# Weekend Transit and Walking Accessibility to Social, Cultural, and Recreational Destinations: A GIS Analysis of Knoxville, Tennessee

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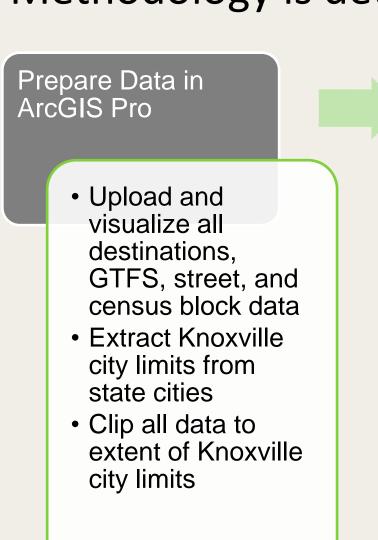
1Current Affiliation: Fulbright Scholar CZ; Former Affiliation: University of Tennessee Undergraduate Student | 2 Department of Civil and Environmental Engineering, The University of Tennessee Contact: Eilish Bennett: eilishjbennett@gmail.com | Jing Guo: jguo31@vols.utk.edu | Candace Brakewood: cbrakewo@utk.edu TRBAM-S-23-00328 | Tuesday, Jan 09 2024 | 1:30PM - 3:15PM

## INTRODUCTION

- Efficient and equitable urban and transit planning has many environmental, economic, and social benefits.
- The "15-minute city" and "complete communities" are urban planning models that prioritize access to an array of destinations via transit, cycling, or walking.
- Cultural, social, and recreational destinations are neglected in transit accessibility metrics despite their contribution to forming rich and vibrant communities.
- This study evaluates walkability and weekend transit accessibility to the following destinations: public libraries, full-service restaurants, drinking places, fitness centers, and places of worship.

# **METHODOLOGY**

The data used in this study were obtained from publicly available datasets and the ArcGIS Community Analyst application. The software used for analysis was ArcGIS Pro. Methodology is detailed below:



# **Build Network** Workspace for

Build network

Perform Transit and

Walking Accessibility

Run the "Calculate

Accessibility Tool"

with the following

• Origins: census

block group

Destinations:

each of the 5

Repeat analysis

Daytime;

destination types

for following times:

Transit: Saturday

Saturday Night;

Sunday Morning

Walking: invalid

transit time for

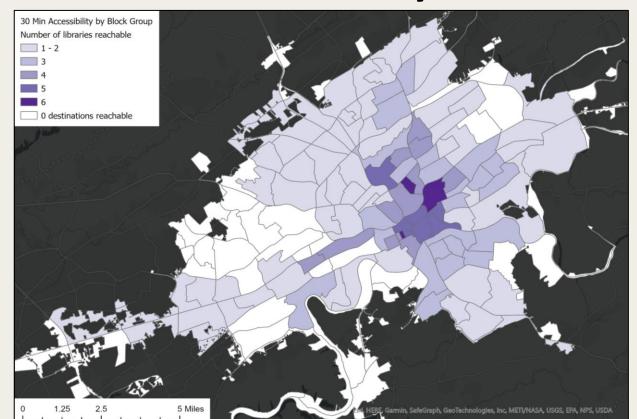
walking (2AM-

parameters:

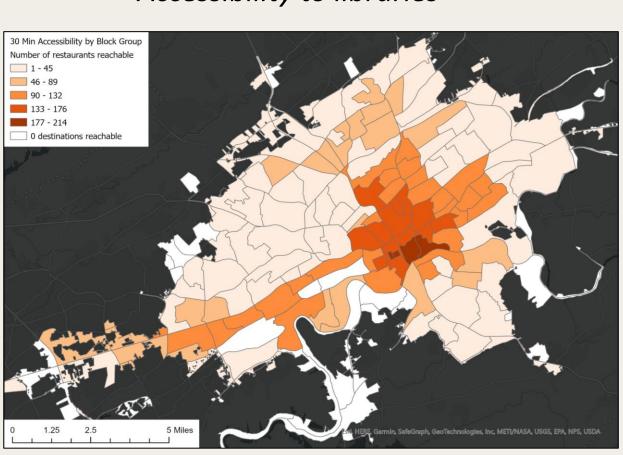
centroids

- Connect street data and GTFS data
- Configure pedestrianrestricted roads within network
- Configure proper connectivity

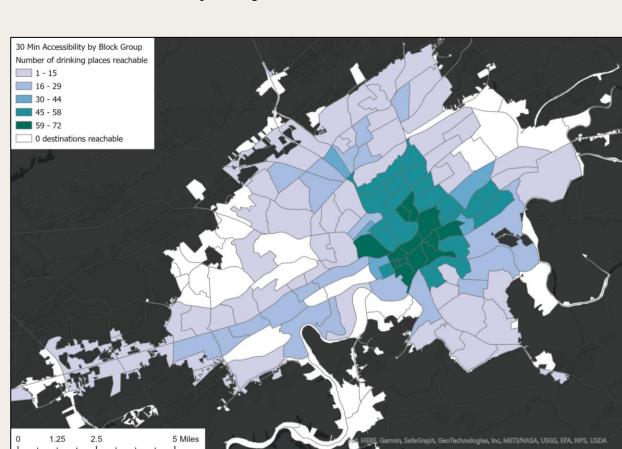
# Accessibility\*:



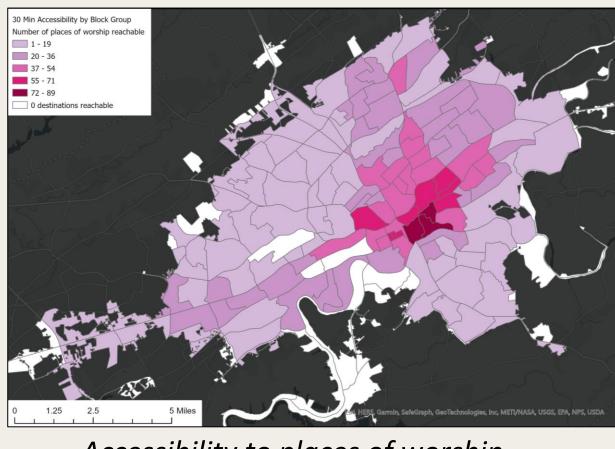
Accessibility to libraries



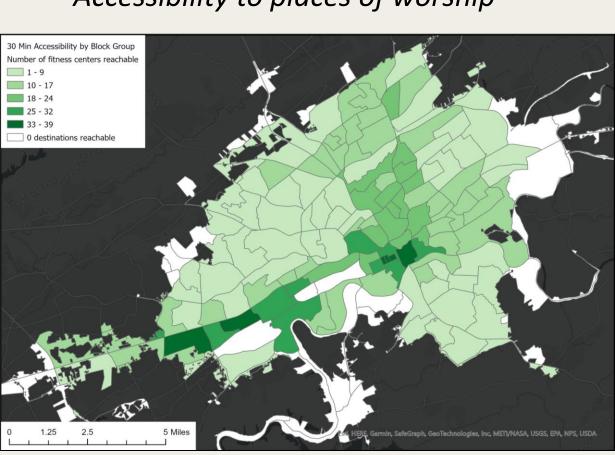
Accessibility to full-service restaurants



Accessibility to drinking places

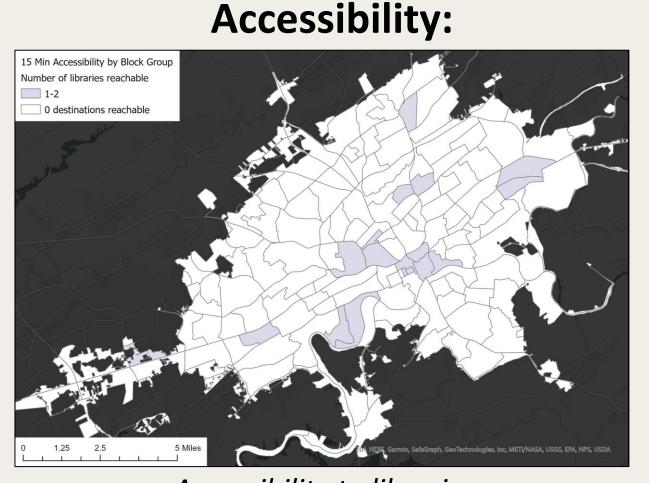


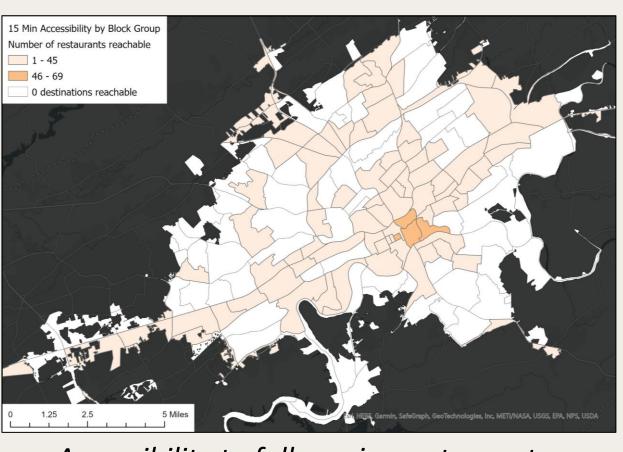
Accessibility to places of worship



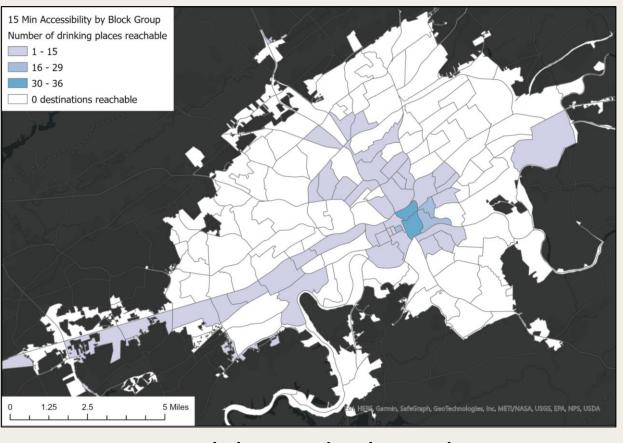
Accessibility to fitness centers

#### **Saturday Daytime Transit** Walking

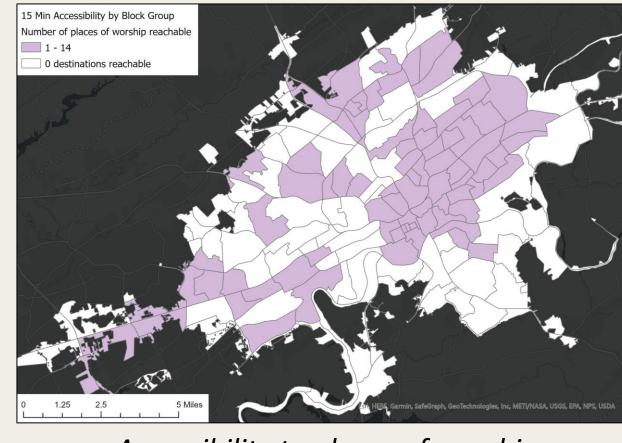




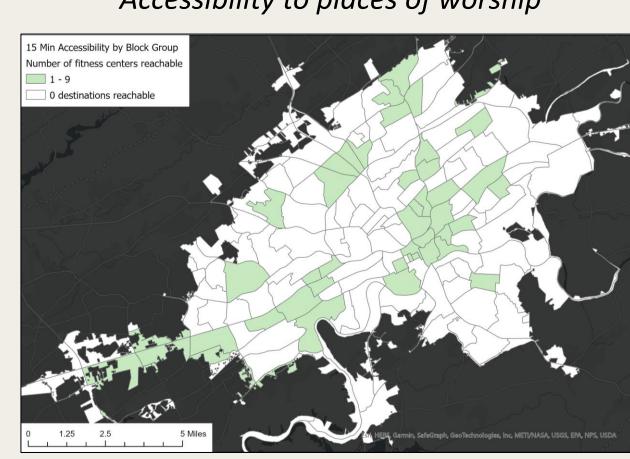
Accessibility to full-service restaurants



Accessibility to drinking places



Accessibility to places of worship



Accessibility to fitness centers

The table below shows, on average, how many libraries, full service-restaurants, drinking places, places of worship, and fitness centers are reachable from each census block group via transit or walking:

		Accessibility Measure			
Destination Type	Measure	Saturday Daytime - Transit	Saturday Night - Transit	Sunday Morning - Transit	Walking - General
Libraries	Average	1	1	1	0
	Minimum	0	0	0	0
	Maximum	6	6	6	2
	Standard Deviation	1.51	1.57	1.53	0.37
	Average	43	45	37	4
Full-Service	Minimum	0	0	0	0
Restaurants	Maximum	214	220	219	69
	Standard Deviation	51.68	53.39	51.61	10.94
Drinking Places	Average	13	14	12	1
	Minimum	0	0	0	0
	Maximum	72	72	72	36
	Standard Deviation	20.62	21.29	19.64	4.34
	Average	16	16	14	2
Places of Worship	Minimum	0	0	0	0
	Maximum	89	89	83	14
	Standard Deviation	18.72	18.76	18.46	2.77
Fitness Centers	Average	8	8	7	0
	Minimum	0	0	0	0
	Maximum	39	40	40	8
	Standard Deviation	9.48	9.58	9.32	1.57

### DISCUSSION

- Downtown Knoxville has the highest transit accessibility and walkability to every destination type, with the edges of the city experiencing low accessibility levels.
- There are substantially less destinations reachable via a 15-minute walk than via transit.
- Transit accessibility levels do not vary significantly across weekend times.
- Policymakers and planners should consider emphasizing the incorporation of pedestrian and transit infrastructure in order to increase accessibility to non-work destinations.
- Limitations are that pedestrian wait times could not be considered in the walking analysis and that street network data may not be comprehensive.





- Objective 1: Evaluate differences in transit accessibility to libraries, full-service restaurants, drinking places, places of worship, and fitness centers across three weekend times:
  - Saturday Daytime (10AM-1PM)
- Saturday Night (6PM-9PM)
- Sunday Morning (9AM-12PM)
- Objective 2: Evaluate the walkability of Knoxville to libraries, full-service restaurants, drinking places, places of worship, and fitness centers

\* Transit accessibility column only represents Saturday Daytime from 10AM-1PM. Saturday Night and Sunday Morning transit results not shown.