Objective: Create an obesogenic index to measure obesity risk quantitatively in Fairfax County and establish a baseline for measuring change.

Obesogenic Environment
"The sum of influences that the social determinants of health ‘have on promoting obesity in individuals or populations.’" 
(Swinburn et al. 1999)

Dimension 1: Food Environment
Cronbach’s Alpha: 0.92

Dimension 2: Social and Economic Status
Cronbach’s Alpha: 0.89

Dimension 3: Physical Environment
Cronbach’s Alpha: 0.82

20 Minute Travel Area by Bus

Obesogenic Environments

Supervisor Districts
Obesogenic Environment Index by Supervisor District

High School Districts
Obesogenic Environment Index by High School Attendance Area

Census Tracts
Obesogenic Environment Index by Census Tract

Limitations
1. Quality of OSM data
2. Quality of TravelTime application programming interface (API)
3. Index weights and validation

Conclusions
1. Interdisciplinary method for index construction provides new measurement for health inequities
2. Low-income racial and ethnic minority groups have high risk, especially Hispanics
3. Policy intervention and resource allocation requires analysis at multiple geographic units

Next Steps
1. Overlaying findings with Inova health data to better understand patient population
2. Conduct sensitivity analysis (robustness of index)
3. Compare current policy initiatives with maps to enhance existing measures and to create evidence-based policy

Resources
Composite Index Construction

Introduction

Fairfax County and the Inova Health System seek to better understand the context in which their citizens and patients live, learn, work, and play. Both stakeholders would benefit from a Fairfax CommunityScape, a quantitative characterization of the county’s social determinants of health and wealth.

Objective: Create an economic vulnerability index to identify populations at risk, promote informed policy in Fairfax County, and establish a baseline for measuring change.

Data sources

Demographics
- Financial conditions
- Employment status
- Transportation

Domicile locations
- Housing conditions

Measures

Location of ACS Domiciles by Fairfax Census Tract

According to the literature, e.g., educational attainment, English proficiency, and access to medical care, are proxies for economic vulnerability. This information informed our variable selection.

We combined American Community Survey (ACS) data with Fairfax housing stock data using a population synthesis technique to obtain ACS data at three geographic levels (census tract, supervisor district, high school attendance zone).

We created variables (e.g., proportions, medians as appropriate) at each geography of interest.

Composite Index Construction

Our final model uses a varimax rotation with the principal factor solution method.

Using the loadings from the model, we computed the economic vulnerability index using the following formula:

\[ F = Xs \cdot F^T \cdot w. \]

Where:
- \( F \) is the standardized design matrix
- \( Xs \) is the matrix of factor scores
- \( w \) is the proportion of variance explained

Index score

Matrix of factor scores

ECONOMIC VULNERABILITY

Chronbach’s alpha = 0.91

INDICATORS AND LOADINGS

Proportion of geography with...

- NO INSURANCE: 0.92
- HISPANIC: 0.92
- NO HIGH SCHOOL: 0.91
- LIMITED ENGLISH: 0.82
- IN POVERTY: 0.80
- SINGLE PARENT: 0.74
- NO VEHICLE: 0.63
- BLACK: 0.49
- RENT BURDENED: 0.33

Results

Economic Vulnerability Index by Census Tract

Regions with high levels of economic vulnerability:
- Census tracts: Dulles and Arlington adjacent
- High school districts: Annandale, Justice, Mt. Vernon
- Supervisor districts: Mason, Lee

Future Directions

• Further collaboration with Inova and Fairfax County: Place citizens and patients in context.
• Index refinement: Develop stakeholder weights and compare results.
• Index validation: How can we ensure our CommunityScape reflects reality? Does the index predict citizen and patient outcomes?

Footnotes