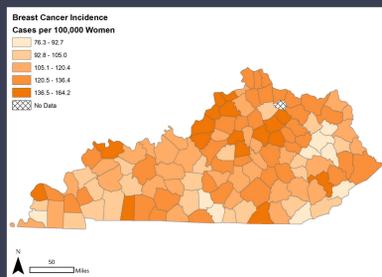
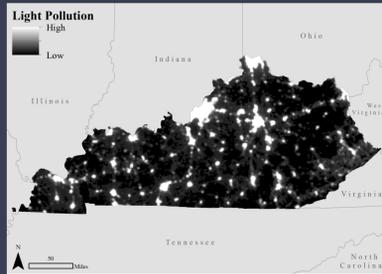


LIGHTS OUT

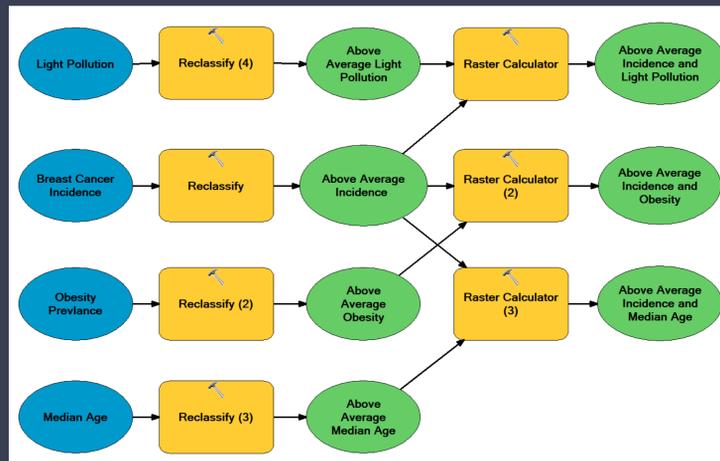
An assessment of the relationship between breast cancer and light pollution in the State of Kentucky

Introduction

The goal of this study was to determine whether or not the relationship between light pollution and breast cancer could be detected using spatial analysis. This was accomplished by identifying the distribution of light pollution and breast cancer incidence at the county level in the state of Kentucky. Additionally, this study analyzed the distribution of female obesity and median female age among Kentucky counties — two alternative risk factors associated with breast cancer. Kentucky was chosen as the study area due to its high number of counties and high ratio of counties per unit area. Data on breast cancer incidence in Kentucky for 2011-2015 was gathered from the CDC.



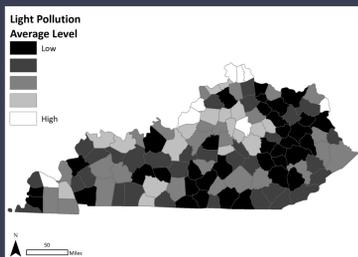
Methodology



The study began by assessing the spatial distribution of breast cancer incidence, light pollution, female age, and female obesity at the county level in Kentucky. This was accomplished by identifying counties in which these variables were higher than the average value for all Kentucky counties. For each variable, the mean value for all counties was calculated using the attribute table statistics tool. Then, using the reclassify tool, counties were classified as either being above or below average for a specific risk factor. Next, counties with an above average breast cancer incidence were compared to counties with above average values for light pollution, age, and obesity. Using the raster calculator tool, counties with above average values for breast cancer and above average values for a particular risk factor were identified. Finally, the strengths of the risk factors were compared.

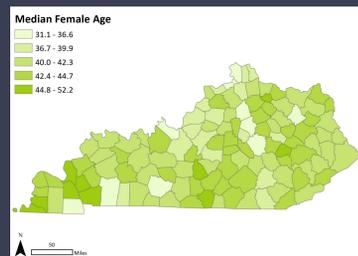
Risk Factors

Light Pollution



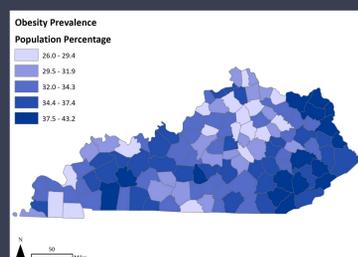
Previous studies have suggested that exposure to artificial lighting at night (ALAN) may increase the risk of developing hormone mediated cancers, such as breast cancer. Exposure to ALAN disrupts the production of melatonin, a sleep-promoting hormone that is produced in nighttime darkness and has been shown to slow breast cancer tumor growth. For this study, data on light pollution in Kentucky for the year 2013 was gathered from the NOAA.

Age



According to the CDC, the risk for developing breast cancer increases with age. Specifically, the CDC warns that most breast cancers are diagnosed after age 50. Data on the median female age in Kentucky counties for the year 2013 was gathered from the United States Census.

Obesity

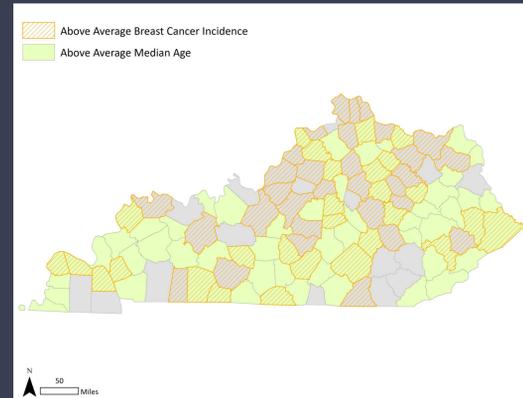
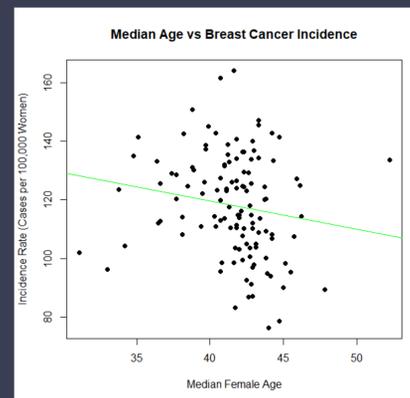


The CDC specifies that women who are overweight or obese have a higher risk of developing breast cancer. Data on the prevalence of female obesity in Kentucky for the year 2013 was gathered from the CDC.

Results and Conclusion

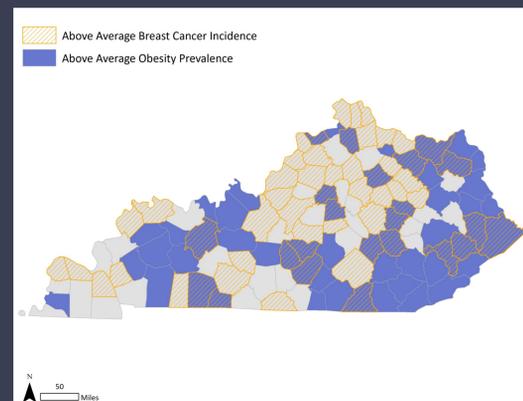
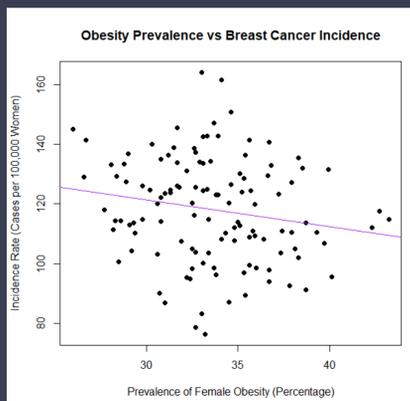
Age

It was found that 73 out of 120 counties had a median female age that was above the average of all Kentucky counties. Of these 73 counties, 28 also had an above average incidence of breast cancer.



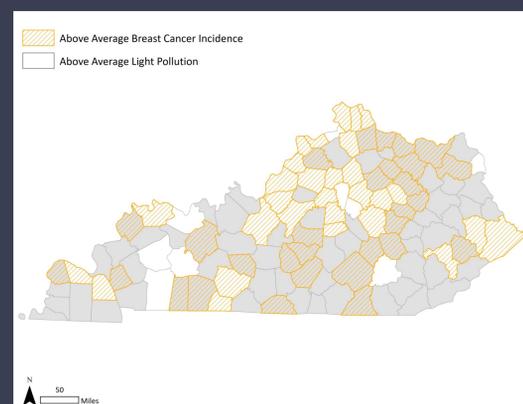
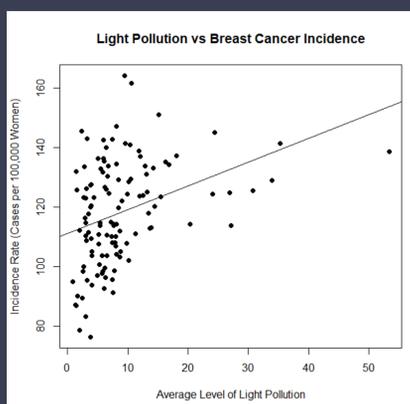
Obesity

It was found that 59 out of 120 counties had a female obesity prevalence that was above the average of all Kentucky counties. Of these 59 counties, 23 also had an above average incidence of breast cancer.



Light Pollution

It was found that 38 out of 120 counties had a light pollution level that was above the average of all Kentucky counties. Of these 38 counties, 29 also had an above average incidence of breast cancer. Based on the results, light pollution appears to be more strongly associated with breast cancer incidence at the county level than obesity or age.



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CEE 187-Geographical Information Systems

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Data is sourced from the CDC, NOAA, ESRI, and the US Census

Projected Coordinate system: NAD 1983 StatePlane

Kentucky FIPS 1600

Title image sourced from unsplash.com