A Spatial Analysis of Access to Veterans Healthcare

Background Information

The Veterans Administration healthcare system has been a polarizing integrated healthcare system over the past ten years. Some argue that the program is a highly successful government organization, while others argue it's programs come up short of providing accessible high quality care to the veterans population. This study will look at how accessible the VA healthcare facilities are to those they serve. Additionally the 2014 Phoenix Veterans healthcare Crisis caused President Obama to Sign the Veterans Choice Act allowing veterans who, "live more than 40 miles from a VA facility, or if VA doctors can't see you within a reasonable amount of time, you'll have the chance to see a doctor outside the VA system," (Branchley, 2014). This policy was then amended to allow any veteran who lived over 40 miles away on the road network from a VA facility to see non-VA providers. The Veterans Choice Act will be superseded by the VA Mission Act. Initial drafts of this policy propose that anyone outside of a 30 minute drive time to a primary care and mental health provider within the VA system could see an outside provider (Shane III, 2018). Understanding current access to care can help project how the state's veteran population will be affected by these changing policies.

Importance

This issue is important because while some argue privatized care provides a higher quality of service to the patient, others point out that private care is much more expensive for the VA system. One study showed an 11% increase in outpatient costs when VA care is privatized (Elizabeth Bass, 2014).

Hypothesis

Based on changing policies veterans healthcare facilities are inadequately located to serve the Veterans Administration insured population in the State of Illinois.
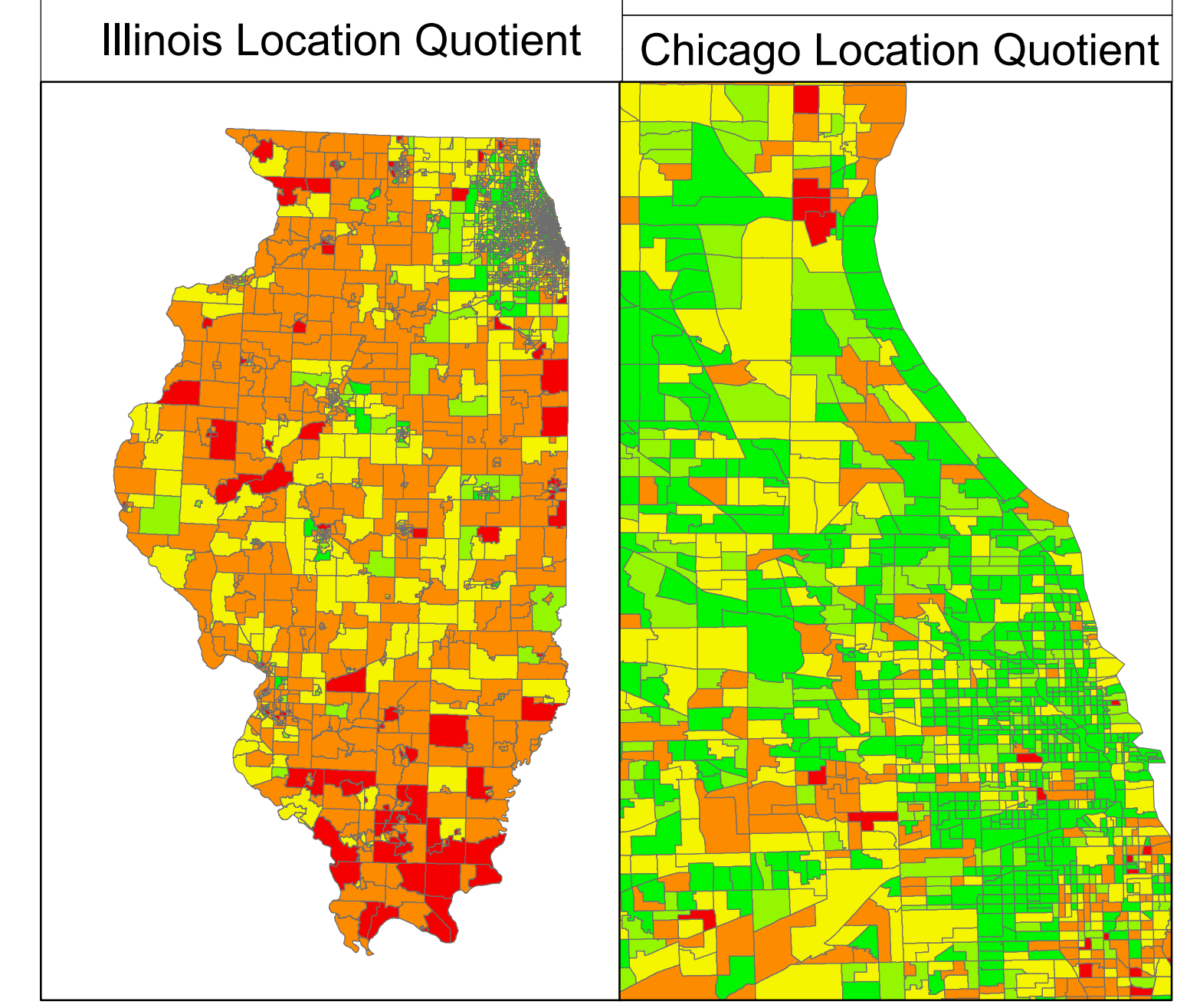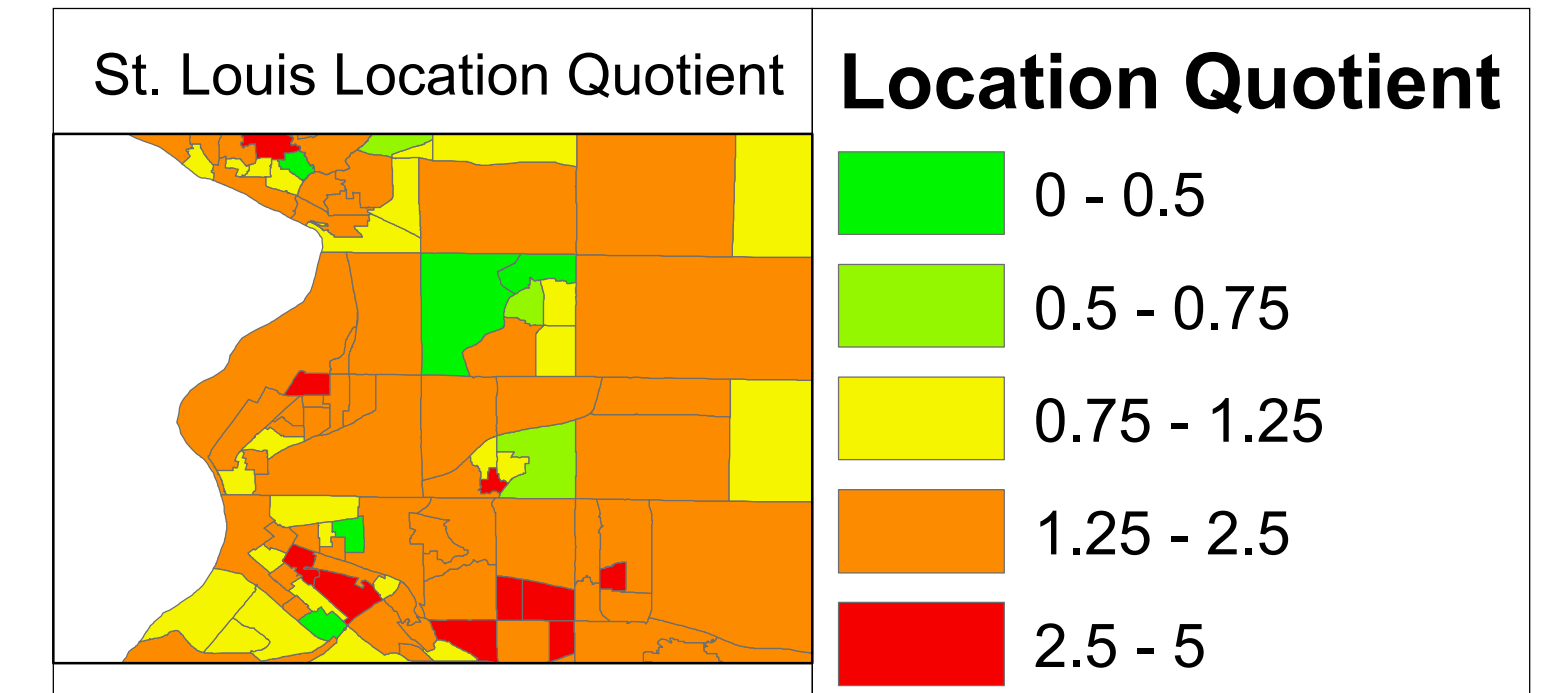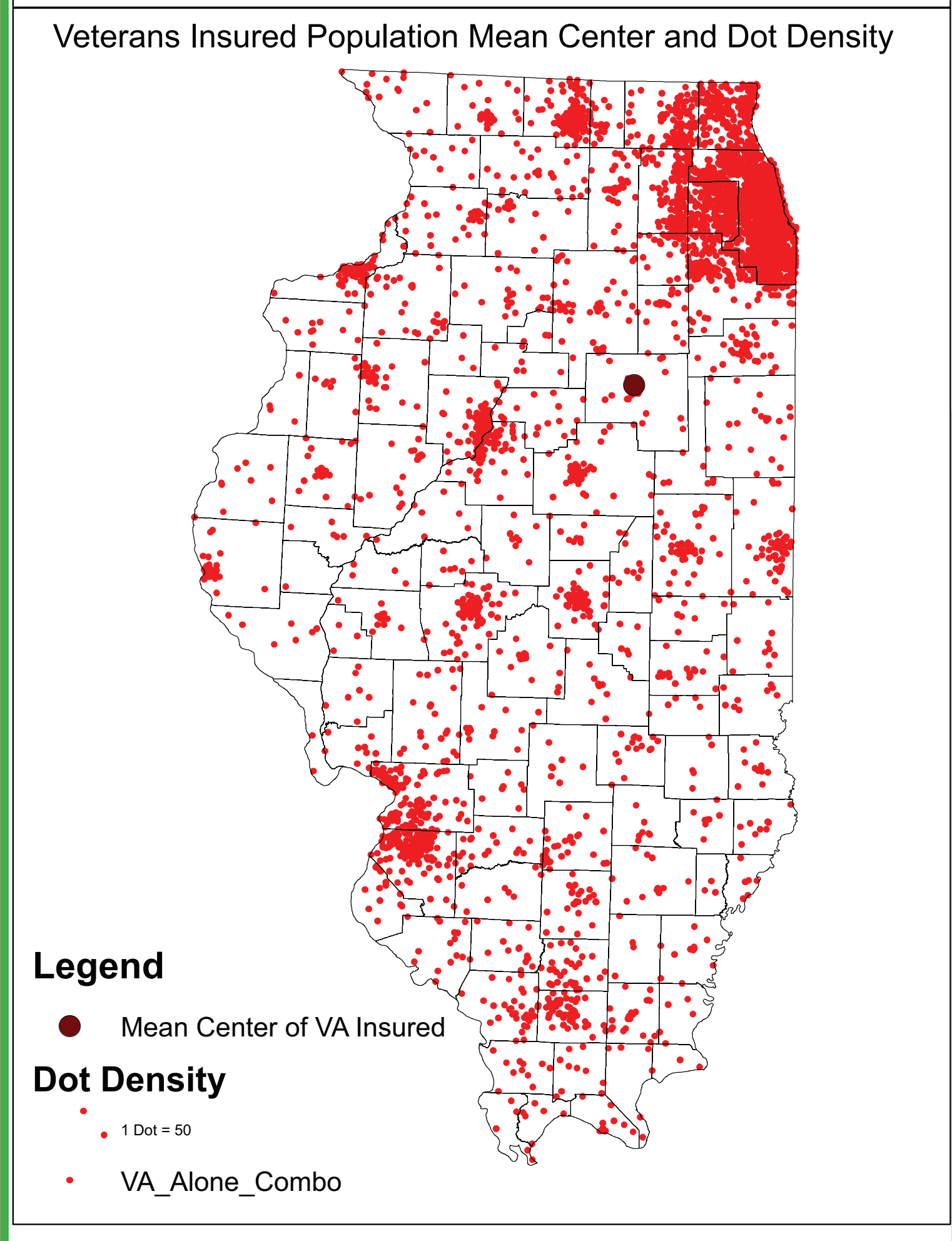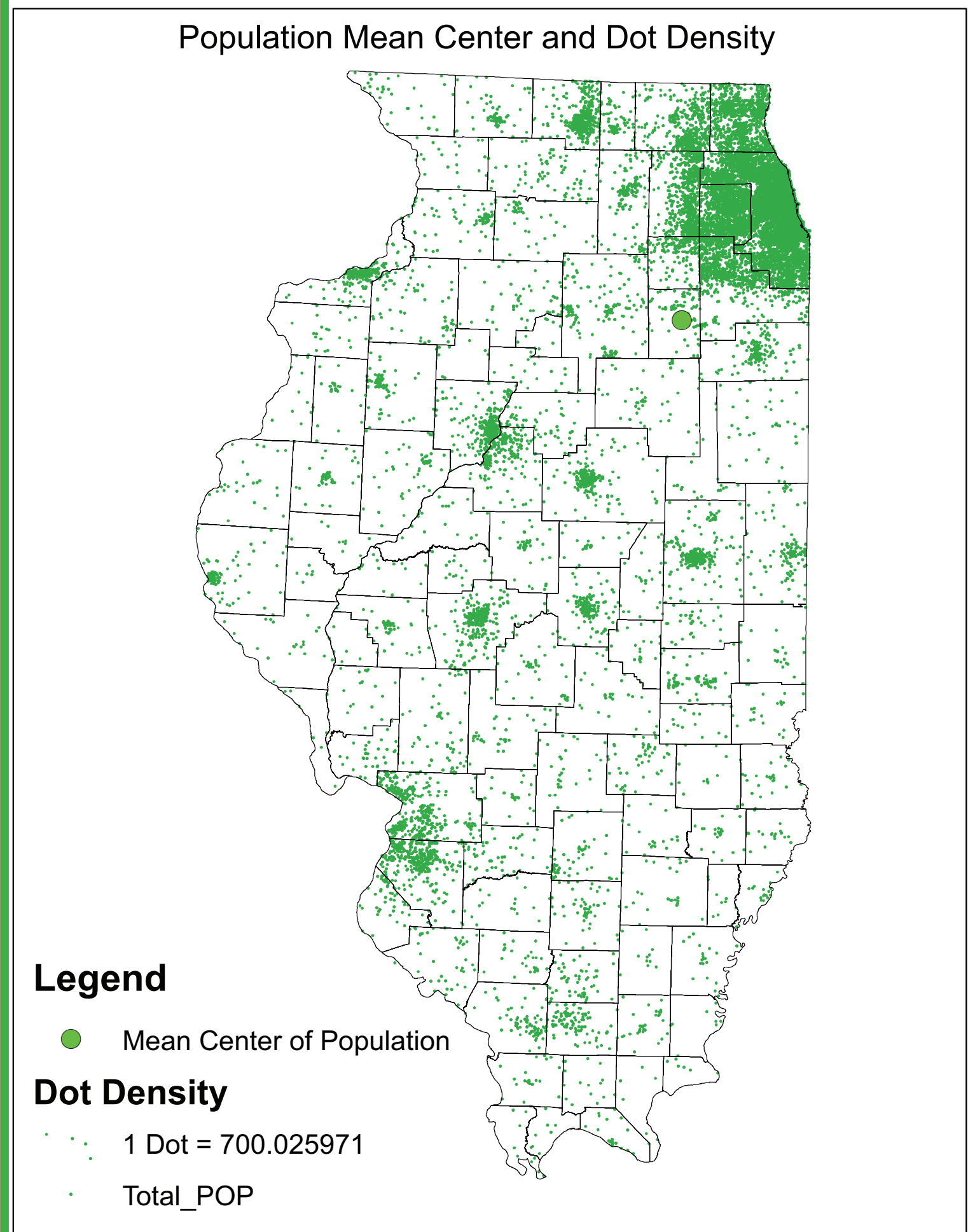
Data Set

- Two sets of observations used in the various overlays
- First set of observations was census tract geographies
- Second set of observations was veterans healthcare facilities
- Variables for census tracts were veterans insured population estimates and total population estimates, and location
- No variables for veterans healthcare facilities except location
- Census Tract data collected based on American Community Survey estimates in 2017
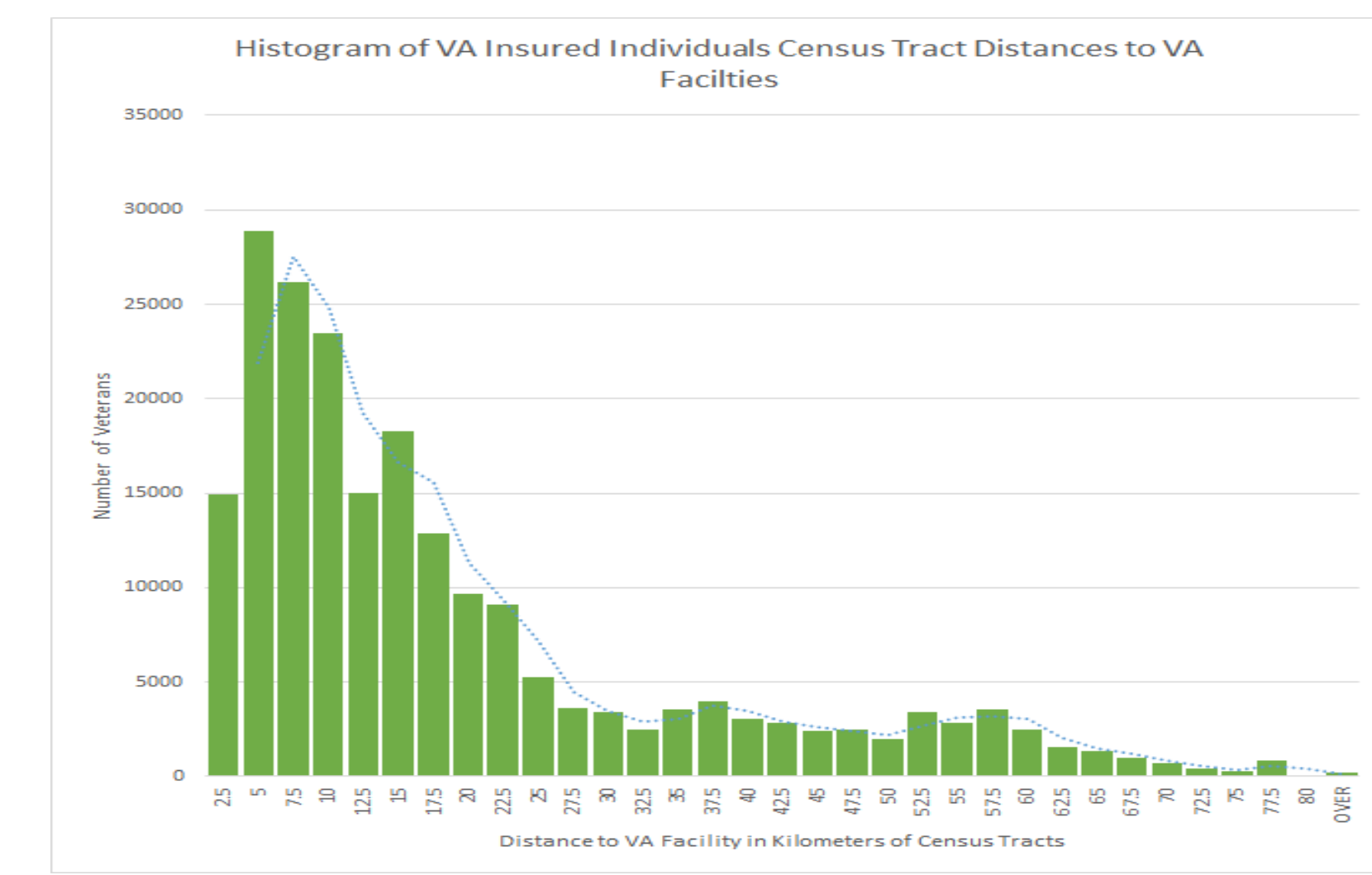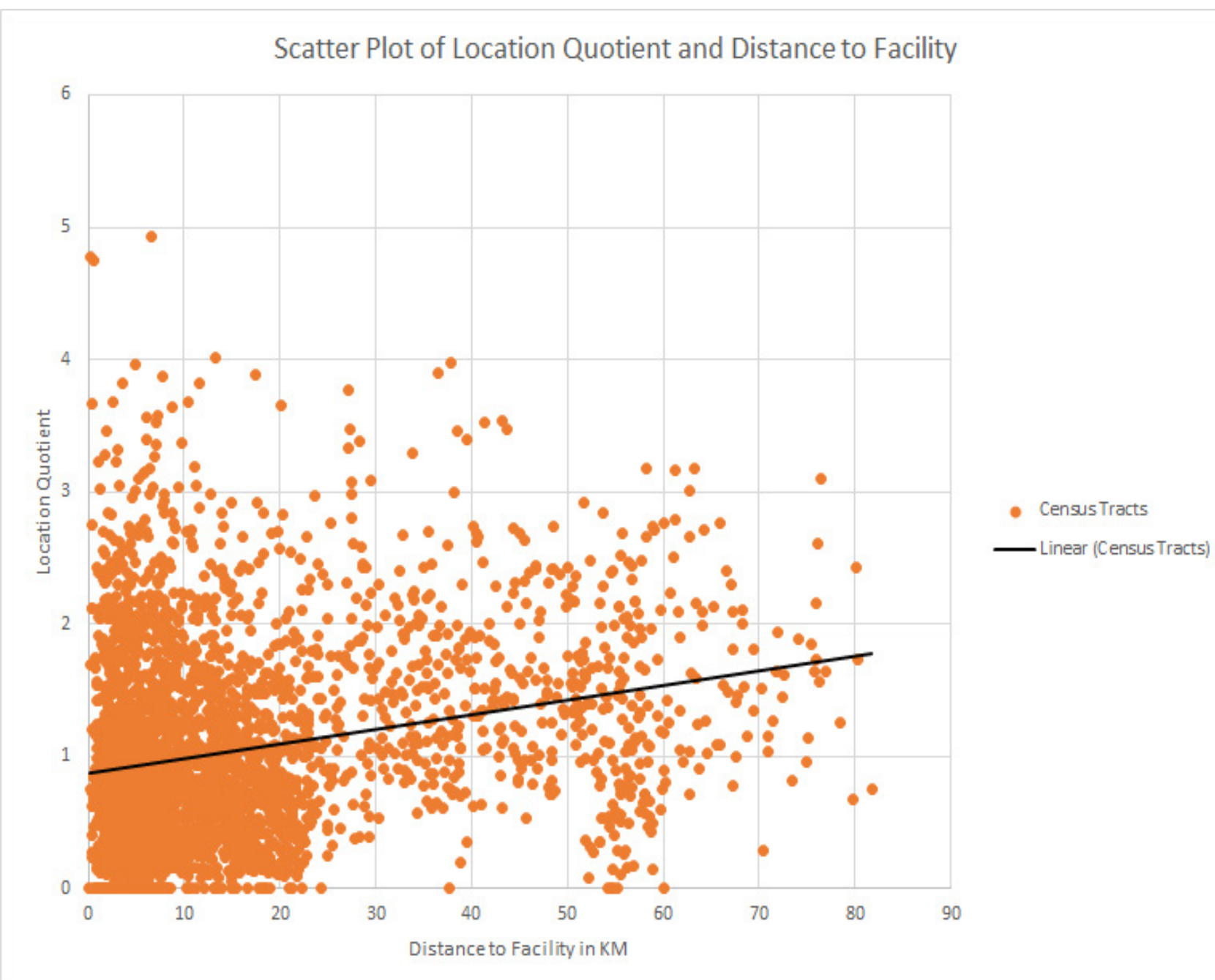- Hospital data collected from Homeland Infrastructure Foundational-Level Data

Analysis Methods Used

- Evaluated difference in VA Insured population to total population using weighted mean center
- Evaluated causes of mean center difference using location quotient
- Used VA facilities mean center to evaluate the effectiveness of facilities locations in respect to veterans insured population
- Used Kernel density heat mapping to find well served and under served areas within the state of Illinois.
- Used descriptive statistics to determine the various measures such as skewness and variation of the data as well as the percentage of the VA population within a certain distance of facilities
- Used correlation coefficient to evaluate the relationship between large populations of veterans and distance to healthcare facilities

Results

Population Mean Center and Dot Density

Legend
- Mean Center of Population

Dot Density
- 1 Dot = 700.025971
- Total_POP

Veterans Insured Population Mean Center and Dot Density

Legend
- Mean Center of VA Insured

Dot Density
- 1 Dot = 50
- VA_Alone_Combo

St. Louis Location Quotient

Location Quotient
- 0 - 0.5
- 0.5 - 0.75
- 0.75 - 1.25
- 1.25 - 2.5
- 2.5 - 5

Illinois Location Quotient

Chicago Location Quotient

Location Quotient shows the reason the Veterans insured population has a further southwest mean center then the total Illinois population. This is shown to be largely due to high concentrations of Veterans in Southern Illinois and in the Saint Louis Area. The presence Scott Air force base could be the reason for high concentrations in this region.

Scatter Plot of Location Quotient and Distance to Facility

Scatter Plot of VA Insured Population and Distance to Facility

Histogram of VA Insured Individuals Census Tract Distances to VA Facilities

Heat Map of Access to Veterans Healthcare Facilities

Legend
- Mean Center of Veterans Insured
- Mean Center of Facilities
- Healthcare Facilities

Heat Map
- High Access
- Low Access
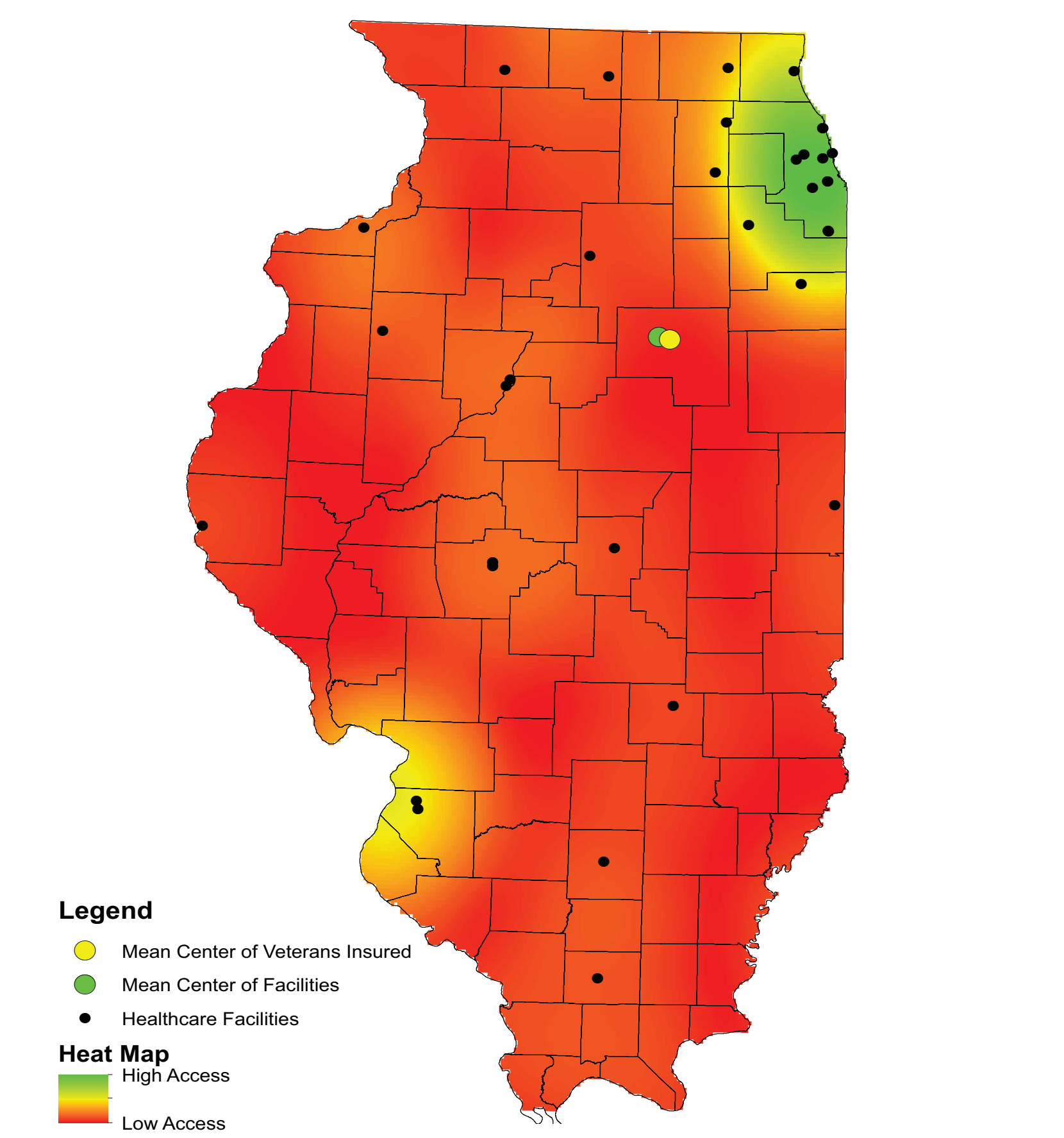
Descriptive Statistics

- Mean distance is 15.98 KM to the nearest facility
- Standard deviation is 16.36 KM with nearest facilities
- ACS Estimates there are 212,348 veterans who are insured in some way by the VA
- 126,764 live in a census tract within 15 KM of a VA healthcare facility or 59% of the population
- Positive skewness of 1.67 indicates expected disparities above the mean in access to facilities

Correlation Coefficient

- R value for Location Quotient of VA insured population in a census tract and Distance from census tract to Nearest Facility is .24
- R value for VA insured population in a census tract and distance from census tract to nearest facility was .15
- Correlation coefficients Showed a statistically significant positive correlation for both correlation coefficients

Conclusion

Based on the research conducted, there are a few major takeaways from this study. The first takeaway being that 59% of the VA insured population lives within 15 kilometers, or roughly ten miles, of a VA facility. This shows us that a large portion of the veterans population is actually very close to its VA Healthcare facilities. Also, the mean center of VA healthcare facilities is very close to the mean center of the population. This shows that when evaluating global measures, the locations of VA Healthcare facilities were effective, or the distribution of facilities in each region is correct. This evidence points towards facilities being located throughout the state in a way that allows at least a proportionate number of facilities to be located in the region similar to the proportion of the Illinois VA insured population that lives there. However, multiple measures show the improper locations of healthcare facilities on a local level. The correlations coefficients showing an increase in distance from a facility as the concentration and volume of veterans in a census tract increase leads me to believe locations could be better selected within localized regions for these healthcare facilities. Additionally the heat mapping of the facilities shows that access is particularly low in west central and east central Illinois. These areas would likely be most affected by changing policies allowing them to see private providers outside the VA system. The state would require better located or possible more VA facilities to most effectively provide care for the VA insured population. Additionally, More studies must be conducted as to the effect these policy changes will have on the veterans population in the state of Illinois.

Discussion

- Test statistics showed statistical significance for correlation analysis using t distribution
- T distribution used was 1 tailed
- Showed a high level of significance that facilities are not close to large Veteran Populations
- Study Used American Community Survey Estimates
- Estimates Come From 2017
- Modifiable Area Unit Problem when evaluating distances to centroid of census tracts
- Modifiable Area Unit Problem when calculating Mean Centers
- Study more accurate for distances to facilities of smaller census tracts in urban areas
- Rural areas could likely be unevenly distributed in closer proximity to the urban areas
- These urban areas often are where VA Healthcare Facilities are located
- Considered out of state locations in mean center and heat mapping of facilities

References

Branchley, C. (2014, August 7). the White House: Presdient Brack Obama. Washington, District of Columbia, United States of America. Retrieved February 19, 2019

Elizabeth Bass, P. E. (2014, December). VA Healthcare Costs. (C. Howlett, Ed.) Retrieved February 19, 2019, from Congressional Budget Office: https://www.cbo.gov/sites/default/files/113th-congress-2013-2014/reports/49763-VA_Healthcare_Costs.pdf

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