Status Report

Insurance Institute for Highway Safety | Highway Loss Data Institute

Saving lives

Improved vehicle designs bring down death rates

ALSO IN THIS ISSUE

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- Death rates by make and model
- Crashes around football stadiums go up when the home team loses

The chances of dying in a crash in a late-model vehicle have fallen by more than a third in three years, the latest IIHS calculations of driver death rates show. Among 2011 models, a record nine vehicles have driver death rates of zero. However, the gap between the safest and riskiest models remains wide, and three cars have death rates exceeding 100 per million registered vehicle years.

Improved vehicle designs and safety technology have a lot to do with the continuing decline in fatality risk. In a related study, Institute researchers estimated how much of the decline was due to changes in the vehicle fleet during 1985-2012. They found that vehicle changes — including improved structural designs, the addition of safety features and an evolving mix of vehicle types — were the main source of declining risk from 1993 through 2006. These changes continued to contribute to later declines as well, though other factors such as the weak economy also appear to have played a role.

A firefighter uses an extrication tool at the Vehicle Research Center during a First Responders Emergency Extrication event. Fire departments from the Mid-Atlantic region tested Holmatro gear on late-model cars provided by State Farm.

There were 7,700 fewer driver deaths in 2012 alone than there would have been had vehicles remained the same since 1985.

The latest death rates by make and model confirm the rapid pace of improvement. Among 2011 models, there were 28 driver deaths per million registered vehicle years through the 2012 calendar year, down from 48 for 2008 models through 2009 (see *Status Report*, June 9, 2011, at iihs.org). A registered vehicle year is one vehicle registered for one year.

"This is a huge improvement in just three years, even considering the economy's influence," says David Zuby, IIHS executive vice president and chief research officer. "We know from our vehicle ratings program that crash test performance has been getting steadily better. These latest death rates provide new confirmation that real-world outcomes are improving, too."

Although the numbers reflect 2011 models, data from earlier model-year vehicles as far back as 2008 are included if the vehicles weren't substantially redesigned before 2011. Including older, equivalent vehicles increases the exposure and thus the accuracy of the results. To be included, a vehicle must have had at least 100,000 registered vehicle years of exposure during 2009-12 or at least 20 deaths.

IIHS has published death rates by make and model periodically since 1989, at first for cars only and later for all passenger vehicles (see *Status Report*, Nov. 25, 1989). The rates include only driver deaths because the presence of passengers is unknown. Fatality counts are taken from the federal Fatality Analysis Reporting System. Registration data are from R.L. Polk & Co.

The rates are adjusted for driver age and gender, but not all the demographic factors that can influence results are accounted for. Four years ago when IIHS released death rates for 2008 models, researchers found that they needed to include an adjustment for calendar year in order to account for the effects of the recession. For this reason, researchers developed another model that included the calendar year adjustment, as well as adjustments for vehicle age and vehicle density at the garaging location, in addition to driver age and gender. That more-complex model worked well at the time, but when researchers used it to calculate the 2011 death rates, the results were unstable. Since the U.S. economy didn't see such large fluctuations during the new time period, » *page 6*

Driver death rates by vehicle style and size
2011 and equivalent earlier models, 2009-12

		Overall	MV	SV	SV roll
CARS		**38**	**22**	**16**	**6**
4-DOOR	mini	115	71	44	13
	small	51	28	22	11
	midsize	29	19	10	4
	large	34	21	14	3
	very large	24	15	9	0
2-DOOR	mini	54	33	22	8
	small	71	42	27	12
	midsize	43	32	8	3
	large	37	0	37	22
SPORTS	small	0	0	0	0
	midsize	50	19	32	16
	large	67	15	51	22
LUXURY	midsize	14	5	10	5
	large	26	13	12	3
	very large	10	8	1	0
STATION WAGONS	mini	37	35	3	3
	small	41	25	16	7
	midsize	7	4	3	2
MINIVANS		**23**	**17**	**5**	**2**
SUVs		**18**	**9**	**9**	**4**
4-WHEEL DRIVE	small	22	11	11	3
	midsize	16	7	9	4
	large	8	3	4	2
	very large	18	10	7	4
2-WHEEL DRIVE	small	32	20	11	4
	midsize	17	7	9	4
	large	15	8	7	4
	very large	31	15	15	6
4-WHEEL DRIVE LUXURY	midsize	10	5	4	1
	large	13	2	12	8
	very large	17	9	8	0
2-WHEEL DRIVE LUXURY	midsize	15	7	8	3
PICKUPS		**29**	**15**	**14**	**5**
4-WHEEL DRIVE	small	32	14	18	6
	large	29	14	15	6
	very large	39	15	24	14
2-WHEEL DRIVE	small	29	18	10	5
	large	26	15	11	2

KEY:
overall: driver deaths per million registered vehicle years
mv: driver death rate in multiple-vehicle crashes
sv: driver death rate in single-vehicle crashes of all types
sv roll: driver death rate in single-vehicle rollovers (subset of sv)

Models with the highest and lowest rates of driver deaths

Lowest rates of driver deaths
Fewer than 6 driver deaths per million registered vehicle years, 2011 and equivalent earlier models, 2009-12

			Overall	MV	SV	SV roll
Audi A4 4WD	luxury car	midsize	0	0	0	0
Honda Odyssey	minivan	very large	0	0	0	0
Kia Sorento 2WD	SUV	midsize	0	0	0	0
Lexus RX 350 4WD	luxury SUV	midsize	0	0	0	0
Mercedes-Benz GL-Class 4WD	luxury SUV	large	0	0	0	0
Subaru Legacy 4WD	4-door car	midsize	0	0	0	0
Toyota Highlander hybrid 4WD	SUV	midsize	0	0	0	0
Toyota Sequoia 4WD	SUV	large	0	0	0	0
Volvo XC90 4WD	luxury SUV	midsize	0	0	0	0
Honda Pilot 4WD	SUV	midsize	2	0	2	0
Mercedes-Benz M-Class 4WD	luxury SUV	midsize	3	3	0	0
Ford Crown Victoria	4-door car	very large	4	4	0	0
GMC Yukon 4WD	SUV	large	4	0	4	0
Acura TL 2WD	luxury car	midsize	5	5	0	0
Chevrolet Equinox 2WD	SUV	midsize	5	3	2	0
Chevrolet Equinox 4WD	SUV	midsize	5	5	0	0
Ford Expedition 4WD	SUV	large	5	5	0	0
Ford Flex 2WD	SUV	midsize	5	0	5	0
Mazda CX-9 4WD	SUV	midsize	5	0	5	5

Highest rates of driver deaths
More than 46 driver deaths per million registered vehicle years, 2011 and equivalent earlier models, 2009-12

			Overall	MV	SV	SV roll
Kia Rio	4-door car	mini	149	96	54	15
Nissan Versa sedan	4-door car	small	130	44	87	51
Hyundai Accent	4-door car	mini	120	65	53	16
Chevrolet Aveo	4-door car	mini	99	65	31	10
Hyundai Accent	2-door car	mini	86	43	48	20
Chevrolet Camaro coupe	sports car	large	80	19	60	25
Chevrolet Silverado 1500 Crew 4WD	pickup	large	79	40	36	17
Honda Civic	2-door car	small	76	46	29	10
Nissan Versa hatchback	4-door car	small	71	37	33	20
Ford Focus	4-door car	small	70	55	13	5
Nissan Cube	station wagon	small	66	38	29	6
Chevrolet HHR	station wagon	small	61	34	25	9
Chevrolet Suburban 1500 2WD	SUV	very large	60	31	28	9
Chevrolet Aveo	station wagon	mini	58	58	0	0
Mercury Grand Marquis	4-door car	very large	57	33	25	0
Jeep Patriot 2WD	SUV	small	57	44	9	3
Mazda 6	4-door car	midsize	54	34	17	3
Dodge Nitro 2WD	SUV	midsize	51	7	50	40
Honda Civic	4-door car	small	49	28	21	8

KEY:
overall: driver deaths per million registered vehicle years
mv: driver death rate in multiple-vehicle crashes
sv: driver death rate in single-vehicle crashes of all types
sv roll: driver death rate in single-vehicle rollovers (subset of sv)
2WD: 2-wheel drive | **4WD:** 4-wheel drive

Death rates by make and model

Driver deaths per million registered vehicle years

These rates are for 2011 models, but results are included for earlier model years as far back as 2008 if the vehicle wasn't substantially redesigned during that time. A change in electronic stability control from not available or optional to standard is treated as a redesign.

Exposure is the number of registered vehicle years. A registered vehicle year is one vehicle registered for one year.

Rates are adjusted for driver age and gender.

Information on deaths is from the National Highway Traffic Safety Administration's Fatality Analysis Reporting System. Data on vehicle registrations comes from R.L. Polk & Co.

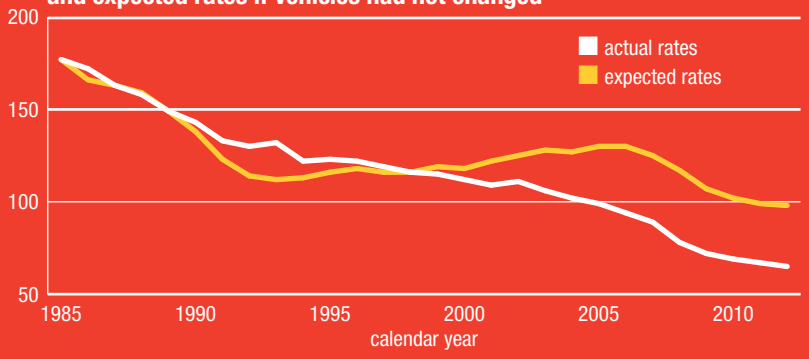
KEY:
overall: all crash types; numbers in parentheses are 95 percent confidence bounds
mv: driver deaths in multiple-vehicle crashes
sv: driver deaths in single-vehicle crashes
sv roll: driver deaths in single-vehicle rollovers (subset of sv)
2WD: 2-wheel drive | **4WD:** 4-wheel drive

	Death rates				Model	
	Overall	MV	SV	SV roll	years	Exposure
ALL PASSENGER VEHICLES	28 (27-30)	16	12	5	2008-11	62,932,462
4-DOOR CARS						
mini						
Chevrolet Aveo	99 (55-143)	65	31	10	2008-11	296,315
Hyundai Accent	120 (69-171)	65	53	16	2008-11	273,617
Kia Rio	149 (94-204)	96	54	15	2008-11	258,137
small						
Toyota Prius hybrid	16 (5-28)	9	7	4	2010-11	622,139
Toyota Corolla	32 (19-44)	18	15	6	2010-11	1,114,543
Chevrolet Cruze	42 (4-80)	35	4	0	2011	171,570
Kia Forte	46 (9-82)	31	12	4	2010-11	190,081
Honda Civic	49 (38-61)	28	21	8	2008-11	1,954,222
Ford Focus	70 (39-101)	55	13	5	2010-11	410,771
Nissan Versa hatchback	71 (45-96)	37	33	20	2008-11	556,730
Nissan Versa sedan	130 (75-185)	44	87	51	2008-11	276,648
midsize						
Subaru Legacy 4WD	0 (0-32)	0	0	0	2010-11	116,291
Acura TSX	7 (0-17)	7	0	0	2009-11	216,674
Volkswagen CC	8 (0-23)	0	8	0	2009-11	101,114
Honda Accord	19 (13-24)	12	7	2	2008-11	2,758,908
Volkswagen Jetta	20 (0-44)	20	0	0	2011	112,225
Nissan Maxima	28 (12-43)	18	10	2	2009-11	357,008
Toyota Camry hybrid	29 (11-46)	19	10	3	2008-11	294,261
Ford Fusion 2WD	32 (17-47)	19	14	10	2010-11	641,184
Hyundai Sonata	34 (9-59)	11	25	3	2011	280,780
Toyota Camry	35 (23-48)	22	12	4	2010-11	1,026,466
Chevrolet Malibu	41 (26-56)	26	16	6	2009-11	1,042,795
Nissan Altima	44 (23-66)	35	7	3	2010-11	537,497
Mazda 6	54 (14-93)	34	17	3	2009-11	222,880
large						
Ford Taurus 2WD	20 (0-40)	10	10	0	2010-11	154,873
Chevrolet Impala	35 (15-56)	27	8	2	2010-11	468,830
Toyota Avalon	37 (9-65)	22	15	5	2009-11	145,206
Buick Lacrosse 2WD	43 (7-80)	21	25	0	2010-11	153,002
very large						
Ford Crown Victoria	4 (0-12)	4	0	0	2009-11	193,425
Mercury Grand Marquis	57 (19-95)	33	25	0	2009-11	120,360
2-DOOR CARS						
mini						
Mini Cooper	21 (0-48)	21	0	0	2009-11	170,586
Smart Fortwo coupe	36 (4-68)	30	7	0	2008-11	106,146
Hyundai Accent	86 (42-131)	43	48	20	2008-11	227,164
small						
Honda Civic	76 (47-105)	46	29	10	2008-11	535,147
midsize						
Honda Accord	42 (16-68)	37	2	0	2008-11	385,871
large						
Dodge Challenger	29 (0-59)	0	29	14	2010-11	104,017
SPORTS CARS						
large						
Chevrolet Camaro coupe	80 (48-113)	19	60	25	2010-11	298,350
LUXURY CARS						
midsize						
Audi A4 4WD	0 (0-31)	0	0	0	2009-11	120,394
Acura TL 2WD	5 (0-16)	5	0	0	2009-11	139,458
Mercedes-Benz C-Class 4WD	7 (0-18)	0	7	0	2008-11	208,643
BMW 328i sedan	7 (0-15)	5	2	2	2008-11	322,057
Lexus ES 350	9 (2-16)	3	6	1	2008-11	573,619
BMW 328xi sedan	16 (0-42)	0	16	0	2008-11	171,409
Mercedes-Benz C-Class 2WD	10 (1-20)	4	6	2	2008-11	368,751
Lexus IS 250 2WD	16 (0-37)	7	11	10	2008-11	220,052
Lexus IS 250 4WD	30 (0-68)	0	30	6	2008-11	120,537
Infiniti G37 coupe 2WD	42 (12-72)	11	31	21	2008-11	145,678
large						
Cadillac CTS sedan 2WD	21 (0-43)	6	16	5	2009-11	143,135
Cadillac DTS	46 (22-69)	32	15	6	2008-11	250,591
very large						
Lexus LS 460 2WD	18 (0-55)	18	0	0	2008-11	110,210
STATION WAGONS						
mini						
Chevrolet Aveo	58 (17-100)	58	0	0	2009-11	105,060

	Death rates				Model	
	Overall	MV	SV	SV roll	years	Exposure
small						
Subaru Impreza 4WD	25 (0-64)	25	0	0	2009-11	111,102
Scion xB	31 (16-47)	20	11	4	2008-11	392,533
Kia Soul	32 (12-52)	30	3	0	2010-11	238,659
Dodge Caliber 2WD	39 (19-58)	19	20	12	2008-11	574,523
Chevrolet HHR	61 (30-91)	34	25	9	2009-11	397,838
Nissan Cube	66 (14-118)	38	29	6	2009-11	131,761
midsize						
Subaru Outback 4WD	6 (0-14)	0	6	3	2010-11	264,109
Volkswagen Jetta	6 (0-18)	6	0	0	2009-11	124,544
MINIVANS						
very large						
Honda Odyssey	0 (0-37)	0	0	0	2011	100,518
Kia Sedona	16 (0-37)	16	0	0	2008-11	221,446
Chrysler Town & Country	25 (15-35)	16	8	2	2008-11	1,109,920
Dodge Grand Caravan	27 (15-39)	22	4	1	2008-11	1,061,095
Toyota Sienna 2WD	27 (0-66)	12	16	15	2011	148,898
SUVs						
small						
Jeep Compass 2WD	7 (0-20)	7	0	0	2008-11	114,776
Jeep Patriot 4WD	11 (0-25)	4	7	4	2008-11	200,988
Honda Element 4WD	12 (0-30)	7	6	0	2008-11	123,098
Honda CR-V 4WD	17 (8-26)	9	8	2	2008-11	1,249,370
Honda CR-V 2WD	19 (8-31)	15	3	2	2008-11	759,316
Toyota RAV4 4WD	19 (8-29)	4	16	2	2008-11	931,863
Subaru Forester 4WD	20 (7-33)	18	1	0	2009-11	548,808
Nissan Rogue 4WD	25 (7-42)	12	14	0	2008-11	513,731
Ford Escape 2WD	27 (9-46)	16	10	0	2009-11	541,561
Jeep Wrangler 2-door 4WD	34 (15-52)	11	24	12	2008-11	378,918
Ford Escape 4WD	35 (16-54)	28	8	4	2009-11	384,876
Toyota RAV4 2WD	35 (14-55)	12	25	10	2008-11	561,569
Nissan Rogue 2WD	42 (16-67)	28	12	5	2008-11	299,848
Jeep Patriot 2WD	57 (20-95)	44	9	3	2008-11	248,487
midsize						
Kia Sorento 2WD	0 (0-35)	0	0	0	2011	106,363
Toyota Highlander hybrid 4WD	0 (0-26)	0	0	0	2008-11	141,251
Honda Pilot 4WD	2 (0-7)	0	2	0	2009-11	344,213
Chevrolet Equinox 2WD	5 (0-12)	3	2	0	2010-11	302,463
Chevrolet Equinox 4WD	5 (0-15)	5	0	0	2010-11	151,440
Ford Flex 2WD	5 (0-15)	0	5	0	2009-11	151,479
Mazda CX-9 4WD	5 (0-16)	0	5	5	2008-11	143,907
Jeep Grand Cherokee 4WD	7 (0-21)	7	0	0	2011	108,237
Toyota Highlander 2WD	7 (0-18)	5	2	2	2008-11	387,923
Honda Pilot 2WD	11 (0-34)	0	11	12	2009-11	180,017
Hyundai Santa Fe 4WD	12 (0-24)	0	12	6	2008-11	259,481
Mazda CX-9 2WD	12 (0-29)	0	12	6	2008-11	126,339
Dodge Nitro 4WD	13 (0-29)	5	9	4	2008-11	170,978
Toyota Venza 4WD	13 (0-31)	7	6	0	2009-11	118,931
Ford Edge 2WD	14 (3-25)	4	10	4	2008-11	625,197
Toyota Highlander 4WD	14 (0-28)	14	0	0	2008-11	530,715
Hyundai Santa Fe 2WD	16 (1-32)	11	5	5	2008-11	476,958
Toyota FJ Cruiser 4WD	18 (0-36)	5	13	4	2008-11	170,822
Jeep Liberty 4WD	19 (4-35)	7	14	2	2008-11	449,619
Jeep Wrangler 4-door 4WD	21 (7-35)	11	10	7	2008-11	517,661
Nissan Murano 4WD	21 (0-43)	5	18	7	2009-11	298,811
Toyota Venza 2WD	21 (0-47)	5	18	4	2009-11	173,444
Nissan Murano 2WD	25 (0-54)	25	0	0	2009-11	170,979
Dodge Journey 2WD	34 (8-61)	16	19	0	2009-11	326,409
Jeep Liberty 2WD	34 (0-73)	6	31	23	2008-11	126,600
GMC Terrain 2WD	38 (0-80)	29	6	0	2010-11	114,848
Ford Edge 4WD	41 (12-70)	17	24	14	2008-11	356,784
Dodge Nitro 2WD	51 (0-107)	7	50	40	2008-11	109,765
large						
Toyota Sequoia 4WD	0 (0-33)	0	0	0	2008-11	110,430
GMC Yukon 4WD	4 (0-11)	0	4	0	2008-11	208,828
Ford Expedition 4WD	5 (0-15)	5	0	0	2008-11	153,460
GMC Yukon 2WD	7 (0-20)	0	7	0	2008-11	116,869
Nissan Armada 2WD	7 (0-21)	0	7	7	2008-11	111,238
Buick Enclave 2WD	8 (0-16)	5	2	3	2008-11	300,006
Chevrolet Traverse 2WD	8 (0-17)	3	5	3	2009-11	296,227
GMC Acadia 4WD	8 (0-18)	3	5	3	2008-11	271,691
Buick Enclave 4WD	10 (0-29)	0	10	10	2008-11	213,503
Chevrolet Tahoe 4WD	10 (1-18)	6	4	2	2008-11	401,018
Chevrolet Traverse 4WD	11 (0-24)	4	7	0	2009-11	206,139
GMC Acadia 2WD	15 (1-29)	11	4	4	2008-11	391,239
Chevrolet Tahoe 2WD	18 (6-30)	8	10	4	2008-11	386,837
Ford Expedition 2WD	36 (3-68)	30	5	5	2008-11	165,001
very large						
GMC Yukon XL 1500 4WD	9 (0-23)	9	0	0	2008-11	163,541
Chevrolet Avalanche 1500 2WD	15 (0-36)	8	7	7	2008-11	101,293
Chevrolet Suburban 1500 4WD	17 (0-34)	14	2	0	2008-11	299,625
Chevrolet Avalanche 1500 4WD	29 (5-53)	0	29	19	2008-11	156,690
Chevrolet Suburban 1500 2WD	60 (13-107)	31	28	9	2008-11	166,891
LUXURY SUVs						
midsize						
Lexus RX 350 4WD	0 (0-20)	0	0	0	2010-11	185,441
Volvo XC90 4WD	0 (0-33)	0	0	0	2008-11	111,610
Mercedes-Benz M-Class 4WD	3 (0-10)	3	0	0	2008-11	236,380
Lexus RX 350 2WD	6 (0-18)	6	0	0	2010-11	126,252
Acura MDX 4WD	12 (0-24)	6	5	2	2008-11	423,632
Acura RDX 4WD	12 (0-28)	0	12	0	2008-11	130,291
Lincoln MKX 4WD	12 (0-30)	12	0	0	2008-11	122,868
BMW X5 4WD	14 (0-31)	6	9	8	2008-11	262,354
Lincoln MKX 2WD	20 (0-43)	14	6	7	2008-11	114,683
large						
Mercedes-Benz GL-Class 4WD	0 (0-22)	0	0	0	2008-11	170,820
Land Rover Range Rover Sport 4WD	6 (0-18)	0	6	0	2008-11	127,130
Cadillac Escalade 4WD	37 (0-73)	6	33	26	2008-11	139,354
PICKUPS						
small						
Toyota Tacoma Double short bed 2WD	19 (0-49)	19	0	0	2009-11	145,733
Toyota Tacoma Double short bed 4WD	20 (0-41)	11	10	5	2009-11	150,514
Toyota Tacoma Xtra 4WD	20 (0-44)	7	13	7	2009-11	112,892
Toyota Tacoma Xtra 2WD	28 (0-71)	28	0	0	2009-11	100,884
large						
Dodge Ram 1500 Quad 4WD	8 (0-20)	0	8	4	2009-11	185,420
Chevrolet Silverado 1500 Crew 2WD	12 (0-29)	6	6	6	2010-11	127,150
Honda Ridgeline 4WD	13 (0-25)	13	0	0	2008-11	244,108
Toyota Tundra Double short bed 4WD	15 (4-27)	7	8	2	2008-11	352,117
Dodge Ram 1500 Crew short bed 2WD	18 (0-39)	6	12	6	2009-11	125,958
Toyota Tundra Double short bed 2WD	18 (4-32)	14	5	3	2008-11	290,908
Ford F-150 Crew 2WD	19 (6-31)	13	6	0	2009-11	371,109
Toyota Tundra Crew Max 4WD	20 (0-46)	5	18	4	2008-11	176,959
Ford F-150 Super 2WD	24 (4-44)	17	8	0	2009-11	191,480
Ford F-150 Crew 4WD	27 (13-40)	15	12	6	2009-11	719,382
Dodge Ram 1500 Crew short bed 4WD	28 (7-50)	17	12	4	2009-11	188,367
Dodge Ram 1500 Quad 2WD	29 (3-54)	12	17	0	2009-11	133,799
Ford F-150 Regular 2WD	30 (0-59)	5	27	0	2009-11	171,870
Chevrolet Silverado 1500 Ext 4WD	36 (8-64)	20	14	4	2010-11	206,052
Ford F-150 Super 4WD	39 (19-58)	13	26	7	2009-11	318,178
Toyota Tundra Crew Max 2WD	41 (0-83)	34	6	0	2008-11	122,927
Chevrolet Silverado 1500 Crew 4WD	79 (40-117)	40	36	17	2010-11	227,007

The yellow line in the figure below shows what would have happened to death rates if vehicles hadn't changed over the years. Death rates would have crept up between 1993 and 2006 instead of continuing their steady fall.

Driver deaths per million registered passenger vehicles and expected rates if vehicles had not changed



(« from page 2) the researchers went back to the previous model.

Getting to zero

The list of models with the lowest death rates illustrates just how much vehicles have improved. Eight years ago, there were no models with driver death rates of zero (see *Status Report*, April 19, 2007). Now there are nine. These vehicles — which include several luxury models but also some less expensive ones such as the Kia Sorento midsize SUV and the Subaru Legacy sedan — had no driver deaths during the calendar years studied.

The presence of so many zeros among the latest death rates comes at a time when more and more highway safety advocates are setting their sights on a goal of zero deaths in motor vehicle crashes. Sweden has been working toward eliminating crash deaths since its parliament formally adopted a "Vision Zero" policy in 1997. New York City now has its own Vision Zero plan. The Governors Highway Safety Association unveiled a plan titled "Toward Zero Deaths" in 2009.

"The complete elimination of traffic deaths is still many decades away, and, along with vehicle improvements, getting there will require changes in road design and public policy that can help protect all road users," Zuby says. "Still, the rise in the number of vehicles with zero driver deaths shows what's possible."

One striking thing about the group of zero-death vehicles — aside from the sheer number — is that two-thirds of them are SUVs.

A decade ago, SUVs had some of the highest rates, due to their propensity to roll over (see *Status Report*, March 19, 2005). However, the spread of electronic stability control (ESC) through the fleet has dramatically lessened the risk of rollover crashes in these and all vehicles. The rollover death rate of 5 per million registered vehicle years for 2011 models is less than a quarter of what it was for 2004 models.

With ESC dramatically reducing rollover risk, the inherent advantages offered by SUVs' greater size, weight and height emerge more clearly. Today's SUVs have the lowest driver death rate of any vehicle type.

Small vehicles, high death rates

The vehicle with the highest death rate among the 2011 models is the Kia Rio, a minicar, with 149 driver deaths per million registered vehicle years. It's one of only three vehicles with death rates above 100.

Minicars and small cars dominate the worst list. That's not surprising, since these vehicles can't protect as well as larger ones. Death rates by vehicle type and size show that the smallest vehicles typically have the highest death rates, and, with some exceptions, death rates tend to go down as size goes up.

The effect of vehicle design

The driver death rates IIHS publishes allow consumers to compare specific vehicles. They also show differences

among various classes and sizes of vehicles. What they don't do is show what portion of the overall decline in deaths can be attributed to a changing vehicle mix, improvements in vehicle design and the spread of technology like ESC, and what portion is due to other factors such as improvements in driver behavior resulting from changes in traffic laws and enforcement or from safer intersections and road designs.

To answer that question, IIHS researchers updated a 2006 study that predicted what would have happened to driver death rates if vehicles had not changed (see *Status Report*, April 22, 2006).

As they did in the earlier study, the authors estimated the effect of vehicle age and calendar year on death rates. Calendar year differences are assumed to be due to factors common to all vehicles — for example, weather or laws affecting driver behavior. By controlling for these effects, the authors were able to isolate the effects of vehicle changes.

The researchers found that 1985-95 fleets weren't as protective of their drivers as the 1984 fleet, but vehicles steadily improved after that. From 1993 through 2006, vehicle changes were the main source of the decline in driver death risk. Had vehicles not improved during that time, the longstanding downward trend of driver fatality rates would have ended in 1993.

"In some ways, the '90s weren't a great time for highway safety policy. Speed limits increased, and belt use gains leveled off," says IIHS President Adrian Lund, a coauthor of both the 2006 study and the new one. "However, consumers began to think more about the safety of vehicles, thanks at least in part to the increasing availability of crash test ratings from both the National Highway Traffic Safety Administration and the Institute. Manufacturers responded to the ratings by making improvements, and this process has accelerated in recent years, thanks to shorter design cycles."

While the number of lives saved from vehicle improvements is good news, the flip side of the study is the missed opportunities for reducing fatality risk by other means. Lower speed limits, stronger safety belt laws and wider use of automated enforcement are just a few examples of policies that could have reduced the death toll even further (see *Status Report*, Aug. 18, 2011).

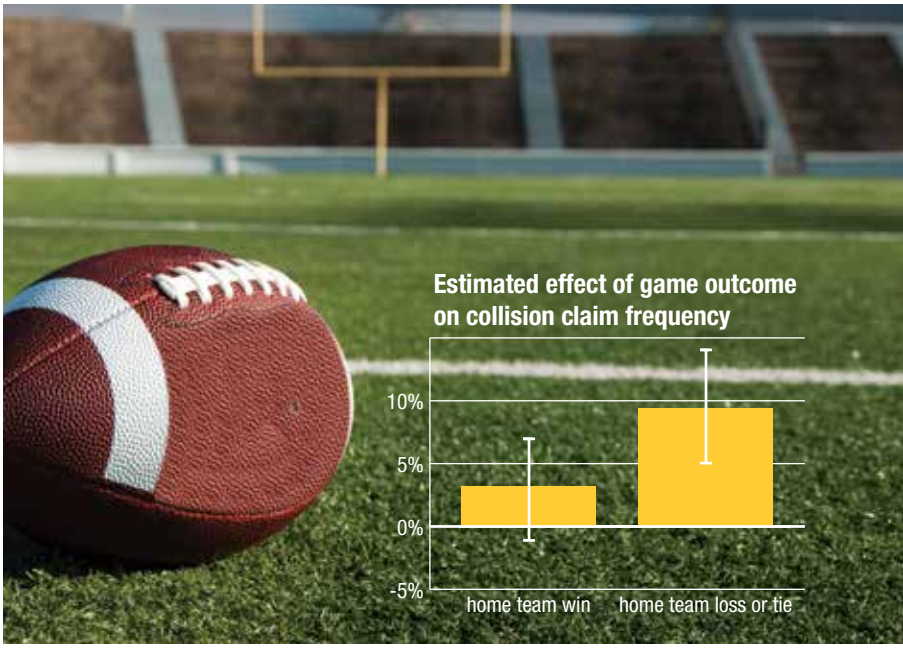
Since 2006, improvements in vehicle design have continued to play a big role in declining fatality risk, though the risk would have fallen somewhat even without vehicle changes, the study shows. A small increase in safety belt use and other improvements in driver behavior may have contributed to this reduced risk by calendar year, but the biggest factor was probably the weak economy. This means that fatality rates could be expected to rise again when the economy improves unless better traffic safety policies are put in place.

For a copy of "The effects of vehicle redesign on the risk of driver death" by C.M. Farmer and A.K. Lund, email publications@iihs.org. ■

Home team loss boosts collision claim rates around NFL stadiums

As any sports fan knows, it's easy to be driven to distraction by the home team's travails. A new HLDI study quantifies that effect, showing that the rate of collision claims associated with the ZIP codes around an NFL stadium is higher on days when the home team loses or ties than when it wins.

HLDI analysts looked at collision claims for ZIP codes in which the 31 NFL stadiums are located, as well as adjacent ZIP codes. Claim frequency was higher on home game days, compared with other days. The effect was especially pronounced in the ZIP codes where the stadiums are located, though it was also present in the surrounding ZIP codes.



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In HLDI's claims data, the ZIP codes reflect the vehicle's garaging location, and not the location of the crash. Thus, crashes involving the vehicles of people who live elsewhere and drove into the ZIP code for the game aren't included. In addition, some crashes of vehicles garaged near the stadium could have taken place elsewhere. Nevertheless, the pattern of increased claim frequency on home game days is probably connected to higher traffic volumes around the stadiums on those days.

On days when the home team won, the rate of collision claims was 3.2 percent higher than on days without a home game. On days when the team lost or tied, the claim rate was 9.4 percent higher than on days without a home game. Only the increase for a loss or tie was statistically significant.

"The game day effect was much more pronounced at some stadiums than at others," says HLDI Vice President Matt Moore. "This may point to differences in policing and traffic management strategies, which could present opportunities for improvement."

For a copy of the HLDI bulletin "Collision claim frequencies and NFL games," email publications@iihs.org. ■

Insurance Institute for Highway Safety
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All cover story photographs were taken by IIHS photographers at a First Responder Emergency Extrication event hosted by IIHS, State Farm, the National Auto Body Council, the Craftsman Auto Body Group and Holmatro at the IIHS Vehicle Research Center in Ruckersville, Va.

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IIHS is an independent, nonprofit scientific and educational organization dedicated to reducing the losses — deaths, injuries and property damage — from crashes on the nation's roads.

HLDI shares and supports this mission through scientific studies of insurance data representing the human and economic losses resulting from the ownership and operation of different types of vehicles and by publishing insurance loss results by vehicle make and model.

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