



United States Department of Agriculture, Economic Research Service

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Rural Poverty over Time and Space: A Sub-county Analysis of Persistent Concentrated Poverty

Tracey Farrigan
*Research Geographer
USDA-Economic Research Service*

Justification

- Increasing demand for sub-county analysis
 - Policy & Programs (e.g. Rural Development)
 - Unit of analysis –“hidden poverty”
- Nationwide socioeconomic data at the sub-county level
 - 5-year estimates of the American Community Survey
 - Valuable for assessing the economic health of communities and regions
- Advances in GIS applications (e.g. ArcGIS)
 - Spatial statistical procedures; local space-time analysis:
 - Use of mapping applications to visualize patterns
 - Analyze multiple dimensions of poverty and other community-related measures of well-being.



Census Tract Data

- Decennial census 1990 and 2000;
 - American Community Survey 5-year estimates for 2007-11
-
- Data for all years and 2010 tract shape files were downloaded from the Bureau of the Census.
 - Census tracts for 1990 and 2000 were standardized to 2010 tract geography using a crosswalk provided online by Brown University.
 - The data were imported into SPSS 22.0 and ArcGIS 10.1, where they were joined to the 2010 tract shape file.



Definitions

What is rural?

- Census tracts that fall within the boundaries of a nonmetro county
 - Office of Management and Budget 2013 metropolitan county designations
- Census building blocks –allows for complementary state & county analysis

Concentrated poverty

- Tendency for high poverty areas to be geographically clustered
- Tendency for poverty to be highest within particular sub-populations
- Double burden: Confluence of place-based and people-based poverty
 - Economic well-being influenced by local conditions and individual, family, or household characteristics

Persistent concentrated poverty

- High poverty area (individual tracts) or cluster (groups of tracts) over multiple decades

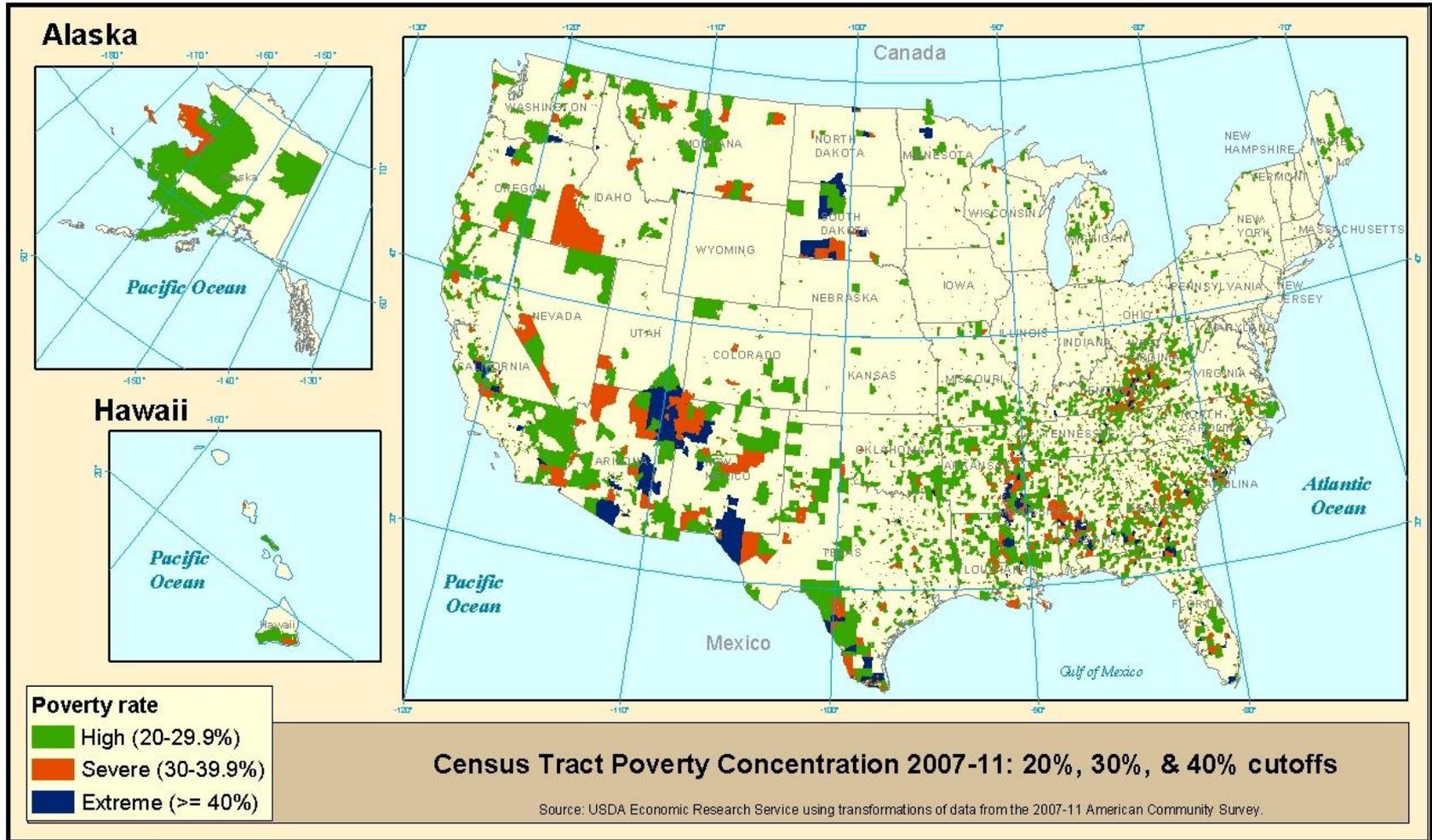


Metrics

- Greater focus on unit of analysis; limited attention to differences based on metrics
 - No general rule for determining the presence and extent of concentrated poverty
- Map tract-level poverty rates using a variety of popular cut-points and related techniques
 - Use cut-points prominent in the literature, which typically range from a 20 percent to a 40 percent area (county, tract, or place) poverty rate.
 - Use a quartile (or quintile) classification and a divergent color ramp to show distribution.



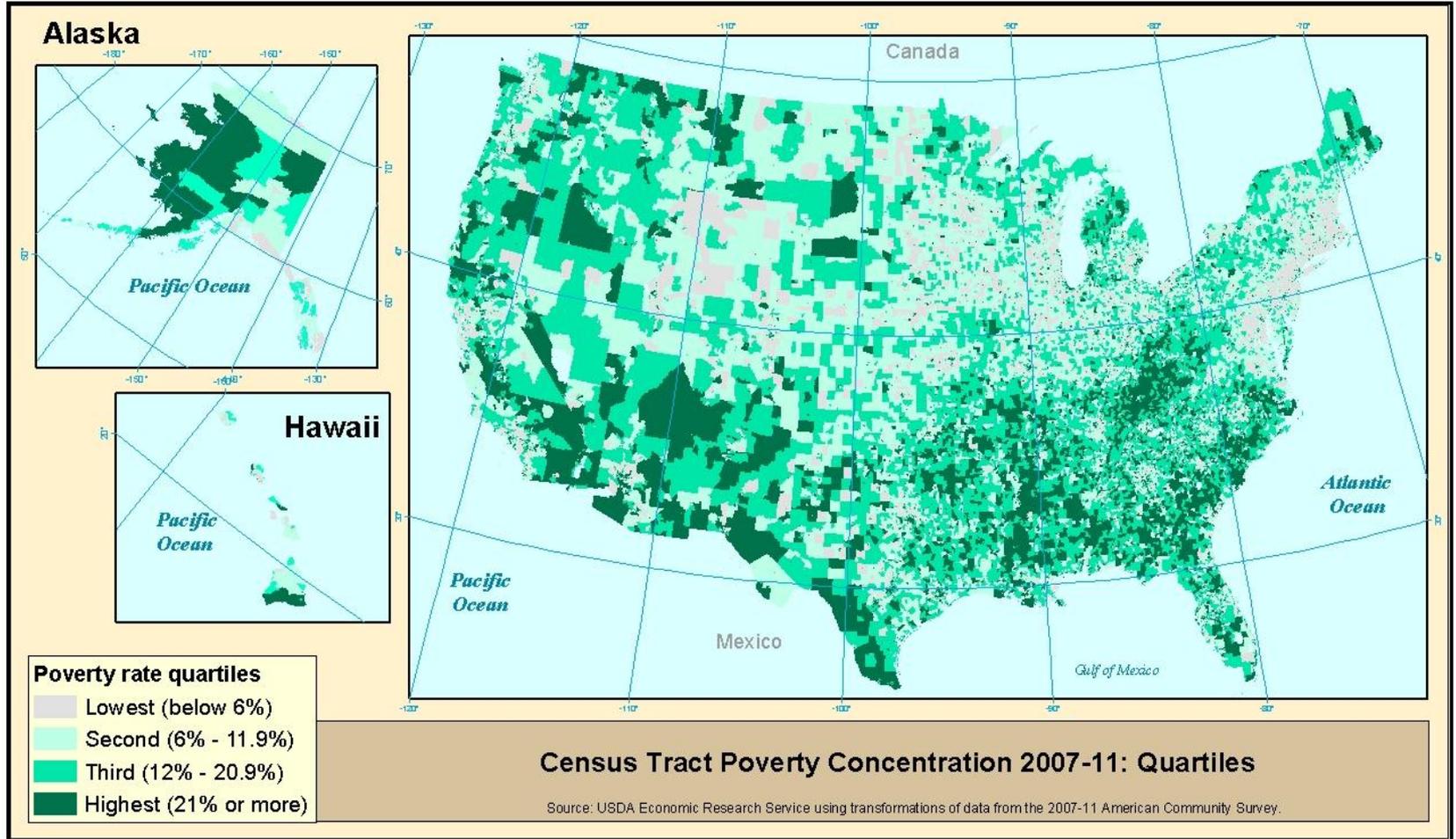
Cut-points: 20%, 30%, & 40%



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Quartiles



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Objectivity & Quantification

- The spatial structure in the data cannot be quantified objectively
 - Classification of data into discrete data ranges involves the analysis of data values in isolation from their spatial context.
 - An alternative method for exploring the spatial structure of a dataset:
 - Use a statistical measure that accounts for the spatial locations of each data observation in conjunction with the observed data value at each location.



Alternative Approach

- *Spatial autocorrelation*
 - The degree to which attributes or values at some place on the earth's surface are similar to attributes or values of nearby locations
- Measures
 - Moran's I (similar to Pearson correlation coefficient)
 - limitation is that it cannot provide information on the specific locations of spatial patterns; it only indicates the presence of spatial autocorrelation globally.
 - Anselin's local indicator of spatial association (LISA)
 - Localizes the presence and magnitude of spatial autocorrelation
 - local derivations or dis-aggregations of global measures of spatial autocorrelation;

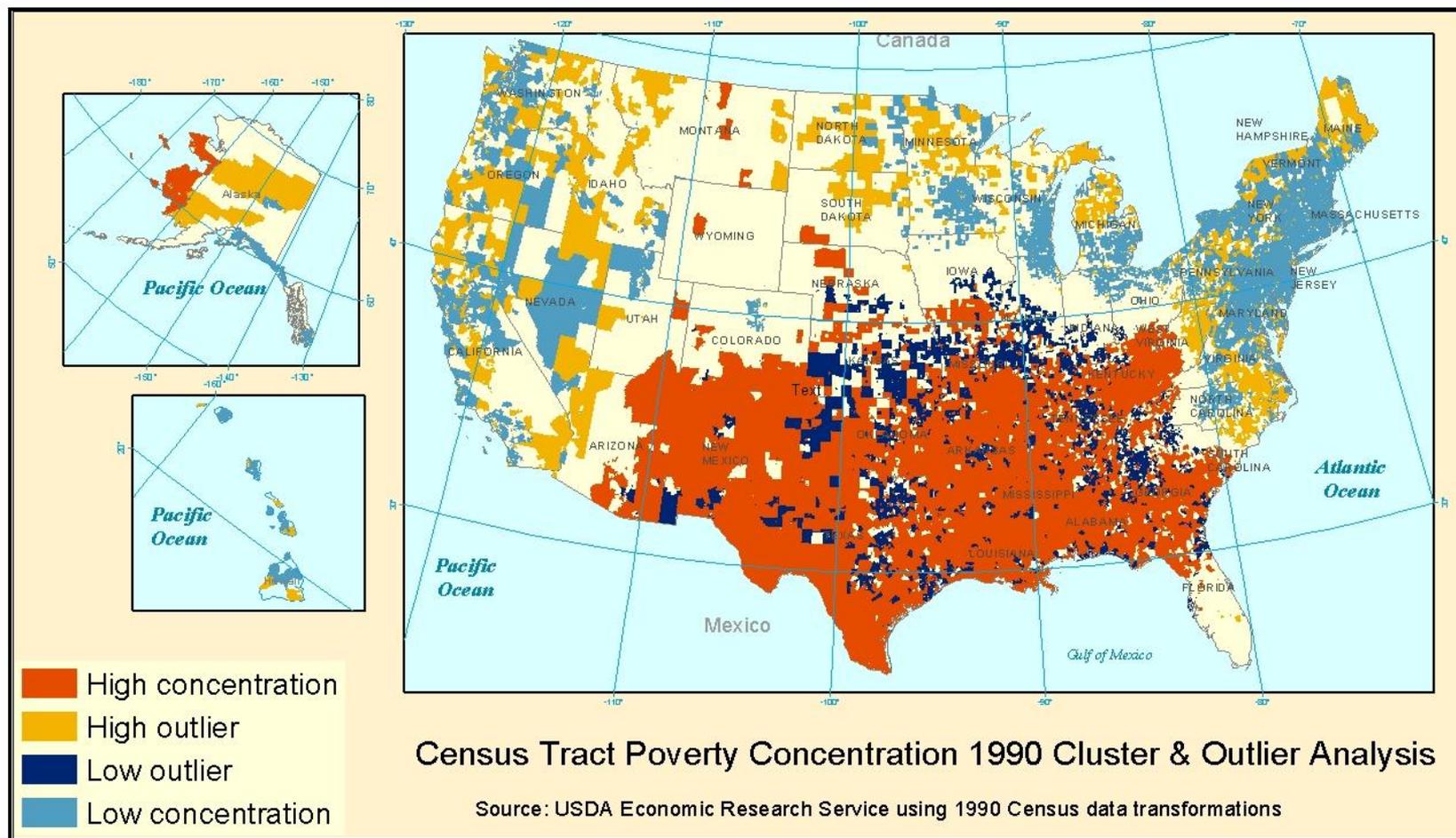


Procedures

- The local Moran's I algorithm was used in ArcGIS 10.1 to compute a local Moran value for each Census tract in the United States.
- Inverse distance weighting with row standardization of the spatial weights, in which each weight is divided by its row sum, was selected (permits comparability among regions with different numbers of neighbors)
- Resulting local Moran indices converted to z scores to indicate whether the similarity or dissimilarity in values between each tract and those of its neighbors exceeded the value that would be expected due to chance
- Each tract was assigned a categorical value depending on its standardized z score, so that each tract was one of the following:
 - Part of a concentration of tracts in which similar levels of poverty clustered, defined as high poverty concentration or low poverty concentration areas
 - A spatial outlier where the poverty rate was significantly different from the poverty rates of nearby or surrounding tracts, defined as high poverty in a predominantly low poverty area or low poverty in a predominantly high poverty area
 - Neither part of a concentration of tracts with similar values or a spatial outlier.



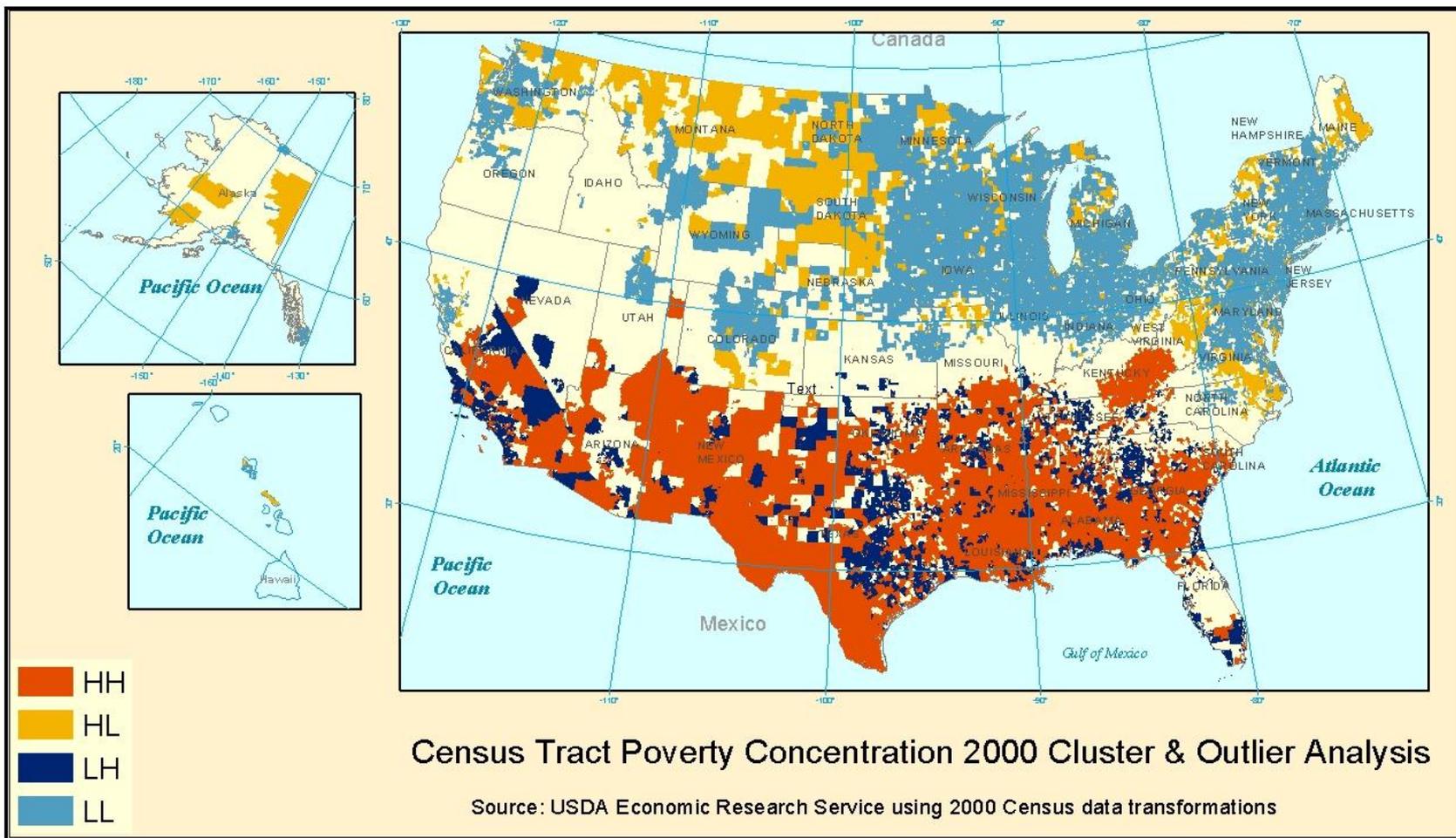
Cluster Type, 1990



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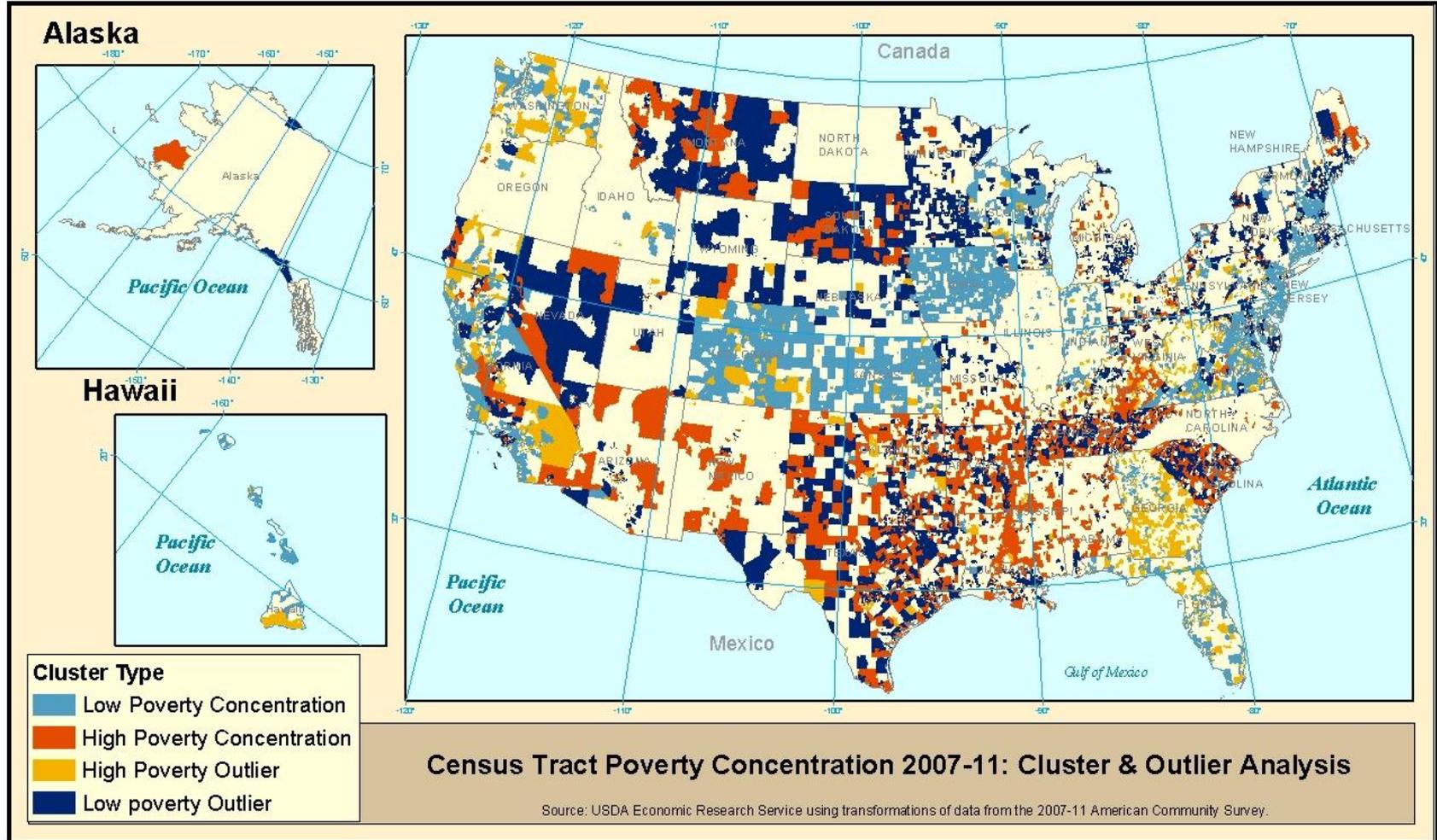
Cluster Type, 2000



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Cluster Type, 2007-2011

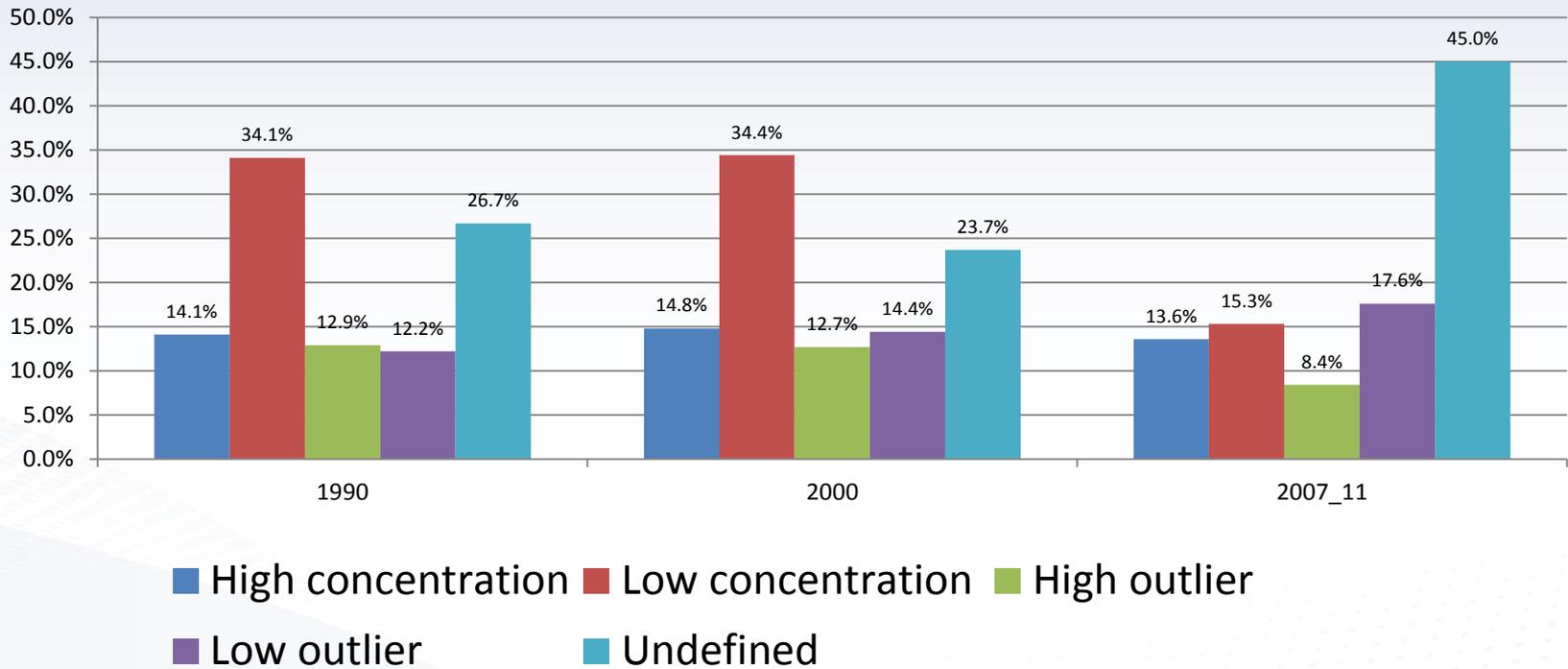


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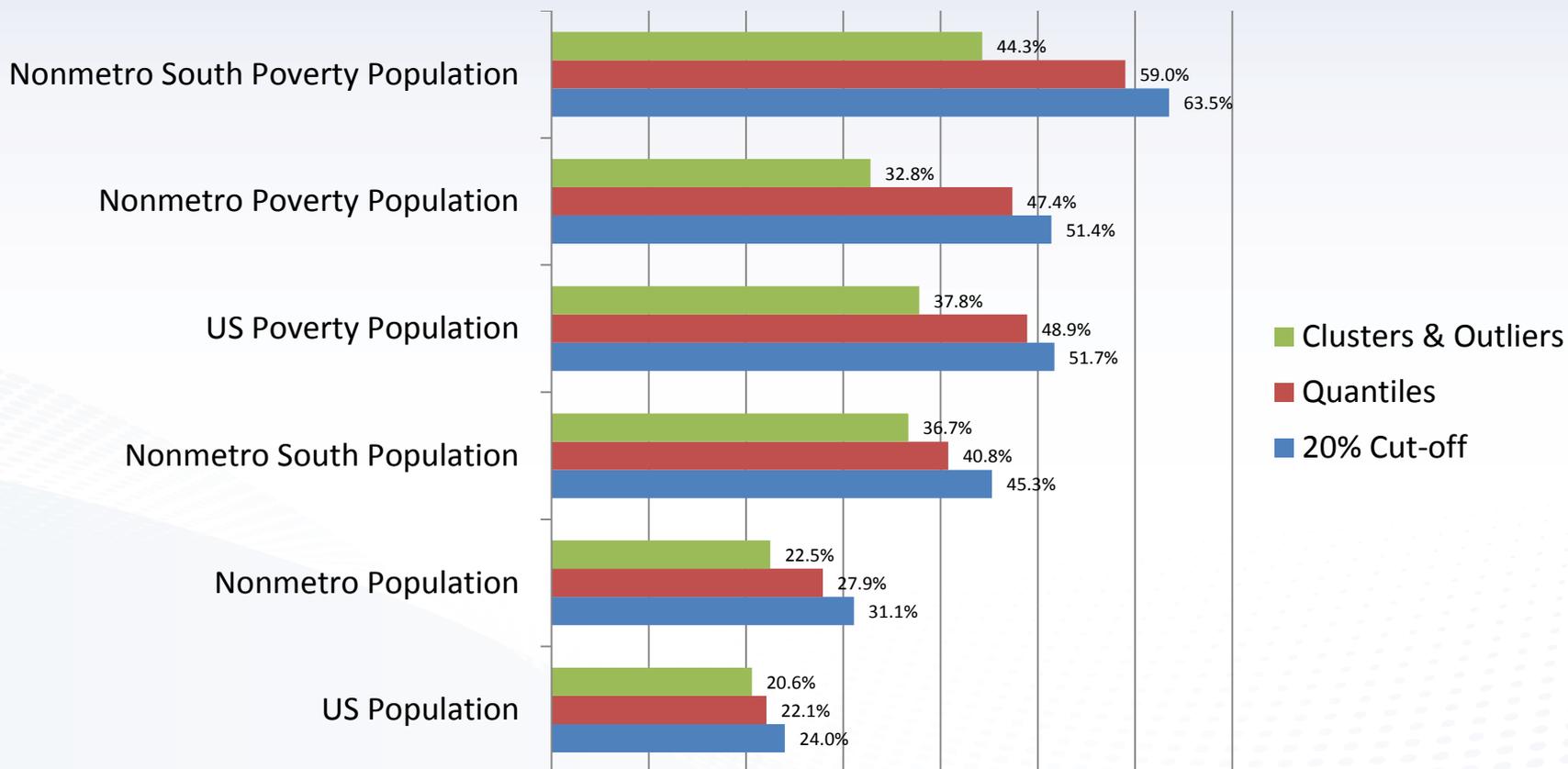
Cluster Type by Year

Share of Census Tracts by Cluster Type and Year



Population by Metric

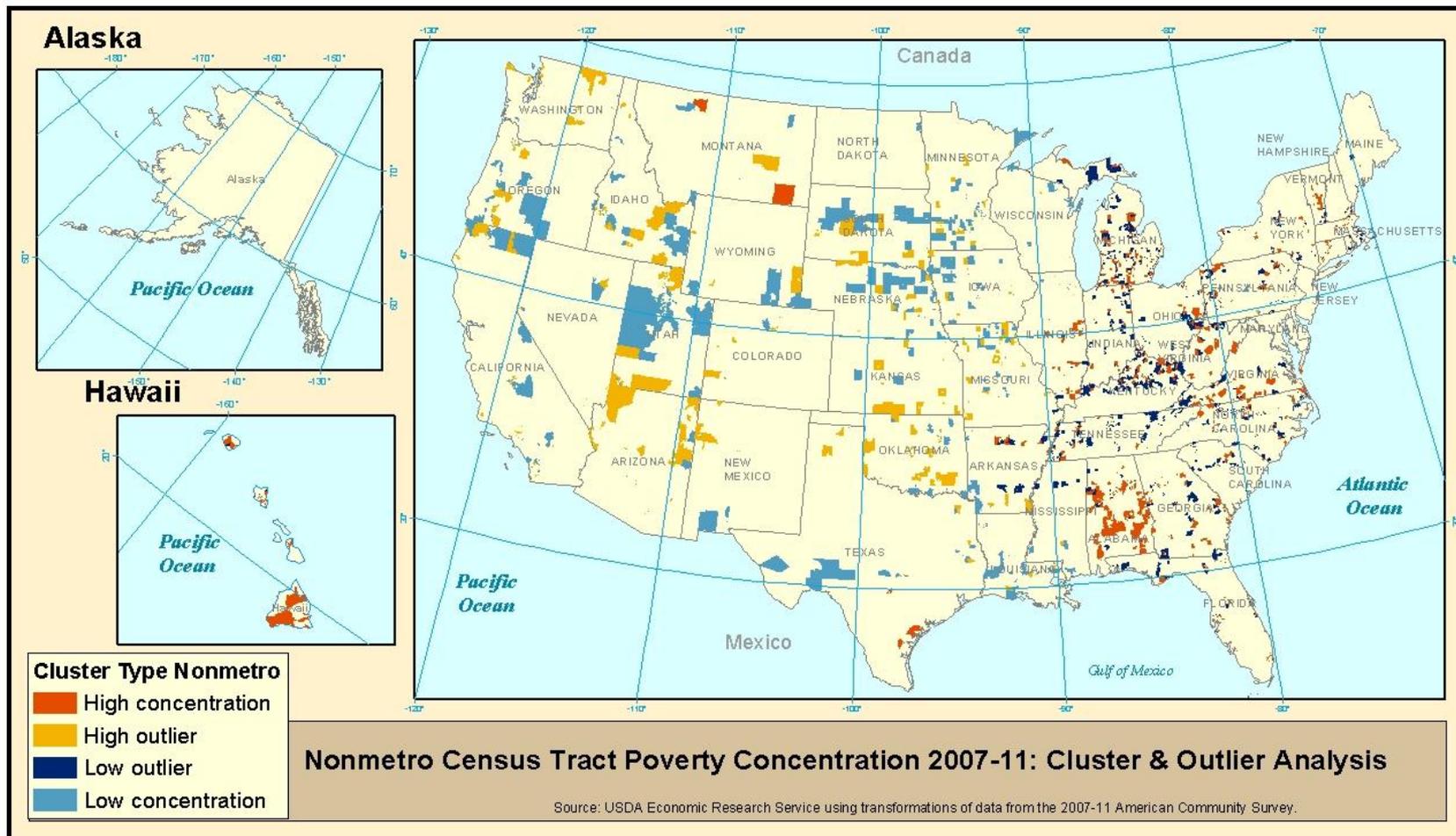
Share of Total & Poverty Populations Residing in Concentrated Poverty Area by Geography & Metric



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Cluster Type Nonmetro, 2007-2011

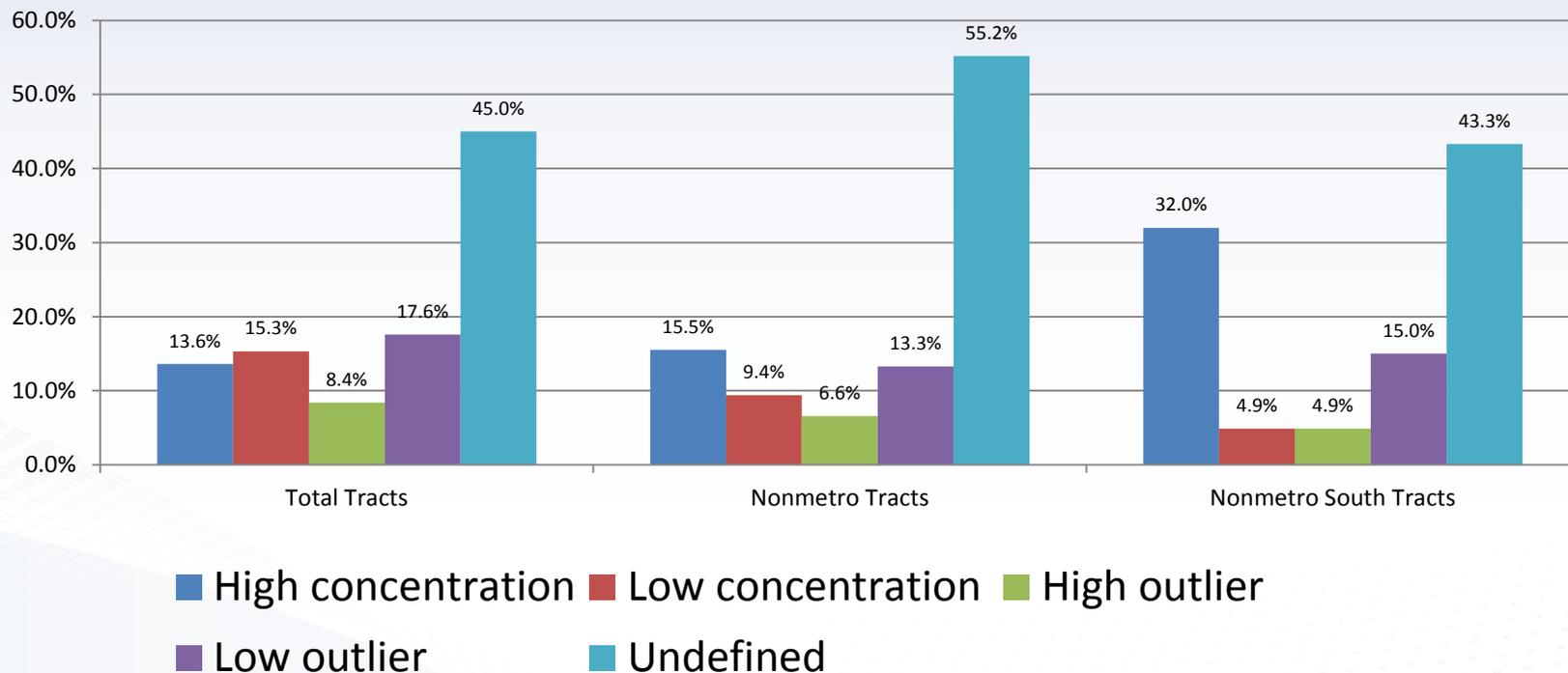


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Cluster Type by Area, 2007-2011

Share of Census Tracts by Cluster Type and Geographic Area



Summary

- Spatial statistical techniques in a geographic information system (GIS) were used to calculate and compare point-in-time patterns of geographically concentrated poverty and spatial outliers with ACS 5-year estimates.
 - A comparison of standard poverty concentration metrics was presented.
- The analysis identified significant patterns of persistent concentrated poverty as well as isolated pockets of high and low poverty where the opposite was predominant
- Highlighted findings:
 - Changing national patterns
 - Bi-coastal, north-south divide, divergence
 - Decreasing concentration on the whole; persistent nonmetro, increasing rural South
 - Global measures mask significant increases in poverty concentration for the rural South
 - Rural South has the highest rate of concentration for all metrics
 - 20% cut-off significantly higher than for clusters & outliers



Implications

- These findings can be useful in exploring the underlying factors and processes that contribute to spatial patterns of poverty, such as local level capacities or vulnerabilities to macroeconomic change.
 - Ongoing research: persistent poverty, food deserts, health outcomes



Thank You

Further Information:

ERS website: <http://www.ers.usda.gov>



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