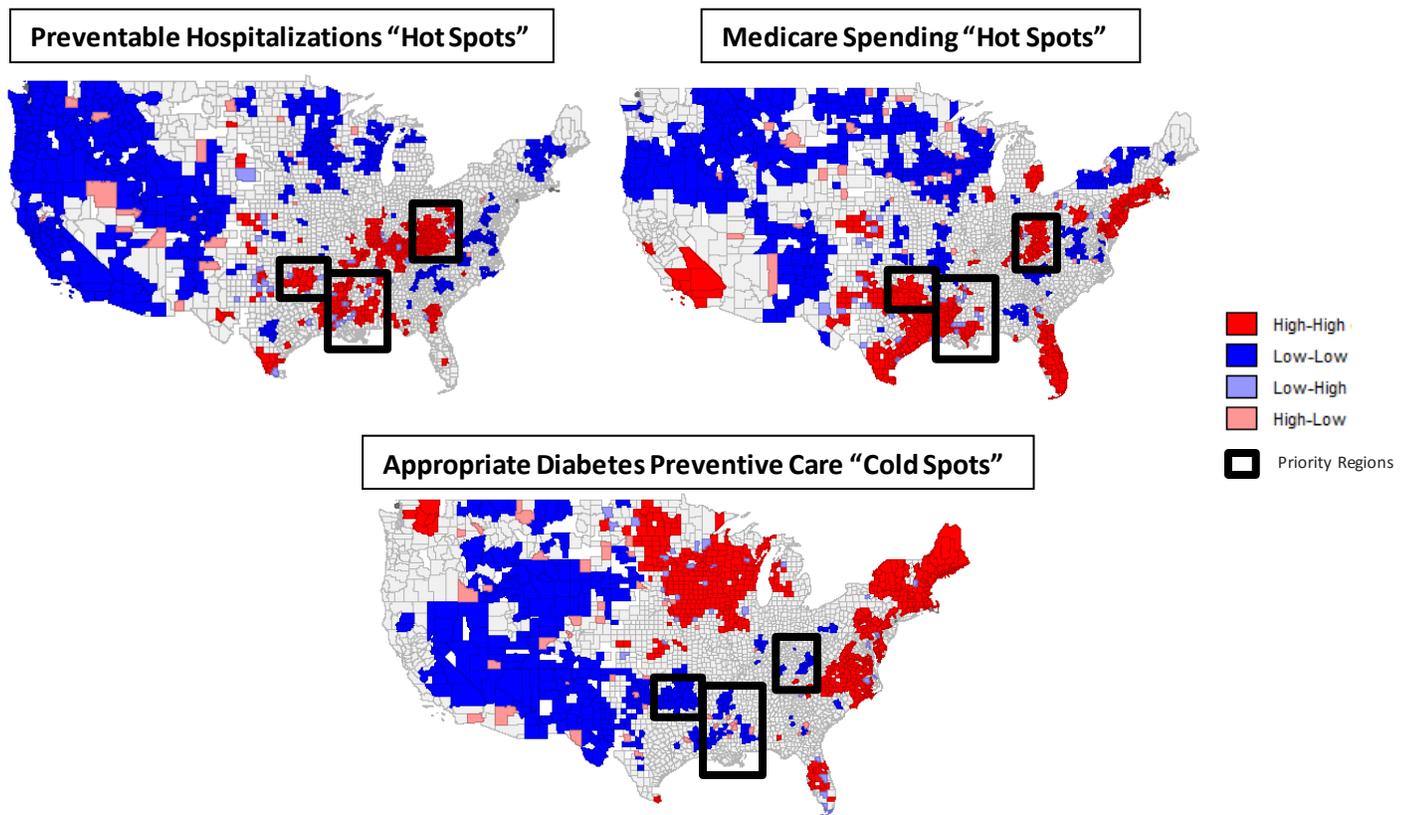


Many healthcare reform efforts are underway that are working towards achieving the triple aim of better care, better health, and lower costs. However, questions still remain about how reforms take into account the significant geographic variation of healthcare spending and utilization. Recognizing the importance of geography, researchers have developed hot-spot and cold-spot approaches for targeting healthcare super-utilizers and high need communities, offering potential models for identifying priority regions where policymakers can target scarce resources (Gawande, 2011; Westfall, 2013). Hot-spotting and cold-spotting has also been used in the field of geospatial analysis, where hot spots are defined as clusters of high values and cold spots as clusters of low values (Anselin et al., 2006). Thus, we could think of clusters of counties with low rates of preventive care as cold spots. While our first brief demonstrated an association between preventive care and Medicare spending and preventable hospitalizations (Topmiller, 2016), this brief details an approach for identifying priority geographic regions for improving preventive care.

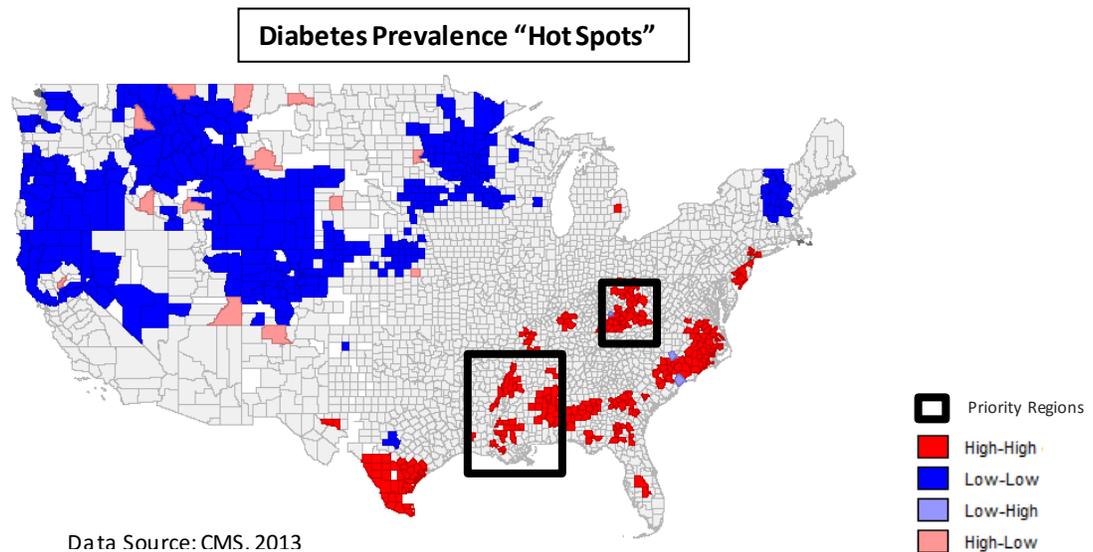
A county-level composite measure of appropriate delivery of Diabetes preventive services was created using 2013 Dartmouth Atlas data for fee-for-service (FFS) diabetic beneficiaries ages 65-75 with an annual hemoglobin A1C test, annual blood lipids LDL-C test, and annual eye exam. Local indicators of spatial autocorrelation (Local Moran’s I) were used to identify “hot spots” of Medicare spending (clusters of high cost counties) and preventable hospitalizations (clusters of high hospitalization rate counties) and “cold spots” for appropriate Diabetes preventive care (clusters of counties with low preventive care).



Data Source: Dartmouth Atlas, 2013

In general, the “hot spot” maps reveal (in red) clusters of counties with high rates of preventable hospitalizations and high spending in Louisiana, Mississippi, Arkansas, northern Texas, Oklahoma and the central Appalachia region. The “cold spot” map displays (in blue) clusters of counties with low rates of preventive care, many of which are located in the same areas as spending and preventable hospitalization “hot spots.” The maps also reveal general patterns of lower utilization (preventive care and preventable hospitalizations) and lower spending in the western half of the U.S., particularly in the mountain states.

The maps reveal that regions with lower rates of preventive care often have higher rates of preventable hospitalizations and higher Medicare spending, particularly in the eastern half of the U.S. Priority regions are indicated by the black boxes and are located primarily within and around Louisiana, northern Texas and Oklahoma, and the central Appalachia region; these are areas that are both spending and preventable hospitalization “hot spots” and preventive care “cold spots.” Compared to national averages, Medicare spending is almost \$500 more per enrollee and preventable hospitalizations are 30% higher in priority regions. The importance of targeting these areas is further highlighted by exploring the Diabetes prevalence map below, which shows clusters of counties with high rates of Diabetes (CMS, 2013).



This brief illustrates the use of geographic approaches for identifying priority regions for improving preventive care, and the value of exploring “hot spots” and “cold spots” simultaneously as a method for targeting scarce resources. The geospatial methods outlined in this brief are intended to be the first phase of a mixed-methods approach to improving access to preventive care. Next steps would involve targeting healthcare providers within these priority regions and using qualitative methods to explore potential reasons for low rates of preventive care and develop strategies for improvements. Future research could also focus on high-performing (“bright spot”) regions in order to identify successful strategies for improving preventive care that could be applied to priority regions.

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References

Anselin, Luc, Ibnu Syabri and Youngihh Kho (2006). GeoDa: An Introduction to Spatial Data Analysis. *Geographical Analysis* 38 (1), 5-22.

Centers for Medicare and Medicaid (CMS), 2013. Geographic Variation Public Use File
Accessed at <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/>

Dartmouth Atlas of Health Care, 2013. Data Downloads.
Accessed at <http://www.dartmouthatlas.org/tools/downloads.aspx>

Gawande, Atul. (2011). “The Hot Spotters: Can we lower medical costs by giving the neediest of patients better care?”
The New Yorker. January 24, 2011.
Accessed at <http://www.newyorker.com/magazine/2011/01/24/the-hot-spotters>

Topmiller, Michael. (2016). “Do Regions with More Preventive Care have Lower Spending and Fewer Hospitalizations?”
HealthLandscape Geospatial Research Brief #1.
Accessed at <http://www.healthlandscape.org/Geospatial-Analysis.cfm>

Westfall, John M. (2013). Cold Spotting: Linking Primary Care and Public Health to Create Communities of Solution.
Journal of the American Board of Family Medicine, 26(3): 239-240.