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DYING IN A CRASH

has become much less likely than it used to be for people in all types of passenger vehicles. For occupants of SUVs, the change has been dramatic. In the past, the top-heavy vehicles frequently rolled over, giving many models some of the highest driver death rates.

But drivers of today's SUVs are among the least likely to die in a crash, the Institute's latest calculations of driver death rates show. The change is due largely to the widespread availability of electronic stability control (ESC), which helps prevent rollovers. With the propensity to roll over reduced, SUVs are on balance safer than cars because their bigger size and weight provide greater protection in a crash.

The overall driver death rate for 2005-08 models during 2006-09 was 48 per million registered vehicle years. Rates for each of the more than 150 vehicles span a huge range from 0 for 7 models to 143 for the Nissan 350Z sports car. When the rates are

looked at by vehicle style, minivans have the best record with a driver death rate of 25. SUVs aren't far behind at 28. Pickups average 52 driver deaths per million registration years. Cars average 56, but smaller cars fare worse than bigger ones. For example, 4-door minicars have a death rate of 82, compared with 46 for very large 4-doors.

"The rollover risk in SUVs used to outweigh their size/weight advantage, but that's no longer the case, thanks to ESC," says Anne McCartt, the Institute's senior vice president for research.

It's not just weight that gives SUVs an advantage. It's also their height and other factors. When cars and SUVs of similar weight are compared, the SUVs have lower death rates.

The Institute computes driver-only death rates because the presence of passengers varies. Across vehicle types, size is a huge factor. All but 3 of the 26 vehicles with the lowest death rates are

While many of the differences in death rates reflect characteristics of the vehicles themselves, other factors also come into play. The high death rate of the 2007 Malibu/2008 Malibu Classic, for example, could be connected to the fact that many were sold as fleet vehicles, which may be driven differently from private vehicles. Death rates may have been held down for certain sports cars and convertibles because they often aren't driven as much as other vehicles.

Calculating death rates: Researchers computed driver death rates for all models with at least 100,000 registered vehicle years during 2006-09. (A registered year is 1 vehicle registered for 1 year or 2 vehicles for 6 months each.) Although the vehicles span 2005-08 models, only those equivalent to 2008 models are included. In other words, if a vehicle was completely redesigned for the 2007 model year, the 2005-06 versions weren't counted. The exception is the Malibu.

POUND FOR POUND, SUVs HAVE LOWER DEATH RATES

Driver deaths per million registered vehicle years, 2005-08 models during calendar years 2006-09

Vehicle weight	CARS				SUVs				PICKUP TRUCKS			
	overall	mv	sv	sv roll	overall	mv	sv	sv roll	overall	mv	sv	sv roll
≤ 2,500 lbs.	71	44	27	13	—	—	—	—	—	—	—	—
2,501-3,000 lbs.	70	40	30	14	—	—	—	—	—	—	—	—
3,001-3,500 lbs.	51	27	24	13	39	22	17	7	66	30	37	21
3,501-4,000 lbs.	47	25	23	8	23	12	11	6	60	19	40	25
4,001-4,500 lbs.	41	20	21	6	30	14	16	8	38	16	22	10
4,501-5,000 lbs.	—	—	—	—	21	11	9	3	54	18	37	17
> 5,000 lbs.	—	—	—	—	20	6	14	7	49	12	37	25

midsize or larger, while more than half of those with the highest rates are small vehicles or minicars.

Still, risk varies widely, even among vehicles of the same type and size. Among 4-door midsize cars, for example, the lowest death rate was 19 for the Honda Accord, and the highest was 99 for the 2007 Chevrolet Malibu, which continued to be sold in the 2008 model year as the Malibu Classic. The redesigned 2008 Malibu fared better with 67.

For the first time since the Institute began comparing driver death rates among vehicles in the 1980s (see *Status Report*, Nov. 25, 1989; on the web at ihs.org), researchers adjusted for a variety of factors that affect crash rates, including driver age and gender, calendar year, vehicle age, and vehicle density at the garaging location. Previously, researchers had adjusted only for driver age and gender.

"The adjusted driver death rates do a better job of teasing (*continues on p. 4*)

MODELS WITH THE HIGHEST & LOWEST DEATH RATES

LOWEST RATES OF DRIVER DEATHS

Fewer than 22 driver deaths per million registered vehicle years, 2005-08 models during calendar years 2006-09

Model	Vehicle Type	Size	Overall
Audi A6 4-door 4WD	luxury car	large	0
Mercedes E-Class 4-door 4WD	luxury car	large	0
Toyota Sienna	minivan	very large	0
Ford Edge	4WD SUV	midsize	0
Nissan Armada	4WD SUV	large	0
Land Rover Range Rover Sport	4WD SUV	large	0
Land Rover LR3	4WD SUV	large	0
Honda CR-V	4WD SUV	small	7
Jeep Grand Cherokee	4WD SUV	midsize	11
Acura MDX	4WD SUV	midsize	11
Mercedes E-Class 4-door	luxury car	large	12
Lexus RX 400h	4WD SUV	midsize	12
Lexus GX 470	4WD SUV	large	13
Mercedes M-Class	4WD SUV	midsize	14
Saab 9-3 4-door	luxury car	midsize	16
Kia Sedona	minivan	very large	16
Honda Odyssey	minivan	very large	17
Jeep Wrangler	4WD SUV	midsize	17
Honda Accord	4-door car	midsize	19
Jeep Wrangler 2-door	4WD SUV	small	20
Honda Pilot	4WD SUV	midsize	20
Honda Pilot	2WD SUV	midsize	20
Dodge Dakota crew cab	4WD pickup	small	20
Acura 3.2 TL	luxury car	midsize	21
Acura RL	luxury car	large	21
Nissan Armada	2WD SUV	large	21



&

HIGHEST RATES OF DRIVER DEATHS

More than 75 driver deaths per million registered vehicle years, 2005-08 models during calendar years 2006-09

mv	sv	sv roll				overall	mv	sv	sv roll
0	0	0	Nissan 350Z 2-door	sports car	midsize	143	53	90	63
0	0	0	Nissan Titan crew cab	2WD pickup	large	126	31	94	81
0	0	0	Chevrolet Aveo	4-door car	mini	119	60	60	33
0	0	0	Chevrolet Cobalt	4-door car	small	117	63	54	23
0	0	0	Nissan Titan extended cab	2WD pickup	large	111	35	77	42
0	0	0	Kia Spectra	station wagon	small	102	63	39	24
0	0	0	Chevrolet Malibu Classic	4-door car	midsize	99	67	32	28
4	4	0	Hyundai Tiburon	2-door car	small	96	33	63	22
0	11	5	Nissan Versa	4-door car	small	96	36	60	30
0	11	11	Chevrolet Colorado extended cab	2WD pickup	small	93	39	54	31
12	0	0	Nissan Titan crew cab	4WD pickup	large	92	18	74	68
12	0	0	Kia Rio	4-door car	mini	89	64	25	10
13	0	0	Kia Spectra	4-door car	small	87	49	38	20
14	0	0	Mazda Miata MX-5	sports car	mini	83	62	21	21
8	8	8	Subaru Legacy	4-door car	midsize	83	38	45	6
10	5	0	Mitsubishi Eclipse	2-door car	midsize	82	31	51	46
12	5	3	Mitsubishi Galant	4-door car	midsize	82	16	66	29
0	17	0	Nissan Maxima	4-door car	midsize	82	36	46	20
11	8	4	Ford Ranger	2WD pickup	small	81	47	34	17
10	10	5	Hyundai Elantra	4-door car	small	80	59	21	10
20	0	0	Ford Ranger extended cab	4WD pickup	small	79	36	43	27
5	15	0	Toyota Yaris	2-door car	mini	79	46	33	7
3	17	9	Nissan Frontier crew cab	2WD pickup	small	77	31	46	27
13	8	0	Buick Lucerne	4-door car	large	77	54	23	6
10	10	0	Buick LaCrosse	4-door car	large	76	37	39	11
14	7	0	Chrysler Sebring	4-door car	midsize	76	30	46	15

BODY STYLE & SIZE

Driver death rates by vehicle size and body style

	overall	mv	sv	sv roll
CARS	56	30	25	12
4-DOOR				
mini	82	52	29	14
small	72	42	30	13
midsize	51	28	23	10
large	55	30	25	10
very large	46	29	17	4
2-DOOR				
mini	70	35	35	18
small	62	25	36	17
midsize	58	29	29	18
SPORTS				
mini	83	58	25	17
small	36	15	21	13
midsize	80	27	53	33
LUXURY				
midsize	31	17	15	5
large	24	11	13	5
very large	39	18	21	6
STATION WAGON				
mini	61	29	32	15
small	59	36	23	14
midsize	43	18	24	18
large	47	27	20	6
MINIVANS	25	17	7	2
SUVs	28	14	14	6
4-WHEEL DRIVE				
small	31	16	15	6
midsize	23	11	12	5
large	15	6	9	4
very large	19	5	14	5
2-WHEEL DRIVE				
small	41	24	17	7
midsize	35	16	19	10
large	35	21	14	6
PICKUP TRUCKS	52	17	35	21
4-WHEEL DRIVE				
small	42	15	27	16
large	46	12	34	21
very large	46	9	38	30
2-WHEEL DRIVE				
small	62	25	38	21
large	57	19	38	19
very large	46	20	26	24

KEY TO TABLES

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

DRIVER DEATHS

PER MILLION REGISTERED VEHICLE YEARS

ABOUT THESE TABLES

Rates are for 2005-08 model passenger vehicles during calendar years 2006-09. Not every model year is included for every vehicle. If a vehicle was substantially redesigned in 2005-08, only the most recent design is included.

Note: The Chevrolet Malibu was redesigned in 2008, but the 2007 model continued to be sold as the Malibu Classic, so both the new and the previous version are included in the table.

Rates are driver deaths per million registered vehicle years. A registered vehicle year is 1 vehicle registered for 1 year or 2 vehicles for 6 months each.

Sources of data are the National Highway Traffic Safety Administration's Fatality Analysis Reporting System and R.L. Polk & Co.'s National Vehicle Population Profile. Death rates are adjusted with information on driver age and gender and vehicle density from the Highway Loss Data Institute.

KEY

overall: all crash types; numbers in parentheses are 95 percent confidence bounds

mv: driver death rate in multiple-vehicle crashes

sv: driver death rate in single-vehicle crashes

sv roll: driver death rate in single-vehicle rollovers (subset of sv)

(continued from p.2) out differences among vehicles, but they can only go so far. For one thing, people don't behave the same when they're behind the wheel of a sports car as when they're driving a minivan. And some people are more susceptible to injury and death for reasons that can't completely be adjusted for."

Driver death counts are from the federal Fatality Analysis Reporting System. Registration data are from R.L. Polk & Co., and information about driver age and gender and vehicle density are from the Highway Loss Data Institute.

Changing risk: Because the latest round of driver death rates has been fine-tuned in a way that previous ones weren't, it's impossible to do an apples-to-apples comparison, but some broad trends are clear. One is that the (continues on p.6)

	MODELS	EXPOSURE	DRIVER DEATH RATES				
			OVERALL	MV	SV	SV ROLL	
ALL PASSENGER VEHICLES			65,078,867	48 (47-49)	23	25	13
4-DOOR CARS							
MINI			635,300	82 (73-91)	52	29	14
	Toyota Yaris	2007-08	240,623	65 (50-79)	47	18	7
	Hyundai Accent	2006-08	117,875	70 (53-87)	42	28	14
	Kia Rio	2006-08	161,985	89 (72-105)	64	25	10
	Chevrolet Aveo	2007-08	114,817	119 (92-146)	60	60	33
SMALL			8,490,887	72 (70-74)	42	30	13
	Toyota Prius	2007-08	479,386	52 (43-61)	40	12	5
	Mazda 3	2005-08	670,984	52 (45-58)	22	29	13
	Honda Civic Hybrid	2006-08	186,527	53 (40-67)	42	12	6
	Honda Civic	2006-08	1,153,249	55 (49-61)	33	21	5
	Ford Focus	2008	148,431	60 (43-76)	49	11	5
	Suzuki Forenza	2005-08	290,549	62 (53-72)	36	26	13
	Nissan Sentra	2007-08	296,907	65 (52-78)	23	42	13
	Toyota Corolla	2005-08	3,026,580	66 (62-71)	46	20	10
	Hyundai Elantra	2007-08	268,744	80 (66-95)	59	21	10
	Kia Spectra	2005-08	502,861	87 (78-96)	49	38	20
	Nissan Versa	2007-08	168,017	96 (76-115)	36	60	30
	Chevrolet Cobalt	2005-08	1,128,364	117 (109-125)	63	54	23
MIDSIZE			7,396,852	51 (49-53)	28	23	10
	Honda Accord	2008	326,845	19 (13-25)	11	8	4
	Ford Fusion	2008	128,494	23 (13-33)	8	16	0
	Acura TSX	2005-08	324,601	23 (16-30)	4	19	12
	Volkswagen Jetta	2005-08	796,450	27 (23-32)	14	14	9
	Hyundai Sonata	2006-08	834,623	27 (22-31)	18	9	1
	Toyota Camry Hybrid	2007-08	164,364	36 (24-48)	22	14	7
	Dodge Avenger	2008	130,254	45 (31-59)	26	19	0
	Toyota Camry	2007-08	1,306,055	46 (40-52)	31	15	8
	Saturn Aura	2007-08	185,079	46 (33-59)	46	0	0
	Mazda 6	2007-08	134,201	60 (44-77)	48	12	0
	Kia Optima	2006-08	211,032	61 (49-74)	26	35	22
	Pontiac G6	2007-08	385,833	65 (53-77)	39	26	9
	Chevrolet Malibu	2008	125,488	67 (48-85)	42	25	0
	Nissan Altima	2007-08	621,441	70 (60-80)	42	28	12
	Chrysler Sebring	2007-08	201,150	76 (60-92)	30	46	15
	Nissan Maxima	2005-08	638,139	82 (73-91)	36	46	20
	Mitsubishi Galant	2005-08	250,916	82 (69-96)	16	66	29
	Subaru Legacy	2005-08	143,867	83 (66-100)	38	45	6
	Chevrolet Malibu/Malibu Classic	2007-08	237,026	99 (80-118)	67	32	28
LARGE			6,586,933	55 (53-58)	30	25	10
	Chrysler 300 Hemi	2005-08	484,778	35 (29-42)	15	21	6
	Hyundai Azera	2006-08	125,175	35 (22-47)	9	26	9
	Chrysler 300	2005-08	1,009,445	38 (33-43)	15	23	11
	Toyota Avalon	2005-08	723,040	47 (40-53)	27	20	9
	Dodge Charger	2006-08	474,409	51 (44-59)	19	32	7
	Pontiac Grand Prix	2005-08	959,166	59 (53-64)	40	19	12
	Dodge Charger Hemi	2006-08	230,078	62 (50-74)	20	43	12
	Chevrolet Impala	2006-08	1,621,410	65 (59-72)	35	29	13
	Buick LaCrosse	2006-08	370,868	76 (57-95)	37	39	11
	Buick Lucerne	2006-08	485,267	77 (57-97)	54	23	6
VERY LARGE			1,003,857	46 (41-51)	29	17	4
	Ford Crown Victoria	2005-08	466,892	33 (27-38)	20	13	5
	Mercury Grand Marquis	2005-08	536,965	57 (50-65)	37	20	3
2-DOOR CARS							
MINI			311,832	70 (59-82)	35	35	18
	Toyota Yaris	2007-08	132,721	79 (61-98)	46	33	7
SMALL			1,091,332	62 (55-68)	25	36	17
	Honda Civic	2006-08	491,322	64 (54-74)	34	30	15
	Hyundai Tiburon	2005-08	165,081	96 (82-110)	33	63	22
MIDSIZE			593,919	58 (50-66)	29	29	18
	Toyota Camry Solara convertible	2005-08	192,085	27 (17-37)	21	7	0
	Mitsubishi Eclipse	2006-08	151,399	82 (66-99)	31	51	46
SPORTS CARS							
MINI			101,952	83 (61-104)	58	25	17
	Mazda Miata MX-5	2006-08	101,952	83 (61-104)	62	21	21
SMALL			382,527	36 (28-45)	15	21	13
	Mercedes-Benz SLK-Class	2005-08	101,150	47 (27-67)	47	0	0
	Pontiac Solstice convertible	2006-08	107,662	63 (45-80)	9	54	36

MIDSIZE

Chevrolet Corvette 2
Nissan 350Z 2-door

LUXURY CARS

MIDSIZE

Saab 9-3 4-door
Acura 3.2 TL
Audi A4 4-door 4W
Lexus ES 350
Mercedes CLK-Class
Lexus IS 250 4-door
BMW 3 series 4-door
Lincoln Zephyr/MKZ

LARGE

Audi A6 4-door 4W
Mercedes E-Class 4
Mercedes E-Class 4
Acura RL
Cadillac STS V6

VERY LARGE

BMW 7 series
Lincoln Town Car

STATION WAGONS

MINI

Chevrolet Aveo
Honda Fit

SMALL

Dodge Caliber
Toyota Matrix
Pontiac Vibe
Chevrolet HHR
Kia Spectra

MIDSIZE

Subaru Outback
Mazda 5

LARGE

Dodge Magnum
Dodge Magnum Hemi

MINIVANS

VERY LARGE

Toyota Sienna
Kia Sedona
Honda Odyssey
Pontiac Montana SV
Chrysler Town & Co
Chevrolet Uplander
Nissan Quest
Dodge Grand Caravan

SUVs: 4-WHEEL DRIVE

SMALL

Honda CR-V
Jeep Wrangler 2-door
Toyota RAV4
Kia Sportage
Subaru Forester
Hyundai Tucson

MIDSIZE

Ford Edge
Jeep Grand Cherokee
Acura MDX
Lexus RX 400h
Mercedes M-Class
Jeep Wrangler
Honda Pilot
BMW X3
Lexus RX 350
Dodge Nitro
Nissan Xterra
Volvo XC90
Nissan Pathfinder
Mazda CX-7

	MODELS	EXPOSURE	DRIVER DEATH RATES			
			OVERALL	MV	SV	SV ROLL
		817,075	80 (72-88)	27	53	33
2-door	2005-08	196,623	69 (56-82)	27	41	37
	2005-08	150,467	143 (120-166)	53	90	63
		2,802,392	31 (28-35)	17	15	5
	2005-08	160,496	16 (8-24)	8	8	8
	2005-08	667,804	21 (16-26)	13	8	0
	2005-08	189,290	28 (18-38)	21	7	0
	2007-08	316,267	32 (22-42)	14	18	0
s convertible	2005-08	112,275	33 (16-50)	20	13	7
r	2006-08	150,891	33 (21-45)	24	8	0
r	2007-08	172,597	63 (44-81)	31	31	16
Z	2006-08	156,731	72 (53-90)	36	36	22
		1,596,600	24 (20-28)	11	13	5
D	2005-08	130,298	0 (0-28)	0	0	0
-door 4WD	2005-08	130,696	0 (0-43)	0	0	0
-door	2005-08	340,356	12 (7-17)	12	0	0
	2005-08	134,719	21 (10-31)	10	10	0
	2005-08	183,357	38 (26-49)	13	25	13
		682,539	39 (34-45)	18	21	6
	2006-08	128,483	30 (17-43)	30	0	0
	2005-08	357,895	54 (45-63)	28	26	8
		341,857	61 (51-71)	29	32	15
	2006-08	137,928	58 (44-72)	35	23	0
	2007-08	203,929	63 (49-77)	26	37	26
		2,330,481	59 (55-63)	36	23	14
	2007-08	373,770	39 (31-47)	21	18	14
	2005-08	471,023	54 (45-62)	33	20	10
	2005-08	464,275	61 (52-70)	48	13	8
	2006-08	547,912	73 (63-82)	41	32	20
	2005-08	109,620	102 (79-125)	63	39	24
		723,643	43 (36-49)	18	24	18
	2005-08	591,439	40 (34-47)	17	23	17
	2006-08	103,072	67 (44-89)	27	40	40
		419,599	47 (39-55)	27	20	6
	2005-08	302,443	40 (31-48)	30	9	0
	2005-08	117,156	66 (46-87)	27	40	20
		2,835,972	25 (22-27)	17	7	2
	2008	103,030	0 (0-36)	0	0	0
	2006-08	226,792	16 (9-22)	10	5	0
	2005-08	1,587,331	17 (14-20)	12	5	3
	2005-08	105,914	28 (14-42)	19	9	0
/6	2008	138,882	28 (15-41)	9	19	0
untry	2007-08	117,755	51 (33-68)	51	0	0
	2005-08	280,057	58 (46-70)	29	29	10
an	2008	131,720	63 (42-84)	63	0	0
IVE		2,006,978	31 (28-34)	16	15	6
	2007-08	381,995	7 (3-11)	4	4	0
or	2007-08	156,747	20 (12-27)	10	10	5
	2007-08	274,031	33 (23-43)	14	19	0
	2005-08	111,881	41 (24-59)	10	31	21
	2005-08	428,930	45 (37-54)	23	23	8
	2005-08	146,206	46 (31-62)	15	31	15
		4,031,740	23 (21-25)	11	12	5
	2007-08	137,396	0 (0-27)	0	0	0
	2007-08	220,974	11 (5-16)	0	11	5
	2007-08	144,067	11 (3-19)	0	11	11
	2006-08	122,154	12 (3-21)	12	0	0
	2006-08	209,041	14 (7-22)	14	0	0
	2007-08	110,521	17 (8-26)	0	17	0
	2006-08	439,432	20 (14-26)	20	0	0
	2005-08	255,826	24 (15-33)	12	12	12
	2007-08	132,859	25 (12-38)	12	12	0
	2007-08	113,586	26 (15-38)	9	18	18
	2006-08	139,394	27 (17-37)	14	14	7
	2005-08	232,507	28 (18-38)	21	7	0
	2005-08	341,596	31 (23-39)	16	16	8
	2007-08	120,347	32 (18-46)	32	0	0

	MODELS	EXPOSURE	DRIVER DEATH RATES			
			OVERALL	MV	SV	SV ROLL
	Infiniti FX35	2005-08	46 (22-70)	31	15	0
	Subaru B9 Tribeca	2006-08	62 (39-84)	31	31	15
	Cadillac SRX	2005-08	63 (48-78)	19	44	25
	LARGE	1,784,764	15 (12-17)	6	9	4
	Nissan Armada	2005-08	0 (0-34)	0	0	0
	Land Rover LR3	2005-08	0 (0-26)	0	0	0
	Land Rover Range Rover Sport	2006-08	0 (0-33)	0	0	0
	Lexus GX 470	2005-08	13 (7-20)	13	0	0
	Jeep Commander	2006-08	22 (15-29)	7	15	7
	Land Rover Range Rover	2005-08	22 (6-37)	0	22	22
	Porsche Cayenne	2005-08	28 (13-43)	14	14	0
	Cadillac Escalade	2007-08	33 (19-47)	11	22	22
	VERY LARGE	170,793	19 (11-27)	5	14	5
	SUVs: 2-WHEEL DRIVE					
	SMALL	1,425,937	41 (37-46)	24	17	7
	Honda CR-V	2007-08	22 (14-30)	22	0	0
	Toyota RAV4	2007-08	34 (22-45)	20	14	7
	Hyundai Tucson	2005-08	39 (31-48)	18	21	11
	Ford Escape	2008	42 (25-58)	31	10	0
	Kia Sportage	2005-08	58 (45-71)	32	27	16
	MIDSIZE	1,762,147	35 (31-38)	16	19	10
	Honda Pilot	2006-08	20 (13-28)	5	15	0
	Ford Edge	2007-08	25 (15-34)	12	12	6
	Hyundai Santa Fe	2007-08	25 (16-35)	6	19	13
	Nissan Pathfinder	2005-08	60 (48-72)	26	34	22
	Nissan Xterra	2006-08	72 (55-89)	29	43	22
	LARGE	658,993	35 (29-41)	21	14	6
	Nissan Armada	2005-08	21 (12-29)	14	7	0
	PICKUP TRUCKS: 4-WHEEL DRIVE					
	SMALL	1,540,822	42 (39-45)	15	27	16
	Dodge Dakota crew cab	2005-08	20 (14-26)	3	17	9
	Nissan Frontier crew cab	2005-08	22 (14-31)	11	11	6
	Dodge Dakota extended cab	2005-08	24 (14-35)	12	12	6
	Toyota Tacoma extended cab	2005-08	26 (20-33)	11	16	5
	Toyota Tacoma crew cab	2005-08	28 (22-34)	11	17	11
	Chevrolet Colorado crew cab	2005-08	73 (61-85)	17	55	44
	Ford Ranger extended cab	2005-08	79 (67-91)	36	43	27
	LARGE	3,349,044	46 (43-49)	12	34	21
	Honda Ridgeline crew cab	2006-08	27 (20-33)	13	13	3
	Ford F-150 crew cab	2005-08	40 (36-44)	11	29	19
	Dodge Ram 1500 crew cab	2006-08	40 (33-47)	3	36	26
	Ford F-150 extended cab	2005-08	55 (50-60)	14	42	20
	Ford F-150	2005-08	62 (50-74)	26	37	18
	Nissan Titan crew cab	2008	92 (70-114)	18	74	68
	VERY LARGE	1,170,402	46 (43-50)	9	38	30
	Dodge Ram 2500 crew cab	2005-08	47 (42-53)	7	40	33
	Dodge Ram 3500 crew cab	2005-08	59 (51-68)	11	48	39
	PICKUP TRUCKS: 2-WHEEL DRIVE					
	SMALL	2,695,511	62 (60-65)	25	38	21
	Dodge Dakota extended cab	2005-08	41 (31-51)	28	13	3
	Toyota Tacoma extended cab	2005-08	42 (35-50)	16	26	14
	Toyota Tacoma crew cab	2005-08	51 (44-59)	18	33	18
	Dodge Dakota crew cab	2005-08	55 (44-67)	4	51	16
	Chevrolet Colorado	2005-08	57 (47-67)	20	37	20
	Chevrolet Colorado crew cab	2005-08	60 (50-70)	15	45	33
	Toyota Tacoma	2005-08	61 (50-72)	31	31	15
	Nissan Frontier extended cab	2005-08	71 (59-84)	29	42	21
	Ford Ranger extended cab	2005-08	75 (65-85)	27	48	31
	Nissan Frontier crew cab	2005-08	77 (64-90)	31	46	27
	Ford Ranger	2005-08	81 (71-91)	47	34	17
	Chevrolet Colorado extended cab	2005-08	93 (78-108)	39	54	31
	LARGE	3,385,125	57 (54-60)	19	38	19
	Toyota Tundra crew cab	2007-08	23 (15-31)	9	14	0
	Dodge Ram 1500	2006-08	36 (26-46)	9	27	18
	Ford F-150 crew cab	2005-08	44 (39-50)	15	29	14
	Dodge Ram 1500 crew cab	2006-08	49 (41-57)	9	39	21
	Ford F-150 extended cab	2005-08	59 (53-65)	21	39	19
	Ford F-150	2005-08	65 (59-71)	24	42	15
	Nissan Titan extended cab	2008	111 (86-137)	35	77	42
	Nissan Titan crew cab	2008	126 (102-149)	31	94	81
	VERY LARGE	124,905	46 (31-62)	20	26	24

(continued from p. 4) overall death rate for all vehicles of 48 per million represents a large decline. The rate for 2001-04 models during 2002-05 was 79 (see *Status Report*, April 19, 2007). Before that, it was 87 for 1999-2002 models and 110 for 1989-1993 models.

The relative risk of different types of vehicles also has changed. For 1999-2002 models, the average death rate for SUVs was 82 per million, nearly as high as the 88 per million for cars. In the new analysis, the death rate for SUVs is half that of cars.

Before the mid-1980s, when production of some small and rollover-prone SUVs was stopped, SUV death rates were much higher than those of cars. Throughout the 1990s, cars and SUVs had similar death rates. Recently, death rates for SUVs have fallen much faster than those of cars.

This change parallels the increase in ESC availability. The safety feature was offered in the United States as optional equipment on luxury vehicles beginning in the late 1990s. Among 2002 models, ESC was standard on 28 percent of cars and 10 percent of SUVs and wasn't available even as an option on pickups. By the 2008 model year, it was standard on 65 percent of cars, 96 percent of SUVs, and 11 percent of pickups.

ESC's role is evident when looking at death rates by crash type. The rate of rollover deaths — 13 per million — is less than half of what it was for 1999-2002 models, and SUVs now have lower than average rollover death rates. Pickups, few of which had ESC by 2008, have a much higher rollover death rate of 21.

Death rates and crash tests: Among the 26 vehicles with the lowest driver death rates, most earn good front and side crashworthiness ratings from the Institute. Many wouldn't qualify for *TOP SAFETY PICK* under today's standards because of marginal or acceptable rollover ratings. However, all but one model has standard ESC, decreasing the chance that roof strength would come into play.

Among the 26 vehicles with the highest death rates, more have poor or marginal side ratings than good or acceptable ones, and none has standard ESC. The Institute doesn't test all vehicles, and some models with the best and worst death rates aren't rated.

EXPLORING WAYS TO OPTIMIZE ESC FOR ALL VEHICLES

Thanks to a safety standard issued by the National Highway Traffic Safety Administration, electronic stability control (ESC) will be required on all new passenger vehicles starting with 2012 models. The feature is saving lives and reducing insurance losses under collision coverage, but previous analysis by the Highway Loss Data Institute indicates that ESC's benefits vary among vehicles. New research begins to examine whether vehicle-handling tests like the one manufacturers use to certify compliance with the rule requiring ESC can be used to understand the reasons for these differences.

The Institute recently ran obstacle-avoidance maneuver tests with SUVs equipped with stability control. Although vehicle performance in the tests varied, the results didn't correlate with insurance loss patterns, leading researchers to conclude that one test condition by itself can't explain the real-world differences observed in insurance data. Analysis of insurance losses indicates that vehicle and driver characteristics account for much of the variation, suggesting that differences in the ESC systems themselves are small.

ESC helps drivers control their vehicles during high-speed maneuvers like entering curves or swerving to avoid obstacles on slippery highways (see *Status Report*, June 13, 2006; on the web at ihs.org). ESC senses when a vehicle strays from the intended travel path or begins to spin out. Then the system automatically brakes individual wheels and sometimes reduces throttle to keep the vehicle under control and moving in the intended direction of travel.



The test track research grew out of an analysis published in September 2009 by the Highway Loss Data Institute. HLDI, an affiliate of the Institute, found that ESC reduces losses under collision coverage by 18 percent for 1998-2008 SUVs with ESC compared with predecessor models without it. The reductions weren't uniform across all of the 48 SUVs examined. Results ranged from a 44 percent decrease for the Toyota 4Runner 4-door 4-wheel drive to a 5 percent increase for the Honda Element 4-door 2-wheel drive.

"Our goal was to see if we could zero in on test responses that help explain the insurance loss data," explains David Zuby, the Institute's chief research officer. "If we could, that would help determine if it's possible to enhance current ESC technology beyond what U.S. regulations require."

Engineers picked 8 SUVs with varying insurance loss reductions to subject to tests



with ESC turned on and off and examined dozens of metrics. Researchers conducted the work in conjunction with the Transportation Research Center, an independent automotive test center in Ohio.

“We couldn’t correlate the test track results with HLDI’s loss data by vehicle make and model,” Zuby says. “We think most of the differences HLDI found in ESC effectiveness reflect things like how a vehicle handles, its size and weight, and who’s at the wheel more than they do the system’s design or manufacturer. That is, the SUVs with the highest insurance losses to begin with get the biggest benefit from ESC, not because they have better stability control systems but because they are more likely to get into situations that ESC is designed to prevent.”

ESC is so important that it’s among the criteria to win *TOP SAFETY PICK*, the Institute’s award for vehicles with state-of-the-art crash protection. It’s also a requirement to land on Consumer Reports’ recommended list, and the National Highway Traffic Safety Administration recommends ESC as part of the New Car Assessment Program.

Institute research shows that ESC reduces fatal single-vehicle crash risk by 49 percent and fatal multiple-vehicle crash risk by 20 percent for cars and SUVs (see *Status Report*, June 19, 2010). It lowers the risk of a deadly crash by 33 percent overall and cuts the risk of a fatal single-vehicle rollover by 73 percent.

Federal rules require ESC systems to have certain specified components and capabilities, and vehicles must meet performance requirements to prevent oversteer and understeer in a dynamic test. Oversteer happens when the rear of a vehicle begins to slide or spin out. Understeer happens when the front of a vehicle continues to go straight even as the driver steers the vehicle to move right or left. ESC helps in both situations.

During U.S. rulemaking, the Institute and others raised questions about whether the standard might limit ESC advancements. The concern was that the required compliance test for ESC would discourage manufacturers from exploring ways to make the feature even more effective.

“That doesn’t appear to be the case because we know ESC is paying dividends as intended,” Zuby says. “The government’s compliance test is meant to measure the difference in performance between a vehicle with ESC and one without it, and it does a good job of that.” What it can’t do, Zuby explains, is tell if an ESC system is a strong one or a weak one. “At this point, no single test does that.”

Euro NCAP and other groups also are working to see if it’s possible to optimize ESC. The U.S. standard is the basis of a Global Technical Regulation on ESC adopted in June 2008 by the United Nations’ World Forum for Harmonization of Vehicle Regulations. Besides the United States, ESC is mandatory in Australia, Canada, and the European Union starting with 2012 models.

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SUV drivers are among the least likely to die in a crash, the latest calculations of driver death rates show1

Models with the highest and lowest rates of driver deaths2

Driver death rates by vehicle model and crash type4

ESC is working as intended under a federal rule requiring the feature in all new passenger vehicles6

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	MODELS	EXPOSURE	— DRIVER DEATH RATES —			
			OVERALL	MV	SV	SV ROLL
MIDSIZE		817,075	80 (72-88)	27	53	33
Chevrolet Corvette 2-door	2005-08	196,623	69 (56-82)	27	41	37
Nissan 350Z 2-door	2005-08	150,467	143 (120-166)	53	90	63
LUXURY CARS						
MIDSIZE		2,802,392	31 (28-35)	17	15	5
Saab 9-3 4-door	2005-08	160,496	16 (8-24)	8	8	8
Acura 3.2 TL	2005-08	667,804	21 (16-26)	13	8	0
Audi A4 4-door 4WD	2005-08	189,290	28 (18-38)	21	7	0
Lexus ES 350	2007-08	316,267	32 (22-42)	14	18	0
Mercedes CLK-Class convertible	2005-08	112,275	33 (16-50)	20	13	7
Lexus IS 250 4-door	2006-08	150,891	33 (21-45)	24	8	0
BMW 3 series 4-door	2007-08	172,597	63 (44-81)	31	31	16
Lincoln Zephyr/MKZ	2006-08	156,731	72 (53-90)	36	36	22
LARGE		1,596,600	24 (20-28)	11	13	5
Audi A6 4-door 4WD	2005-08	130,298	0 (0-28)	0	0	0
Mercedes E-Class 4-door 4WD	2005-08	130,696	0 (0-43)	0	0	0
Mercedes E-Class 4-door	2005-08	340,356	12 (7-17)	12	0	0
Acura RL	2005-08	134,719	21 (10-31)	10	10	0
Cadillac STS V6	2005-08	183,357	38 (26-49)	13	25	13
VERY LARGE		682,539	39 (34-45)	18	21	6
BMW 7 series	2006-08	128,483	30 (17-43)	30	0	0
Lincoln Town Car	2005-08	357,895	54 (45-63)	28	26	8
STATION WAGONS						
MINI		341,857	61 (51-71)	29	32	15
Chevrolet Aveo	2006-08	137,928	58 (44-72)	35	23	0
Honda Fit	2007-08	203,929	63 (49-77)	26	37	26
SMALL		2,330,481	59 (55-63)	36	23	14
Dodge Caliber	2007-08	373,770	39 (31-47)	21	18	14
Toyota Matrix	2005-08	471,023	54 (45-62)	33	20	10
Pontiac Vibe	2005-08	464,275	61 (52-70)	48	13	8
Chevrolet HHR	2006-08	547,912	73 (63-82)	41	32	20
Kia Spectra	2005-08	109,620	102 (79-125)	63	39	24
MIDSIZE		723,643	43 (36-49)	18	24	18
Subaru Outback	2005-08	591,439	40 (34-47)	17	23	17
Mazda 5	2006-08	103,072	67 (44-89)	27	40	40
LARGE		419,599	47 (39-55)	27	20	6
Dodge Magnum	2005-08	302,443	40 (31-48)	30	9	0
Dodge Magnum Hemi	2005-08	117,156	66 (46-87)	27	40	20
MINIVANS						
VERY LARGE		2,835,972	25 (22-27)	17	7	2
Toyota Sienna	2008	103,030	0 (0-36)	0	0	0
Kia Sedona	2006-08	226,792	16 (9-22)	10	5	0
Honda Odyssey	2005-08	1,587,331	17 (14-20)	12	5	3
Pontiac Montana SV6	2005-08	105,914	28 (14-42)	19	9	0
Chrysler Town & Country	2008	138,882	28 (15-41)	9	19	0
Chevrolet Uplander	2007-08	117,755	51 (33-68)	51	0	0
Nissan Quest	2005-08	280,057	58 (46-70)	29	29	10
Dodge Grand Caravan	2008	131,720	63 (42-84)	63	0	0
SUVs: 4-WHEEL DRIVE						
SMALL		2,006,978	31 (28-34)	16	15	6
Honda CR-V	2007-08	381,995	7 (3-11)	4	4	0
Jeep Wrangler 2-door	2007-08	156,747	20 (12-27)	10	10	5
Toyota RAV4	2007-08	274,031	33 (23-43)	14	19	0
Kia Sportage	2005-08	111,881	41 (24-59)	10	31	21
Subaru Forester	2005-08	428,930	45 (37-54)	23	23	8
Hyundai Tucson	2005-08	146,206	46 (31-62)	15	31	15
MIDSIZE		4,031,740	23 (21-25)	11	12	5
Ford Edge	2007-08	137,396	0 (0-27)	0	0	0
Jeep Grand Cherokee	2007-08	220,974	11 (5-16)	0	11	5
Acura MDX	2007-08	144,067	11 (3-19)	0	11	11
Lexus RX 400h	2006-08	122,154	12 (3-21)	12	0	0
Mercedes M-Class	2006-08	209,041	14 (7-22)	14	0	0
Jeep Wrangler	2007-08	110,521	17 (8-26)	0	17	0
Honda Pilot	2006-08	439,432	20 (14-26)	20	0	0
BMW X3	2005-08	255,826	24 (15-33)	12	12	12
Lexus RX 350	2007-08	132,859	25 (12-38)	12	12	0
Dodge Nitro	2007-08	113,586	26 (15-38)	9	18	18
Nissan Xterra	2006-08	139,394	27 (17-37)	14	14	7
Volvo XC90	2005-08	232,507	28 (18-38)	21	7	0
Nissan Pathfinder	2005-08	341,596	31 (23-39)	16	16	8
Mazda CX-7	2007-08	120,347	32 (18-46)	32	0	0