A picture is worth a thousand words.

When attempting to better understand the structure of the elements that influence local food systems, it is important to think about how the local system fits into the larger regional system. This can be done any number of ways. In using the county food systems profiles, comparing the county values for each indicator to the statewide and/or North Central regional averages provides an important benchmark. Seeing how a given county compares to the state allows profile users to better understand the strengths and weaknesses of the local food system.
While such a comparison is insightful, looking at the indicators of a county and its neighboring counties perhaps offers a superior comparison. Within the County Food Systems Profiles Portal, one could find the individual profiles for the neighboring counties and then compare and contrast multiple counties. However, the process would be cumbersome and might result in more confusion than insight. An alternative approach is to view maps of the individual indicators included in the profile and then visually examine how the county of interest “fits” into the larger region. A map of each individual local food system indicator is provided to facilitate such comparisons.

Consider, for example, the map below showing the number of farms with direct sales of products for human consumption, adjusted to the size of the county by showing the number of farms per 10,000 county residents. Here one can see that there are more farms with direct sales in certain parts of the North Central region, including much of central and western Wisconsin, northern Michigan, and much of Missouri. One can also see that in much of the corn belt of Illinois and Indiana, there are fewer farms with direct sales. This pattern makes intuitive sense because of the region’s strong comparative advantage in corn and soybean production.

This simple map suggests that there may be a spatial cluster of economic activity of a particular type, which economists call an economic cluster. While there are as many definitions of an economic cluster as there are researchers studying the phenomenon, there are many common themes. One such theme is agglomeration economies, which speaks to the presence of internal and external economies of scale for firms of a given industry, critical levels of input suppliers such as specialized labor, and geographic proximity of firms in related industries. Mapping the individual indicators of the local food profiles cannot address all of the elements that together constitute an economic cluster, but it can shed light on the idea of geographic concentrations. The information shown in the simple map of farms with direct sales allows users to make inferences about patterns of higher and lower concentrations.

To test whether the patterns observed in the simple mapping are “statistically significant” as opposed to random, we use what economic geographers refer to as hotspot analysis. While there are numerous tools for hot spot analysis, the one that is perhaps most widely used is the Getis-Ord spatial statistic ($G^*_c$). This tool places the observed pattern in one of three possible categories: (1) a statistically significant positive relationship, which constitutes a “hot spot”; (2) a statistically significant negative relationship, which constitutes a “cold spot”; or (3) a statistically insignificant pattern.
The map of the Getis-Ord spatial statistic reveals that there are several “hot spots” of farms with direct sales to consumers (shown in red), as well as “cold spots” (in blue). Two of the hot spots include the Upper Mississippi River Valley from the Wisconsin–Illinois border north to the Duluth, Minnesota, area, as well as a large part of central and northern Missouri. The cold spot covering much of Illinois and Indiana is not surprising given the predominance of large-scale corn and soybean production in the area.

While hot spot analysis offers insight into the significance of the geographic pattern of a given indicator, one must take some care when interpreting these types of analyses. For example, the “hot spots” in western Nebraska and parts of Kansas are more likely a function of the low population densities than a strong presence of farms with direct sales.

This potential for misinterpretation highlights two needs: to rely on local knowledge of the region and to recognize the limitations of individual indicators. Rather than rely on a single local food system indicator, one must look at a variety of indicators to gain a stronger understanding of the local food system.

\[ G_{i}^{*} = \frac{\sum_{j=1}^{n} w_{ij} X_j - \bar{X} \sum_{j=1}^{n} w_{ij}}{\sqrt{n \left( \sum_{j=1}^{n} w_{ij}^2 - \left( \sum_{j=1}^{n} w_{ij} \right)^2 \right) / (n-1)}} \]

The Getis-Ord \( G_{i}^{*} \) is computed as

\[ G_{i}^{*} = \frac{\sum_{j=1}^{n} w_{ij} X_j - \bar{X} \sum_{j=1}^{n} w_{ij}}{\sqrt{n \left( \sum_{j=1}^{n} w_{ij}^2 - \left( \sum_{j=1}^{n} w_{ij} \right)^2 \right) / (n-1)}} \]

where \( S = \sqrt{\frac{n \sum_{j=1}^{n} X_j^2 - \left( \sum_{j=1}^{n} X_j \right)^2}{n}} \), \( X_i \) is the food system indicator for county \( i \), and \( w_{ij} \) consists of spatial weight matrix elements identifying adjacent counties. Here, if two counties are adjacent, then \( w_{ij} \) takes a value of one. If two counties are not adjacent, then \( w_{ij} \) takes a value of zero.