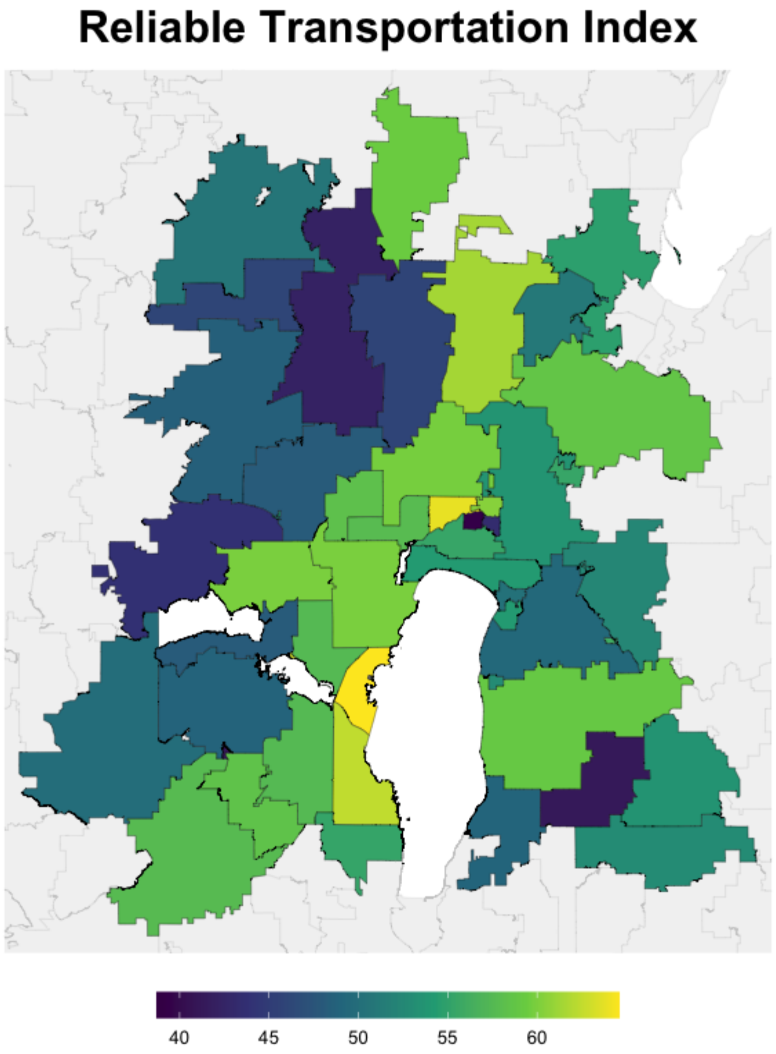
RELIABLE TRANSPORTATION INDEX

- Composite 0-100 score summarizing transportation reliability and infrastructure
- Six variables are used to calculate the index
  1. Walk/bike – (%) of workers who walk or bike to work (ACT)
  2. Drive alone – (%) of workers who drive alone to work (CAR)
  3. Public transit – (%) of people who take public transportation to work (PUB)
  4. No vehicle – (%) of households with no car (NVC)
  5. Travel time – mean travel time to work in minutes (TRV)
  6. Walkability Index – ranking of an area's walkability (EKW)
- Calculated for Zip Codes, Census Tracts, Cities/Towns, and Counties

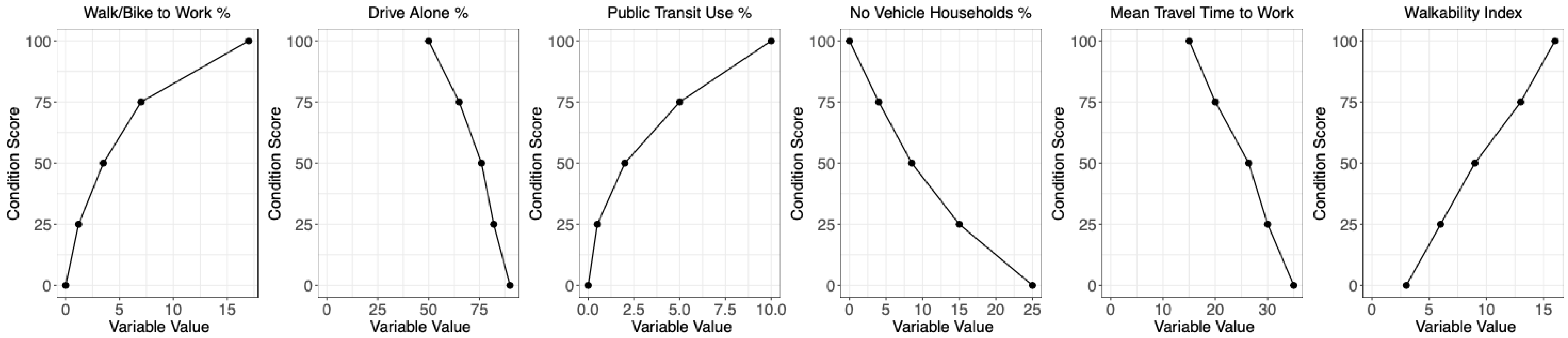


LINEAR INTERPOLATION MODEL

- First convert each variable into a "condition score" on a 0–100 scale
- We define five benchmark values (0, 25, 50, 75, 100).
- Breakpoints are chosen using national benchmarks
- Observed values can then be mapped to scoring curves

Table 1: Scoreing Thresholds for Each Variable

Variable	Terrible (0)	Bad (25)	Average (50)	Good (75)	Ideal (100)
ACT (Walk/Bike) %	0%	1.2%	3.5%	7%	17%
CAR (Drive Alone) %	90%	82%	76%	65%	50%
PUB (Public Transit) %	0%	0.5%	2%	5%	10%
NVC (No Vehicle) %	25%	15%	8.5%	4%	0%
TRV (Commute Time, min)	35	30	26.4	20	15
EKW (Walkability)	3	6	9	13	16



INTERPOLATION SCORING EXAMPLE

We can compute our index for the 54911 Zip Code. First, we look at the values for each variable:

GEOID	ACT	CAR	PUB	NVC	EKW
54911	7.539379	67.71678	0.6423	8.676148	9.299907

Starting with (ACT) walk/bike to work, we can see that the value ≈ 7.54 corresponds to the points (7,75) and (17,100) from our breakpoints. We can then use algebra to calculate our ACT score:

The slope of the line connecting these two boundary points are:

$$m_{AC} = \frac{100-75}{17-7} = \frac{25}{10}$$

We can then use point-slope form

$$y - y_1 = m(x - x_1)$$

to get the equation of the line

$$y - 75 = \frac{25}{10}(x - 7)$$

Plugging in the ACT value of 7.54 yields an ACT score of

$$\begin{aligned} y - 75 &= \frac{25}{10}(7.54 - 7) \\ y - 75 &= \frac{25}{10}(0.54) \\ y - 75 &= (2.5)(0.54) \\ y - 75 &\approx 1.35 \\ y &\approx 1.35 + 75 \\ y &\approx 76.35 \end{aligned}$$

We repeat this for the remaining five variables. These are the scores for the rest of the variables calculated in R: We can see that they match our algebraic example.

- ACT 76.348448
- CAR 68.82551
- PUB 27.3716674
- NVC 49.32251
- TRV 87.50000
- EKW 51.874421

INDEX CALCULATION & INTERPRETATION

- After converting each variable to a 0–100 condition score, we combine them into a single Reliable Transportation Index.
- Public transit use (PUB) and lack of vehicle access (NVC) capture two sides of the same issue, so we first blend them
- Blended score gives credit when an area scores well in **either** public transit use **or** access to a car
- The final index is then calculated as:

$$\text{Transportation Index} = \frac{\text{actScore} + \text{carScore} + \text{trvScore} + \text{ekwScore} + 2 \times \text{pubNvcBlendScore}}{6}$$

- If we plug in our variable scores, we will arrive at our final index for the 54911 Zip Code:

$$\text{Transportation Index} = \frac{76.348448 + 68.82551 + 87.50000 + 51.874421 + 2 \times 49.32251}{6} = 63.8655665$$

ADDITIONAL NOTES & FUTURE DIRECTIONS

Index Notes

- All geographic layers are scored using the same scoring curves and formula: May not capture every local nuance
- Outliers and small differences between neighboring areas should be interpreted cautiously and checked against underlying indicator values

Use Cases

- Screening tool to flag communities that may face transportation access challenges
- Compare Index values on a national scale
- Identify high performing areas

Future Directions

- Refine and expand the index
- Track index over time to monitor changes and evaluate the impact of local policies and investments
- Integrate index into planning tools so local partners can explore patterns and identify high need areas

FOX VALLEY Data Exchange

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