

# Exploring Social Determinants of Health and Health Outcomes in Neighborhoods using R Shiny

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# Social Determinants of Health (SDOH)

- Economic Stability
- Education Access and Quality
- Healthcare Access and Quality
- Neighborhood and Built Environment
- Social and Community Context



Source: Health.gov <https://health.gov/healthypeople/priority-areas/social-determinants-health>



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# Neighborhood Health Profiles (NHP)

- Contain health indicators and outcome data for Baltimore City's 55 Community Statistical Areas (CSAs).
- 102 continuous variables on SDOH and health outcomes.
- How can the data be made more accessible for epidemiologists, other researchers or the public?



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# The App

## Baltimore City: Neighborhood Health Profiles (2017) Correlation Explorer

**Choose First Variable (Explanatory)**

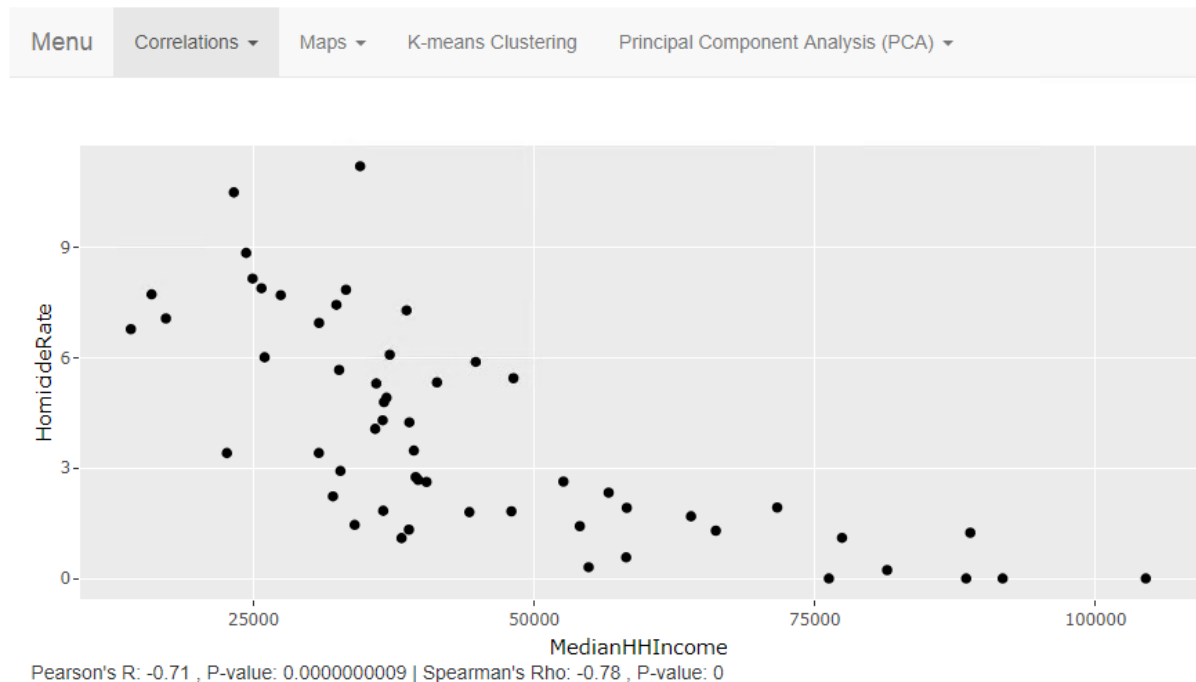
MedianHHIncome

**Choose Second Variable (Outcome)**

HomicideRate

Explore potential patterns between social determinants of health and health outcomes. This tool uses data from Baltimore City's Neighborhood Profiles (NHP 2017) and 55 Community Statistical Areas (CSAs), which are groupings of census tracts. The NHP have continuous data on a wide range of indicators.

[Neighborhood Health Profiles](#)



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# Mapping with Overlay

## Baltimore City: Neighborhood Health Profiles (2017) Correlation Explorer

**Choose First Variable (Explanatory)**

MedianHHIncome ▾

**Choose Second Variable (Outcome)**

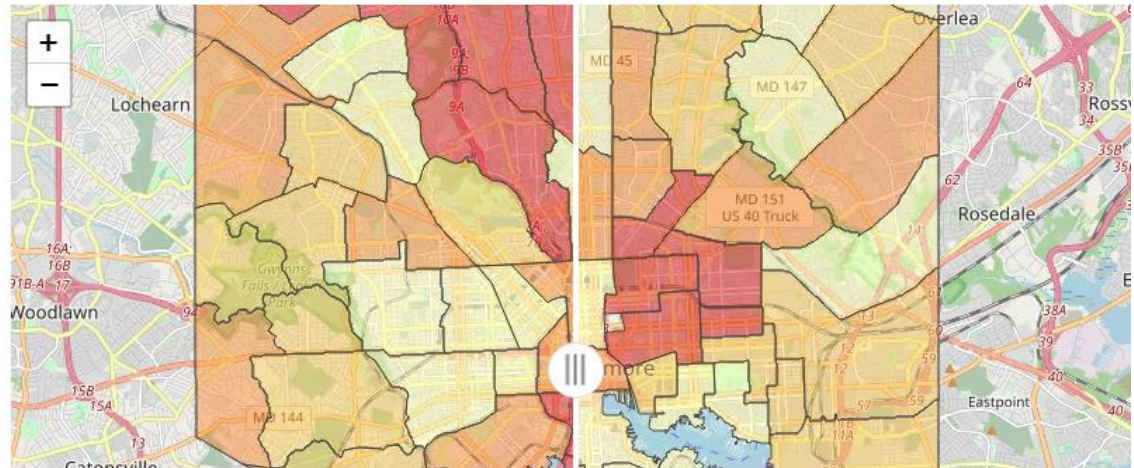
HomicideRate ▾

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[Neighborhood Health Profiles](#)

Menu Correlations ▾ Maps ▾ K-means Clustering Principal Component Analysis (PCA) ▾

### Explanatory (left) vs Outcome (Right): Ranked Symbology



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# Machine Learning: K-means Clustering

## Choose First Variable (Explanatory)

MedianHHIncome

## Choose Second Variable (Outcome)

HomicideRate

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[Neighborhood Health Profiles](#)

Menu

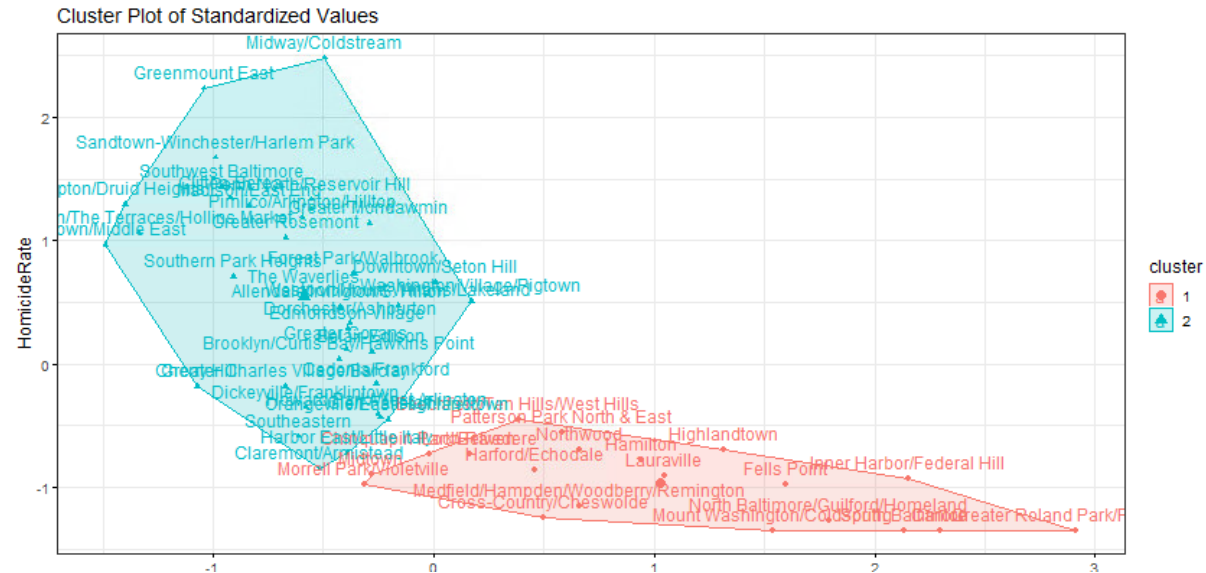
Correlations ▾

Maps ▾

K-means Clustering

Principal Component Analysis (PCA) ▾

K-means clustering: Usually used for explanatory variables only, but can provide interesting visualizations of outcome and explanatory variables. So, you will likely want to change the outcome variable to an explanatory variable. Uses Silhouette method to automatically choose the number of clusters. An unsupervised technique.



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# Machine Learning: Principal Component Analysis (PCA)

## Baltimore City: Neighborhood Health Profiles (2017) Correlation Explorer

### Choose First Variable (Explanatory)

MedianHHIncome

### Choose Second Variable (Outcome)

HomicideRate

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Menu

Correlations ▾

Maps ▾

K-means Clustering

Principal Component Analysis (PCA) ▾

Principal Component Analysis (PCA) can help to sort through explanatory variables. This is for exploratory data analysis and does not separate data into a training dataset--for making predictions.

### Choose multiple variables for PCA

PercentHispanic MedianHHIncome AlcoholDensity

PercentAbsentHigh LeadPaintViolationRate

### Choose an Outcome to Group PCA Graphical results

HomicideRate

How many groups/ranks for your Outcome  
(Only used in last graph).

3

[Click for More Information on PCA](#)



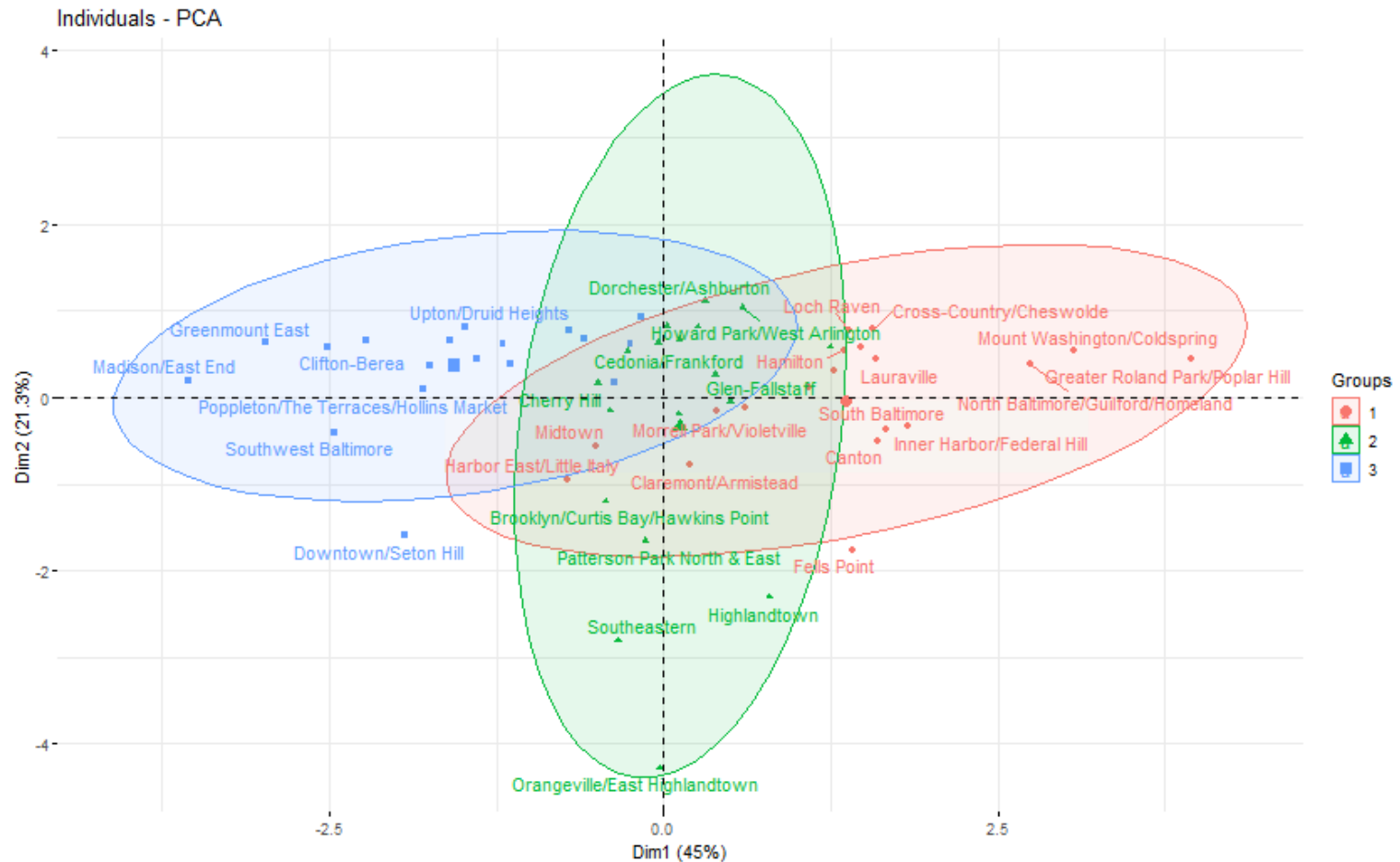
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# Machine Learning: PCA

Ideally, you want to see separate clusters or low amounts of overlap between clusters on this graph.



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# Code

- Located on GitHub:  
<https://github.com/bchd/nhpexplorer>

## Questions? Comments?

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