
Identifying and Analyzing Tire-Disablement-related Crashes in NCSA Data Systems

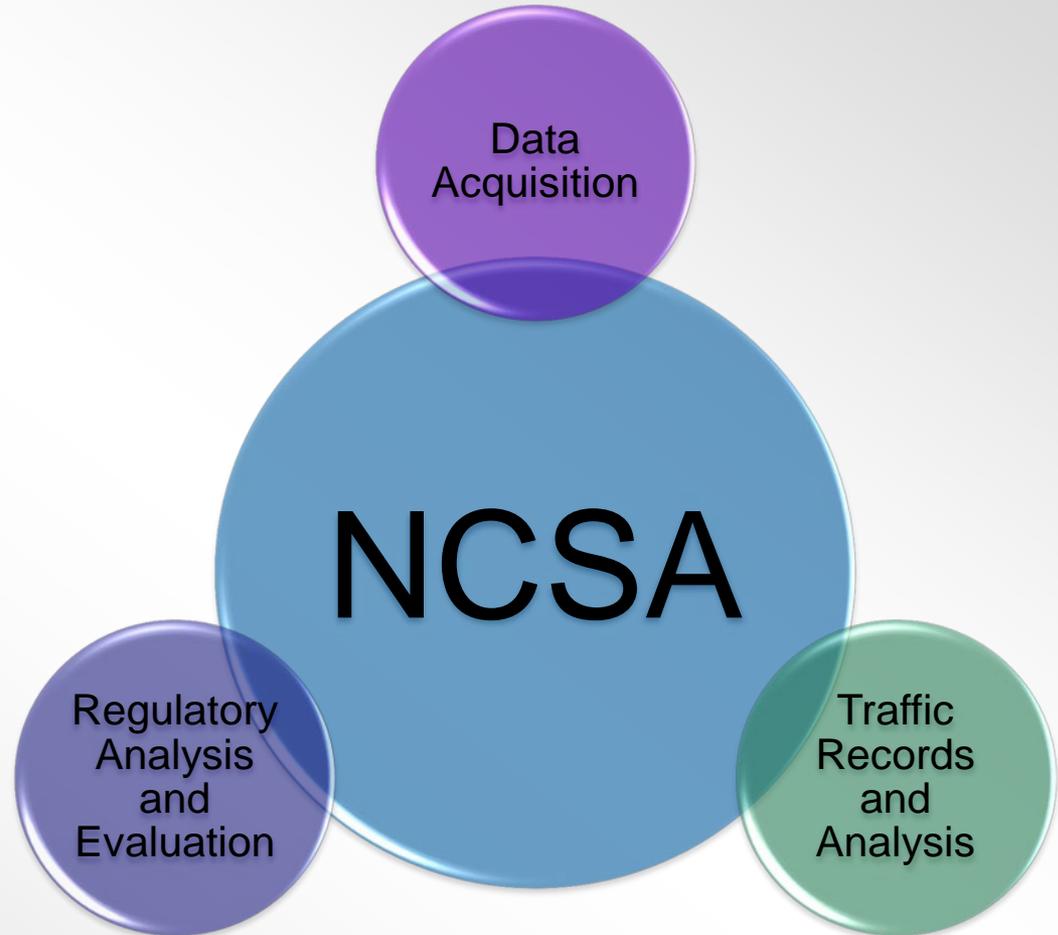
*NTSB Tire Symposium
December 9-10, 2014*

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NCSA Organization

National Center for Statistics and Analysis (NCSA)

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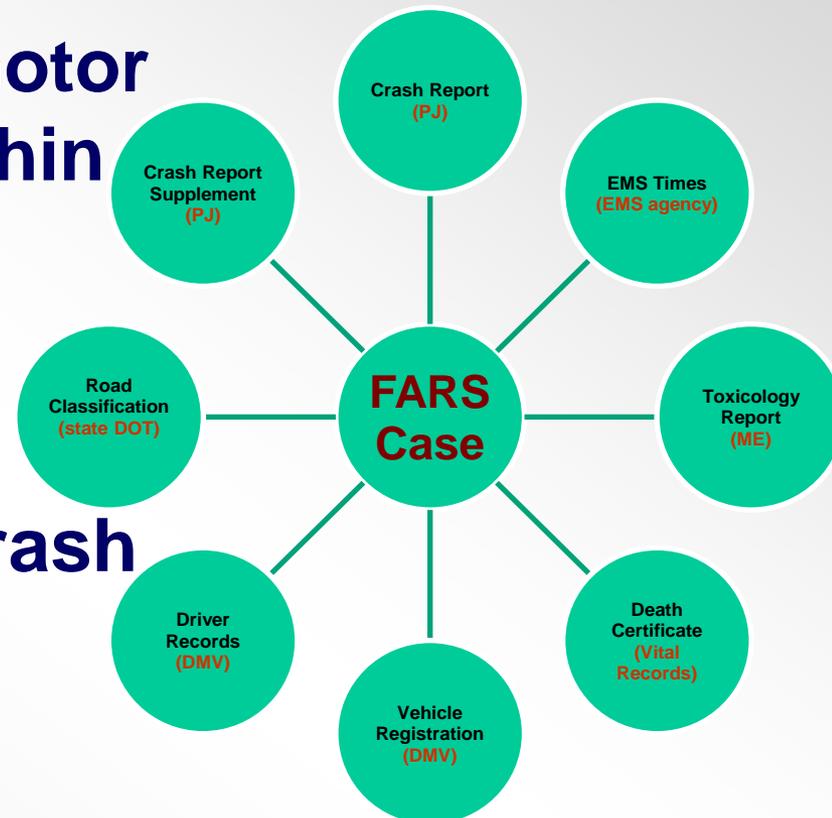
NCSA Crash Data Systems

TOPICS:

- ◆ **FARS**
- ◆ **NASS GES**
- ◆ **NASS CDS**
- ◆ **NMVCCS**

Fatality Analysis Reporting System (FARS)

- All police-reported fatal motor vehicle traffic crashes within the U.S.
- State data recoded into a uniform national data set
- Fatality w/in 30 Days of Crash



Tire-Related Variables in FARS

Related Factors, Vehicle Level

DEF: This data element records factors related to this vehicle expressed by the investigating officer.

VEH_CF1,2 1982-2009

01=Tires (does not include wheels)

- Excludes improper tire pressure, which is due to driver irresponsibility.
- Defective tires, tread separation, sidewall failure, excessively worn or bald tires.
- Tires improperly sized for this vehicle.
- Excludes: Tire damage produced in the crash (hitting pothole, curb, etc.).

Tire-Related Variables in FARS

Contributing Circumstance, Motor Vehicle

DEF: This data element describes this vehicle's possible pre-existing defects or maintenance conditions that may have contributed to the crash.

MFACTOR 2010-later (MARK ALL THAT APPLY)

01=Tires

include any defect of a tire. If the contributing factor is of the wheel (e.g., a lug nut comes off), then use 11 (Wheels).

Tire-Related Variables in FARS

Related Factors, Driver Level

This data element records factors related to this driver expressed by the investigating officer.

DR_CF1,2,3,4 1982-2009

DR_SF1,2,3,4 2010-later

80= Skidding, swerving or sliding due to tire blowout or failure

No additional description.

Note – an available person-level version is never used in light vehicles in FARS 1995-2012

Tire-Related Variables in FARS

Critical Precrash Event

DEF: This data element identifies the attribute that best describes the critical event which made this crash imminent (i.e., something occurred which made the collision possible).

P_CRASH2 (2010-later)

01=This vehicle loss of control due to blowout/flat tire

is used when a vehicle in motion loses control as the result of an immediate tire disruption. Examples include blow out, rapid air loss, tread separation, etc.

Tire-Related Variables in FARS

How the different variables contribute:

Tire Factor in light vehicle	AVG. CRASHES/ YEAR	% of all FARS crashes	AVG FATALITIES/YEAR
Vehicle Factor (1995-2012)	496	1.38 %	600
Driver Factor (1995-2012)	145	0.40 %	183
Critical Precrash Event (2010-2012)	201	0.66 %	249
Any of the above	526	1.46 %	637

Source: FARS 1995-2012

Tire-Related Variables in FARS

Year group breakouts, any tire factor:

Any tire factor (VEH_CF, DR_CF, or P_CRASH2) in light vehicle	AVG. CRASHES/YEAR	% of all FARS crashes	AVG FATALITIES/YEAR
1995-2006	543	1.43 %	662
2007-2009	454	1.33 %	544
2010-2012	530	1.75 %	630
Source: FARS 1995-2012			

Tire-Related Variables in FARS

FARS strengths and limitations

Strengths:

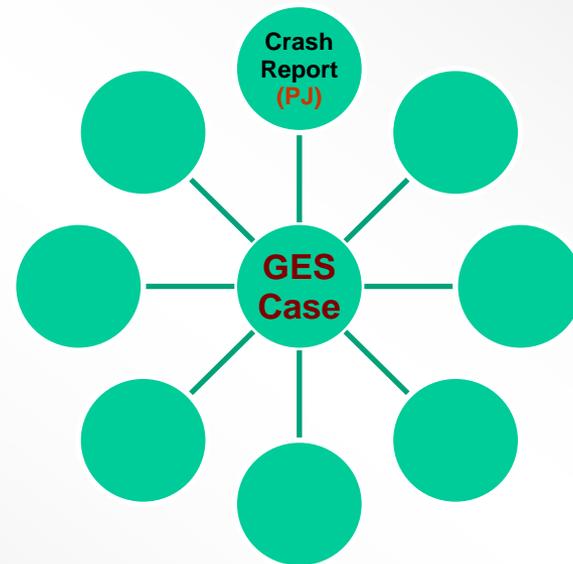
- Census.
- No standard errors or estimates needed.
- Can analyze by State.
- Since 2010, variables harmonized with NASS GES variables.

Limitations:

- Fatal crashes only.
- Crash circumstances only as can be drawn from State crash report
- Information on State crash report varies by State – each State develops independently.

National Automotive Sampling System GENERAL ESTIMATES SYSTEM (GES)

- Nationally representative sample of police reported traffic crashes
- ~50,000 crashes coded per year
- Sampled from ~5M police reported crashes
- Collected at 60 sites across the country



Tire-Related Variables in NASS-GES

Vehicle Contributing Factors

DEF: This data element describes this vehicle's possible pre-existing defects or maintenance conditions that may have contributed to the crash.

- DEFECT 1988-1994, FACTOR 1995-2009
- MFACTOR 2002-later (mark-all-that-apply)
- 2002-2009 FACTOR derived from MFACTOR
- 2010 later only MFACTOR

01=Tires includes any defect of a tire. If the contributing factor is of the wheel (e.g., a lug nut comes off), then use code "Wheels."

Tire-Related Variables in NASS GES

Critical Precrash Event

DEF: This data element identifies the attribute that best describes the critical event which made this crash imminent (i.e., something occurred which made the collision possible).

P_CRASH2

01 (1992-93, 1999-later), **10** (1994-1998)

=This vehicle loss of control due to Blowout/Flat tire.

is used when a vehicle in motion loses control as the result of an immediate tire disruption. Examples include blow out, rapid air loss, tread separation, etc.

(Same as FARS, 2010-later)

Tire-Related Variables in NASS GES

GES Presence of Either Factor - Point Estimates (95% Confidence Intervals)

MFACTOR= Tires or P_CRASH2= This vehicle loss of control due to blowout/flat tire	AVG. CRASHES/YEAR (weighted estimate) (crash has a light vehicle with at least one of the factors)	% of all GES crashes	AVG INJURED/YEAR fatal and non-fatal
1995-2006	38,000 (33,000 – 44,000)	0.61% (0.52% - 0.69%)	24,000 (18,000 – 30,000)
2007-2012	33,000 (29,000 – 36,000)	0.58% (0.51% - 0.66%)	19,000 (14,000 – 24,000)

Source: NASS GES 1995-2012

Tire-Related Variables in NASS GES

NASS GES strengths and limitations

Strengths:

- Nationally representative sample.
- Universe includes non-fatal injury crashes and property-damage only crashes (not just fatal crashes as in FARS).
- Since 2010, variables harmonized with FARS variables.

Limitations:

- Not a census, so point estimates have sampling errors.
- Crash circumstances only as can be drawn from State crash report
- Information on State crash report varies by State – each State develops independently.
- Can't make State-level estimates.

National Automotive Sampling System CRASHWORTHINESS DATA SYSTEM (CDS)

- Detailed data on vehicle damage and the occupant outcome (crashworthiness) of towed light passenger vehicles
 - ◆ Approximately 3,500 sampled cases annually
- Field Investigation Based
- Over 600 CDS Data Elements Describe
 - ◆ Crash Events
 - ◆ Damage to Vehicle
 - ◆ Crash Forces Involved
 - ◆ Injuries to Victims
 - ◆ Injury Mechanisms



Tire-Related Variables in NASS CDS

Critical Precrash Event

DEF: This variable identifies the critical event which made the crash imminent (i.e., something occurred which made the collision possible).

Source: Researcher determined — inputs include scene inspection, vehicle inspection, driver interview, and police report.

PREEVENT

1=This Vehicle Loss Of Control, Blow Out or Flat Tire

is used when a vehicle in motion loses control as the result of an immediate tire disruption. Examples include blow out, rapid air loss, tread separation, etc.

Tire-Related Variables in NASS CDS

CDS Point Estimates (95% Confidence Intervals)

CRITICAL PRECRASH EVENT=1 This Vehicle Loss Of Control, Blow Out or Flat Tire	AVG. CRASHES/YEAR (weighted estimate) (crash has a light vehicle with the factor)	% of all CDS crashes	AVG INJURED/YR Using KABCO fatal+nonfatal	AVG KILLED/YR Using KABCO
1995-2006	17,000 (9,500 – 24,500)	0.68% (0.39% - 0.97%)	14,000 (6,000 – 23,500)	333 (0 – 688)
2007-2010	9,000 (3,000 – 14,500)	0.42% (0.15% - 0.70%)	8,500 (1,500 – 15,500)	199 (0 – 508)
2011-2013	11,000 (400 – 21,500)	0.55% (0.08%, 1.03%)	4,500 (2,500 – 6,000)	41 (0 - 126)
Source: NASS CDS 1995-2012				

Tire-Related Variables in NASS CDS

NASS CDS strengths and limitations

Strengths:

- Data based on NHTSA-trained crash technician findings, physical evidence, interviews etc, - not just state crash reports.-
- Crash research allows photos and clinical review of individual cases.
- Injury coding from medical records (not just crash report).
- Many more variables than FARS or GES.

Limitations:

- Smaller sample size means larger confidence intervals, less precision to aggregate estimates.
- Emphasis is on crashworthiness, not causation.
- Since 2009, vehicles more than 10 years old do not have full data.

National Motor Vehicle Crash Causation Survey (NMVCCS)

- **On-scene crash study 2005-2007**
- **Detailed data on factors leading up to the crash**
- **Crashes with at least one towed light passenger vehicle**
- **5470 weighted cases**
- **NMVCCS researcher traveled to crash site as soon as possible after crash**
 - ◆ **EMS monitoring – dispatch required**



Tire-Related Variables in NMVCCS

NHTSA Paper,

Tire-related Factors in the Pre-Crash Phase

using NMVCCS, found:

- 5% of light vehicles in NMVCCS had some kind of tire factor present (critical event, critical reason, or presence of factor)
- 50% of crashes with a tire factor were single-vehicle crashes
- Underinflation was over-represented in tire-related factor crashes, compared to properly inflated
- Rollovers over-represented in tire factor crashes
- Wet roads, slick surfaces over-represented in tire-related factor crashes

Paper is online as DOT HS 811 617

National Motor Vehicle Crash Causation Survey (NMVCCS)

NMVCCS strengths and limitations

Strengths:

- Data based on crash technician findings, physical evidence, interviews etc, - not just state crash reports.
- Crash technicians are at the scene of the crash before it is cleared, allowing most accurate pre-crash data
- Crash research allows photos and clinical review of individual cases.
- Large assortment of specifically designed precrash variables
- For tires, had the tires examined at the scene, pressure taken, etc.

Limitations:

- Only 2005-2007.
- Universe did not cover overnight, and was only EMS-dispatched crashes.
- Sampling depended on notification.

Thank You

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