IDENTIFYING HIGH SUICIDE RATES AND POTENTIAL CAUSES IN COLORADO COUNTIES

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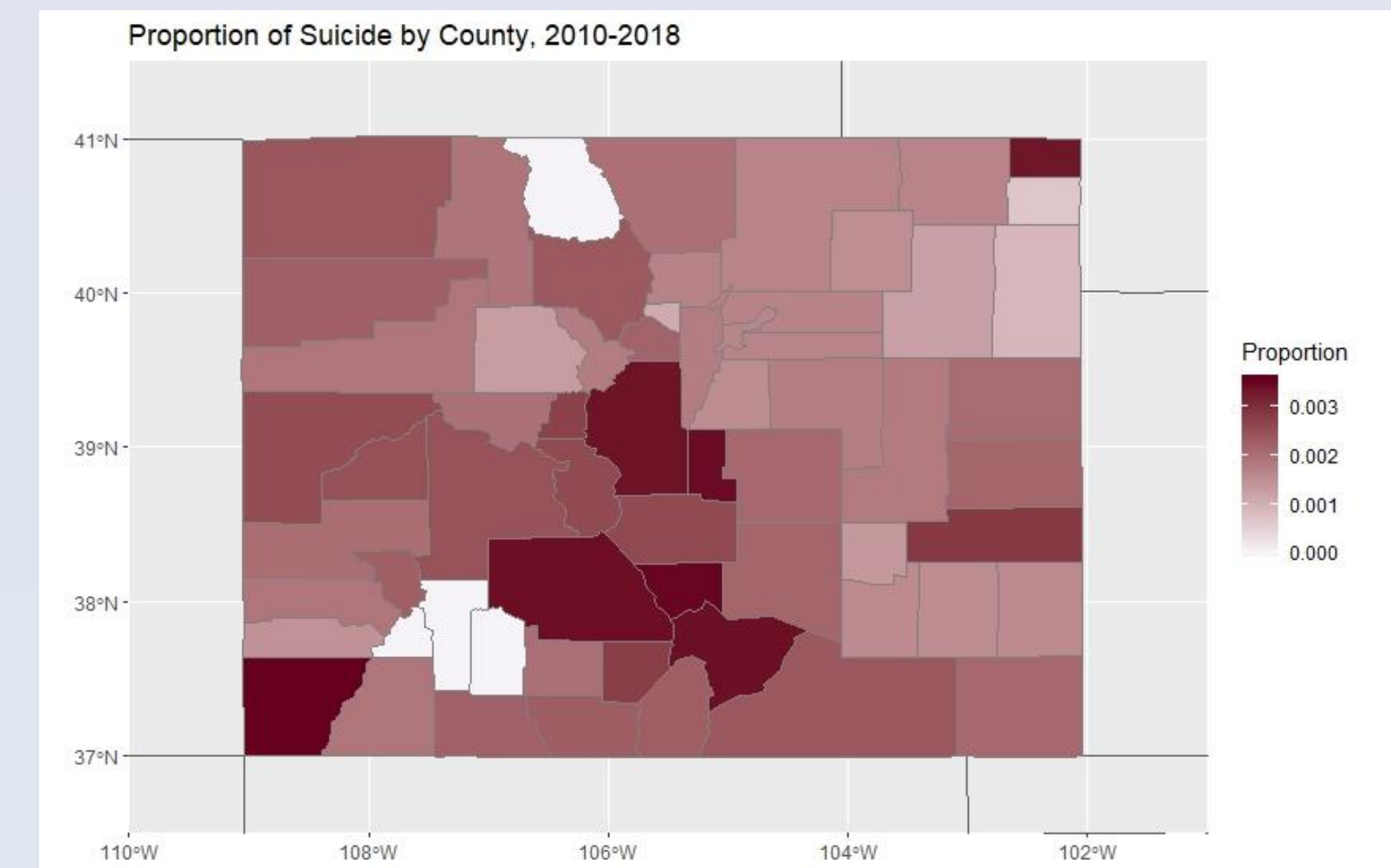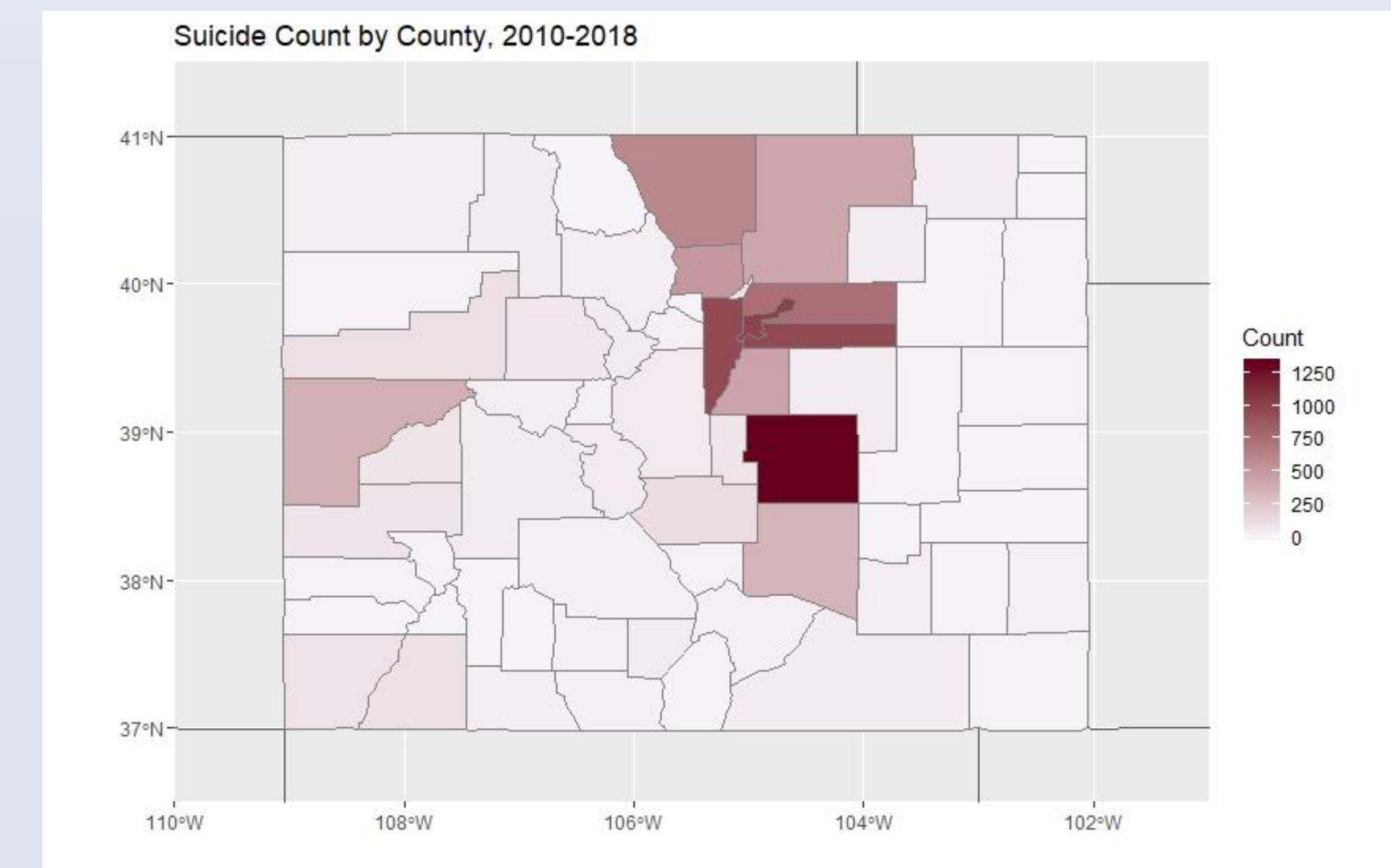
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INTRODUCTION

In 2017, suicide was the 10th leading cause of death for Americans.

Colorado is ranked 11th for highest suicide rates in all fifty states. [1]

Are there any unusually high rates of suicide in Colorado counties between 2010 and 2018?

Can we identify any demographics that lead to higher rates of suicide in Colorado counties?

Suicide Count by County, 2010-2018

Proportion of Suicide by County, 2010-2018

METHODS

We use publicly available data from the U.S. Census Bureau [2] and the Colorado Department of Public Health and Environment [3].

We use the combined suicide counts between 2010 and 2018 where counts below 3 are suppressed to 0. Demographic information is from 2010.

First, we use various tests for spatial clustering for areal data; the Besag-Newell test, Turnbull et.al's Cluster Evaluation Permutation Procedure (CEPP), and Kulldorf's Spatial Scan test.

Each test uses similar methods to determine clustering under the Constant Risk Hypothesis (CRH) and returns the most likely cluster of counties with unusually high suicide rates.
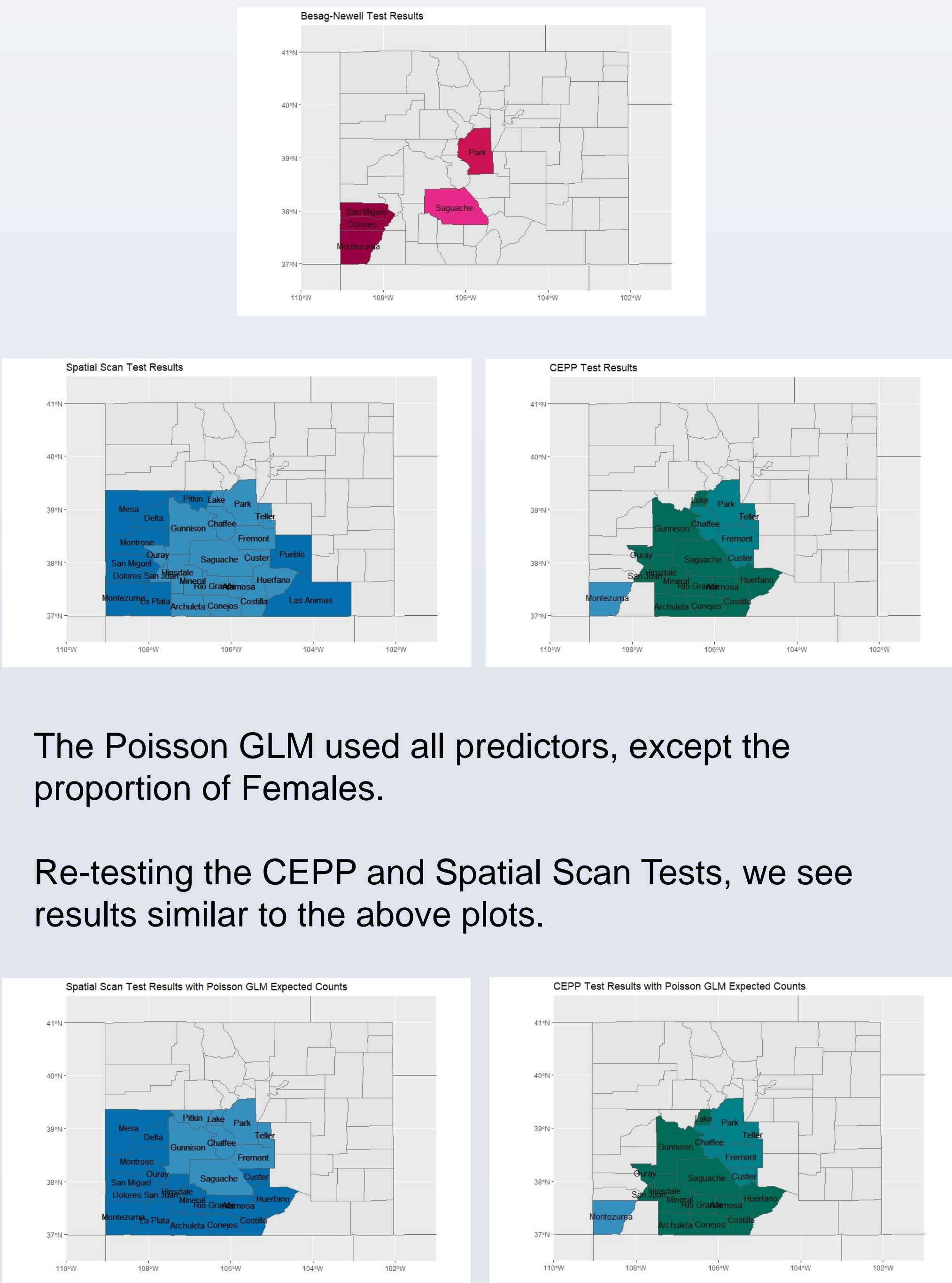
We then fit a Poisson generalized linear model (GLM) to predict suicide counts from:
- Income Per Capita
- Proportion Rural
- Proportion Female
- Proportion with HS degree
- Proportion of Poverty
- Proportion of Home Ownership

Lastly, we re-test the CEPP and Spatial Scan Tests using the predicted values from our Poisson GLM to determine whether the demographics used influence suicide counts.

RESULTS

Our initial results from the three tests under the CRH have varying results but show a similar area of the state.

Besag-Newell Test Results

Spatial Scan Test Results

CEPP Test Results

The Poisson GLM used all predictors, except the proportion of Females.

Re-testing the CEPP and Spatial Scan Tests, we see results similar to the above plots.

Spatial Scan Test Results with Poisson GLM Expected Counts

CEPP Test Results with Poisson GLM Expected Counts

CONCLUSIONS

While we cannot strongly identify demographics that lead to higher suicide rates in Colorado counties, we can see higher suicide rates in the Southwest counties between 2010 and 2018.

These findings also correspond to the initial plots of the proportion of suicide counts to population.

POLICY

There is a mental health professional shortage in Colorado (and the rest of the country) [4].

[5]

Many of the counties identified as having unusually high suicide rates are also lacking mental health care.

Universities need to improve recruiting efforts for psychiatry programs.

More mental health facilities and providers should consider telepsychiatry to provide care to those in rural areas.

REFERENCES

[1] American Foundation for Suicide Prevention. (2019, April 16). *Suicide Statistics*. Retrieved from https://afsp.org/about-suicide/suicide-statistics/
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[5] State of Colorado. (2019, June 22). *Health Professional Shortage Area maps and data*. Retrieved from Department of Public Health and Environment: https://www.colorado.gov/pacific/cdphe/shortage-area-maps-and-data

National Suicide Prevention Lifeline: **1-800-273-8255**   Crisis Text Line: text **TALK** to **741741**