

REGIONAL EMISSION AND HEALTH IMPACT ASSESSMENT OF IMPLEMENTATION OF MICROMOBILITY: AN EL PASO, TX CASE STUDY

Presenter: Farinoush Sharifi

Center for Advancing Research In Transportation Emissions,
Energy, and Health (CARTEEH)
Texas A&M Transportation Institute



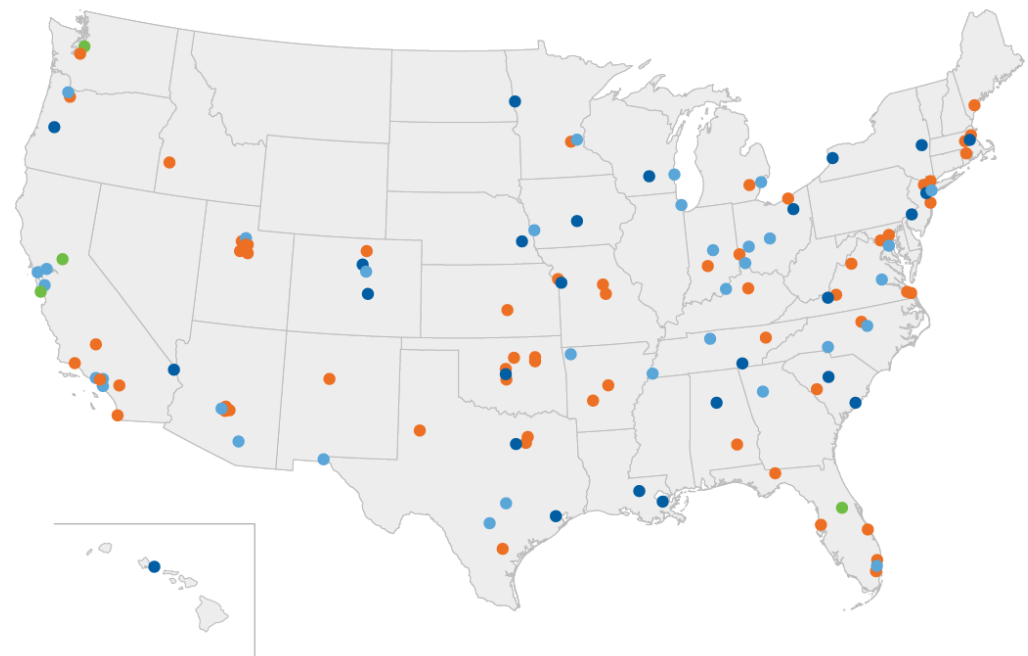
Background

- Recent policies in place to promote micromobility:
 - dedicated lanes and parkings
 - partnership with shared service providers
- 136 million shared micromobility trips in 2019 (60% increase)
- Need for comprehensive assessment of potential benefits to urban sustainability

SHARED MICROMOBILITY ACROSS THE US

As of 12/31/2019. Source: NACTO

- Station-based systems only
- Both dockless & station-based systems
- Dockless scooters and/or bikes only
- Dockless bikes only

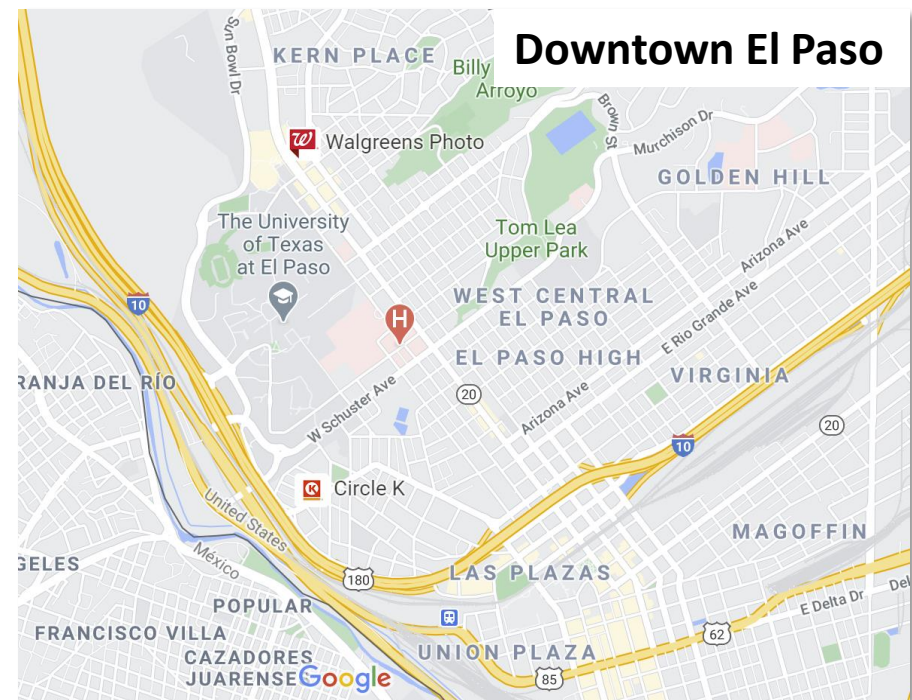


Research Goals

- Incorporate micromobility demand at different adoption rates into the existing transportation network
- Investigate the environmental and societal role of micromobility at regional and boundary levels

El Paso Case Study

- Located on the Texas border region with several ports of entry
- A non-attainment area for particulate matter (PM₁₀)



Current Shared-Micromobility in El Paso

- SunCycle bikesharing managed by Camino Real Regional Mobility Authority (CRRMA)
 - 3% increase in ridership in 2019
 - 15,673 rides in 2019
 - Estimated 35 tons carbon offset in 2019
 - \$74,616 ridership revenue
- Glide scooters
 - Officially started in 2019

<https://www.crrma.org/past-projects/suncycle>

<https://www.facebook.com/GlideYourCity>



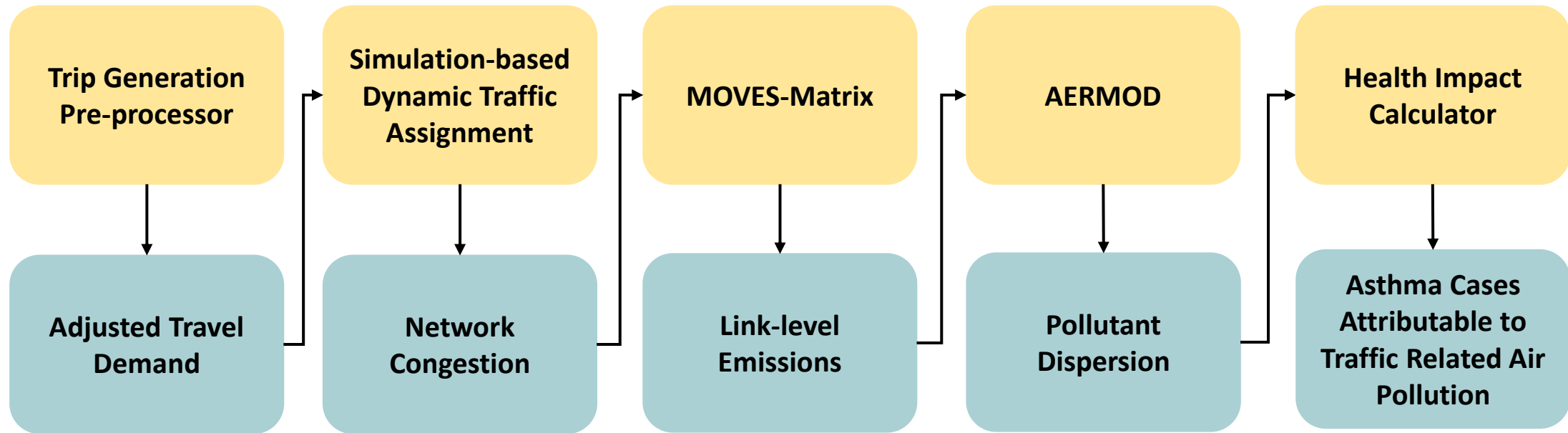
Micromobility Scenarios Setup

- Eligible micromobility trips:
 - Car trips
 - Originated/terminated in Downtown and UTEP areas
- Adoption formulation:
 - Distance of a trip taken via a micromobility mode
 - Probability of a very short car trip being replaced by a micromobility trip
- For each eligible trip i , the probability of being replaced is: $P_r^i = P_{max} e^{-L^i/L}$

Scenario	L	P_{max}	Daily Micromobility Trips	Daily Vehicle Trips
Low Adoption	1	0.2	1,743	2,491,492
Medium Adoption	1.25	0.25	2,772	2,490,463
High Adoption	1.5	0.3	3,845	2,489,390

Method

Platform to Assess Transportation, Health, and Sustainability (PATHS)



Regional Traffic Operation and Emission Impacts

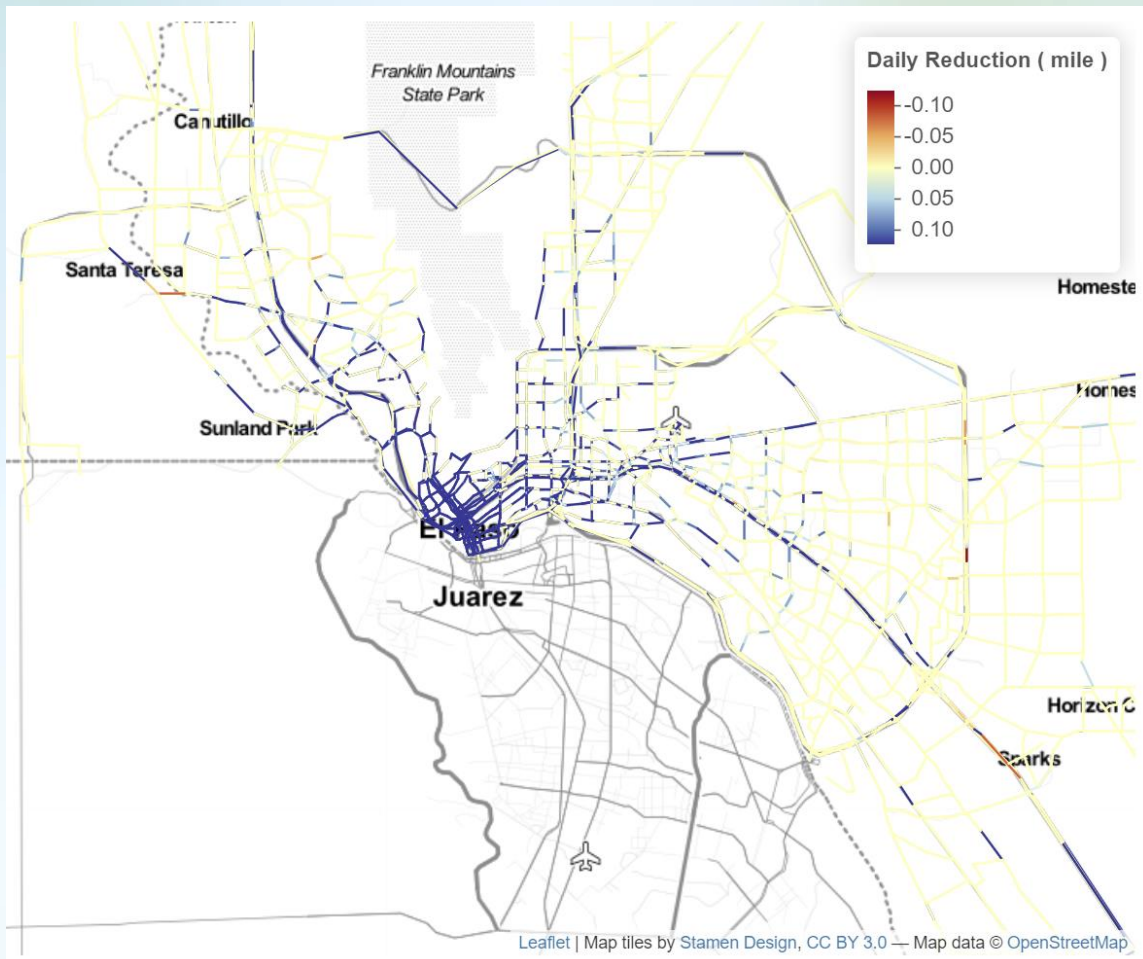
Scenario	Metric	Total Reduction	Percent Change	p-value
Micro-mobility: Low Adoption	PM10 (kg/day)	0.38	0.06	0.64
	PM2.5 (kg/day)	0.34	0.06	0.64
	NOx (kg/day)	8.77	0.05	0.60
	Energy Consumption (MMBTU)	322,809	0.25	0.45
	CO2e (kg/day)	24,501	0.25	0.45
	Total Delay (min/day)	-13,886	-0.12	0.85
	VMT	2,195	0.01	0.53
Micro-mobility: Medium Adoption	PM10 (kg/day)	0.27	0.04	0.65
	PM2.5 (kg/day)	0.25	0.04	0.65
	NOx (kg/day)	5.50	0.03	0.61
	Energy Consumption (MMBTU)	38,415	0.03	0.73
	CO2e (kg/day)	2,942	0.03	0.72
	Total Delay (min/day)	2,497	0.02	0.97
	VMT	3,940	0.02	0.28
Micro-mobility: High Adoption	PM10 (kg/day)	0.82	0.12	0.31
	PM2.5 (kg/day)	0.74	0.12	0.31
	NOx (kg/day)	18.75	0.11	0.26
	Energy Consumption (MMBTU)	496,714	0.39	0.33
	CO2e (kg/day)	37,732	0.38	0.33
	Total Delay (min/day)	16,879	0.15	0.81
	VMT	6,393	0.03	0.11

No statistically significant improvement in regional level, likely due to small implementation area

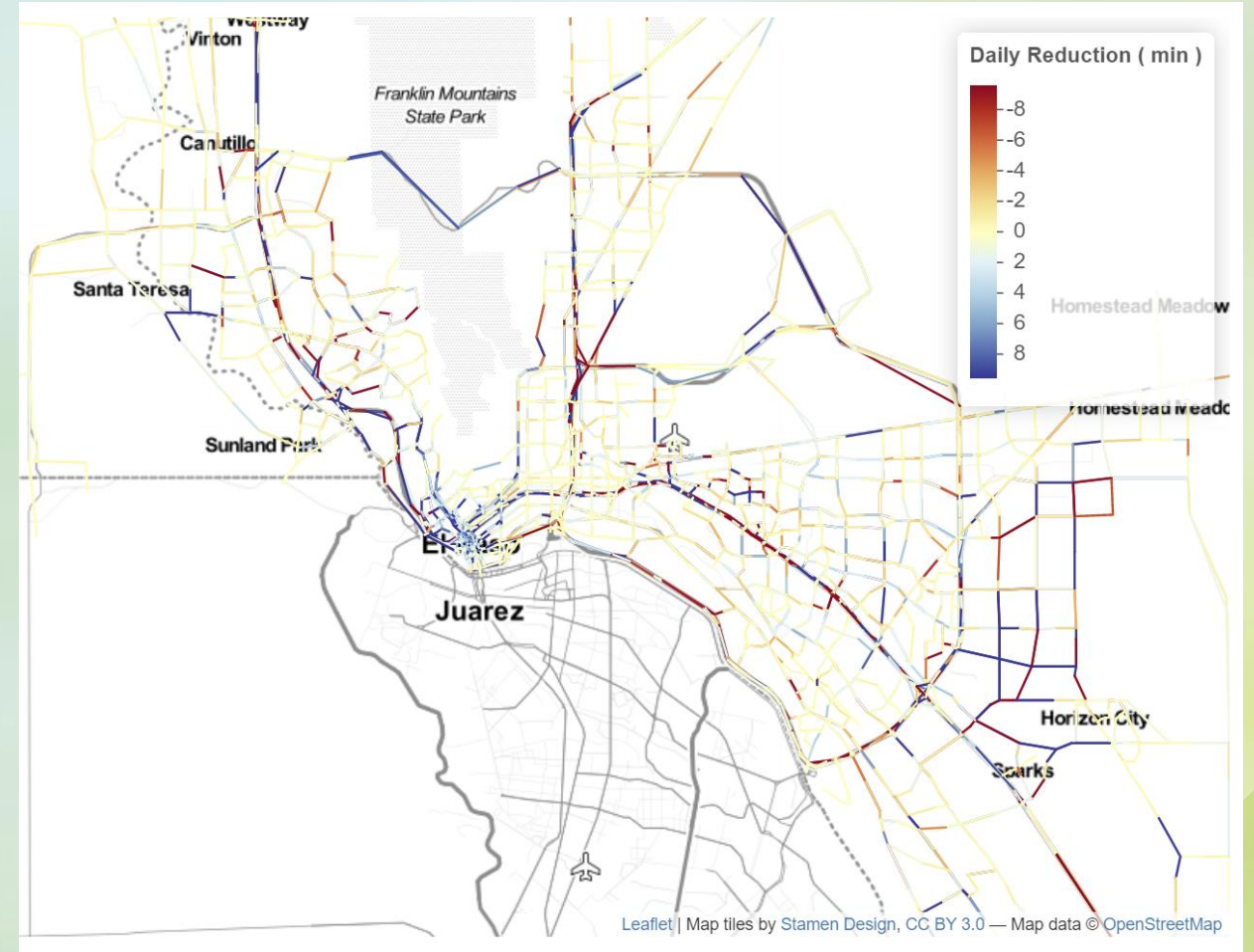


Local Impacts: Traffic

VMT

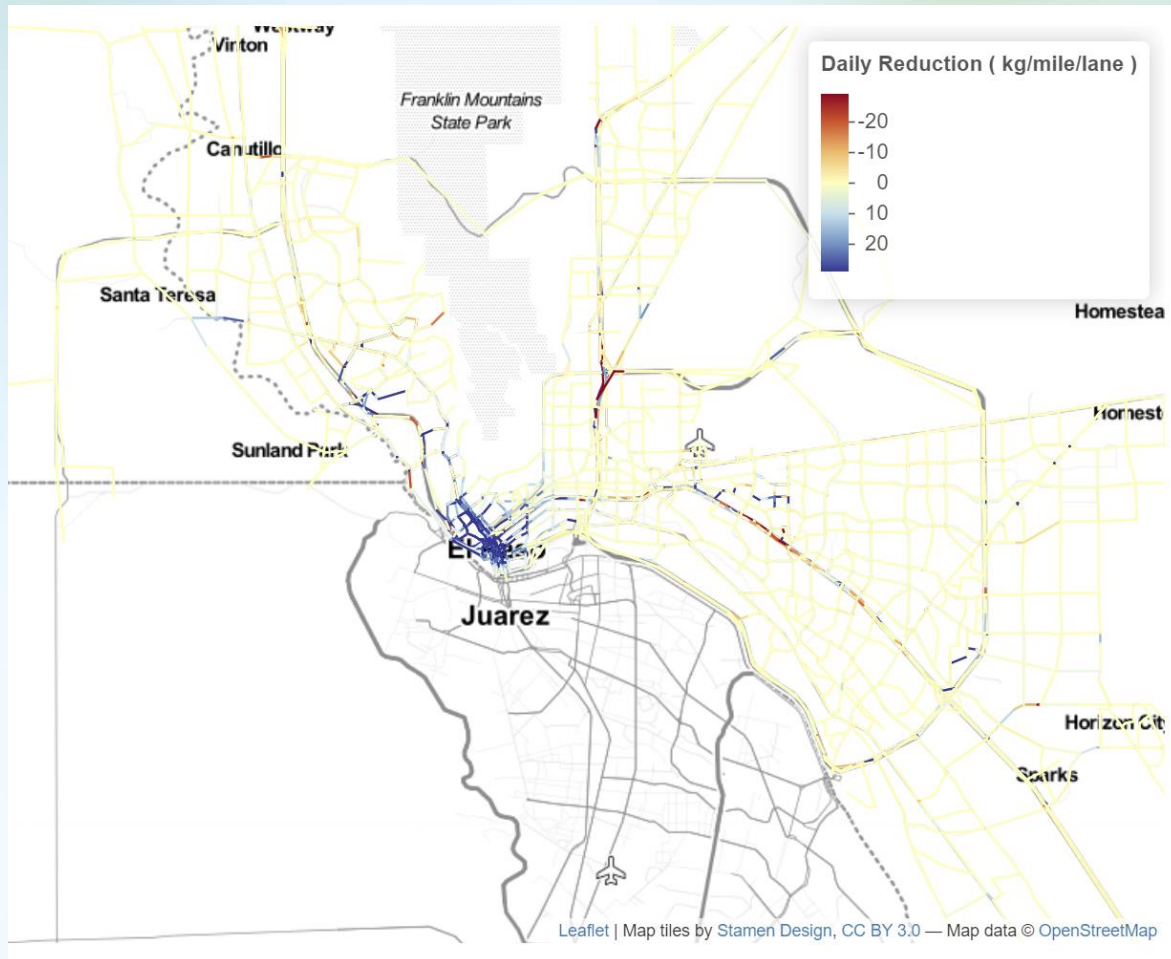


Delay

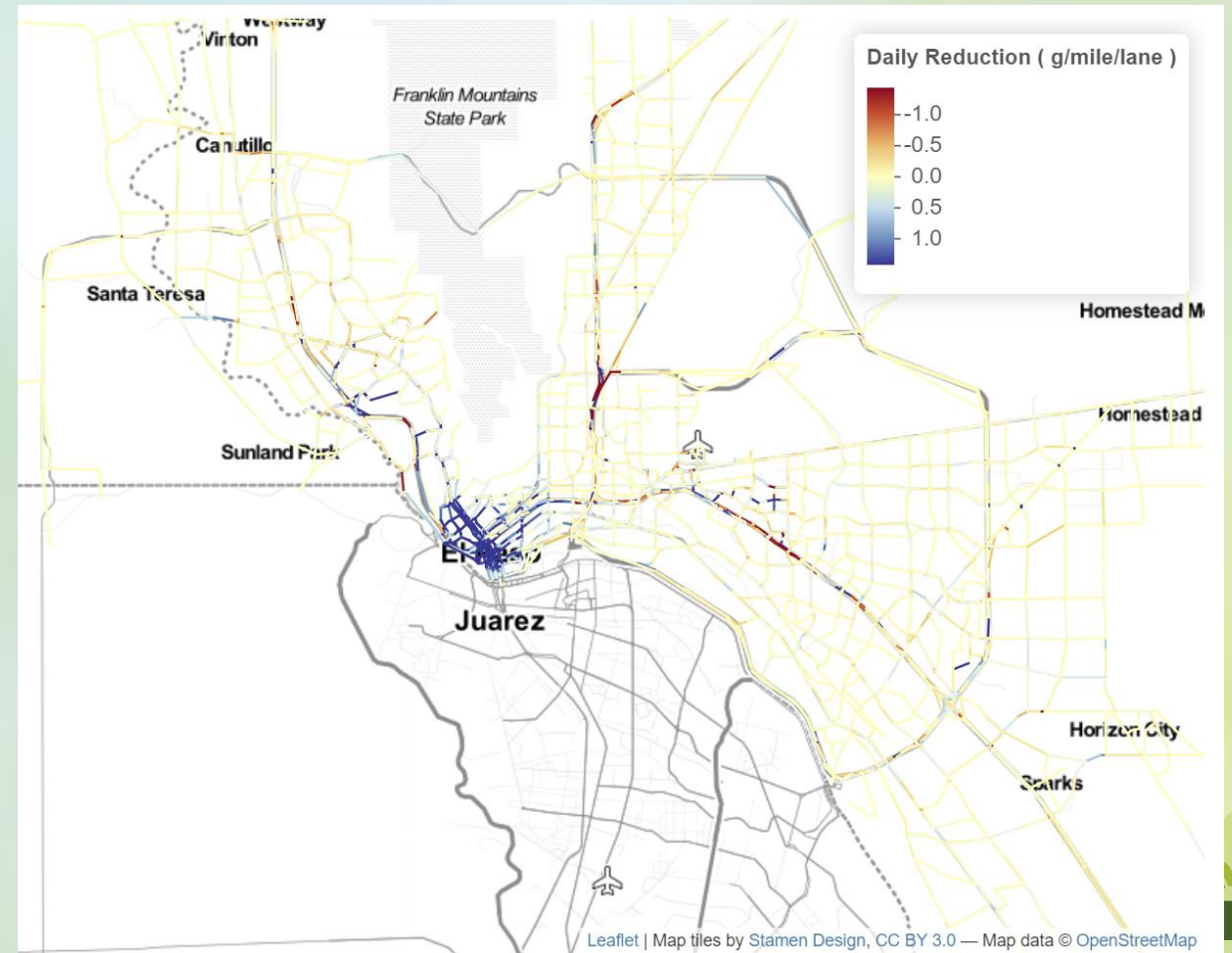


Local Impacts: Emission

GHG

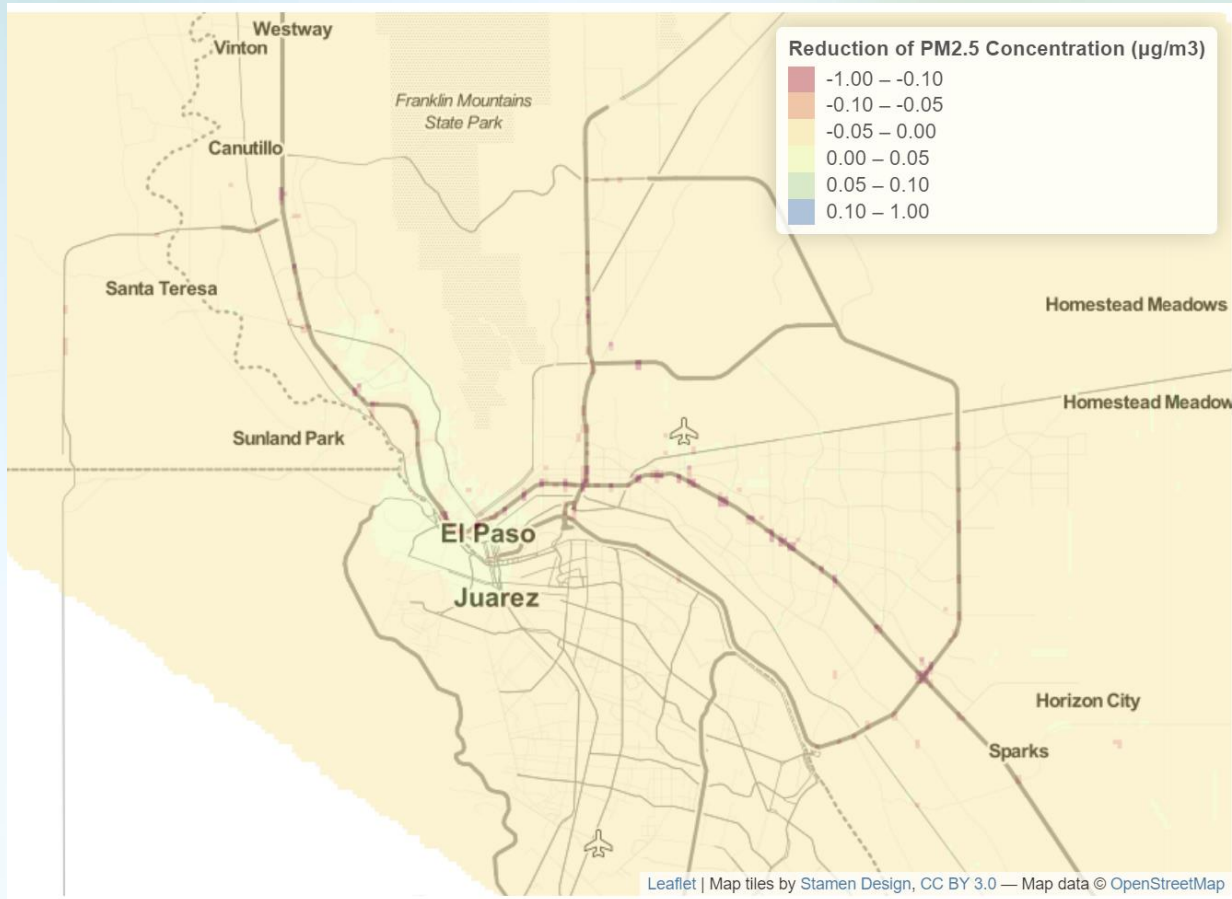


PM_{2.5}

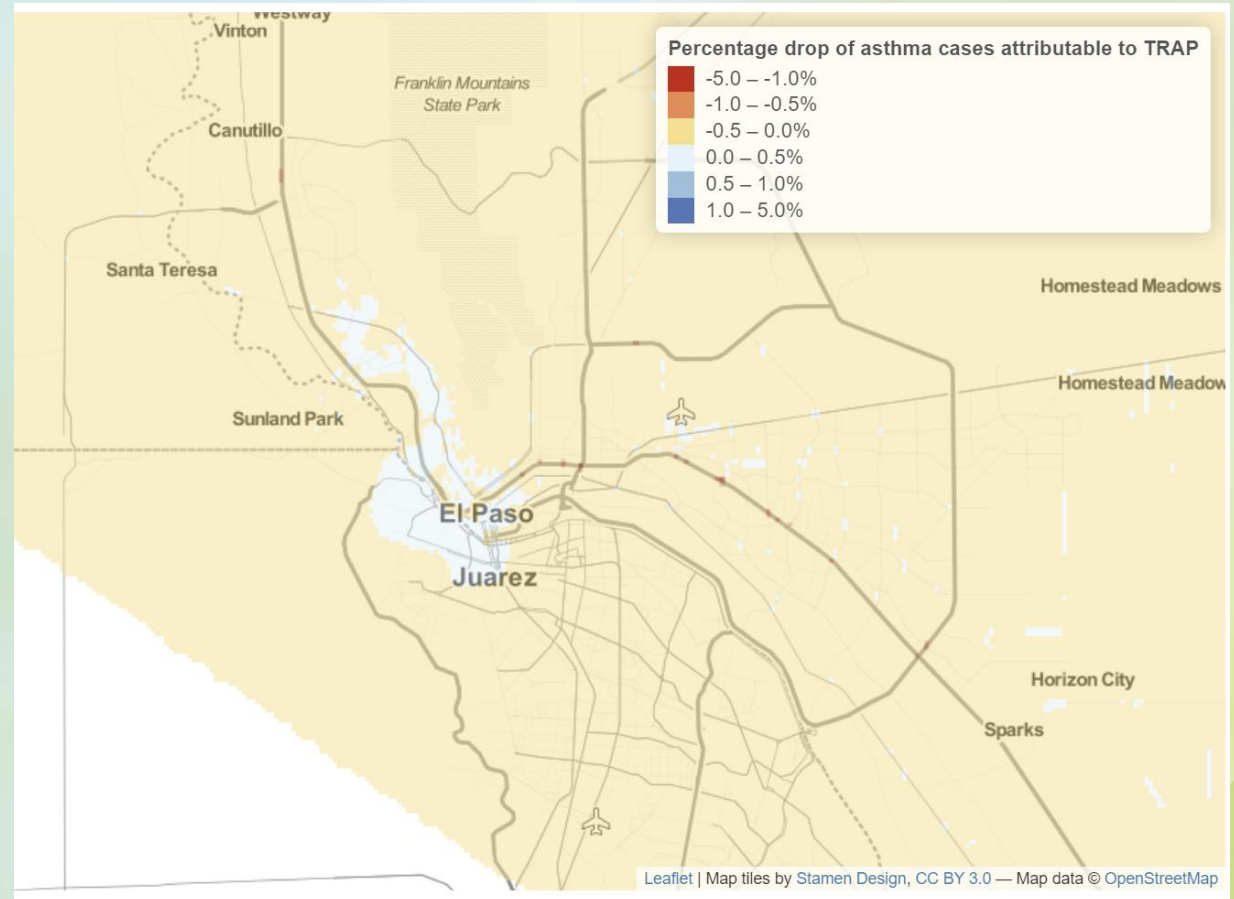


Local Impacts: Pollutant Dispersion and Health

PM_{2.5} Dispersion



Asthma Cases



Conclusions

- Environmental impacts are measured in greenhouse and air pollutant emissions, and societal impacts are measured in public health outcomes attributable to traffic-related air pollution.
- No significant improvement is observed in regional congestion and emission.
- Localized emission, pollutant concentration, and respiratory disease benefits are observed.
- Micromobility is effective at the local level.

Research Implications and Future Work

- Growing shared-micromobility services do not necessarily improve regional congestion and emissions.
- However, emission benefits and health impacts can be observed where micromobility is implemented.
- Current land use in El Paso does not allow for regional implementation of micromobility; may have other emission and health implications in other regions.



Thank you!

Email: farinoushsharifi@tamu.edu

Team:

Farinoush Sharifi

Alex Meitiv

Jeff Shelton

Xiaodan Xu

Yanzhi Ann Xu

