Using Integrated Data to Catalyze Transportation Safety Efforts

NJ Safety and Health Outcomes (NJ-SHO) Data Warehouse

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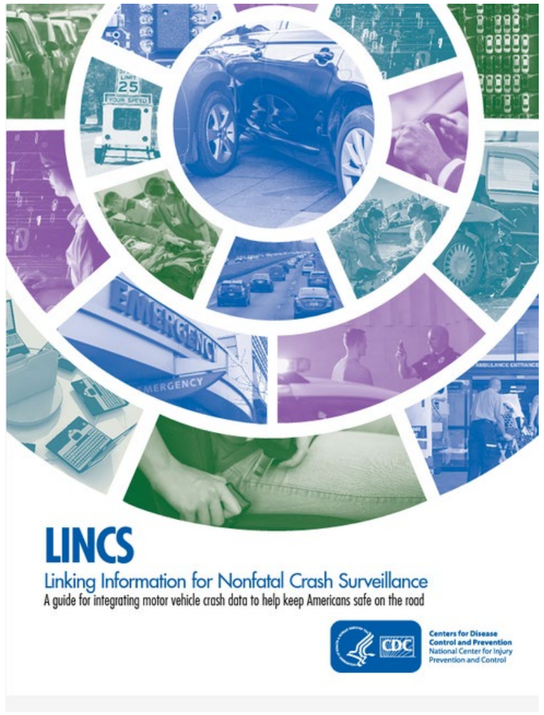
Children's Hospital of Philadelphia
RESEARCH INSTITUTE

Perelman School of Medicine
University of Pennsylvania

Recent Safety Strategies Emphasize Importance of Data Integration



Vision for Initial Development of NJ-SHO

Data Sources

Innovative Features that Enable Critical Research

Vision for Future

Just before crash → Crash → Just after crash

Time period:

minutes

Licensing history
Prior adverse events
Individual/group factors
Medical conditions

Crash

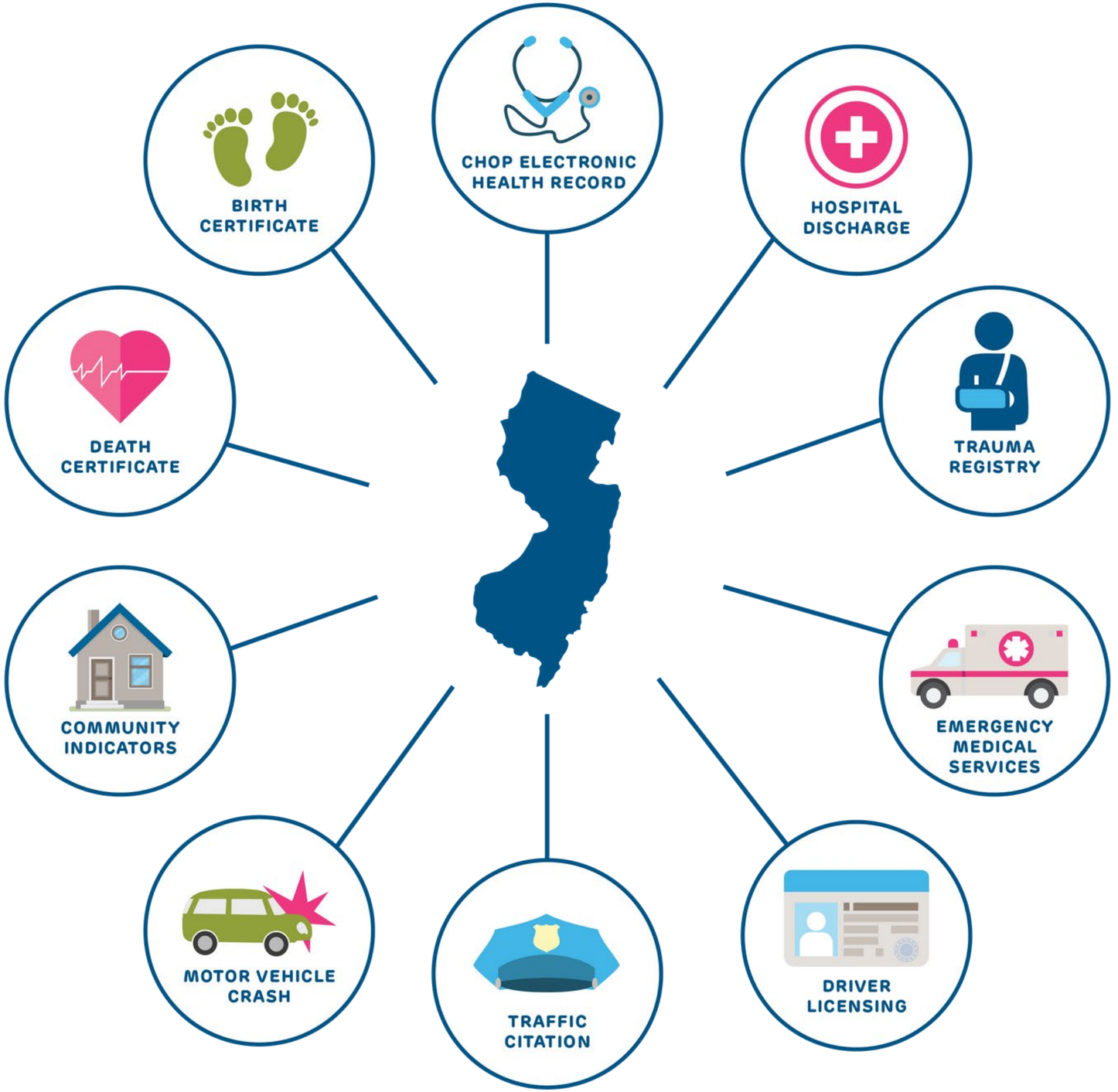
Injury, disability & mortality
Subsequent crash events
Short- & long-term care

Time period:

decades

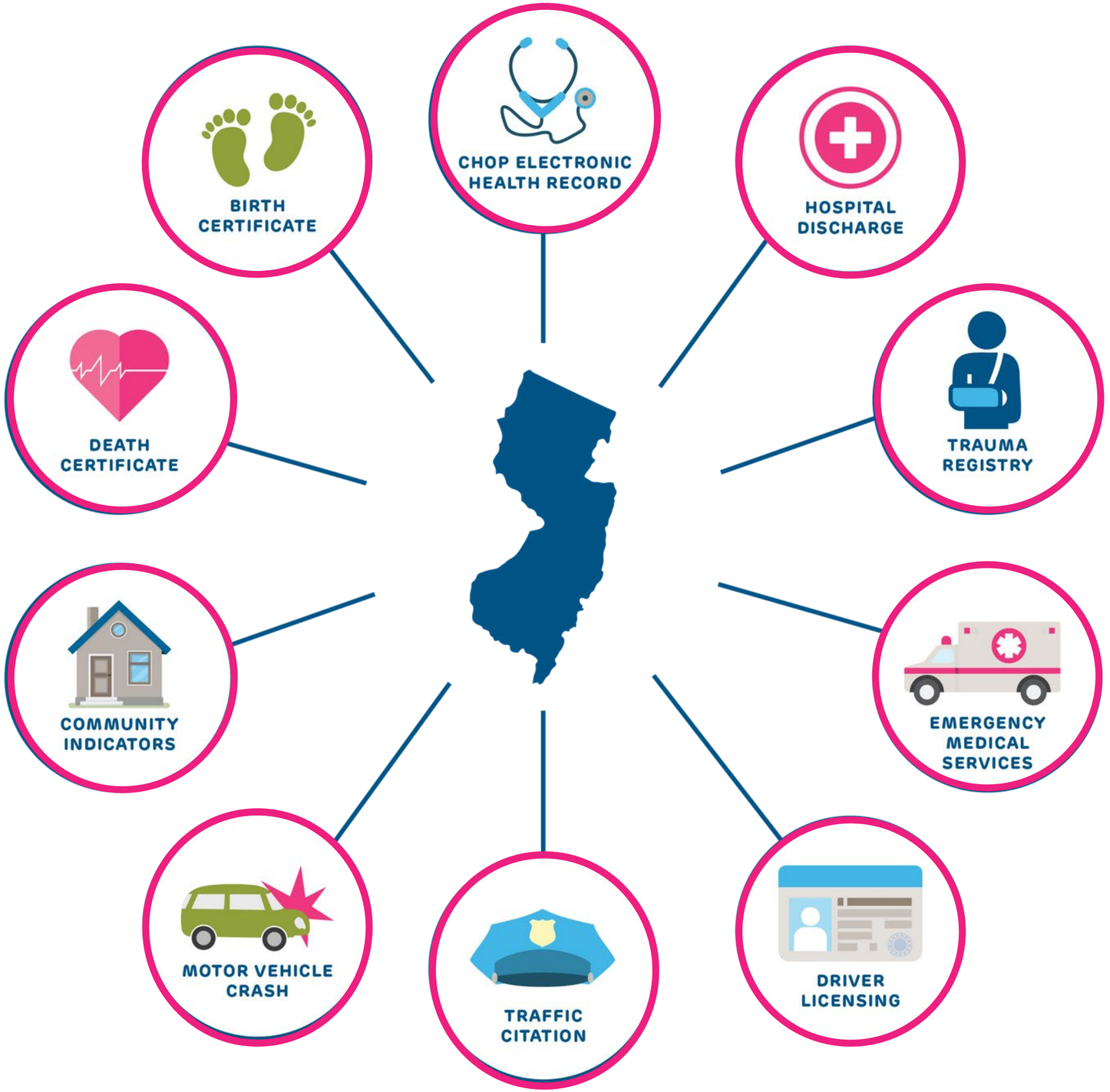
NJ-SHO Warehouse

Currently covers 2004-2019



NJ-SHO Warehouse

Currently covers 2004-2019



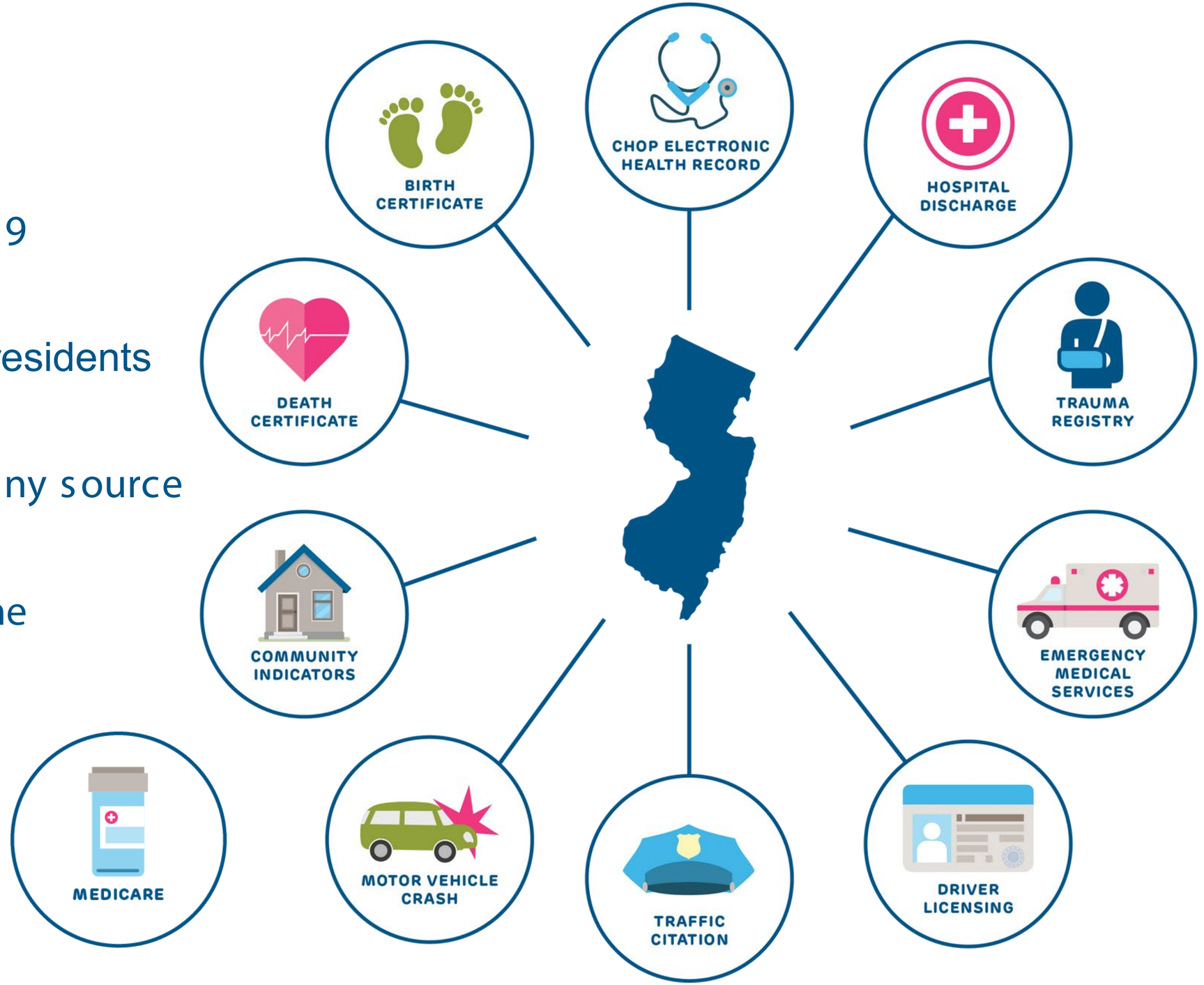
NJ-SHO Warehouse

Currently covers 2004-2019

125M+ records on 24M NJ residents

Individuals who appear in any source

Follows individuals over time



Integrated traffic safety data is critical…

for accurate capture of traffic injuries

NJ Crash Data Misses One-Third of All Crash Injuries

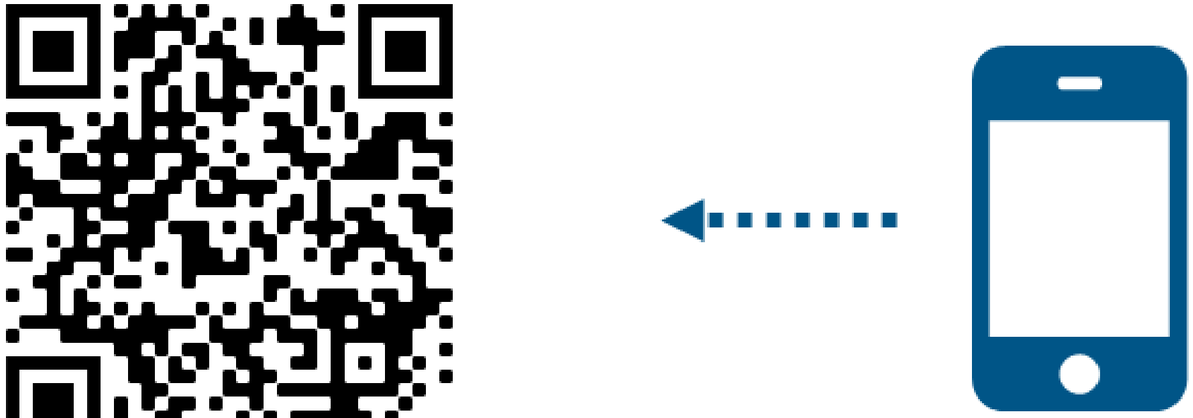
Lombardi et al., 2022

NJ Crash Data Misses One-Third of All Crash Injuries

And 59% of Bicyclist Injuries

Lombardi et al., 2022

45+ Research Studies



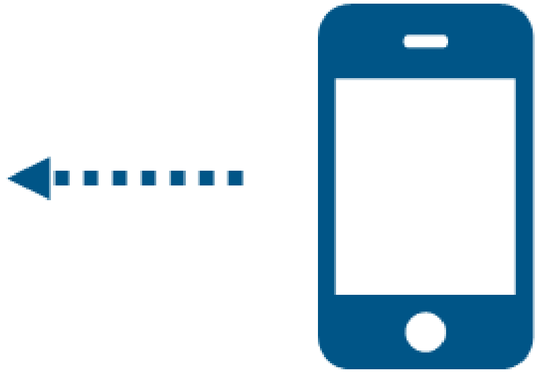
2023

- Gaulton TG, Pfeiffer MR, Metzger KB, Curry AE, Neuman MD. Motor Vehicle Crash Risk Among Adults Undergoing General Surgery: A Retrospective Case-Crossover Study . *Anesthesiology*. (Epub 2023 Mar 13).
- Sartin EB, Lombardi LR, Metzger KB, Myers RK, Pfeiffer MR, Curry AE. Variation In Drivers' Seat Belt Use By Indicators of Community-Level Vulnerability . *Journal of Safety Research*. (Epub 2023 Feb 6).

2022

2021

45+ Research Studies



Development of the integrated New Jersey Safety and Health Outcomes (NJ-SHO) data warehouse: catalysing advancements in injury prevention research

Allison E Curry ,[1,2] Melissa R Pfeiffer,[1] Kristina B Metzger,[1] Meghan E Carey,[1,3] Lawrence J Cook[4]

Curry AE, *et al*. *Inj Prev* 2021;**27**:472–478. doi:10.1136/injuryprev-2020-044101

Innovative Feature:
Longitudinal Perspective

Comprehensive Policy Evaluation: NJ's 2010 GDL Decal Provision

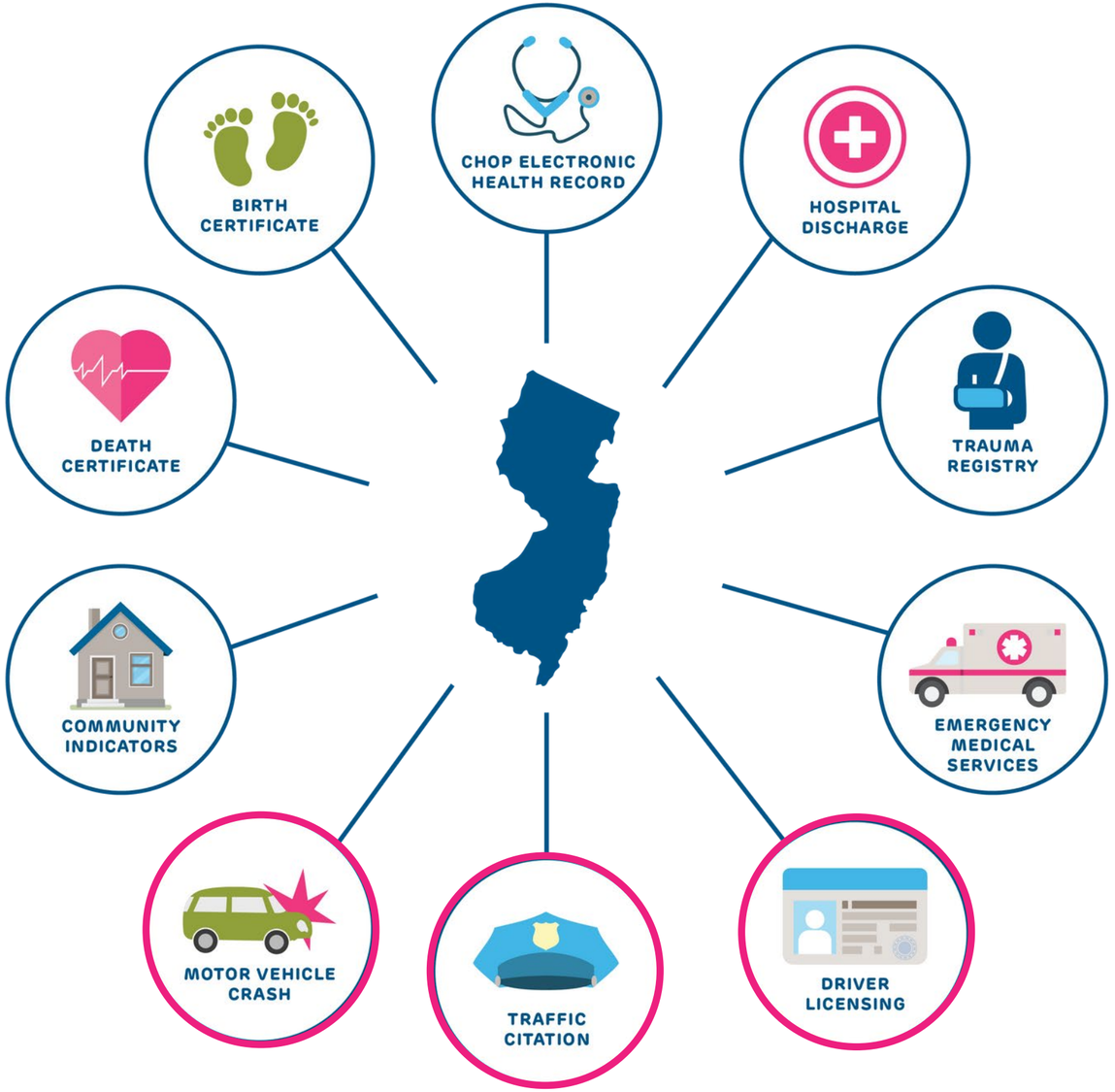
Goal: Evaluate effect of decal provision on intermediate drivers

- Licensing
- Crashes
- Citations
- Enforcement of GDL night and passenger provisions
- Compliance with GDL night and passenger provisions

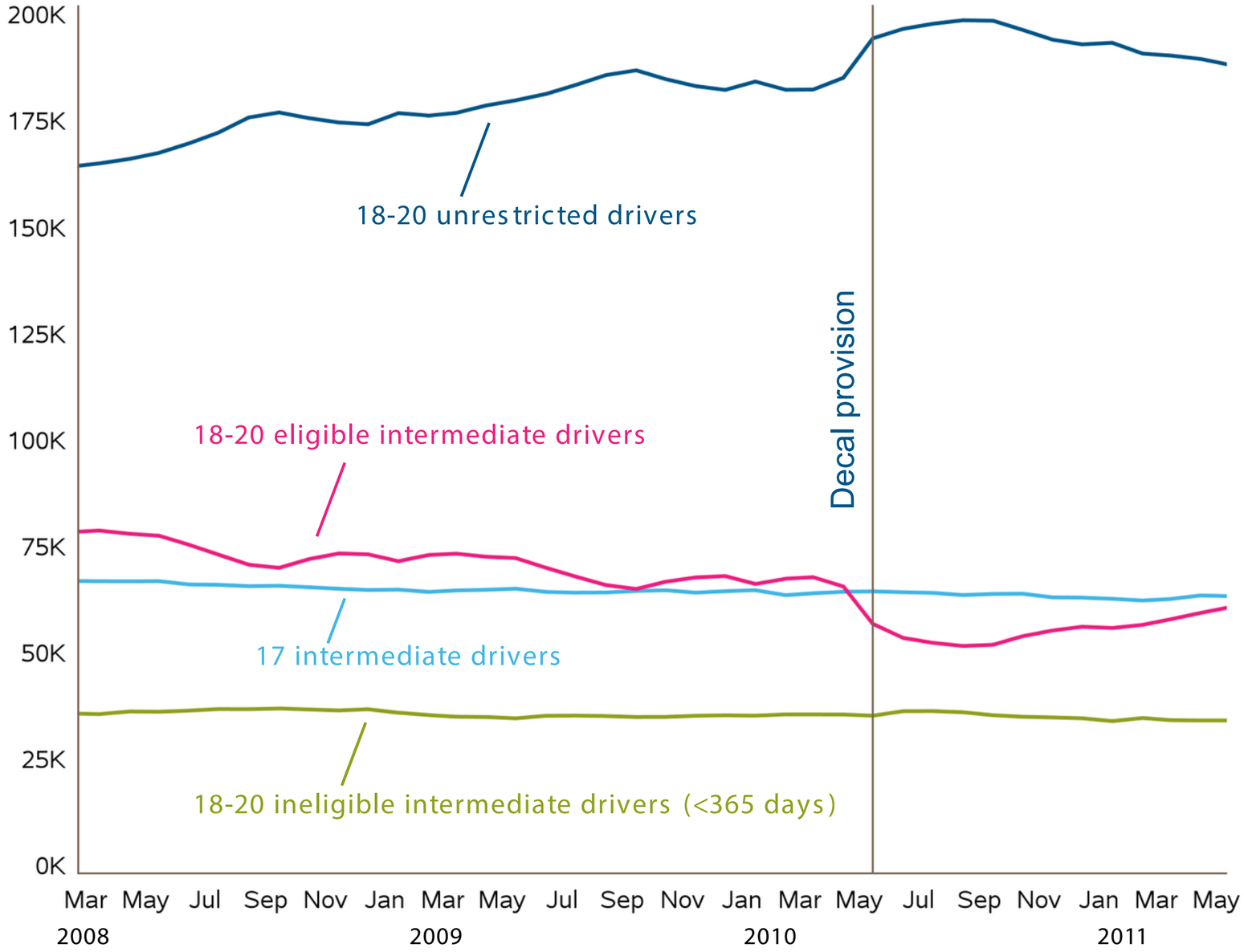
Required us to:

- Identify intermediate drivers
- Account for changes in underlying licensing rates

Comprehensive Policy Evaluation: NJ's 2010 GDL Decal Provision

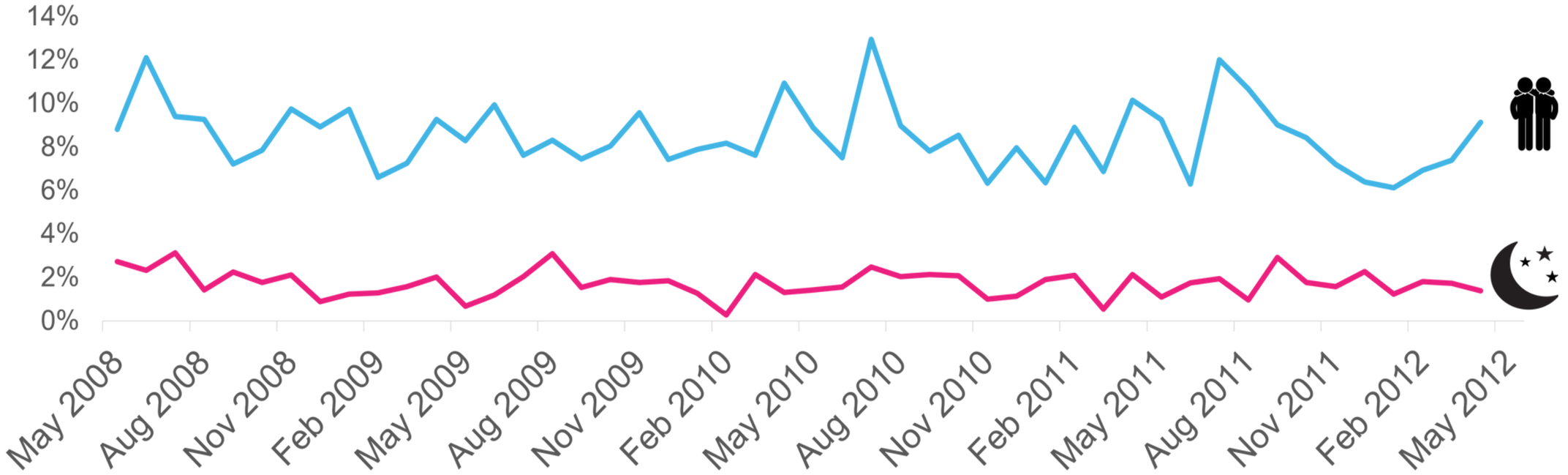


Number of Intermediate Drivers Decreased Post-Decal



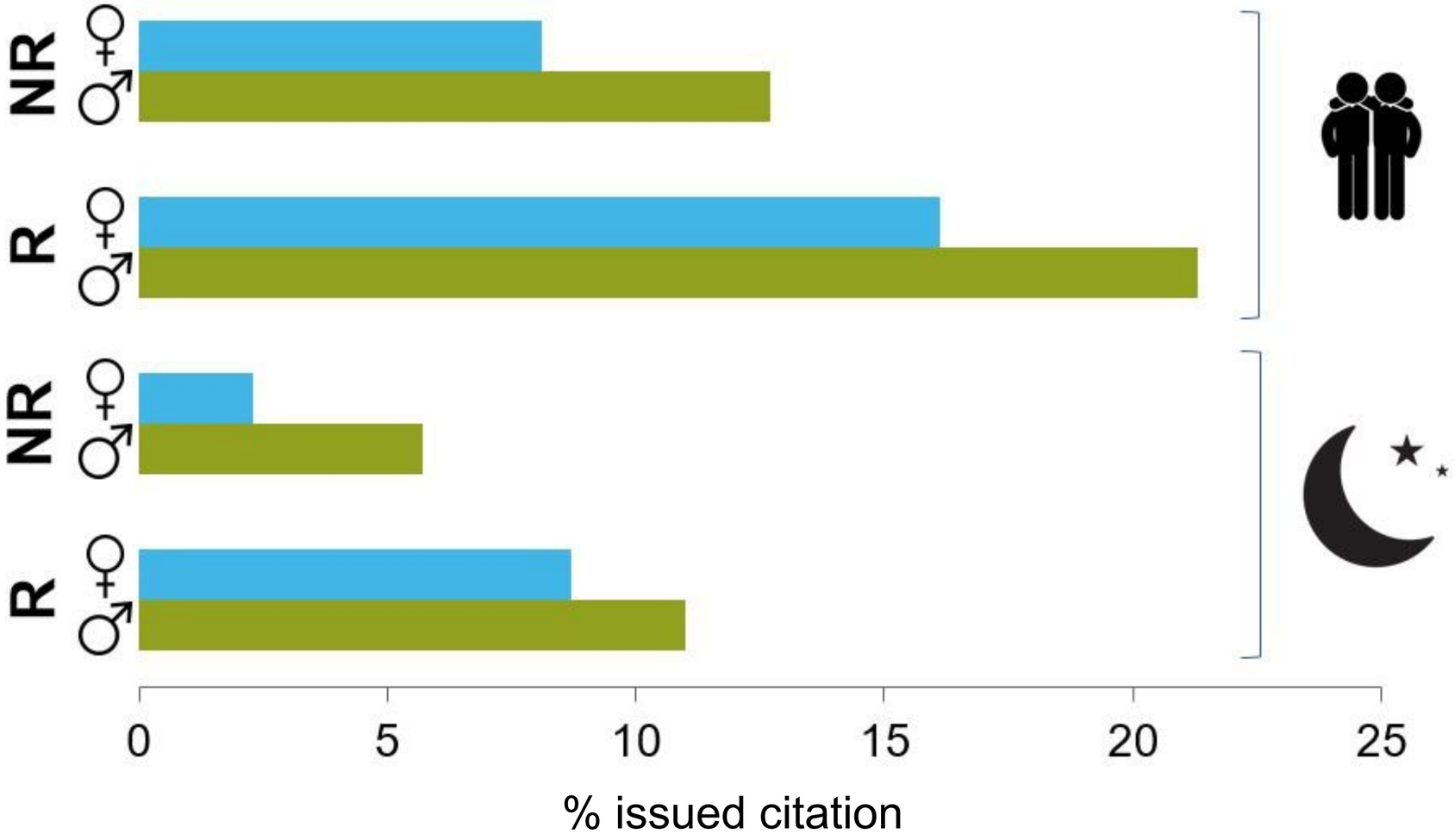
Curry et al., AJPM, 2013; Curry, AJPM 2017; Palumbo et al, JAH 2018.

Proportion of Trips in which Intermediate Driver was Not Complying with GDL Restrictions Did Not Change



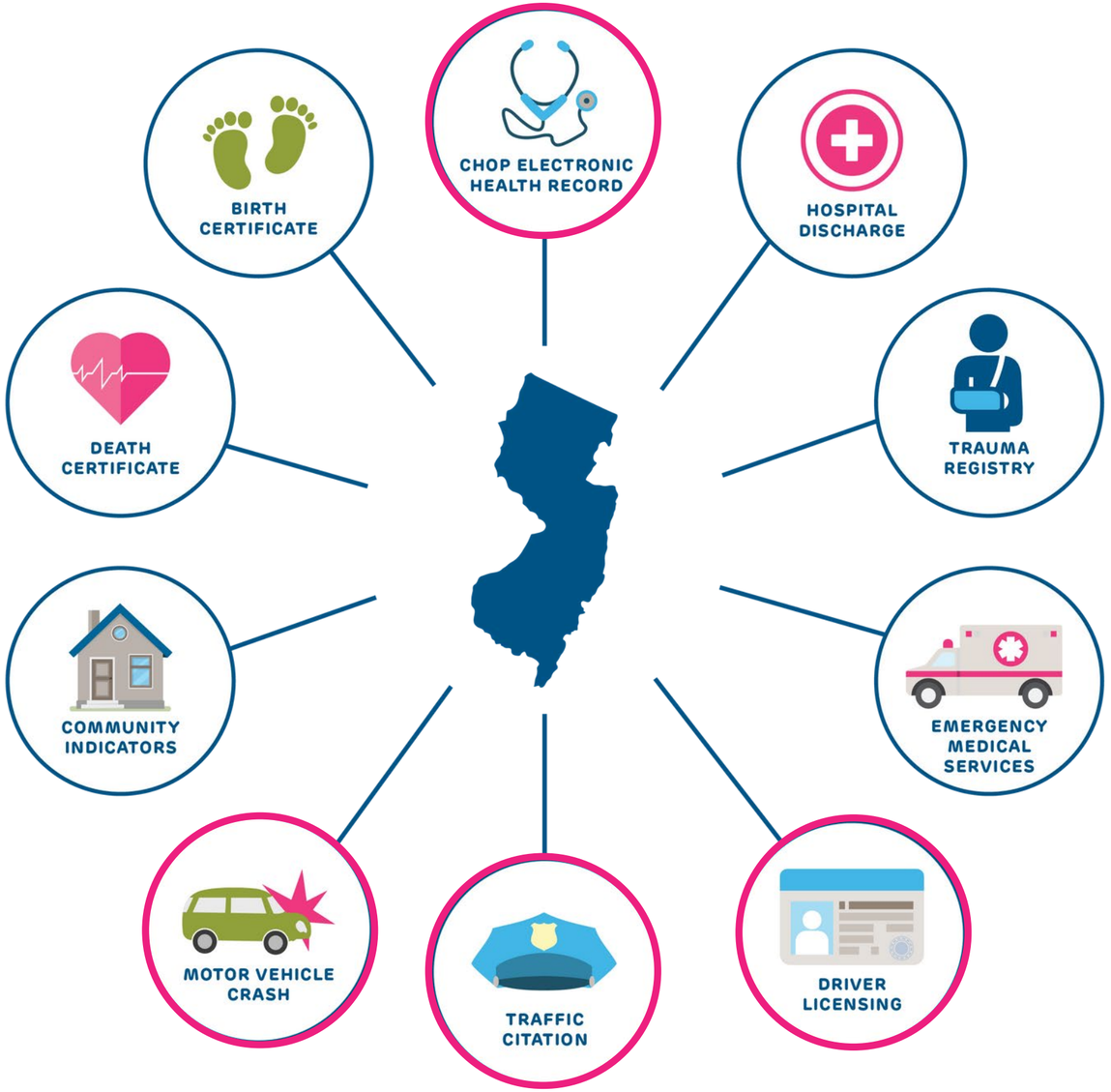
Curry et al., AJPM, 2013; Curry, AJPM 2017; Palumbo et al, JAH 2018.

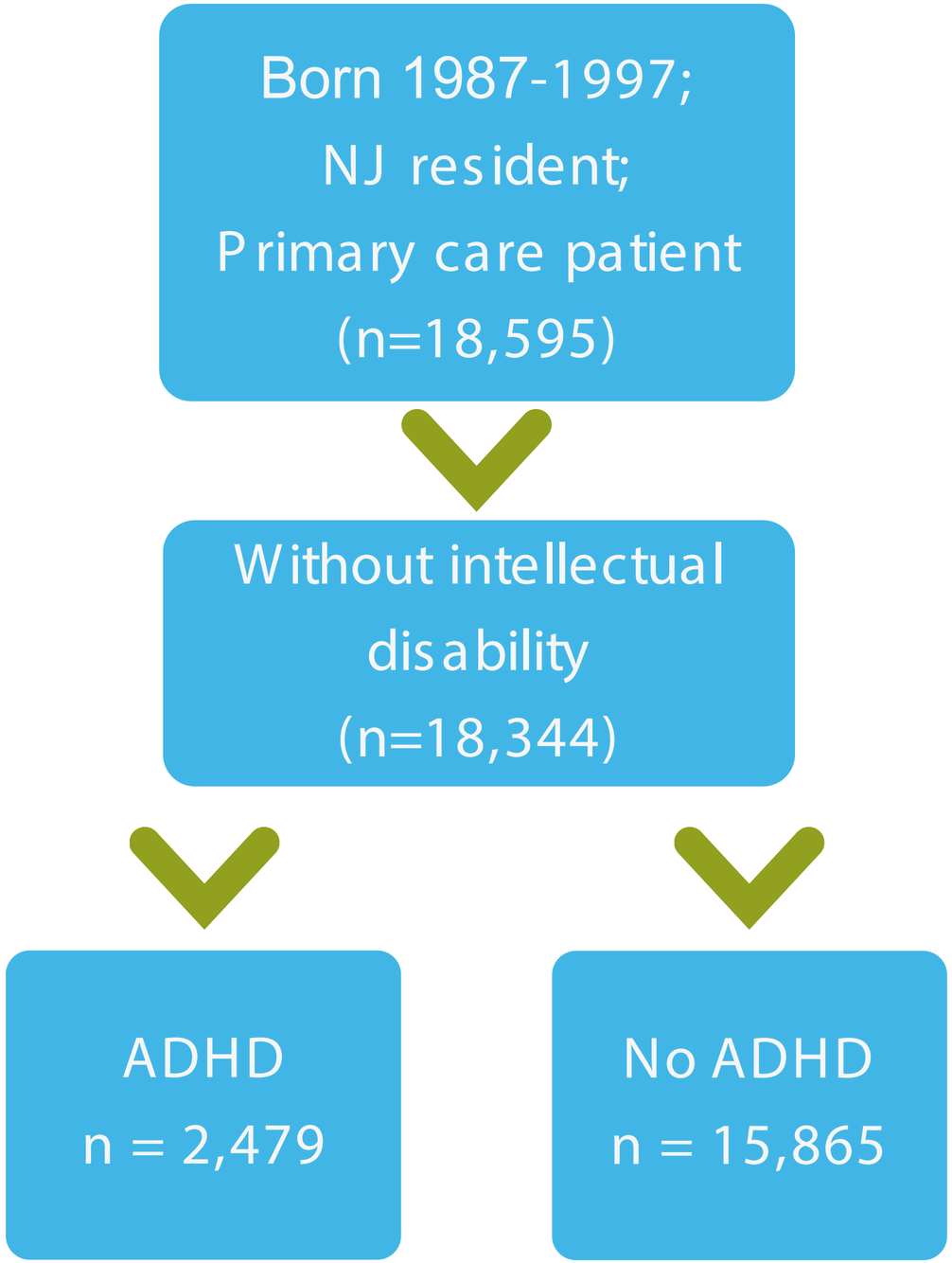
Enforcement of Non-Complying Crash-Involved Intermediate Drivers was Low and Differed Among Groups

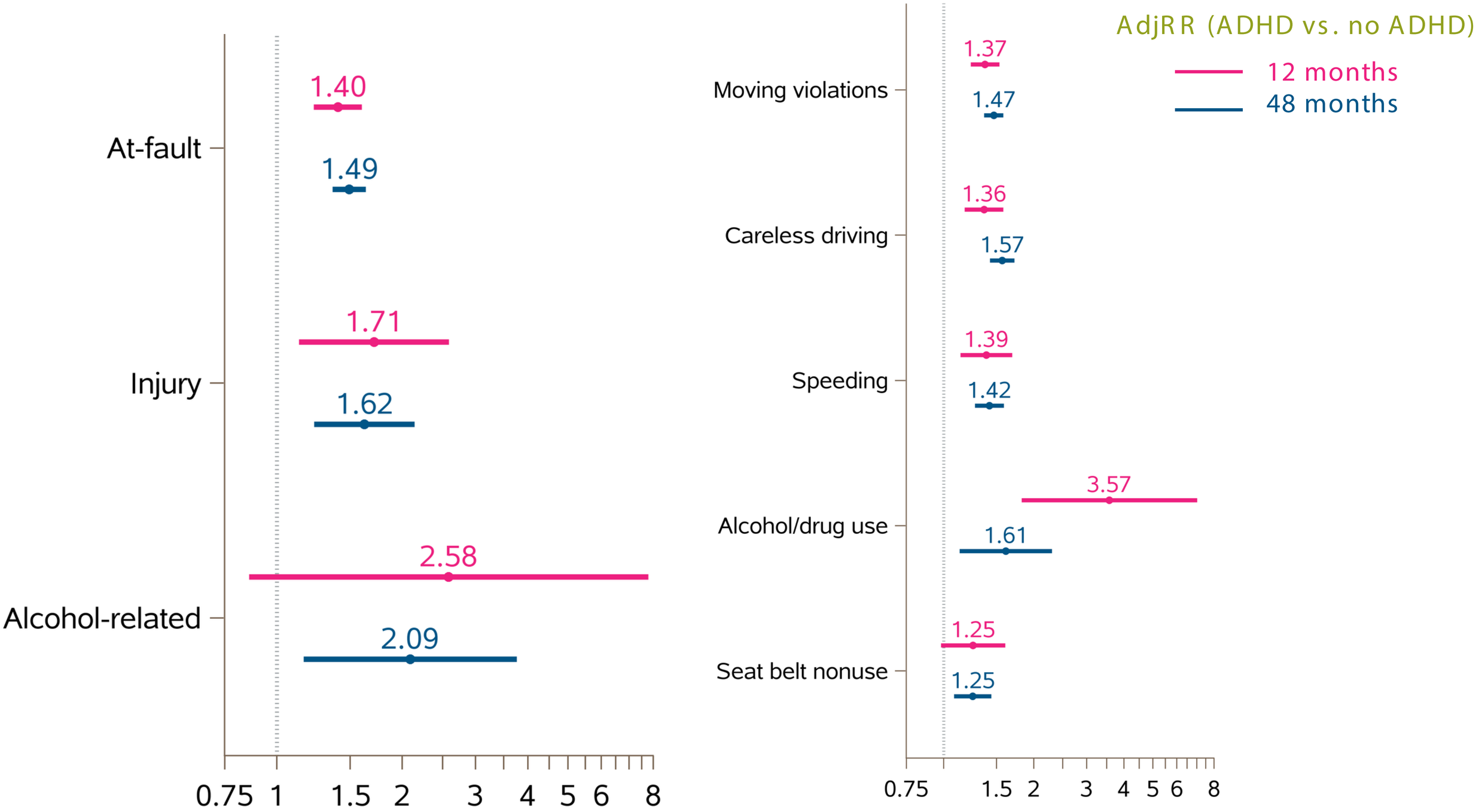


Curry et al., AJPM, 2013; Curry, AJPM 2017; Palumbo et al, JAH 2018.

Crash Risk Among Young Drivers with ADHD: Retrospective Cohort Study



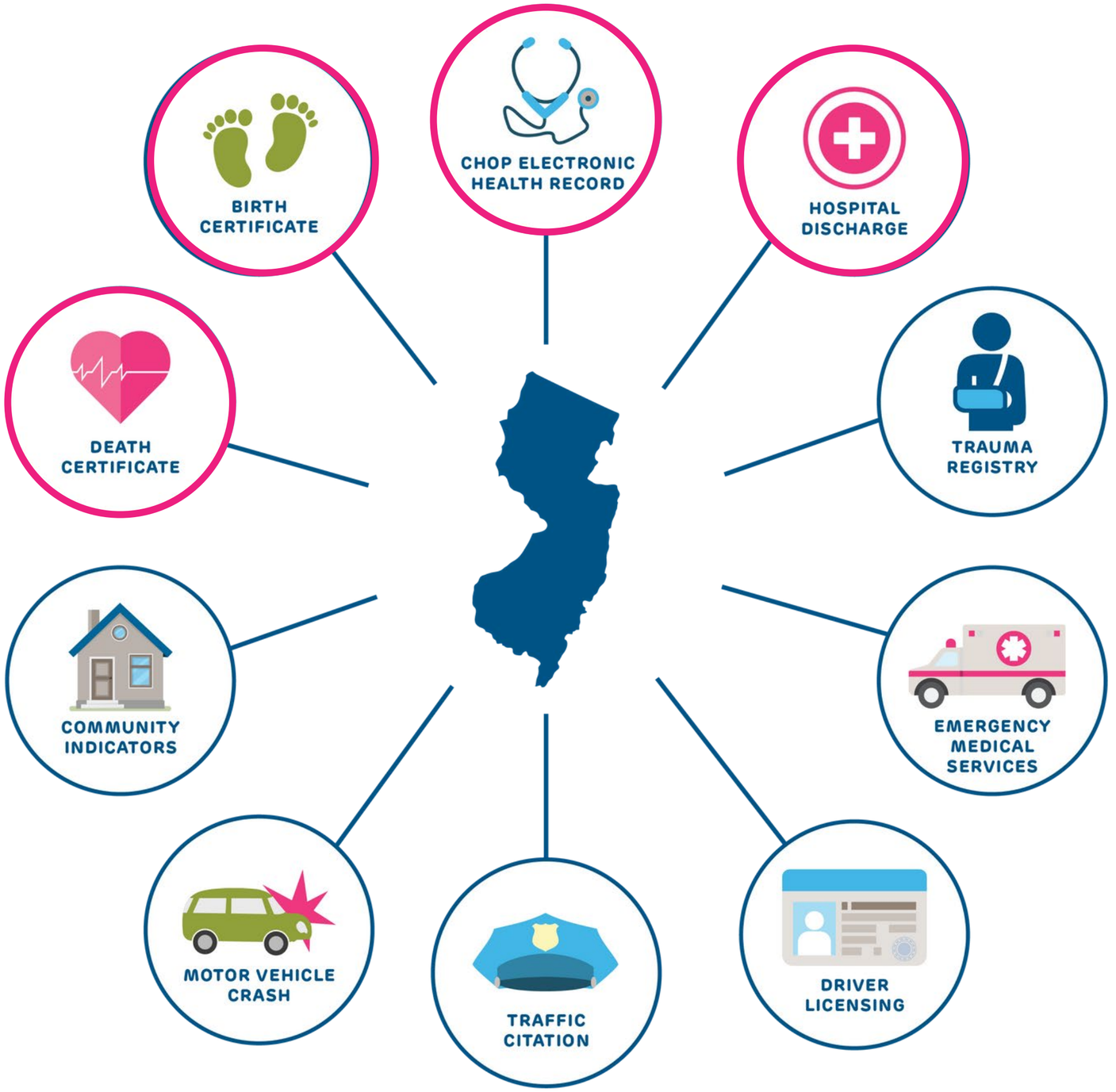

Born 1987-1997;
NJ resident;
Primary care patient
(n=18,595)
Without intellectual disability
(n=18,344)
ADHD
n = 2,479
No ADHD
n = 15,865



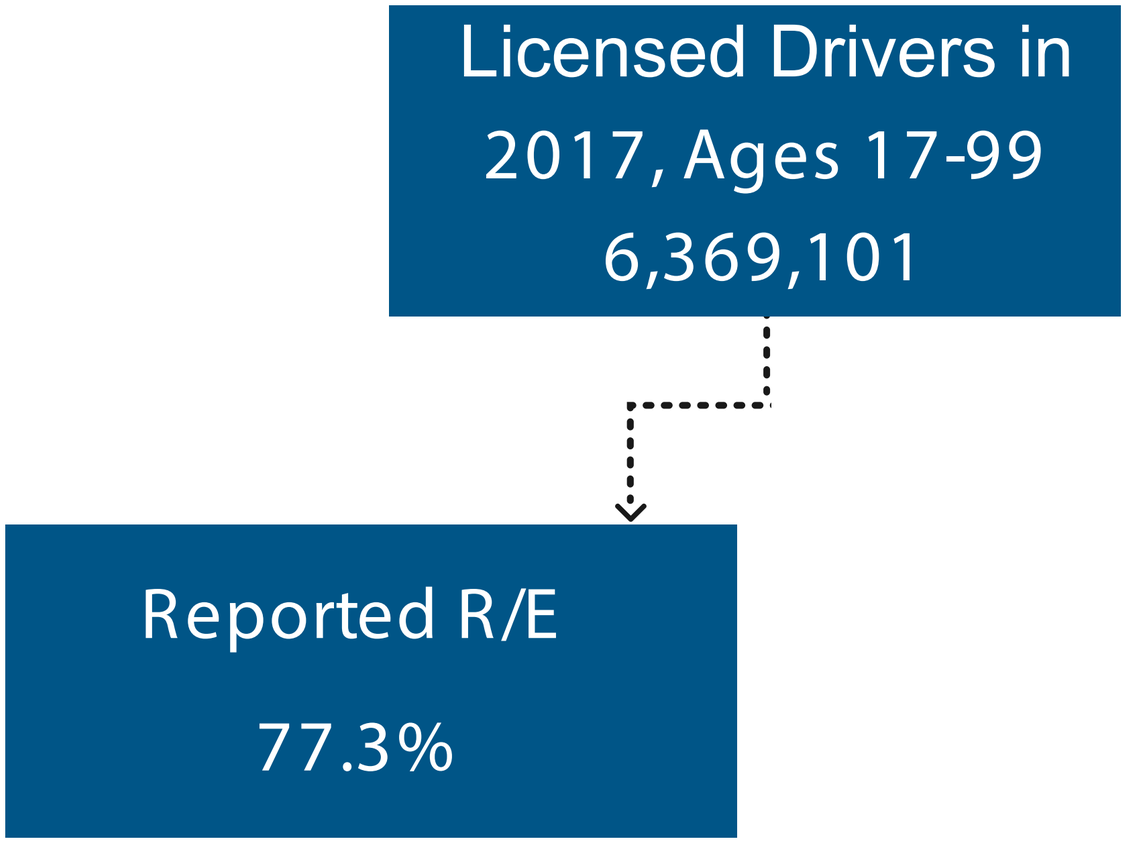
Curry et al., JAMA Pediatrics, 2017; Pediatrics, 2019; JAH, 2021.

Innovative Feature:
Incorporation of Individual and Community-level Equity Data

Race/ethnicity data: not collected in NJ crash or licensing data


BIRTH CERTIFICATE
CHOP ELECTRONIC HEALTH RECORD
HOSPITAL DISCHARGE
DEATH CERTIFICATE
TRAUMA REGISTRY
COMMUNITY INDICATORS
EMERGENCY MEDICAL SERVICES
MOTOR VEHICLE CRASH
TRAFFIC CITATION
DRIVER LICENSING

Classifying Race and Ethnicity Among NJ Drivers

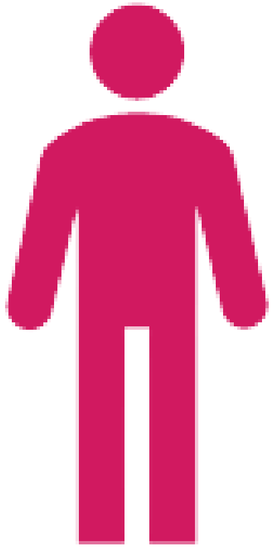


Sartin et al., 2021

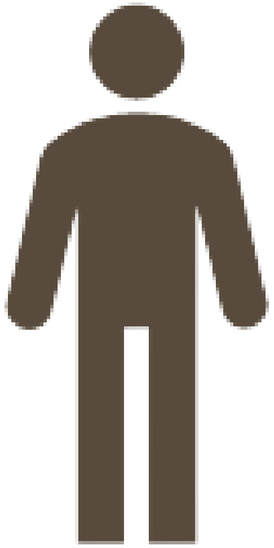
Bayesian Improved Surname Geocoding

Uses Census Data to Assign Each Individual 6 Probabilities

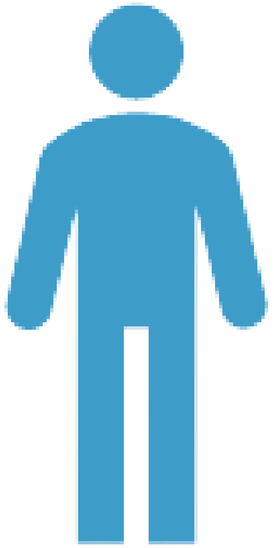
White



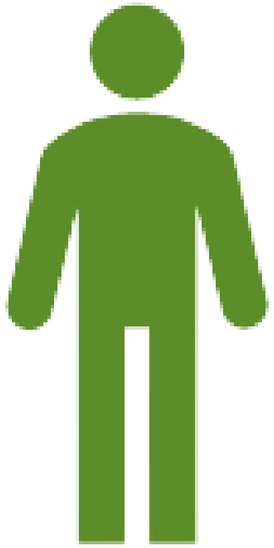
Hispanic



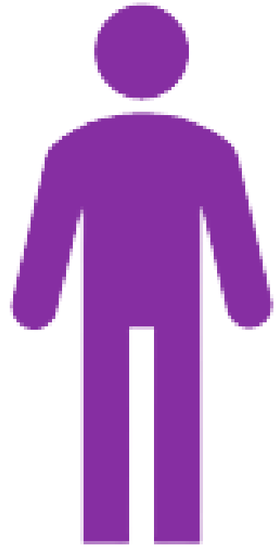
Black



Asian/Pacific Islander



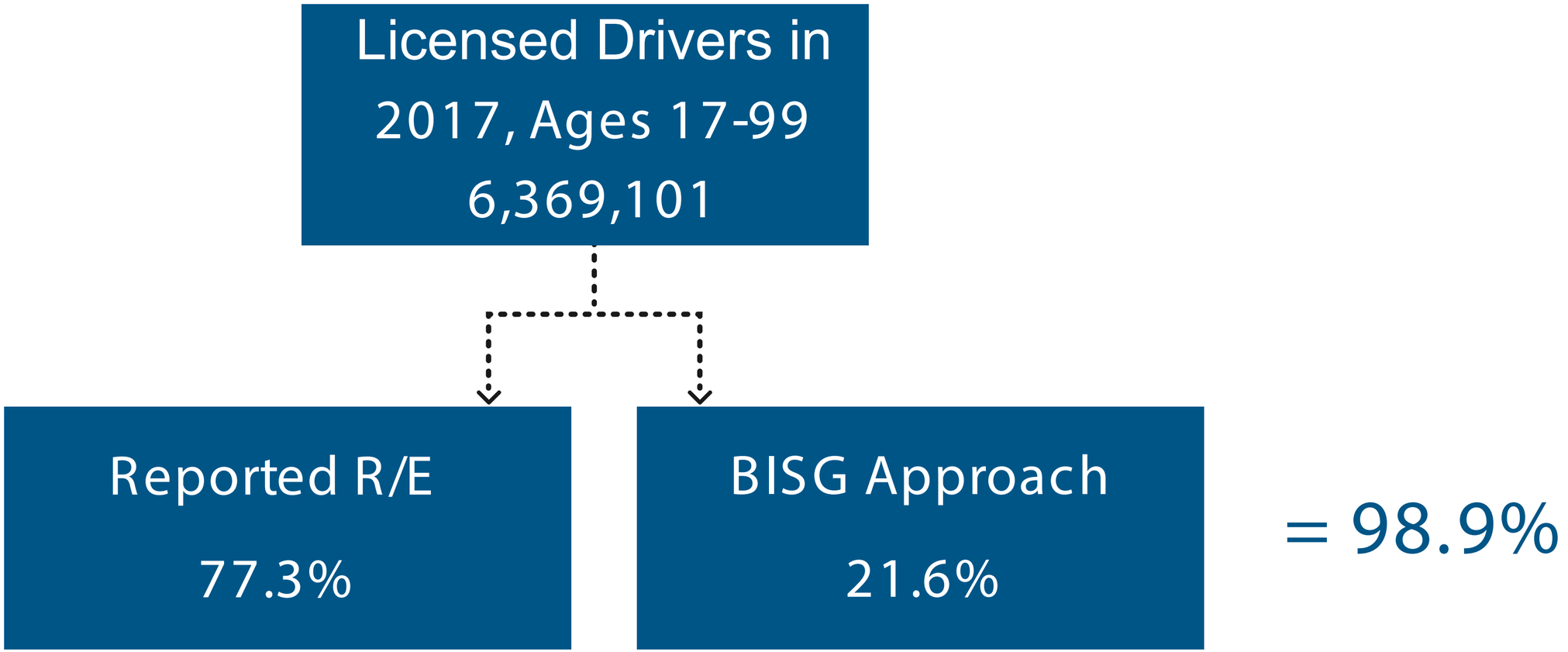
Multiracial



American Indian/Alaskan Native

P(White) + P(Hisp) + P(Black) + P(API) + P(Multi) + P(AIAN) = 1

Classifying R/E Among NJ Drivers



Sartin et al., 2021

Race/ethnicity data: not collected in NJ crash or licensing data

Geocoded residential addresses & crash location

Two Ways to Characterize Communities of Interest

Where do crashes occur? *Urban planning lens*

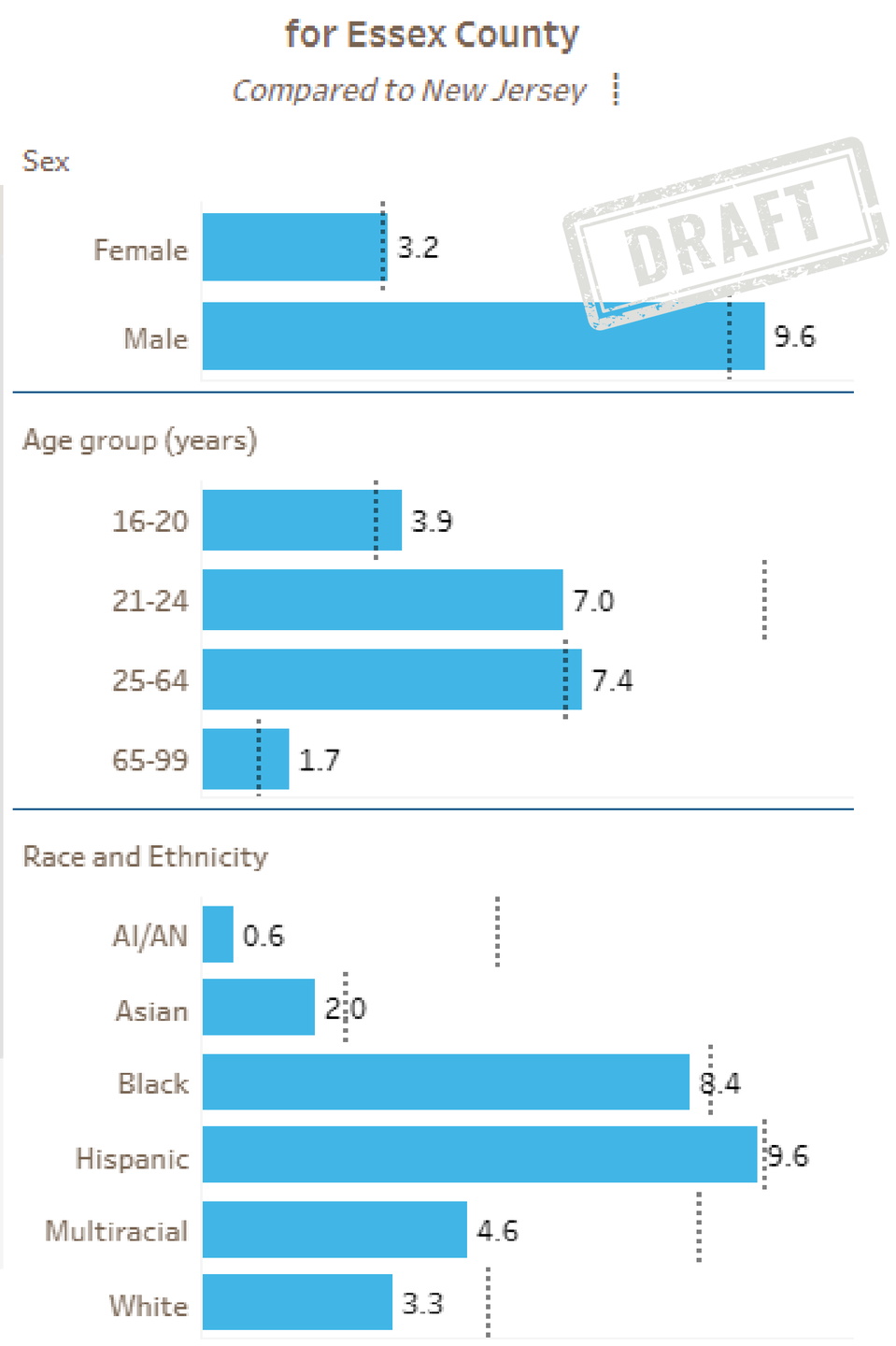
Who do crashes occur to?

Where do crash-affected individuals live?

Where to devote educational efforts? *Public health lens*

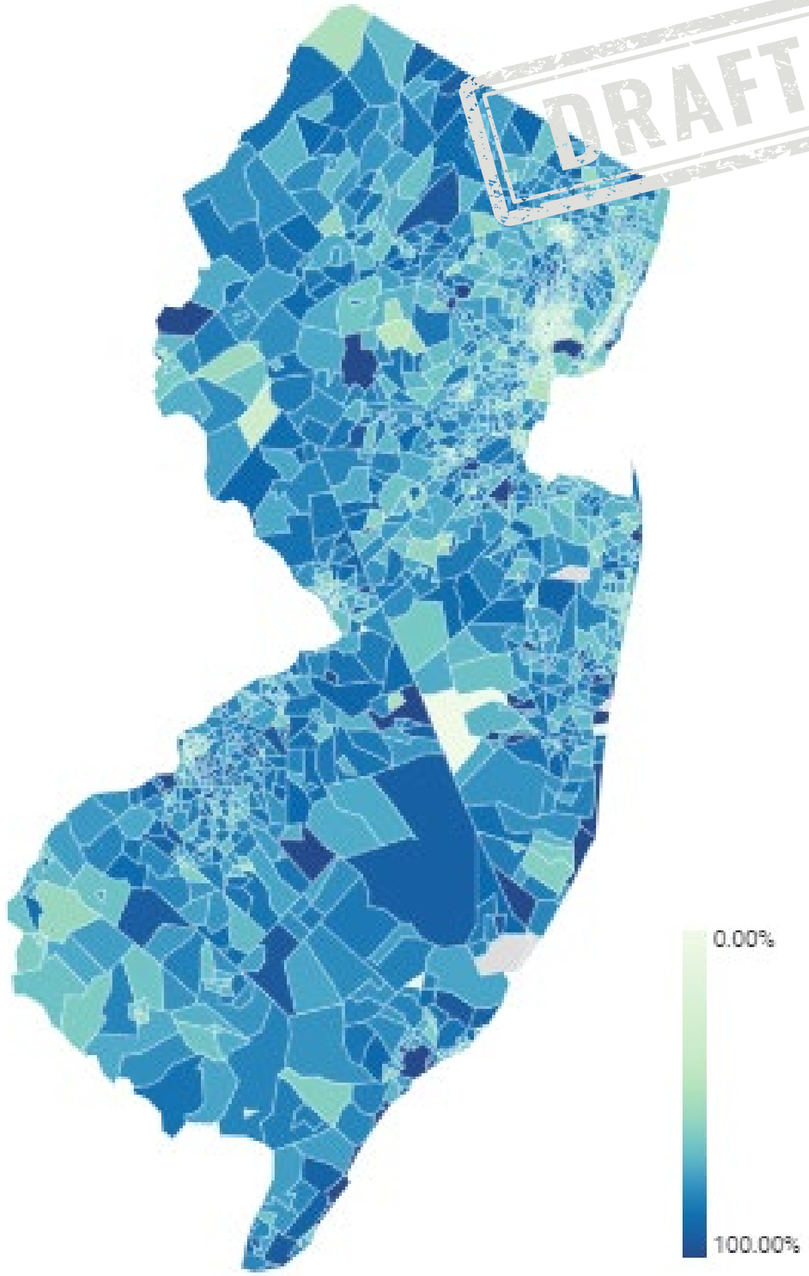
Rates of Drivers in Alcohol-Involved Crashes

(per 10,000 Licensed Drivers Living in Essex Country)



In 2014-2017, a total of 58,781 NJ drivers with children < age 8 were involved in a crash.

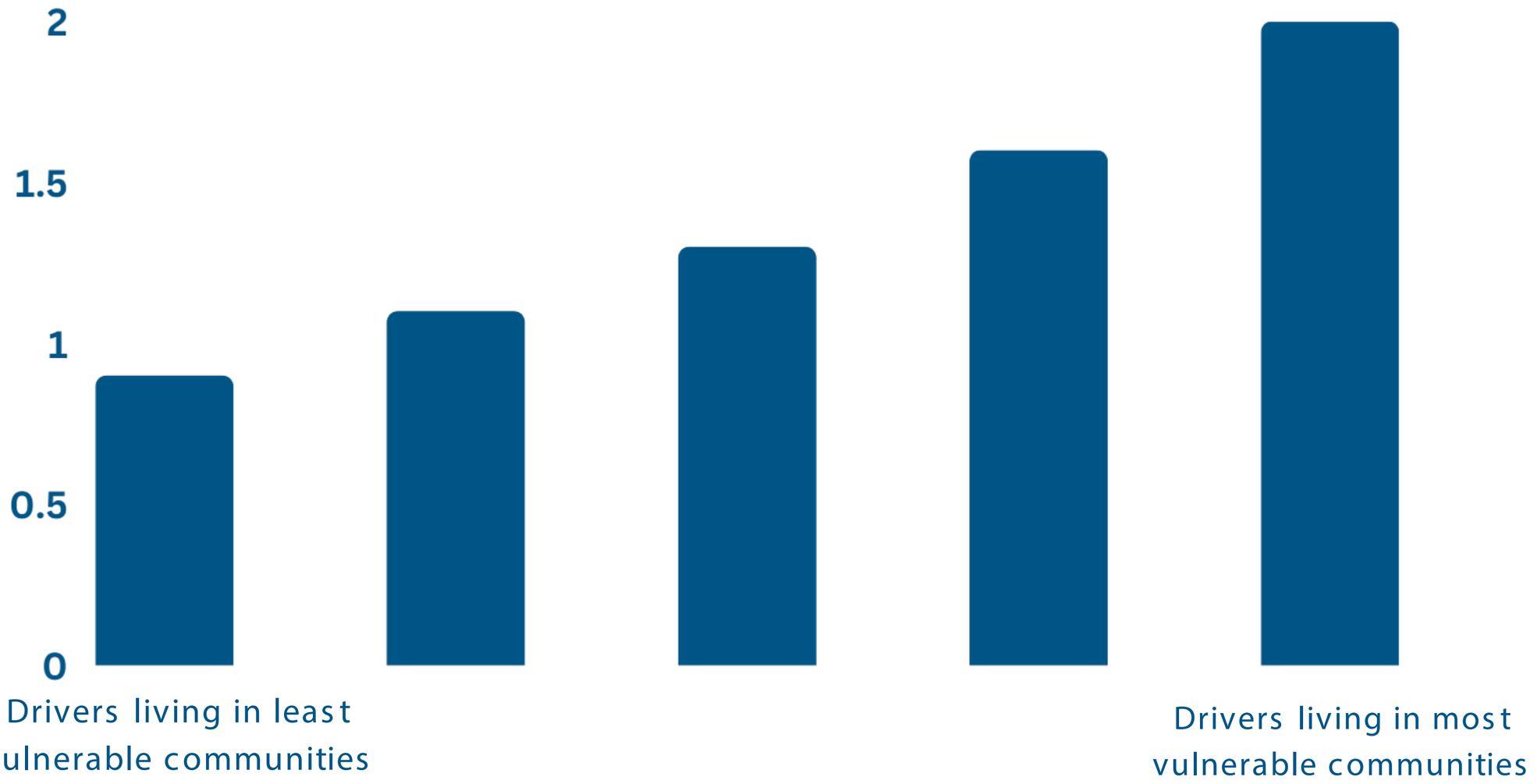
Overall, 72% of drivers had all child occupants restrained in CRS



Sartin et al., 2020.

Disparities Beyond Crashes….

Percent of Unbelted Trips Among NJ Drivers

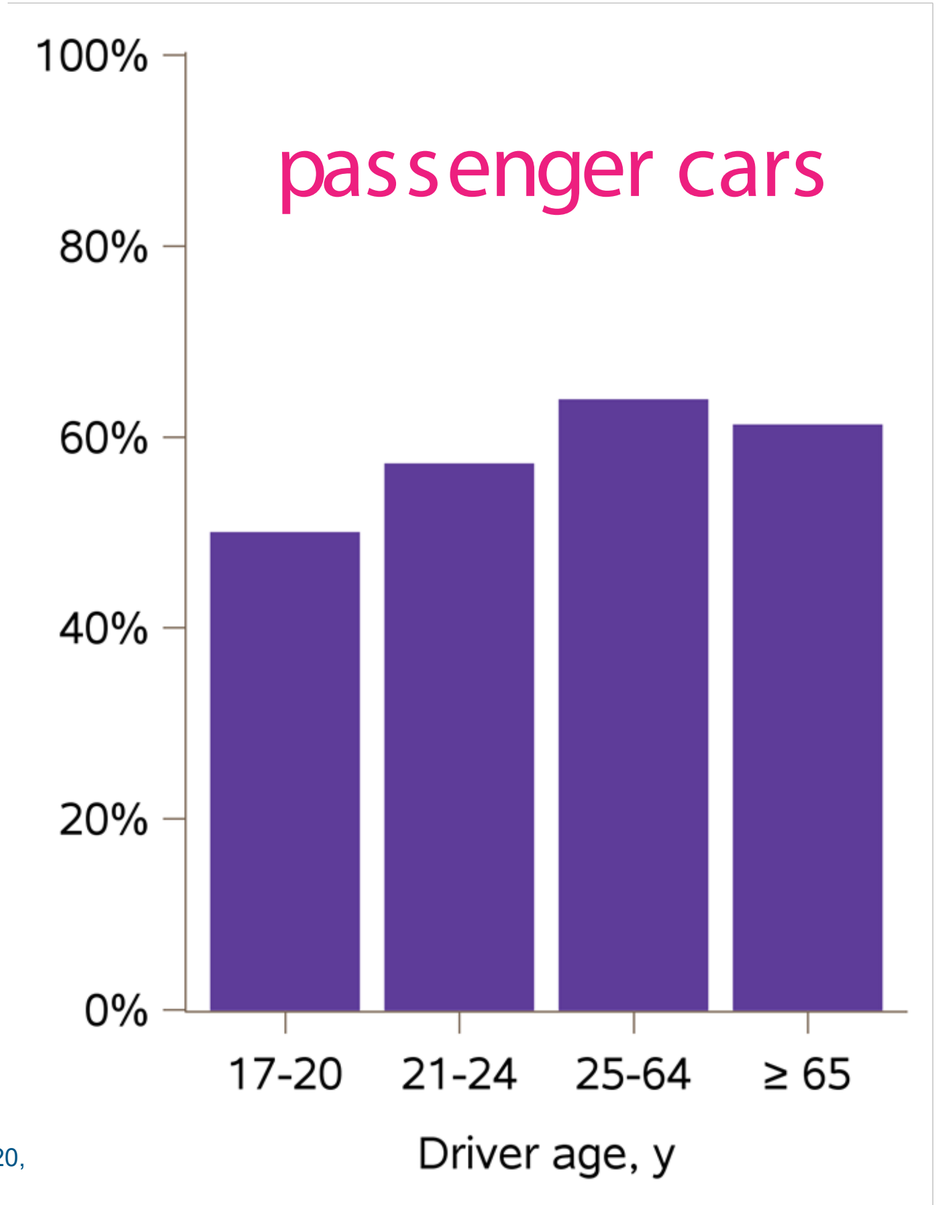


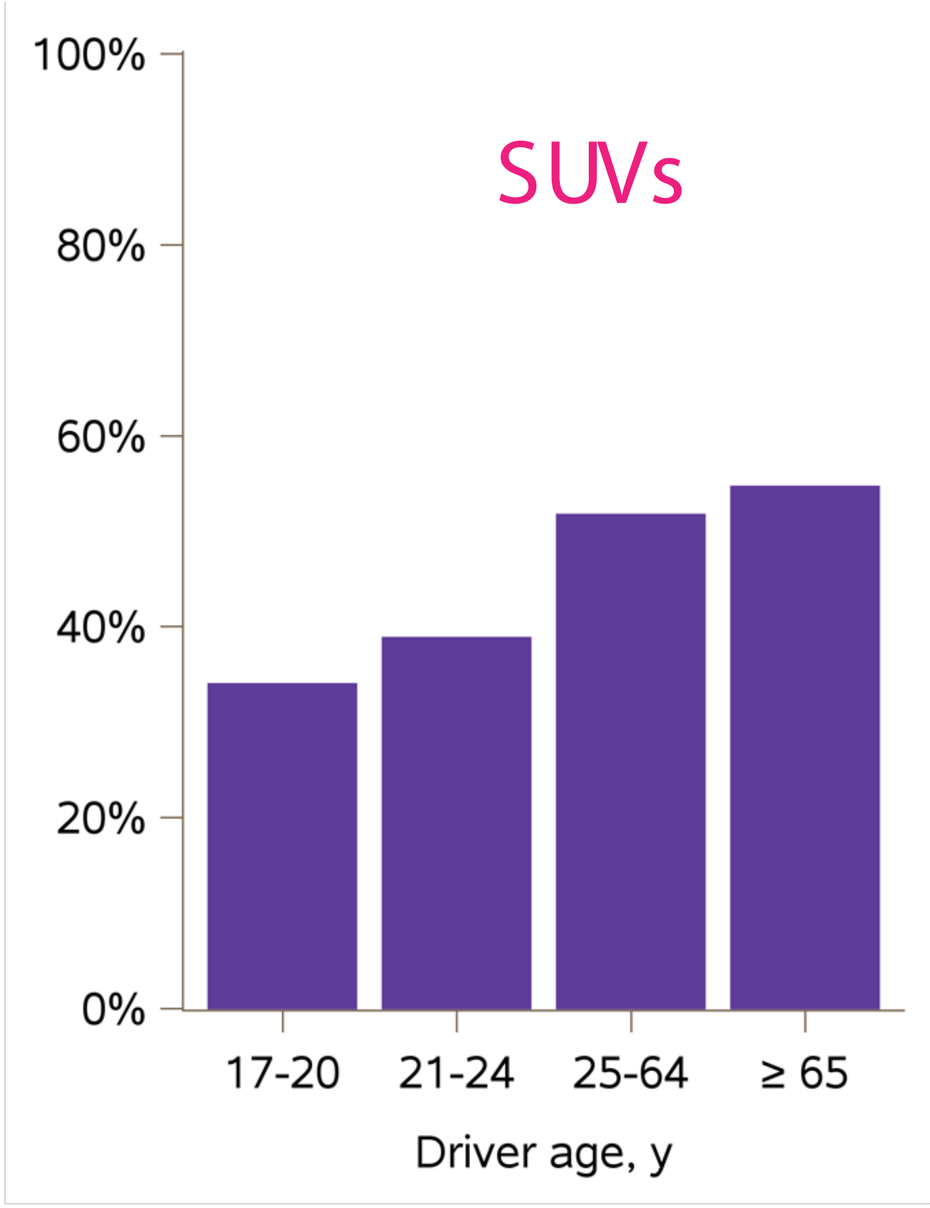
Sartin et al., 2022.

Innovative Features:
Detailed Vehicle and Injury Data

Vehicle Identification Number: Make/model, vehicle age, presence of adaptive driver assistance systems

Vehicles of Younger Drivers were Less Likely to Have Side Air Bags





Metzger et al., 2020,

Vehicle Identification Number: Make/model, vehicle age, presence of adaptive driver assistance systems

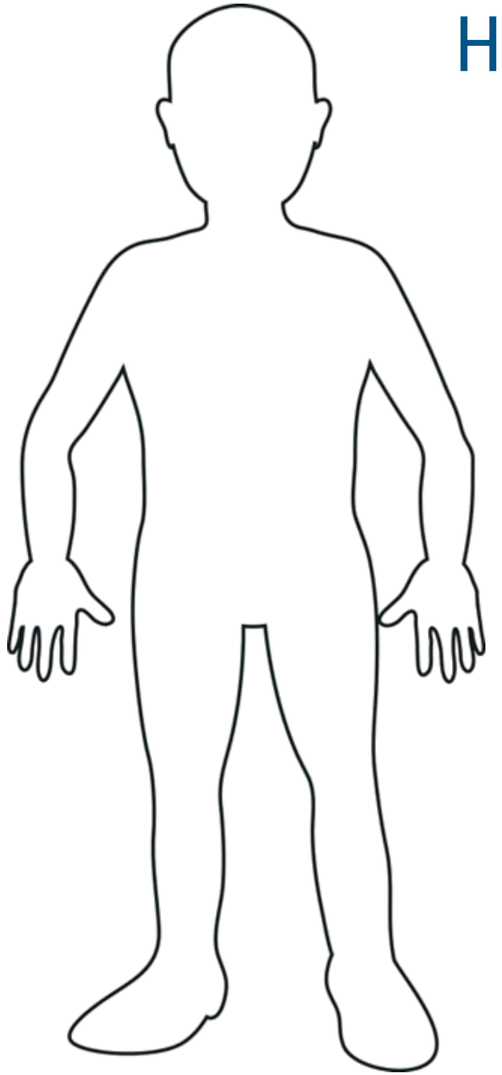
Crash Injury Severity: Mapped ICD-9/10 diagnostic codes to injury severity (AIS, ISS) codes

Location of AIS 2+ Injuries Among Hospitalized Child Passengers

Head: 25%

Upper Extremity: 15%

Abdomen: 19%



Lower Extremity: 20%

Myers et al., in preparation.

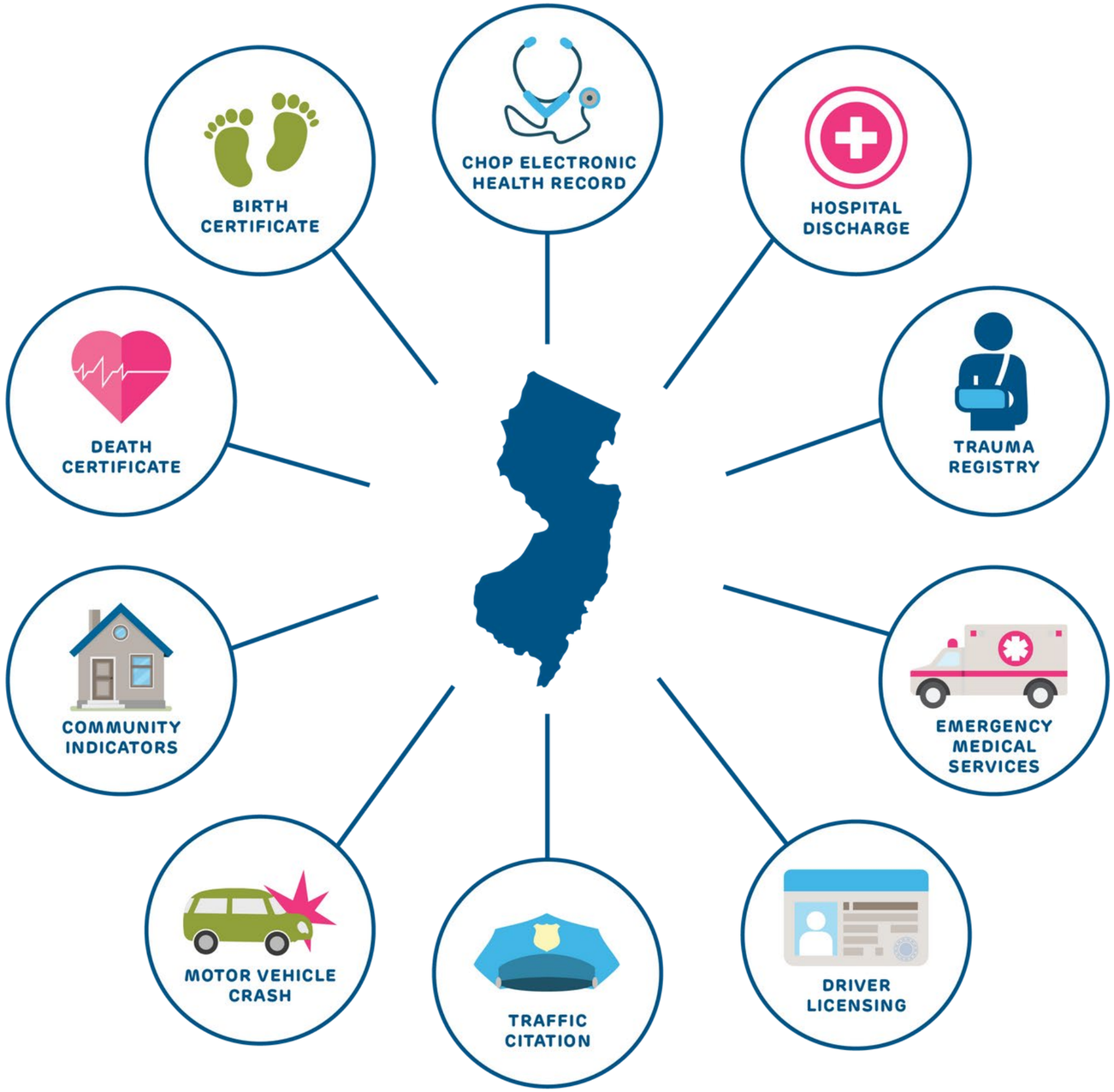
Future Research & Collaborations

Vulnerable road users

Spatial distribution of crashes

Link between crash characteristics & injury

Post-crash care (EMS data, triage to trauma centers)



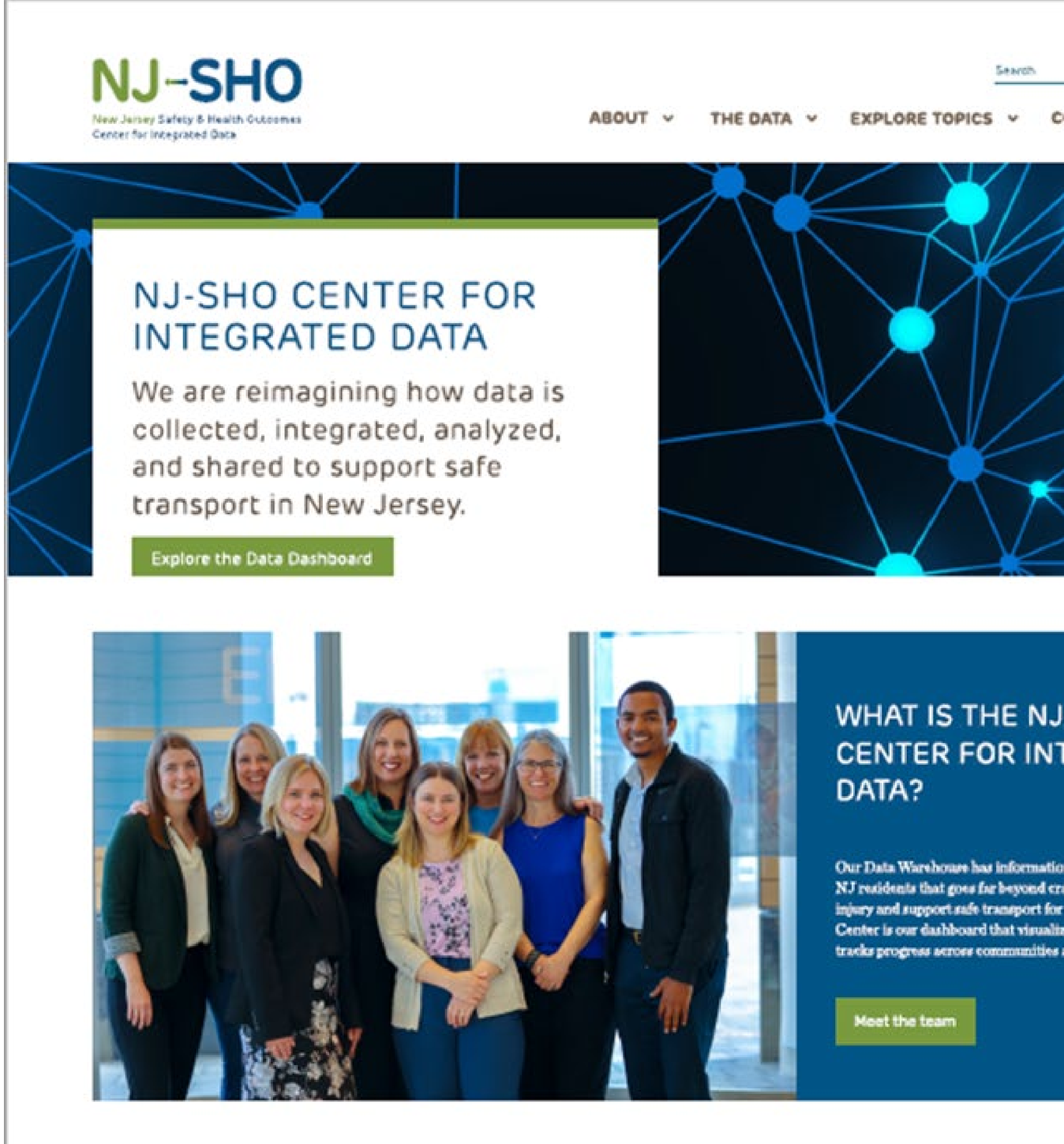
Integrated traffic safety data is critical…

but out of reach of injury professionals

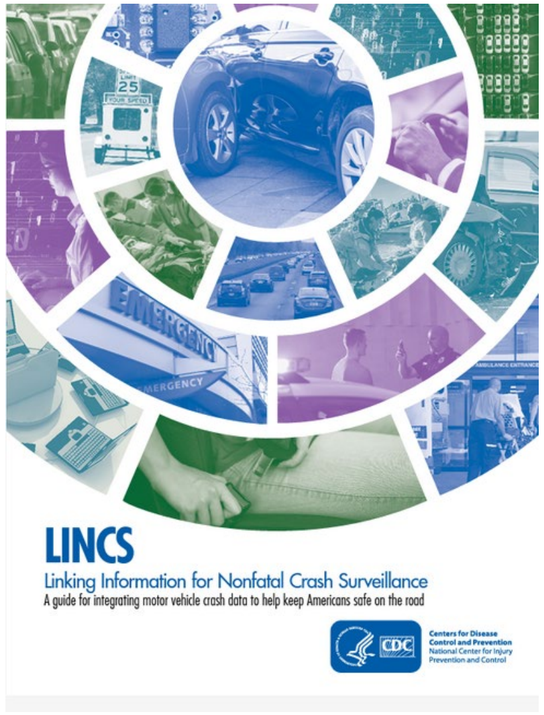
Coming in Summer 2024

NJ-SHO

New Jersey Safety & Health Outcomes
Center for Integrated Data



Recent Safety Strategies Call For Improved Collaboration between Partners



Academia

Research

Capacity

Organizations

Connections/On Ground Efforts

Government

Data

Small Business

Expertise/Connections

Funding

National Institutes of Health

NJ Division of Highway Traffic Safety

American Public Health Association/Centers for Disease Control

National Safety Council

Brain Institute Alliance of NJ

AAA Foundation for Traffic Safety

National Science Foundation

Robert Wood Johnson Foundation

State Farm Insurance Company

Children's Hospital of Philadelphia

Brown University

Administrative Agreements

Memorandum of Understandings / Data Use Agreements:

1) NJ Motor Vehicle Commission / NJ Department of Transportation / NJ Office of Information Technology
2) Department of Health (for each data source)
3) Medicare and Medicaid Services (through Brown University)

Institutional Review Board Approvals:

1) CHOP
2) Brown University
3) NJ Department of Health

Collaboration Research Agreement with each academic partner

Thank You!

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njsho@ chop.edu

Take a picture to get more information about NJ-SHO