Demonstrating the Effectiveness of Small Area Estimates During Periods of Change: The Case of Health Insurance Coverage

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BACKGROUND

Understanding changes in the composition of health insurance coverage across the United States is important for many local communities. Currently, detailed survey estimates of health insurance coverage for counties with small populations are available as multi-year estimates from the Census Bureau's American Community Survey (ACS). These multi-year estimates are period in time estimates and do not reflect an annual estimate; therefore, the estimates do not reflect annual changes.

However, the Census Bureau's Small Area Health Insurance Estimates (SAHIE) program models 1-year ACS estimates using administrative records to provide health insurance coverage estimates for every county in the United States on an annual basis. This research analyzes how ACS 5-year survey estimates compare with the single-year modeled estimates. The purpose of this analysis is to demonstrate how Small Area Estimation can be a powerful tool during periods of rapid change. This research does not aim to establish a causal relationship between any policy changes and changes to a population characteristic, only to evaluate the effectiveness of Small Area Estimation as a means of capturing such changes.

DATA AND METHODS

Data Sources

- Small Area Health Insurance Estimates (SAHIE): 2013, 2014; and 2015
  - Indirect model-based estimates produced by statistical methodology
  - Single-year estimates of health insurance coverage for all U.S. counties
  - Combines survey data from the 1-year ACS with administrative records, such as Internal Revenue Service (IRS) 1040 tax returns and the Centers for Medicare and Medicaid Services' (CMS) Medicaid enrollment data
- American Community Survey (ACS) 5-year Estimates: 2009-2013, 2010-2014, and 2011-2015
  - Direct estimate produced from survey collection
  - Multi-year survey estimates of health insurance coverage for all U.S. counties
  - Intended as a replacement for the decennial long-form. Combines 60 months of collected data for a larger sample size
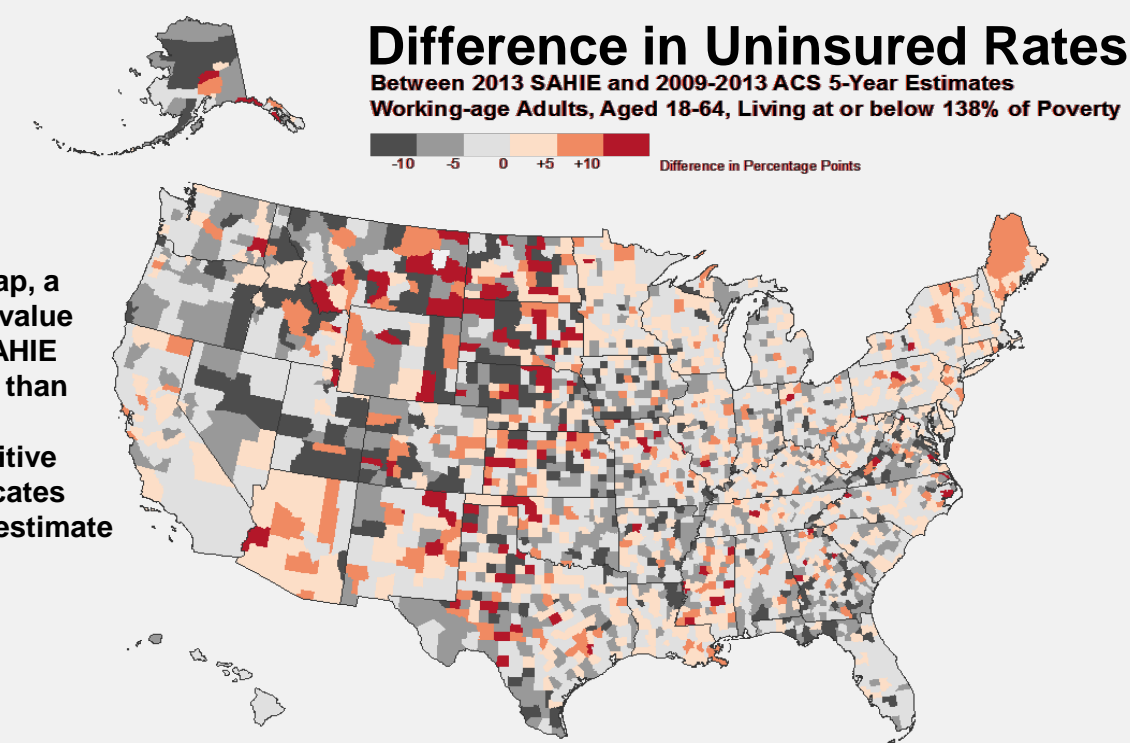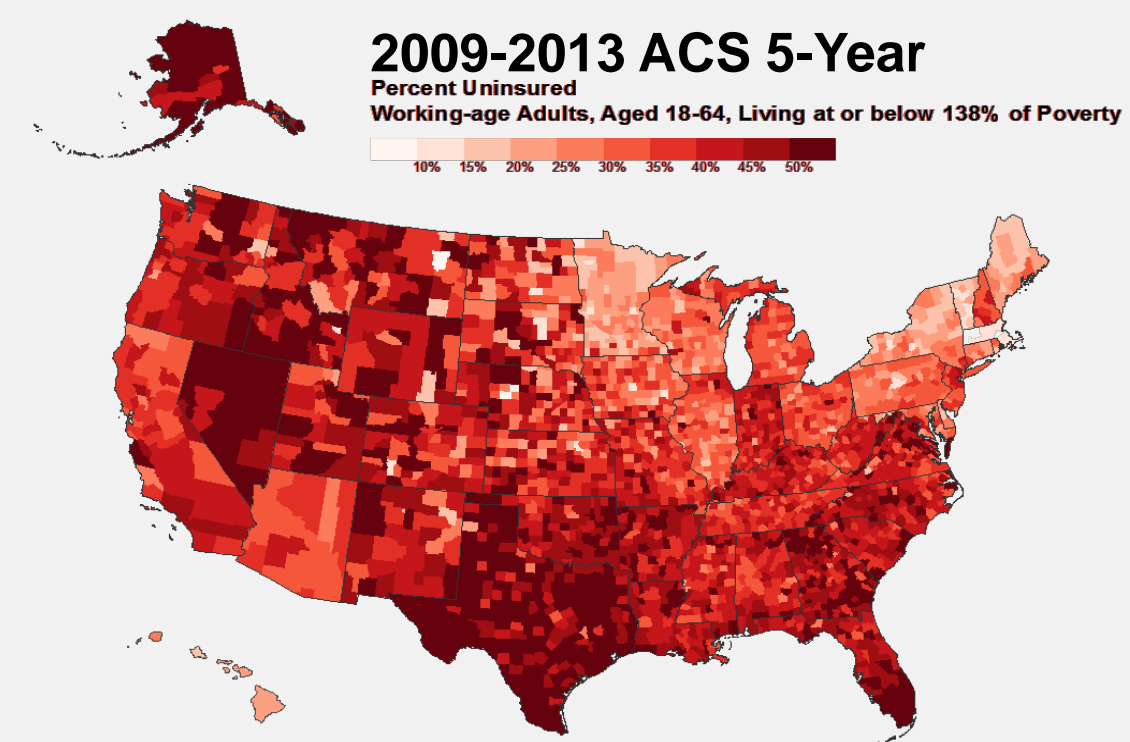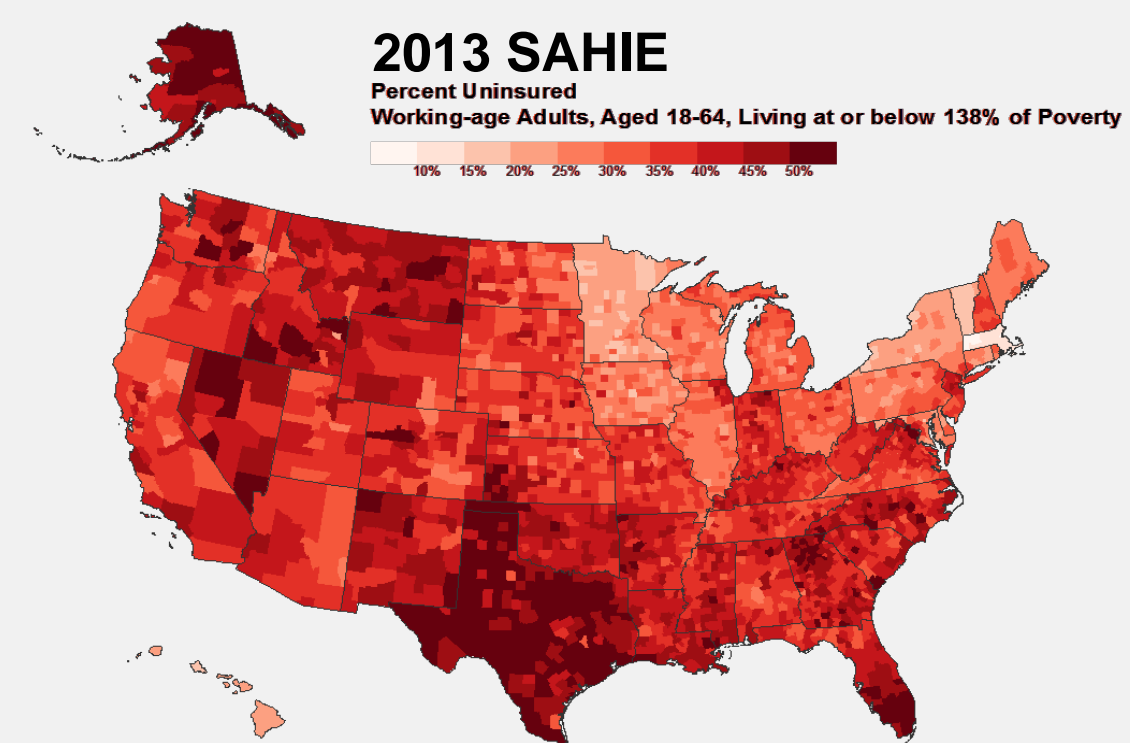
Data Similarities and Differences

- Same concept; Same geographies
- Different time periods; Different estimation methods

Analysis Group

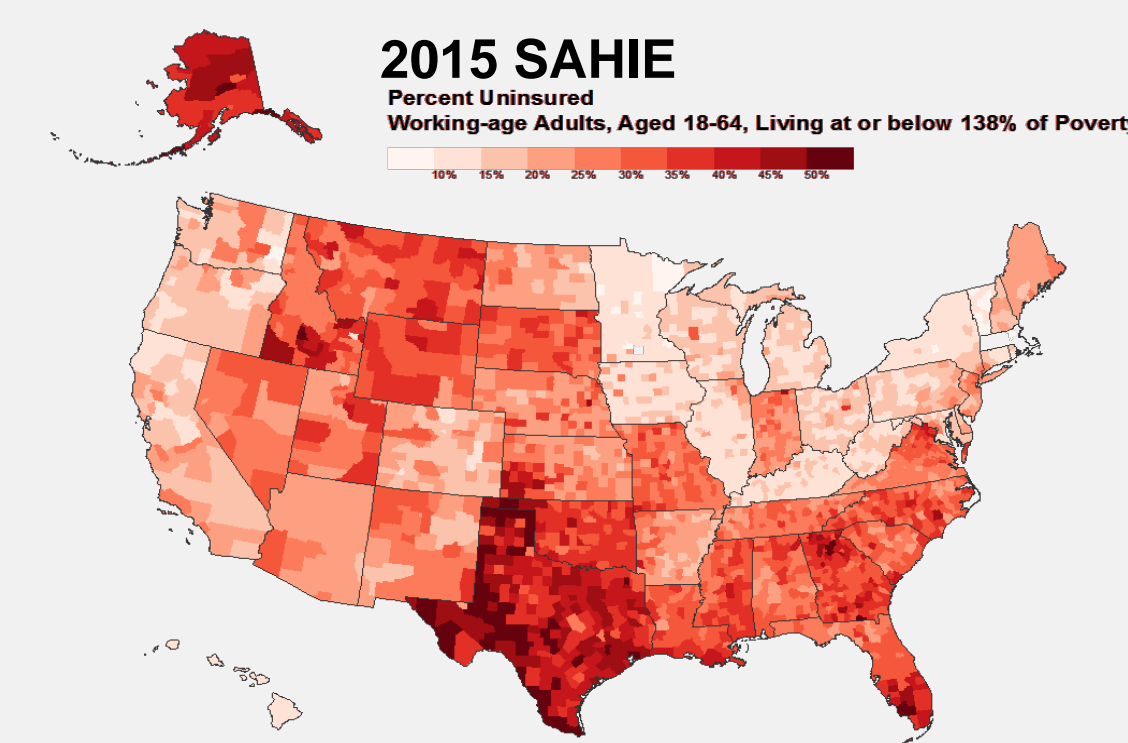- Uninsured, working-age adults, aged 18-64 with incomes at or below 138 percent of poverty
  - Income eligibility requirement for Medicaid expansion
  - As of December 31, 2015, 30 states including D.C. expanded Medicaid eligibility

Methods

- Analyze how the geographic distribution of estimated county-level uninsured rates compares between the modeled and multi-year survey estimates before and after changes in the healthcare landscape by displaying maps of uninsured rates from both data sources.
- Evaluate differences between the distributions of modeled and multi-year survey estimated uninsured rates during the same period using histograms and box plots.
- Analysis limited by the absence of a statistical test to compare the ACS 5-year estimates with the single-year SAHIE estimates.

2013 SAHIE — Percent Uninsured, Working-age Adults, Aged 18-64, Living at or below 138% of Poverty
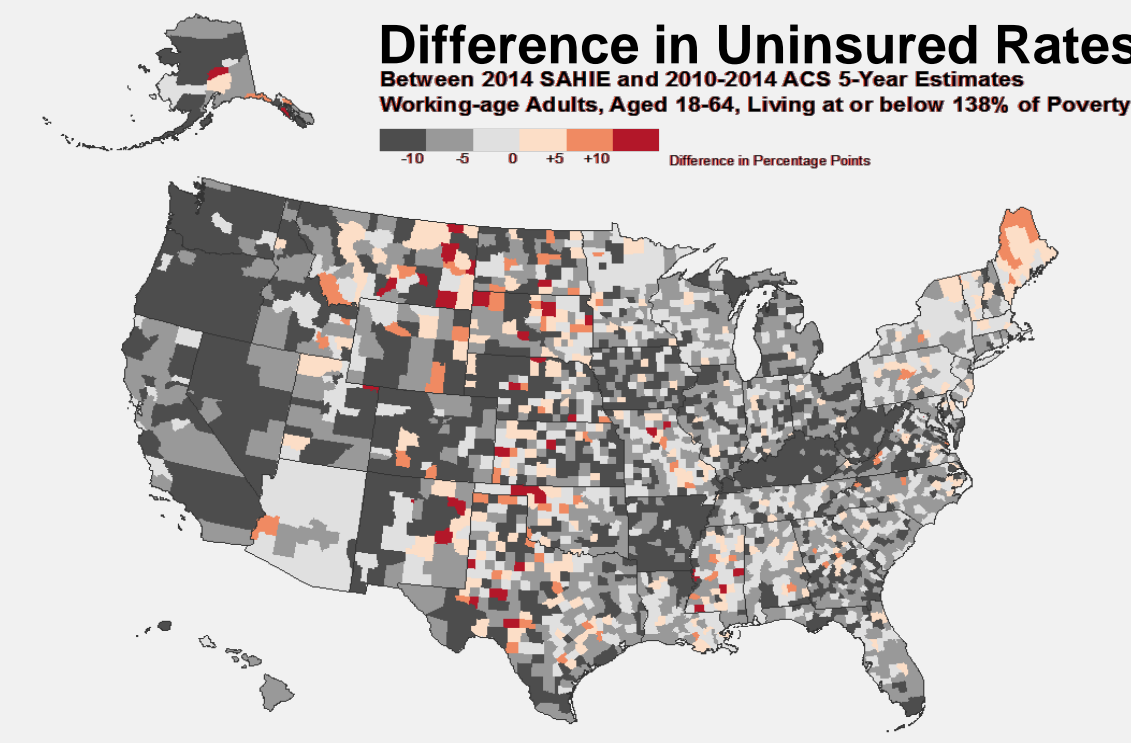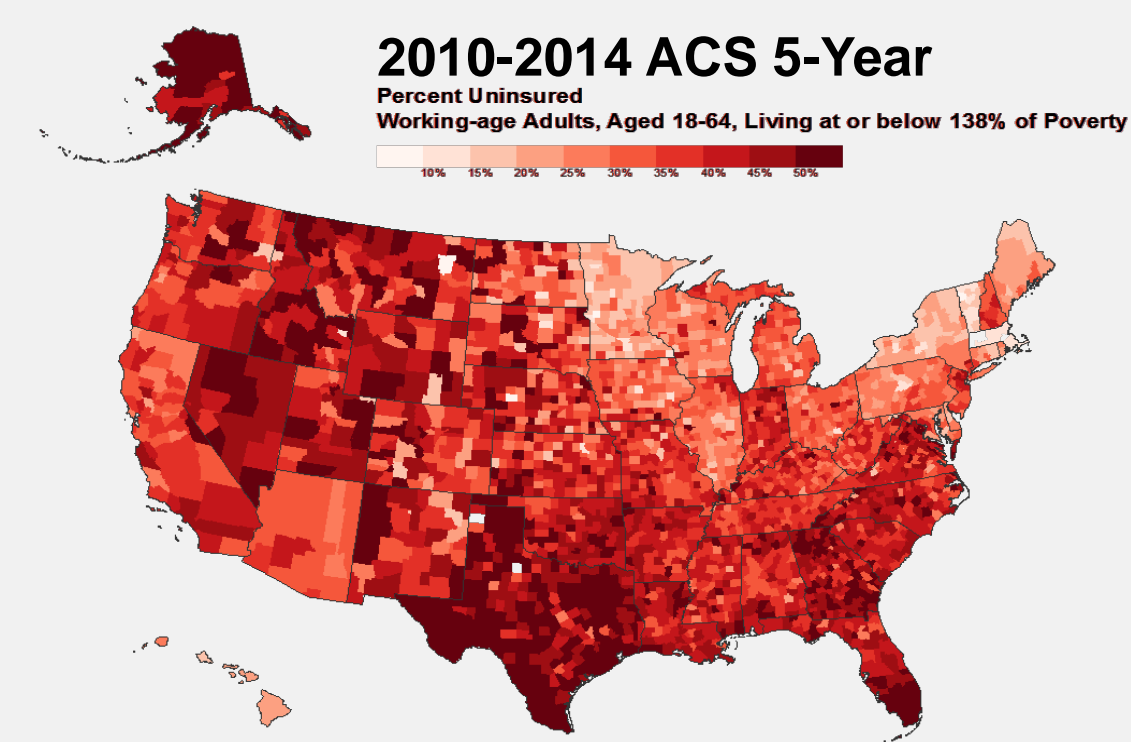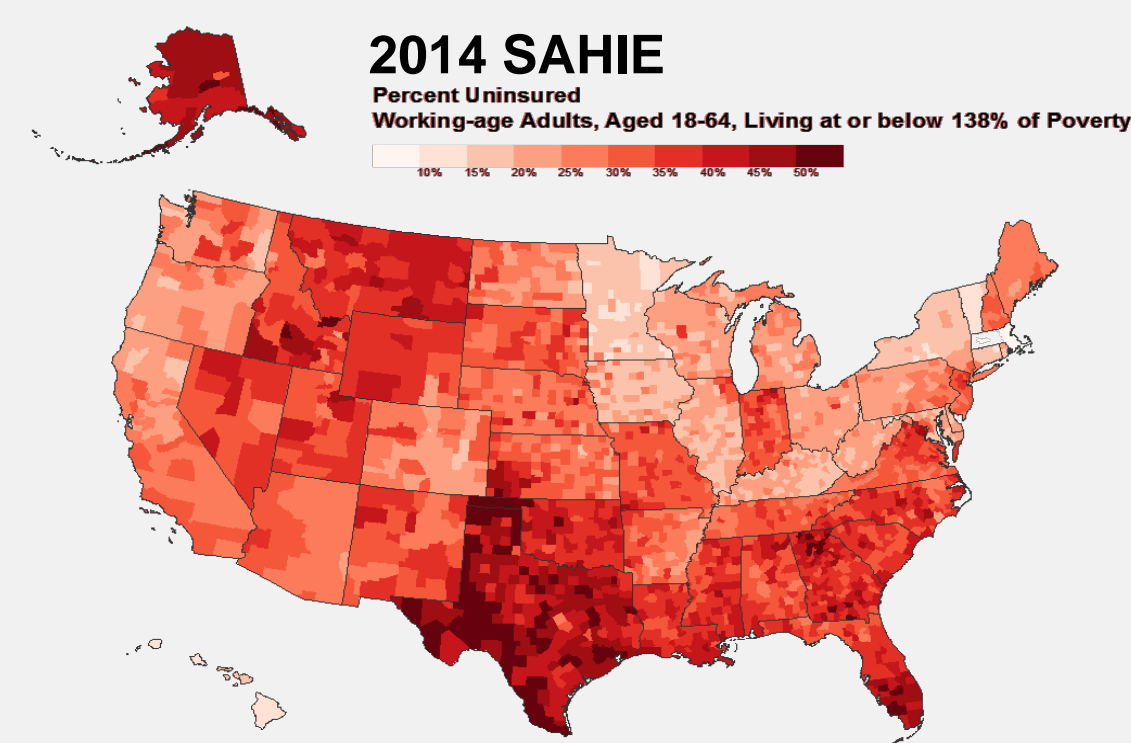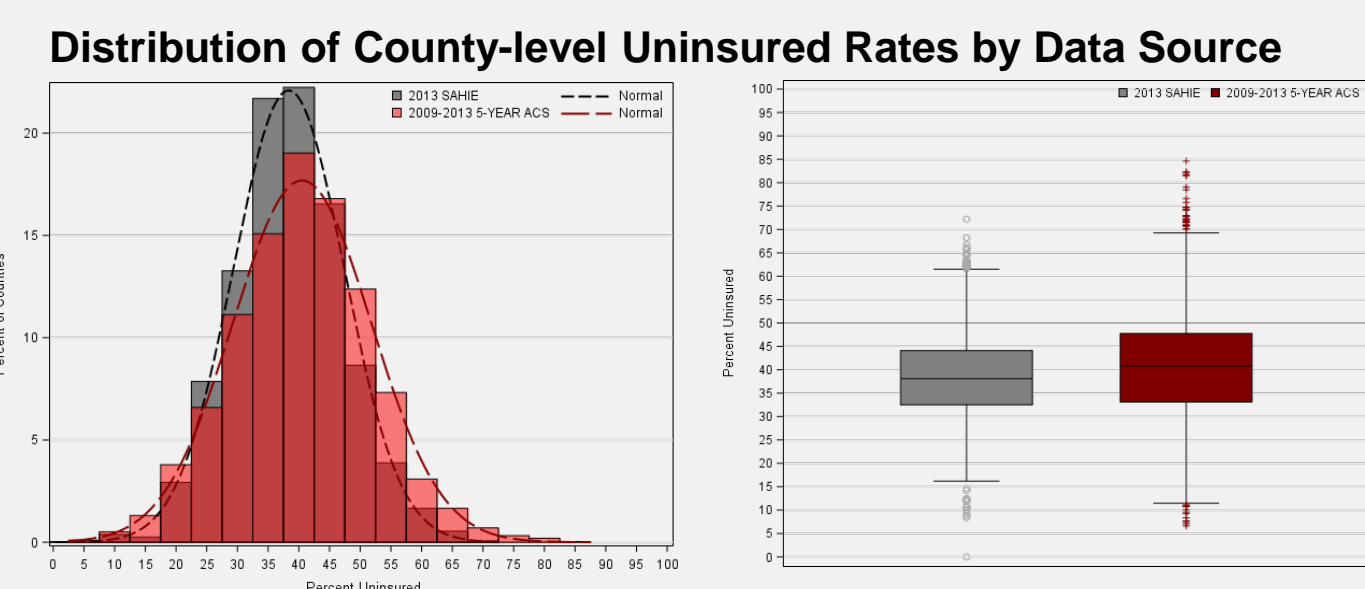
2014 SAHIE — Percent Uninsured, Working-age Adults, Aged 18-64, Living at or below 138% of Poverty

2015 SAHIE — Percent Uninsured, Working-age Adults, Aged 18-64, Living at or below 138% of Poverty

2009-2013 ACS 5-Year — Percent Uninsured, Working-age Adults, Aged 18-64, Living at or below 138% of Poverty

2010-2014 ACS 5-Year — Percent Uninsured, Working-age Adults, Aged 18-64, Living at or below 138% of Poverty

2011-2015 ACS 5-Year — Percent Uninsured, Working-age Adults, Aged 18-64, Living at or below 138% of Poverty

Difference in Uninsured Rates — Between 2013 SAHIE and 2009-2013 ACS 5-Year Estimates — Working-age Adults, Aged 18-64, Living at or below 138% of Poverty

Note : In this map, a negative (grey) value indicates the SAHIE estimate is less than the ACS 5-Year estimate. A positive (red) value indicates that the SAHIE estimate is larger.

Difference in Uninsured Rates — Between 2014 SAHIE and 2010-2014 ACS 5-Year Estimates — Working-age Adults, Aged 18-64, Living at or below 138% of Poverty

Difference in Uninsured Rates — Between 2015 SAHIE and 2011-2015 ACS 5-Year Estimates — Working-age Adults, Aged 18-64, Living at or below 138% of Poverty

Distribution of County-level Uninsured Rates by Data Source
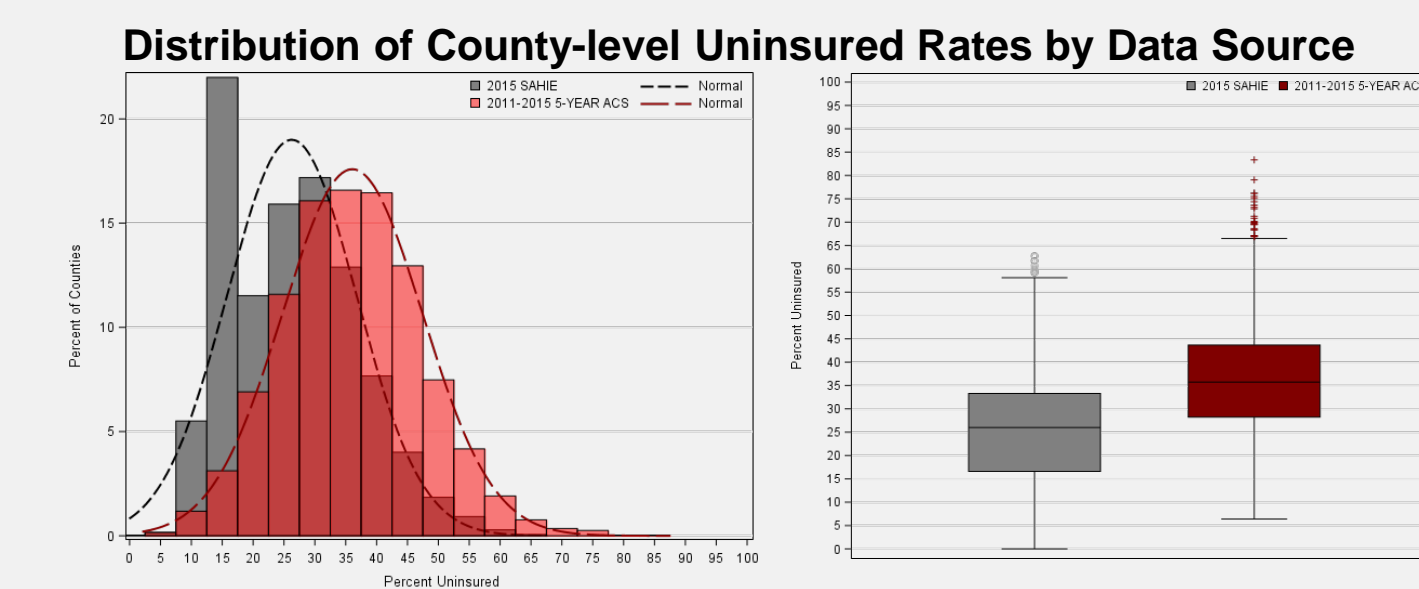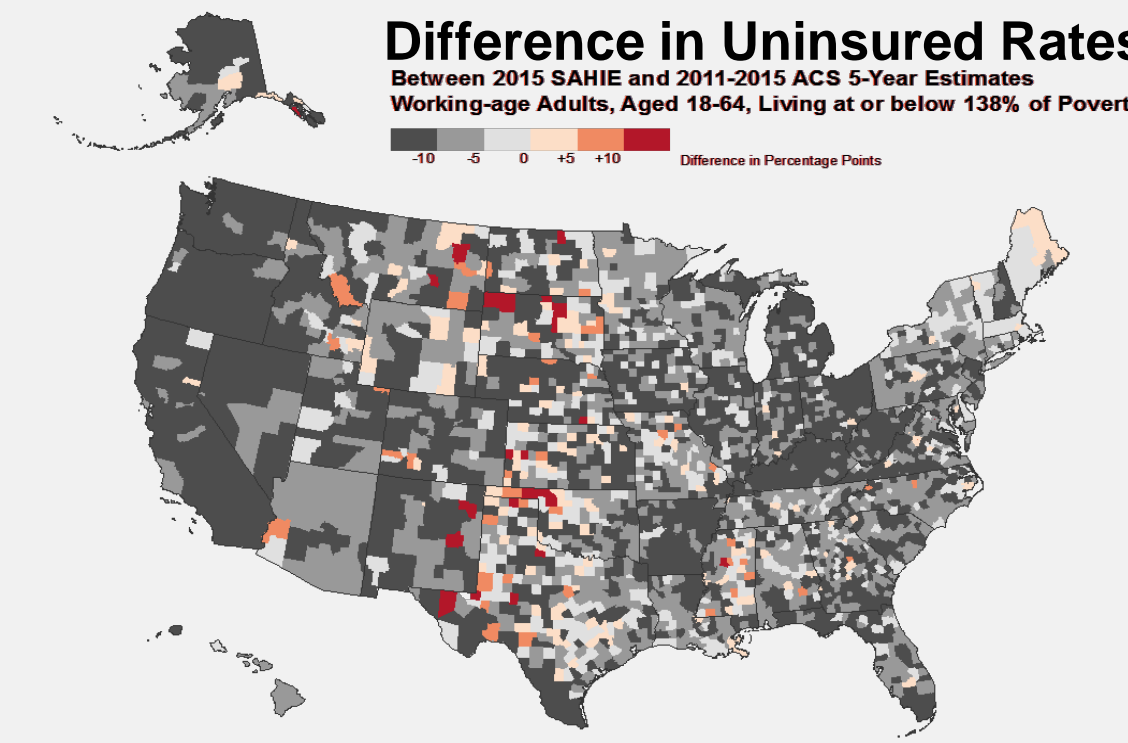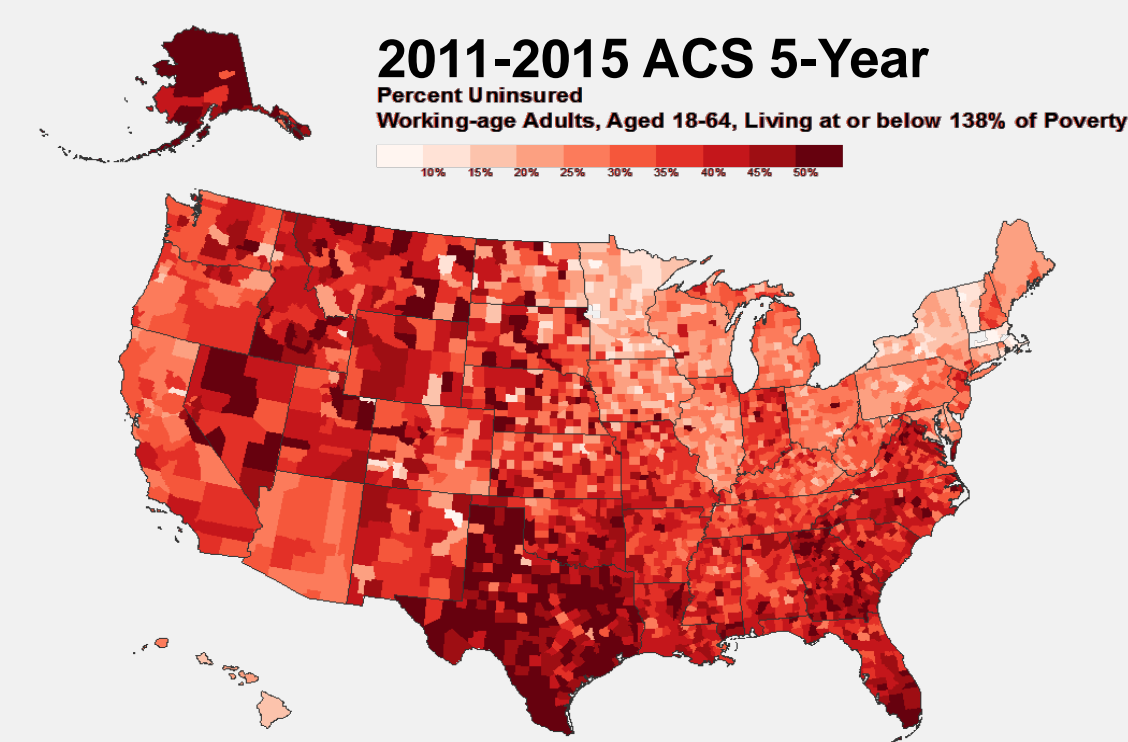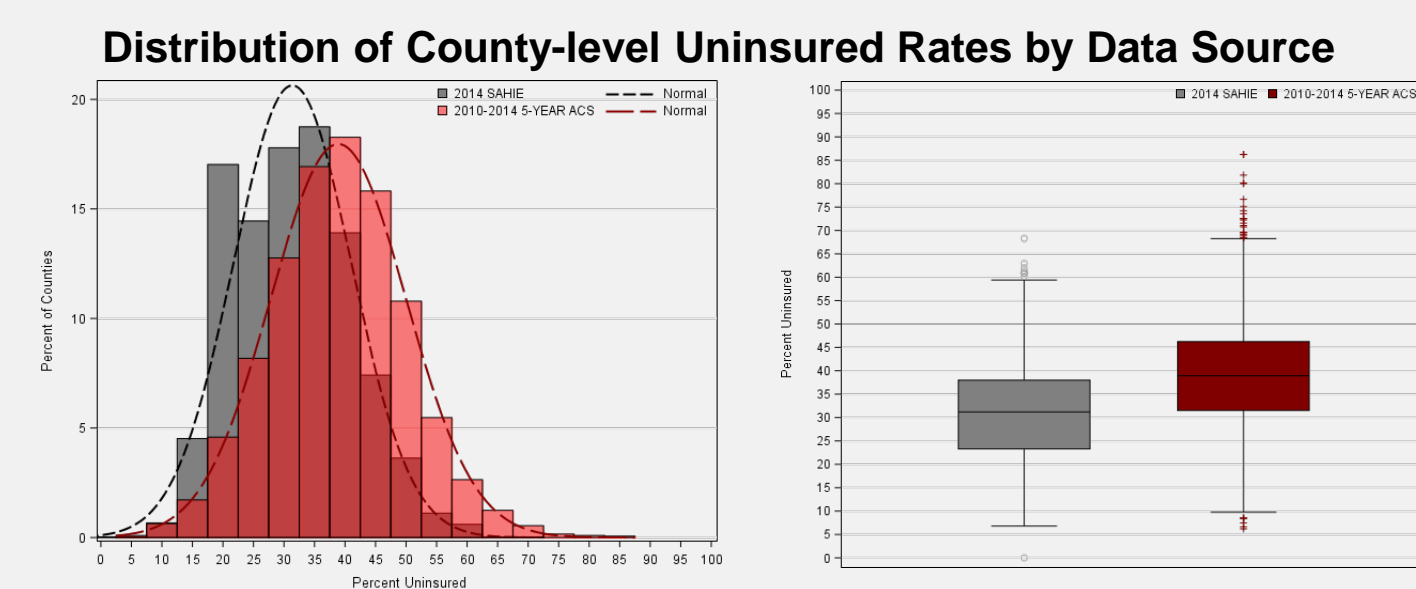
KEY FINDINGS

After 2013, SAHIE's geographic distribution for estimated county uninsured rates for low-income, working-age adults vary from the ACS 5-year estimates

- 2013 SAHIE and the 2009-2013 ACS 5-year estimated county uninsured rates share a similar geographic distribution.
- 2014 SAHIE and the 2010-2014 ACS 5-year show a substantially different geographic distribution in estimated uninsured rates. SAHIE shows that lower uninsured rates are more pronounced in states that expanded Medicaid in 2014, such as, Kentucky, Arkansas, West Virginia, Nevada, Oregon, Washington, and California.
- The differences in geographic distributions persists between 2015 SAHIE and the 2011-2015 ACS 5-year estimates.

After 2013, SAHIE's distribution of county uninsured rates diverge from the ACS 5-year estimates

- 2013 SAHIE and the 2009-2013 ACS 5-year estimated uninsured rates have similar distributions (see histograms and boxplots).
- For 2014 SAHIE and the 2010-2014 ACS 5-year estimates, the distribution of uninsured rates begin to diverge. We see a similar pattern when comparing 2015 SAHIE and the 2011-2015 ACS 5-year estimates.

CONCLUSION

The purpose of this analysis is to demonstrate how Small Area Estimates can be a powerful tool to analyze sub-populations in small geographies during periods of change. The findings show that when sub-populations are stable, the ACS 5-year and SAHIE have similar distributions for county-level estimates. However, when the population of interest experiences change, the distributions diverge. One limitation of this analysis is the absence of a statistical test to compare the ACS 5-year estimates with the single-year SAHIE estimates; however, through visualizations of the two data sources we find that SAHIE accounts for more change in its distribution of county uninsured rates over time.

Currently, the Census Bureau's SAHIE program releases single-year model-based estimates for health insurance coverage status for all U.S. counties. The ACS 5-year estimates are the only other data source that provides estimates for all counties. However, by using data collected over multiple years, the ACS 5-year estimates cannot be used to evaluate annual changes. Both model-based estimates and the multi-year survey estimates are a valuable resource for evaluating social and economic characteristics for populations in small geographic areas, but by modeling survey data with administrative records, we are able to capture trends that would otherwise not be discernable.