5280: Relative Health of Denver Neighborhoods

Background

What is the Relative Health of Neighborhoods in the City of Denver?

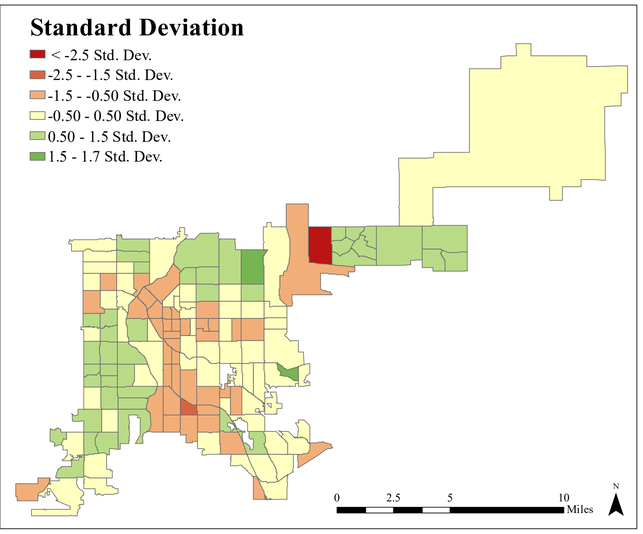
Colorado Department of Public Health & Environment (CDPHE) website allows guests to explore data sets through an interactive online map. Data sets may be viewed individual by condition for percent of adults. Additionally, one may view data from county to census tract levels throughout the state. This project combined CDPHE data for diabetes, heavy drinking, heart disease, and obesity to assess relative health of neighborhoods and look for potential patterns and relationships.

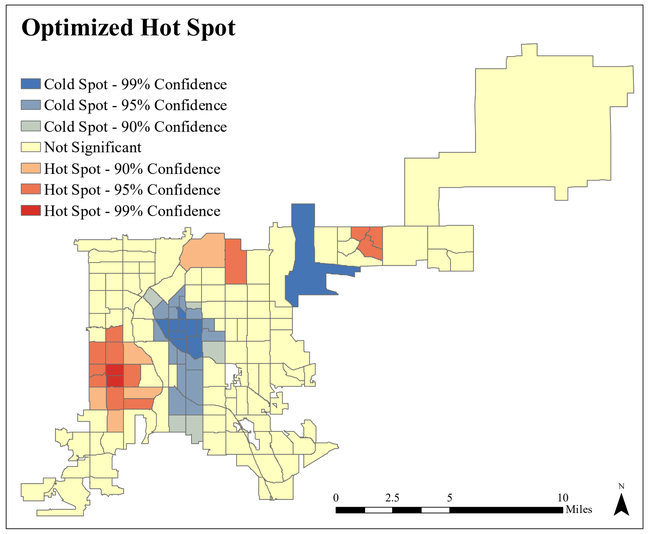
Methods

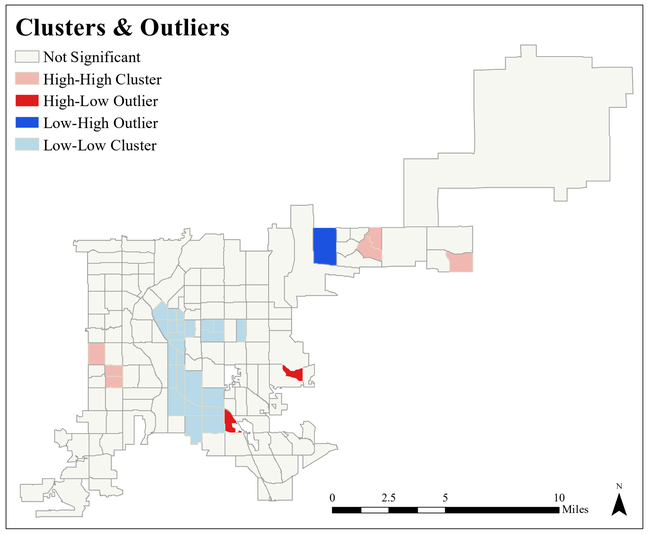
Broadly stated, selected CDPHE data were downloaded as shapefiles and prepared for use in ArcMap ModelBuilder. Preparations included reducing data set contents to select fields and projecting data into the identical, State Plane, coordinate system. Additionally, file geodatabases were created to store ModelBuilder inputs and outputs. The decision to apply ModelBuilder to this effort was to demonstrate the ability to weight chronic health conditions relative to one another. The public health and epidemiology communities use the Charlson Comorbidity Index to assess individual health and health risks for various chronic conditions. The thought was that any attempt to model neighborhood health should allow application of a similar index to weight conditions relative to each other. The model was built and tested through an iterative process. Model outputs were compared to original data to ensure that the values entered as parameters produced correct and consistent results. Finally, ArcMap Spatial Statistics tools were applied to the model output feature class. Specifically, the tools were applied to the field that represented the sum-total of health conditions for census tracts throughout the city of Denver,

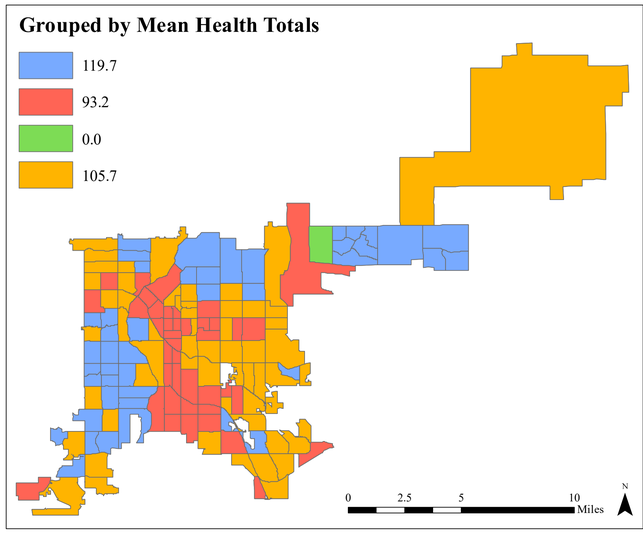
Analysis

This study combined the values for diabetes, heart disease, drinking, and obesity for each census tract in Denver. Analyses were based on this sum, or total value. Analysis of the data began with symbolizing health by standard deviation. The question, What is the Relative Health of Neighborhoods?, seeks to compare one location to another rather than definitively rate a neighborhood. The map of Standard Deviation demonstrated areas of relatively high, low, and mean health totals. Next, the same field, Health Total, was analyzed using Optimized Hot Spot, Cluster & Outliner Analysis, and Grouping tools. Additionally, Analyzing Patterns tools were run on the same field to produce reports regarding the likelihood of the data being random.









Conclusions

Relative health of neighborhoods in Denver is clustered. Both the Spatial Autocorrelation and Cluster & Outlier Analyses reports state: "there is a less than 1% likelihood that this clustered pattern could the result of random chance." While this sounds like a definitive statement, further study must be made as to whether the model and the assumptions underlying this study reflect best practices in public health and epidemiology. If one can total values for various chronic diseases and use the sum to assess relative neighborhood health than the question that arises is: What, if anything, underlies the clustering of neighborhood health? Future efforts would include a more thorough understanding of statistical analysis as applied to public health and an examination of patterns of age, education, and affluence for the same locations.

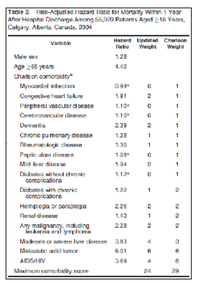


Table 2. Risk-Adjusted Hazard Ratio for Mortality Within 1 Year After Hospital Discharge Among 56,309 Patients Aged ≥ 66 Years, Calgary, Alberta, Canada, 2004

Variable	Hazard Ratio	Epidetiat Weight	Charlson Weight
Male sex	1.28		
Age ≥ 66 years	4.02		
Charlson comorbidity*			
Myocardial infarction	0.99*	0	1
Congestive heart failure	1.91	2	1
Peripheral vascular disease	1.12*	0	1
Cerebrovascular disease	1.13*	0	1
Dementia	2.39	2	1
Chronic pulmonary disease	1.28	1	1
Rheumatologic disease	1.30	1	1
Peptic ulcer disease	1.08*	0	1
Mild liver disease	1.94	2	1
Diabetes without chronic complications	1.12*	0	1
Diabetes with chronic complications	1.22	1	0
Hemiplegia or paraplegia	2.26	2	2
Renal disease	1.43	1	2
Any malignancy, including lymphoma and leukemia	2.28	2	2
Moderate or severe liver disease	3.83	4	3
Metastatic solid tumor	6.01	6	6
AIDS/HIV	3.69	4	6
Maximum comorbidity score		24	29

Sources: Colorado Department of Public Health & Environment
Esri, Dr. Huan Quan, et. al. American Journal of Epidemiology Vol. 173, No. 6, February 17, 2011.

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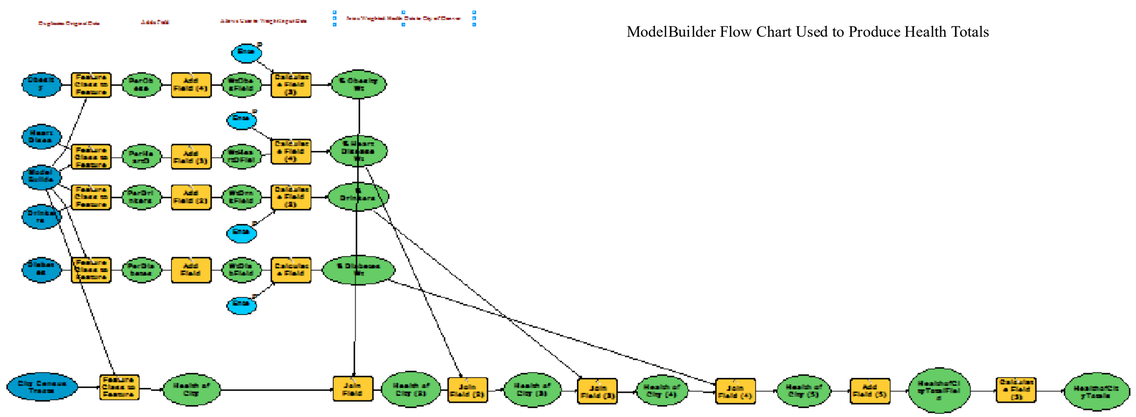

ModelBuilder Flow Chart Used to Produce Health Totals