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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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.

Source: NPR

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**
- 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

**Map**

**Engage**

**Act**
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
- COVID-19 cases, mortality
- Social Vulnerability Index (SVI)
- COVID-19 Community Vulnerability Index (CCVI)

Community-generated data
- Vaccine locations
- Transportation hubs/routes
- Places of worship
- Schools
- Health care facilities
- Libraries, community centers
2. Use existing tools to generate maps

Map

- Facilities able to administer vaccines
  - Westhealth Vaxmap

COVID-19 Community Vulnerability Index (CCVI)
  - Surgo Ventures

Places of worship
  - Google maps
Or compile data to generate custom visuals

Map

Darker shading indicates greater vulnerability

Place of worship

Vaccination site

Sources: Surgo Ventures & ArcGIS
### 3. Explore maps with community members

**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

Where should interventions occur? Possible site for mobile vaccination

What features stand out? Census tract with high vulnerability (CCVI), and no vaccine sites

What isn’t visualized? Does public transit allow sufficient access for those without cars?

Sources: Surgo Ventures & ArcGIS
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

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
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.
Platforms for mapping

*Using existing tools for visualizing resources and gaps*
Using existing tools: Mapping Vaccine Desserts

This platform displays vaccine deserts. 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.

Learn more at Vaccine Equity Planner
Using existing tools: COVID-19 among American Indians/Alaskan Natives

This platform displays COVID-19 disease burden among America 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.

Learn more at Surgo Ventures

Learn more at CDC
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.

Learn more at RxOpen

Locations of Select Existing Healthcare Facilities that Could Administer COVID-19 Vaccines

Learn more at Westhealth Vaxmap
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.

Learn more at RTI International
Thank You!

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