Kansas Cancer Clusters: A Spatial Analysis of Kansas's County-Level Cancer Cases

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Introduction

- Cancer incidence rates can vary widely across geographic regions, and identifying high-incidence areas is essential for targeted public health interventions.
- Kansas has a diverse populations consisting of varying demographics and environmental factors that can influence cancer trends.
- Understanding the spatial clustering of cancer cases is critical for uncovering health trends, identifying potential risk factors, and guiding resource allocation for prevention and treatment.

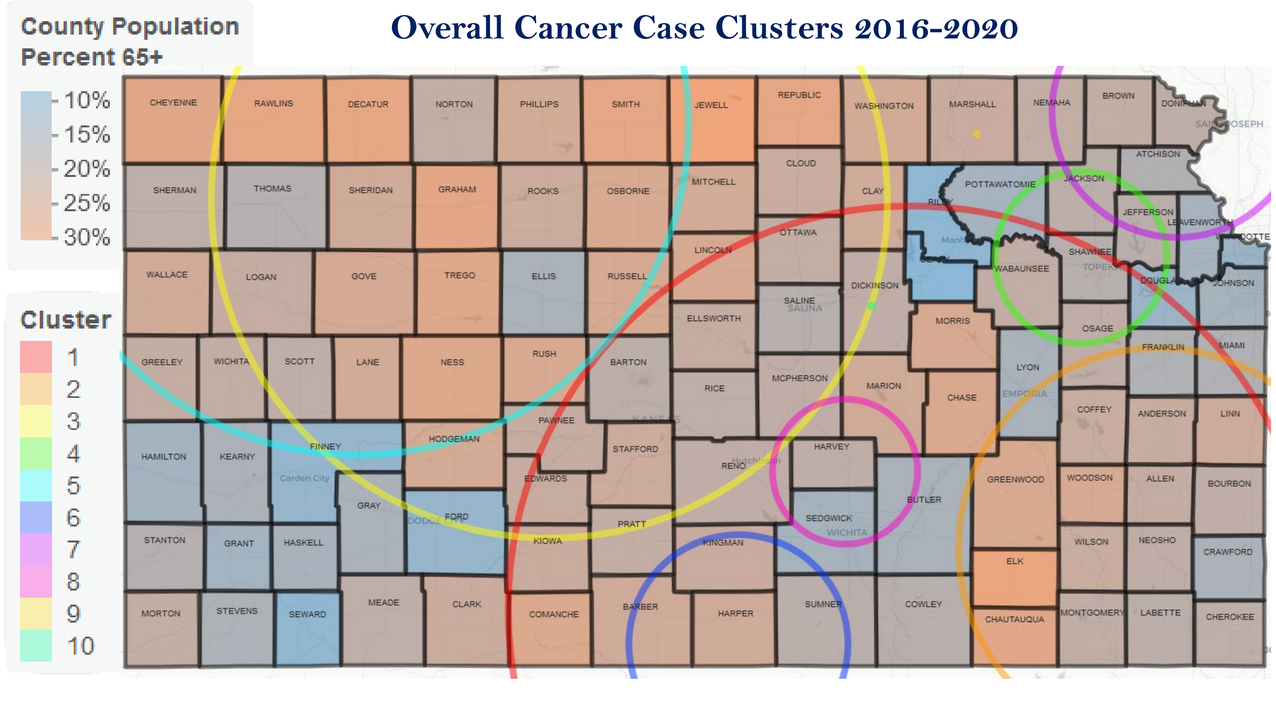
Methods

- Overall cancer incidence case counts were obtained by county for the state of Kansas through OPTIK and the Kansas Cancer Registry for the year range 2016-2020
- County Population and Percentage 65 and older were obtained from County Health Rankings for the year 2020
- Spatial Poisson discrete scan statistics were performed in SaTScan to identify areas with significantly elevated case counts and elevated areas were mapped in R using Leaflet

Cluster #	LLR	Observed	Expected	Obs/Exp	Relative Risk	Population	Hierarchical	Gini
1	183.27	41559	38888	1.069	1.147	1452766	Y	
2	142.63	7915	6567	1.205	1.229	245319		T
3	133.65	10725	9218	1.164	1.190	344360		T
4	72.22	6700	5799	1.155	1.170	216653		T
5	41.52	3512	3009	1.167	1.175	112421	Y	
6	23.43	1309	1078	1.214	1.218	40284		T
7	17.01	2296	2031	1.130	1.134	75883	Y	
8	16.79	1443	1236	1.168	1.171	46160		T
9	8.41	329	260	1.264	1.265	9722	Y	T
10	7.86	592	501	1.182	1.183	18717		T

SatScan Clustering Outputs

Overall Cancer Case Clusters 2016-2020



Results

- 10 elevated case count clusters were identified with a p-value less than 0.05
- 4 Clusters were created by Secondary Hierarchical clustering
- 7 Clusters were created by Secondary Gini clustering

Conclusions

- The clusters relative risk (RR) values range from 1.134 to 1.265, which indicates a slightly increased risk of cancer incidence in the identified areas.
- This increased risk is not definitive as these risk values are close to 1.
- The clusters show no clear visual pattern with relation to the percentage of county population over the age of 65.

Future Directions

- We know that incidence cancer is highly related to age therefore we have submitted a data request for cancer data by age groups and county to adjust for it in clustering.
- If obtainable additional covariates like race and ethnicity can be included into the SatScan clustering.

References

1. https://www.satscan.org/
2. https://www.countyhealthrankings.org/
3. https://www.kumc.edu/kcr/