Exploring Transportation Justice through the “Transportation Justice Threshold Index Framework (TJTIF) ” in Oklahoma County

Tahsin Tabassum
Masters in Regional and City Planning
University of Oklahoma

Overview

- Research Question
- Objective of the Study
- Literature Review
- Study Area Profile
- Methodology
- Result and Discussion
- Recommendations and Implication in Transportation Planning

Research Question

- ✓What is the scenario of transportation justice in OKC Metropolitan Area?
- ✓How transportation justice in OKC metropolitan area impacts its residents in terms of transportation access and affordability?

Objective of the study

To develop ‘**Transportation Justice Threshold Index (Tjtif) Framework’** to identify transportation justice (TJ) regions based on socio-economic and demographic factors.

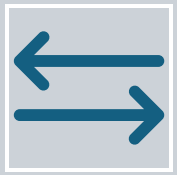
To identify unique challenges faced by residents in terms of transportation access and affordability

Concepts of Transportation Justice

Transportation justice frequently focuses on the **social equity** resulting from urban-scale problems like **accessibility, travel time, and large transportation investments** (Gössling, 2016).

Transportation justice aim to provide **safe, reliable, and affordable transportation options** for everybody, despite their physical attributes, race, or socioeconomic status

Concepts of Transportation Justice



Three dimensions are used to identify transport injustices: **exposure, space, and time**.

Some organizations have broadened the definition of **environmental justice regions** to include populations such as **households without cars, persons with disabilities, and elderly, beyond age 65** with limited access to mobility (Bailey et al., 2012; Forkenbrock & Schweitzer, 1999)

The investigation of **mobility, access, and modal opportunity** is done through the lens of **transportation justice** explaining how **environmental justice concepts** are applied to the sector of transportation (Forkenbrock & Schweitzer, 1999)

Methods of Measuring Transportation Justice

Threshold Approach

An established threshold to determine if a community meets or exceeds specific demographic attributes (usually based on regional averages). Drawbacks include relativity and inability to represent intensity.

Graduated Scale Approach

A rating scale instead of a threshold. Enables calculation of intensity in identifying EJ populations.

Index Approach

Assigning points to regions based on attainment or non-attainment of a metric. Two index methodologies identified: buffer comparison index and area comparison index.

Transportation Justice Threshold Index Framework (TJTIF)

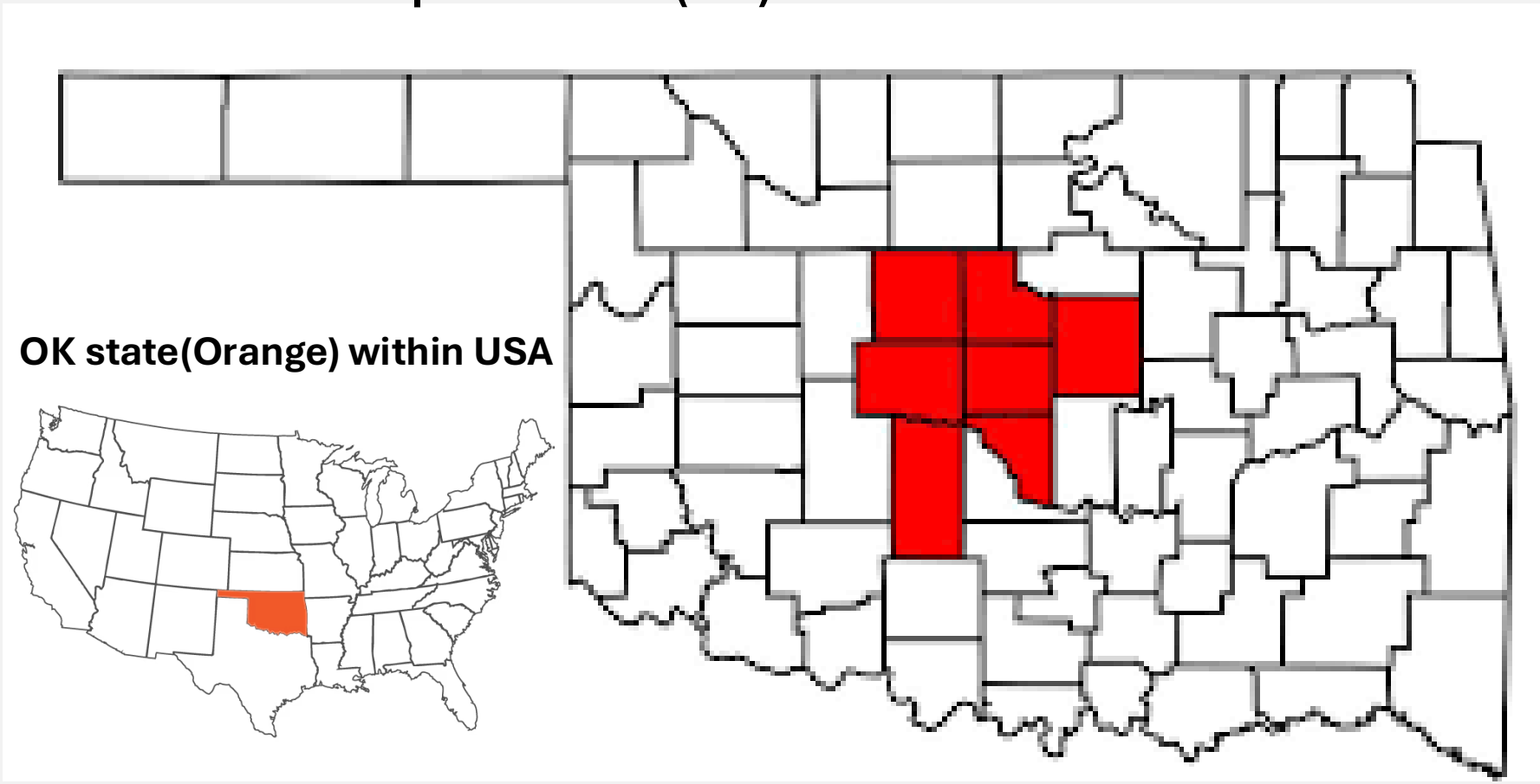
A rigorous and comprehensive method, evaluates and identifies inequities in terms of factors related to **Demographic, Socioeconomics and Transportation & Land Use**.

- A region is considered to be in a TJ area if its **composite index value** is positive (greater than 0).
- If it is negative, the locality is not in a TJ area.
- A composite index value of **zero** indicates that further investigation of the locality is recommended, as it might soon be considered a TJ area.

Study Area Profile

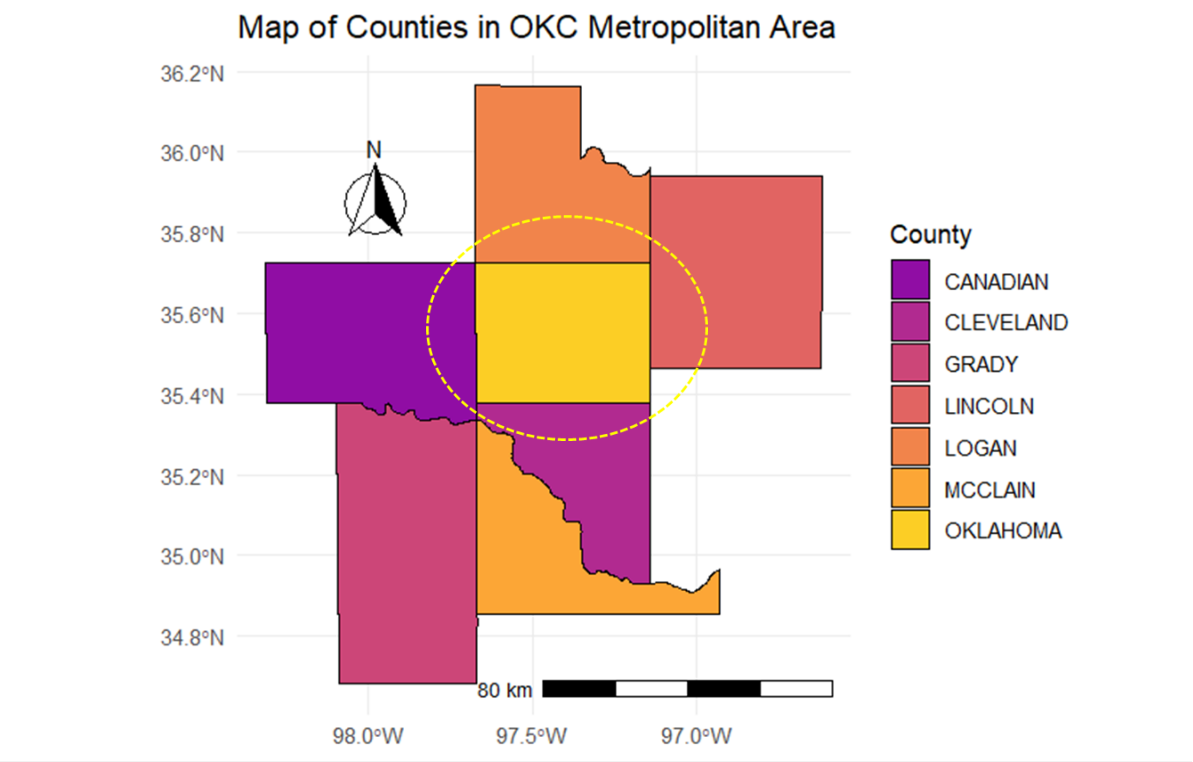
- The Oklahoma City metropolitan area, located **in Central Oklahoma**, largest urban region in the Oklahoma state
- The OKC MA area includes counties like **Canadian, Cleveland, Grady, Lincoln, Logan, McClain, and Oklahoma.**

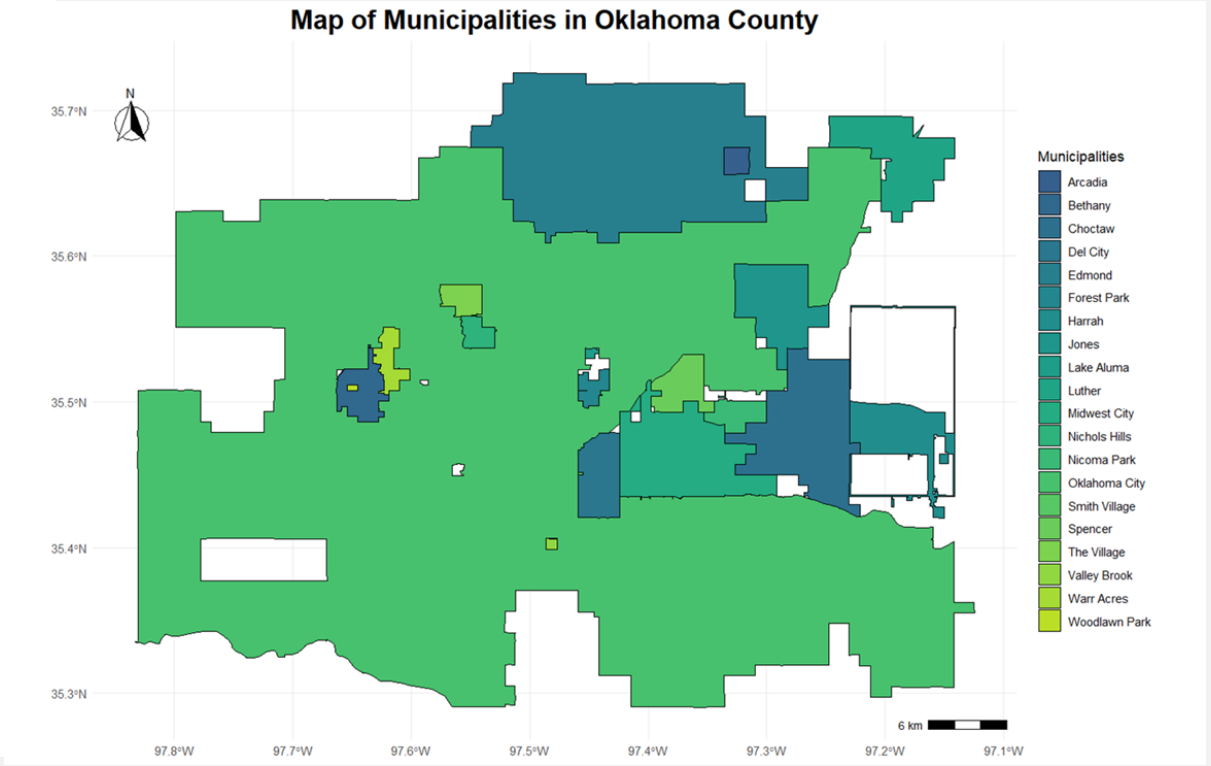
OKC Metropolitan Area (red) within the state of Oklahoma



OK state(Orange) within USA

Study Area Profile





- Population OKC metropolitan area of **1,425,695** in **2020**, up from **1,252,987** in **2010**
- **20** Municipalities in Oklahoma County
- Mean travel time to work (minutes), workers 16 years+, 2018-2022 is **21.8**

Methodology

Required Data

Table 1: Transportation justice variables for demographics category

Category	TJ Variable	Definition	Data Source	Direction of Need
Demographics	Race	Percentage of non-white population including two or more races	U.S. Census	Above average
	Age	Percentage of the population below the age of 18, and above the age of 65	U.S. Census	Above average
	Disability	Percentage of population with a disability	U.S. Census	Above average

Direction of Need: The factor scale can be determined based on whether a lower percentage indicates a higher need (Below Average), or if a higher percentage indicates a higher need (Above Average).

Table 2 : Transportation justice variables for socio economic category

Category	TJ Variable	Definition	Data Source	Direction of Need
Socio-economic	Household income	Percentage of households earning less than the average household income of the area	U.S. Census	Above average
	Single parent household	Percentage of single parent household regardless of having children under 18 as a compared to family households	U.S. Census	Above average
	Vehicles per household	Percentage of households with less than one vehicles per household	U.S. Census	Above average
	Economic development	Percentage difference in people employed between 2017 and 2022	U.S. Census	Above average
	Cost of living	The percentage of people with median monthly housing costs for occupied housing units lower than the regional average.	U.S. Census	Above average

Table 3 : Transportation justice variables for transportation and land use

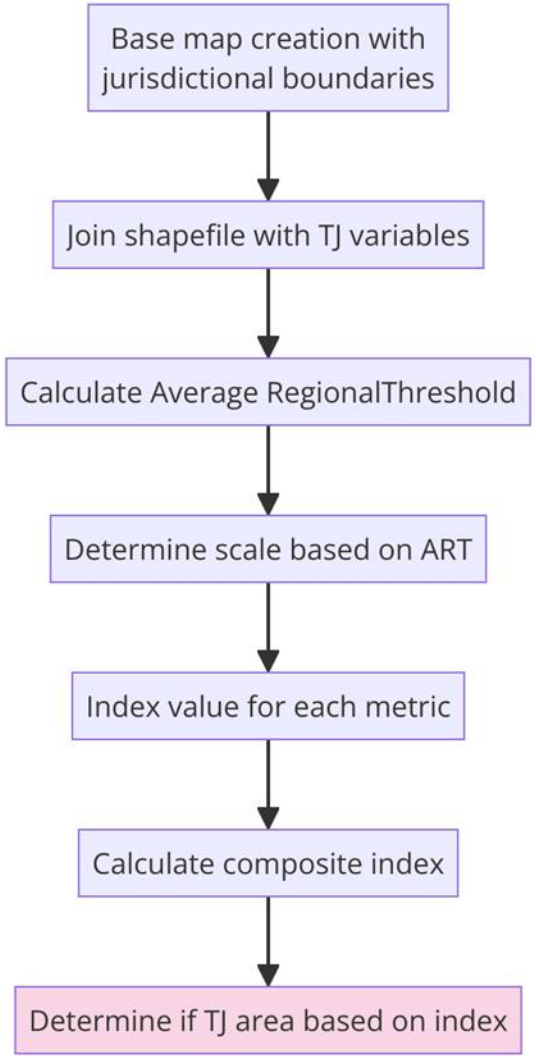
Category	TJ Variable	Definition	Data Source	Direction of Need
Transportation and land use	Public transit Access	Percentage of land within one mile of a fixed route transit stop	Bureau of Transportation Statistics	Above average
	Crash rates	Percentage of fatal crashes per year	Oklahoma Highway Safety Office interactive crash map	Above average
	Truck volume	Percentage of truck traffic per current annual average daily traffic rate	Oklahoma Freight Transportation Plan	Above average

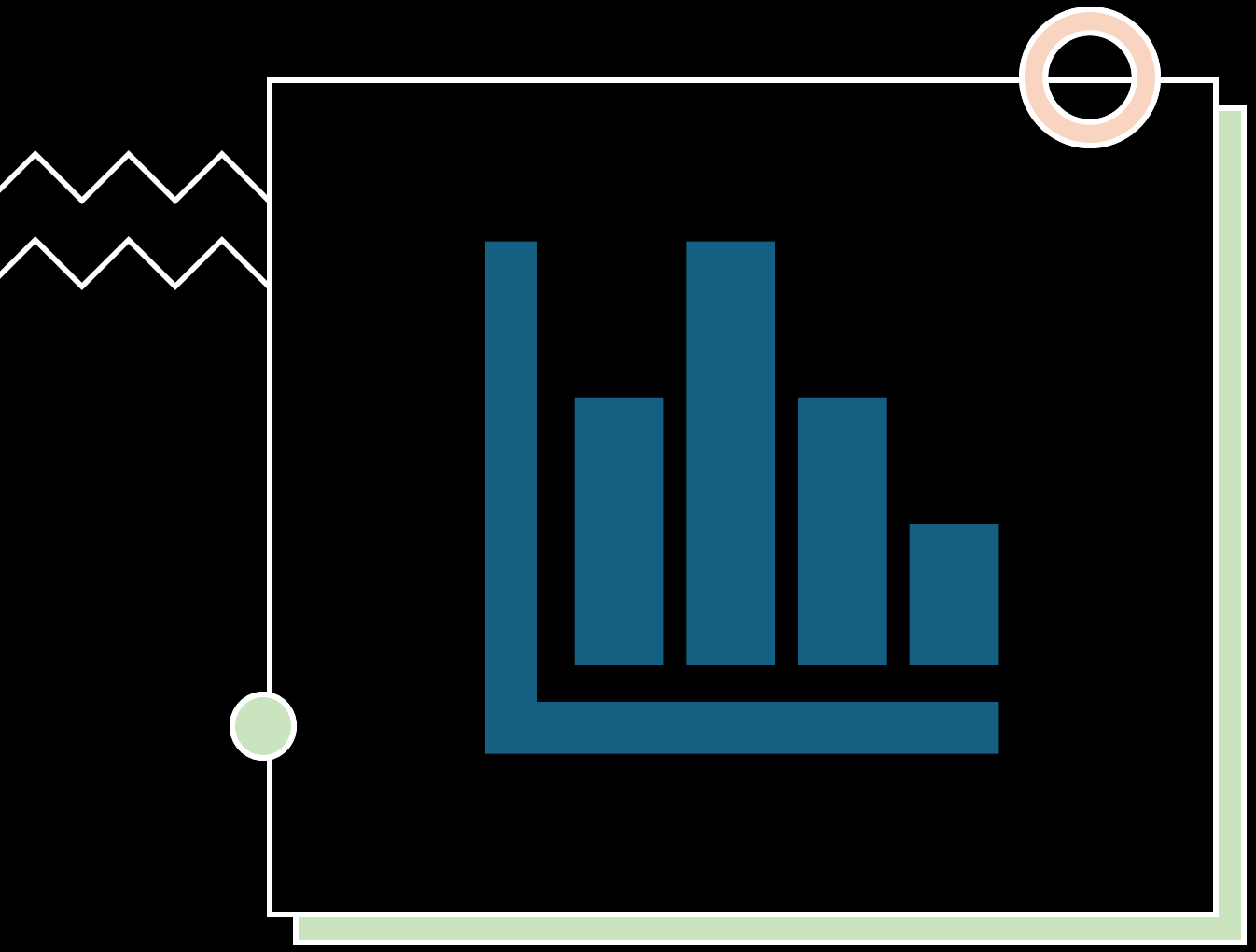
Methods

- The scale was calculated by dividing the scale into **seven different categories**, based on the distance between the ART (representing the **mid-point**) and the minimum and maximum values for every factor.
- Any municipalities greater than the ART would receive a positive value, indicative of a higher need.
- The threshold index values were generated

$$\text{Composite Index Value} = \sum_{i=1}^{n}(\text{Fi}) .$$

- **A positive composite index value= A TJ area Negative composite index value= Not a TJ area**.
- If **a composite index value = 0,** it is suggested that the municipality be investigated more in depth as it may be a potential TJ area in the near future.





Result and Discussion

Table 4 Oklahoma county TJTIF application compared to Oklahoma Metropolitan Area.

Regional Values (based on 7 counties)					Cities and towns in Oklahoma county																		
Category	TJ Variable	Region Min	Region Max	ART	Lake Aluma	Woodlawn Park	Nichols Hills	Smith Village	Nicoma Park	Harrah	Jones	Choctaw	Luther	Edmond	The Village	Valley Brook	Bethany	War Acres	Oklahoma City	Midwest City	Del City	Arcadia	Spencer	Forest Park
Demographics	Race	6.40%	21%	11%	3%	3%	6%	9%	10%	10%	10%	11%	15%	15%	17%	18%	18%	27%	30%	35%	36%	62%	68%	77%
	Age	35%	42%	39%	68%	63%	46%	23%	44%	43%	45%	46%	42%	40%	33%	40%	43%	44%	38%	42%	41%	46%	46%	56%
	Disability	13%	20%	16%	15%	12%	11%	24%	15%	15%	15%	18%	8%	11%	13%	21%	15%	15%	13%	18%	20%	21%	21%	17%
Socio-economic	Household income	51%	62%	58%	100%	53%	51%	71%	58%	54%	54%	58%	62%	52%	54%	57%	64%	69%	57%	64%	36%	66%	65%	52%
	Single parent household	33%	50%	39%	16%	27%	21%	76%	46%	40%	43%	35%	49%	36%	60%	54%	50%	45%	50%	55%	55%	83%	56%	31%
	Vehicles per household	1%	6%	4%	0%	0%	0%	0%	2%	4%	6%	6%	1%	3%	4%	12%	7%	3%	6%	5%	8%	10%	12%	3%
	Cost of living	13%	80%	50%	0%	0%	59%	0%	69%	55%	60%	43%	95%	28%	63%	80%	47%	61%	49%	51%	53%	75%	48%	0%
	Economic development	0%	2%	1%	3%	15%	0%	4%	5%	3%	2%	0%	12%	1%	6%	13%	1%	1%	1%	0%	0%	2%	8%	2%
Transportation and land use	Network connectivity	0	4.90%	2.20%	0.3%	0.0%	12.9%	0.0%	1.5%	0.0%	0.0%	0.1%	0.0%	0.0%	6.2%	16.5%	5.0%	11.7%	6.1%	0.0%	1.1%	0.0%	0.1%	2.0%
	Truck Volume	1	8	3.88	2	6	1	6	1	8	2	1	2	2	2	2	1	1	8	2	6	35	2	3
	Crash rates	0%	100%	8.29%	N/A	N/A	0%	N/A	N/A	100%	0%	33.30%	N/A	1.57%	0%	N/A	4.54%	5.88%	5.82%	5.37%	9.23%	0%	5.82%	N/A

Demographic Category

- The racial composition has a general regional range of **6.40%** to **21%.**
- Municipalities like **Oklahoma City** and **Arcadia** have higher percentages, indicating a more diverse population.
- The age cohorts from **35%** to **42%**, with **Luther** and **Arcadia** showing higher percentages.
- Disability rates range from **13%** to **20%,** with some towns having lower rates. Harrah has a higher prevalence at **24%.**

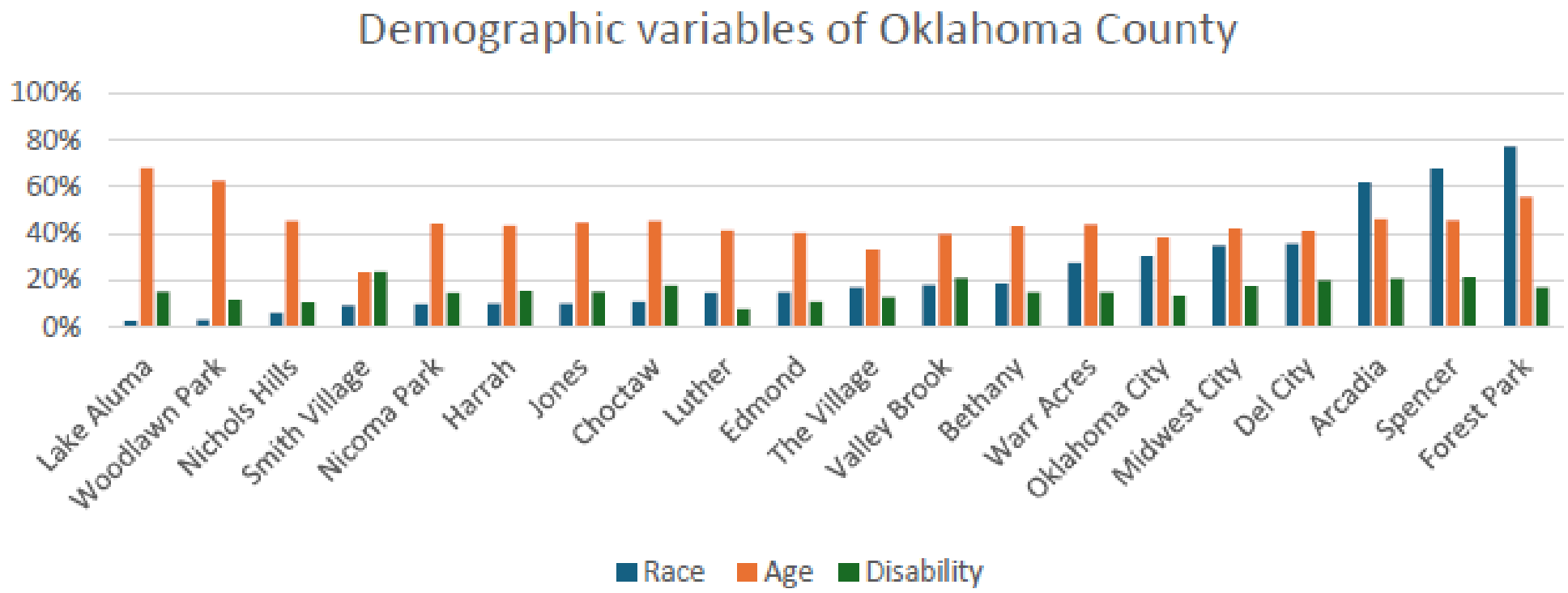
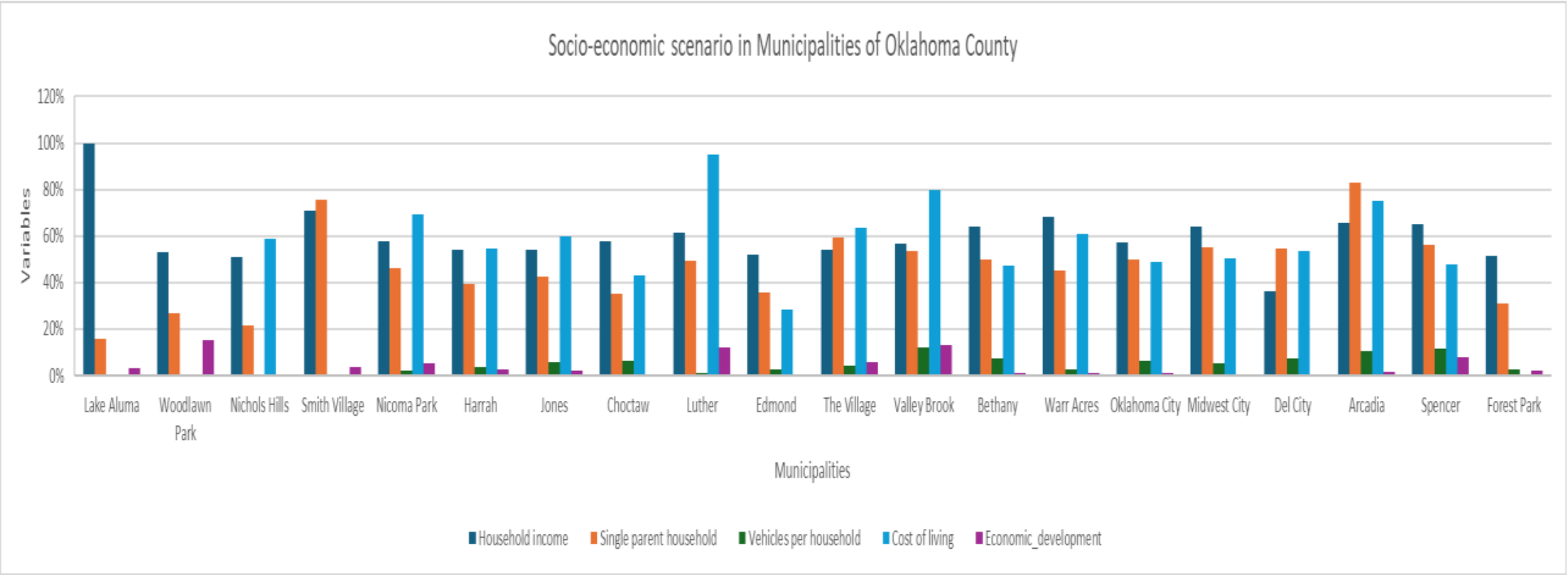


Table 5 :Index value for each matric of demographic category

City Name	Race	Age	Disability
Arcadia	1	1	0
Del City	-3	0	0
Smith Village	0	-3	1
Valley Brook	-2	0	0
Jones	0	0	-2
Lake Aluma	0	2	-2
Forest Park	2	2	-3
Choctaw	-1	1	-3
Spencer	2	1	0
Midwest City	-3	0	-3
Nicoma Park	0	0	-2
Edmond	-1	0	-1
Oklahoma City	-3	-1	-1
The Village	-2	-2	-1
Nichols Hills	0	1	-1
Warr Acres	-2	0	-2
Bethany	-2	0	-2
Woodlawn Park	0	2	-1
Harrah	0	0	-2
Luther	-1	0	0

Socio-economic Category



- **Low economic development** is prevalent, with some areas showing improvements.
- **Spencer**, with a **95%** median monthly housing income below the regional average

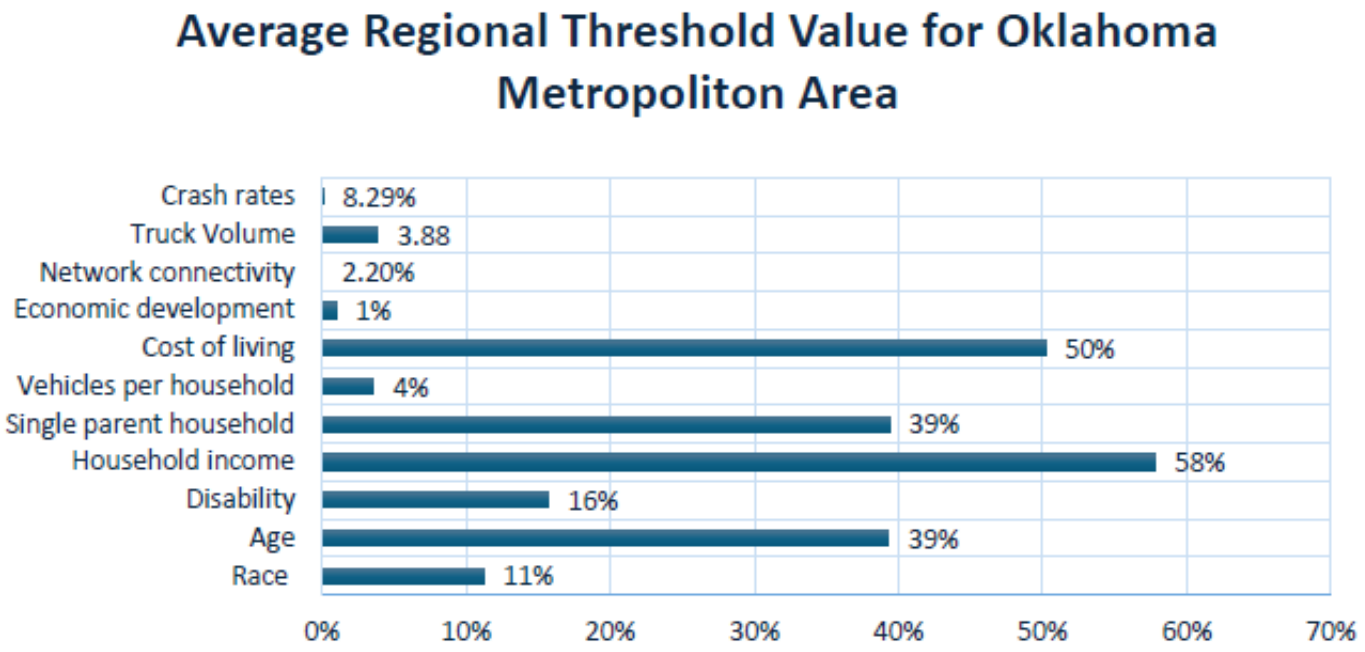
Table 6 : Index value for each matric of socio-economic category

City Name	Economic Development	Household income	Single parent household	Vehicles per household	Cost of living
Arcadia	-1	-3	2	1	1
Del City	0	0	0	0	0
Smith Village	-2	0	2	0	0
Valley Brook	2	-1	0	1	2
Jones	-1	-1	-3	-3	0
Lake Aluma	-2	2	0	0	0
Forest Park	-1	-1	-1	-1	0
Choctaw	0	-3	-1	-3	-2
Spencer	0	-3	0	1	-3
Midwest City	0	-3	0	-2	0
Nicoma Park	-3	-3	-3	-1	1
Edmond	-1	-1	-1	-1	-1
Oklahoma City	-1	-1	0	-3	-3
The Village	-3	-1	0	-2	0
Nichols Hills	0	-1	0	0	0
Warr Acres	-1	0	-3	-1	0
Bethany	-1	-3	0	-3	-2
Woodlawn Park	2	-1	0	0	0
Harrah	-2	-1	-3	-2	0
Luther	1	-3	-3	0	2

Transportation and Land Use Category

- Transit access ranging from **0%** to **4.90%**
- Edmond and The Village having higher connectivity.
- **Truck volume** is highest in **Oklahoma City**, with 35 trucks and crash rates are highest in Oklahoma City at **9.23%.**

Average Regional Threshold Value



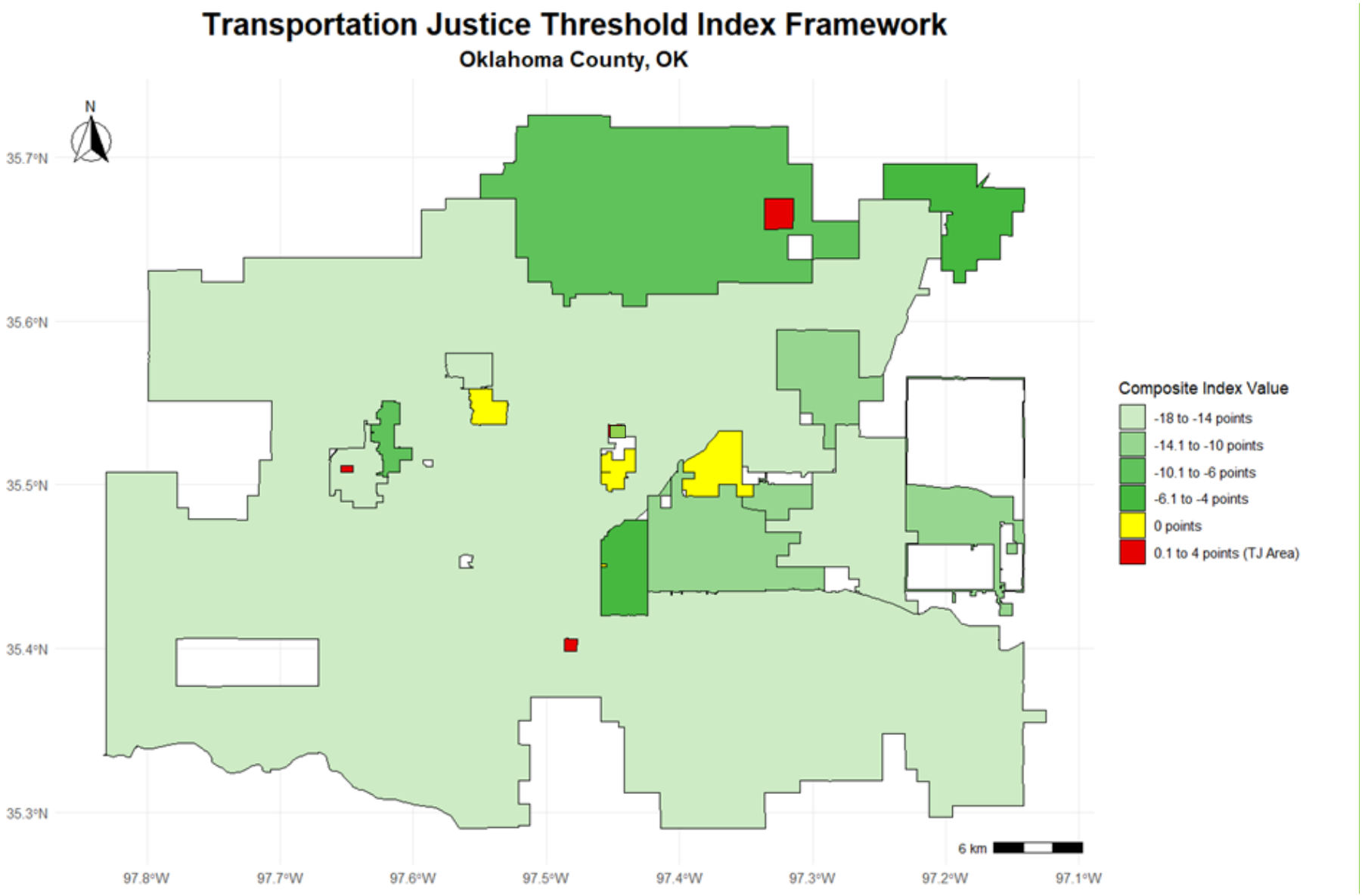
- **16%** of the population having disabilities.
- Most households earn **below average**, indicating **income inequality**.
- The high vehicle ownership rate suggests reliance on automobiles
- **Economic development** is **slow**

Table 7 : Index value for each matric of transportation and land-use

City Name	Public transit Access	Truck Volume	Crash Rates
Arcadia	0	2	0
Del City	0	-1	-1
Smith Village	0	-1	0
Valley Brook	2	0	0
Jones	0	0	0
Lake Aluma	0	0	0
Forest Park	0	0	0
Choctaw	0	0	-2
Spencer	0	0	0
Midwest City	0	0	0
Nicoma Park	0	0	0
Edmond	0	0	0
Oklahoma City	-3	-2	0
The Village	-3	0	0
Nichols Hills	1	0	0
Warr Acres	1	0	0
Bethany	-2	0	0
Woodlawn Park	0	-1	0
Harrah	0	-2	2
Luther	0	0	0

Table 8 :TJTIF results for municipalities in Oklahoma County, OK

City Name	Composite Index	Remarks
Oklahoma City	-18	NOT A TJ AREA
Bethany	-15	NOT A TJ AREA
Choctaw	-14	NOT A TJ AREA
The Village	-14	NOT A TJ AREA
Midwest City	-11	NOT A TJ AREA
Nicoma Park	-11	NOT A TJ AREA
Harrah	-10	NOT A TJ AREA
Jones	-10	NOT A TJ AREA
Warr Acres	-8	NOT A TJ AREA
Edmond	-7	NOT A TJ AREA
Del City	-5	NOT A TJ AREA
Luther	-4	NOT A TJ AREA
Forest Park	-3	NOT A TJ AREA
Smith Village	-3	NOT A TJ AREA
Spencer	-2	NOT A TJ AREA
Nichols Hills	0	POTENTIAL TJ AREA
Lake Aluma	0	POTENTIAL TJ AREA
Woodlawn Park	1	A TJ AREA
Arcadia	4	A TJ AREA
Valley Brook	4	A TJ AREA



TJTIF results for municipalities in Oklahoma County, OK

Recommendations and Implication in Transportation Planning

Integrating Theories of Justice into Transportation Policy

Focusing on Procedural and Distributive Justice

Implementation of Comprehensive transportation Planning

Promoting Sustainable and Inclusive Mobility

Enhancement of Health and Transportation Integration

Thank you