

Food Security in the North Central Health District of Idaho

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Executive Summary

- Introduction

Food security has implications on the local economy, the environment, public health, and the quality of our communities. Food insecurity is more about distribution than malnutrition in this country. The literature has identified four parameters of food insecurity, incorporating demographic variables as well as the availability of and access to adequate food resources. Community food security focuses on these indicators at the neighborhood or community level incorporating measures of self-reliance as a way to supplement the region's traditional food system.

- Methodology

Relying on nationally available data sets, this study quantified the available food choices in the region and the accessibility of those food options to create a food security index at the zip code level across the region. Using Geographic Information System (GIS) technology, this study used spatial analysis to test for spatial clustering in the food security indices, identifying areas within the region that are most vulnerable to food insecurity. Extending beyond existing sourced indicators, a stakeholder survey instrument was used to collect primary data and gauge perception of food security in the region.

- Results

The food security index suggested that there was a clustering of food secure areas in Latah County and a clustering of food insecure zip codes in the eastern parts of Nez Perce, Lewis, and Idaho counties. This clustering was confirmed with two separate spatial autocorrelation tests using GIS technology. In addition, two spatial outliers in the region were identified – zip code areas that were more secure surrounded by areas of higher food insecurity and areas that were less secure surrounded by areas of lower food insecurity. The stakeholder survey revealed that there is little consensus on many of the parameters of food insecurity discussed in the literature although overall, the zip code areas that were considered the most food secure (83843 and 83501) by the food security index were also the zip codes that perceived themselves to be the most food secure in the stakeholder survey. This suggests that if we could increase the sample size of the remaining zip code areas we could possibly validate our index further.

- Conclusion

Food security in the North Central Health District of Idaho exhibits some spatial clustering. These relationships should be explored further to understand the process of this observed pattern. Focus groups in areas with the highest food insecurity could further supplement the findings with valuable insight from these populations.

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Introduction to Food Security

1.1 Defining Food Security

Food insecurity has implications on the local economy, the environment, public health, and the quality of our communities (Pothukuchi and Kaufman 1999). Defining what it means for a specific region to be food insecure is a prerequisite for identifying what actions can be taken to alleviate the problem (Raja and Yadav 2008). However, there is not a clear and universal definition of food insecurity, which makes it difficult to examine food insecurity in a standardized manner. Since the World Food Conference in 1974, there have been over 200 definitions of food security (Maxwell, 1996). Definitions have varied on what contributing factors should be used to best explain the phenomena.

This project uses the definition reconfirmed at consecutive World Food Summits: that food security is achieved when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences to maintain an active and healthy lifestyle (Barrett, 2010; Do et al., 2006; Gregory, Ingram, & Brklacich, 2005; Maxwell, 1996; Pinstруп-Andersen, 2009). At the 2009 food summit, the definition of food security was expanded by specifying the importance of securing individual dietary needs and food preferences, calling for more qualitative, place-based analyses (Pinstруп-Andersen, 2009).

Community Food Security (CFS) encompasses all of that, but instead of focusing on household or individual food security (Carlson, Andrews, & Bickel, 1999; Coleman-Jensen, Nord, Andrews, & Carlson, 2012; Coleman-jensen, 2013; Do et al., 2006; Radimer, 2002) CFS focuses on achieving a situation in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through an economical and environmentally sustainable food system that maximizes community self-reliance and social justice (Kaiser, 2013; Hamm, 2003). CFS aims to build up the community's food resources incorporating seasonal supplements like farmers markets and community gardens (Forster, 2002).

1.2 Measuring Food Security

In order to alleviate the problem of food insecurity, the spatial and temporal dimensions of the phenomena must be assessed (Bashir & Schilizzi, 2013). First world food insecurity cannot be assessed by the obvious signs of malnutrition just as insecurity indicators in one third world country may not be indicative of food insecurity levels it in another (Carlson et al., 1999; Do et al., 2006; Maxwell, 1996). Countywide, in 2012, the United States Department of Agriculture (USDA) estimated that over fourteen percent of the country's population was food insecure (Coleman-Jensen, Nord, & Singh, 2013). Food insecurity in the U.S. is not necessarily about scarcity, but more about distribution (G. Feenstra & Ohmart, 2012; Sen, 1981). Even within the United States, food insecurity does not always look the same. The disparities between rural and urban environments are vast and often misunderstood, and hard to quantify (Ecker & Headey,

2013; Garasky, Morton, Lois Wright, & Morton, 2006). While there has been a continued focus on food access in urban areas (Curtis & McClellan, 1995; Kervenael, Kirkup, Hallsworth, Jackson, & Perez, 2004; Weinberg, 2013), rural food access issues are less understood and the reliance on urban food assessments as standardized formats of analysis could overstate or understate the food environment in non-urban areas (Morton & Blanchard, 2007; Sharkey & Horel, 2008). All of this points to the importance of place-based assessment so that remediation strategies can be targeted to the most vulnerable populations within the region (Barrett, 2010).

The World Food Summit identified three unified concepts in 1996 for analyzing food security: 1) food availability; 2) food access, including the subsidiaries of geographic access, economic access (price, transportation costs, and poverty), and informational access (educational, social, and cultural); and 3) utilization. Utilization is the quality and nutritional component of food security and aims to narrow the gap between availability and access through nutrition education and assistance programs (Agyeman & McEntee, 2009; Bashir & Schilizzi, 2013; Ecker, Olivier and Breisinger, 2012; Gregory et al., 2005; Jaenicke & Virchow, 2013; Maxwell & Unit, 1996; Padmavathy & Poyyamoli, 2011; Pinstrup-Andersen, 2009; Webb et al., 2006). The three concepts are hierarchical in nature, but not deterministic. Food availability is necessary, but not sufficient to maintain food access and food access is necessary, but not sufficient to maintain proper food resource utilization (Do et al., 2006). These parameters were extended at the 2009 World Food Summit to add a fourth concept: the stability of the region or its ability to cope with alterations to the regional food system (Do et al., 2006; Ecker & Breisinger, 2012; Padmavathy & Poyyamoli, 2011). The stability of the food system takes steps to reduce the span of the whole food system and focus on what could be produced regionally to incorporate more sustainable solutions for the whole production, processing, distribution, and consumption sectors of the foodshed (Hemenway, n.d.; Kloppenburg, Hendrickson, & Stevenson, 1996; Salkin & Lavine, 2010). Feenstra (1997) stated that residents could get more of their nutrients from local food sources if communities concentrated on seasonal availability (G. W. Feenstra, 1997).

Methodology

2.1 Regional Overview

This project assesses food security in a rural region in Idaho where several collaborative efforts on community food systems are already occurring. The Palouse-Clearwater Food Coalition is a grassroots organization engaged in projects to strengthen the regional food system through efforts aimed at bringing producers and consumers closer together. Another group, the Food System and Economic Development Initiative, which is sponsored by the University of Idaho's Department of Economic Development, aims to raise awareness campus-wide on all food related research being conducted by University of Idaho faculty and students and it encourages collaborative efforts by cultivating these connections (OED, 2013). Both organizations were supported by an AmeriCorps position hosted by the Palouse Clearwater Environmental Institute in 2012 – 2014. Each year, this position focused on food systems enhancement through community collaborations (PCEI, n.d.).

The state of Idaho was divided into seven health districts in 1970 to focus public health and welfare resources regionally and to extend resources to all rural areas of the state (IDHW, n.d.). The North Central Health District (district 2), the focus of this study, includes the five counties of Latah, Nez Perce, Lewis, Idaho, and Clearwater. The state of Idaho is primarily a rural state with, on average, 19 people per square mile compared to an average of 87 people per square mile nationally (US Census Bureau, 2012). Persons per square mile in the North Central Health District range from 1.9 in Idaho County to 46.3 in Nez Perce County (US Census Bureau, 2012). Figure 1 illustrates the population at the census tract level to show the distribution across the region.

2.2 Food Security Index

This study created an index for food security at the zip code tabulation area. Sixteen variables were included in the index. Data was collected from the Census Bureau American Community Survey 2012 5-Year Estimates. Indexed variables from this source included: population totals, median age, household dynamics and income, poverty, labor force participation and unemployment rates, health insurance coverage, and food stamp participation (U.S. Census Bureau, 2012).

Data for year round food resource retail outlets (grocery stores) was obtained from InfoUSA Inc (InfoUSA, 2012). Grocery stores are identified by the North American Industry Classification System (NAICS). Grocery stores are differentiated from other store outlets as establishments selling a general line of foods both fresh and frozen (US Census Bureau, 2013). Data for SNAP approved retail establishments was sourced through the USDA's Food SNAP Retailer Locator (USDA, 2013). SNAP approved retailer outlets extend beyond grocery store classifications.

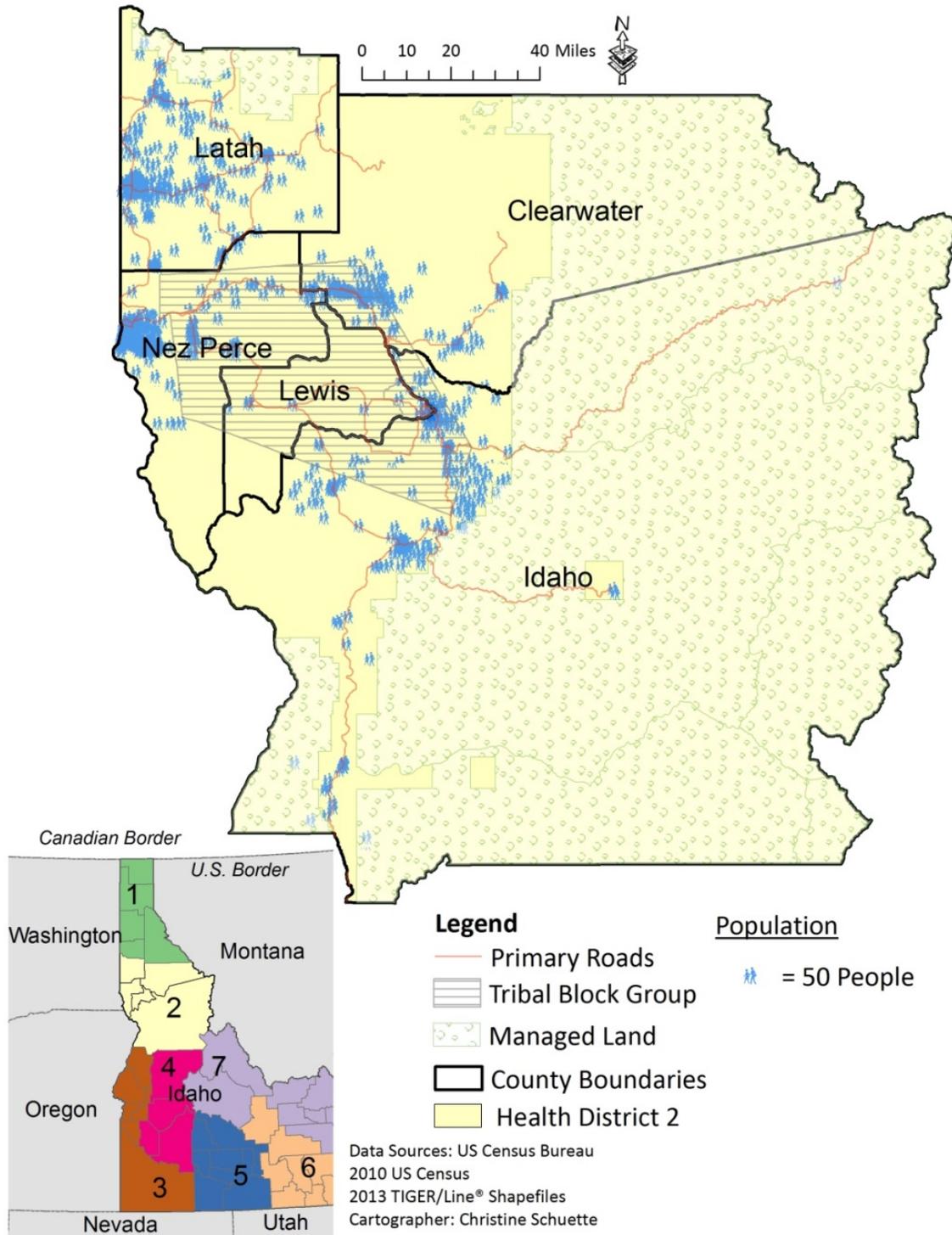


Figure 1: The Population Distribution in the Second Health District of Idaho

In the study region, businesses that were on the SNAP approved list included: grocery stores, service stations-gasoline & oil, convenience stores, one delicatessen and one grocery – wholesale (InfoUSA, 2012).

Seasonal measures of stability were sourced online for farmers markets, community gardens, participation in the Farm-to-School program, and Community Supported Agriculture (CSA) (Eat Well Guide, 2013; Ecovian & Seastian, 2013; Idaho Preferred, 2012). A CSA is a collaborative response to sustainability issues in local communities (Farnsworth, Thompson, Drury, & Warner, 1996). Like shareholders to the farm, CSA's operate in multiple ways with subscribers getting a share of the production each season, or in some instances, even helping with the harvesting themselves (Ecovian & Seastian, 2013).

Values for each of the variables were aggregated into six ranking classes (classes were ranked one to six, with six being the most food insecure). Each variable was individually assessed to determine whether a high or low score would be more advantageous to food security (e.g. the high range of the poverty rate would be given a ranking of 6 and the low range of median household income would also be given a ranking of 6). Table 1 lists the sixteen variables included in the index and the range of values for each indicator within the region. Scores for each ranked variable were summed and an overall food insecurity score was determined for each zip code area. Zip codes with the highest sum value after totaling ranking scores of all sixteen variables were determined the most food insecure.

2.3 Spatial Assessment

The established food security index was used to explore the spatial relationship and significance of the pattern of food security in the study region. Data was examined for spatial autocorrelation using the Spatial Autocorrelation (Global Moran's I) tool test statistic in ArcGIS ,(ESRI 2014). An underlying assumption of the global Moran's I statistic is that the data is stationary, meaning that the distribution of the process being studied is independent of location and can be interpreted in the same way across the study region (Fotheringham & Brunson, 1999). If the global I statistic is significant for spatial clustering, a local Moran's I statistic should be used to pinpoint specific clustering of positive and negative autocorrelation (Burt, Barber, & Rigby, 2009). The 'Cluster and Outlier Analysis (Anselin Local Moran's I)' tool in ArcGIS is used as a local test for spatial clustering (ESRI 2014).

Table 1: Food Security Indicators: Descriptive Statistics

| INDICATOR | Range (Low) | Range (High) | Mean | Median | Standard Deviation |
|--|-------------|--------------|----------|----------|--------------------|
| DEMOGRAPHIC | | | | | |
| Median Age | 25.50 | 58.80 | 46.57 | 47.60 | 7.23 |
| Labor force Participation | 41.30 | 89.10 | 57.07 | 56.40 | 10.48 |
| Unemployment Rate | 0.00 | 21.90 | 9.23 | 8.60 | 6.30 |
| Male householder, no wife present, family – With own children under 18 years | 0.00 | 8.50 | 1.93 | 1.46 | 2.07 |
| Female householder, no husband present, family – With own children under 18 years | 0.00 | 18.69 | 3.71 | 2.94 | 4.22 |
| Householder living alone – 65 years and over | 0.00 | 25.00 | 10.78 | 9.20 | 5.71 |
| Civilian population without health insurance | 1.10 | 41.30 | 16.11 | 14.90 | 7.75 |
| Civilian population under 18 years of age without health insurance | 0.00 | 64.70 | 12.28 | 9.00 | 13.46 |
| AVAILABILITY, ACCESS, & UTILIZATION | | | | | |
| Year Round Food Resource Outlets (e.g. grocery stores) | 0.00 | 7.00 | 0.86 | 0.00 | 1.62 |
| SNAP Approved Retail Outlets | 0.00 | 34.00 | 2.30 | 1.00 | 6.09 |
| Food Banks and Food Pantries | 0.00 | 12.00 | 1.14 | 0.00 | 2.50 |
| Median Household Income | \$20,948 | \$76,406 | \$44,128 | \$42,424 | \$10,834 |
| Poverty Rate | 0.00 | 53.00 | 14.73 | 12.40 | 10.26 |
| Poverty Rate Over 65 years of age | 0.00 | 57.10 | 8.72 | 6.80 | 12.35 |
| Households receiving SNAP benefits | 0.00 | 32.38 | 9.06 | 6.74 | 6.91 |
| STABILITY | | | | | |
| Aggregated Seasonal Food Resource Outlets (e.g. CSA's, farmer's markets, community gardens, participation in Farm-to-School) | 0.00 | 15.00 | 0.97 | 0.00 | 2.52 |

2.4 Stakeholder Survey

Stakeholders are community representatives that can provide a place-based understanding of community food security (Pothukuchi et al. 2002; Cohen 2002). Stakeholders for this study were modeled off of the literature to include community members representing: community-based organizations, the faith community, food supply (e.g. farmers, processors and distributors), government, and health care and education (Cohen 2002; Pothukuchi et al. 2002). A list of potential respondents was obtained through InfoUSA Inc. data (InfoUSA, 2012) and suggested contacts from collaborators. Seven hundred and fifty potential key informants were identified and three hundred and ninety two surveys were administered online. One hundred and eighty surveys were completed. Figures 2 and 3 illustrate the distribution of respondents by stakeholder category and age group.

The survey was designed to assess stakeholder perception in the region of food security. The survey consists of thirty-two closed and open-ended question. Fourteen closed-ended questions (e.g. Yes, No, Not Sure) were designed around the four parameters of food security outlined in the World Food Summit; availability, access, utilization, and stability (Do et al., 2006; Ecker & Breisinger, 2012; Padmavathy & Poyyamoli, 2011). The closed-ended questions are highlighted in this report as a descriptive comparison to the food security index.

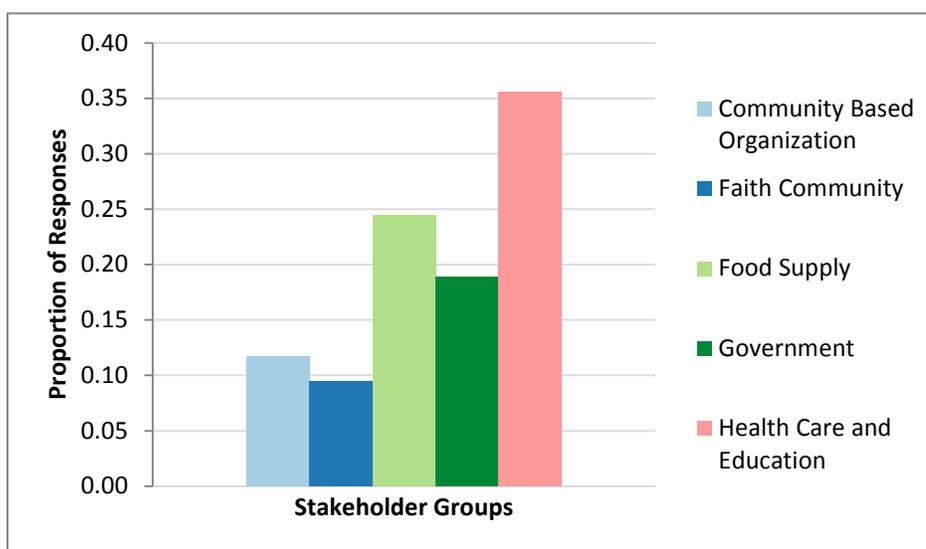


Figure 2: Survey Respondent Distribution by Stakeholder Category

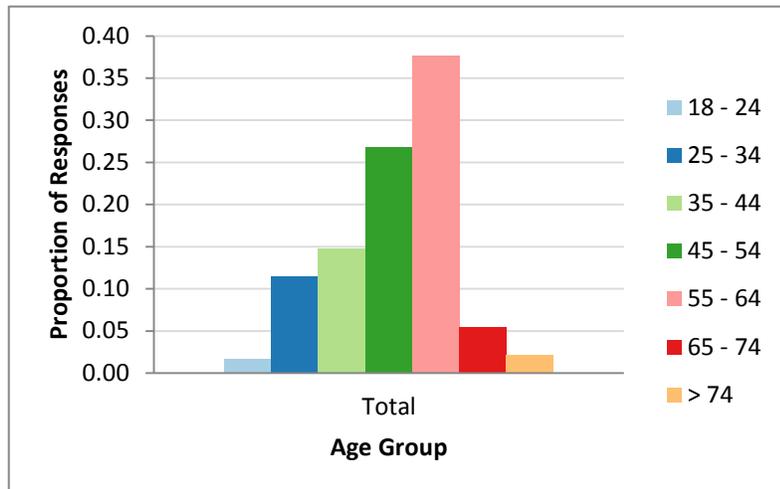


Figure 3: Survey Respondent Distribution by Age Group

Table 2 lists the fourteen closed-ended questions asked of survey respondents. The questions are partitioned into the four parameter categories discussed in the literature, availability and access, utilization, and stability.

Table 2: Community Food Security Perception Questions

| Access & Availability | |
|----------------------------------|---|
| 1 | Is community food insecurity a problem in your community? |
| 2 | Can residents in your community do their food shopping within a 10 mile radius of their home? |
| 3 | Does the food retail provider nearest to your community offer a wide variety of food options? |
| 4 | Does the food retail provider nearest to your community offer the foods that residents in your community prefer to purchase at a price that most people can afford? |
| 5 | Do residents in your community experience a seasonal change to their food security? |
| 6 | Are there any public transportation options available in your community, that connect to places to obtain food? |
| 7 | Are there any “para-transportation” options in your community? |
| Utilization | |
| 8 | Are there any barriers to participation in the Supplemental Nutrition Assistance Program (SNAP) formally called Food Stamps in your community? |
| 9 | Are there any barriers to participation in the Women, Infants, and Children Program (WIC) in your community? |
| 10 | Are there other food assistance options in your community? |
| Stability | |
| 11 | Does your community have Community Supported Agriculture (CSA's)? |
| 12 | Are there any community gardens in your community? |
| 13 | Are there local policies that affect the availability of local foods in your community? |
| 14 | Does your school district participate in the Farm-to-School program? |

Results

3.1 Spatial Analysis

Figure 4 illustrates the distribution of food insecurity across the study area. The index describes the distribution of food insecurity across the study region based on our aggregated data variables. The two lowest ranked zip code areas: 83843 in Latah County and 83501 in Nez Perce County are determined to be the most food secure according to the index. Initial observation suggest that there appears to be a clustering of areas classified as most to moderately food secure (index score 1-3) in the northwest of the region, and a clustering of areas classified as most to moderately food insecure (index score 4-6), with the highest food insecurity rankings, in the eastern side of the region. Additional spatial analyses are needed to confirm those assumptions.

To test for the significance of any clustering or dispersal amongst the food insecurity rankings, a global Moran's I test for spatial autocorrelation was conducted on the aggregated index score for each zip code area. The results confirm that there is clustering within the data. Figure 5 illustrates where this spatial clustering occurs within the study region and the difference between clusters of high food insecurity and clusters of low food insecurity using a local Moran's I statistic. Significant clusters of high food insecurity at the 0.05 significance level (HH) centered on zip code 83552 (Idaho County) and the city of Stites. Clusters of low food insecurity at the 0.05 significance level (LL) are centered on zip code areas 83872 and 83843 (Latah County) and the cities of Viola and Moscow. The (HL) and (LH) on the map illustrate spatial outliers in the region where zip code area 83542 (Idaho County) and the city of Lucile received a lower score of food insecurity, but is surrounded by areas of higher food insecurity. Zip code areas 83540 and 83524 (Nez Perce County) and the cities of Lapwai and Culdesac received a higher score of food insecurity, but are surrounded by areas of lower food insecurity. These areas in the region could be further explored to understand the spatial processes that might be leading to the variation displayed.

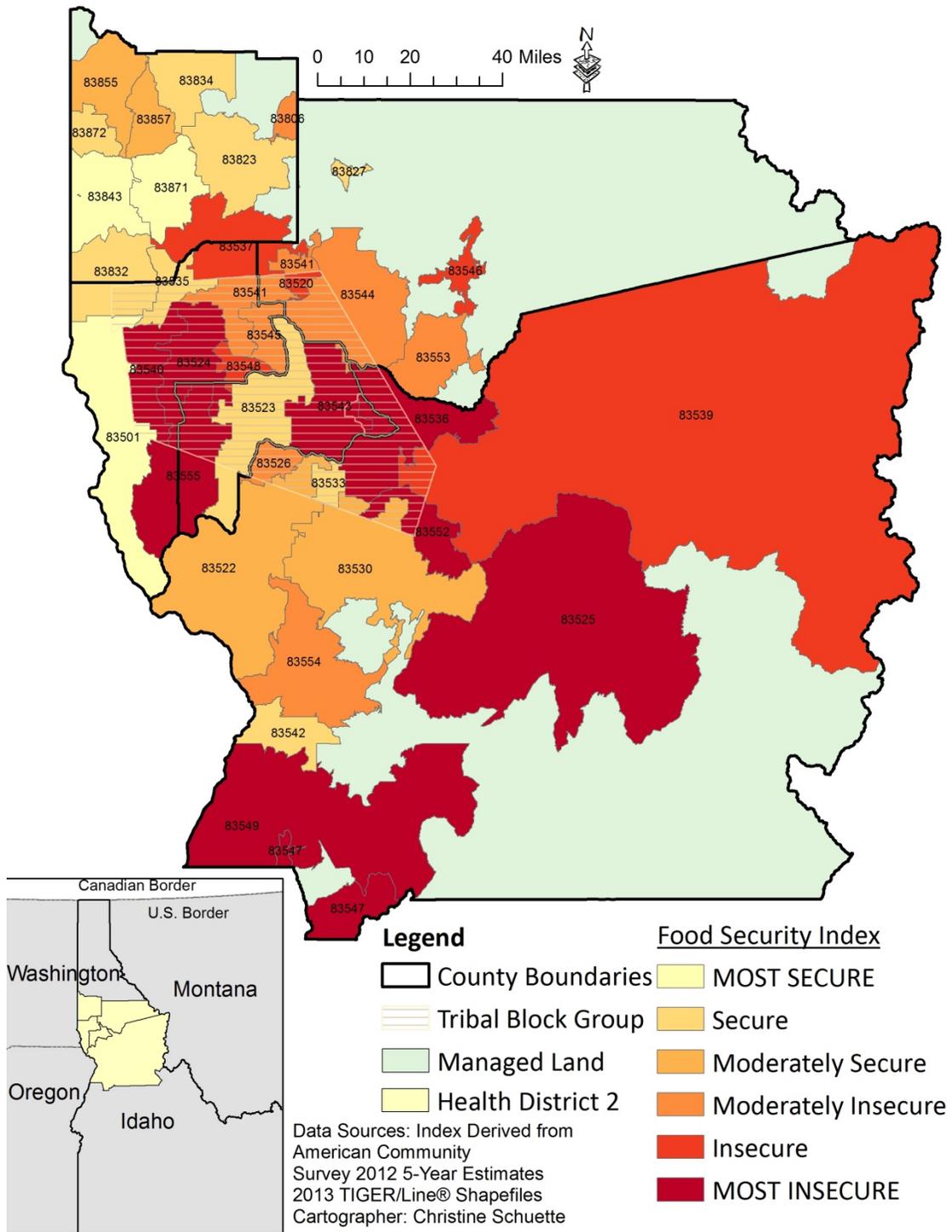


Figure 4: Food Security Index

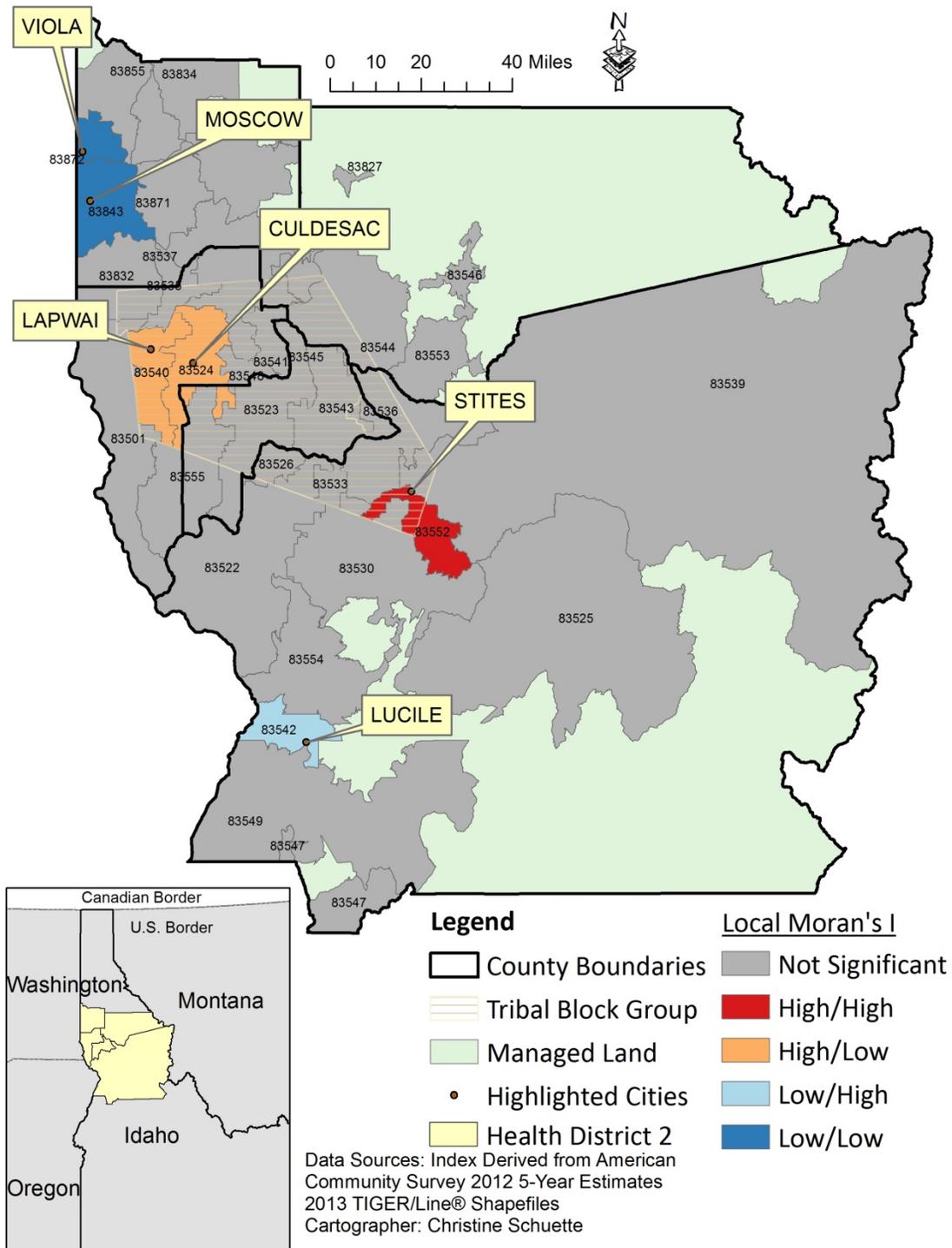


Figure 5: Local Moran's I Statistic: Spatial Autocorrelation of High and Low

3.2 Stakeholder Comparison

Bar graphs with plus or minus one standard error were created for each of the fourteen closed-ended survey questions. Figure 6 illustrates the answers given to question one: is community food insecurity a problem in your community? Respondents were aggregated by zip code areas. Zip code areas with less than ten surveys were not analyzed, which reduced the sample size to 140 respondents (77% of the original sample). The survey respondents were distributed over 5 zip code areas: 83501 in Nez Perce County, 83530 in Idaho County, 83544 in Clearwater County, and both 83843 and 83871 in Latah County. There was no consensus from respondents in any of the zip code areas as to an overall perception of community food insecurity.

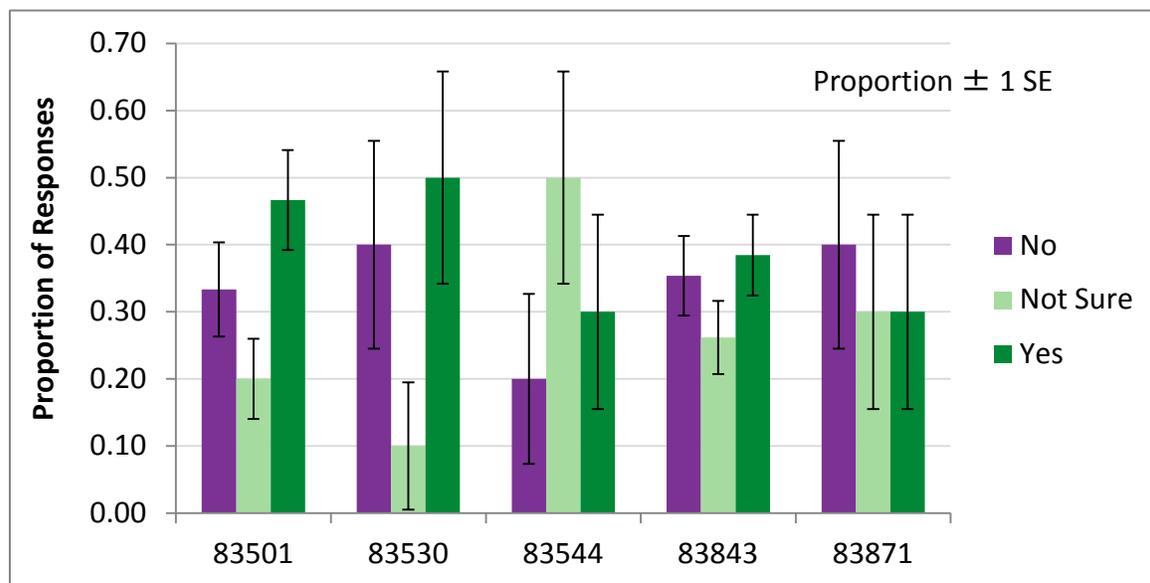


Figure 6: Stakeholder Community Food Security Perception by Zip Code Area

Table 3 shows the descriptive comparison between the survey respondents aggregated by zip code area and the food security index. The Index Row displays the classification for each zip code based on the food insecurity index. Each survey question received a “Secure” or “Insecure” ranking based on the nature of the question (e.g. whether a majority answer of Yes would be more or less advantageous to food security), and a “No Consensus” (-) if given an overlap in standard error bars a suggested distinction “Secure” and “Insecure” could not be made. The remaining rows in the table list the proportions of “Secure” and “Insecure” answers given to all fourteen closed-ended questions.

Table 3: Stakeholder Community Food Security Perception by Zip Code Area

| ZIP CODE AREAS | 83843 (Latah) | 83501 (Nez Perce) | 83871 (Latah) | 83530 (Idaho) | 83544 (Clearwater) |
|--|------------------|----------------------|------------------|-------------------|-----------------------|
| INDEX GROUP | Most Secure | Most Secure | Most Secure | Moderately Secure | Moderately Insecure |
| 1 (Overall Perception) | - | - | - | - | - |
| 2 (Distance) | Secure | Secure | - | Secure | Secure |
| 3 (Choice Variety) | Secure | Secure | - | Secure | Secure |
| 4 (Choice Preference & Affordability) | Secure | Secure | - | - | Secure |
| 5 (Seasonal Change) | - | - | Insecure | - | - |
| 6 (Public Transportation) | Secure | Secure | Insecure | - | - |
| 7 (Para Transportation) | Secure | - | - | - | - |
| 8 (Barriers to SNAP) | - | - | - | - | - |
| 9 (Barriers to WIC) | - | - | - | - | - |
| 10 (Food Assistance) | Secure | Secure | Secure | Secure | Secure |
| 11 (CSA's) | Secure | - | - | - | - |
| 12 (Community Gardens) | Secure | Secure | Secure | Secure | - |
| 13 (Land-Use Policies) | - | - | - | - | - |
| 14 (Farm-to-School) | - | - | - | - | - |
| Secure | 57% | 43% | 14% | 29% | 29% |
| Insecure | 0% | 0% | 14% | 0% | 0% |
| No Consensus | 43% | 57% | 71% | 71% | 71% |

Stated above, there was no consensus from respondents in any of the zip code areas as to an overall perception of community food insecurity. Zip code area, 83871 was the only one to report a perception of seasonal food insecurity. Respondents from that zip code area reported in a follow-up open ended question that the primary reasoning for that insecurity was the lack of fresh foods available in the region. Zip codes 83843 and 83501 were positioned one and two in the food security index and respondents in those areas also had the most and second most perceived food security in the stakeholder survey. The remaining three zip codes had fewer consensus between perceived food security and insecurity, but with only 10 surveys each, the results may also be due to the lower sample size attained in those areas.

Figure 7 illustrates the answers given to the question pertaining to the perception of community food security by stakeholder category. There was no consensus from three of the five stakeholder groups, but there was a discrepancy of stakeholder perception between respondents from Food Supply and respondents from Government. Stakeholders in the Food Supply group

(e.g. farmers, processors and distributors) perceived community food security to be a problem while stakeholders in the Government group did not perceive community food security to be a problem.

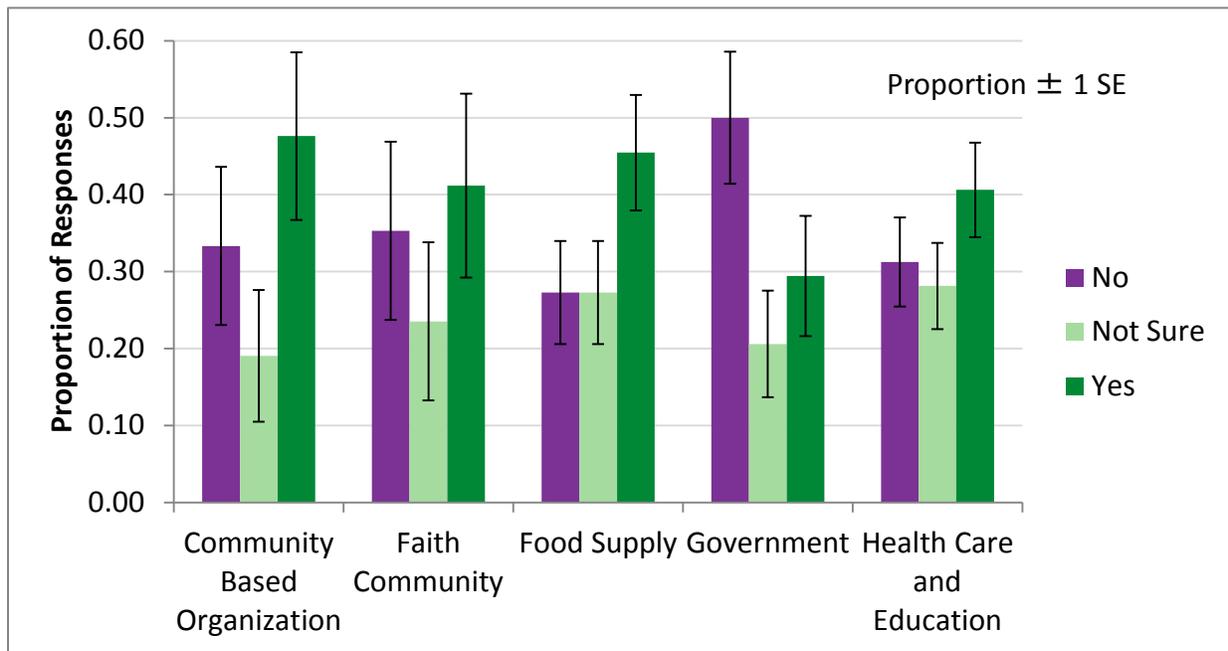


Figure 7: Stakeholder Community Food Security Perception by Stakeholder Category

Table 4 shows the descriptive comparison between the survey respondents by stakeholder categories. All 180 survey respondents were used in this analysis.

Each survey question received a "Secure" or "Insecure" ranking based on the nature of the question (e.g. whether a majority answer of Yes would be more or less advantageous to food security), and a "No Consensus" (-) if given an overlap in standard error bars a suggested distinction "Secure" and "Insecure" could not be made. The remaining rows in the table list the proportions of "Secure" and "Insecure" answers given to all fourteen closed-ended questions.

Table 4: Stakeholder Community Food Security Perception by Stakeholder Category

| STAKEHOLDER GROUP | Community Based Organizations | Faith Community | Food Supply | Government | Health Care & Education |
|--|-------------------------------|-----------------|-------------|------------|-------------------------|
| 1 (Overall Perception) | Secure | - | Secure | Insecure | - |
| 2 (Distance) | Secure | Secure | Secure | Secure | Secure |
| 3 (Choice Variety) | Secure | Secure | Secure | Secure | Secure |
| 4 (Choice Preference & Affordability) | Secure | Secure | Secure | Secure | Secure |
| 5 (Seasonal Change) | - | - | - | Secure | - |
| 6 (Public Transportation) | Secure | Secure | Secure | Secure | Secure |
| 7 (Para Transportation) | - | - | - | - | Secure |
| 8 (Barriers to SNAP) | - | - | - | - | - |
| 9 (Barriers to WIC) | - | - | - | - | - |
| 10 (Food Assistance) | Secure | Secure | Secure | Secure | Secure |
| 11 (CSA's) | - | - | Secure | - | - |
| 12 (Community Gardens) | - | Secure | Secure | - | Secure |
| 13 (Land-Use Policies) | - | - | - | Secure | - |
| 14 (Farm-to-School) | - | - | - | - | - |
| Secure | 43% | 43% | 57% | 50% | 50% |
| Insecure | 0% | 0% | 0% | 7% | 0% |
| No Consensus | 57% | 57% | 43% | 43% | 50% |

There was little variation between the overall perceptions of food security between stakeholder categories. For more details on the results of the stakeholder survey, see Schuette 2014.

Conclusion

Food security in the North Central Health District of Idaho exhibits some spatial clustering. These relationships should be explored further to understand this observed pattern. The Local Moran's I test agrees with the food security index, which suggests a clustering of low food insecurity values in the northwestern part of the region and a clustering of higher food insecurity values in the middle and eastern part of the region. The local spatial autocorrelation analysis can be used to help develop further hypotheses about the nature of the spatial process dictating those relationships.

Outcomes of this research should target vulnerable areas of the region for collaborative programs and further analysis. Flexibility, adaptability, diversification, and resilience are key words to the community food security assessment and the identification and weighting of indicators can only truly be decided by the food insecure themselves (Maxwell, 1996). Focus groups in areas with the highest food insecurity could further supplement the findings with valuable insight from these populations.

The stakeholder survey revealed that there is some uncertainty about the perception of community food security in the region and whether there are barriers to the utilization of specific food assistance programs in the region. Efforts should be targeted as raising awareness about these programs and what resources are available to food insecure individuals in the region.

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