

Mapping and Targeting Vulnerable Groups for Development and Relief Interventions

By Nelly Mecklenburg, Senior Program Officer, Community and Social Development, Institute for State Effectiveness

Introduction

Relief and development organizations use various methodologies to map populations, households and individuals that are vulnerable to different shocks – economic and resource shocks, natural disasters and climate change, conflict and violence, health crises and disease and more. **There is an urgent need for appropriate methods to identify and target at-risk populations in the U.S. for quick relief and services in response to the COVID-19 pandemic.** This may include health services, information, financial relief, food support, etc.

As of April 22, 2020, there are over 828,441 cases of COVID-19 in the United States and over 46,379 deaths.¹ Estimates suggest that the peak of the pandemic remains weeks away as new hotspots emerge across the country. Even if the virus abates, it may return in waves, requiring cyclic periods of social distancing. National and targeted relief is needed for immediate response as well as over the longer-term as communities reel from the social and economic effects. This note provides a short overview of vulnerability mapping and offers a few examples of different kinds of methodologies, with an eye toward developing an approach to identify individuals and households in the U.S. at greater risk of health and socioeconomic impacts of the COVID-19 pandemic.

Methodologies for identifying vulnerable populations

Vulnerability mapping is used in both the design phase of programming and to improve ongoing work. Given limited resources, it helps to identify **who** interventions should target, **what** is the appropriate type of intervention (e.g. cash, food or vouchers for food insecure households), the **scale** of intervention needed and the appropriate **means** of distribution (through schools, existing relief programs, door-to-door, etc.).

Two key principles of vulnerability mapping to bear in mind are:

- Marginalization that leads to vulnerabilities includes both a spatial and socioeconomic component. Understanding spatial marginalization helps in understanding socio-economic marginalization (e.g. poorer households often live on the periphery or further away from essential resources), and it should, therefore, be examined in that order.
- Vulnerability is not binary. It is important to look at it as a scale, to capture nuances and to help anticipate likely trends and changes in households and communities.

In the COVID-19 pandemic, there are multiple at-risk populations to target for different kinds of interventions. In each, poverty exacerbates the risk. These include:

- **The elderly and people with compromised immune systems and pre-existing conditions** – they may have worse health outcomes from COVID-19, and may not have reliable access to other vital medical resources
- **Prisoners** – they are densely confined and may not be able to maintain sufficient hygiene
- **The homeless** – they lack both regular access to health, hygiene care and information
- **Undocumented immigrants** and their families – they may be reticent to access medical care due to identification concerns and be ineligible for other relief services
- **Families that rely on subsidized meals** – they may not be able to access meals they depend on through schools or shelters, either due to their closure, limited availability, and/or changes in operation and scale to how they provide food to their communities
- **People without health insurance** – they may be less likely to seek out medical care and be over-burdened by the costs of paying for care out of pocket

Approaches to vulnerability mapping

Vulnerability mapping is conducted at both a macro-level (e.g. identifying municipalities, districts, etc. that are more vulnerable) and

¹ “Cases of Coronavirus Disease (COVID-19) in the U.S.,” U.S Centers for Disease Control and Prevention, April 22, 2020, <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html>.

at a micro-level (e.g. neighborhoods, households and individuals within districts or municipalities who are most vulnerable).

There are three basic approaches to vulnerability mapping:

- **Assets and income approach:** A quantitative approach that involves using a standard set of indicators to ask households about their assets and income, which makes it easier to scale and compare across communities. This can be done by a sample or census of an entire population. It is often done by going household to household (knocking on doors, calling people, etc.). This is both time consuming and fairly two-dimensional, as that it does not account for larger socio-economic or relational issues that cause poverty and vulnerability.
- **Participatory approach:** In this approach, communities develop and drive the process of defining indicators and assessing their own vulnerability. This requires good facilitation to prevent community power dynamics from biasing outcomes. While these subjective indicators are harder to compare across communities, this approach captures a great deal more variation and nuance for design, programming and MEL (Monitoring, Evaluation and Learning), including the relational part of vulnerability. Many participatory approaches are based on Participatory Rapid Appraisal (PRA), in which communities identify the criteria, indicators and household distribution of poverty (as well as the solutions). Participatory approaches are widely used in development.²
- **Proxy indicator approach:** Where information cannot be collected from all areas/communities to determine indicators, indicators from similar communities/areas can be used (based on the asset and income or PRA approach). This requires a good spatial sense of the country to know what areas/communities are similar, from socioeconomic and agroecological perspectives.

Examples of tools from development, public health crises and the United States during COVID-19

Vulnerability mapping methodologies from development³

Vulnerability Analysis and Mapping (VAM): The VAM analysis methodology was developed by the World Food Program and is the basis for all their programming. It is widely considered the best tool for macro-level poverty mapping. The information is openly available and is used as a starting point for many other assessments, including more micro-level vulnerability and poverty mapping approaches. It uses a variety of geospatial and economic analysis tools to determine who is food insecure and vulnerable, location, population size, reasons for food insecurity and the link with local

agroecosystems. VAM helps to inform programming and how the situation may evolve.

It includes specific tools such as an Alert for Price Spikes, Call Detail Records that uses anonymized mobile data to follow population movements after a crisis, basic interactive mobile surveys and Shock Impact Simulation Models to provide preliminary estimates of shock impacts on food security. It can be adapted to be used as a baseline assessment, a food production and availability assessment, a rapid 72-hour assessment and a refugee and Internally Displaced Persons (IDP)-specific assessment.

Household Livelihood Security Assessment (HLSA): This PRA-based framework first developed by CARE provides a multi-dimensional profile of a micro-level context (i.e. a community). It looks at household's access to resources and income to meet their basic needs, as well as the broader economic, education, food, health and empowerment systems that affect livelihoods, resource allocation, and marginalization. Vulnerability is measured based on the risk of livelihood failure. As is common in PRA, it adapts as it progresses, combines informal and formal processes, and looks at sociocultural, economic and ecological factors.

HLSA utilizes data from tools similar to VAM to establish where poor or vulnerable groups are at the macro-level, which is used to investigate relationships, interests and power dynamics with principal stakeholders in the targeted communities. Communities are involved in the design and planning of the assessment. Secondary information is used to triangulate information and to help contextualize the assessment so that it can be scaled up appropriately to similar areas.⁴

ISE's approach: ISE's social and participatory development experts have developed a PRA process based on decades of working with organizations such as CARE, Save the Children and others to refine their own tools. It is used in Afghanistan's [Citizens' Charter program](#) and World Bank community-driven development (CDD) programs in Central Asia. This approach works with communities to first look at the spatial components of marginalization through a resource map and then at the socioeconomic elements through a Well-Being Analysis. Communities define their own criteria (e.g. land, income, livestock, housing type, access to health and education), create indicators for socioeconomic groupings based on those criteria

2 Participatory targeting is more straightforward in rural communities because 1) zones or neighborhoods are more clearly delineated; and 2) people are more familiar with their neighbors and their lives. The "neighborhood" or "zone" delineation is very important for participatory approaches.

3 Whitney Moret, "Vulnerability Assessment Methods," FHI 360, May 2014, <https://www.fhi360.org/sites/default/files/media/documents/Vulnerability%20Assessment%20Methods.pdf>.

4 TANGO International, "Household Livelihood Security Assessment: A Tool for Practitioners," CARE International, July 2002, <https://www.alnap.org/help-library/household-livelihood-security-assessments-a-toolkit-for-practitioners>.

and then identify where each household sits (rich, middle class, poor, very poor). This process is designed to account for different agroecosystems and socioeconomic dynamics (such as livelihood structures of pastoralism, subsistence farming, etc.).

Communities then explore their different vulnerabilities and marginalizations through additional exercises such as a seasonal calendar (which looks at when and why wage laborers are food insecure and their coping mechanisms), a health analysis (understanding of common illnesses, access to healthcare and medicine, etc.), a “leaking pot” exercise (identifying major costs that drain income and assets, such as weddings and funerals) and more.

Vulnerability mapping for public health

CDC Social Vulnerability Index (SVI): This macro mapping tool is used by the United States Centers for Disease Control and Prevention (CDC) to map communities’ health resiliency from shocks, including disease outbreaks, but also natural disasters or man-made events (see Figure 1). It uses 15 census variables to map four factors of vulnerability by census tracts (which are country subdivisions). These variables include poverty, housing density and access to vehicles, and inform the four factors of socioeconomic status, household composition, housing and transportation access and race/ethnicity/language.⁵

This process creates a spatial analysis that informs how much supplies, emergency personnel and funding will be required, where to locate shelters and how to design evacuation plans. This offers a macro, or “population approach,” which then should be complemented by a micro, or “individual approach.” The CDC uses registries and Community Outreach Information Networks (COINs), which depend on liaising with trusted local leaders and institutions, for the individual approach. These must be developed in each community based on the most locally appropriate outreach mechanisms.⁶

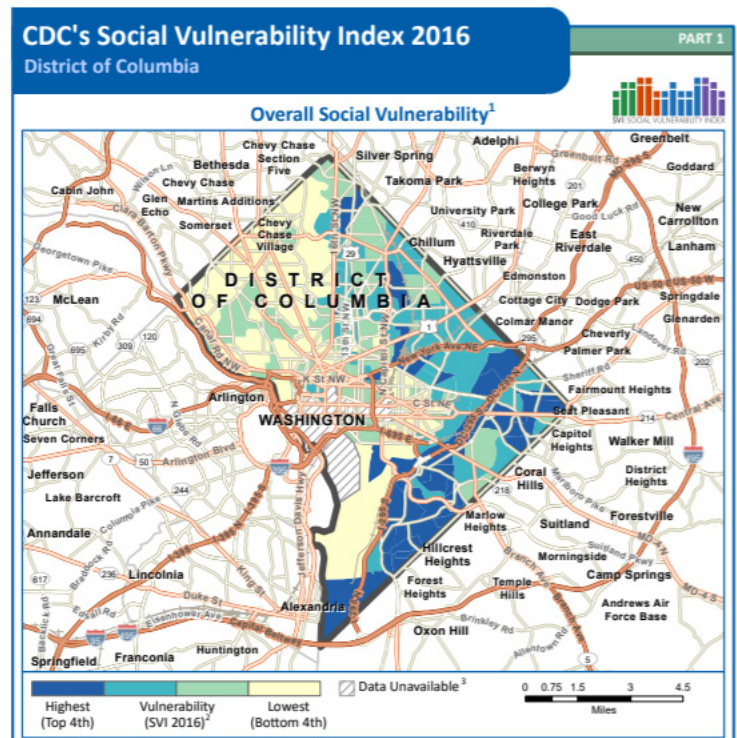
The Citizens’ Charter response to COVID-19 in Afghanistan:

The Citizens’ Charter National Priority Program (CCNPP) is now adapting its programming to help communities respond to COVID-19. Existing Community Development Councils (CDCs), which have been established in some 36,000 communities in Afghanistan under the CCNPP and its predecessor, the National Solidarity Program, are being mobilized to relay information on preventative measures and

to help distribute relief to households in need.

Well-being analyses have been conducted in a third of Afghan villages under the first phase of the CCNPP. Indicators developed through this exercise can be used as proxy indicators in similar villages to identify the poor and very poor. However, the precariousness of household income means others in the middle class (such as shopkeepers) will also be vulnerable as businesses close and people maintain social. CDCs are comprised of neighborhood representatives, so CDC members will still need to go to different households within their neighborhoods (at a safe distance) to identify those families in need.⁷

Figure 1: An example of a CDC SVI map



Graphic: U.S. Centers for Disease Control and Prevention

Emerging tools for vulnerability mapping of the COVID-19 pandemic in the U.S.

In addition to tools that map the spread of COVID-19, there are emerging tools being used to identify vulnerabilities that may make outcomes from COVID-19 worse. These are only now being rolled out and their efficacy and usefulness are yet to be determined.

5 “CDC’s Social Vulnerability Index: a Tool to Identify Socially Vulnerable Communities,” U.S. Centers for Disease Control and Prevention, <https://svi.cdc.gov/Documents/FactSheet/SVIFactSheet.pdf>

6 “Planning for an Emergency: Strategies for Identifying and Engaging At-Risk Groups,” (Atlanta (GA): CDC, 2015): <https://www.cdc.gov/nceh/hsb/disaster/atriskguidance.pdf>

7 This is based on ongoing workshops with key stakeholders.

COVID Community Vulnerability Map: A health data firm, Jvion, has created an interactive map to identify where there is a higher risk of severe health outcomes from COVID-19 (including hospitalization, organ failure and death). It uses anonymized health data from 30 million patients in the U.S., as well as 5000 variables on socioeconomic and environmental factors (including employment, commercial job density, poverty, commute times, etc.) to map where and what the risk factors are at the census tract level. The analysis is based on risk factors of similar viruses, such as the flu. This is overlaid with information on where key resources, such as hospitals and access to transportation and food, are located. The idea is that this can help local leaders and healthcare providers allocate limited resources to reduce outcome disparities.⁸

Esri COVID-19 GIS Hub maps: Esri, a GIS spatial analysis firm, is using various databases to map nine different vulnerabilities. The Nine maps identify clusters of people who are: above 65 years old and working, seniors and living alone, uninsured, socially vulnerable (according to the CDC's SVI), more densely populated, have access to healthcare facilities, and are under travel restrictions, as well as areas that have more travelers, high daytime populations (commuters) and seniors. They have also applied this to homeless populations and are offering to help different agencies and firms with GIS mapping capacity to fit their needs.⁹ Because these rely on different sources, the maps use different spatial units.

COVID-19 Community Vulnerability Index: This index, developed by the Surgo Foundation, builds on the CDC's SVI. This analysis adds two additional categories of indicators (epidemiologic factors and healthcare system factors) on to the four from the SVI (listed above), looking at a total of 34 factors of vulnerability. This data is drawn from the CDC, Centers for Medicare & Medicaid Services (CMS), the Harvard Global Health Institute, PolicyMap, the U.S. Bureau of Labor Statistics (BLS), the U.S. Census Bureau (USCB) and the Association of Public Health Laboratories. It notes that it is meant to measure vulnerability at the community level (census tract, county and state level), rather than individual or household level.

Household and individual targeting for COVID-19

The above indexes and analyses are macro-level tools. Mapping households and individuals for targeted interventions at the micro-level in addition to these will require specific approaches depending on the vulnerability factor, adapted to spatial units (also varying per factor). Participatory and community-level approaches can be adapted from other contexts to be used in the U.S. A quick outline of what some of the sources for micro-level targeting may include is provided below. At the individual level, there are also concerns about privacy that will need to be managed.¹⁰

Table 1: Outline of micro-level targeting sources

Target Population	Spatial reality	Means of identification
Elderly	Atomistic*	Social security and Medicaid benefits
Immunocompromised and underlying conditions	Atomistic	Hospitals
Prisoners	Clustered*	Prisons
Undocumented immigrants	Combination	
People without health insurance	Atomistic	
Homeless	Combination	Homeless camps, shelters
Child poverty	Combination	Schools/records of free and reduced lunches

*Atomistic – population is not spatially clustered | *Clustered – population is spatially clustered

8 Fred Pennic, "New COVID-19 Community Vulnerability Map Uses Social Determinants of Health to Identify Populations At Greater Risk," Jvion, March 24, 2020, <https://jvion.com/news/media/new-covid-19-community-vulnerability-map-uses-social-determinants-of-health-to-identify-populations-at-greater-risk>

9 Gary Burgess, "Exploring COVID-19 Impact on Vulnerable Populations Using Infographics," Esri, March 13, 2020, <https://www.esri.com/arcgis-blog/products/bus-analyst/health/exploring-vulnerable-pop/>.

10 This includes around the use of cellphone tracking. See [here](#) for more.