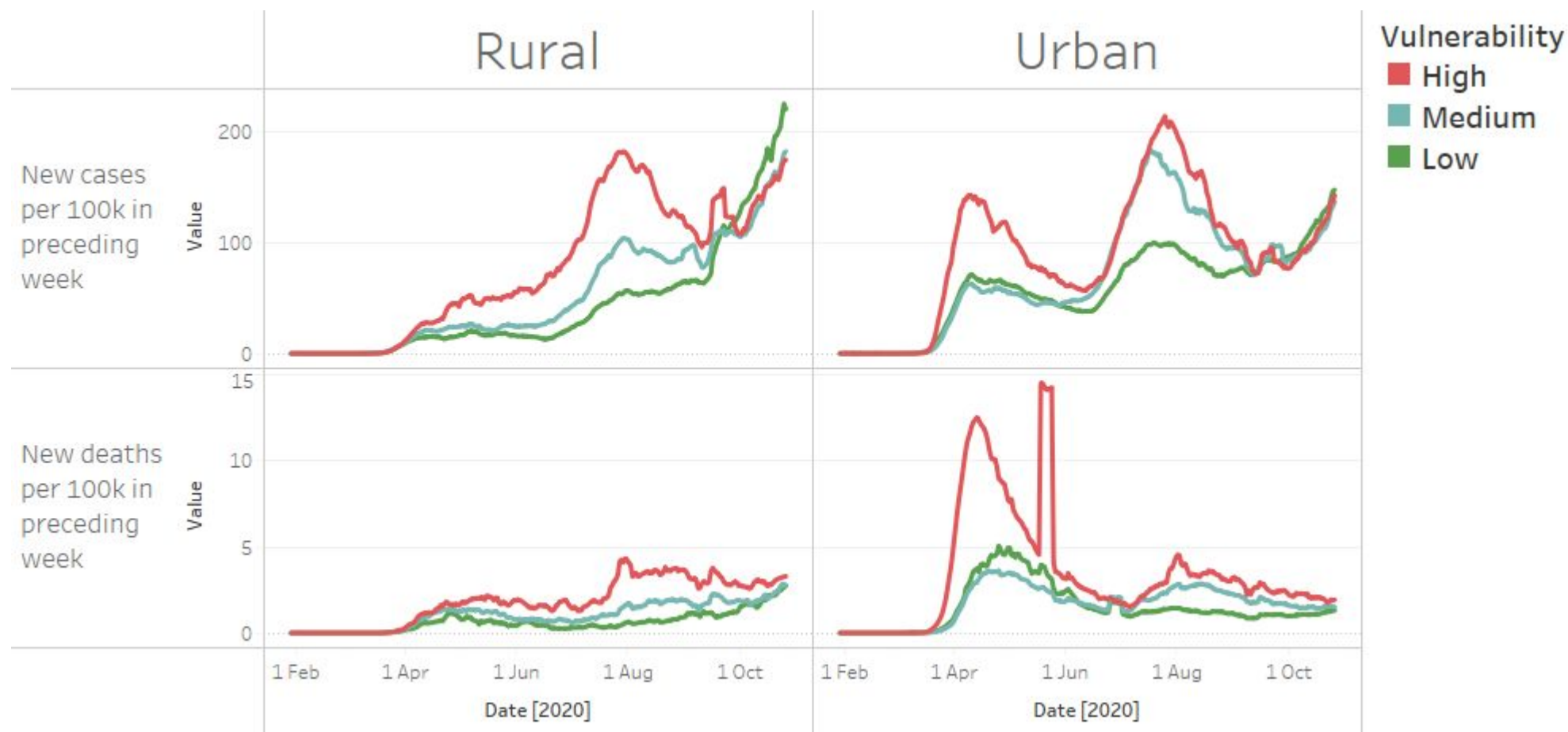
Healthcare System Factors



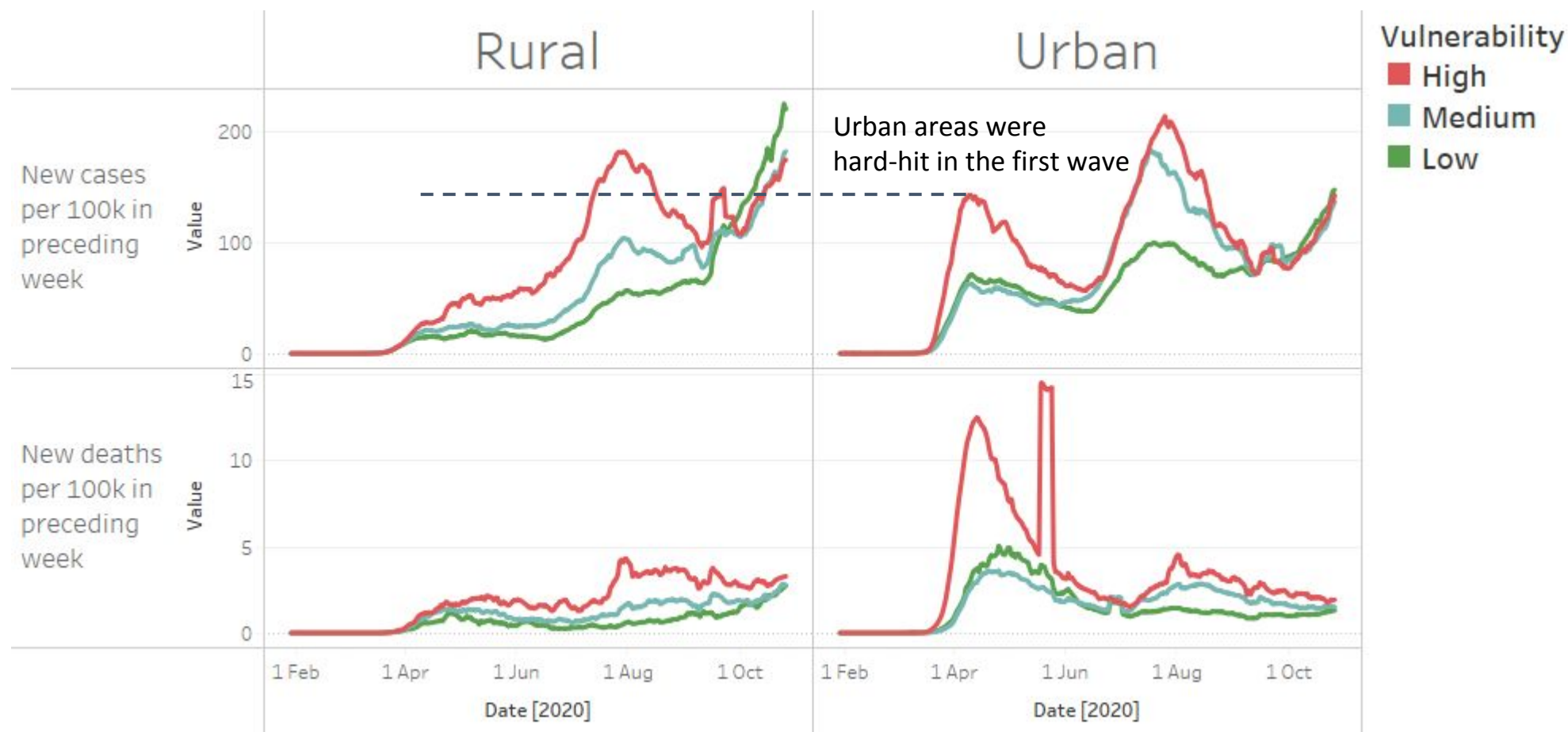
By layering it with epidemiological and live response data we can see a richer picture of what's happening



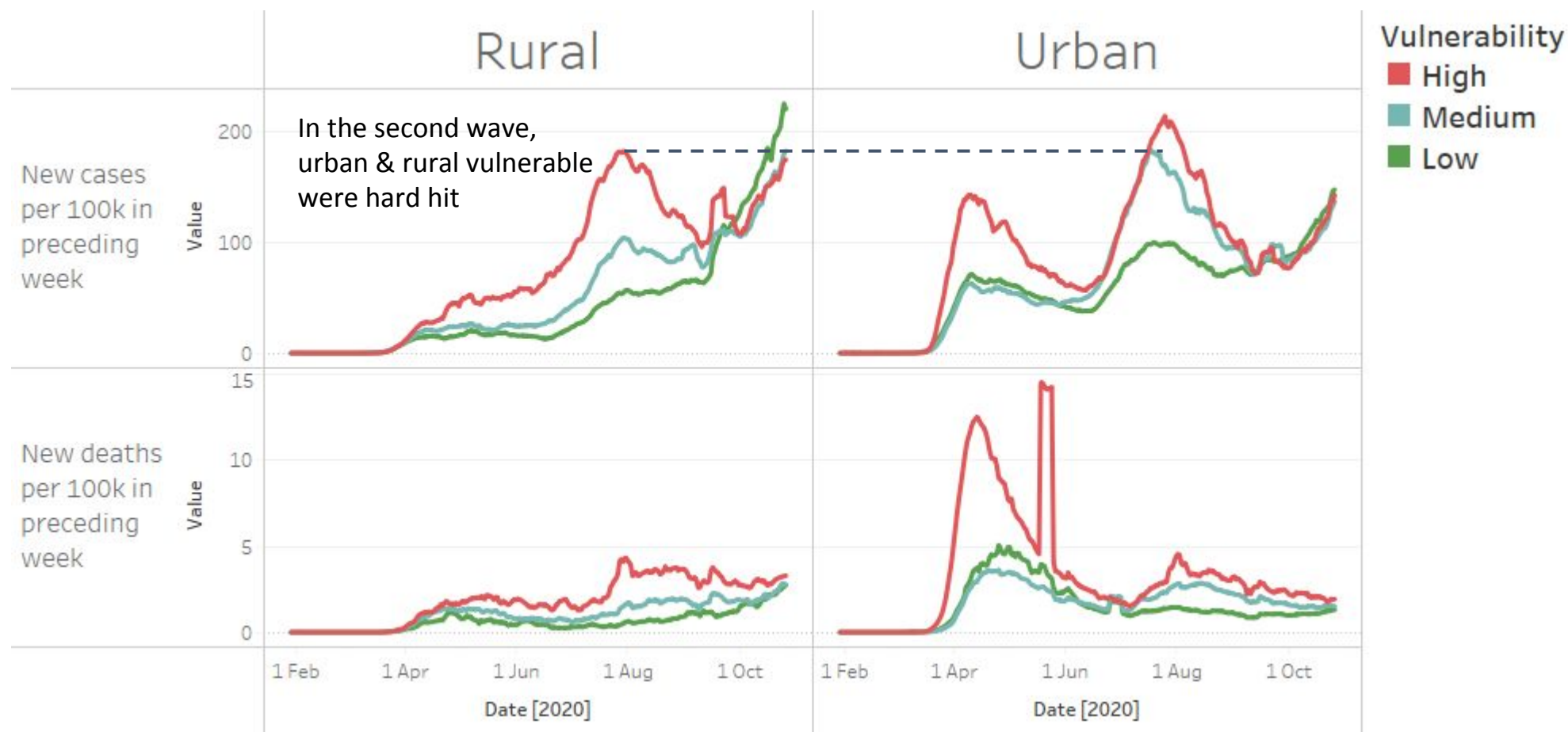
Vulnerable populations have been hit hard in both rural and urban areas



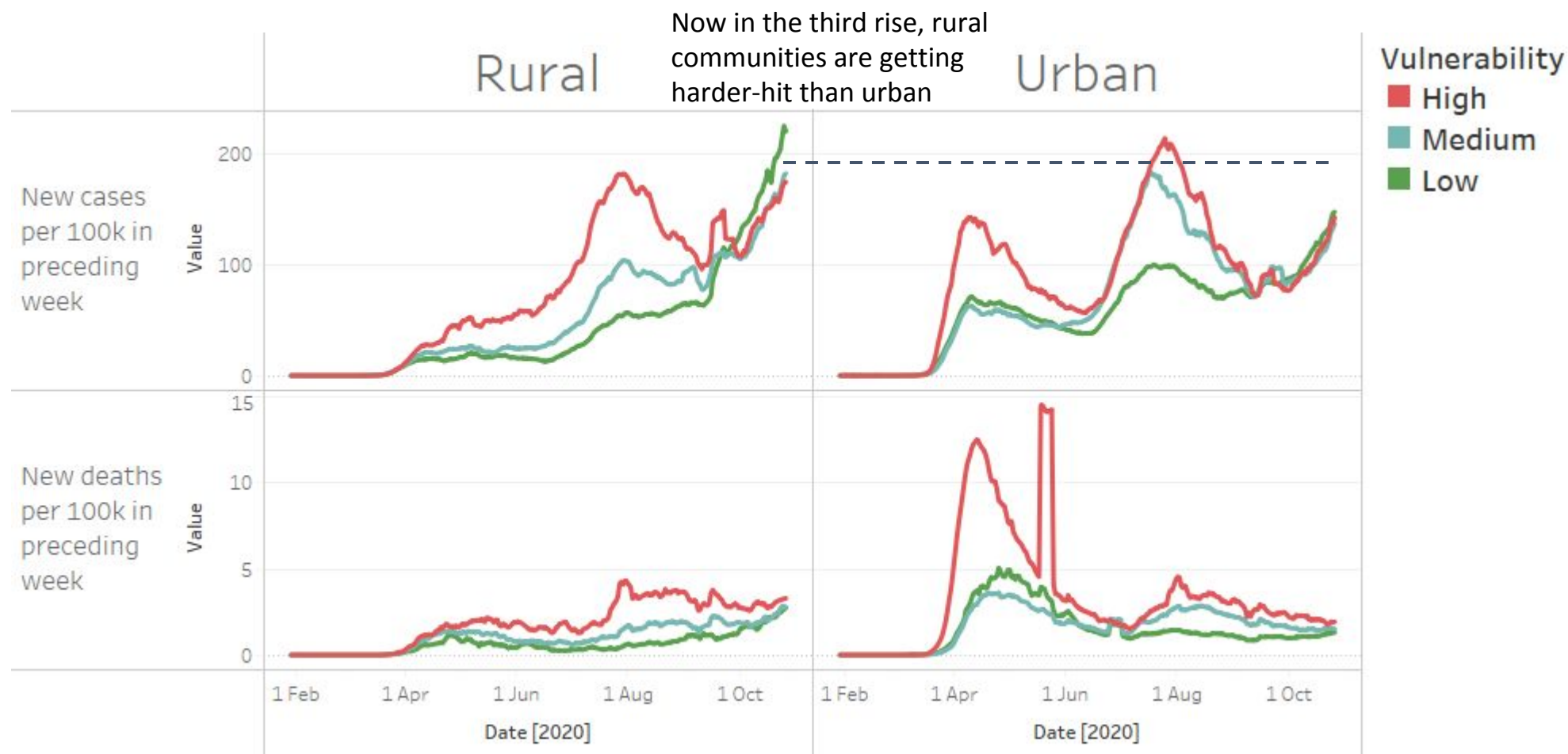
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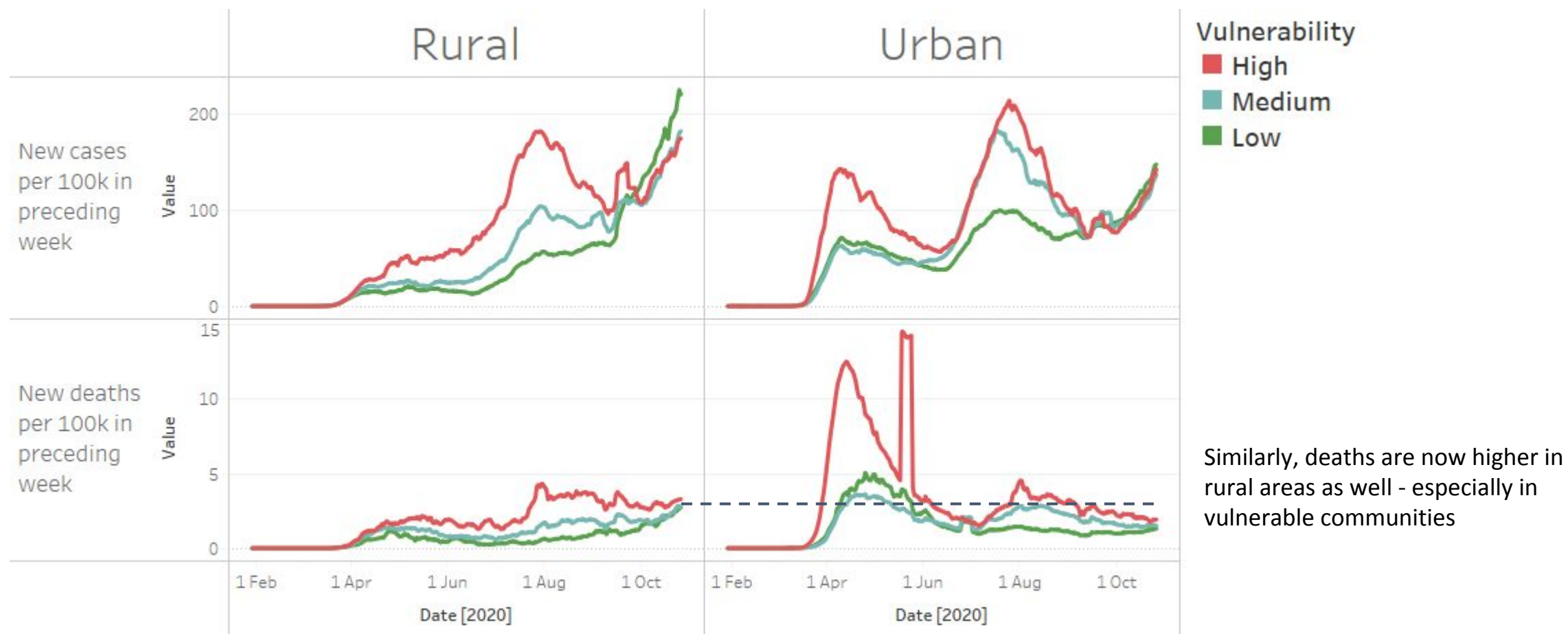
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And vulnerability continues to matter a great deal

Cases in the past week: Highly vulnerable counties versus low



Cases have always been higher in vulnerable counties, but changed in October with no difference between vulnerable and non-vulnerable counties

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Deaths in the past week: Highly vulnerable counties versus low



Deaths have been consistently higher in vulnerable geographies: as of today, **people in vulnerable counties are twice as likely to die from COVID-19**

And vulnerability continues to matter a great deal

Cases in the past week: Highly vulnerable counties versus low



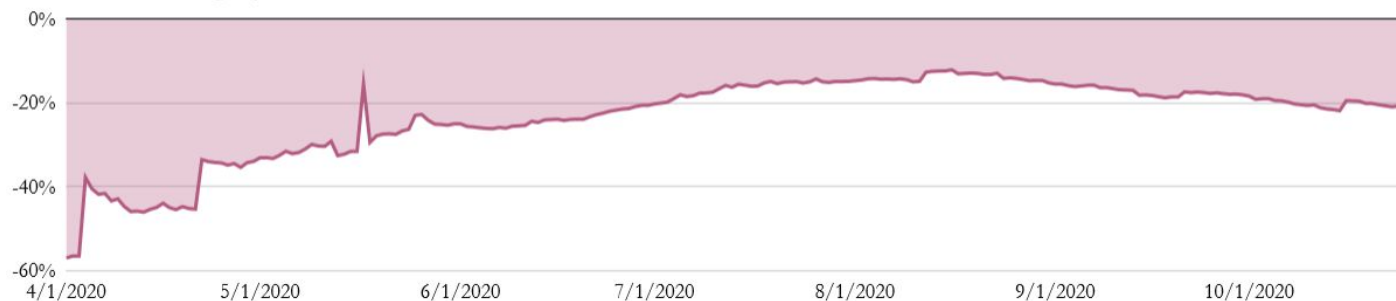
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Deaths in the past week: Highly vulnerable counties versus low



Deaths have been consistently higher in vulnerable geographies: as of today, **people in vulnerable counties are twice as likely to die from COVID-19**

Total Tests: Highly vulnerable states versus low

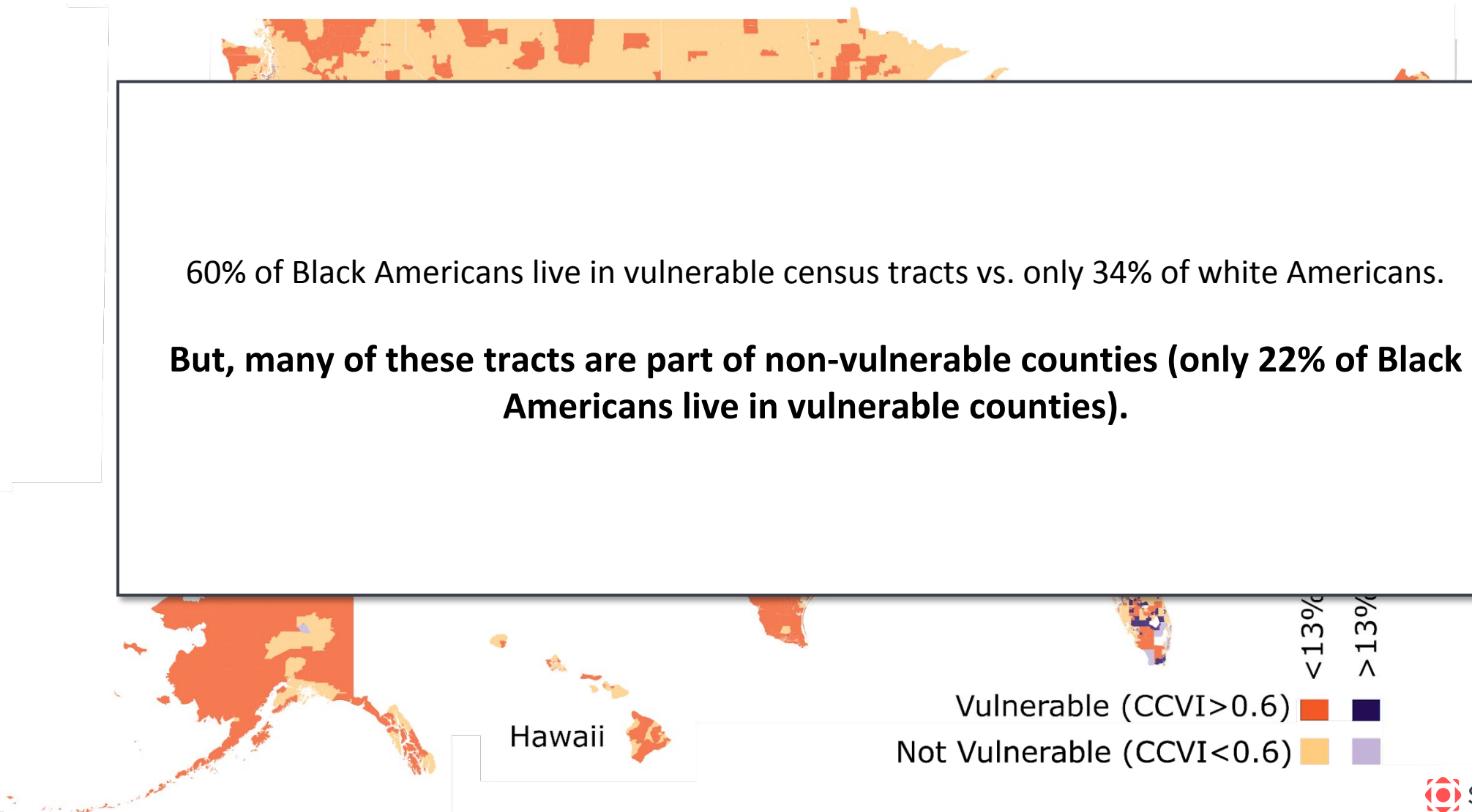


Despite all this, tests per capita have been 20-30% lower in vulnerable communities

The CCVI uncovered the racial disparities in COVID-19 vulnerability early on

60% of Black Americans live in vulnerable census tracts vs. only 34% of white Americans.

But, many of these tracts are part of non-vulnerable counties (only 22% of Black Americans live in vulnerable counties).



Vulnerable (CCVI>0.6)    
Not Vulnerable (CCVI<0.6)  

Hawaii

The CCVI supports a growing set of stakeholders

Pandemic tracking

Intervention Impact
Analysis

Advocacy

Resource allocation

Policy & Program
design

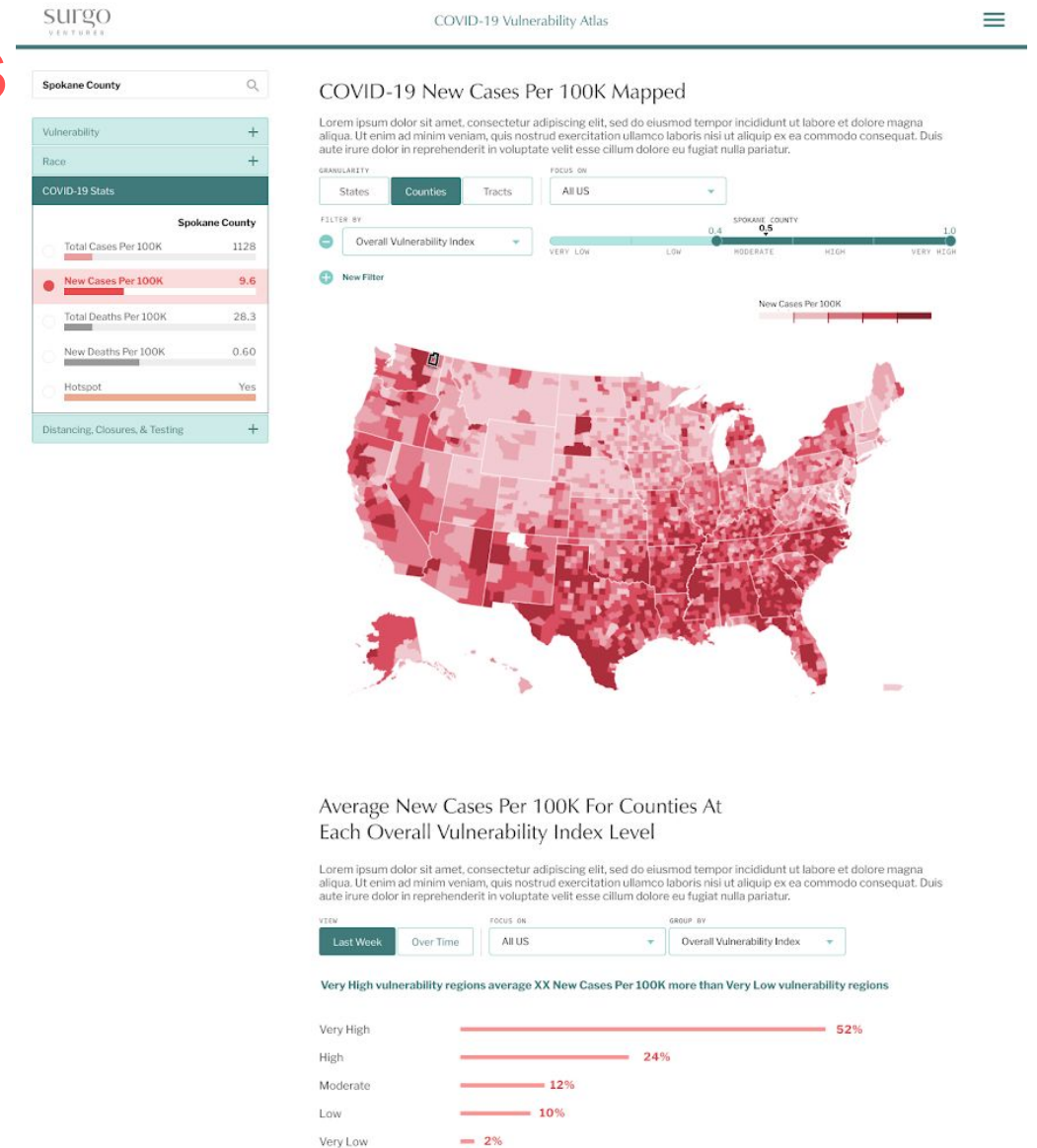
- NASEM Vaccine Allocation
- BanCorp Community Bank
- Vanguard Charitable Trust
- Partners in Allegheny County
- Partners in Newark, New Jersey
- The City of Little Rock, Arkansas
- The World Bank
- The Clinton Foundation
- NAACP Legal Defense Fund
- Partners In Health
- Harvard Center for Ethics and Microsoft
- RAND
- Uber
- Inter-American Development Bank
- South Holland, Netherlands

Soon to launch: a live tracker of how vulnerable populations are being affected

1. Build a centralized toolkit to empower more partners

2. Inform equitable vaccine distribution

3. Launch the go-to playbook for data & analysis in future pandemic response



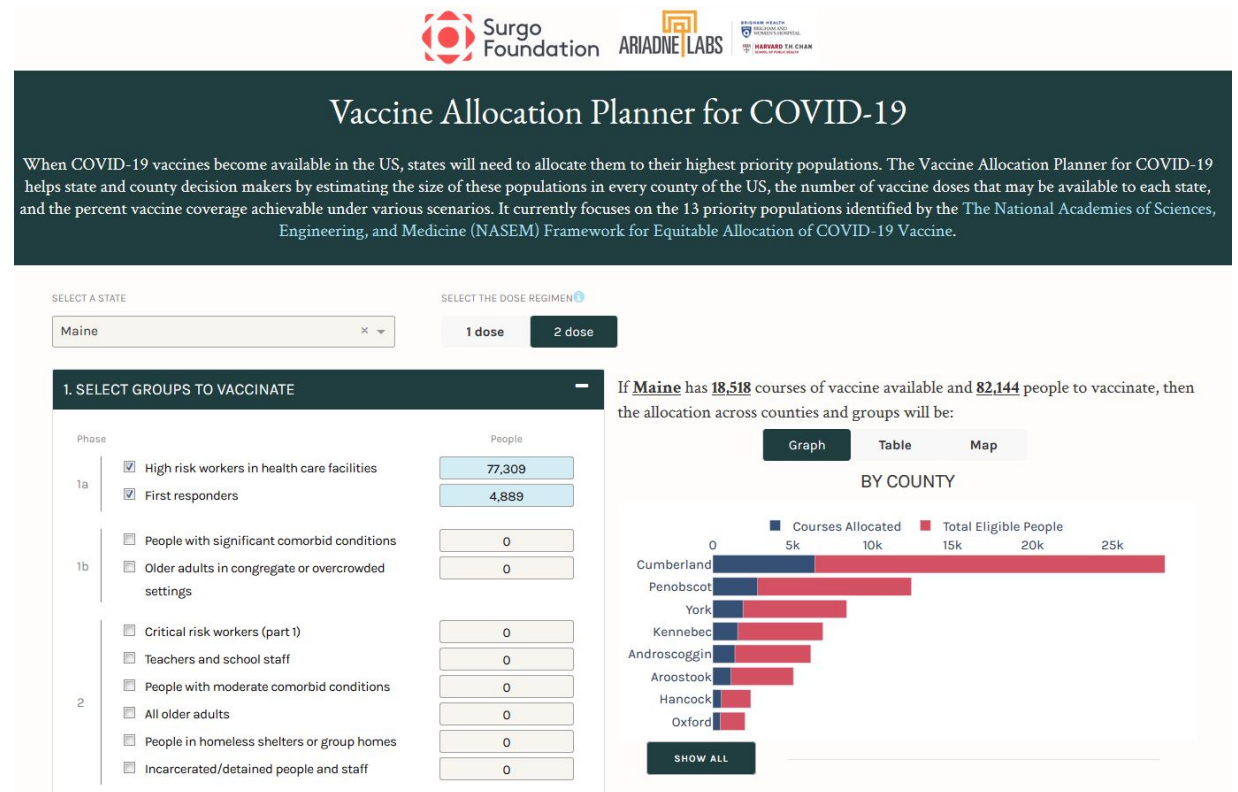
Map where vaccines should go and where to expect low coverage

1. Build a centralized toolkit to empower more partners

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3. Launch the go-to playbook for data & analysis in future pandemic response

If we do not prioritize smart, precise vaccine distribution then the racial inequities we are already seeing will be **exacerbated to devastating effect**. **NASEM recommends the CCVI as possible tool to prioritize populations**

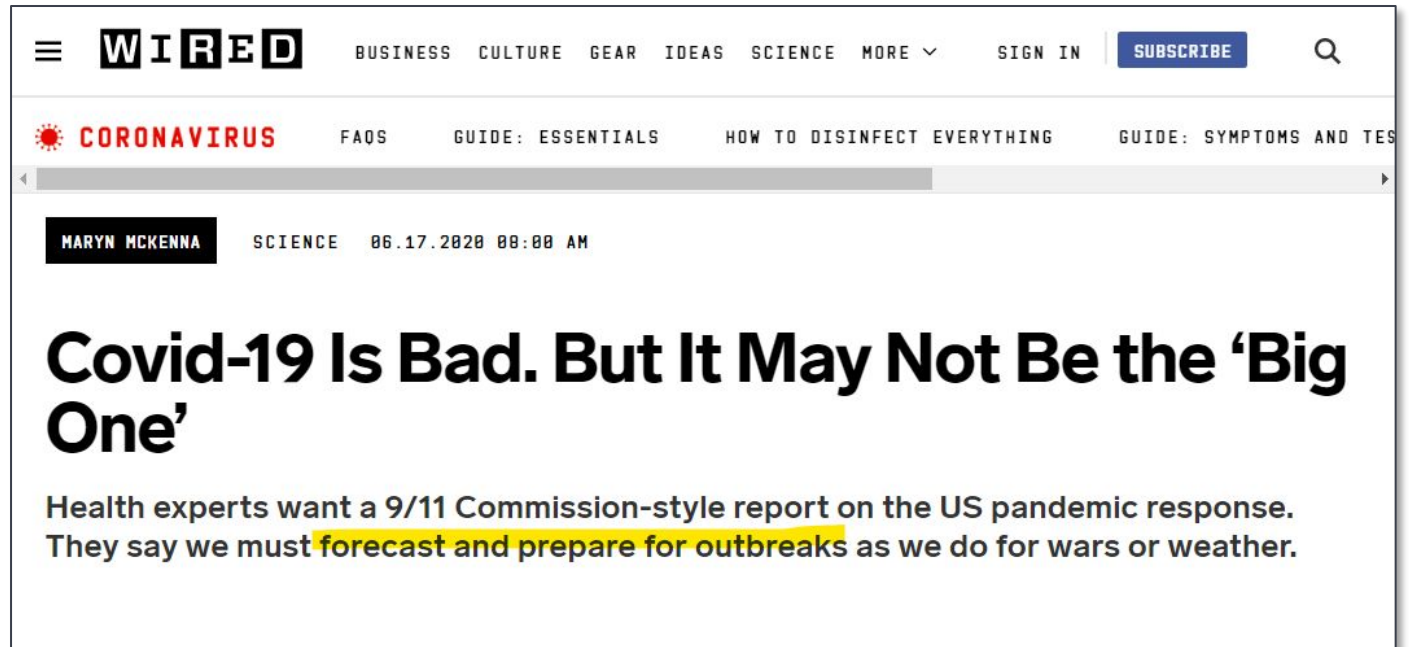


Learn from our mistakes: protecting vulnerable populations in the future

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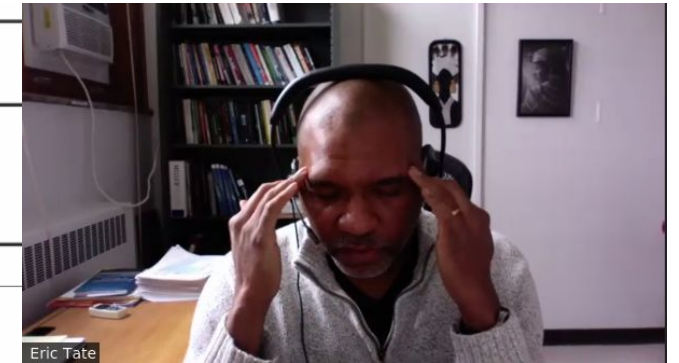
Next steps: validation and refinement of the index

Which dimensions of vulnerability matter for which outcomes at what point in the pandemic?

2. Which indicators reflect vulnerability processes?

Potential indicators	Pre-flood/ mitigation	During flood/ response	Post flood/ recovery
Children	±	+	–
Young adults	+	+	–
Elderly	–	+	+
.....			

- Some drivers reported more often
- Some interact with others
- Disaster stage matters
- Level of development matters

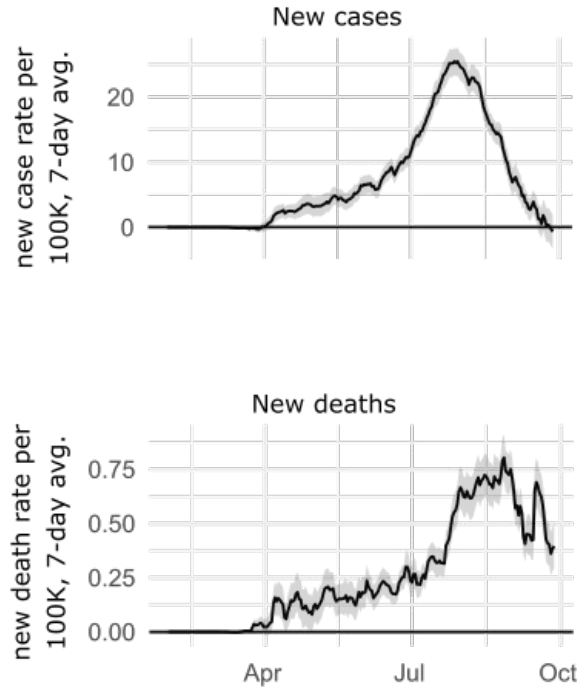


Validation and refinement of the index

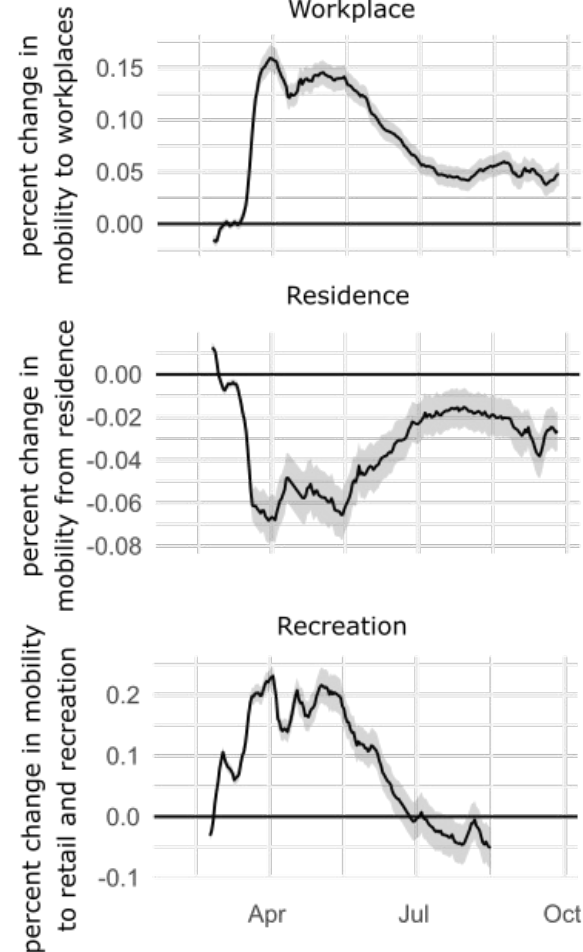
association with CCVI (estimate)

COVID rates

positive: more vulnerability =
more of the outcome

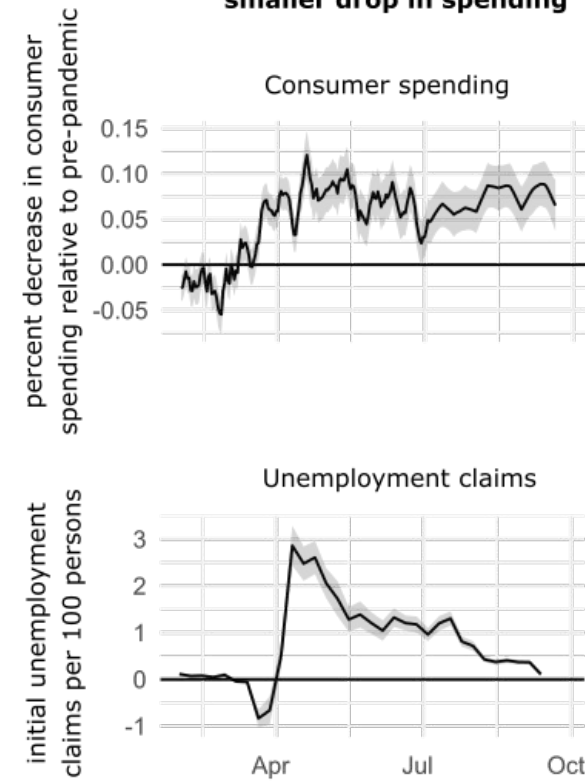


Mobility



Economic

more vulnerability =
smaller drop in spending



<https://precisionforcovid.org/>

<https://medium.com/@surgofoundation>