

## Safe Systems Summit

Redefining Transportation Safety



# Enhancing NC Vision Zero through data integration

April 24, 2019

2:30 – 4:00 PM

Facilitated by Katie Harmon

# Speakers

- Highway Safety Research Center/Collaborative Sciences Center for Road Safety, UNC
  - Katie Harmon, Postdoctoral Research Associate
- Carolina Center for Health Informatics, UNC School of Medicine
  - Anna Waller, Director
- Institute for Transportation Research and Education
  - Tracy Anderson, Program Coordinator, NC Vision Zero
  - Greg Ferrara, Program Manager, Geospatial Analytics and Decision Management
- City of Durham/Durham-Chapel Hill-Carrboro Metropolitan Planning Organization
  - Anne Phillips, Transportation Specialist, City of Durham Transportation Department
  - Dale McKeel, Bicycle and Pedestrian Coordinator, DCHC MPO
- City of Charlotte
  - Angela Berry, Project Manager, Charlotte Vision Zero

# Primary Meeting Objectives

At the end of this workshop, meeting attendees will have a clearer understanding of:

1. What is crash-health outcome data linkage/integration and how it is useful for improving transportation safety?
2. How is North Carolina working to link crash-health outcome data?
3. What are NC Vision Zero, Durham Vision Zero, and Charlotte Vision Zero & how are these organizations using data to improve transportation safety within their respective jurisdictions?

# Secondary Meeting Objectives

In addition, we hope that by the end of this session, attendees will:

1. If a data user, have a better idea of how they can *use data to inform* transportation safety initiatives
2. If a data owner, have a better idea of how their *data informs* transportation safety initiatives
3. Be empowered to share/link/use data as one step towards reaching the goal of *reducing traffic injuries and fatalities to zero in North Carolina!*



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# Overview of Data Integration/Linkage

Presented by Katie Harmon

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# What is Data Linkage?

- Definition: A process of combining information believed to be related to the same person (or place, family, event, etc.) from two or more separate data sources
- *Data linkage* is one step in the process of *data integration*, which is the ongoing, systematic linkage of data sources for the purpose of improved research, program management and evaluation, and policy development

*-However-*

These terms are often used interchangeably



# Types of Data Linkages

1. **Deterministic**: records are matched based on agreement for a given set of predetermined linkage variables (i.e. identifiers)
  - Common linkage variables: name, SSN, MR, DOB, ZIP code of residence
  - May be “exact deterministic” – requires an exact match for all selected linkage variable
  - May be “approximate”, “iterative”, or “hierarchical” deterministic linkage – requires an exact match for one of several rounds of matching, but does not require an exact match for all selected linkage variables
  - May incorporate “fuzzy” matching (e.g. Bill versus William)
  - May incorporate additional information to strengthen match certainty (e.g. time since event, ICD-10-CM codes, keywords)
2. **Probabilistic**: linkage variables are given a weight and individual records are linked if the probability criteria reach a predetermined threshold

Dusetzina SB, Tyree S, Meyer AM, et al. *Linking Data for Health Services Research: A Framework and Instructional Guide* [Internet]. Rockville (MD): Agency for Healthcare Research and Quality. [www.ncbi.nlm.nih.gov/books/NBK253312](http://www.ncbi.nlm.nih.gov/books/NBK253312). Published September 2014. Accessed April 9, 2019.

# Why Link Crash and Health Outcome Data?

- Most secondary data sources are limited in scope; by linking multiple data sources, we can create a much richer data set that can be used to answer many important questions

## Hypothetical linked crash-health outcome data set:

Linkage variables				Crash variables			Health outcome variables		
Name	DOB	Sex	Zip Code of Residence	Injury Status	Person Type	Non-Motorist Location	Primary Dx	Disposition	Hospital Charges for Treatment
John Smith	1/1/1950	Male	27705	B-Evident Injury	Pedestrian	Marked crosswalk at intersection	S02.101 Fracture of base of skull, right side	Admitted to hospital	\$75,000



# What are the Benefits of Linked Crash-Health Outcome Data?

- Characterizing transportation safety problems
  - Example: MA used linked data to describe the characteristics of injuries related to lane departure crashes; found lane departure crashes had higher median hospital charges than other types of crashes
- Supporting transportation safety decisions, programs, and policies
  - Example: KY used linked data to compare hospital admission rates among 4-8 year-olds who were restrained vs. not restrained; restrained children were 40% less likely to be hospitalized; booster seat bill passed <2 years later
- Educating decision-makers and the public about transportation safety
  - Example: CA has an online data query system in which users can create their own reports using linked crash-health outcome data
- Facilitating collaborations across organizations
- Improving data quality across crash and health outcome data sources

Chidester A, et al. *The Crash Outcome Data Evaluation System (CODES) and Applications to Improve Traffic Safety Decision-Making* [DOT HS 811 181]: Washington, DC: NHTSA. <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811181>. Published April 2010. Accessed April 9, 2019.



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# Overview of Data Integration/Linkage in North Carolina

*Motor Vehicle Crash Injury Data Linkage Project*

Presented by Anna Waller

Safe Systems Summit 2019 | April 24, 2019



*Refer to handout describing NC data sources*

# Program Objective

- Establish an integrated ***statewide MVC injury surveillance system***
- Integrated MVC and Health Information has the potential to:
  - Improve safety outcome analysis and evaluation
  - Expand research activities
  - Inform policy and safety programs
- Funded by: Governor's Highway Safety Program (GHSP)
- Supported by: NC Traffic Records Coordinating Committee (TRCC)



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# Pilot Project I

- **Objective:** Describe previously linked 2010/2011 NC crash report & NC EMS data (pedestrians and bicyclists, only)
- **Results:** Poor linkage results (~14% of crash reports linked to EMS data)
  - Report posted to CCHI website
- **Recommendation:** Delay further Crash-EMS data linkage until:
  - Transition to ESO Solutions is complete
  - Newly updated NEMSIS v.3 data have been evaluated



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# Pilot Project II

- **Objective:** Link 2017 NC crash report & NCHA hospital encounter data (pedestrian and bicyclists, only)
- **Results:** NCHA linked **30%** of crash reports to hospital encounter data for injured pedestrians/bicyclists
  - Completed linkage evaluation report
  - Developed two reports highlighting results of linkage
  - All reports posted to CCHI website
- **Recommendation:** Investigate additional sources of health data for linkage



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# Pilot Project III

- **Objective:** Link 2017 NC crash report & NC DETECT emergency department visit data (pedestrians and bicyclists, only)
- **Results:** Linked **40%** of crash reports to NC DETECT ED visit data for injured pedestrians/bicyclists; currently evaluating/documenting linkage



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# Quality Improvement Project

- **Objective:** Evaluate pedestrian/bicycle crash injury surveillance case definitions in NC DETECT using UNC trauma center data
- **Results:**
  - Evaluation led to the addition of keywords to NC DETECT case definitions
  - Implemented enhanced case definitions in NC DETECT in September 2018
- **Recommendation:** Consider trauma registry data as potentially rich source of health data for MVC injury research (and future evaluation activities)

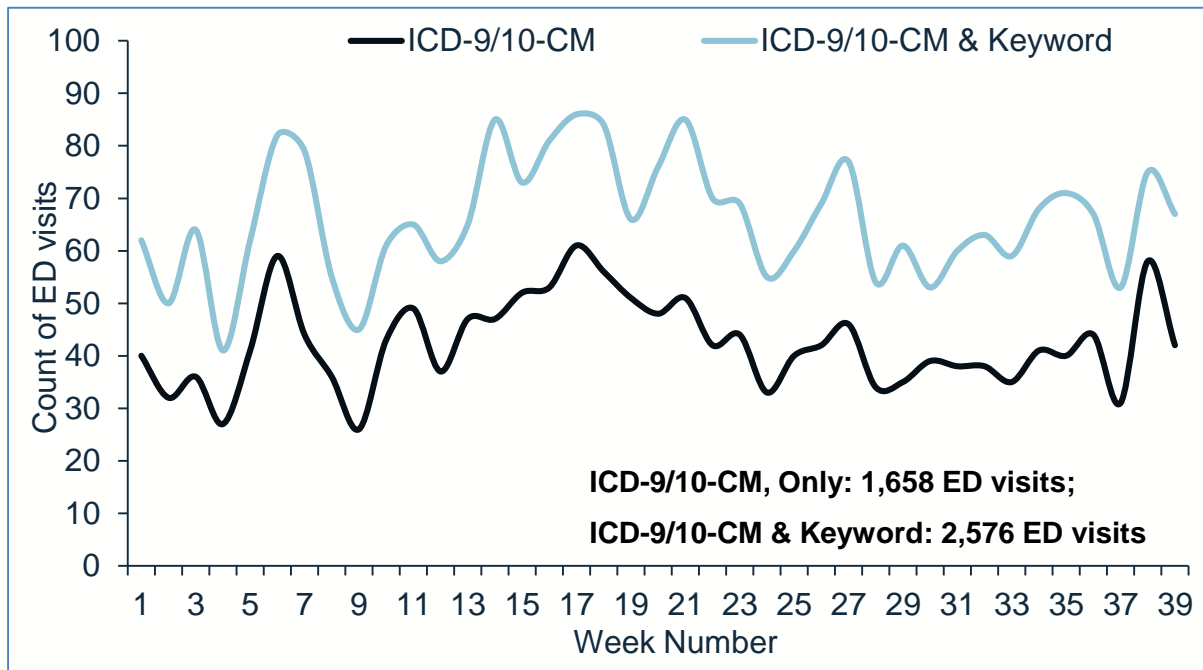


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# Quality Improvement Project

NC DETECT Custom Event Report for Pedestrian Crash Injury-Related ED Visits

01/07/2018-10/06/2018



NC DETECT is a statewide public health syndromic surveillance system, funded by the NC Division of Public Health (NC DPH) Federal Public Health Emergency Preparedness Grant and managed through collaboration between NC DPH and UNC-CH Department of Emergency Medicine's Carolina Center for Health Informatics. The NC DETECT Data Oversight Committee does not take responsibility for the scientific validity or accuracy of methodology, results, statistical analyses, or conclusions presented.



# Pilot Project IV

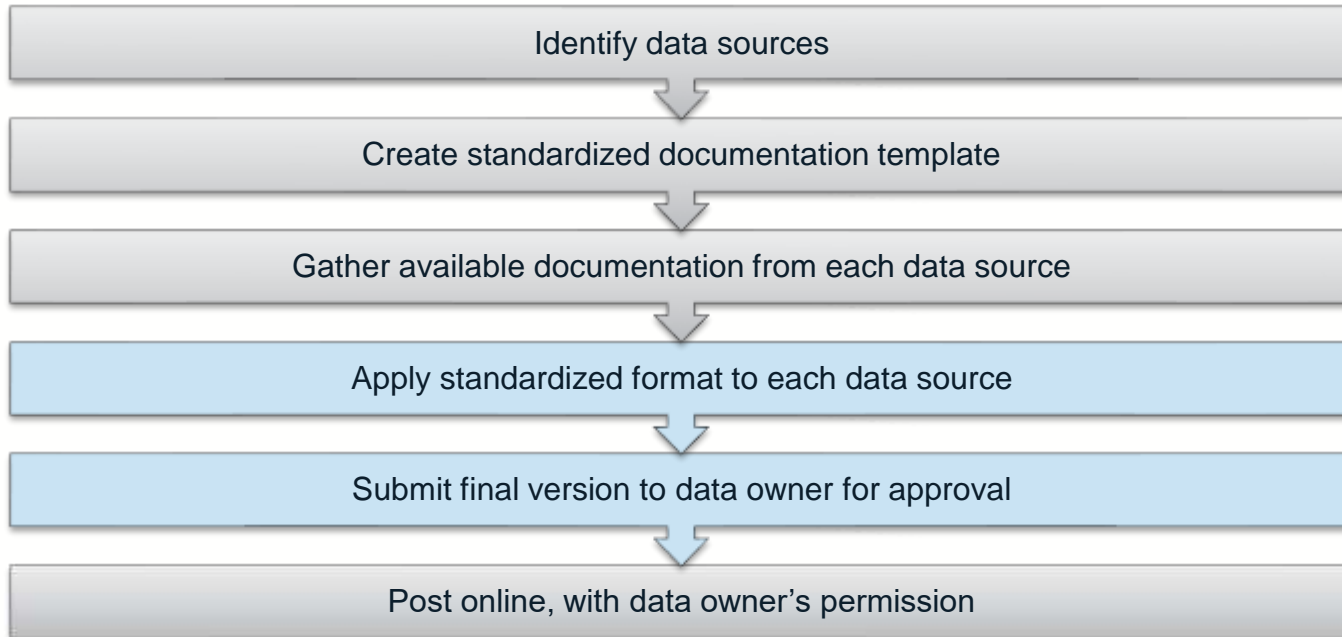
- **Objective:** Link 2017 NC crash report & NC trauma registry data (all motor vehicle crash injuries)
- **Results:** Data request approved, data linkage underway



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# Data Documentation Project

- **Goal:** Create standardized data documentation for key data sources for MVC crash and health data linkage.



# Data Documentation Status

## Finalized (6)

- **Death registration data**
- **Sheps Center ED, Inpatient, Outpatient and Ambulatory Care claims**
- **North Carolina Trauma Registry**
- Emergency Department (ED) visits in NC DETECT
- Hospital Discharge Data at the State Center for Health Statistics
- EMS data in EMSPIC (transitioning to ESO)

## Pending Approval or Feedback from Data Owner (4)

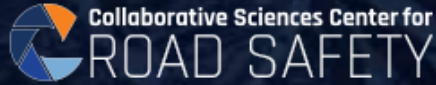
- Crash Report Data from the DMV
- Fatality Analysis Reporting System (FARS)
- Sheps Center Medicaid and BCBS claims
- Office of the Chief Medical Examiner data

## Being Compiled (2)

- HSRC Pedestrian and Bike Crash Data
- Highway Safety Information System (HSIS)

## Not Participating (1)

- ED/Hospital Discharge data from the NC Healthcare Association (NCHA)



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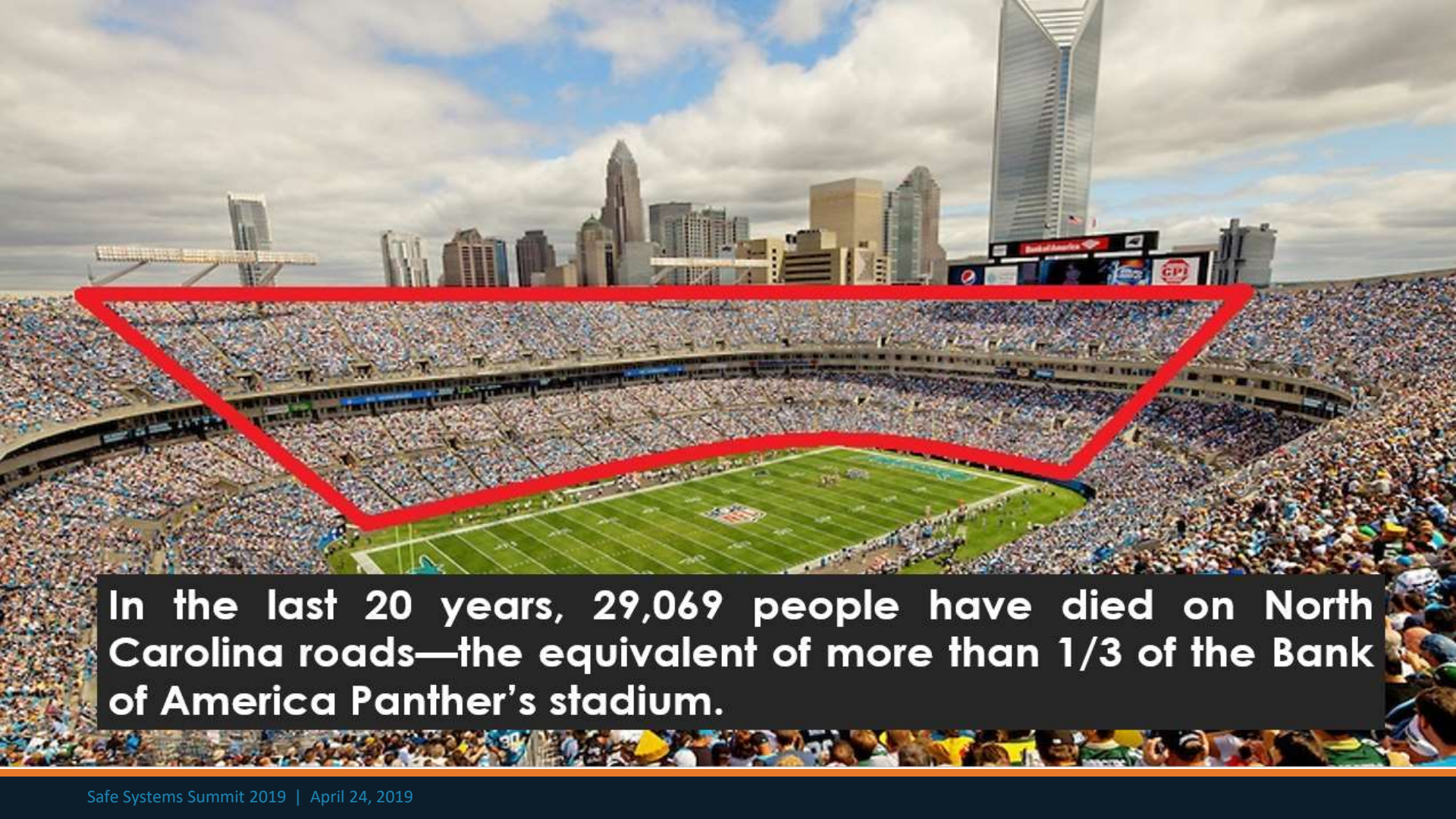
# NC Vision Zero Overview

Presented By Tracy Anderson & Greg Ferrara

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**In the last 20 years, 29,069 people have died on North Carolina roads—the equivalent of more than 1/3 of the Bank of America Panther's stadium.**

A wide-angle photograph of a city street. On the left, there are shops and pedestrians. In the center, a cyclist is riding. On the right, there are cars and a person standing near a planter. The text "What is Vision Zero?" is overlaid in the center in a large, bold, black font.

# What is Vision Zero?





# NC Vision Zero Task Force



American Heart Association



NORTH CAROLINA DEPARTMENT OF PUBLIC INSTRUCTION



Kimley»»Horn







Safety Dashboard When Where Why Who

# NC VISION ZERO

## SAFETY DASHBOARD

ALL SPEEDING



UNBELTED



ALCOHOL



DISTRACTED



DRUGGED



DROWSY



LANE DEPARTURE



YOUNGER DRIVER



OLDER DRIVER



BICYCLE



PEDESTRIAN



LARGE TRUCK/BUS



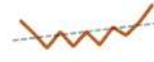
SCHOOL BUS



MOTORCYCLE



WORKZONE



INTERSECTION



### FILTERS

- Fatalities
- Serious Injuries
- Fatalities + Ser Inj

### SELECT YEAR(S)

2018

### SELECT LOCATION

- State
- County
- City

(All)

### REPORTING DEPARTMENT

(All)

DATE OF LAST AVAILABLE DATA:  
5/31/2018

Data presented herein may differ slightly from NCDOT published data due to differences in reporting and update frequencies. The intent of presenting these data is to provide insights and trends for general informational purposes only, and is not intended as official authoritative data. For any official reporting purposes, please contact NCDOT.

Data source: NCDOT TEAAS data snapshots, reportable non-PVA or PP crashes

Note: a fatality may involve more than one emphasis area (e.g. a fatal crash may involve speeding and alcohol and would therefore be included in both emphasis areas).



LOCATION:

DATE RANGE:

12/31/2017 to 4/30/2018

SHOWING:

Fatalities Only

ADDITIONAL FILTERS:

## SAFETY FOCUS AREA

### Driver Factors



### Driver Age



### Vehicle



## Welcome to NC Vision Zero Maps!

### 1 Pick a location:

View By:

Show me:

### 2 Pick a date range:

Quick Date:

Start Date:

End Date:

### 3 Show Me:

- Fatalities Only
- Serious Injuries Only
- Fatalities & Serious Injuries

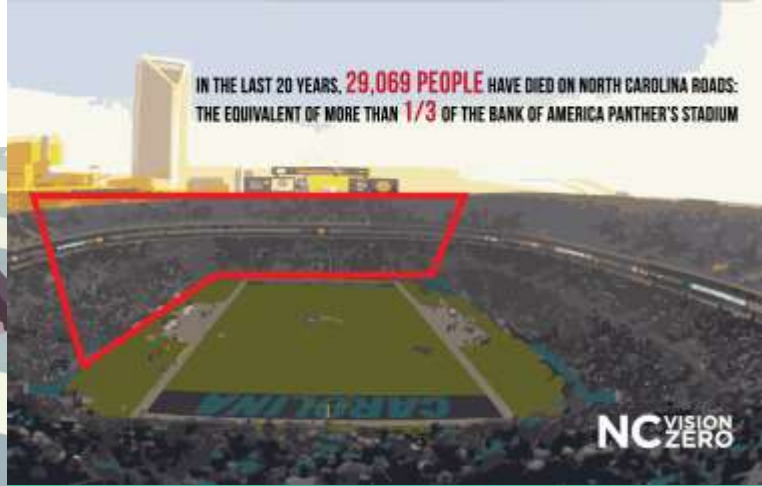
### 4 Additional Filters:



Go!



# Public and Stakeholder Outreach



# NATION ROUSED AGAINST MOTOR KILLINGS

## Secretary Hoover's Conference Will Suggest Many Ways to Check The Alarming Increase of Automobile Fatalities.—Studying Huge Problem

There are few things as dangerous as the automobile in this country. Secretary Hoover has called a conference of representatives of the various agencies interested in checking the steadily increasing number of automobile fatalities. The conference will be held in Washington on Dec. 28. It will cover the subject from every angle, including scientific, medical, mechanical, manufacturing and engineering, city planning and traffic, education, and the motor vehicle and public relations.

The increase of car deaths is so fast that it is almost impossible to keep up with the statistics. The automobile kills more than the battleship. The motor car in the street kills more than the battle ship. The traffic control data show that more than 20,000 automobiles are killed in the United States. This is at the rate of 2,000 deaths a month. An average of 2,000 more automobiles are killed each month by accidents in the United States. The present rate is 100,000 automobiles a year in the United States. It is estimated that in 1930 it will be 1,000,000. It is estimated that the total loss of life from traffic in the United States will be one billion of more than 2,000 for 1930. At the beginning of October approximately 2,000 motor deaths had already been reported.



A conference called by Secretary Hoover for next month will concentrate on the traffic problem. It will be held in the Department of Justice. A Committee on Traffic will be organized by Mr. Hoover to study the problem. The committee will be made up of representatives of the various agencies interested in the traffic problem. The committee is planning to hold a series of public hearings in the various States. The committee is also planning to hold a series of public hearings in the various States. The committee is also planning to hold a series of public hearings in the various States.



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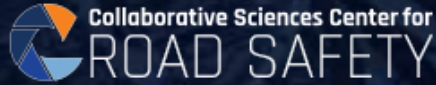


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# VISION ZERO DURHAM

WALK SAFE. RIDE SAFE. DRIVE SAFE.

## Crash Data Analysis

Presented by Anne Phillips & Dale McKeel

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# City of Durham Vision Zero Timeline

- **2003: Launched Accident Reduction Program; annual analysis of crash data to locate and treat high-crash intersections**
- **September 18, 2017: City Council passed Vision Zero resolution**
- **November 17, 2017: First steering committee meeting**
- **January & February 2018: Task forces and subcommittees meet**
- **Fall 2018: Crash analysis and mapping; shared results of analysis with steering committee and gathered feedback**

# Our Crash Study

Using available data we analyzed all reported severe crashes in Durham, CO between 2012-2016

- NC Vision Zero geocoded crashes, NCDOT Roadway Shapefiles, ACS 2016 estimated block group data)
- Most crashes occur on 35-45 mph state-regulated roadways
- Most pedestrian crashes occur on bus-route roadways that lack continuous sidewalk infrastructure
- Communities of color experience a higher pedestrian crash rate compared to white communities



# Transportation Disadvantaged Communities

**Goal: Create a visual representation of areas that:**

- **Experience a disproportionate number of crashes**
- **Are more likely to contain vulnerable roadway users**
- **May receive greater benefit from improved multi-modal access**



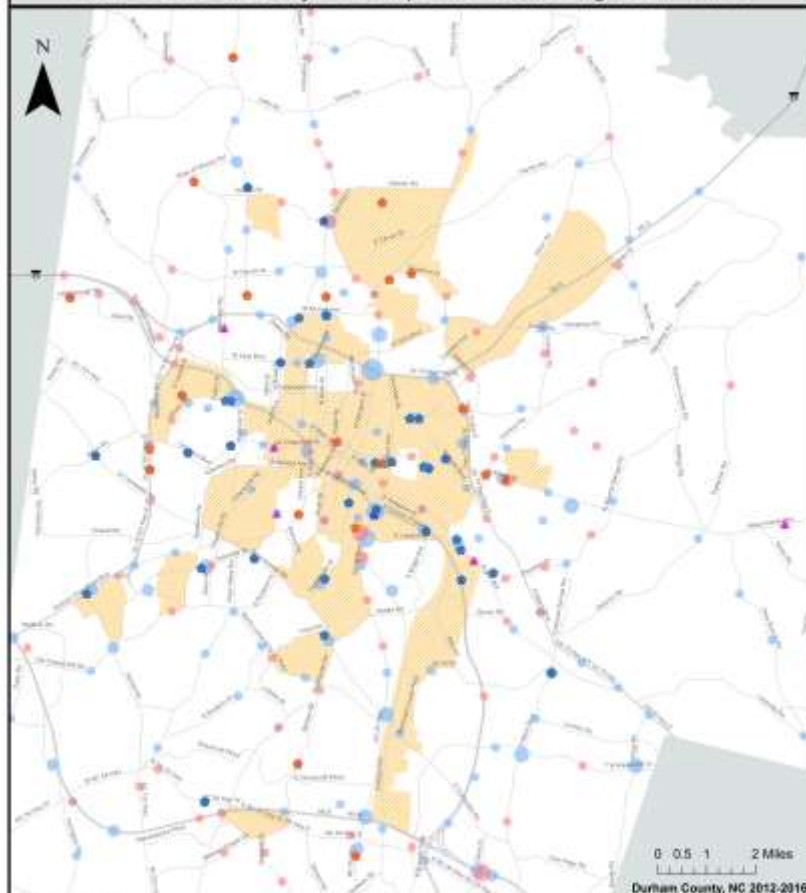
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# Vision Zero: Crash Density and Transportation Disadvantaged Communities



0 0.5 1 2 Miles  
Durham County, NC 2012-2016

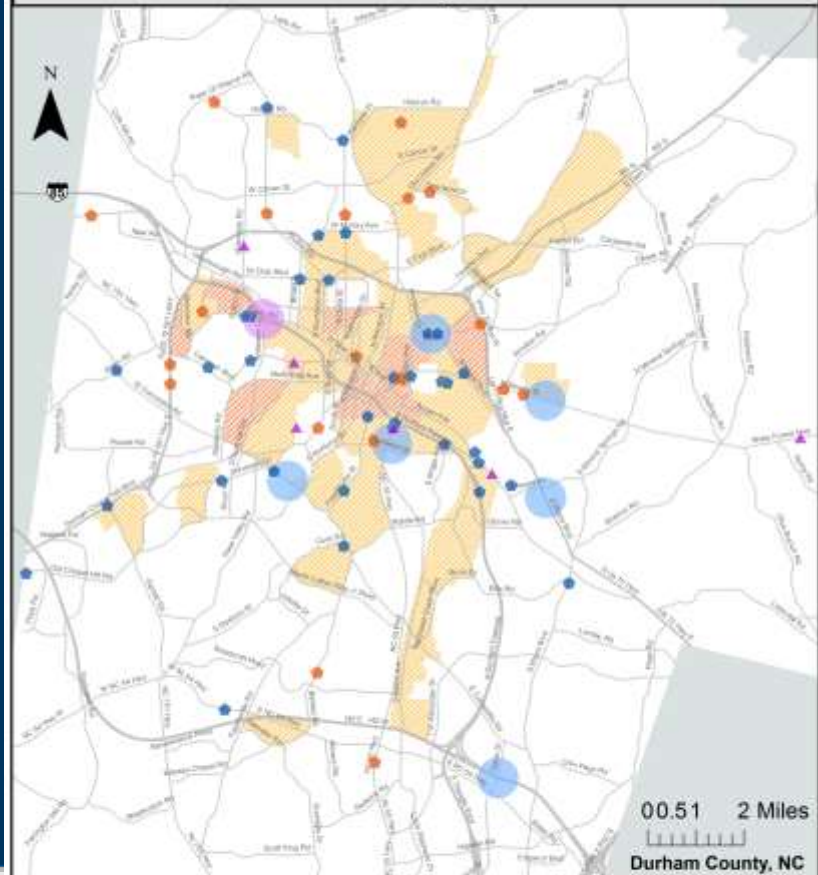
<b>Pedestrian Deaths</b>	<b>Motor Vehicle Deaths</b>	<b>Motor Vehicle Serious Injuries</b>	<b>Transportation Disadvantaged Communities</b>
Pedestrian Deaths	1	1	Are block groups in two of the below parameters: - Communities of color (4th Quartile) - People living below poverty (4th Quartile) - The lowest household income (1st Quartile) - Pedestrians, cyclists or transit users (4th Quartile) - Low English speaking proficiency (4th Quartile)
Pedestrian Serious Injuries	2	2	
Bicycle Deaths and Serious Injuries	3	3	
		4	



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# Vulnerable Roadway User Crashes



- |   |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li><span style="color: orange;">●</span> Pedestrian Deaths</li> <li><span style="color: blue;">●</span> Pedestrian Serious Injuries</li> <li><span style="color: purple;">▲</span> Bicycle Deaths and Serious Injuries</li> </ul> | <ul style="list-style-type: none"> <li><span style="color: lightblue; font-size: 2em;">●</span> Pedestrian Crash Clusters</li> <li><span style="color: magenta; font-size: 2em;">●</span> Bicycle Crash Cluster</li> </ul> | <ul style="list-style-type: none"> <li>Transportation Disadvantaged Communities</li> <li><span style="background-color: #f4a460; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Primary Concern Areas</li> <li><span style="background-color: #fff9c4; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> Secondary Concern Areas</li> </ul> |
|---|--|--|

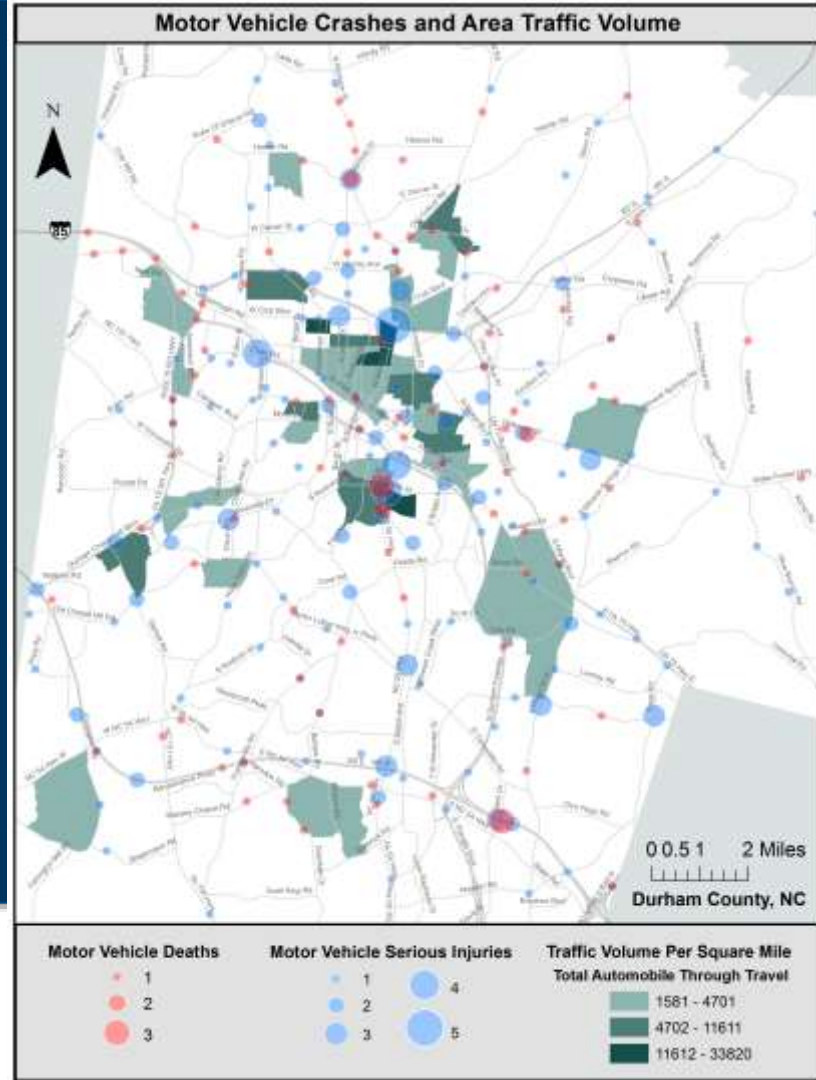


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# New Data Sources

Streetlight data or anonymized cellphone travel data has allowed us to visualize the relationship between traffic volume and crashes



# The Promise of Data Integration

- **Bicycle and pedestrian crashes may be underreported which may affect the accuracy of bike/ped HIN/crash hotspots**
- **Police reporting of crash severity based on appearance of those crash victims; where are severe crashes really happening?**







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# Overview of Charlotte Vision Zero & Related Activities

Presented by Angela Berry

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# Small Group Activities

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Facilitated by Katie Harmon



*Refer to Worksheet*

# Small Group Instructions

- For the next 20 minutes:
  1. Introduce yourself to your group
  2. Individually, take ~4 minutes to review the worksheet; record notes on worksheet
  3. As a group, please discuss the questions
  4. As a group, please take ~4 minutes to select 2-3 key observations to discuss with the full group. The group facilitator will report-back these observations
  5. Please return your worksheet to Katie Harmon at end of workshop

# Large Group Discussion

- For the next 10 minutes, each small group will report-back 2-3 key observations from the small group discussion



# Workshop Wrap-Up

Any Questions?

Thank You!

Contact Information:

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