

Mackenzie Cannon – Faculty Mentor Stephen Borders, PhD, MSHP
 Conway Medical Center College for Health and Human Performance, Department of Health Science
 B.S. in Health Administration

Introduction

Food insecurity is a multidimensional problem. This research project aims to use geographic information systems to reduce food insecurity in the eight-county service area served by the South Michigan Food Bank. We collected and analyzed data on various factors that contribute to food insecurity, such as poverty, education, employment, transportation barriers, and access to supermarkets and grocery stores. By mapping these data at the census tract level and visualizing the results through an interactive dashboard, we identified areas with the highest levels of need while recognizing some of the root causes behind food insecurity throughout the region. In addition, we created a printable infographic for each of the South Michigan Food Bank's 239 census tracts. The infographic summarizes key statistics related to food insecurity for each tract. The use of geographic information systems, interactive dashboards, and printable infographics has demonstrated its potential to be a valuable tool in the effort to reduce food insecurity in the region. Printable infographics are ideal when attempting to pinpoint locations with the greatest needs. This data-driven approach and the ability to summarize complex data sets have allowed the South Michigan Food Bank to identify key factors contributing to food insecurity and develop targeted solutions to address the problem at a more localized level.

Research Question

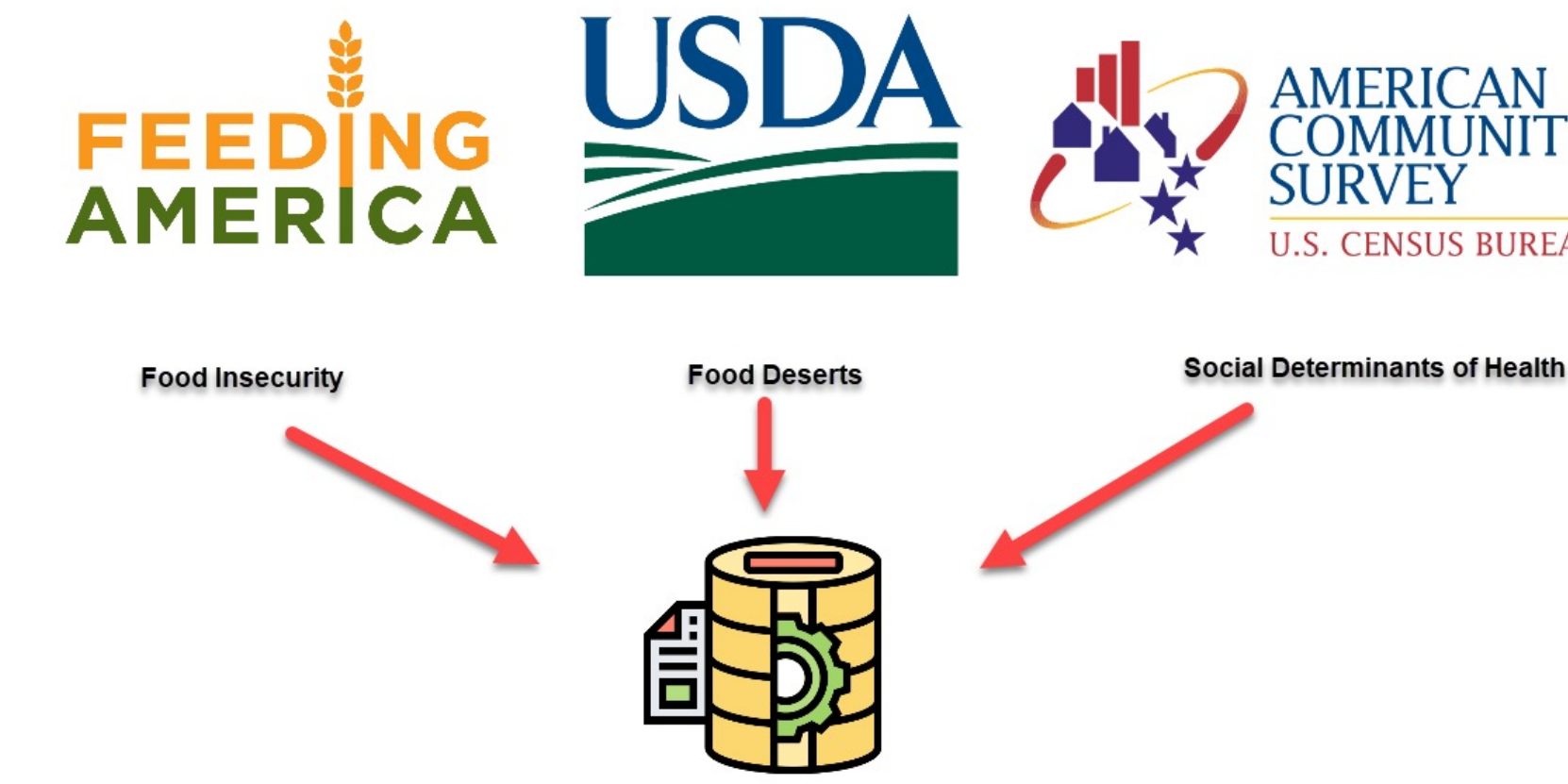
The South Michigan Food Bank, one of seven food banks in the state of Michigan, distributes over 11 million pounds of food each year, providing meals for families and individuals across eight counties. The organization partners with schools, churches, and other nonprofits to organize food pantries and distributions of fresh food that help those most in need. But ensuring resources get where they're most needed is no easy task. One of the main challenges, according to South Michigan Food Bank CEO Peter Vogel, is a lack of data about which Michigan residents could benefit the most from the services the food bank provides, and where those residents are located. This can hinder food banks when it comes to making targeted decisions about distributions or obtaining grants. Our research question became:

- How could we create a tool that would allow the South Michigan Food Bank to visualize crucial information about the counties it serves—and therefore make better-informed choices when it comes to tackling food insecurity in the region?

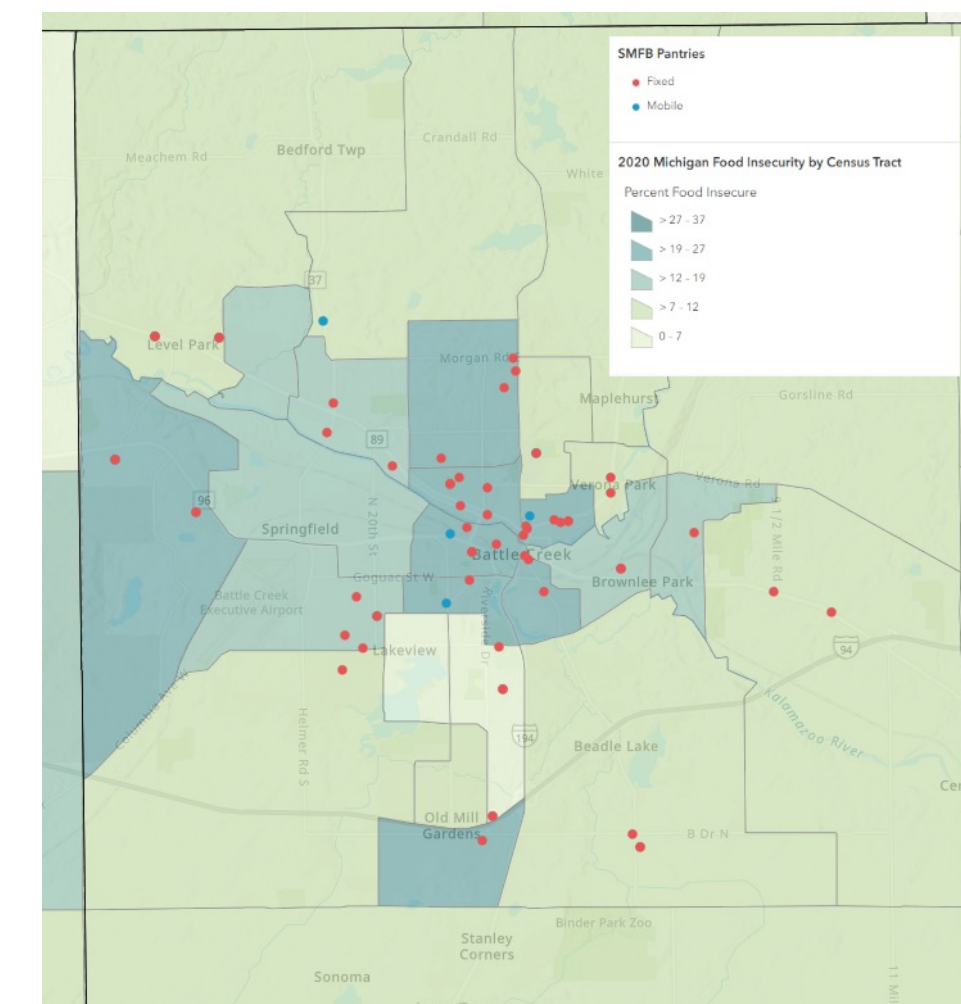
Building an Interactive Dashboard

The design and building of an interactive dashboard analyzing the problem of food insecurity at the census tract level in South Michigan, followed several steps:

Step 1 - Collect and prepare the data: The first step was to collect data on food insecurity and the various socioeconomic factors, also known as the Social Determinants of Health that are often associated with food insecurity at the census tract level. Census tracts are small, relatively permanent geographic entities within counties. Generally, they have between 2,500 and 8,000 residents and are as homogeneous as possible with respect to population, economic status, and living conditions. We assembled data from Feeding America, the US Department of Agriculture, and the U.S. Census Bureau's American Community Survey.

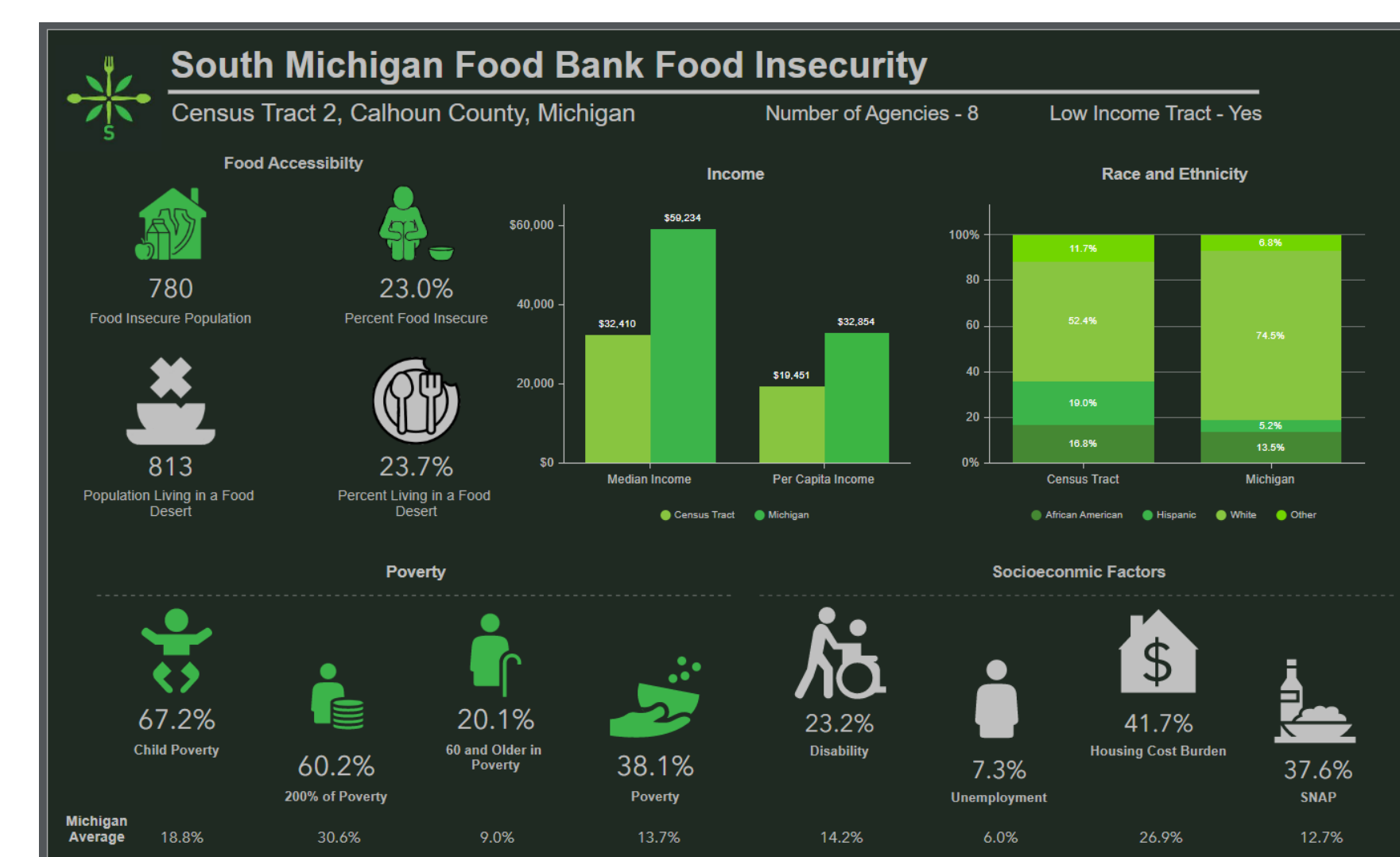
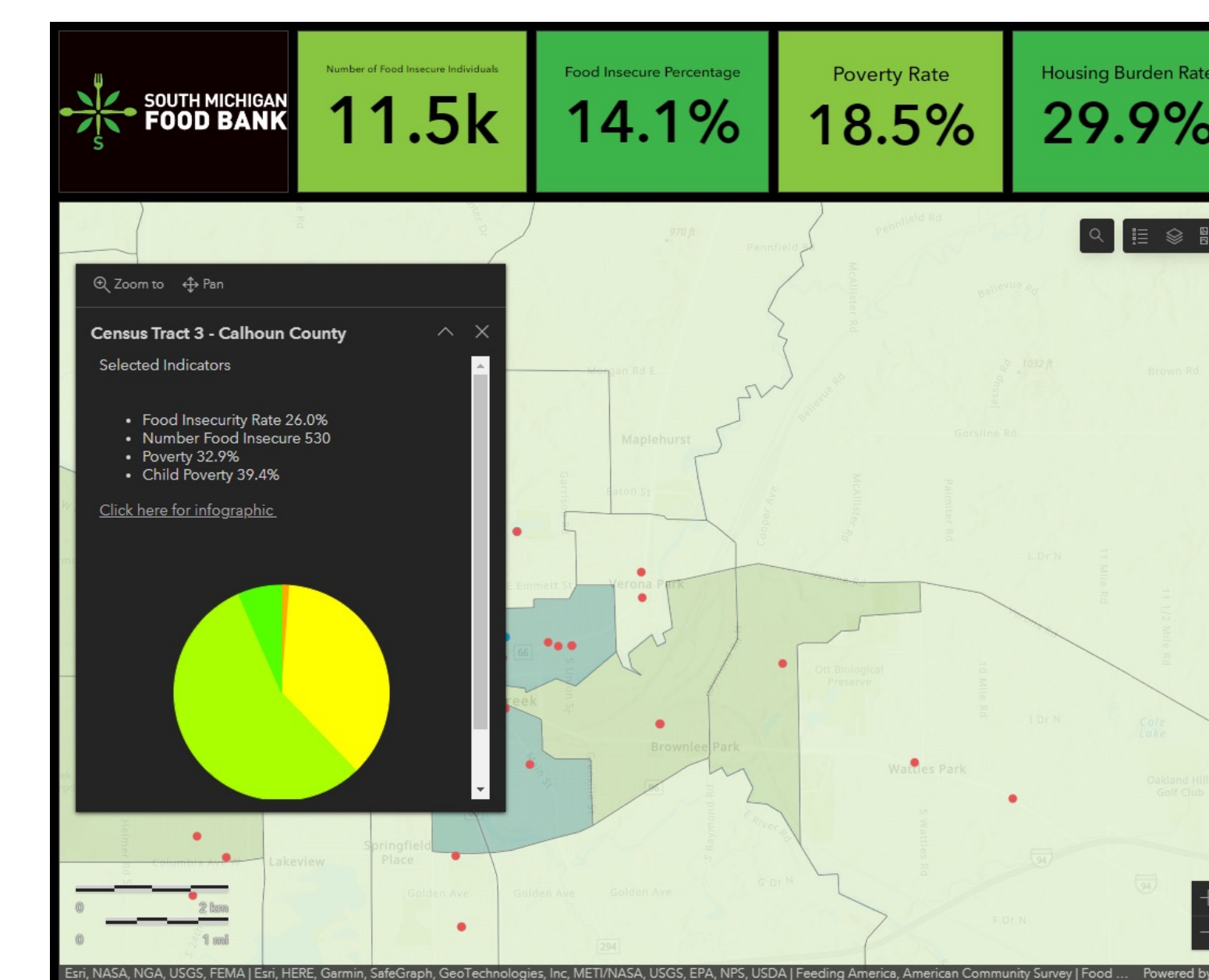


Battle Creek, MI Food Insecurity



Step 2 – Creating the maps: After preparing the data, we began creating the maps in ArcGIS Online to visualize food insecurity by census tract in the South Michigan Food Bank service area. The maps can be customized to include different layers, such as poverty, transportation barriers, and those living in a food desert. This map represents the proportion of the population experiencing food insecurity in and around Battle Creek, MI. The red dots represent the locations of fixed pantries (i.e. church and nonprofit pantries). The blue dots represent the locations of mobile food distribution sites that are serviced by one of the SMFB's mobile pantry food trucks.

Step 3 - Design the dashboard: Our goal was to design a dashboard that provided information about the communities in the SMFB service area that was easy to navigate and provides the necessary information at a glance. The dashboard also has interactive features. For example, when the user zooms in on a community of interest, the dashboard elements change to show the values represented for the selected extent. Users can further interact with the dashboard by selecting a single census tract that reveals detailed socioeconomic data about the selected tract.

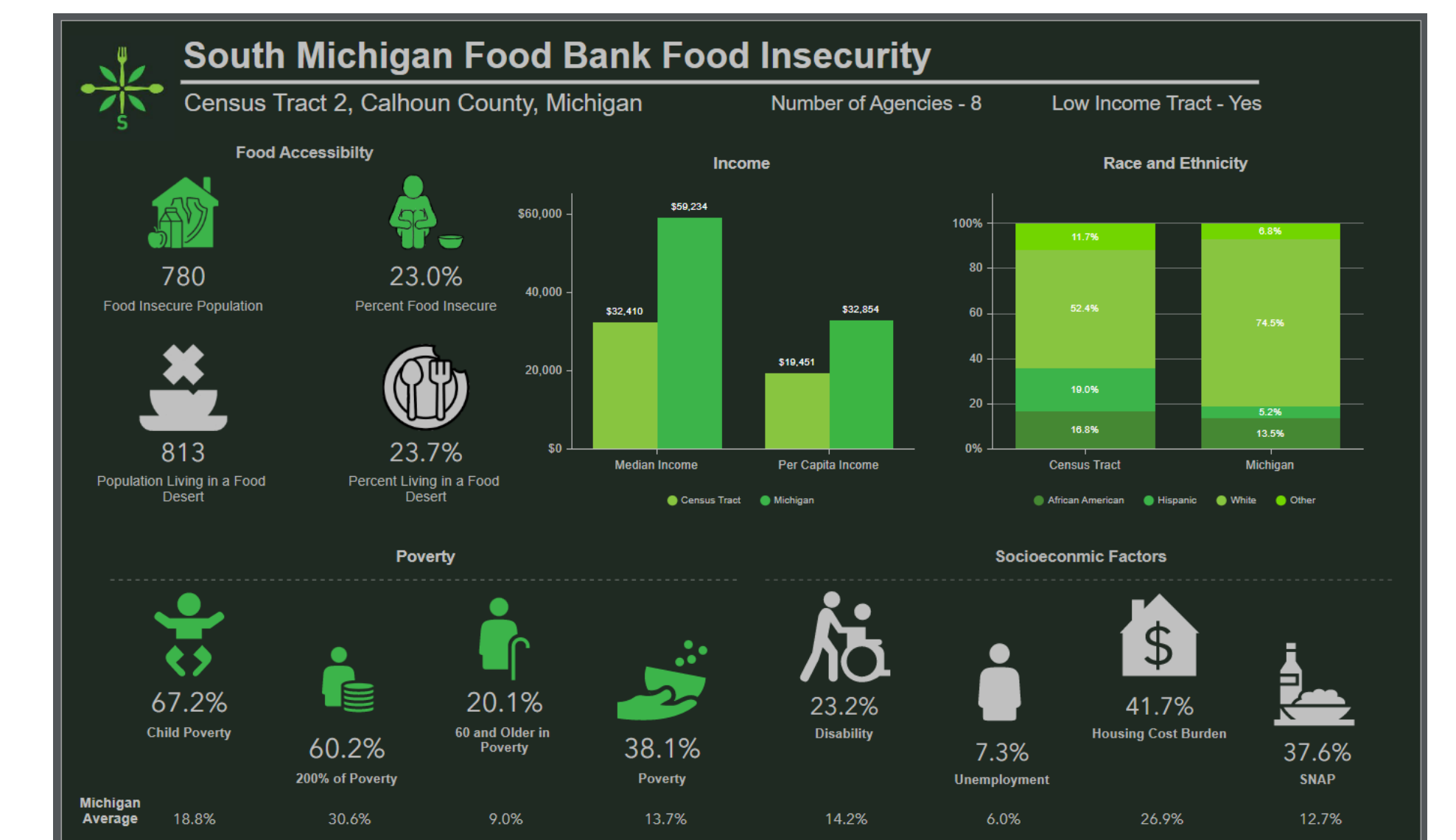


Step 4 - Creating the Infographic: Because we assembled so much data and with the understanding that the problem of food insecurity is very different in urban and rural areas, we created an infographic to present the complex assortment of statistics we collected in a simple and visually appealing way. Infographics are designed to be visually appealing and engaging, which makes them more likely to be shared and remembered. In addition, they allow people to quickly understand and absorb information, without having to read through long documents or reports.

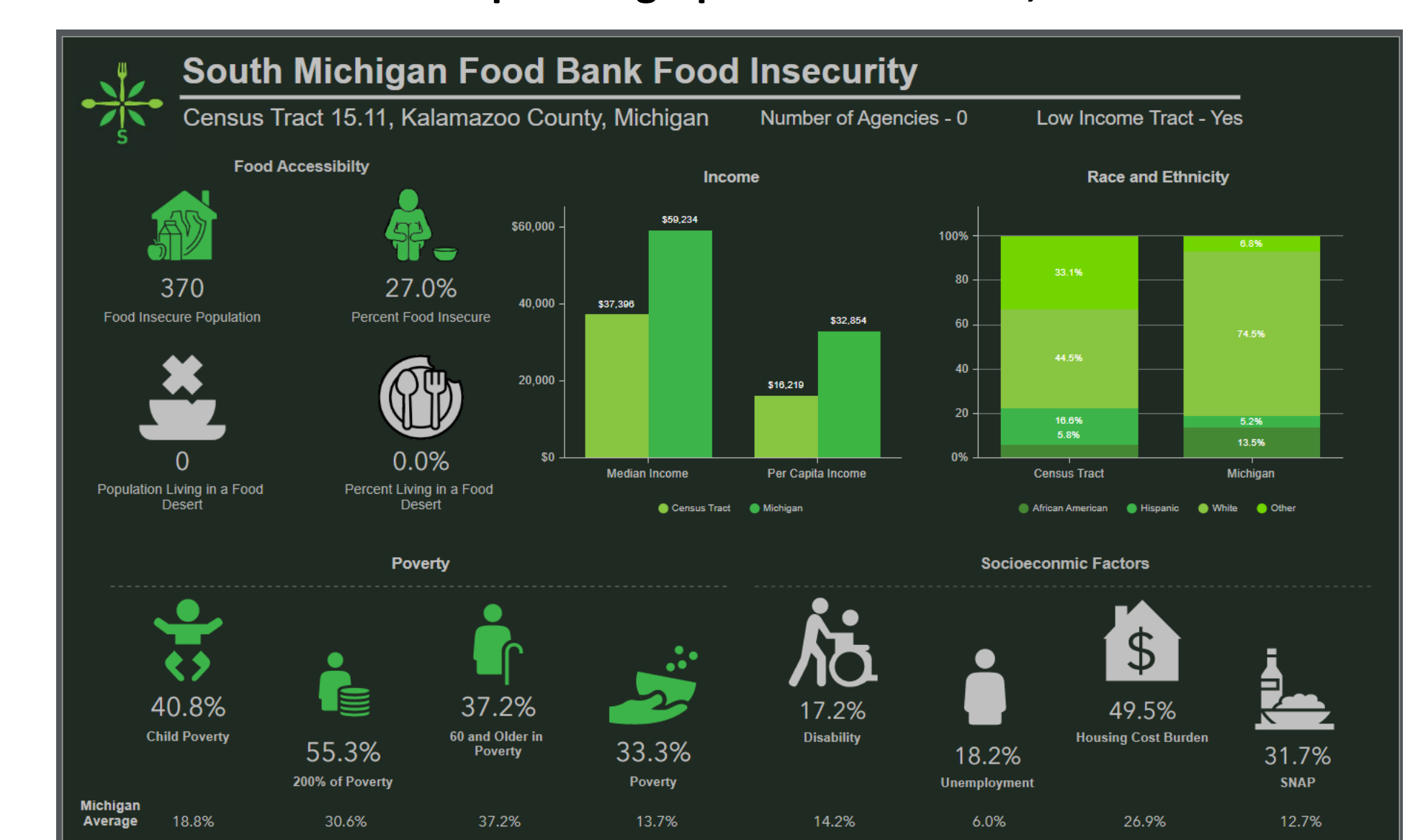
Results

We created an infographic for every census tract within the South Michigan Food Bank service area. Once you begin comparing these, you see that food insecurity is different in Kalamazoo than it is in Battle Creek. Then you get to the rural areas, where the dynamics are very different. Transportation, for instance, is a major issue for residents of rural areas who may be located farther from food pantry locations, and one of many factors that needed to be highlighted for the dashboard to best illustrate the needs of each area.

Sample Infographic – Battle Creek, MI



Sample Infographic – Kalamazoo, MI



One of the most important functions of the dashboard has been to help the food bank scout new locations for food pantries. Being able to visualize data about food insecurity has allowed the South Michigan Food Bank to make more targeted decisions about their distributions, including how frequently they occur. Moreover, the dashboard has been vital from an outreach perspective. Not only is the dashboard instrumental in educating residents and potential partner organizations within the communities the food bank serves, but it has also been a crucial part of seeking new statewide grants that could provide the food bank with resources it hadn't been able to pursue previously.