Walkability across Minnesota

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How is Walkability Measured?

"Walkability is characterized by components of the built environment that influence the likelihood or feasibility of walking as a form of utilitarian transportation"

National Walkability Index inputs:

1. **Intersection density** (33%) - Higher intersection density is correlated with more walk trips.
2. **Proximity to transit stops** (33%) - Distance from population center to nearest transit stop in meters. Shorter distances correlate with more walk trips.
3. **Land Diversity** (33%):
    a. **Employment Mix** - The mix of employment types in a block group (such as retail, office, or industrial).
    b. **Housing and Employment Mix** - The mix of employment types and occupied housing. A block group with a diverse set of employment types (such as office, retail, and service) plus many occupied housing units will have a relatively high value.

Source: Environmental Protection Agency (Smart Location Database)
https://www.epa.gov/smartgrowth/national-walkability-index-user-guide-and-methodology

How is Walkability sorted into groups?

“Block Groups (BGs) are statistical divisions of census tracts, are generally defined to contain between 600 and 3,000 people, and are used to present data and control block numbering.”

Walkability Index Scores

“The block groups are assigned their final National Walkability Index scores on a scale of 1 to 20. The scores are categorized as follows:

1 – 5.75 Least walkable
5.76 – 10.5 Below average walkable
10.51 – 15.25 Above average walkable
15.26 – 20 Most walkable”

What you'll discover

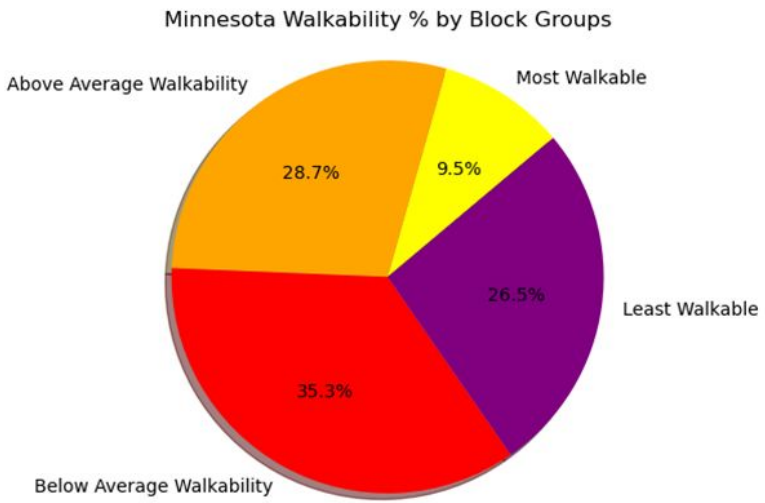
- Walkability amongst block and counties within Minnesota as a whole -Tanner

- Impact of walkability on
  - Physical activity -Hampton
  - Housing populations - Daniel
  - Cars per household - Issa
  - Wage Stratification - Sunita

Minnesota Walkability % by Block Groups

- Tanner

Minnesota Walkability % by Block Groups



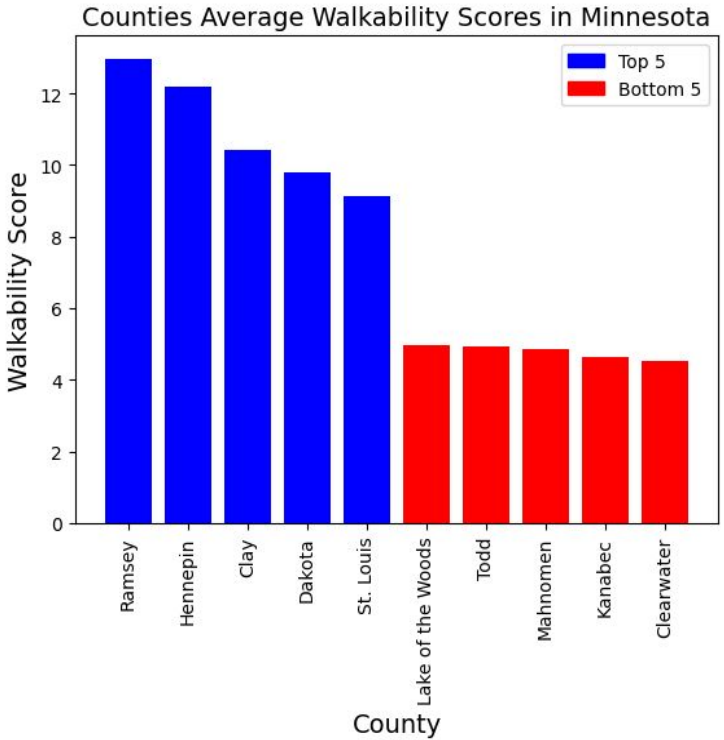
- Looking at the National Walkability Index scores, 61.8% of Minnesota falls between 1-10.5. This shows us that Minnesota, as a whole, is not a very walkable state.

1 – 5.75	Least walkable
5.76 – 10.5	Below average walkable
10.51 – 15.25	Above average walkable
15.26 – 20	Most walkable

Which Counties have the highest and lowest walkability in Minnesota?

- Tanner

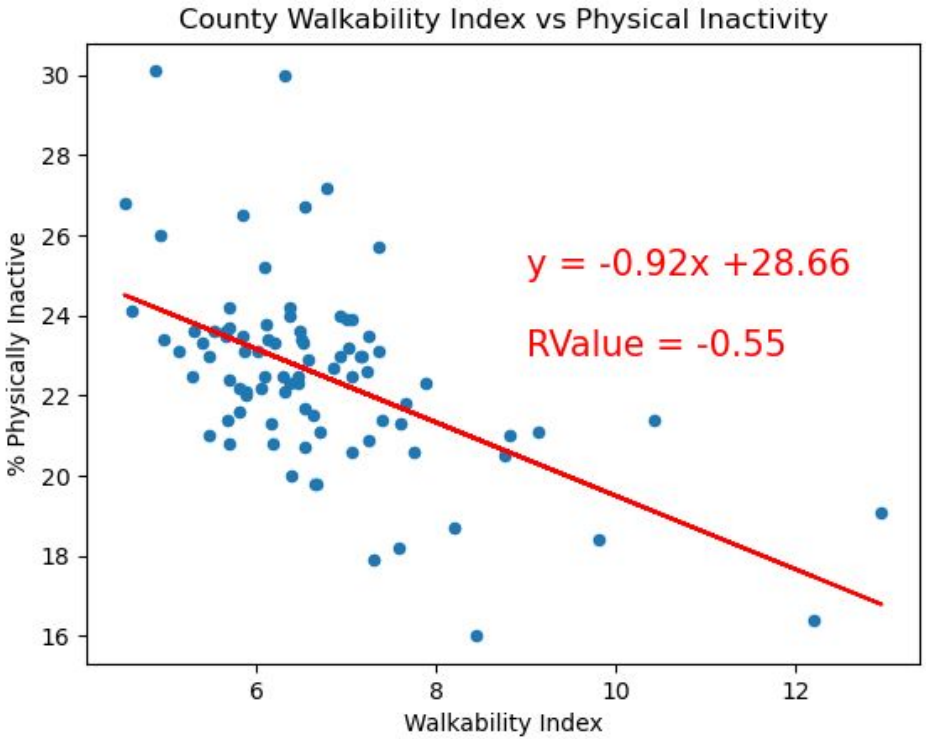
Which Counties have the highest and lowest walkability in Minnesota?



- Top 5 counties: Ramsey, Hennepin, Clay, Dakota, St.Louis
- Bottom 5 counties: LOTW, Todd, mahnomen, Kanabec, Clearwater
- This information can be helpful when looking at a state and seeing what counties would be easier to get around via walking vs counties that may require some other form of transportation.

What is the impact of walkability on physical and mental health?

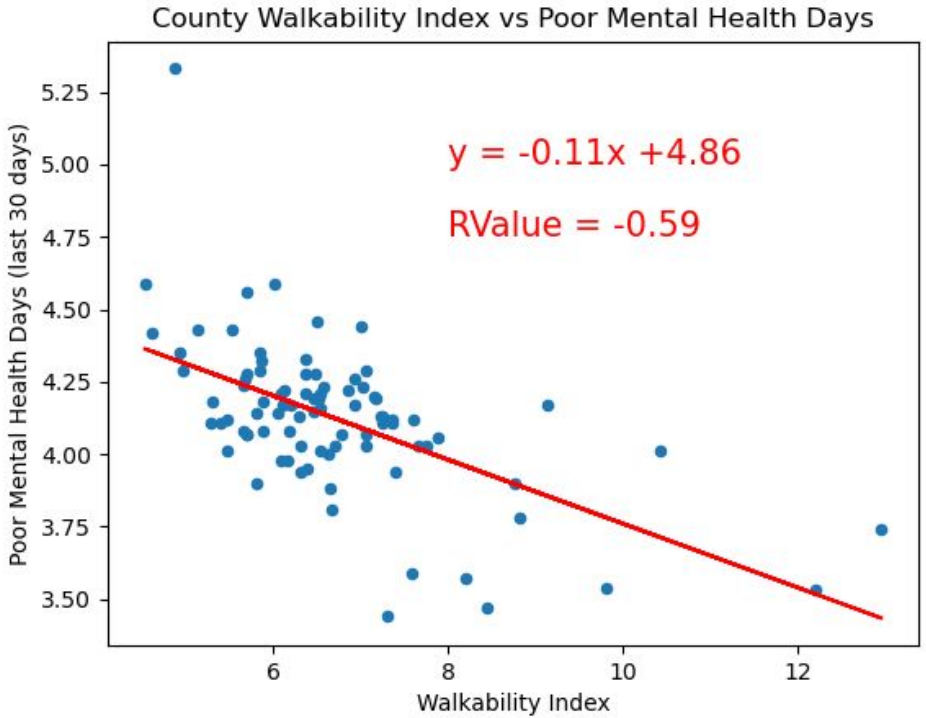
Impact of Walkability on Physical Activity (by county)



- There is a moderate negative correlation (rvalue = -.55) between walkability and adult physical activity*
- As the average walkability score across MN counties increases, the percentage of adults reporting no physical activity decreases
- Walkability has a positive impact of physical activity!

Source: Smart Location Database, US County Health Rankings
*Percentage of adults age 18 and over reporting no leisure-time or physical activity

Impact of Walkability on Mental Health (by county)

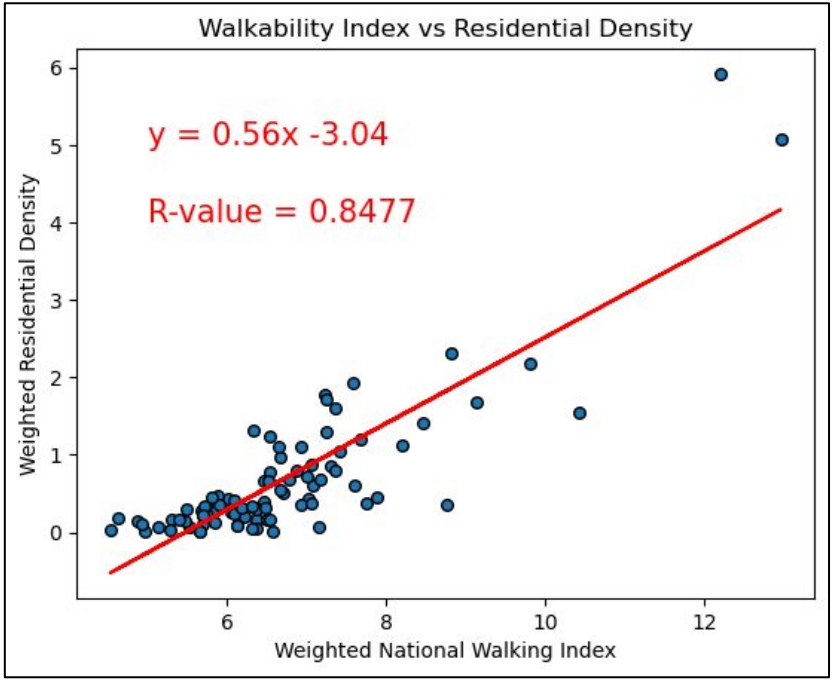


- There is a moderate negative correlation (rvalue = -.59) between walkability and mental health.
- As the average walkability score across MN counties increases, the average number of poor mental health days* decreases.
- Walkable neighborhoods boost mental health!

Source: Smart Location Database, US County Health Rankings
*Average number of mentally unhealthy days reported in past 30 days

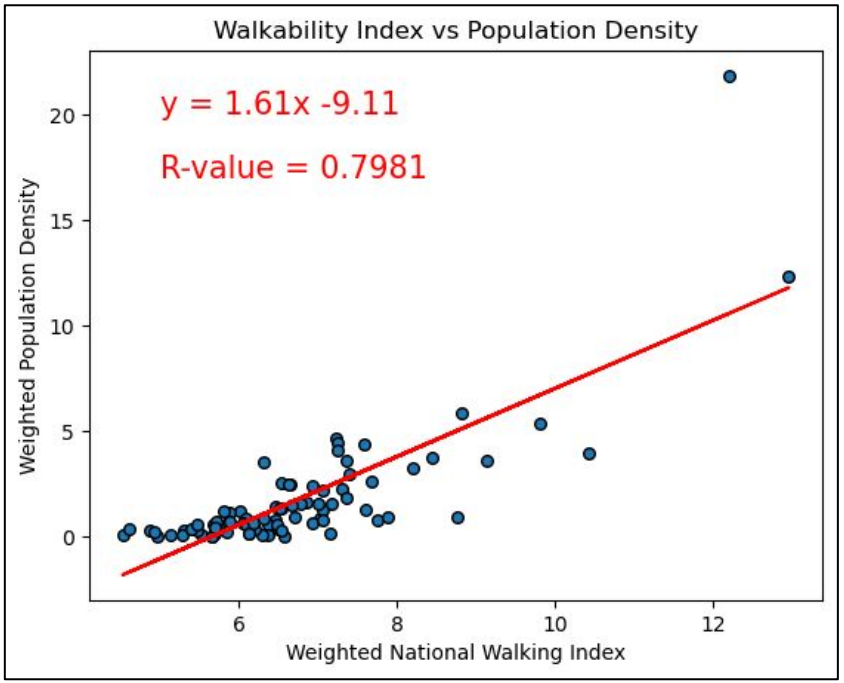
Residential and Population Density impact on Walkability - Dan

Residential Density vs Walkability



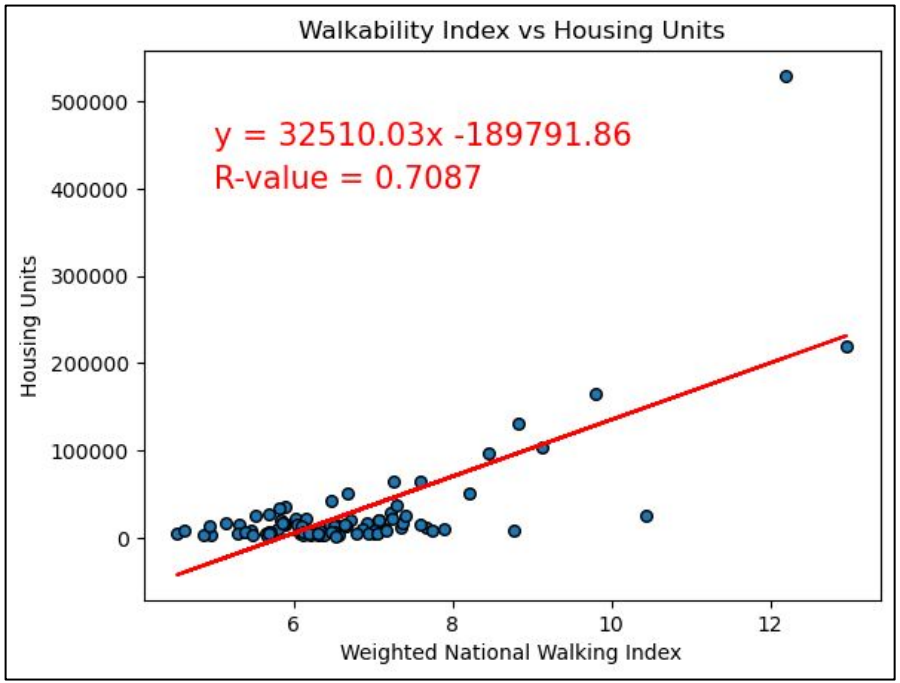
- There is a very strong positive correlation between residential density and walkability of counties

Population Density vs Walkability



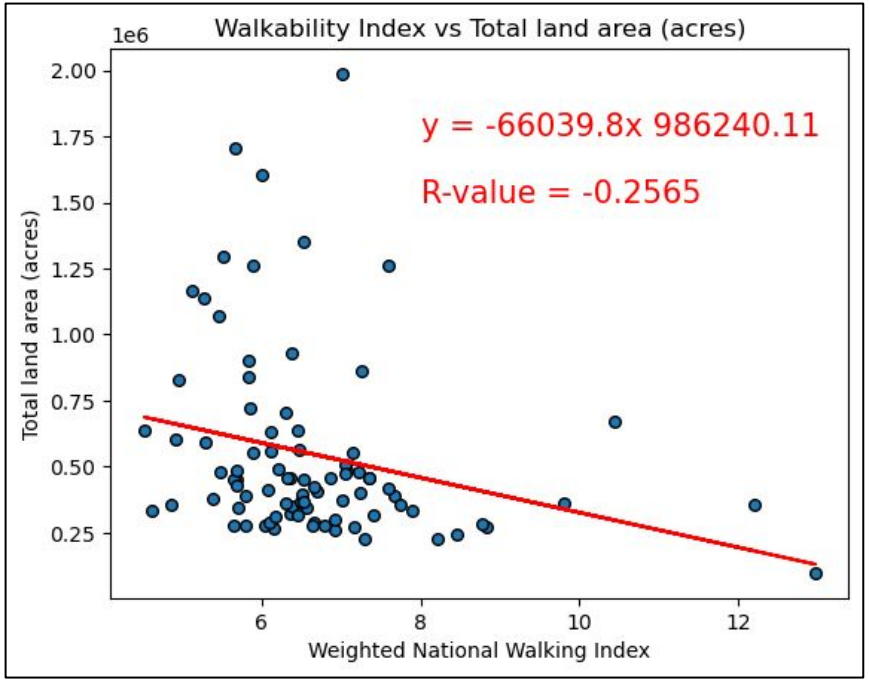
- There is a strong positive correlation between population density and walkability of counties

Housing Units vs Walkability



- Total housing units in a county have a strong positive correlation with walkability

Total land area (acres) vs Walkability



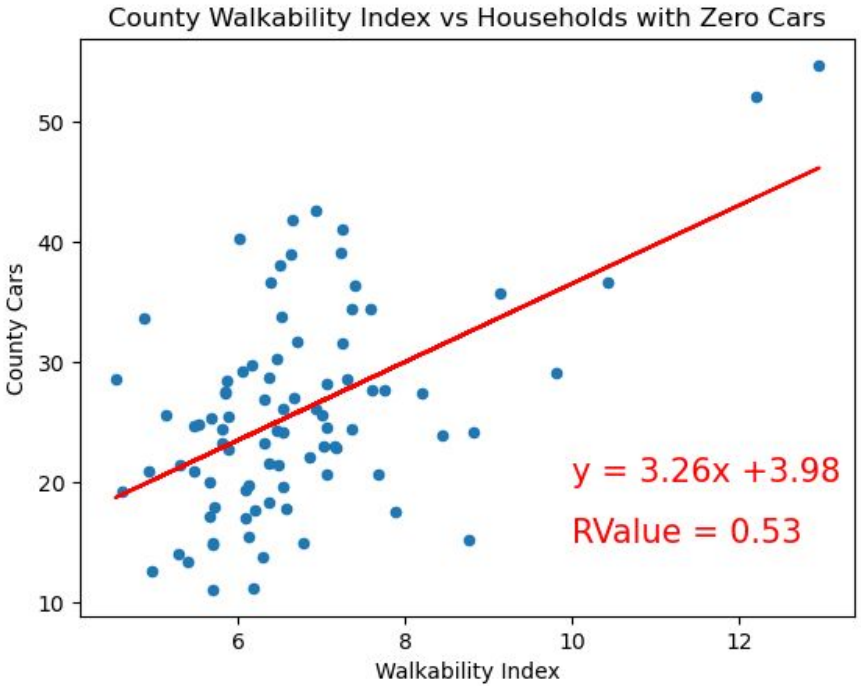
- When excluding ‘St. Louis County’, a higher total land area results in a weak negative correlation between total land and walkability
- With ‘St Louis County’ included, the r-value drops to -0.0385

Density impacts Walkability

- Both higher Population and Residential density have a strong positive impact on the walkability of a county
- However, while total amount of housing units in a county has a strong positive impact on walkability, total land area (acres) has a weak negative to no correlation with walkability
- In conclusion, more people and housing results in better walkability, but surprisingly a larger county does not factor into walkability

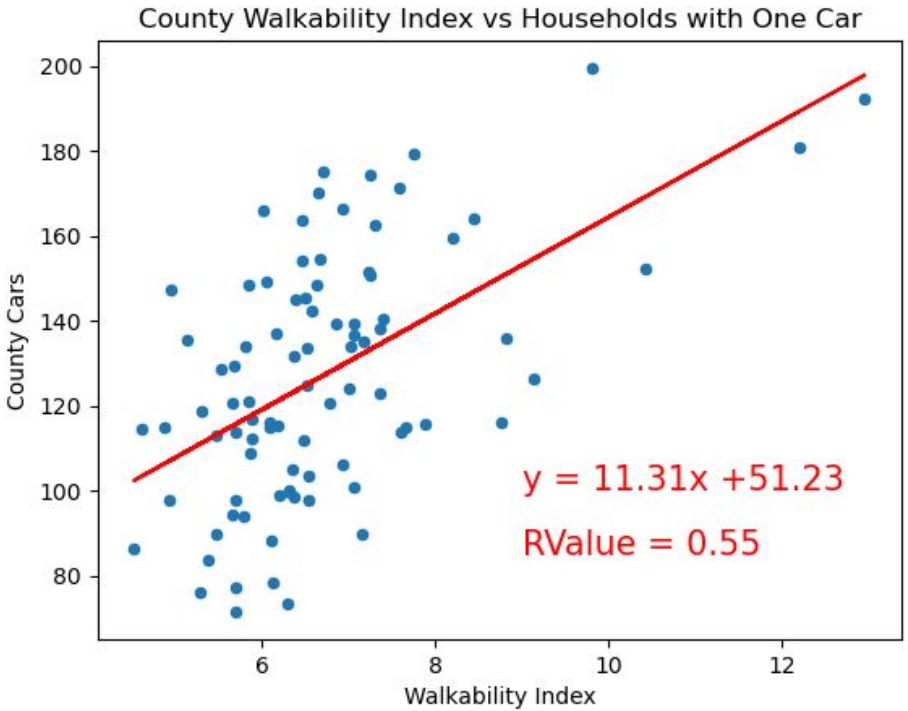
Number of Cars per Household Impact on Walkability

Zero Car Households vs Walkability



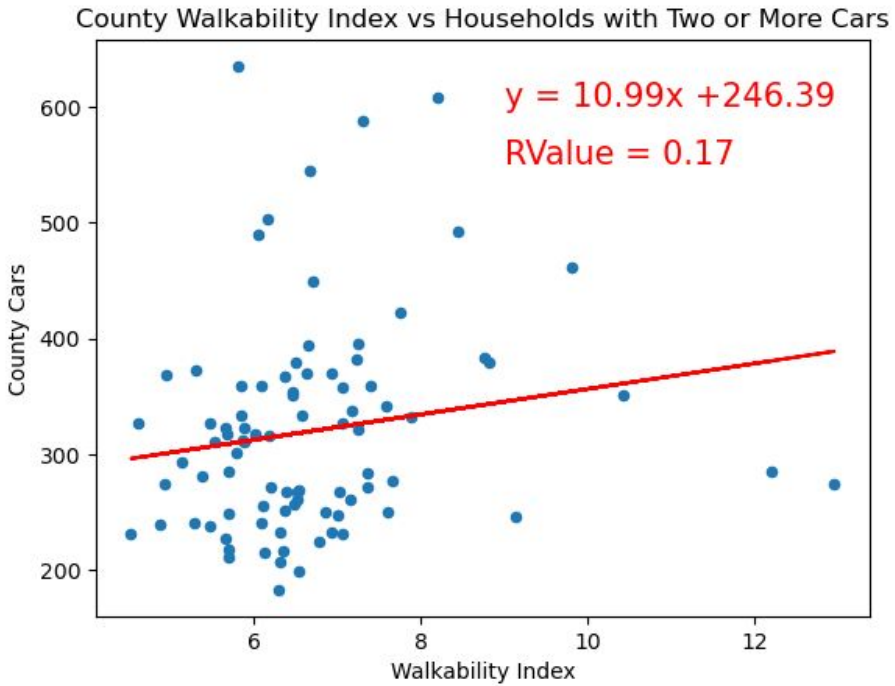
- There is a moderate positive correlation between households with zero cars and walkability.

One Car Households vs Walkability



- There is a moderate positive correlation between households with zero cars and walkability.

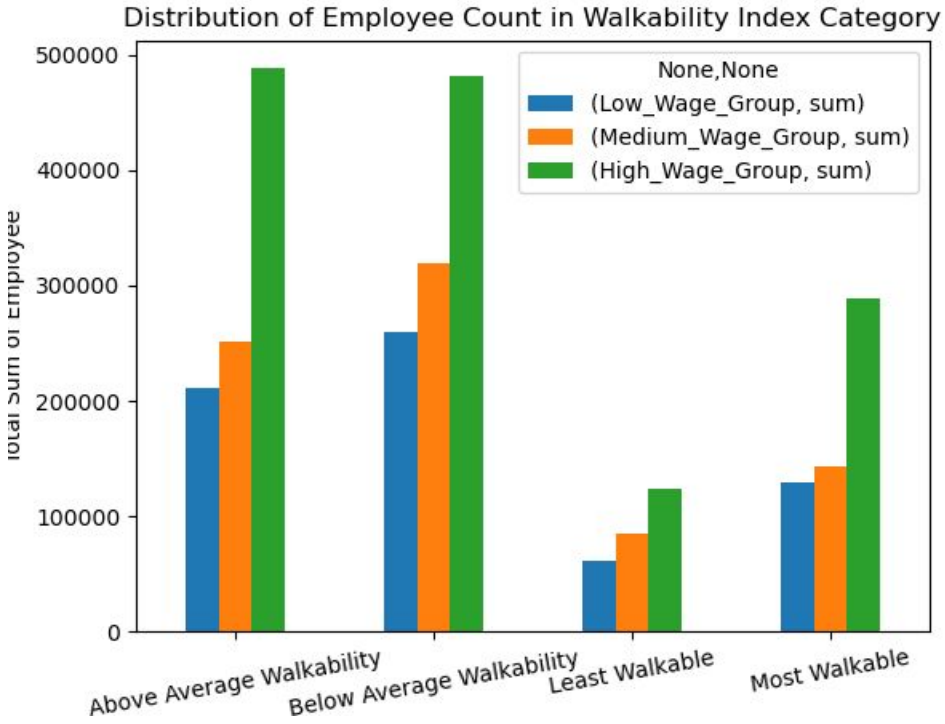
Two or More Car Households vs Walkability



- There is a very weak positive correlation between households with two or more cars and walkability.
- A significant decrease in R-Value from households with zero or one car.

Association Between Wage Stratification and Walkability

Employee Count in Each Walkability Index Category



Datasource: USEPA

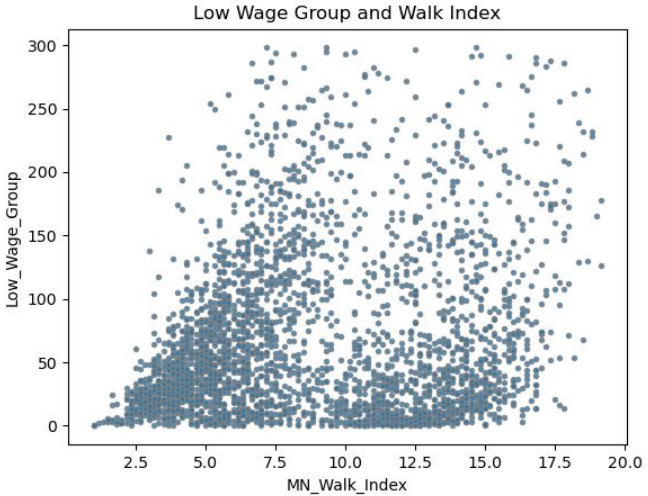
Wage Group Classification

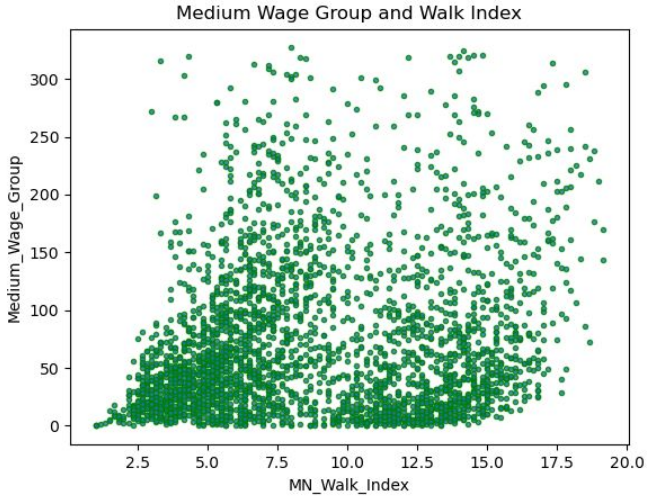
(Wage Stratification based on workplace location)

Low Wage Group: Earnings equal or less than $1250 /month

Medium Wage Group: Earnings between $1250 and $3333 /month

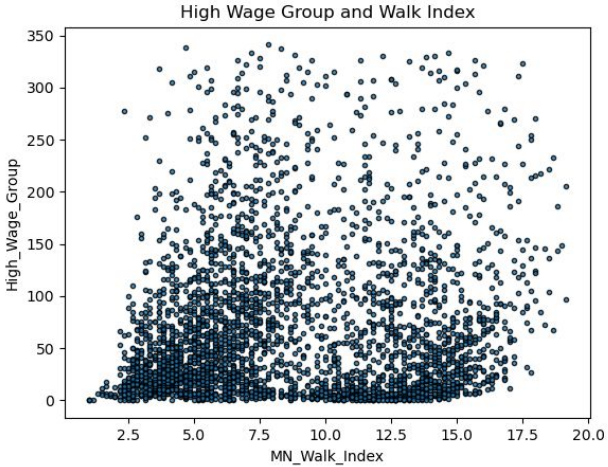
High Wage Group: Earnings Above $3333 /month

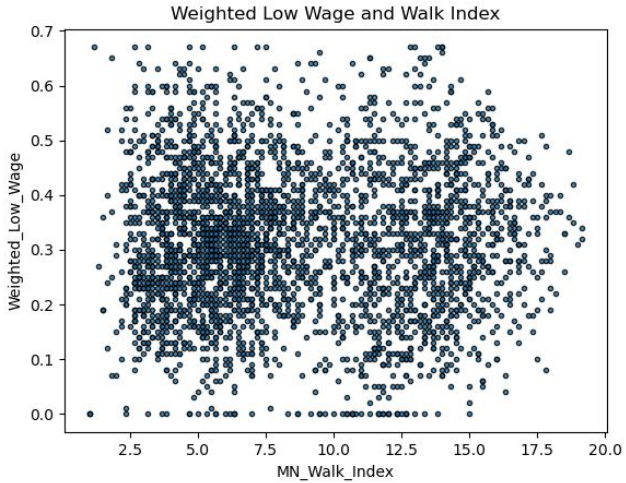




Plot between the Wage Group in Walk-Index

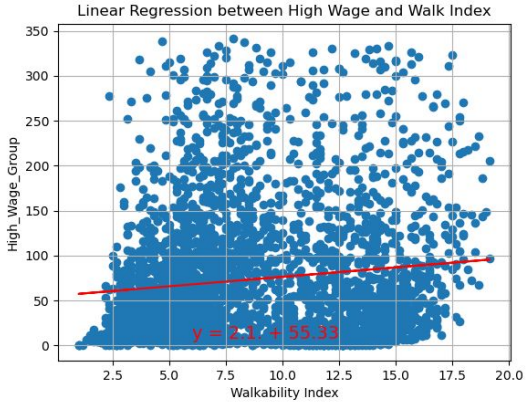
-Data was cleaned for any outliers



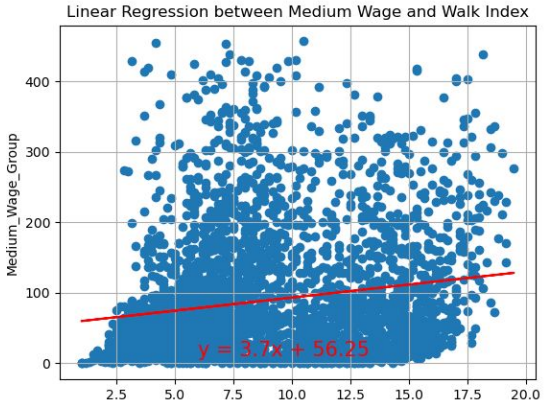


Plot display the wide spread in the data set

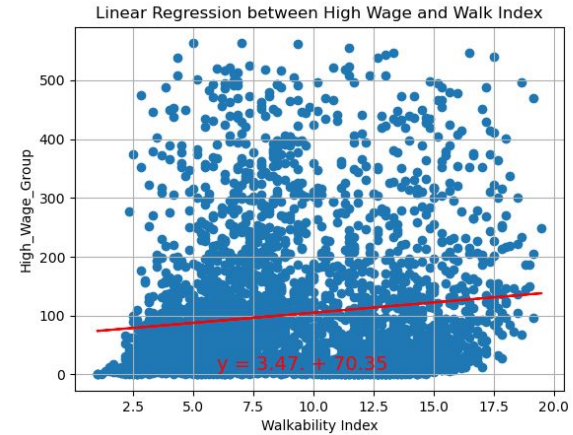
CORRELATION MATRIX (Pearson)	Census Block group	Low Wage Group	Medium Wage Group	High Wage Group	Weighted Low Wage	MN Walk Index
Census Blockgroup	1.000					
Low Wage Group	0.036	1.000				
Medium Wage Group	0.027	0.842	1.000			
High Wage Group	0.046	0.613	0.730	1.000		
Weighted Low Wage	0.015	0.299	-0.020	-0.281	1.000	
MN Walk ndex	-0.089	0.190	0.183	0.119	-0.002	1.000



Regression line equation is: y = 3.83x + 46.57
R squared: 0.039



Regression line equation is: y = 3.7x + 56.25
R squared: 0.030



Regression line equation is: y = 3.47. + 70.35
R squared: 0.015

Regression line equation is: y = -0.0x + 0.31
R squared: 2.376

Linear Regression

There was very low association established between the Walkability Index and the Wage Groups.

None of the Wage Group Employees had a very strong correlation with the walkability Index. However, the association established was positive.

Linear Regression was able to explain 3% of variation in Walkability Index.

Appendix

- www.census.gov/programs-surveys/geography/guidance
- https://www.countyhealthrankings.org/
- https://www.epa.gov/sites/default/files/2021-06/documents/epa_sld_3.0_technicaldocumentationuserguide_may2021.pdf
- https://www.epa.gov/sites/default/files/2021-06/documents/national_walkability_index_methodology_and_user_guide_june2021.pdf
- https://www.census.gov/programs-surveys/geography/about/glossary.html#par_textimage_4
- https://catalog.data.gov/dataset/walkability-index

Methodology

- We used the total population per County to give a weight to each datapoint

  Weight = Data point Population / County Population

- We then used this number to apply to the walkability index when aggregating all data points at the county level to determine a county's walkability as well as for other columns that used averages