Spatial Analysis of Bicycle and Pedestrian Collisions and Factors

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Get Healthy San Mateo County (GHSMC): A Local Collaborative

- **Building healthy, equitable communities for all**
- **Mission**: Support policy change to prevent diseases and ensure everyone has equitable opportunities to live a long and healthy life

- **4 key priorities**
  - Healthy Housing
  - Healthy Neighborhoods
  - Healthy Schools
  - Healthy Economy
Bicyclist & Pedestrian Collisions

• Any collision that involves a bicyclist and/or pedestrian

• Research questions
  – Where are bicyclist and pedestrian collisions occurring?
  – What are the primary causes?
  – Where are severe collisions occurring?
Methods: Data Sources

California Statewide Integrated Traffic Records System, 2009-2013

• Database for collecting and processing collision data reported by California Highway Patrol
• UC Berkeley: Transportation Information Management System
Where are bicyclist and pedestrian collisions occurring?
Collision Hot Spots

- Hot spots are areas where high values cluster spatially
- Used Optimized Hot Spot Analysis tool in ArcMap 10.2.1
  - Evaluates dataset attributes to determine optimal parameters for running tool
  - Expanded version of ArcMap’s original Hot Spot Analysis (Getis-Ord Gi*) tool
  - Incident data aggregation method: count incidents within fishnet polygons
Collision Hot Spots

Bike & Pedestrian Collisions in San Mateo County, 2009-2013

Source: UC Berkeley Transportation Injury Mapping System, 2009 to 2013 Statewide Integrated Traffic Records System
Collision Hot Spots

Bike Collisions in San Mateo County, 2009-2013

Bike Collisions
- Cold Spot - 99% Confidence
- Cold Spot 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence

Source: UC Berkeley Transportation Injury Mapping System, 2009 to 2013 Statewide Integrated Traffic Records System
Collision Hot Spots

Pedestrian Collisions in San Mateo County, 2009-2013

Pedestrian Collisions
- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence

Source: UC Berkeley Transportation Injury Mapping System, 2009 to 2013 Statewide Integrated Traffic Records System
Collision Proximity to Schools

- Created 1/4th mile buffer around all schools using Buffer tool
- Focused on schools within hot spots
  - Daly City
  - Burlingame/San Mateo
  - North Fair Oaks/Redwood City
Collision Proximity to Schools

Percent of Bike/Pedestrian Collisions within 1/4th Mile of Schools in San Mateo County, 2009-2013

- Daly City hot spots: 62%
- Burlingame/San Mateo hot spots: 55%
- North Fair Oaks/Redwood City hot spots: 41%
- San Mateo County (overall): 39%
What are the primary causes of bicyclist and pedestrian collisions?
Primary Collision Factors

Primary Bike Collision Factors in San Mateo County, 2009-2013

- Automobile right of way: 21%
- Improper turning: 19%
- Wrong side of road: 15%
- Traffic signals and signs: 8%
- Improper passing: 3%
- Other: 35%
Primary Pedestrian Collision Factors in San Mateo County, 2009-2013

- Pedestrian right of way: 44%
- Pedestrian violation: 25%
- Unsafe starting or backing: 5%
- Unsafe speed: 5%
- Improper turning: 4%
- Other: 18%
Where are severe bicyclist and pedestrian collisions occurring?
Collision Severity

- Severe collisions refer to collision in which a fatality or severe injury has occurred
- Used Kernel Density tool to identify where severe collisions are occurring
Collision Severity

Bike Collision Severity in San Mateo County, 2009-2013

Source: UC Berkeley Transportation Injury Mapping System, 2009 to 2013 Statewide Integrated Traffic Records System
Collision Severity

Pedestrian Collision Severity in San Mateo County, 2009-2013

Collision Severity Density
- High
- Low

Source: UC Berkeley Transportation Injury Mapping System, 2009 to 2013 Statewide Integrated Traffic Records System
Limitations

• Potential data inaccuracy and incompleteness
  – Includes only collisions reported to law enforcement
  – Data entry (such as type of collision, who’s at fault, location) subject to human error
• Data is released 1-2 years behind
• Publicly available datasets vs law enforcement datasets
Next Steps

- Conduct further analysis
  - Street conditions
  - Involvement of alcohol and proximity to alcohol outlets
  - Temporal analysis
  - Weather conditions
- Partner with local jurisdictions and organizations
Recommendations

• Identify community values and priorities
• Adopt Vision Zero policies
• Design streets to prioritize bicycles, pedestrians, and cars
• Create and track performance metrics
• Focus development near transit
• Use existing streets more effectively
• Implement Complete Streets policies
• Enforce safety on streets
Thank You!

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