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Community Engagement for Cooperative Extension: Using Interactive Maps to Understand Communities

Series Publication 2 of 7

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Introduction to interactive maps

Before a plan for community engagement can be effectively developed, it is important to first understand the community. Interactive Geographic Information Systems (GIS) maps are a useful tool to gather and visualize data that can describe a community, and have been used to inform Extension program design and planning in multiple other states, including California,¹ Minnesota,² and Florida.³ The University of Arizona's (UA) Community Research, Evaluation, and Development (CRED) Team, from the Norton School of Human Ecology, created GIS maps to support the UA Supplemental Nutrition Assistance Program – Education (UA SNAP-Ed) efforts across the state of Arizona. These interactive GIS maps can be a useful resource for all of University of Arizona's Cooperative Extension (Extension) programs to assist in planning and implementing community engagement work. By using the maps to identify a community's existing resources and gaps in services, Extension can identify a community's strengths and areas of need that could be supported by Extension efforts.

Overview of the map components

Maps help a user better understand the unique and varying characteristics of communities at different levels of interest by providing a visual representation of multiple data sources. Maps may be zoomed in or out, viewing scale levels from the state level down to the neighborhood level. Different scale levels may be helpful for exploring patterns. For example, viewing a map at the county level can show clusters of food retailers, displaying differences in food access across the county. Zooming in to the town or neighborhood level can show more detail about the types and exact locations of food retailers, providing important information about where Extension could do outreach work in the community.

Navigating the map interface may be a new skill for first time GIS map users. Figure 1 provides a snapshot of one of the SNAP-Ed maps, with key map components identified. Each component is described on the next page (Table 1). Links to a video walk-through of the map components and a cheat sheet similar to Figure 1 are available in the Resources section of this article.

Figure 1. Key Map Components

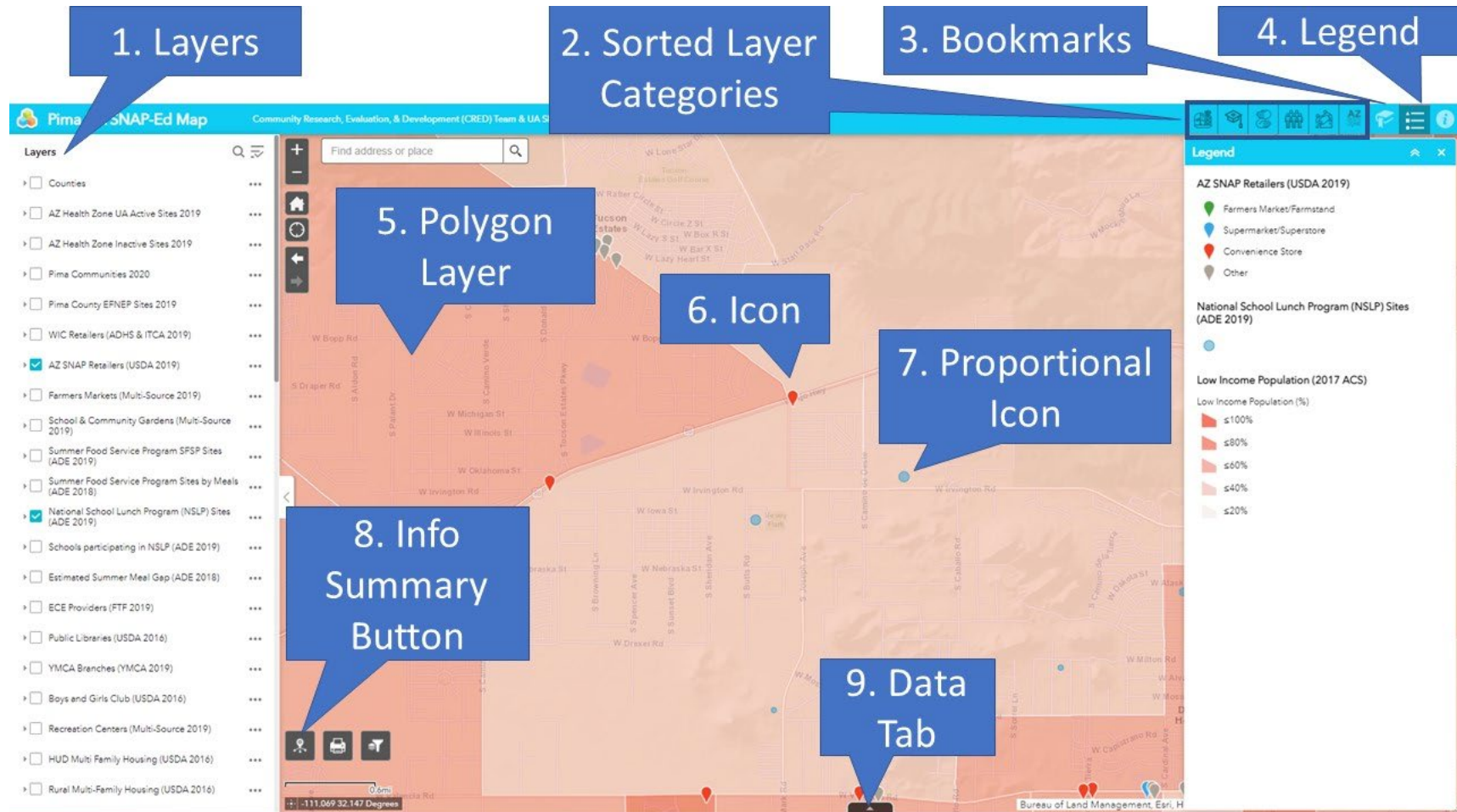
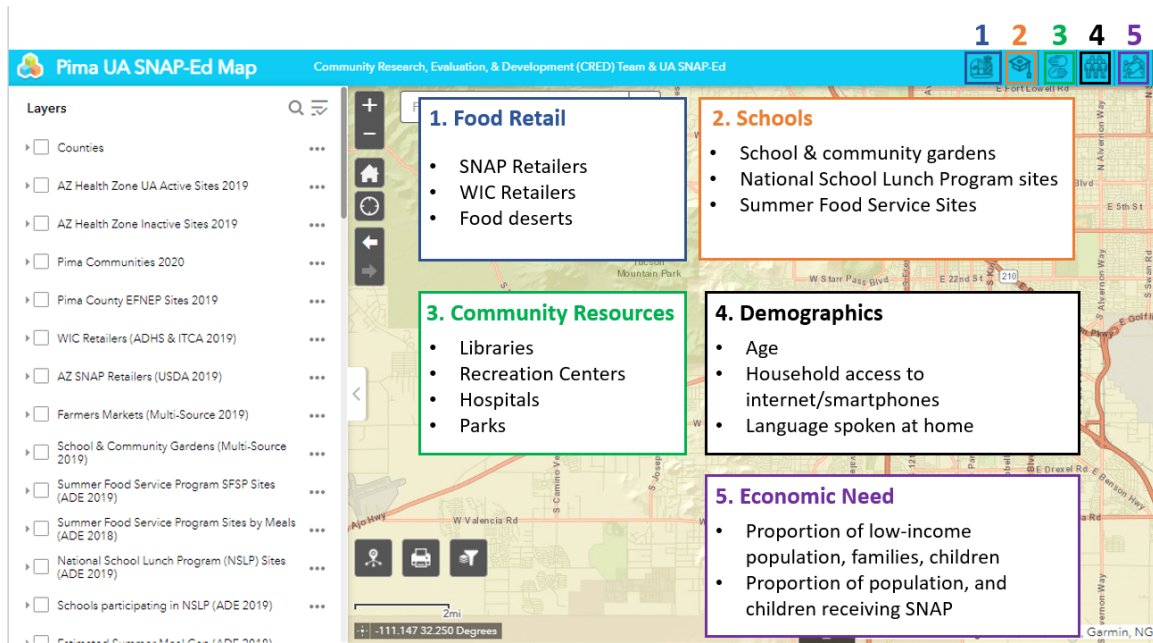


Table 1. Description of Key Map Components

Map Component	Description
1. Layers	Layers are mechanisms used to display datasets geographically on a map. ⁴ A layer may contain data points, lines, or specific geographical areas ("polygons") that are displayed on a map. Layers can be "displayed" or "turned off" by using the checkbox next to the layer title.
2. Sorted Layer Categories	The long list of map layers on the left-hand side is comprehensive but may be difficult to navigate due to the extensiveness of the list. To help find different map layers more quickly, they have been organized into sorted layer categories (e.g., Food Retail, Schools, Community Resources) described in Table 2.
3. Bookmarks	The bookmarks are a list of pre-defined geographic areas identified in a particular county. These may include cities, towns, unincorporated areas, tribal lands, or known communities. The bookmarks are a good tool to use if a user gets lost while navigating the map and would like to return to a specific community or to orient the user to their map location. The bookmarks differ based on which county map is being viewed.
4. Legend	The legend displays the meaning of the symbols, colors, and styles used to represent geographic and other data on the map. ⁴ By clicking the legend button, a full legend will display the information for all the data that is currently selected and being viewed on the map.
5. Polygon Layers	Polygon layers are spread over an area rather than a single address. Like a weather map, more intense colors are associated with more intense values. In Figure 1, the "Low-income population" layer is turned on, and the legend shows how the colors correspond to the different percentages of the low-income population. Other data displayed as polygon layers in the maps include children receiving SNAP, household access to smartphones and internet, and households that speak Spanish and other languages. Users can click on a polygon layer to view a window with more detailed information.
6. Icons	Icons are small map markers which represent a type of place. In Figure 1, the icon of a SNAP retailer is shown. Markers for community resources, such as community centers, early childhood centers, farmers' markets, and schools may be displayed simultaneously.
7. Proportional Icons	Proportional icons are circular icons that vary in size. For example, when looking at the National School Lunch Program in Figure 1, the size of the circle corresponds with the number of meals served at that school. Thus, the larger circles represent schools that served more meals than the smaller circles. Clicking on an icon will reveal more detail about a specific site.
8. Info Summary Button	The Info Summary Button looks like an octopus and is found in the bottom-left corner of the screen. This button tallies the number of data points that are currently being viewed on the screen. For example, to determine how many SNAP retailers are in the specific geographic area, click on the Info Summary Button and it will automatically count how many SNAP retailers are being shown on the screen.
9. Data Tab	The Data Tab summarizes data that is currently being viewed on the screen in table form. The Data Tab Button is found at the bottom-center of the screen and when clicked will expand to display a table version of the map data. This can be particularly useful to view details for multiple places displayed as icons on the screen, such as all the schools participating in the National School Lunch Program. Columns in the data table can be sorted by clicking the heading of the column of interest, such as sorting by site name or city.

As mentioned in the previous table, map layers have been organized into sorted map layer categories found in the top-right of the screen for easier navigation (Figure 2). These layers are available in all county maps. Some county maps include additional map layers if additional data was provided.

Figure 2. Interactive Map Layer Categories



Questions to consider when reviewing map data

Whether working in a group or alone, as a user reviews the interactive map data, these questions may be useful for identifying community assets and needs to explore further (Figure 3):

Figure 3. Questions to Consider when Reviewing Map Data

- Where are particularly **high or low values** located?
- Where are values that are **unexpected** in the context of the community?
- What **surprises** are seen in the data? What **confirms** what was anticipated?
- What factors may **explain** some of the visual patterns?
- Does the visual data prompt **new questions**?

In addition to the exploratory questions described in Figure 3, the maps are also useful from a program planning and implementation perspective. The wide variety of data embedded in the maps can be viewed to answer questions about current activities, opportunities to build on community strengths, needs, and gaps in access (Table 3).

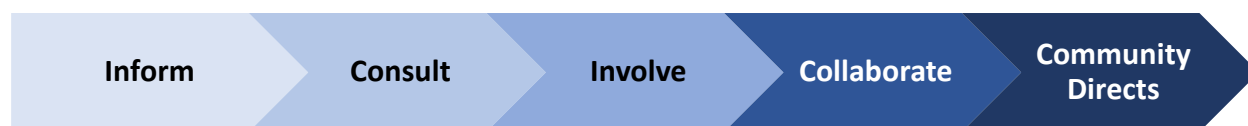
Table 3. Examples of How to Use Interactive Maps to Answer Data Questions

Data Questions	Using Map Data to Answer Data Questions
Where are current activities taking place?	Some icons are used to represent sites where Extension is working. Different icon images are used to differentiate types of partner sites, such as schools, libraries, or community centers.
Where are opportunities to build on community strengths?	Map icons can be used to identify potential new community partner organizations. In addition to current Extension program sites, listed under ‘AZ Health Zone UA Active Sites (2022),’ the maps also include public parks, hospitals, stores, SNAP and WIC retailers, and others.
Where are areas of community need?	Data from the Census, American Community Survey, and other sources can be viewed at the community level to look at key indicators of need, such as areas with high rates of poverty or limited internet access.
Where are gaps in access to resources? What resources exist that could help address those deficiencies?	By visually displaying multiple types of geographical information (i.e., map layers) at the same time, a map user can determine if there are deficits in access to resources for a program’s target population. For example, map icons for SNAP retailers can be viewed at the same time as the map layer for the low-income population. By viewing these two map layers together, communities with a large proportion of low-income people without accessible SNAP retailers can be identified and targeted for future efforts. Extension staff could identify nearby retailers who could be recruited into the SNAP program or work to promote food access in other ways (e.g., Double Up Food Bucks at farmers’ markets).

How to use GIS maps for community engagement

The Spectrum of Public Participation (Figure 4) was introduced in the [first publication of this series](#).⁵ Each level includes different activities as well as different depths of community engagement. Table 4 provides examples of how to use map data to inform community engagement efforts at each level of the spectrum.

Figure 4. Spectrum of Public Participation



Source: *The International Association for Public Participation (2007)*

Table 4. Using Map Data to Inform Community Engagement Efforts at Each Level of the Spectrum of Public Participation

Level of Public Participation	Using Map Data to Inform Community Engagement Efforts
Inform	When planning outreach strategies to inform community members about an upcoming Extension program, interactive maps can be used to determine internet and smartphone access in a target community to suggest whether social media-based outreach would be an effective way to market the program.
Consult	Interactive maps can be used to find locations to consult community members on their preferences of where to hold a farmers’ market. Interactive maps may show the locations of key community resources, such as public libraries and health centers, to host a pop-up engagement – a space in a well-trafficked community location to gather input from community members on their preferences using quick, interactive questions. ⁶
Involve	Extension programs can involve community members by developing a community advisory board on Extension priorities. Recruitment efforts could prioritize high-need areas, such as areas with a large proportion of low-income families, which can be identified by the GIS maps.
Collaborate	If Extension seeks to develop an early childhood community coalition to collaborate on early childhood education issues, the maps can assist in the identification of childcare providers, preschools, and areas with high populations of young children.
Community Directs	Extension programs can be community directed by providing opportunities for communities to make decisions for themselves about their needs and priorities. For example, Extension could create a participatory budget process, allowing community members to vote on how a certain amount of funds could be spent for a community improvement project. The maps could help identify needs, missing resources, or limited community services, which could help inform potential community improvement projects, such as spending funds to train beginning farmers, start a farmers’ market, or create a community garden.

Interactive map data caveats and limitations

Interactive maps are exciting and useful, but they are not a perfect tool. Notably, they are only as good as the data that goes into them. Much of the data, particularly data from the American Community Survey, are estimates of the characteristics of the residents in an area, not exact counts.⁷ Even data from the Census is imperfect. Some demographic groups, including Hispanic or Latino and American Indian or Alaska Native populations, are consistently undercounted.⁸ Local knowledge is critical when interpreting the maps and identifying their limitations. Ground-truthing, validating administrative data with direct observation, is critical for ensuring the data presented in the maps aligns with what is known by individuals living in the communities.⁹ For example, community members can verify that a grocery store listed in the SNAP retailer database is still open and exists in the location listed in the database.

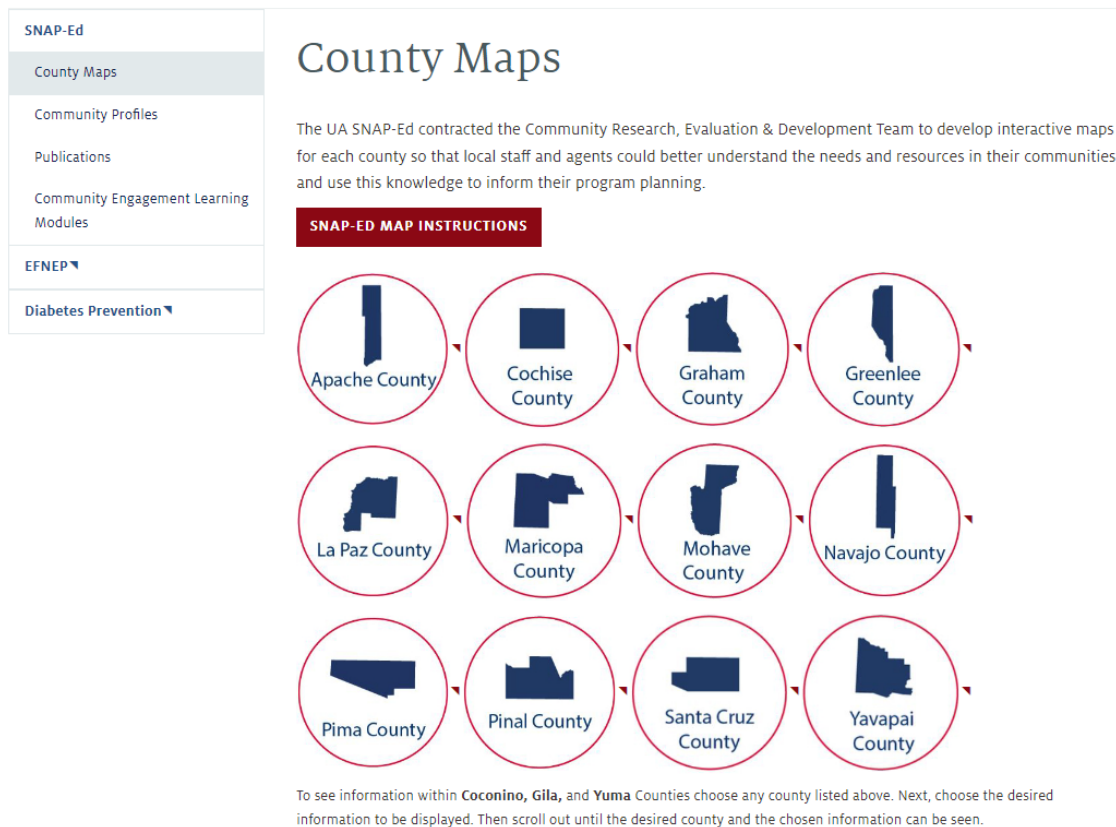
Details about the map data sources can be found under the ‘About’ Page, noted with the ⓘ icon in the top-right corner of the map. The year in which data were last updated is also provided in parentheses in the data layer name. Data layers that are several years old may not reflect more recent changes, such as retailers or farmers’ markets opening or closing.

Furthermore, census tracts are used as the primary geographical unit in the maps.¹⁰ Census tracts generally have a population size between 1,200 and 8,000 people, with an optimum size of 4,000 people. This means that in rural areas the geographical area of census tracts can be quite large, whereas in densely populated urban areas the geographical area of census tracts can be quite small. These boundaries may or may not reflect what residents perceive as community boundaries, and it can be hard to identify small pockets that are different from their surrounding areas. This also has implications for map usage. When looking in urban areas, zoom in to make sure that all the tracts are visible. If the scale is too large or zoomed out too much, some tracts might be hidden by words, icons, or other map indices.

Getting started: Find a specific county’s interactive map

The UA SNAP-Ed program hosts a landing page for the county maps. A link to this landing page is provided in the Resources section of this article. Figure 5 shows a screenshot of the page, which includes a link to map instructions and links to each of the county maps. Because the maps were originally developed for UA SNAP-Ed, only counties with active UA SNAP-Ed programs have specific links. To see map data for Coconino, Gila, and Yuma counties, choose a nearby county from those available and simply navigate within that map to the county of interest.

Figure 5. County Maps Landing Page



Continuation of the Community Engagement Series

This is the second article of a seven part-series on community engagement, a collaboration between the [University of Arizona's School of Nutritional Sciences & Wellness - Cooperative Extension, SNAP-Ed](#) (UA SNAP-Ed) and the [Community Research, Evaluation, and Development \(CRED\) team](#) from the Norton School of Human Ecology. The publications reflect the concepts of seven [interactive, online learning modules about community engagement](#) that were developed by the UA SNAP-Ed and the CRED team. The next publication in this series will focus on using actor mapping to understand who is and is not participating in your community engagement efforts.

The full Community Engagement in Cooperative Extension article series includes:

1. What is Community Engagement?
2. Using Interactive Maps to Understand Communities
3. Who is and is not Participating in Community Engagement?
4. Strategies to Improve Representation
5. Spectrum of Public Participation: Inform and Consult
6. Spectrum of Public Participation: Involve
7. Spectrum of Public Participation: Collaborate and Community Directs

All articles in the series are available at the following link:

[Community Engagement in Cooperative Extension Series](#)

Citations

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Resources

[AHA Community Health Improvement Network - Community Health Needs Assessment Toolkit](#)

[CRED - Helpful Data Resources to Explore](#)

[CRED - Secondary Data Sources for Conducting a Needs Assessment](#)

[CRED - SNAP-Ed Maps Cheat Sheet](#)

[CRED - SNAP-Ed Maps Walk-through Video Tutorial](#)

[The Community Toolbox - Assessing Community Needs and Resources](#)

[UA Nutritional Sciences & Wellness - SNAP-Ed Maps Landing Page \(with links to each map\)](#)



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