

LIVES SAVED BY VEHICLE SAFETY TECHNOLOGIES 1960 TO 2012

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Objectives

Preview of forthcoming NHTSA technical report:

- Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960 to 2012
 - Passenger Cars and LTVs
 - With Reviews of 26 FMVSS and the Effectiveness of Their Associated Safety Technologies in Reducing Fatalities, Injuries, and Crashes
- Charles J. Kahane, Ph.D.

Objectives

Estimate numbers of lives saved by all vehicle safety technologies from 1960 to 2012, cars and LTVs

- Using effectiveness estimates for individual technologies based on statistical analyses of crash data
 - Lives saved by each technology
 - Lives saved in each calendar year

“Lives Saved” Model

**Simplified example –
consider three live-saving technologies:**

Chronology	Technology	Results of statistical analysis
1	Energy-absorbing steering assemblies introduced in 1967-68	Energy-absorbing steering columns found to reduce fatality risk of unbelted drivers by 12.1%
2	3-point belts introduced in 1970s, belt use laws in 1980s	3-point belts found to reduce fatality risk by 42% for drivers in cars equipped with EA columns
3	Frontal air bags introduced in 1990s	Frontal air bags found to reduce fatality risk of belted drivers by 25.3% in cars with EA steering columns

“Lives Saved” Model

Continuing the simplified example –

Now consider those three live-saving technologies:

- Suppose we had 1000 driver fatalities in pre-1966 cars in frontal crashes.
- How many of those 1000 drivers would be saved if we added these technologies?

Method: One Step at a Time

Continuing the Simplified Example:

(Chronology) Technology	From our statistical analyses	Consider 1000 driver fatalities in pre-1966 cars in frontal crashes:
(1) Energy-absorbing steering assemblies introduced in 1967-68	Reduce fatality risk of unbelted drivers by 12.1%	Would drop to 879 with EA steering columns $(1000 \times [1-.121]) = 879$ Lives Saved = 1000 – 879 = 121
(2) 3-point belts introduced in 1970s, belt use laws in 1980s	Reduce fatality risk by 42% in cars equipped with EA columns	Drop to 510 if drivers also buckled 3-point belts $(879 \times [1-.420]) = 510$ Lives Saved = 879 – 510 = 369
(3) Frontal air bags introduced in 1990s	Reduce fatality risk of belted drivers by 25.3% in cars with EA steering columns	Drop to 381 if cars also had frontal air bags $(510 \times [1-.253]) = 381$ Lives Saved = 510 – 381 = 129

“Lives Saved” Model

In reverse, consider 381 FARS cases:

Driver fatalities in post-1997 cars in frontal crashes

If we “remove” technologies, newest first:

- Without air bags, 381 becomes 510 (381/[1-.253])
- With buckled belts, 510 becomes 879 (510/[1-.420])
- Without EA columns, 879 becomes 1000 (879/[1-.121])
 - 1000 potential fatalities if air bags, belts, and EA columns had been “removed”
- We surmise there were $1000-381=619$ drivers in crashes (not on FARS) where these technologies saved the driver
- Allocation:
 - **129 saved by air bags** (510-381)
 - **369 by 3-point belts** (879-510)
 - **121 by EA columns.** (1000-879)

“Lives Saved” Model

The Model Includes:

Safety Technologies that Significantly Reduce Fatality Risk for Car/LTV Occupants

- Seat belts: various types and seating positions
- Air bags: frontal, side, and curtain
- Energy-absorbing steering assemblies
- Child safety seats
- Electronic stability control
- Roof crush resistance
- Fuel system integrity
- Others

“Lives Saved” Model

The model includes:

- Occupants of cars and LTVs
- Peds/bicyclists/motorcyclists saved by car/LTV crash avoidance technologies
- Technologies compliant with FMVSS in effect
- Technologies not required by FMVSS
 - e.g., belt pretensioners and load limiters
- Effect of programs to increase use of seat belts and child safety seats

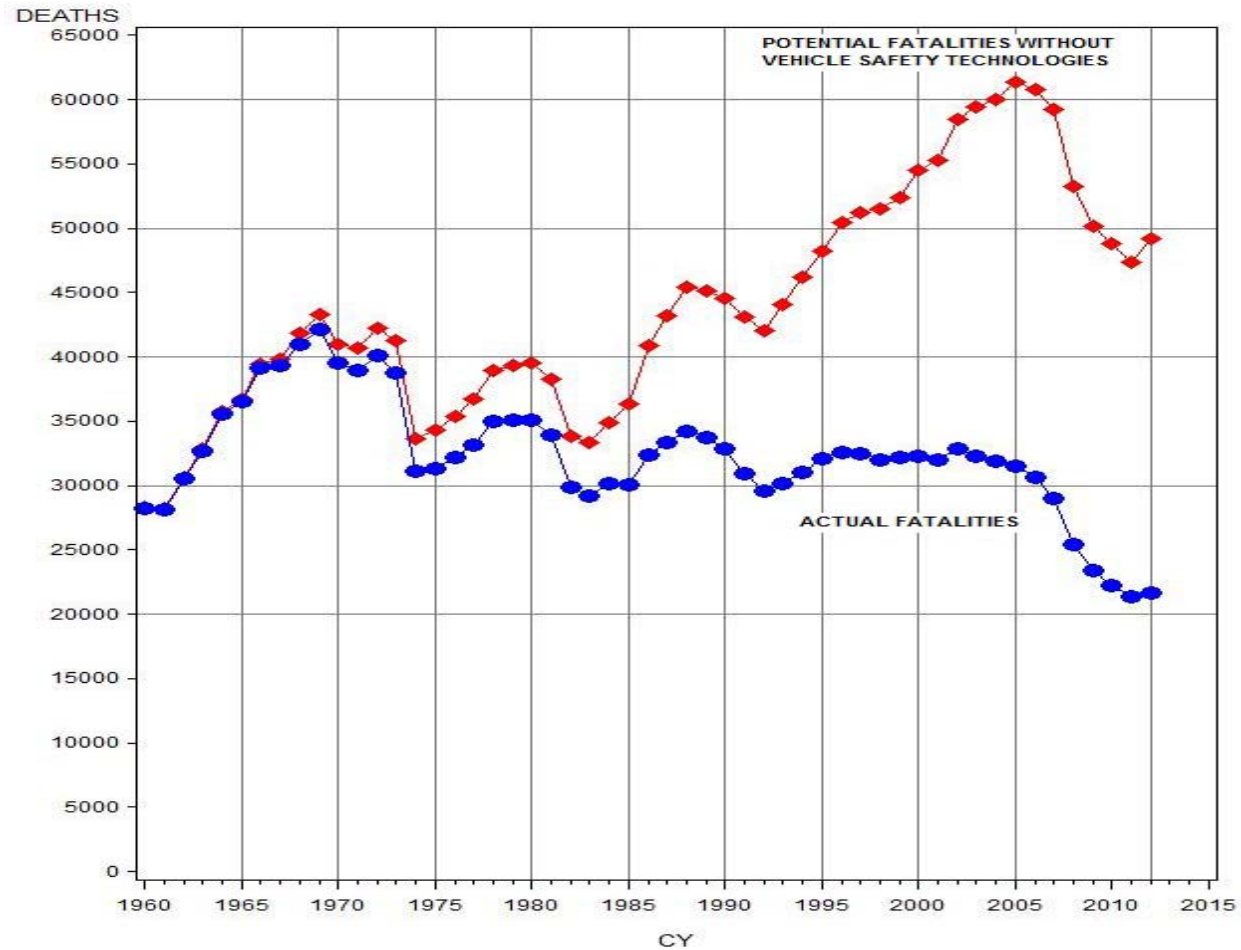
“Lives Saved” Model

The model does not include:

- Behavioral safety (other than programs to increase restraint use)
 - e.g., programs to reduce drunk driving
- Technologies not involving or benefiting cars and LTVs
 - e.g., motorcycle helmets
- Effect of EMS improvements

“Lives Saved” Model

Actual versus Potential Car/LTV Occupant Fatalities, 1960 to 2012



“Lives Saved” Model

Previous estimates of lives saved:

Earlier report using “Lives Saved” model

(NHTSA, DOT HS 809 833, Kahane, 2004)

- Estimated 328,551 lives saved 1960-2002

The new report updates through 2012:

- Breaks out specific numbers by technologies contributing

Forthcoming Report

Additional topics in report include:

- Summary and effectiveness findings of NHTSA evaluations
- Actual versus Potential Car/LTV Occupant Fatalities, 1960 to 2012
- Different options for methodologies
 - Indirect vs. direct effects
- Vehicular Risk Index
 - (actual fatalities) ÷ (potential fatalities w/o safety technologies)
- Car/LTV Fatalities per Vehicle Miles Traveled
- Assessing improvements not included in calculations
- Comparison to premature deaths from disease

Forthcoming Report

NHTSA Technical Report

- Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960 to 2012
 - Passenger Cars and LTVs
 - With Reviews of 26 FMVSS and the Effectiveness of Their Associated Safety Technologies in Reducing Fatalities, Injuries, and Crashes
- Charles J. Kahane, Ph.D.
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Thank You

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