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GEOB 479

Assignment #2: Health Geography

Xu, Y., & Wang, L. (2015). GIS-based analysis of obesity and the built environment in the US. Cartography and Geographic Information Science, 42(1), 9-21. 10.1080/15230406.2014.965748

This article utilizes Ordinary Least Squares (OLS) regression and Geographically Weighted Regression (GWR) in ArcMap to answer whether selected built environment variables closely and consistently correlate to the obesity problem throughout the U.S and if not, can geographic analysis based on a local regression model help policy making. The logic underlying this argument is that the built environment is integral to the relationship between environmental and community health. Based on this philosophy Xu and Wang maintain that the local obesity rate found in counties across the U.S can be explained by a series of independent variables identified by previous research to contribute significantly to obesity in the U.S. Further, the authors claim that given high statistical significance local patterns in correlation coefficients can be used to influence policy related to obesity.

The independent variables chosen to explain the obesity rate in the United states are as follows: ethnic heterogeneity, poverty rate, ratio of fast food to full service restaurants, street connectivity, walk score, and urbanicity. Using these variables an OLS is utilized to determine the most significant variables and check for multi-collinearity of the variables. A Moran's I analysis is then carried out to check for spatial auto correlation. The most important variables identified by the OLS were ethnic heterogeneity, poverty rate, street connectivity, and walk score. From the OLS it was found that minorities were more likely to be obese, high rates of poverty were associated with high rates of obesity, and high rates of street connectivity and walk score were associated with lower rates of obesity. However, the r^2 value for this analysis was only 0.30 showing a very large amount of variance unexplained by the independent variables used, so a GWR was utilized.

A GWR is a localized regression model that allows the parameters of regression model to vary over space. The researchers used the Akaike Information Criterion of regression models to identify spatially adaptive bandwidth values for the GWR analysis. Going through the analysis the team found that poverty was the decisive factor in determining obesity rates due to the consistency of the results across the entire study area. The analysis turned back an r^2 value of 0.72 explaining significantly more of the variance than the previous model. Using the results from the GWR they were able to classify the U.S into 7 regions using a grouping analysis based on the GWR variables. This uncovered a class (7) which showed that obesity could not be explained by any of the variables used in their analysis indicating the need for further development of the regression model.

The evidence for their main argument is not consistent enough to draw many firm conclusions from their results. The distribution of r^2 values for the GWR across the study area is inconsistent with values ranging from 0 to 0.85. The higher values align well with poverty rates

indicating that the finding that poverty is correlated with obesity rates is significant. The claim that the GWR and OLS show walk score is significant variable in explaining the variability of obesity in the U.S does not appear to be strongly supported by the results displayed in their maps comparing the obesity distribution, walk scores, and r^2 values. This strength of this paper is in the showcasing of GIS methods that could be used for public health research, however a stronger analysis and determination of significant variables is needed for the authors to contribute to public health knowledge in the U.S. Therefore, the major contribution the paper makes to promote GIS in public health research is the methods and not the results. Based on this I rate this paper 6/10.