Tucson Street Design at Fatal Pedestrian Crash Sites

Erick Bieber | SBE 498 Capstone | Mentors: Drs. Nataliya Apanovich & Philip Stoker

Introduction

- Tucson is ranked third in the US in pedestrian traffic fatalities [1]
- Pedestrian deaths are continuing to increase over time [2]

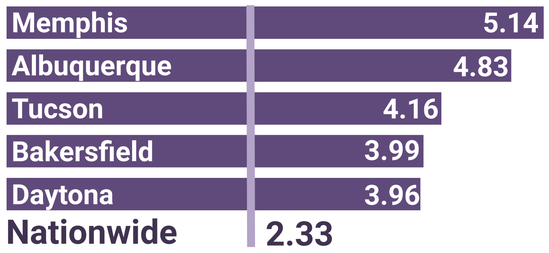

Figure 1. Pedestrian fatalities per 100,000 population [1] [3]

Research Question

What street design elements are associated with increased pedestrian fatalities?

Methods

Quantitative Approach

Research
- Identify established risk designs
- Locate local municipal datasets

Database Building
- Join street design data to the pedestrian crash dataset in GIS

Analysis
- Fatal crash rate by street design
- Mean counts at fatal crash sites

Ward Application
- Count miles of road by risk design elements per ward

Figure 2. Methodology

Results

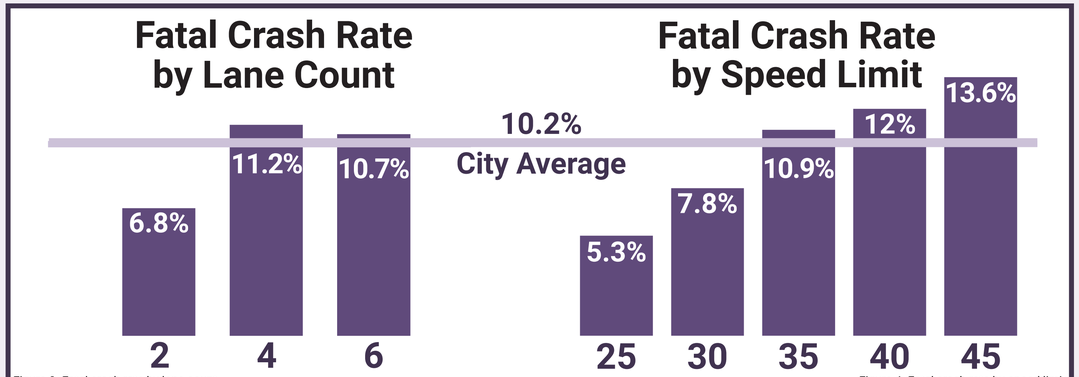

Figure 3. Fatal crash rate by lane count

Figure 4. Fatal crash rate by speed limit

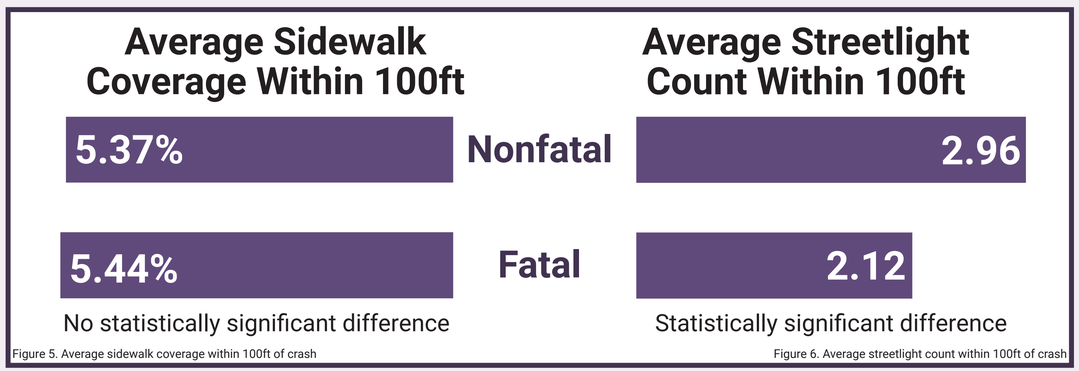

Figure 5. Average sidewalk coverage within 100ft of crash

Figure 6. Average streetlight count within 100ft of crash

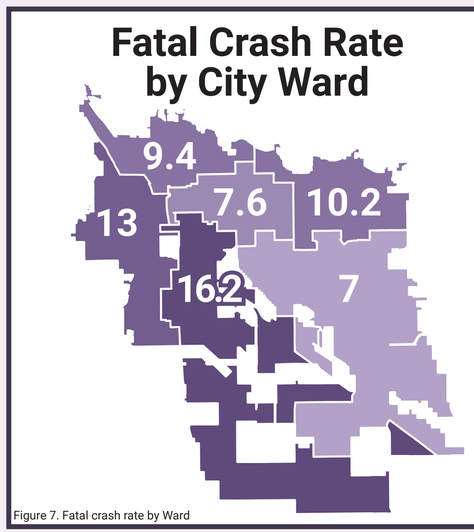

Figure 7. Fatal crash rate by Ward

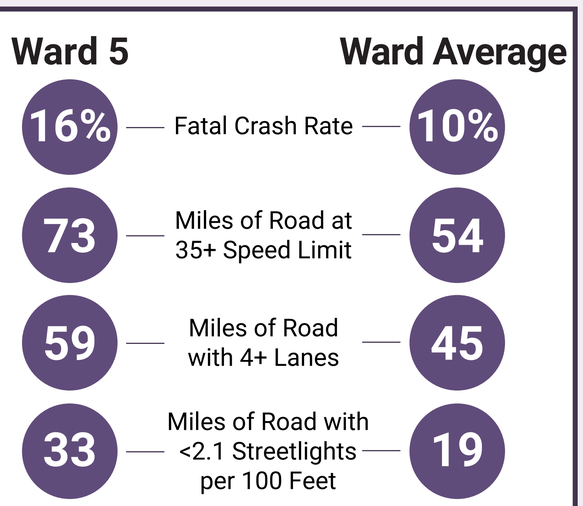

Figure 8. Miles of road by Ward and street design

Conclusion

- **Street lighting** is essential for pedestrian visibility & safety at night.
- **Reducing vehicle speeds** and traffic calming improves crash outcomes.
- There is an **inequitable distribution** of pedestrian safe streets.

Recommendation

Fort Lowell between 1st Ave and Oracle

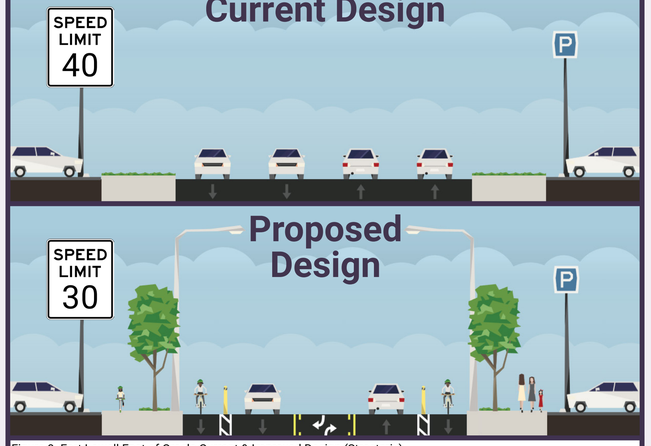

Figure 9. Fort Lowell East of Oracle Current & Improved Design (Streetmix)

Reduced Speeds
- Lower speed limit
- Traffic calming
- Reduced lane count

Pedestrian Amenities
- Street lighting
- Shade
- Sidewalks

References

[1] Smart Growth America. (2024). Dangerous By Design. Smart Growth America. https://smartgrowthamerica.org/dangerous-by-design/
[2] Schneider, R. J. (2020). United States Pedestrian Fatality Trends, 1977 to 2016. Transportation Research Record: Journal of the Transportation Research Board, 2674(9). https://journals.sagepub.com/doi/
[3] Naumann, Rebecca B., et al. "Pedestrian and Overall Road Traffic Crash Deaths — United States and 27 Other High-Income Countries, 2013–2022." Morbidity and Mortality Weekly Report, vol. 74, no. 8, 2025, pp. 134-139. CDC, https://pubmed.ncbi.nlm.nih.gov/40080454/.