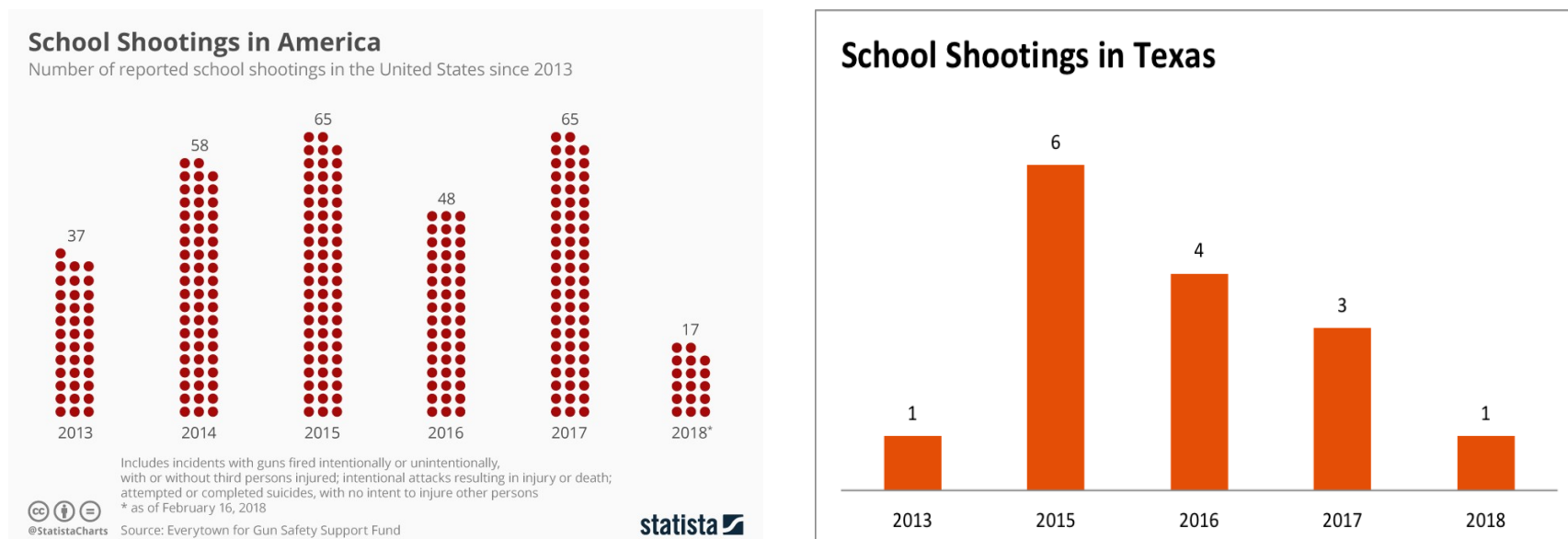


### Background

The high prevalence of school shootings in the United States is no surprise to the global community. Just this past February, 17 students died in Parkland, Florida due to a mass shooting, igniting the nation to march to end gun violence and mass shootings (March for our Lives). According to CNN, there has been an average of one school shooting every week of 2018. According to Everytown Research, Texas had the highest quantity of school shootings (n=15) that resulted in fatality or injury in the USA.

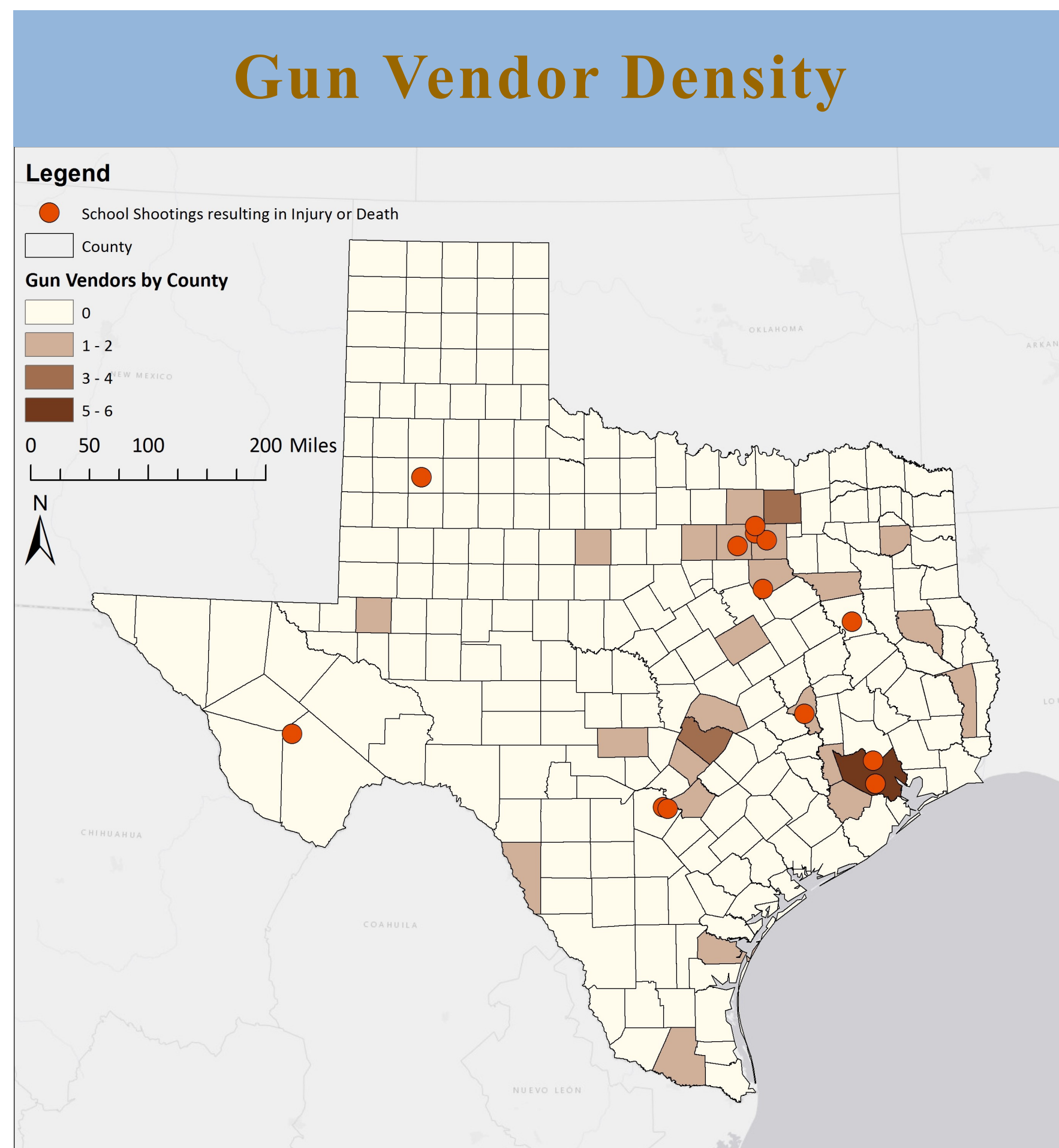


There is a relationship between mental health illnesses, gun access, and mass shootings (Los Angeles Times). Over half of the perpetrators of mass shootings have been diagnosed with a serious mental condition, a prevalence 20 times higher than that of the general population. Texas historically has had very lenient firearm policies, as shown in the table below. It is only illegal to purchase or own a firearm if an individual is convicted of a felony or Class A misdemeanor involving a family member. The state's residents are allowed to purchase firearms and accessories from the vast majority of states. According to the policy "Stand your Ground," an individual is allowed to use a firearms in an act of self-defense without legal ramifications. According to Dallas News, Texas's usual response to fatal shootings is to increase gun access for protective purposes.

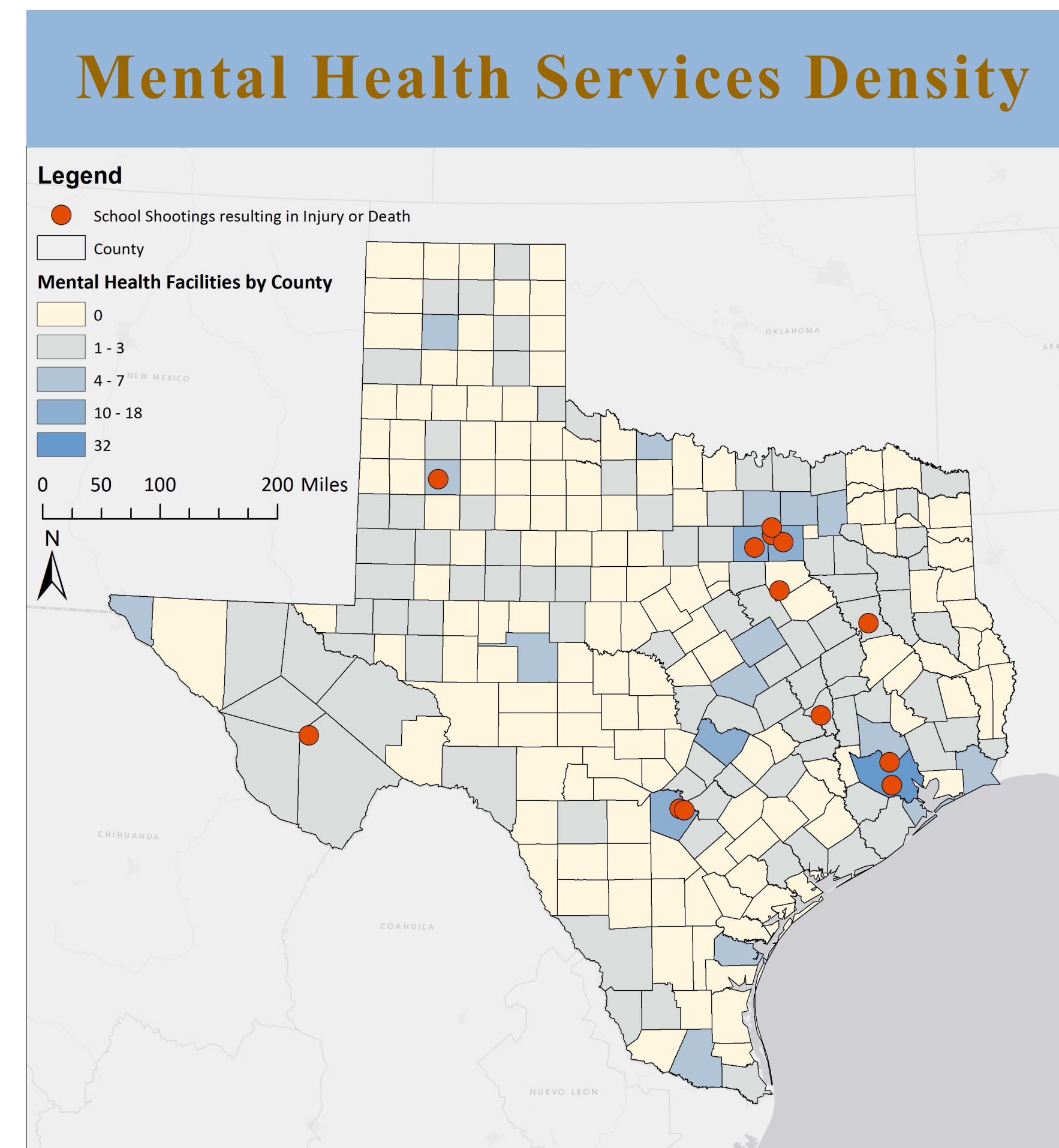
Policy	Rifles & Shotguns	Handguns
Permit to Purchase	No	No
Licensing of Owners	No	No
Registration of Firearms	No	No
Permit to Carry	No	Yes

The solution to end mass shootings can only be found in studying the problem of what causes these shootings in the first place. This poster aims to understand the issue through the following questions:

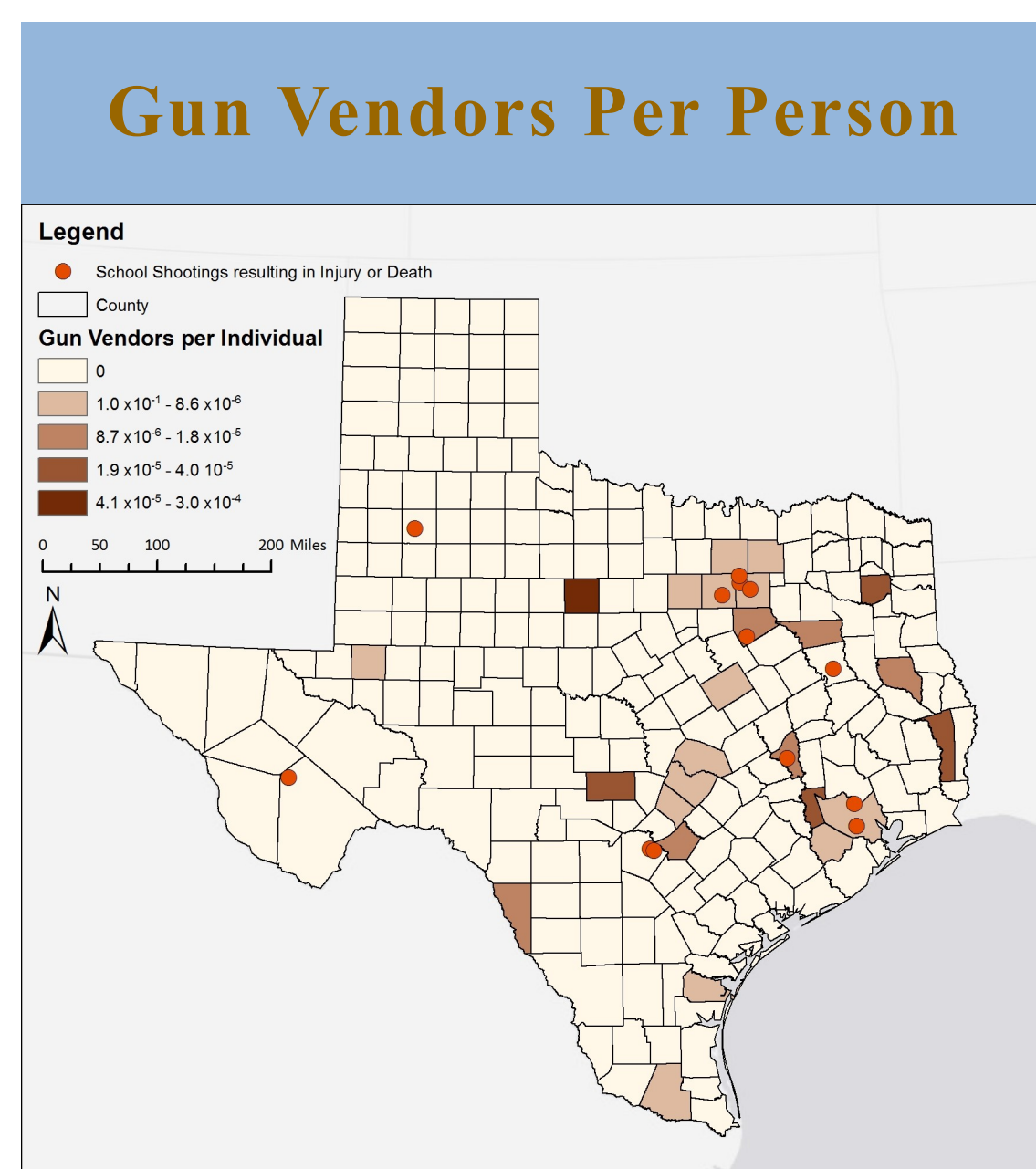
1. Does the accessibility of firearms correlate with school shootings?
2. Does the accessibility of mental healthcare facilities correlate with school shootings?
3. How does clustering (of lack thereof) of firearm vendors and mental health facilities compare to the location of school shootings?
4. How can the results be used to enact effective policy to eradicate school shootings?



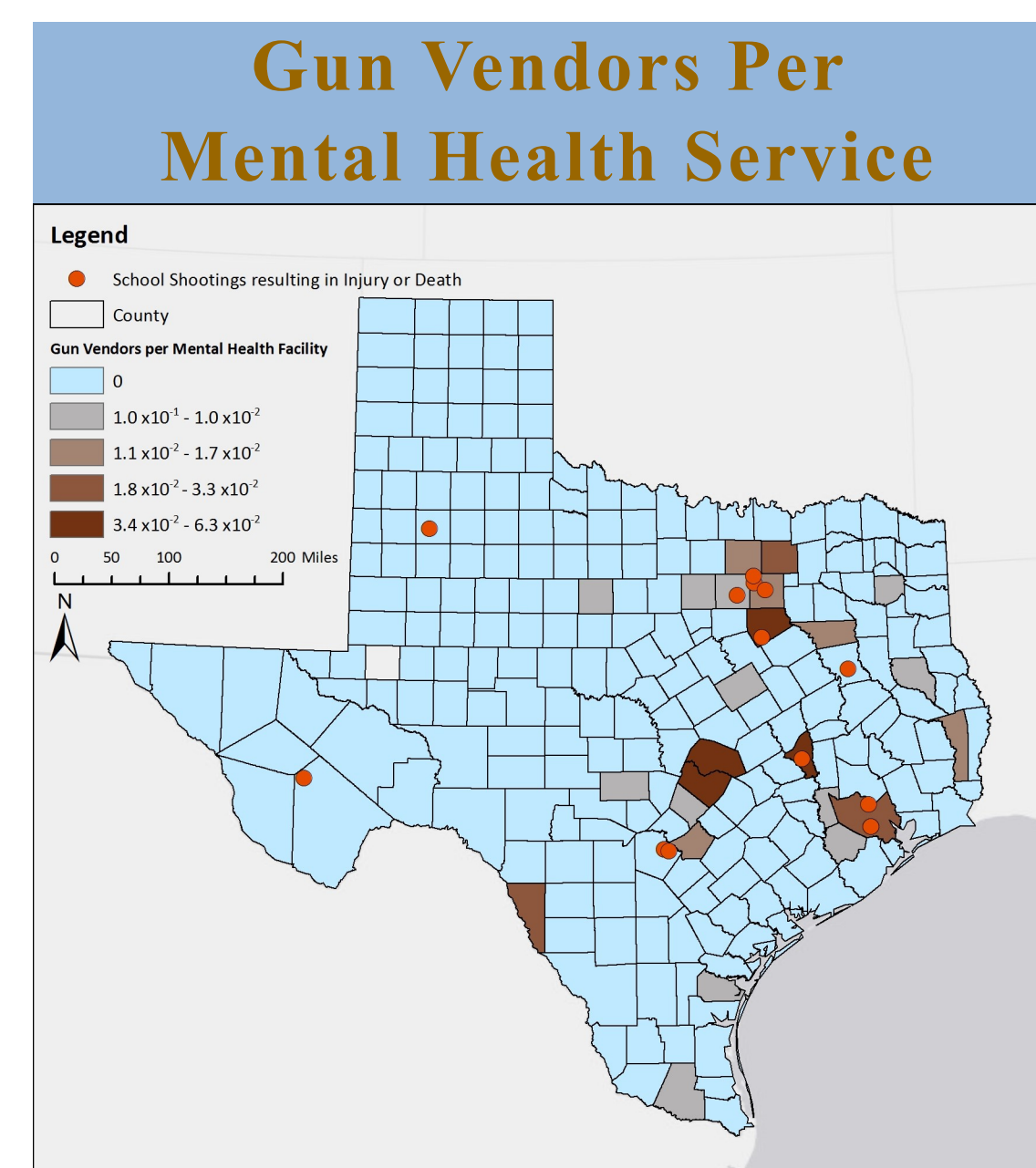
**Figure 1.** Given the z-score of 3.740, and a global Moran's Index of 0.100, there is a less than 1% likelihood that this clustered pattern could be the result of random chance. There is a significant spatial correlation between gun vendors per county and school shootings, with more shootings occurring with a higher amount of gun vendors per county.



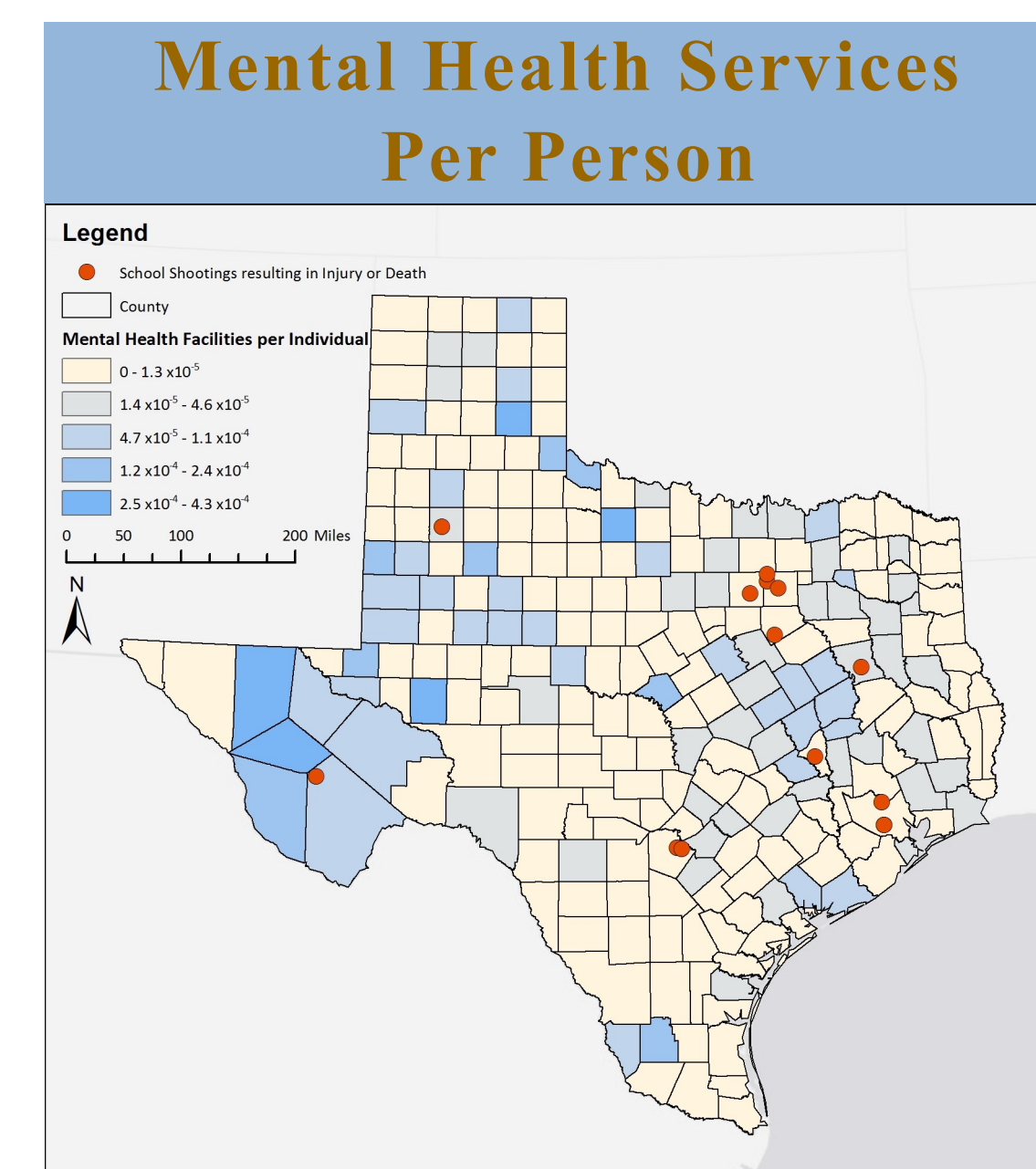
**Figure 2.** Given the z-score of 4.299, and a global Moran's Index of 0.110, there is a less than 1% likelihood that this clustered pattern could be the result of random chance. There is a significant spatial correlation between the amount of mental health facilities per county, with higher numbers of facilities correlating with school shootings.



**Figure 3.** Given the z-score of 0.024, and a global Moran's Index of 0.0072, the pattern does not appear to be significantly different than random. There is no significant correlation between school shootings and density of gun vendors per individual.



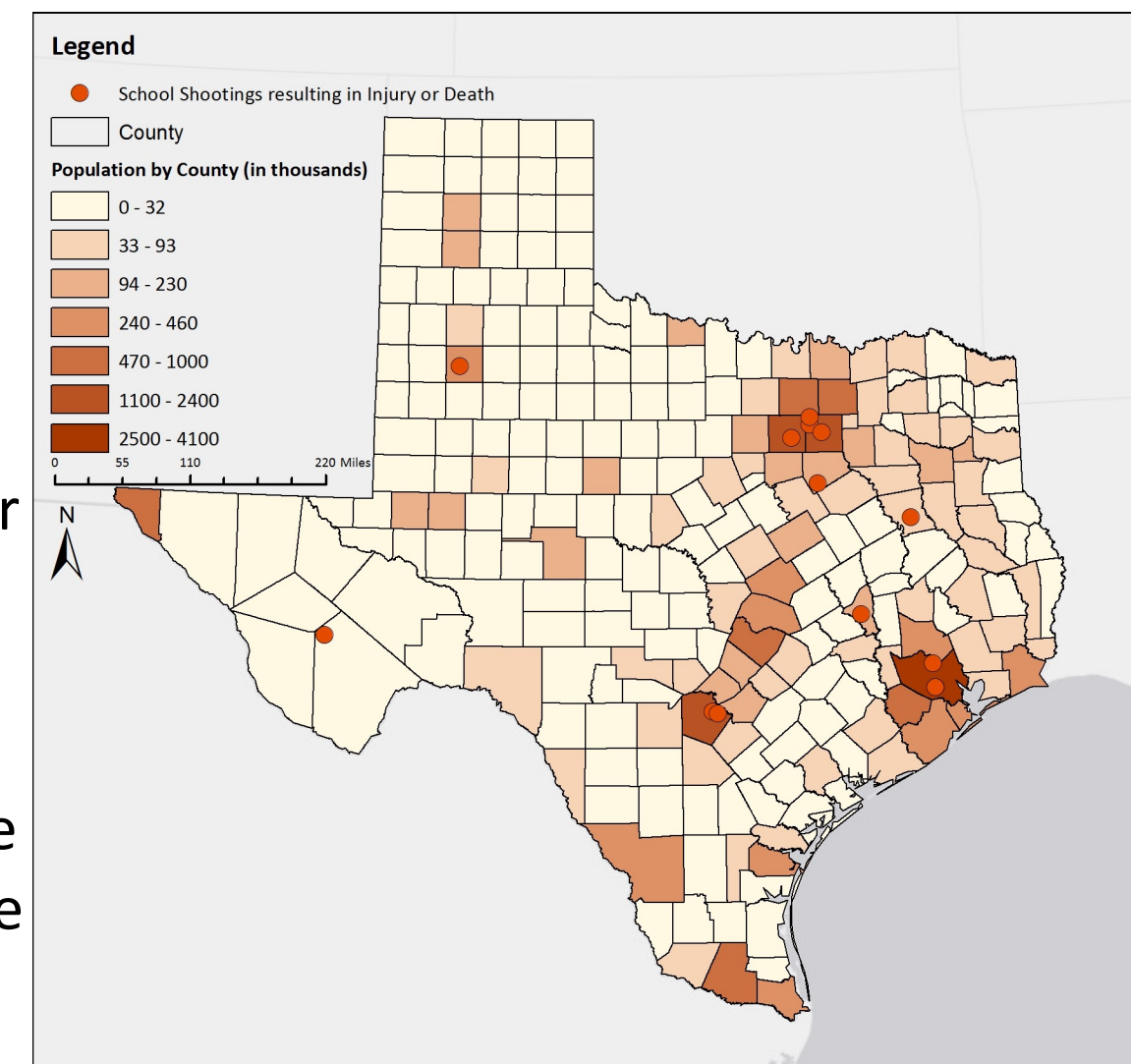
**Figure 4.** Given the z-score of 4.299, and a global Moran's I of 0.110, there is a less than 1% likelihood that this clustered pattern could be the result of random chance. Thus, there is a significant correlation between the amount of gun vendors per mental health facility per county and school shootings.



**Figure 5.** Given the z-score of 0.0855, and a global Moran's Index of 0.0352, the pattern does not appear to be significantly different than random. There is no significant correlation between school shootings and density of mental health services per individual.

### Methods

Population data were input as polygon vectors per county. This layer was symbolized by quantity to represent population density per county (Figure 6). Mental Health Services data were geocoded from a table to point vectors. These were then spatially joined with the Texas county layer (vector polygon) and symbolized by count per county to create Figure 2. This layer was then spatially joined with the Population layer (Figure 6) to determine the amount of mental health services per individual (Figure 5). The same methods were used with gun vendor data to create Figures 1 and 3. The layers created to make Figures 3 and 5 were then spatially joined and gun vendor quantity was normalized by count of mental health facilities to determine the amount of gun vendors to mental health facilities per county (Figure 4). Global Moran's I was used to calculate quantity clustering.



**Figure 6. Population Density**

### Conclusions

From 2013-2018, there have been **16 fatalities and 16 injured** due to school shootings in Texas.

The results demonstrated that the increase of density of mental health services per county does not decrease the amount of shootings in the area. On the other hand, an increased amount of gun vendors per county and per mental health facility correlated with the locations of school shootings. Due to these results, it is clear that increasing the quantity of mental health facilities would not be the solution to preventing school shootings. Rather, decreasing the amount of gun vendors or increasing the difficulty of attaining firearms would be more effective. This may be the best preventative means of ending mass shootings in the USA.

This analysis did fall short due to a few uncertainties. The biggest source of error is the lack of available data. It was very difficult to find data about the locations of firearm vendors and school shootings. The data utilized does not present an accurate image of all the locations of firearm vendors. Additionally, access to firearms and mental health facilities may not be the only determining factors of school shootings that result in injuries or fatalities. To fully solve the problem of mass school shootings, all potential determining factors must be addressed.