

# LINKING CRASH RECORDS WITH EMS REGISTRY DATA

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Injury Epidemiology & Surveillance Branch  
Texas Department of State Health Services

# PROJECT FUNDING

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## Traffic Safety Grant 2015-TDSHS-IS-G-1YG-0157



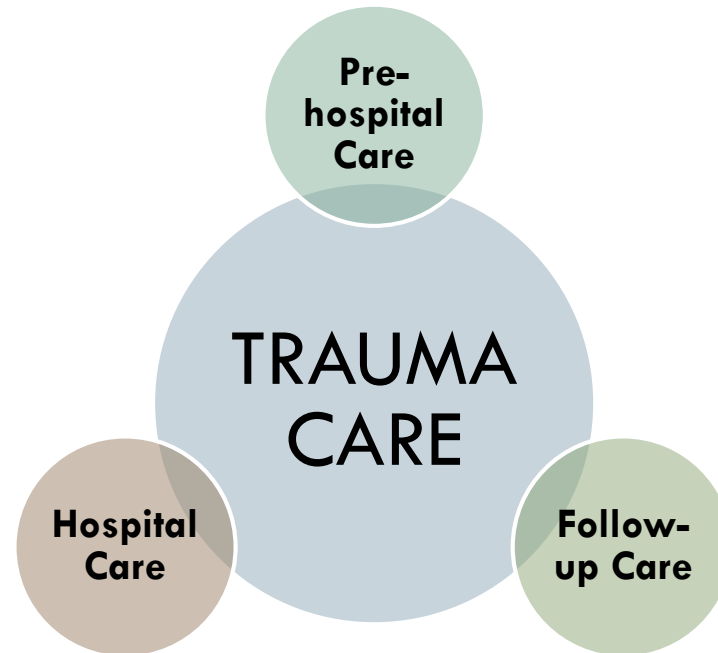
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# WHY IS DATA LINKAGE IMPORTANT?

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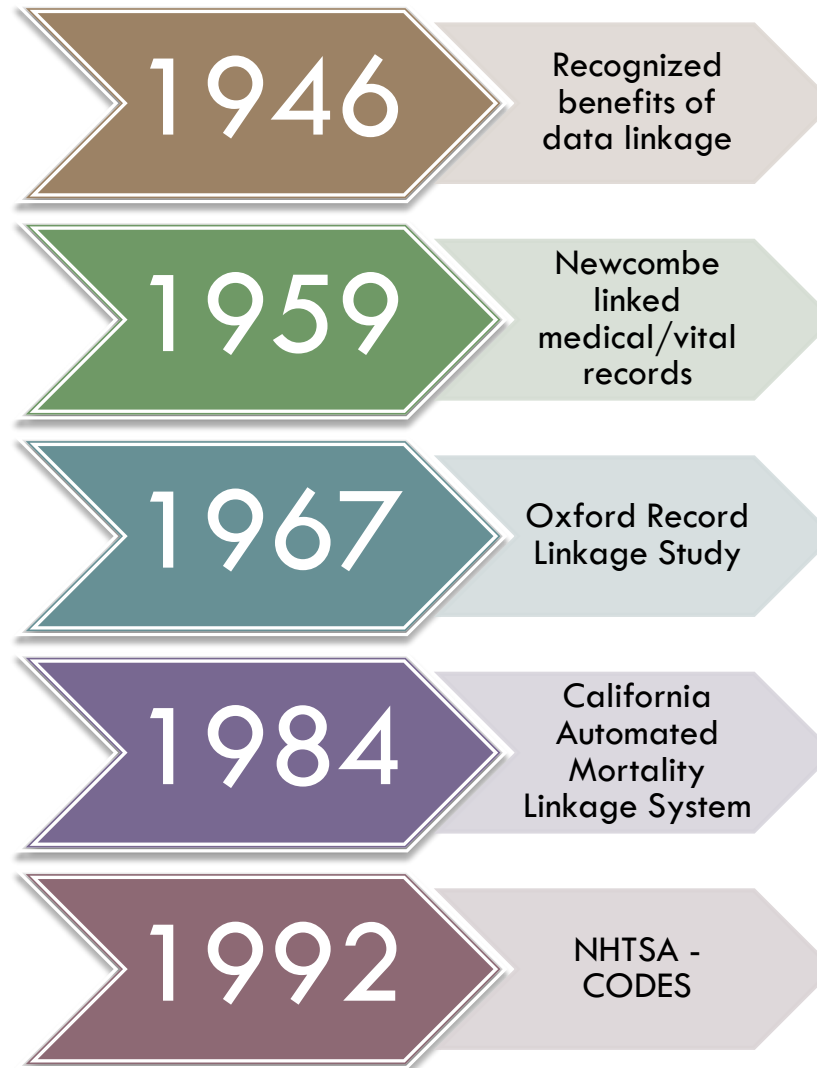
1 database rarely has *all information* on a traumatic event...



Injury surveillance  
Trauma system evaluation

# HISTORY OF DATA LINKAGE

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# CRASH DATA - TxDOT

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- **CR-3 Form**
- **Texas Peace Officer**
- **Crash data**
  - ▣ Vehicle type
  - ▣ Location
  - ▣ Severity of crash
  - ▣ Factors/conditions surrounding crash
  - ▣ Driver/passenger information



# EMS DATA – TEXAS EMS & TRAUMA REGISTRIES

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- **Texas Administrative Code, Title 25, Part 1, Chapter 103, Rule §103.4**
  - EMS providers are to report *all runs* to the Texas EMS & Trauma Registries
- **EMS data**
  - Immediate patient condition
  - Pre-Hospital emergency treatment
  - Timing of response
  - Cause of injury (E-code)



Link Plus - [C:\RegPlus\LinkPlus\Configuration\DelimDemo.cfg]

Manual Review Data Tools Help

Data Type: Delimited File 1: C:\RegPlus\LinkPlus\Data\delimdemofile1.dat

Data Type: Delimited File 2: C:\RegPlus\LinkPlus\Data\delimdemofile2.dat

Select blocking variables

Data Item (File 1)	Data Item (File 2)	Phonetic System
Name--Last	Name--Last	NYSIIS
Social Security Number	Social Security Number	
Birth Date	Birth Date	

Select ID variables (File 1)

ID Variable
Patient ID Number

Select ID variables (File 2)

ID Variable

Select matching variables and methods

Data Item (File 1)	Data Item (File 2)	Matching Method
Name--Last	Name--Last	Last Name
Birth Date	Birth Date	Date
Name--First	Name--First	First Name
Sex	Sex	Exact
Race 1	Race 1	Value-specific
Name--Middle	Name--Middle	Middle Name

Missing Value (File 1)

Missing Value (File 2)

Direct Method

Cutoff Value: 10

Results will be saved to C:\RegPlus\LinkPlus\report\LinkageReport.txt

Add Remove Add Remove

Advanced...

Save

Cancel

Run

Please configure your linkage, and then click the Run button.

# 8

# LINKING METHODOLOGY

*Link Plus*

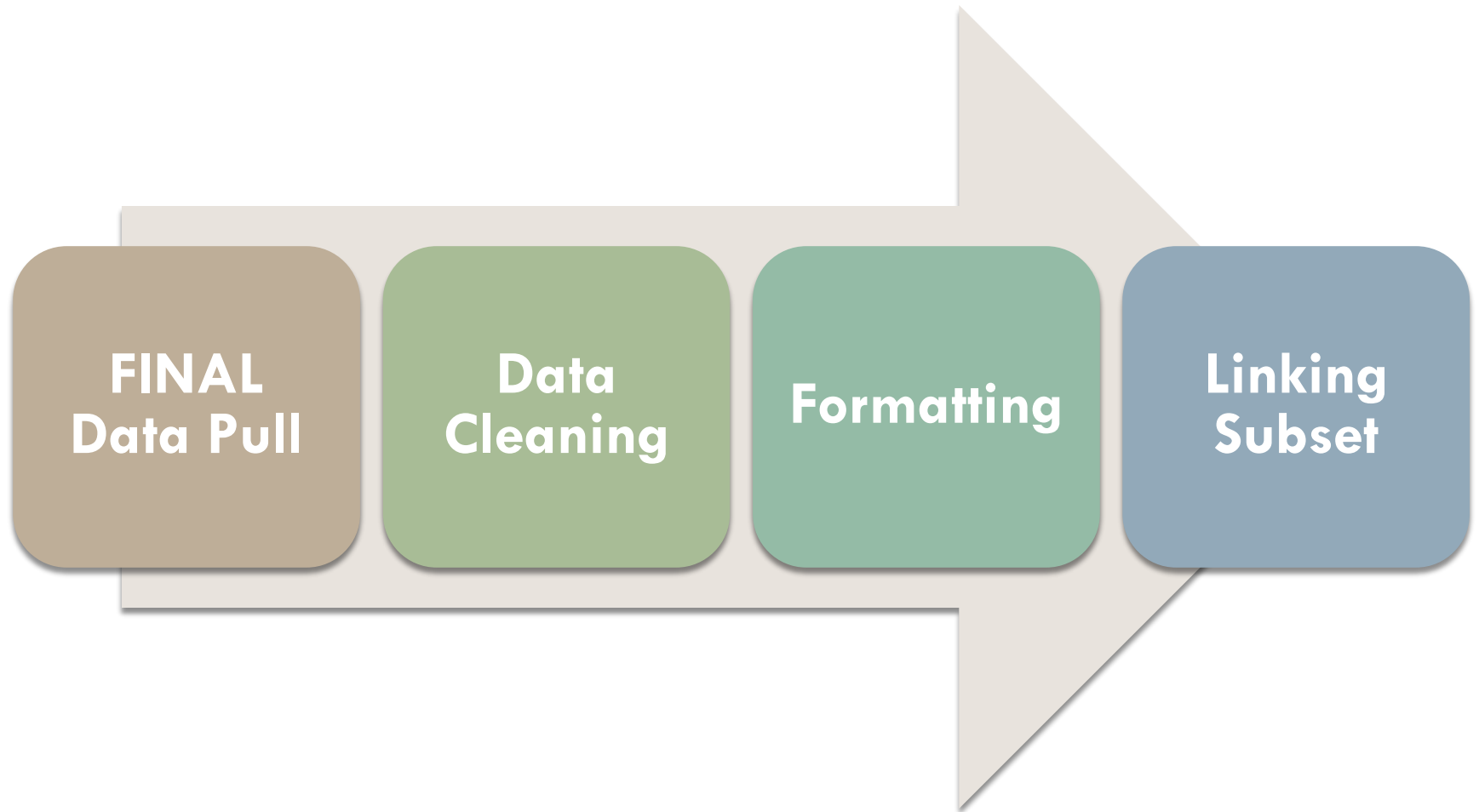
Version 2.0 (06/29/2007)

Please go to File menu to start



# DATA MANAGEMENT PROCESSES

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# DATA LINKING PROCESS

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## □ Probabilistic linkage

Date of Birth

Sex

SSN

Injury County Code

Last Name

First Name

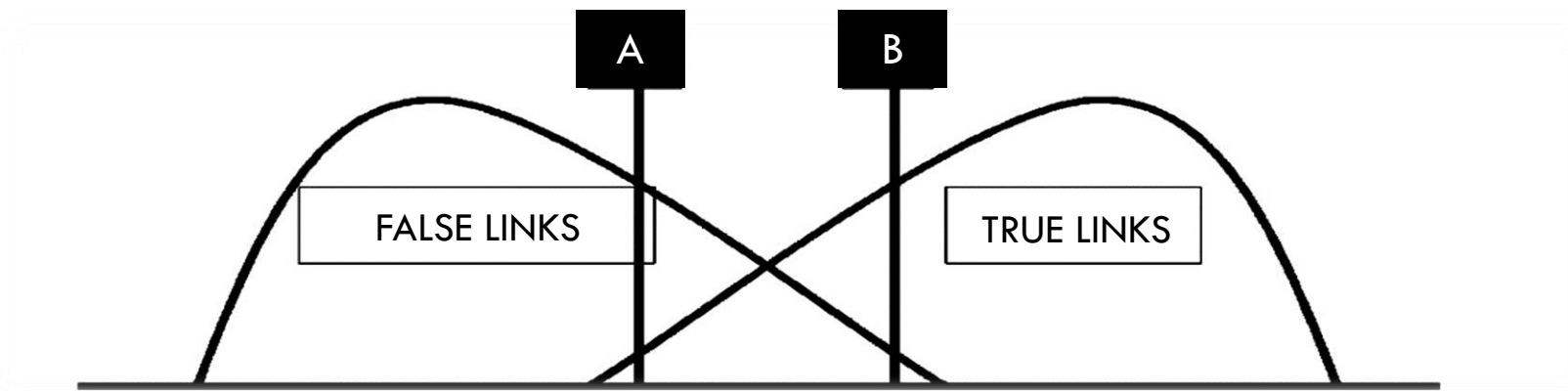
Middle Name

Injury Date

Injury Time

Dispatch Time

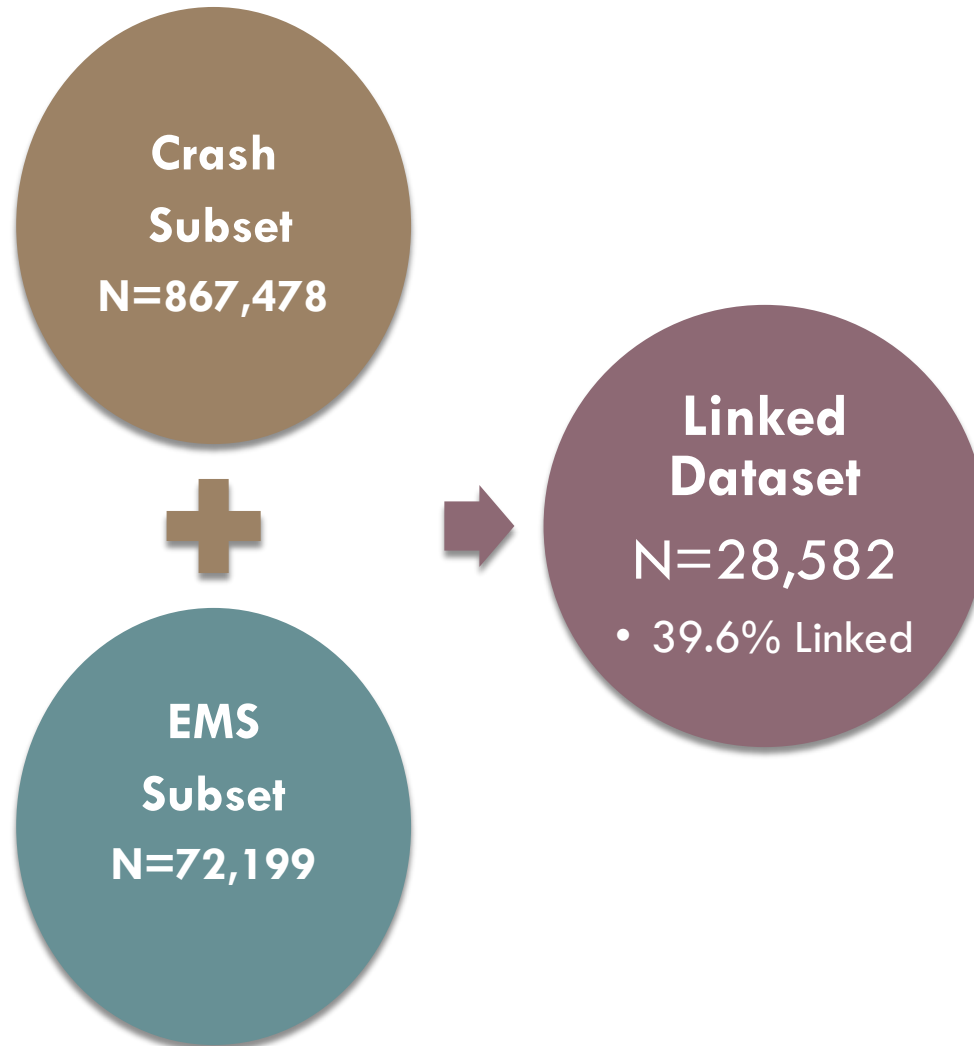
## □ Implemented a “high” cut-off value



# DATA LINKAGE

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2013



## LESSONS LEARNED in the Linking Process

- Data cleaning
  - Record duplication
- For exceptionally large linkages (>1 million records), use mixed-methods linkage
- ‘Good’ data = Linked data

## STUDY OBJECTIVES

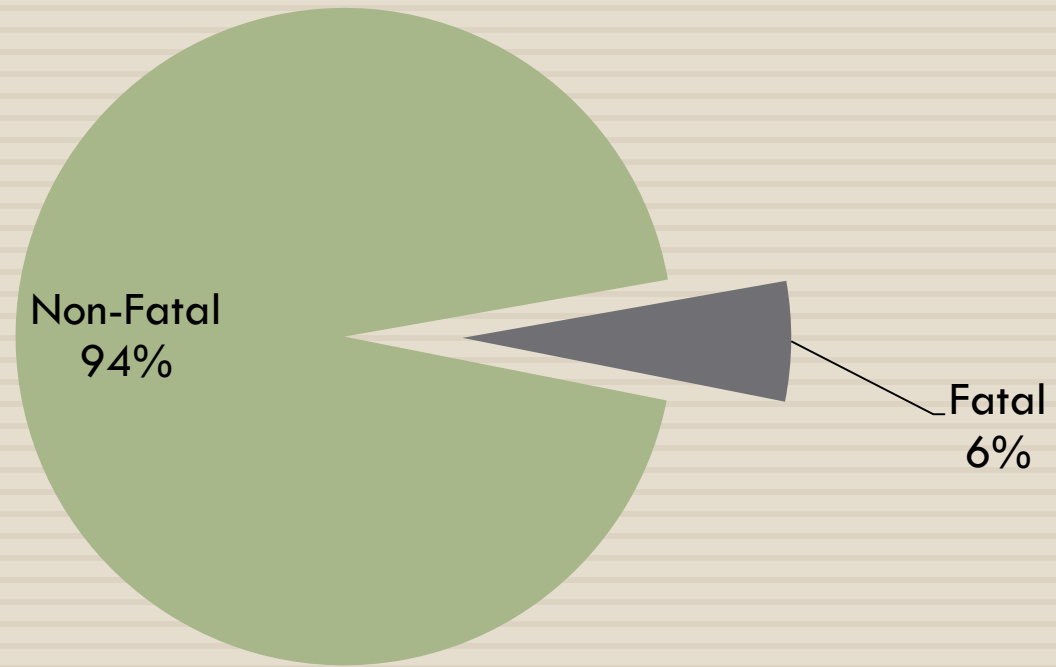
- 1. To characterize and determine crash-related risk factors for fatal/non-fatal motor vehicle crashes involving primary motorcycle drivers in the state of Texas.**
- 2. To describe EMS pre-hospital times and field health characteristics among primary motorcycle drivers in the state of Texas.**

# STUDY METHODOLOGY

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- Categorical – Pearson's Chi-square/ Fisher's Exact
- Continuous – Independent Samples T-test
- Multiple logistic regression
  - ▣ Forward selection approach ( $\alpha=0.05$ )
  - ▣ Marginal associations ( $p<0.25$ )

## Fatal/Non-Fatal Motorcycle Crashes (N = 1,817)



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**PRIMARY MOTORCYCLE DRIVERS (N = 1,937)**

**2013 CRASH TO EMS DATA LINKAGE (N = 28,582)**

# MOST PREVALENT ICD-9-CM E-CODES

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RANK	CAUSE OF INJURY	PERCENT
1	MVT ACCIDENT OF UNSPECIFIED NATURE	62.6
2	OTHER MVT ACCIDENT INVOLVING COLLISION WITH MOTOR VEHICLE	10.6
3	MVT ACCIDENT INVOLVING COLLISION WITH OTHER VEHICLE	9.0



# DEMOGRAPHIC CHARACTERISTICS

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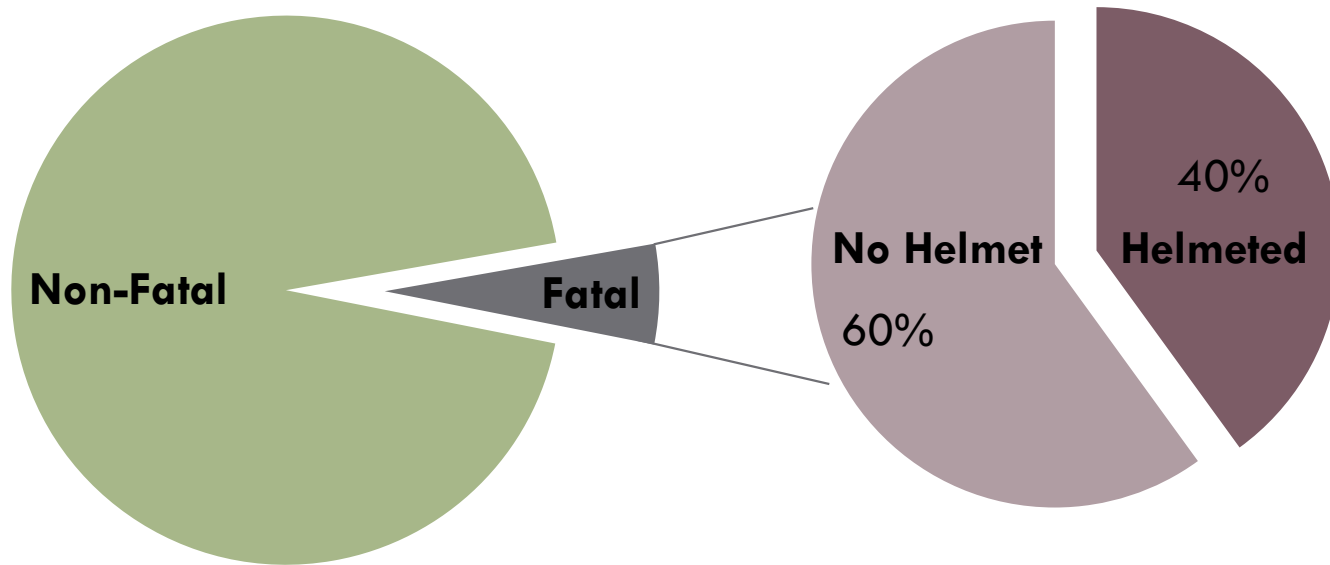
	Fatal (n = 107) N (%)	Non-Fatal (n = 1,710) N (%)	P-value
Male Gender	104 (97.2)	1,589 (92.9)	0.0350
Age (years)			0.0404
20-24	6 (5.6)	245 (14.3)	
25-34	22 (20.6)	411 (24.0)	
35-44	23 (21.5)	317 (18.5)	
45-54	30 (28.0)	337 (19.7)	
55-64	15 (14.0)	239 (14.0)	
65+	7 (6.5)	85 (5.0)	
Race/Ethnicity*			0.1657
Hispanic	8 (7.5)	145 (8.5)	
Non-Hispanic Black	3 (2.8)	125 (7.3)	
Non-Hispanic White	62 (58.0)	794 (46.4)	
Other	18 (16.8)	299 (17.5)	
Unknown	13 (12.2)	266 (15.6)	

\* Race Categories as defined by the 1997 Office of Management and Budget (OMB) standards. Other includes 'American Indian', 'Asian', 'Native Hawaiian Pacific Islander', and ≥2 race categories.

NOTE: Values represent percentages based on column totals. Percentages may not sum to 100% due to rounding.

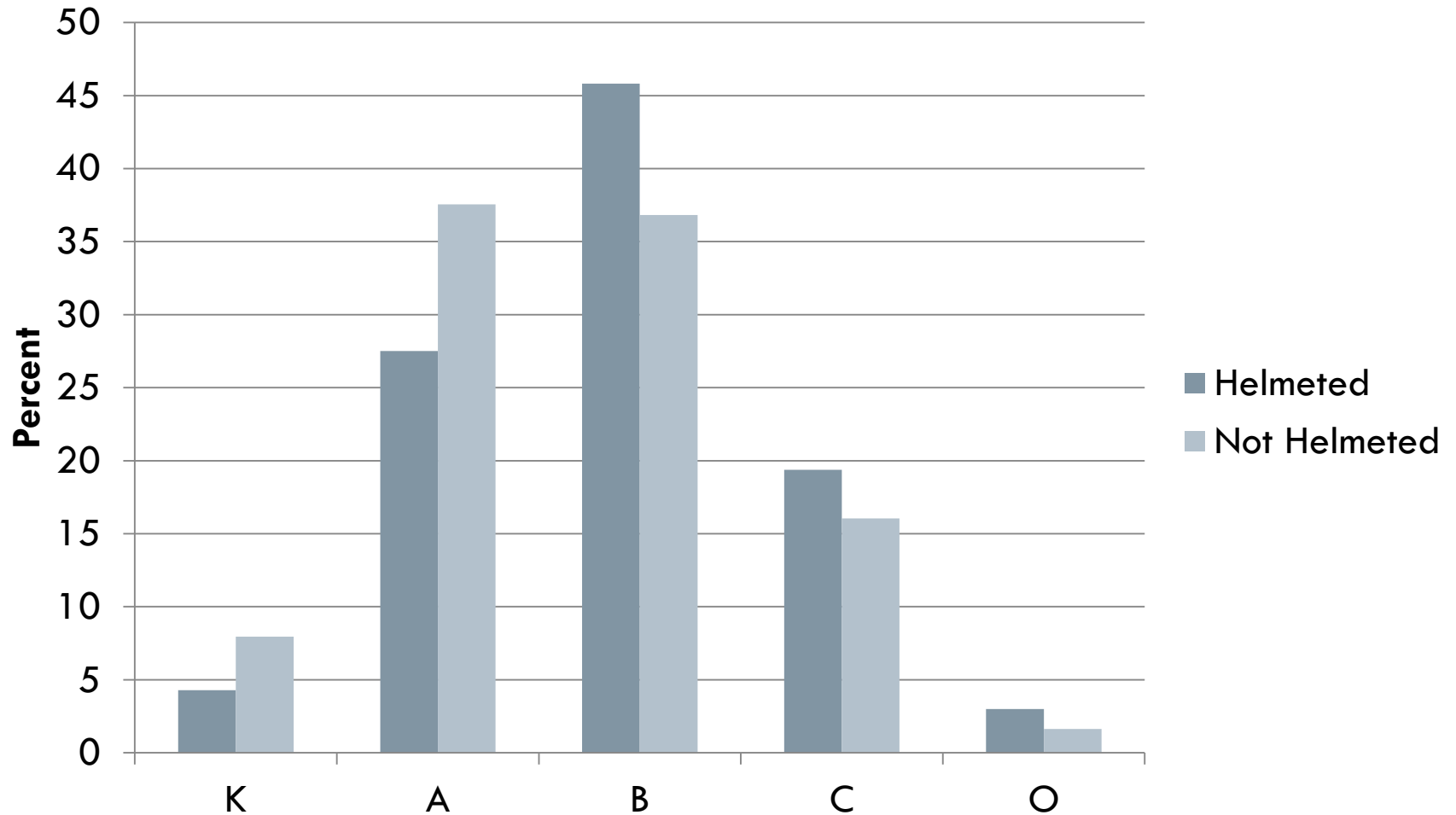
# FATAL/NON-FATAL MOTORCYCLE CRASHES AND HELMET USE

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# HELMET USE AND THE KABCO SCALE

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# MULTIPLE LOGISTIC REGRESSION

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## VARIABLES ( $p < 0.25$ )

Sex	Light	Weather	Road Surface	Race/ Ethnicity	GCS $\leq 13$	SBP $\leq 90$ mm Hg	Dest. SBP $\leq 90$ mm Hg	RR <10, >29 breaths/ min	Helmet Use
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## FINAL MODEL ( $p < 0.05$ )

<b>GCS <math>\leq 13</math></b>	<b>Destination SBP <math>\leq 90</math> mm Hg</b>	<b>RR &lt;10, &gt;29 breaths/min</b>	<b>Helmet Use</b>	<b>Age</b>
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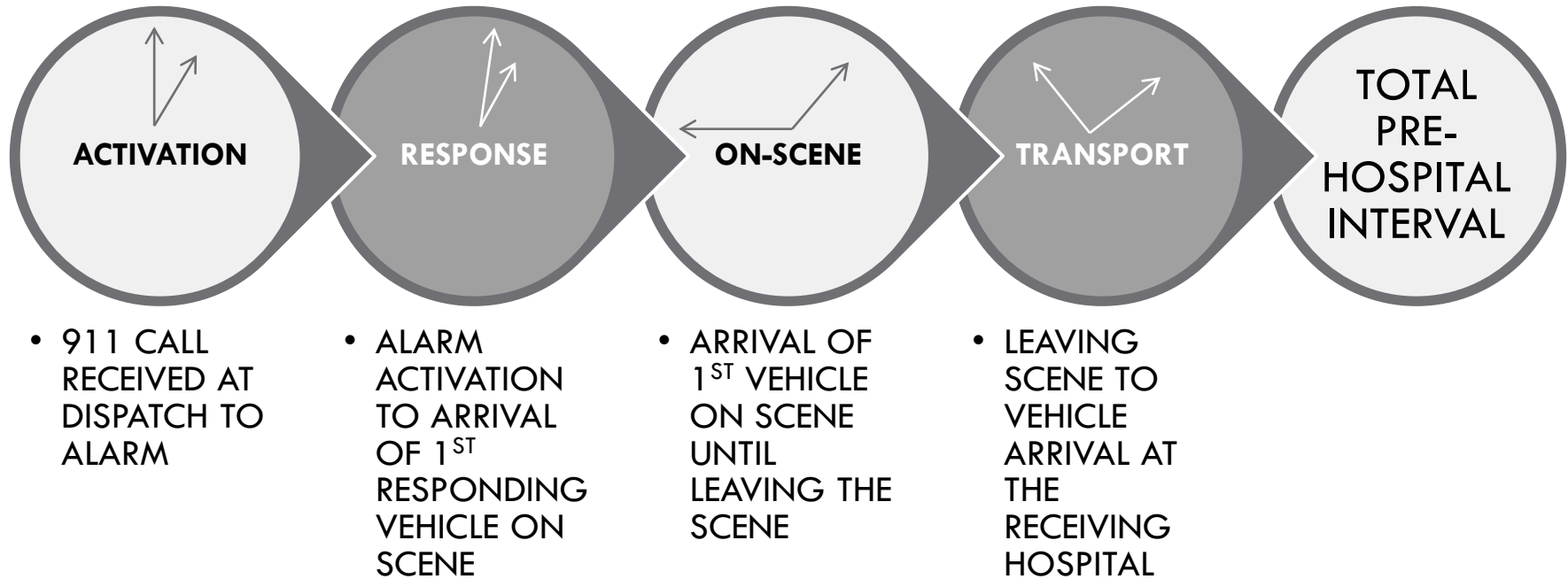
# FATAL/NON-FATAL MOTORCYCLE CRASHES

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<b>Variables</b>	<b>Adjusted OR</b>	<b>95% CI</b>	<b>p-value</b>
<b>Male Gender</b>	<b>12.84</b>	<b>1.15-143.55</b>	<b>0.0382</b>
<b>GCS <math>\leq 13</math></b>	<b>27.14</b>	<b>12.63-58.34</b>	<b>&lt;0.0001</b>
<b>Destination SBP <math>\leq 90</math> mm Hg</b>	<b>15.59</b>	<b>4.72-51.52</b>	<b>&lt;0.0001</b>
<b>RR &lt;10 or &gt;29 breaths/minute</b>	<b>9.30</b>	<b>3.71-23.30</b>	<b>&lt;0.0001</b>
<b>Helmet Use</b>	<b>0.50</b>	<b>0.30-0.70</b>	<b>0.0004</b>

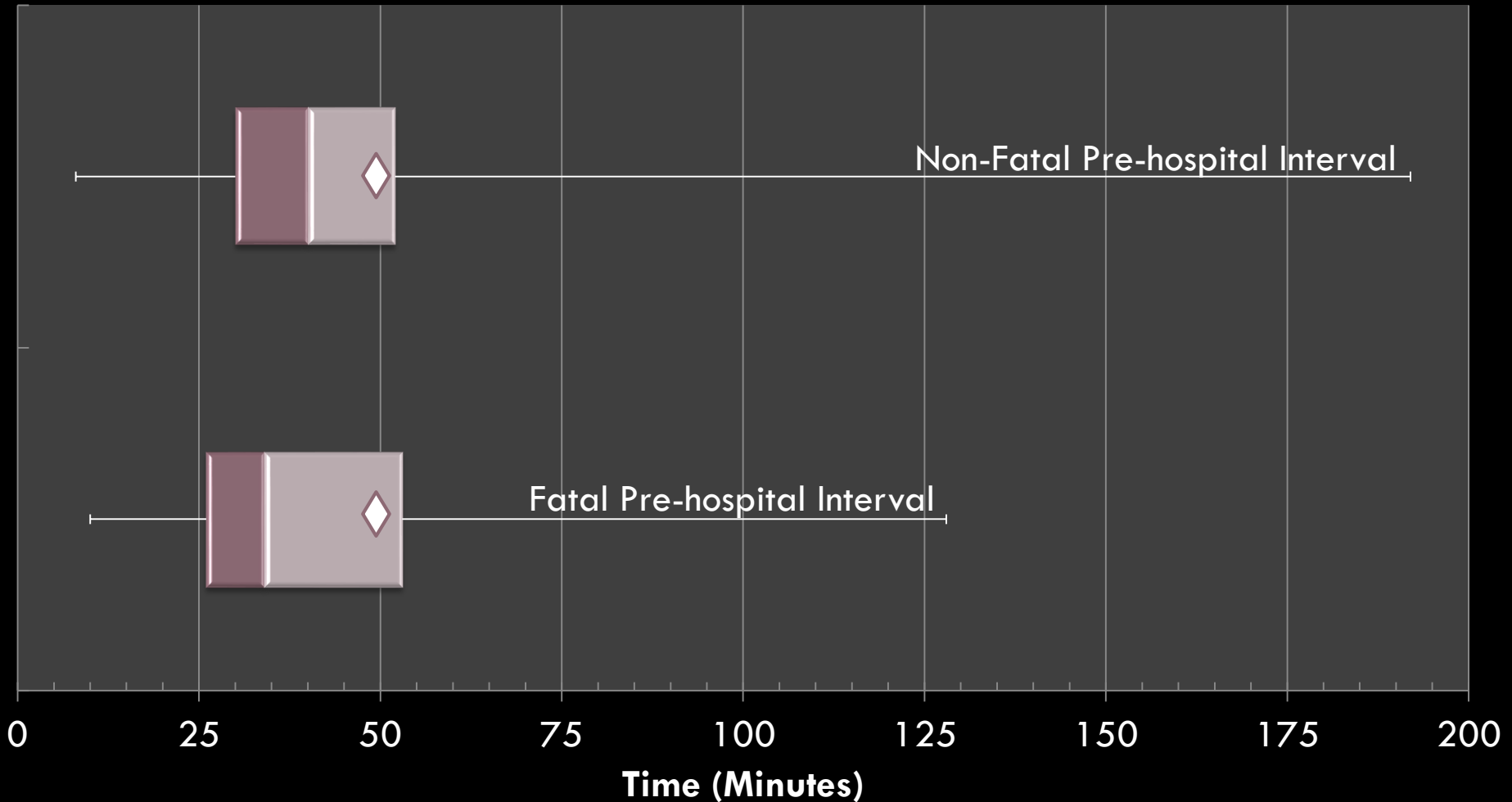
# EMS TIME INTERVALS

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# EMS TOTAL PRE-HOSPITAL TIMES

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# CONCLUSIONS

- Individuals with sub-normal field health measurements may require specialized trauma resources.
- Prioritizing triage decisions with respect to the field measures evaluated among these drivers may be a point of consideration regarding field interventions.
- This study emphasizes the importance of helmeted motorcyclists and the impact on increasing the odds of survival.



# FUTURE STEPS

- Missing data - standard multiple imputation
- Hospital discharge data linking
- Texas EMS & Trauma Registries data quality review
  - Review protocols for 'test record' entry and de-duplication
  - Examine/revise data validation rules

# CONTACT INFORMATION

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1100 WEST 49TH STREET  
AUSTIN, TEXAS 78714**

- WEBSITE: [www.dshs.state.tx.us/injury/data](http://www.dshs.state.tx.us/injury/data)
- EMAIL: [Nina.Leung@dshs.state.tx.us](mailto:Nina.Leung@dshs.state.tx.us)



# SUPP. SLIDE 1: SUCCESSFUL LINKS

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## Crash → EMS → Hospital

	Observations	Percent
Crash → EMS	28,582	100
<b>FULL LINK</b>	<b>3,408</b>	<b>11.9</b>

\* Based on cause of injury e-codes: 810-819, 820-825

† Percent of linked records to MV-related, non-transfer records