Walkability in King County, WA

Group members: Ava, Spencer, Isabel, Abbey

Background

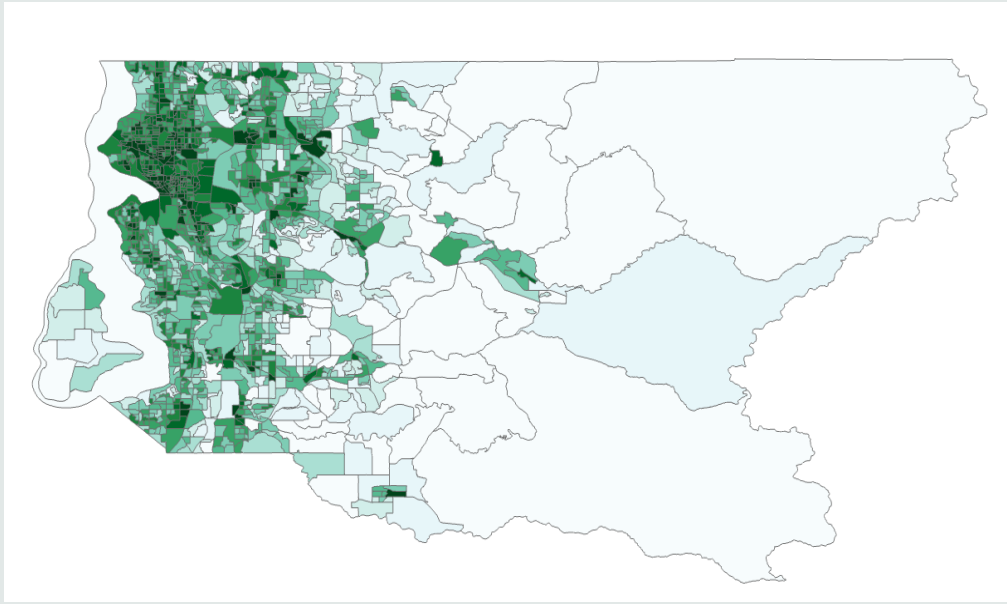
- Location: Seattle, WA
  - 4th most walkable city in the US
  - Walkability score of 99
- What is walkability?
  - Measuring proximity to basic necessities such as food and transit stop locations
  - "Where no car is required to get to a destination"

Research Questions

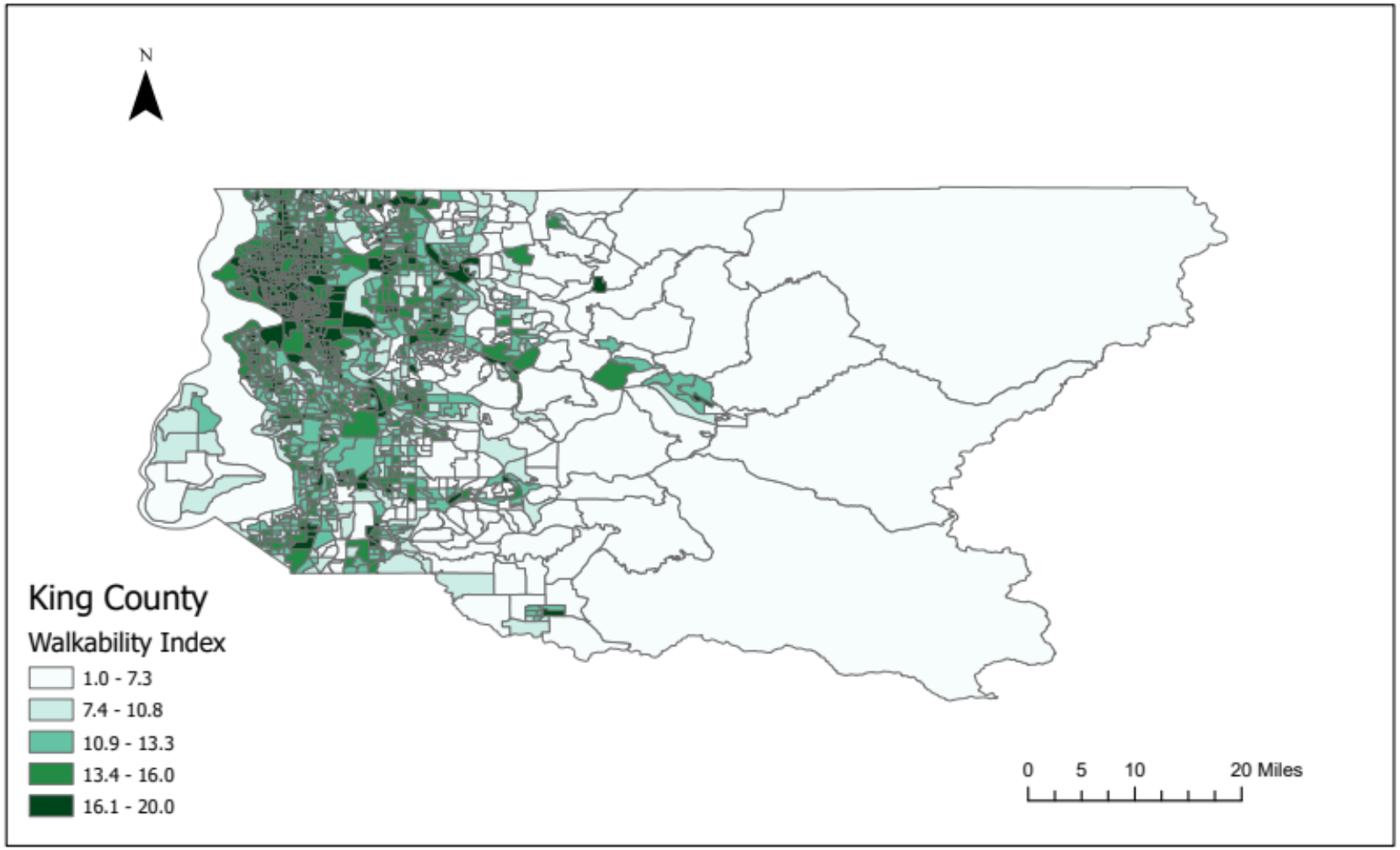
- How does the proximity of food centers affect neighborhood walkability in Seattle?
- What's the influence of demographic factors on pedestrian accessibility patterns in Seattle?

Data

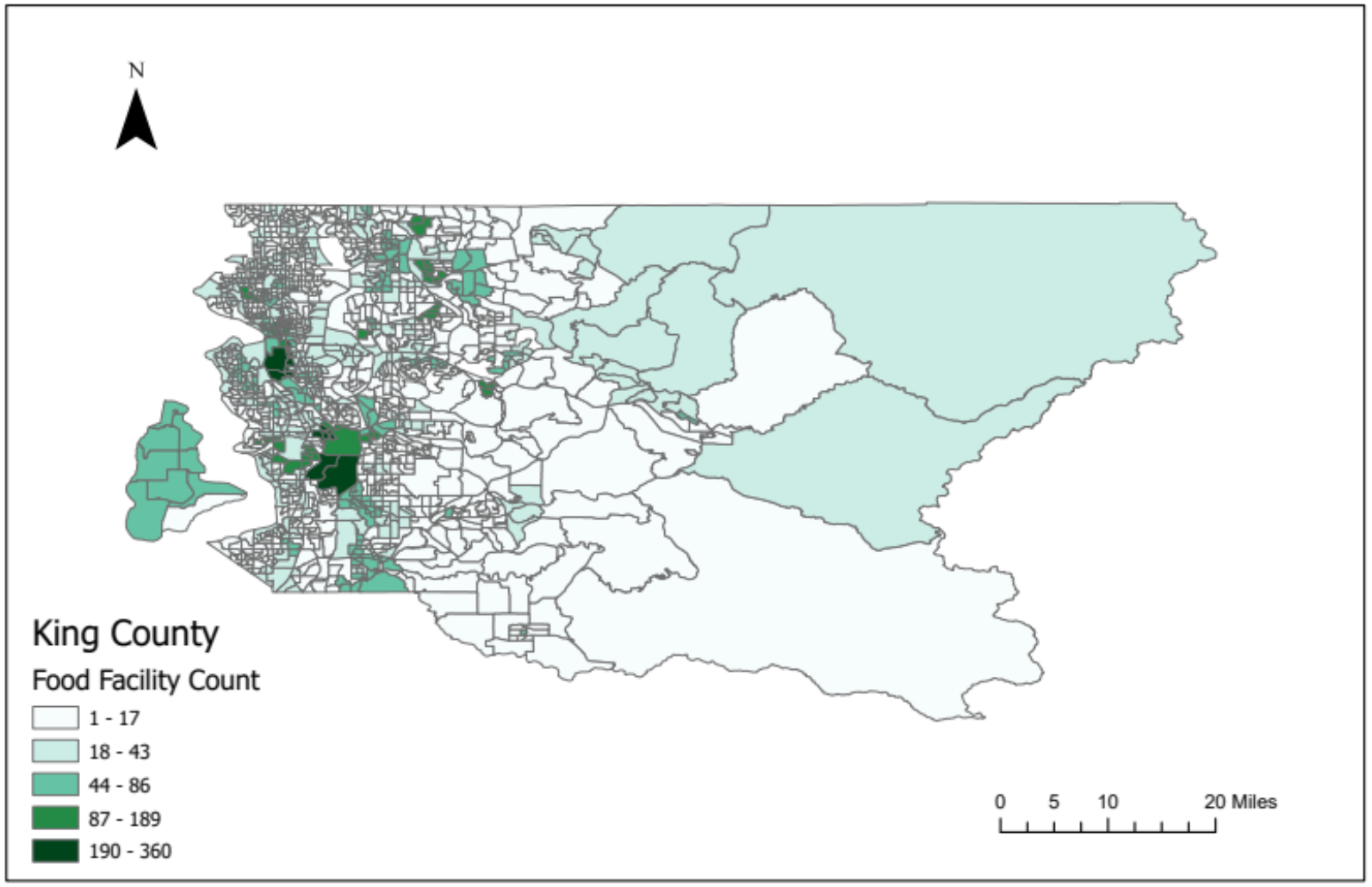
- From King County GIS Open Data, EPA GeoPlatform & Seattle GeoData
  - Demographics Shapefile
  - Food Facilities Shapefile
- National Walkability Index



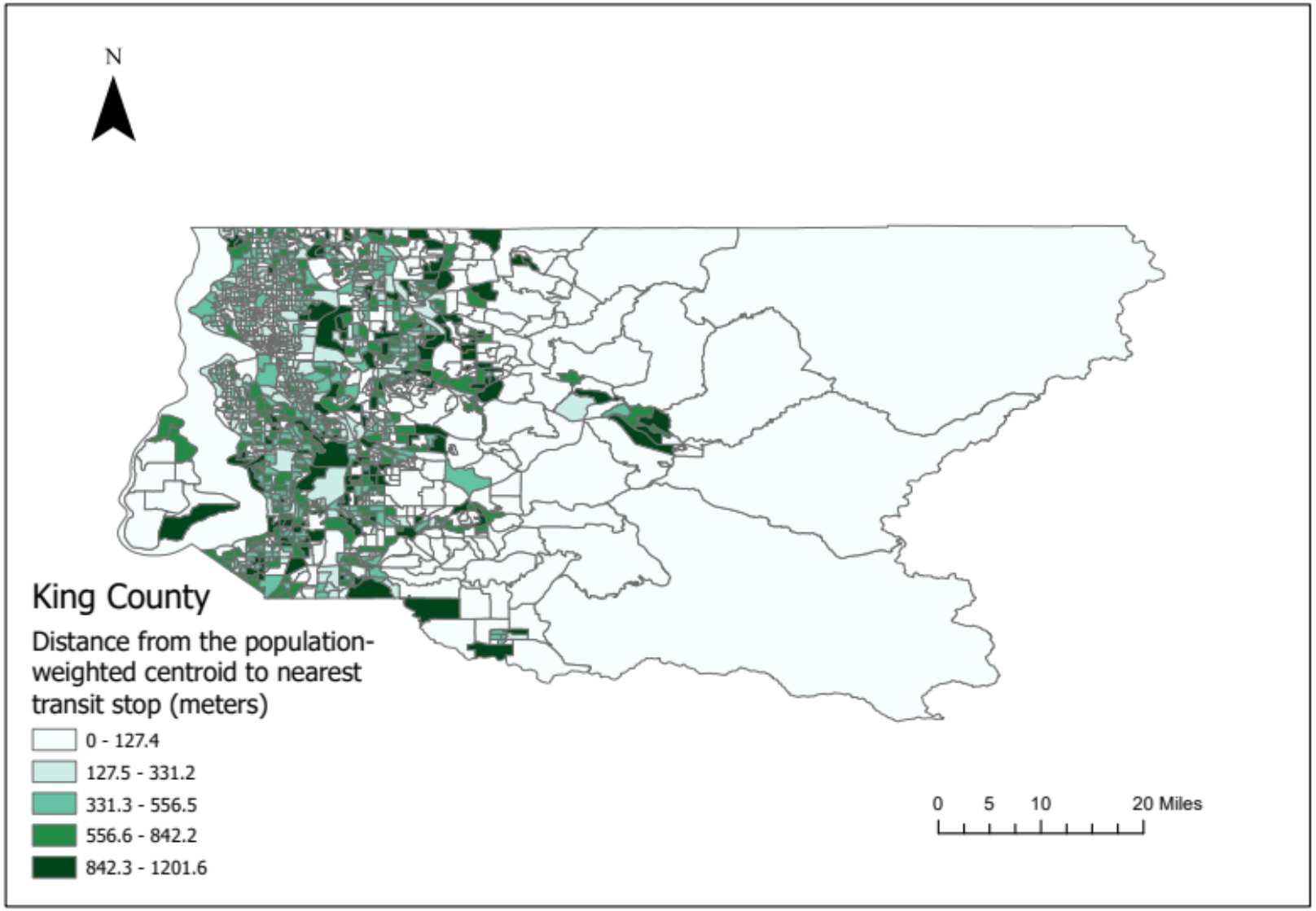
Walkability Index by Block Group
King County, WA



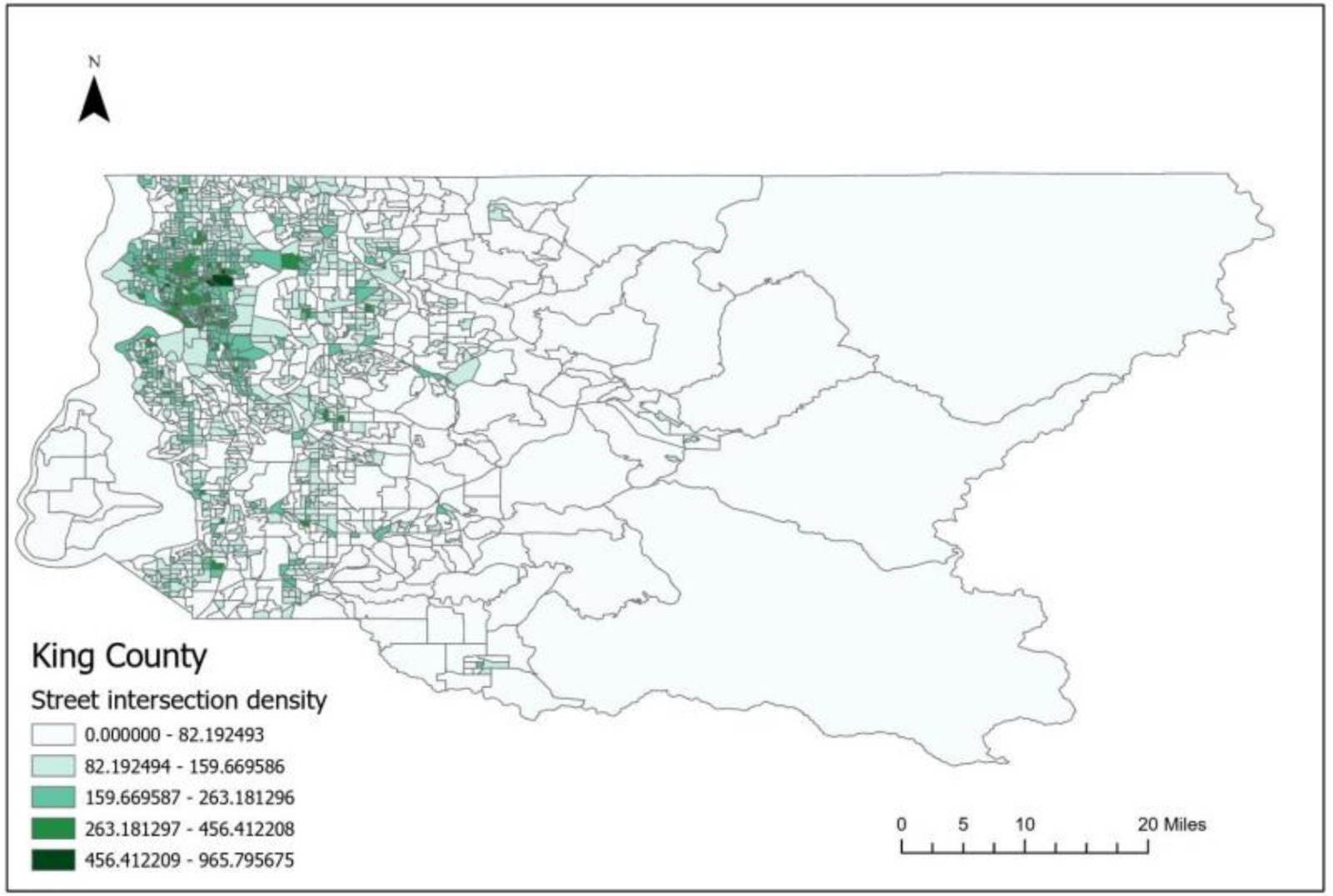
Food Facility Count by Block Group
King County, WA



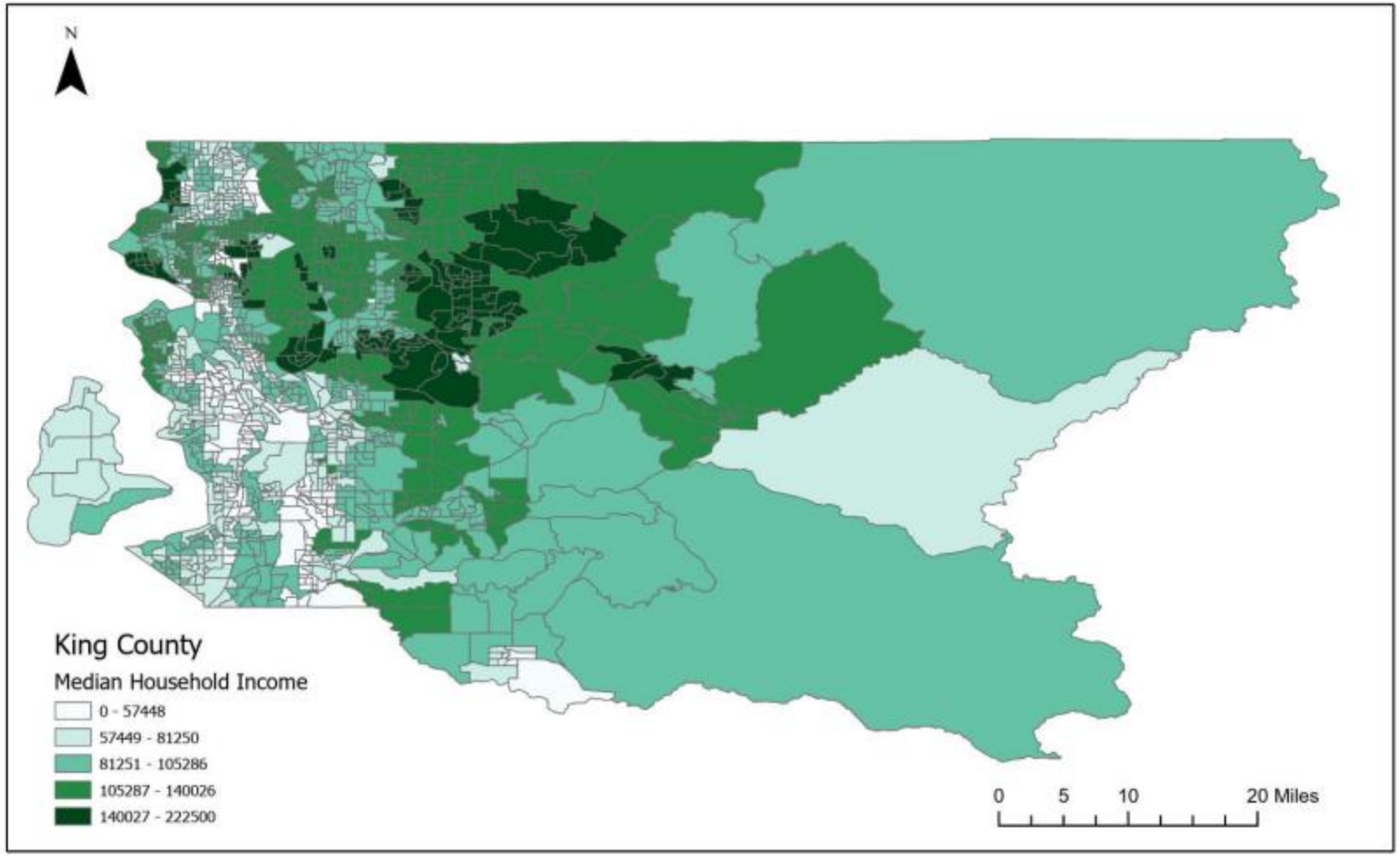
Distance to the Nearest Transit Stop
King County, WA



Street Intersection Density
King County, WA



Median Household Income
King County, WA



Methods

- Cleaned Walkability data to only include King County
- Create a unique ID for the OLS model to identify
- Combined food facility and demographic data using joins.
- Using census blocks of Seattle to define site locations.
- Use OLS and exploratory regression to identify meaningful variables.
- Run GRW models to understand how different variables influence the walkability of the county.

OLS Model

Summary of OLS Results

Variable	Coefficient[a]	StdError	t-Statistic	Probability[b]	Robust_SE	Robust_t	Robust_Pr[b]	VIF[c]
Intercept	9.312908	0.397223	23.445054	0.000000*	0.431637	21.575803	0.000000*	--------
KCWI2.AC_TOTAL	-0.000035	0.000007	-5.001803	0.000001*	0.000008	-4.280479	0.000024*	1.120402
KCWI2.TOTPOP	-0.001267	0.000247	-5.124129	0.000001*	0.000314	-4.031723	0.000066*	4.633848
KCWI2.COUNTHU	0.000295	0.001529	0.193234	0.846799	0.002693	0.109717	0.912634	47.954753
KCWI2.HH	0.003226	0.001751	1.842266	0.065652	0.002984	1.081203	0.279788	53.678377
KCWI2.WORKERS	0.000272	0.000496	0.549257	0.582927	0.000513	0.530367	0.595953	3.888717
KCWI2.D3B	0.024131	0.000860	28.045393	0.000000*	0.002307	10.459495	0.000000*	1.393191
KCWI2.D4A	0.002149	0.000239	9.003773	0.000000*	0.000246	8.745242	0.000000*	1.083649
KCWI2_ADDSPATIALJOIN.MHHI1	-0.000005	0.000003	-2.050799	0.040464*	0.000002	-2.131754	0.033189*	1.453394
KCWI2_ADDSPATIALJOIN.POC	0.000201	0.000082	2.462966	0.013888*	0.000082	2.444967	0.014598*	2.329886
KCWI2_ADDSPATIALJOIN.MALE	-0.001203	0.000337	-3.574677	0.000377*	0.000370	-3.250163	0.001197*	20.831489
KCWI2_ADDSPATIALJOIN.FEMALE	-0.000534	0.000256	-2.086049	0.037145*	0.000293	-1.822710	0.068566	12.318962
KCWI2_ADDSPATIALJOIN.BETWEEN18A	0.000859	0.000247	3.475566	0.000541*	0.000307	2.795815	0.005251*	23.562643
KCWI2_ADDSPATIALJOIN.OVER65	0.001310	0.000330	3.973760	0.000083*	0.000340	3.855534	0.000131*	2.666015
FOOD_DEMOGRAPHICS_STATISTICS2.FREQUENCY	0.004231	0.001723	2.455594	0.014175*	0.001569	2.696407	0.007092*	1.217653

Adjusted R-Squared = 0.55, AIC = 6600

Exploratory Regression

Highest Adjusted R-Squared Results

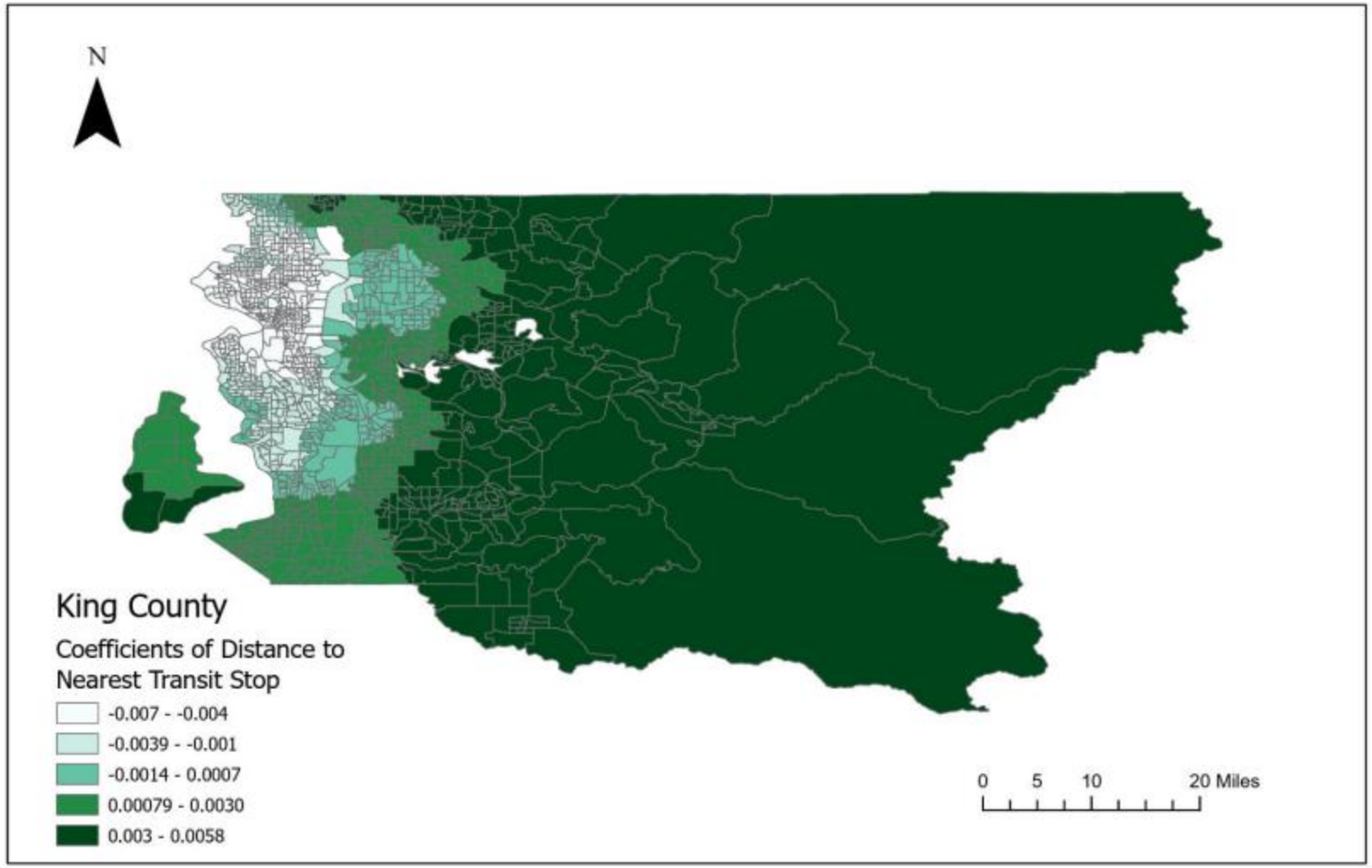
AdjR2	AICc	JB	K(BP)	VIF	SA	Model
0.51	6693.79	0.00	0.00	1.07	0.00	-KCWI2.AC_TOTAL*** +KCWI2.D3B*** +KCWI2.D4A*** -KCWI2_ADDSPATIALJOIN.MHHI1*** +FOOD_DEMOGRAPHICS_STATISTICS2.FREQUENCY***

GWR Model

Model Diagnostics	
R2	0.8123
AdjR2	0.7710
AICc	5803.4147

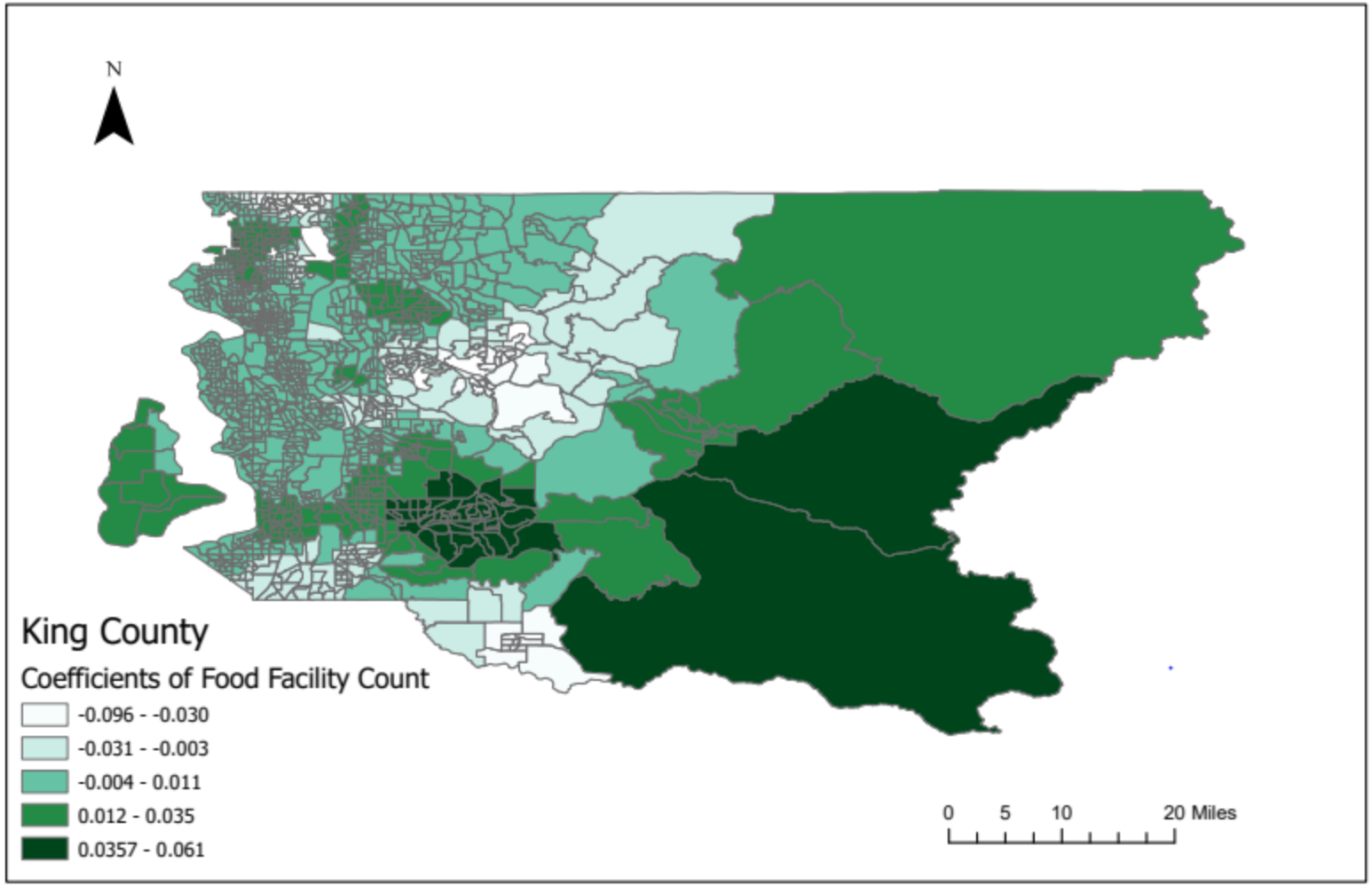
- Dependent Variable:
  - Walkability Index
- Explanatory Variables:
  - Distance to nearest transit stop
  - Food Facility Count
  - Total geometric area
  - Street Intersection Density
  - Median Household Income

Distance to the Nearest Transit Stop vs Walkability
King County, WA



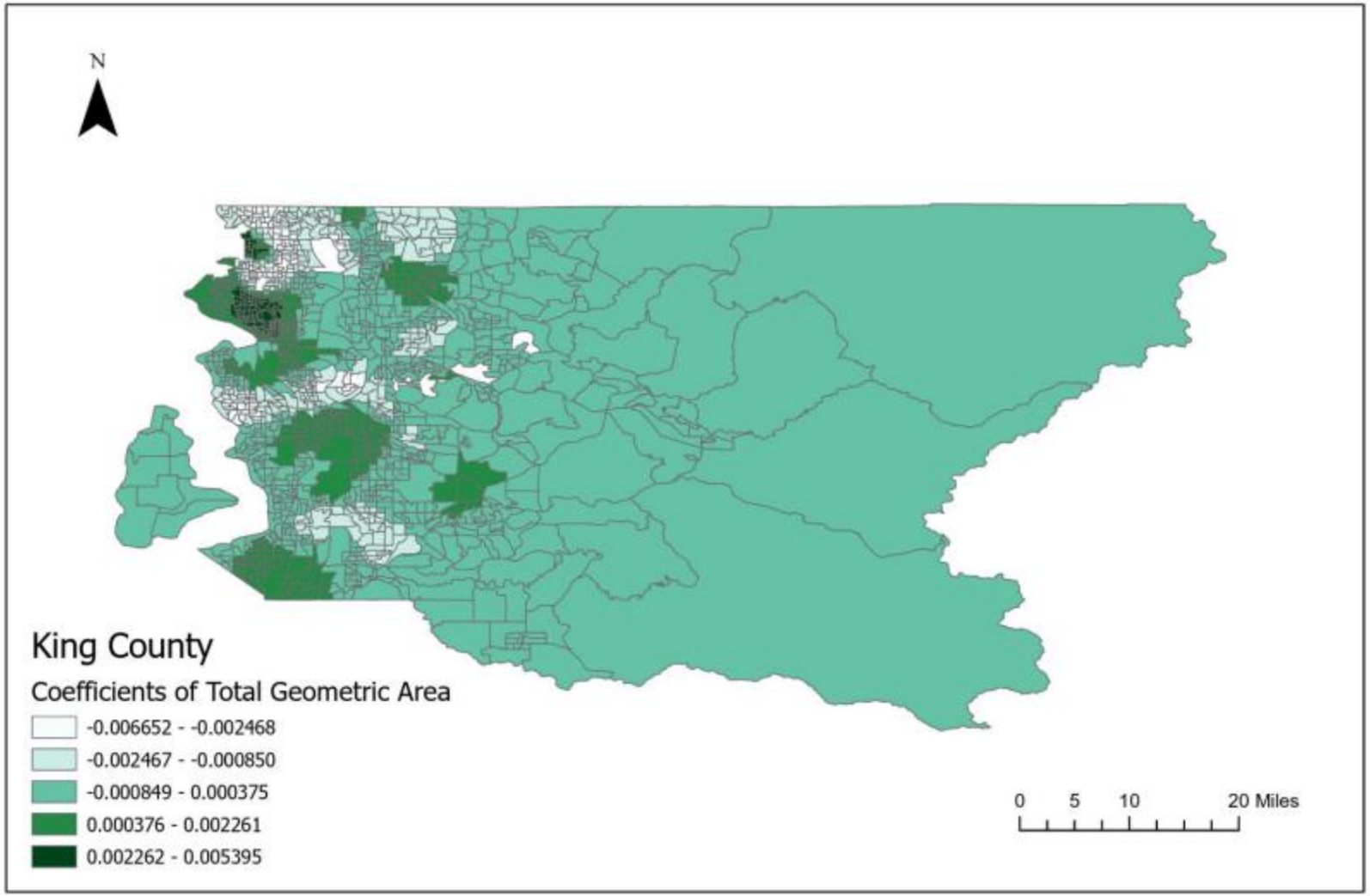
- Darker green areas indicate areas where the relationship between the distance to the nearest transit stop and walkability score is the strongest.
- The closer the nearest transit stop, the more likely the block will be given a higher walkability score.

Food Facility Count vs Walkability
King County, WA

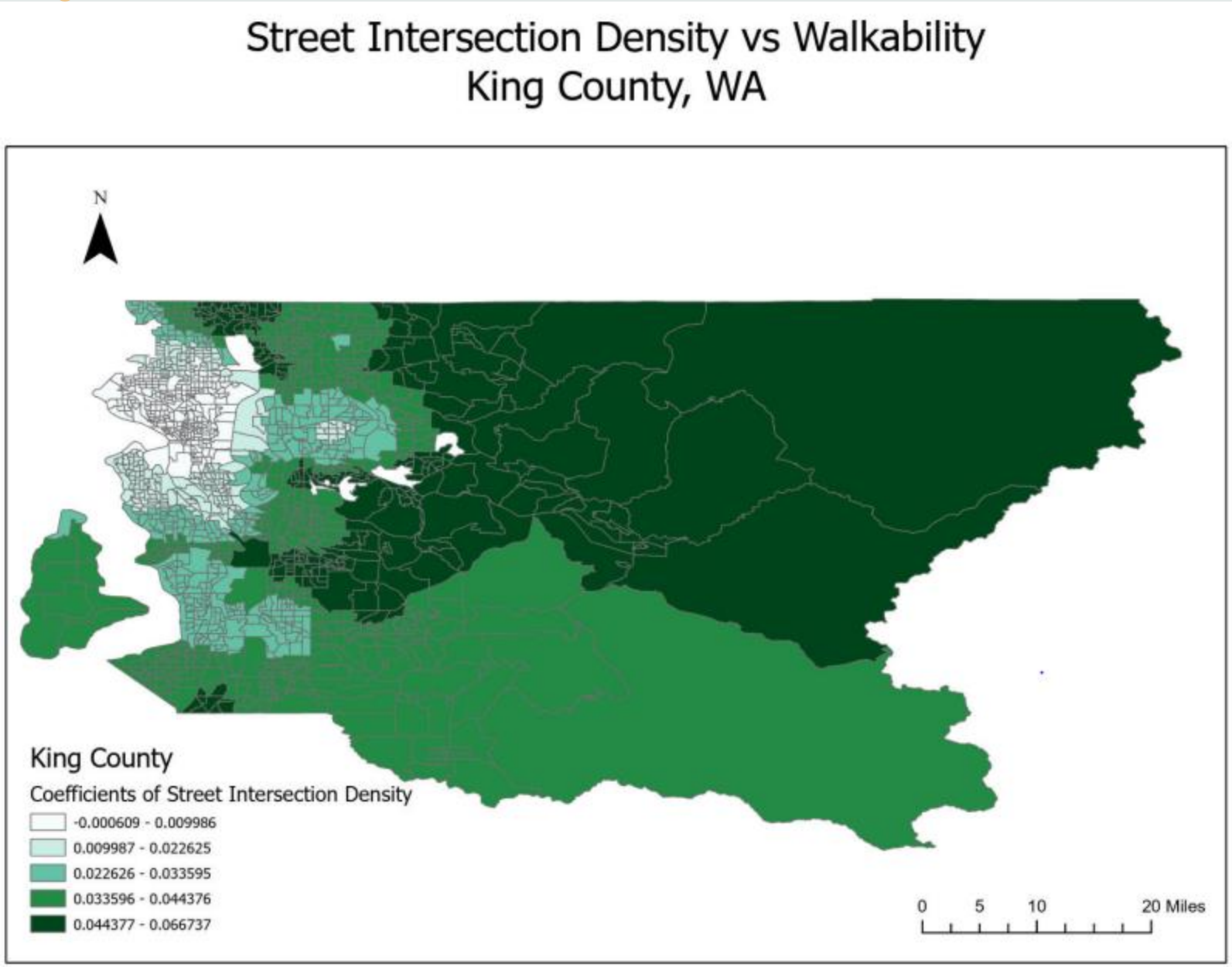


- The more food facilities in a given block, the higher the walkability score

Total Geometric Area vs Walkability
King County, WA

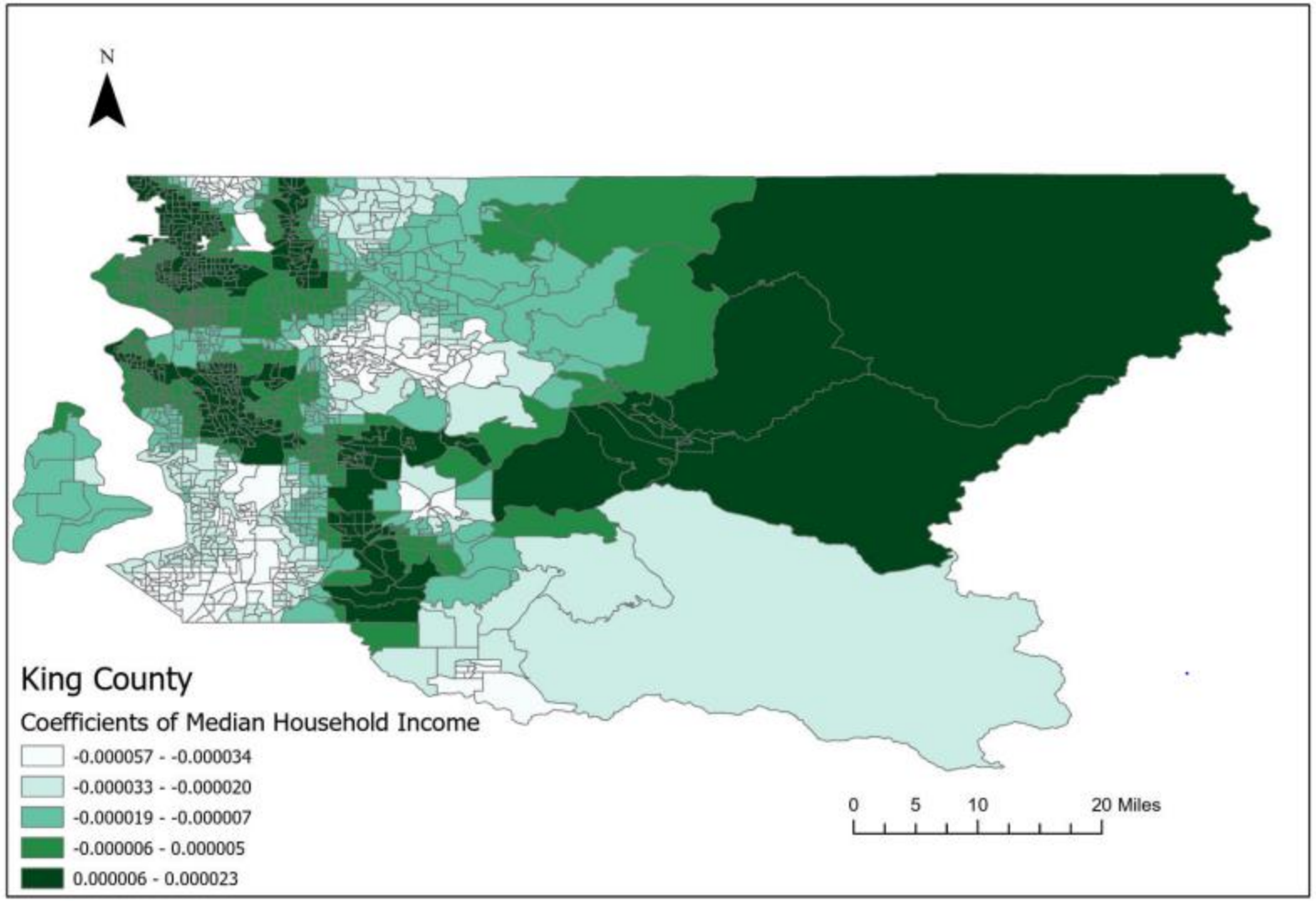


- The larger the area of the block, the less walkable it becomes.



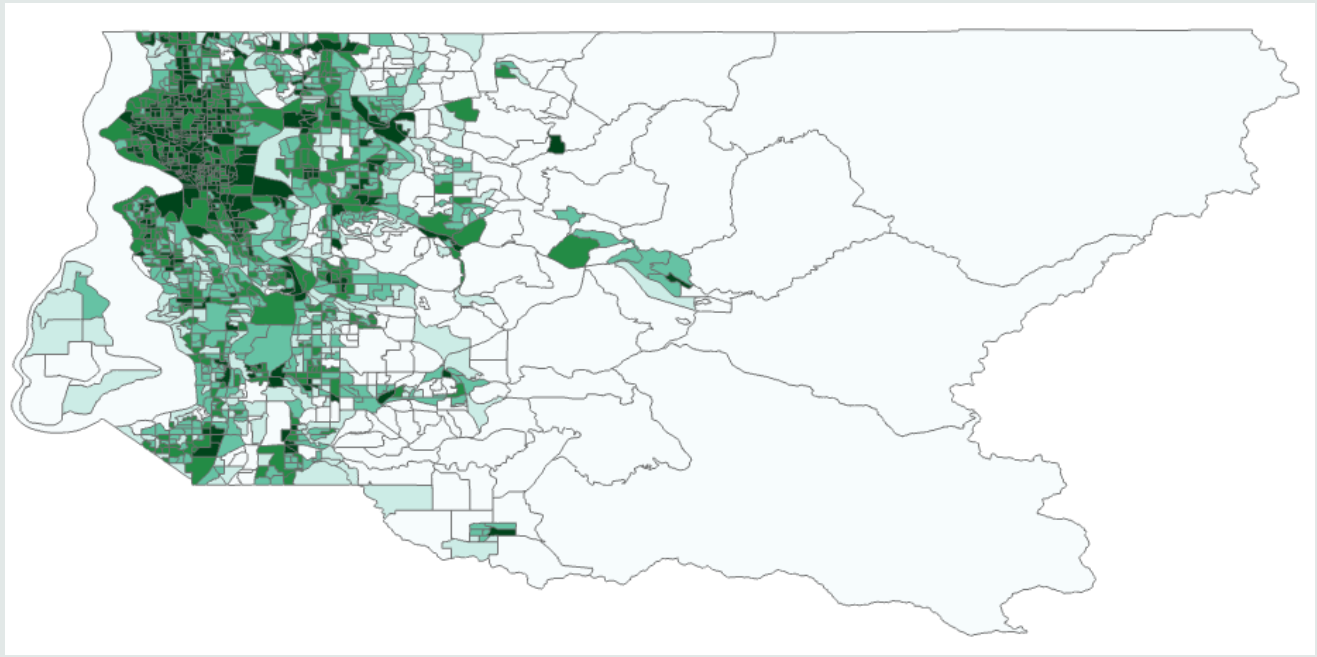
- For areas with higher street intersection density (pedestrian-oriented intersections), mean more walkable areas.
- More intersections in a given block, more busin esses, homes, jobs, etc. In that area

Median Household Income vs Walkability
King County, WA

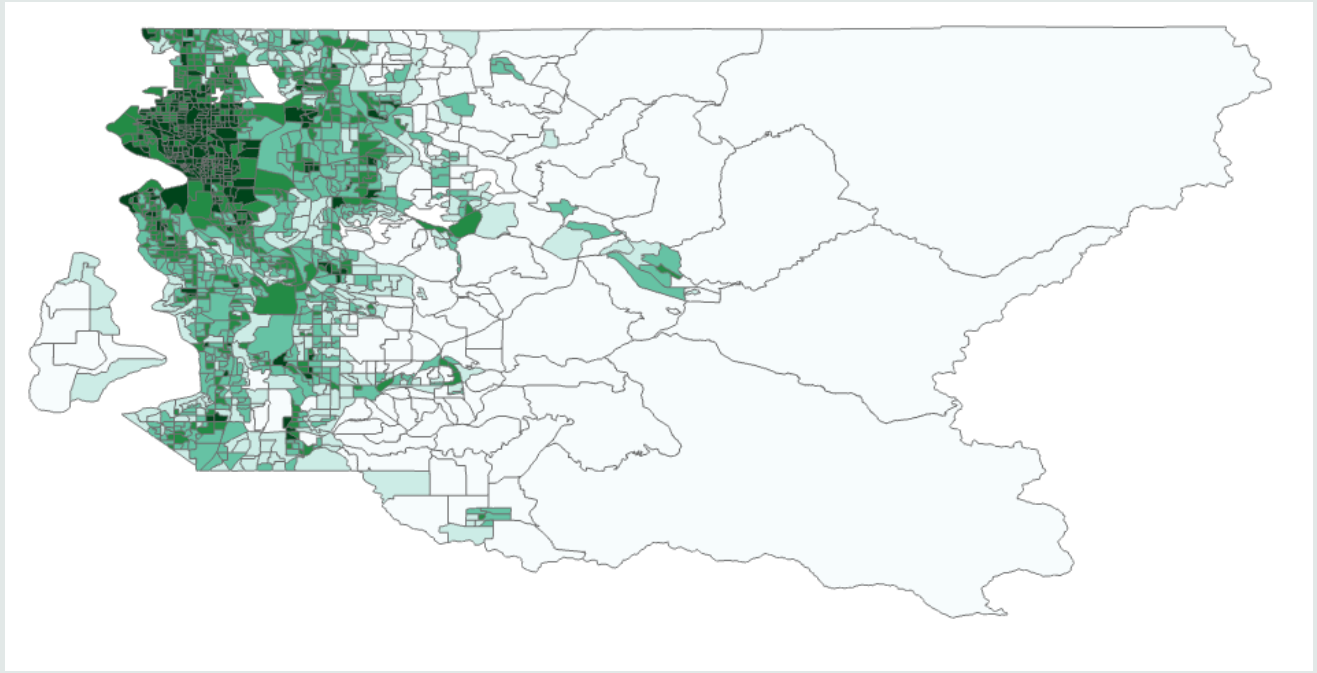


- The higher the median household income, the lower the walkability index score.

Actual Walking Index Scores



Predicted Walking Index Scores with our GWR Model

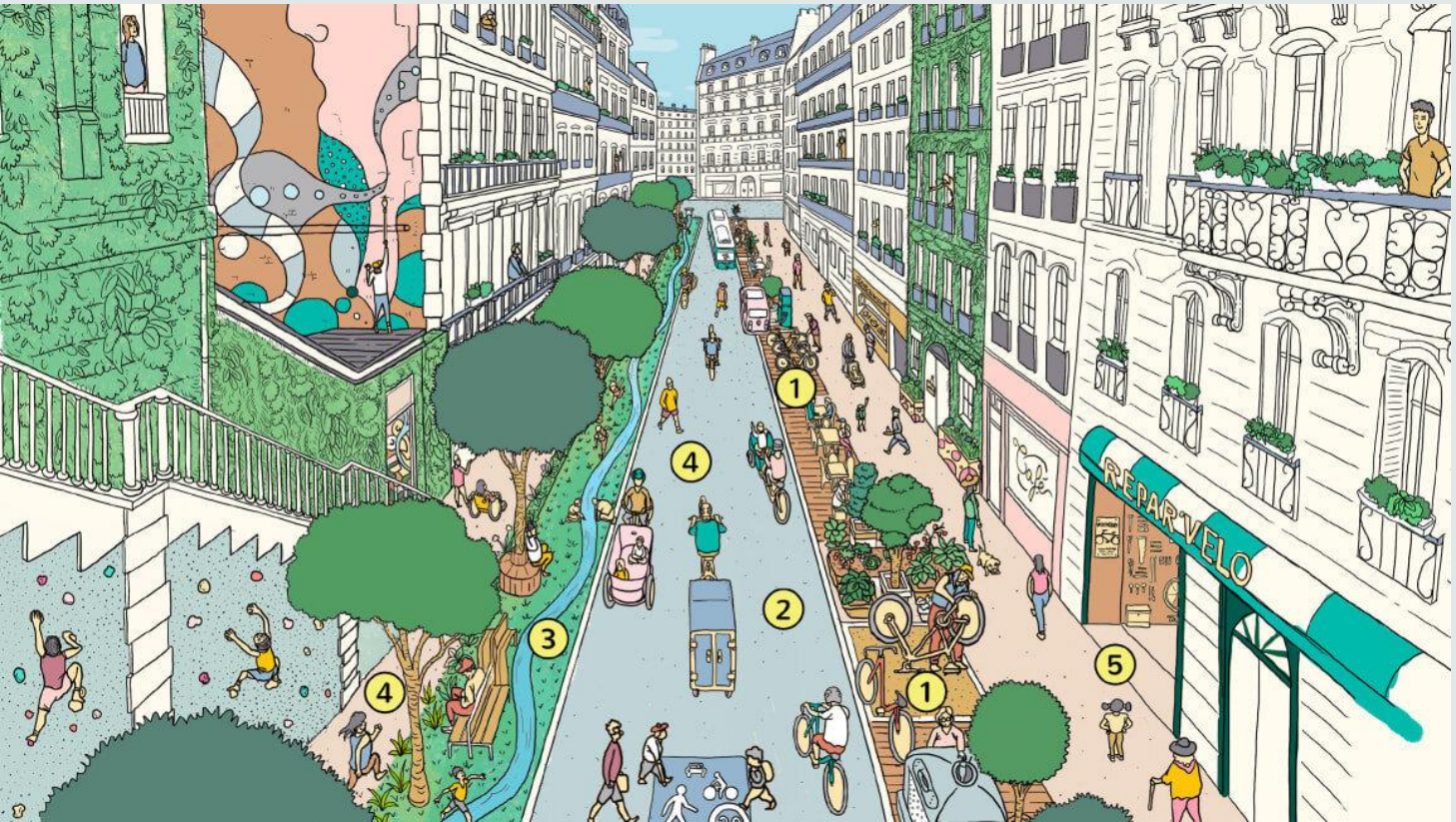


Potential Limitations

- Food center dataset contains many types of food facilities
  - Could be more accurate depending on goal of study
- Grouped by census blocks which doesn't consider variation within those groupings
- Settled for public transit stops even though needing public transport is going against walkability
- Standarization to compare with other locations is difficult

Conclusions

- Both variables greatly influence the walkability score of a given location.
- Sites should positively correlate to the size of the location
  - Ensures that larger locations don't have less effective and inaccessible public services



Future Research and Implications

- Expanding variables
  - Hospitals/health care
  - Schools
  - 1st response centers
  - Pharmacies
- Addressing the lack of necessities in disadvantaged locations
- Involving local governments