Comparing the CR-3 Injury Severity Categories (KABCO) to Injury Severity Metrics

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Department of State Health Services

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State Health Services

Objective

- To compare distributions between crash-assigned CR-3 injury severity categories (KABCO) to the Injury Severity Score (ISS) and the Maximum Abbreviated Injury Scale (MAIS) among primary persons sustaining fatal/non-fatal injuries in the state of Texas.

Data Sources, Primary Drivers, Texas, 2013

No Transfer Data Included

Crash
CR-3

Hospital
Traumatic Injuries
TBI
SCI

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Inclusion Criteria for Trauma Hospitalizations, Texas, 2013

Per Texas Administrative Code, Title 25, Chapter 103, Rule § 103.7, hospitals shall report hospitalizations meeting the following criteria:

- A spinal cord injury, (ICD-9-CM **diagnosis codes** 806.0-806.9 and 952.0-952.9) ***OR…***
- A traumatic brain injury, (ICD-9-CM **diagnosis codes** 348.1, 800.0-801.9, 803.0-804.9, 850.0-854.1, and 994.1) ***OR…***
- Another traumatic injury, (ICD-9-CM **diagnosis codes** 800-959.9 excluding 905-909, 910-924, and 930-939), **AND** at least one of the following:
  - admitted to a hospital inpatient setting (for >48 hours)
  - died after receiving any evaluation or treatment or was dead on arrival
  - transferred into or out of the hospital

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Variables for Probabilistic Linking: TxDOT Crash to Hospital Data Among Primary Persons, Texas, 2013

Block Variables

- Date of Birth
- Sex
- Injury Date

Matching Variables

- Date of Birth
- Sex
- Injury Date
- Injury County Code
- Last Name
- First Name
- Middle Name
- Injury Time

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Number of Linked TxDOT Crash to Hospital Records Among Primary Drivers, Texas, 2013

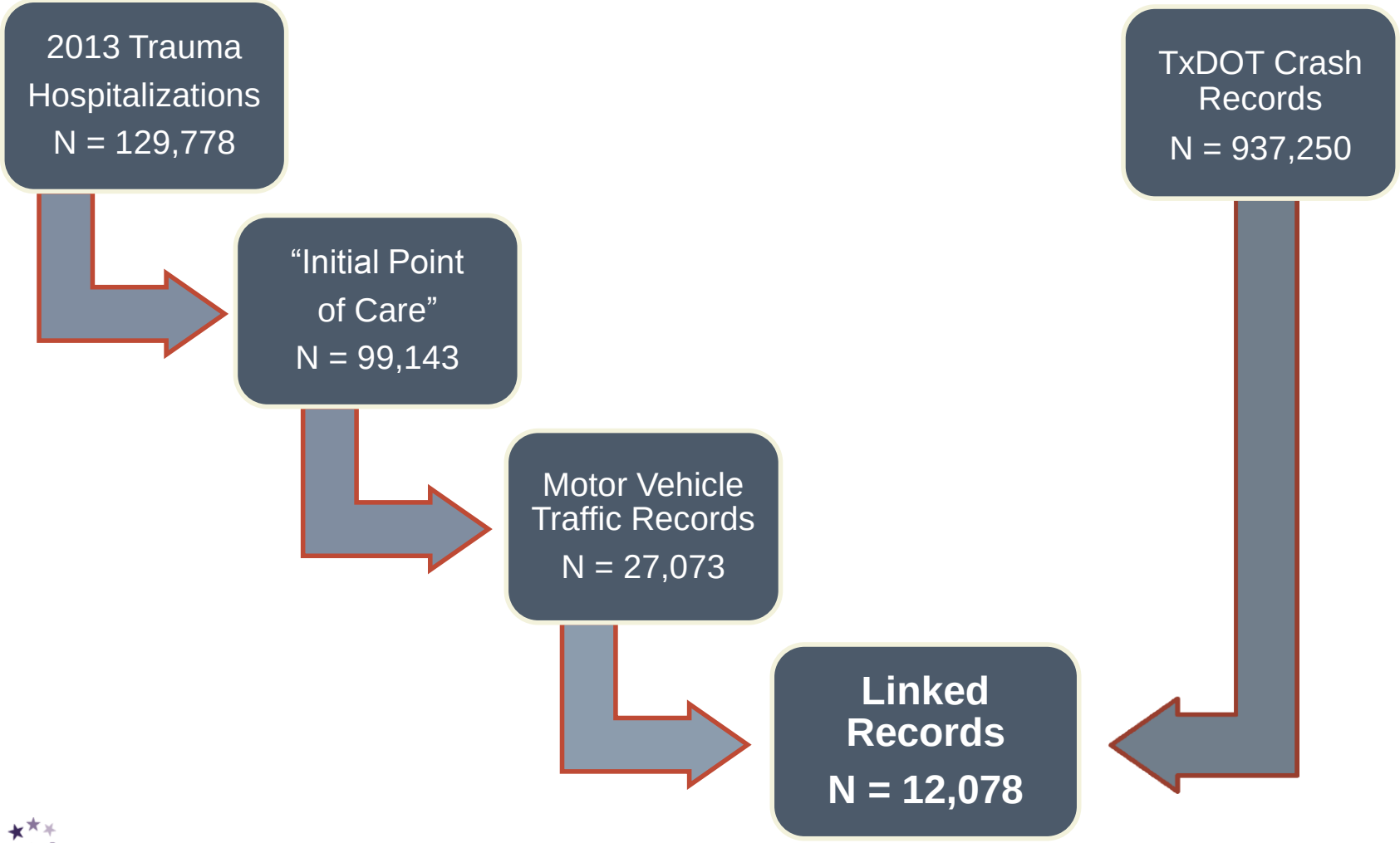

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Table 1. Demographic Characteristics Among Primary Persons, Texas, 2013

	Fatal (N=711) n (%)	Non-Fatal (N=11,367) n (%)
Age		
<18	31 (4.4)*	652 (5.7)*
18-64	548 (77.1)*	9,323 (82.0)*
65+	132 (18.6)*	1,381 (12.2)*
Male Sex	538 (75.7)*	7,803 (68.7)*
Race/Ethnicity		
Hispanic	165 (23.2)*	3,199 (28.1)*
Non-Hispanic Black	72 (10.1)*	1,325 (11.7)*
Non-Hispanic White	435 (61.2)*	6,142 (54.0)*
Other^	30 (4.2)*	505 (4.4)*

*X^2 $p<0.05$
^Includes American Indian, Asian, Native Hawaiian and Other Pacific Islander or two or more races.
NOTE: Sum of percentages may not equal 100% due to rounding

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Table 2. Injury and Outcome Data Among Primary Persons, Texas, 2013

	Fatal (N=711) n (%)	Non-Fatal (N=11,367) n (%)
TBI only	344 (48.4)*	2,708 (23.8)*
SCI only	11 (1.6)*	122 (1.1)*
TBI and SCI	26 (3.7)*	48 (0.4)*
Cause of Injury		
MVT with other vehicle	346 (48.9)*	4,855 (42.9)*
MVT with pedestrian	126 (17.8)*	946 (8.4)*
MVT on highway	45 (6.4)*	899 (7.9)*
MVT and loss of control	142 (20.1)*	2647 (23.4)*
MV Non-traffic accidents	34 (4.8)*	585 (5.2)*
Road vehicle accidents (non-MVA)	3 (0.4)*	81 (0.7)*
Other	11 (1.6)*	1,301 (11.5)*

*X^2 $p<0.05$
NOTE: Sum of percentages may not equal 100% due to rounding

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Table 3. CR-3 Injury Severity Categories (KABCO) Among Primary Persons, Texas, 2013

	Fatal (N = 711) n (%)	Non-Fatal (N = 11,367) n (%)
K	586 (82.4)*	73 (0.6)*
A	53 (7.5)*	4,343 (38.2)*
B	26 (3.7)*	3,723 (32.8)*
C	19 (2.7)*	2,249 (19.8)*
O	21 (3.0)*	903 (7.9)*
unknown/missing	6 (0.8)	76 (0.7)

*X^2 $p<0.05$
NOTE: Sum of percentages may not equal 100% due to rounding

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Figure 2. Distribution of 'K' by ISS Among Primary Persons Suffering Non-Fatal Injuries, Texas, 2013

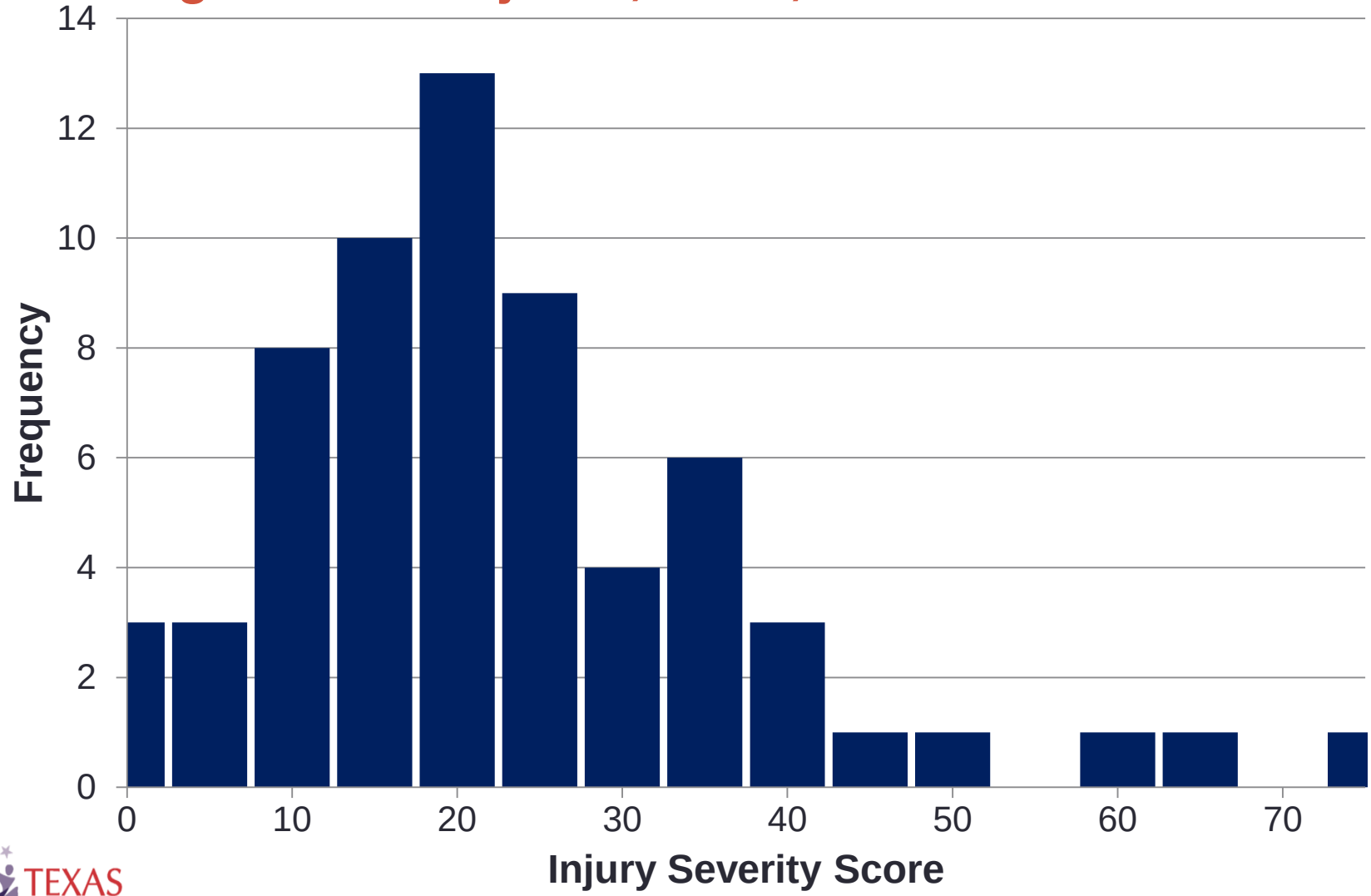

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Figure 2a. Distribution of 'ABCO' by ISS Among Primary Persons Suffering Non-Fatal Injuries, Texas, 2013

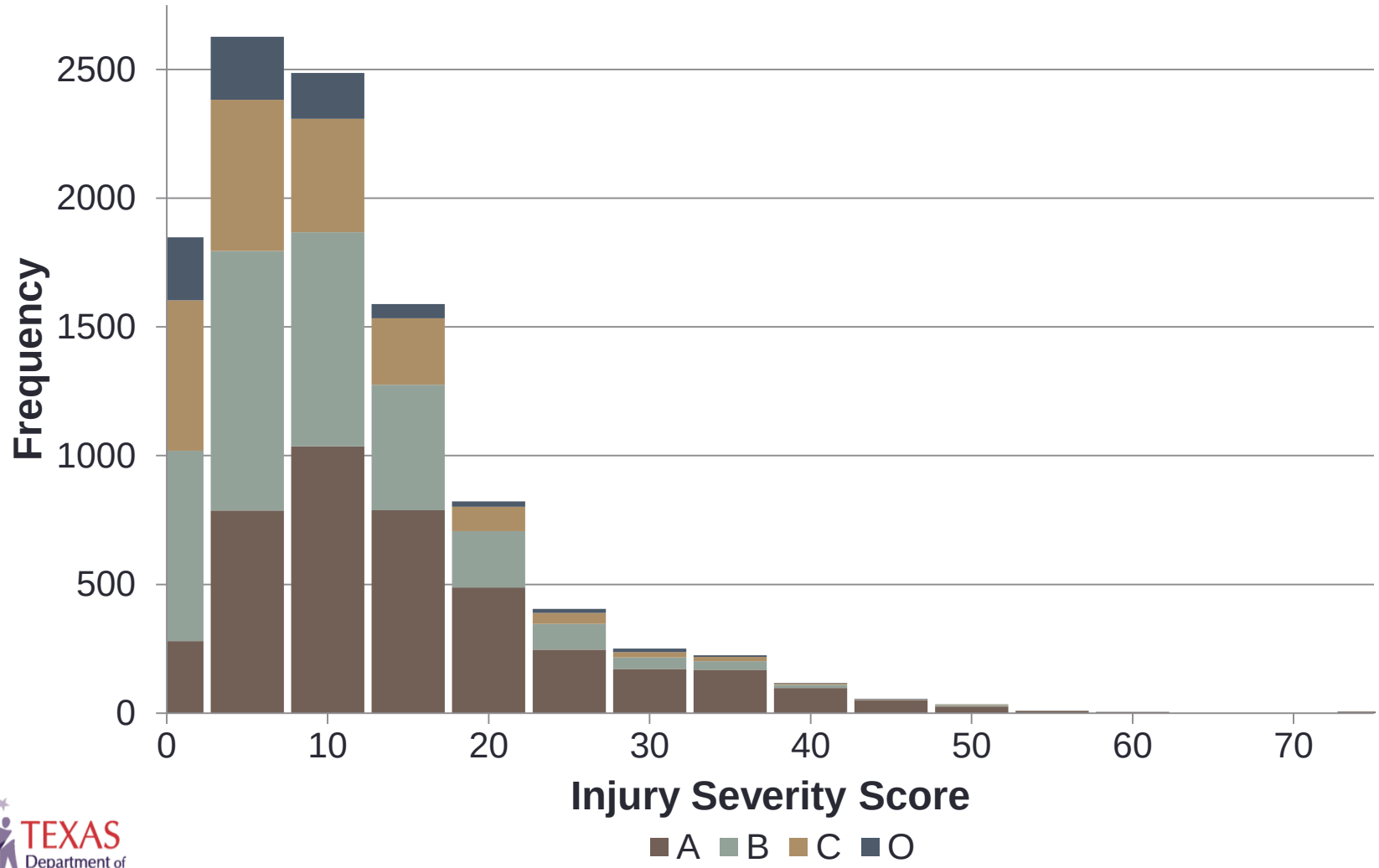

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Figure 1. Histogram of 'K' by ISS Among Primary Persons Suffering Fatal Injuries, Texas, 2013

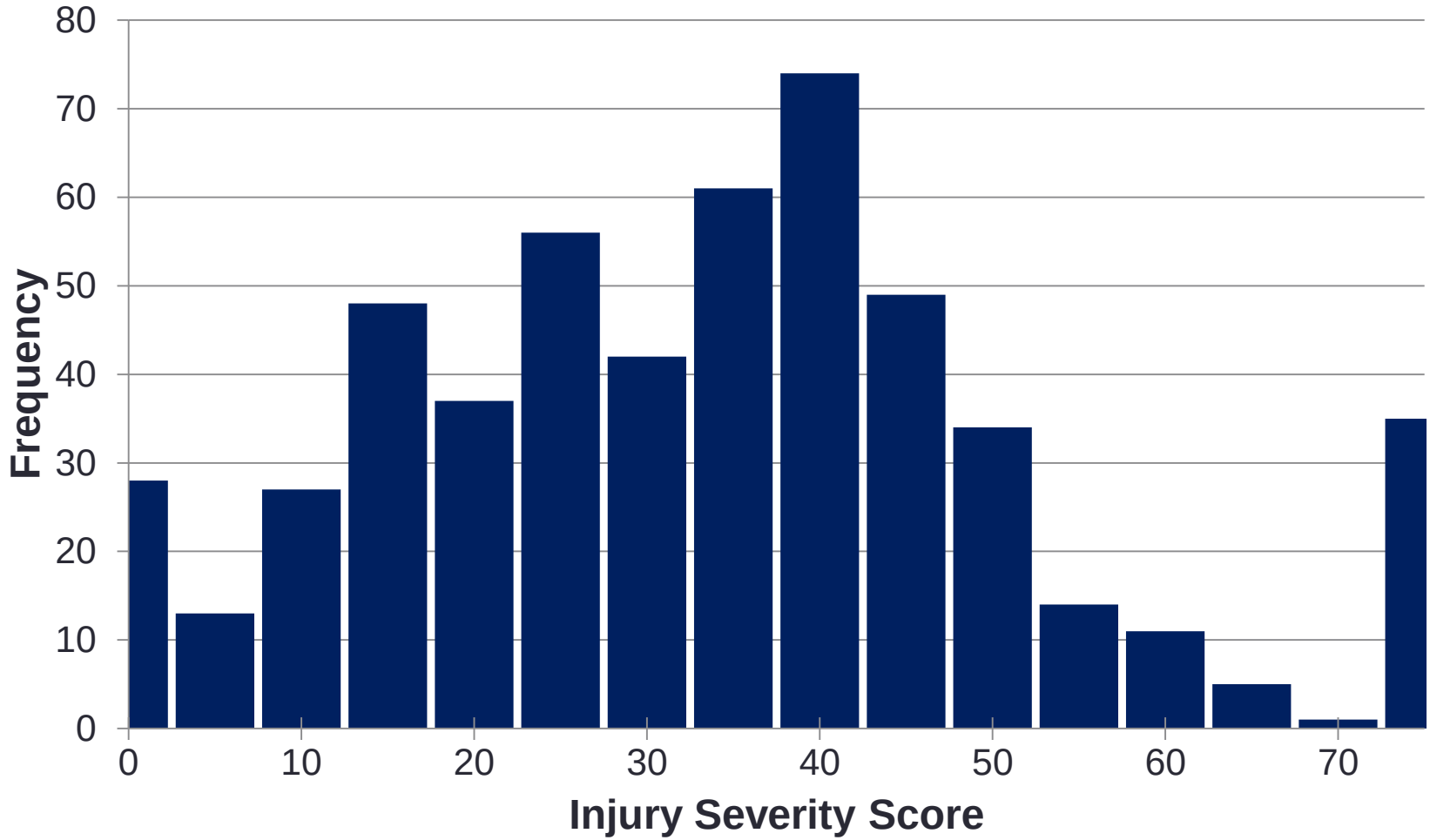

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Figure 1a. Histogram of 'ABCO' by ISS Among Primary Persons Suffering Fatal Injuries, Texas, 2013

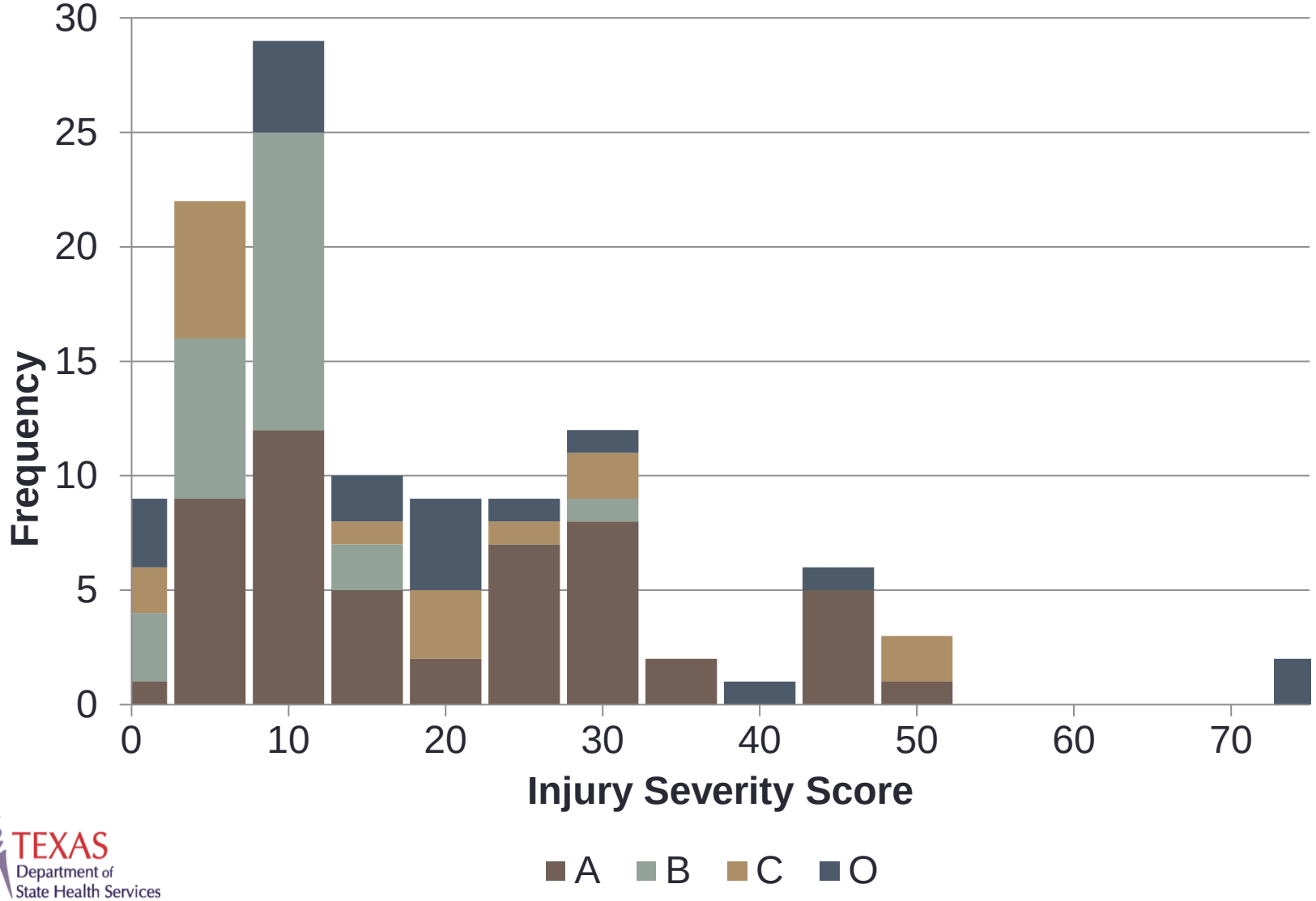

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Figure 3. Distribution of 'KABCO' by MAIS Among Primary Persons Suffering Fatal Injuries, Texas, 2013

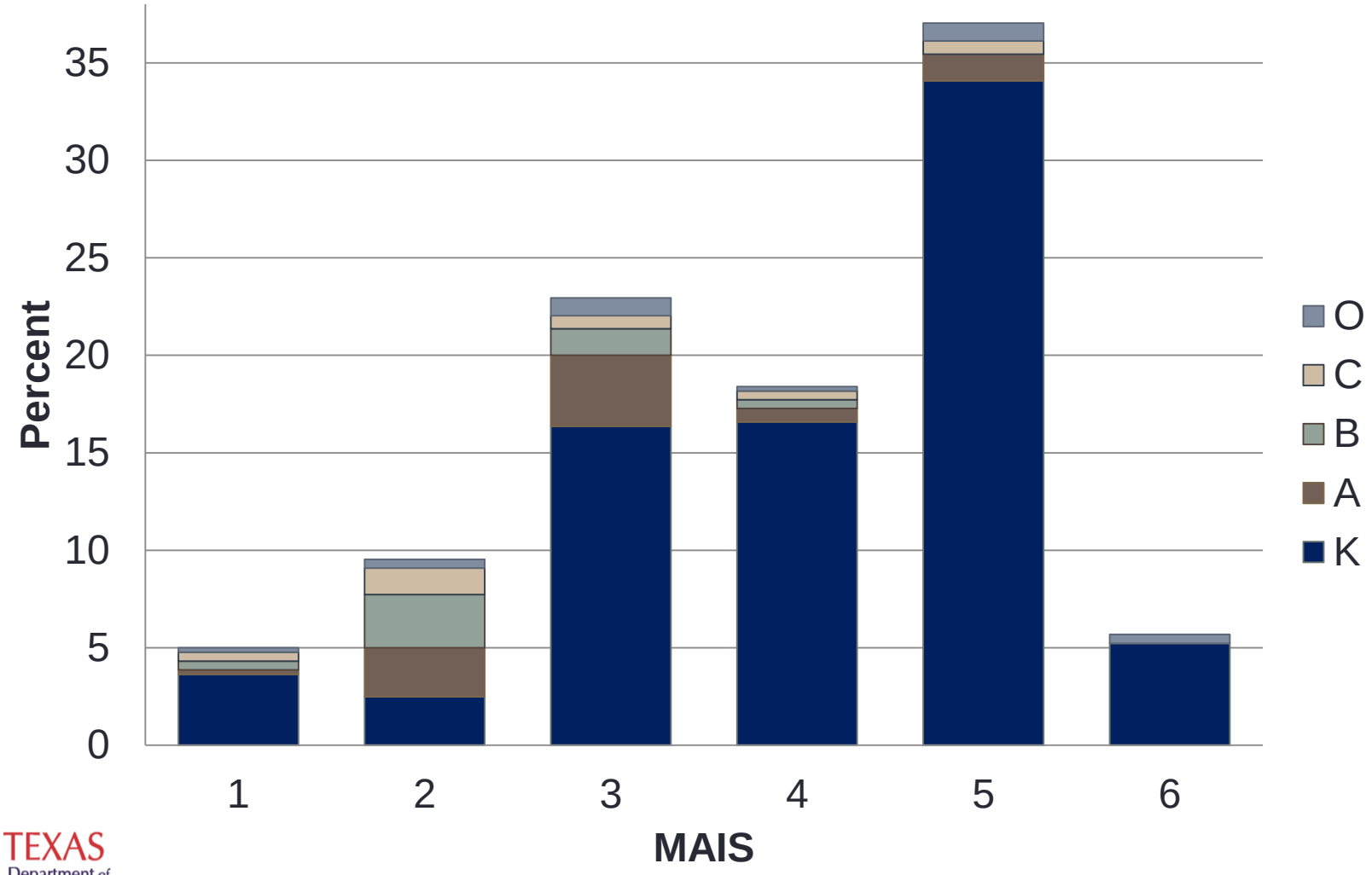

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Figure 4. Distribution of 'KABCO' by MAIS Among Primary Persons Suffering Non-Fatal Injuries, Texas, 2013

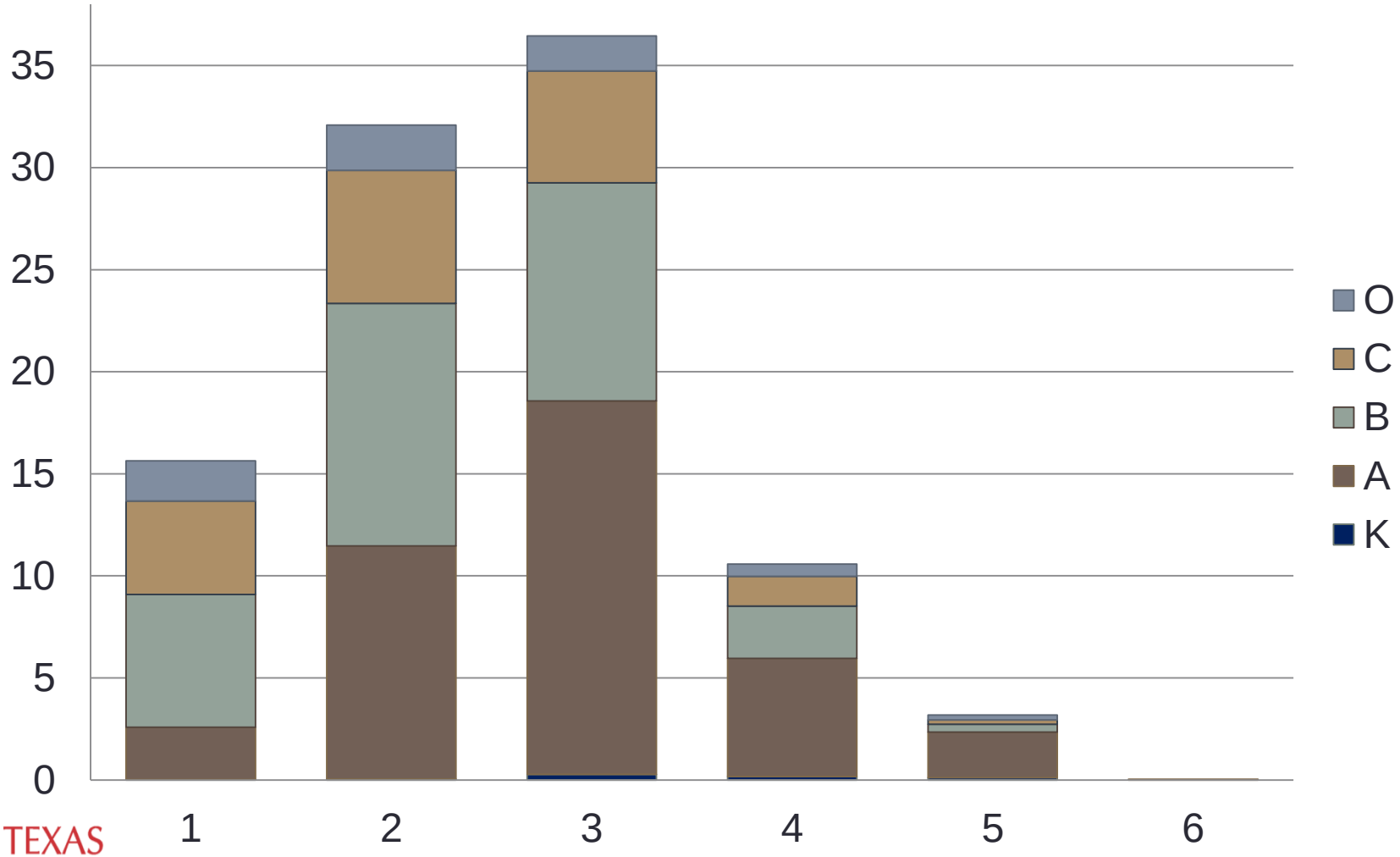

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Table 4. Correlation of 'KABCO' to Injury Severity Metrics Among Primary Persons, Texas, 2013

	Fatal (N=711)	Non-Fatal (N=11,367)
KABCO, ISS	0.28	0.28
KABCO, MAIS	0.31	0.22

	Non-Fatal Injury (N=11,367)		
	LOS ≥ 7 days	ICU Requirement	Disability
KABCO	0.21	0.22	0.14
MAIS	0.35	0.38	0.14
ISS	0.38	0.42	0.22

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Conclusions

- Crash-assigned injury severity categories (KABCO) is weakly correlated to hospital-assigned injury severity metrics (ISS/MAIS).

- Additional research involving linked data should investigate the utility of crash-assigned injury severity categories (KABCO) with regards to other dimensions of injury severity including length of stay, disability, hospital charges, etc.

Limitations to Injury Severity Score Metrics

Crash-assigned KABCO

- Subjective determination by non-medical personnel
- Likelihood of classifying severe internal injuries is low
- Developed based on threat to life and survivability, not only incapacitation

Hospital-assigned ISS/MAIS

- Unweighted summary measure of single or multiple injuries
- Multiple dimensions of injury considered: likelihood of death, use of hospital resources, cost of resources/treatments; length of recovery; likelihood and extent of disability; impact on quality of life, etc.

Other Linking Projects (2010-2013)

No Transfer Data Included

Crash
CR-3

EMS
All Runs

Hospital
Traumatic Injuries
TBI
SCI

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