Labor Day Holiday Period Traffic Fatality Estimate, 2015

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Holiday period definition

Labor Day is observed on the first Monday in September. It is always a 3.25-day weekend consisting of Friday evening, Saturday, Sunday, and Monday. In 2015, the holiday period extends from 6:00 p.m. Friday, September 4, to 11:59 p.m. Monday, September 7.[1]

Method and results

The objective is to estimate the number of deaths that will occur in traffic crashes during the Labor Day holiday period based on data available before the holiday. The estimate developed here includes all traffic deaths from crashes that occur during the holiday period.[2]

The procedure involves three steps. First, historical data are used to determine the average fraction holiday fatalities are of total deaths for the month containing the holiday. Second, total traffic deaths for September 2015 are estimated using a time series forecasting model. Third, the projected total for the month is multiplied by the fraction to obtain the holiday estimate.

Holiday as percent of month. Total September deaths are the estimates published in *Injury Facts* two years after the year of the estimate (e.g., the September 2013 estimate that was published in the 2015 edition of *Injury Facts*). This figure is used, rather than a revised estimate or the National Center for Health Statistics final count, because it closely approximates the level of accuracy that the time series estimate will give for total monthly deaths in the current year. Fatality Analysis Reporting System (FARS) data were used to obtain deaths during the holiday periods.

Table 1 shows the total traffic fatalities for the month of September and fatalities from crashes that occurred during the holiday period. Over the 6 years 2008-2013, fatalities from crashes during the Labor Day holiday period averaged 12.46% of the total fatalities in September.

Time series model and projection. A time series model was developed to forecast an estimate of total traffic deaths for September 2015. An Autoregressive Integrated Moving Average (ARIMA) model was constructed based on 48 months of traffic deaths recorded from July 2011 through June 2015. An ARIMA model was chosen because of the seasonal variations in traffic deaths. The model was developed using the SPSS/PC+ Version 6.1 statistical computer package. The model forecasts total traffic fatalities for September 2015 to be 3,168.

Holiday estimate. Multiplying the projected total fatalities for September 2015 by the fraction obtained in the first step gives an estimate of 395 traffic fatalities from crashes during the holiday period.

Confidence interval

There is uncertainty associated with any estimate. The 90% confidence interval for the estimate of total September deaths is 2,900 to 3,459. If we assume that the fraction of September deaths that occur during the Labor Day period is normally distributed, then the 90% confidence interval for that fraction is 11.58% to 13.33%. Combining these two gives the confidence interval for the Labor Day period estimate: 336 to 461 traffic deaths.

Medically consulted injuries

Based on the current medically consulted injury to death ratio of 121:1, and rounded to the nearest hundred, the estimate of the number of nonfatal medically consulted injuries that will result from crashes during the holiday period is 47,800 with a range of 40,700 to 55,800. Medically consulted injuries are injuries serious enough that a medical professional was consulted and they are not comparable to previous disabling injury estimates.

Holiday comparison

A frequently asked question is "How much more dangerous is travel over the Labor Day holiday?" There are two aspects of this question that must be considered. First, compared to what? And, second, what about changes in the amount of driving?

We chose to compare the holiday to periods of similar length before and after the holiday. Specifically, from 6:00 p.m. Friday to 11:59 p.m. Monday of the weeks immediately before and after the Labor Day weekend. Table 2 shows the fatality data from FARS for 2008 to 2013 for comparable weekends. The average number of traffic deaths during Labor Day over those six years is 8.3% higher than the average number of traffic deaths during the comparison periods (389 vs. 360 deaths). The difference between these two means is not statistically significant.

The second question concerns changes in the amount of travel, or exposure. We know of no data system that tracks changes in vehicle miles of travel by day of the year on a national basis. Lacking an objective measure of exposure change, we assume that travel is greater on holiday weekends than on nonholiday weekends.

If the assumed travel increase exceeds 8.3%, then the risk of dying in a traffic crash during the Labor Day holiday period is less than during comparable nonholiday periods. If the travel increase is less than 8.3% or if travel is actually lower, then the risk of dying on the holiday is greater than during comparable periods.

Arnold and Cerrelli (1987) also examined the variation in fatalities during holiday periods.[3] They used FARS data for 1975-1985 to determine average daily fatalities for each day of the week in each month (e.g., Mondays in September). For the Labor Day holiday period, they found that fatalities rose 35% on Labor Day and were 16% higher than normal on the following Tuesday.

Evaluation

Table 3 compares the actual FARS counts with the Council's estimates for all holidays for which data are available. Ninety-four of the 113 actual counts fall within the 90% confidence interval of the estimate.

Notes

1. The National Highway Traffic Safety Administration extends the holiday period to 5:59 a.m. Tuesday morning in its published tabulations of holiday deaths. Operation C.A.R.E. begins the counting period at 12:01 a.m. Friday.

2. This differs from holiday estimates published by the Council in 1991 and earlier years. The estimating method described here is entirely different from the method used by the Council through 1991 when estimates were discontinued. Comparisons should *not* be made between the holiday data and estimates shown here and holiday data and estimates published in 1991 and earlier years.

3. Arnold, R., & Cerrelli, E.C. (1987). Holiday Effect on Traffic Fatalities. DOT HS 807 115. Springfield, VA: National Technical Information Service

Table 1. Traffic Deaths During the Labor Day Period as a Percent of Total September Traffic Deaths.

YEAR	SEPTEMBER	LABOR DAY PERIOD	PERCENT
2008	3,280	473	14.42
2009	3,060	351	11.47
2010	3,220	390	12.11
2011	2,930	373	12.73
2012	3,070	378	12.31
2013	3,170	371	11.70
6-year avg.	*3,122*	*389*	*12.46*

Source: *Injury Facts* and FARS.

Table 2. Traffic Deaths During Labor Day Periods and Equivalent Nonholiday Periods.

YEAR	LABOR DAY PERIOD	EQUIVALENT PERIODS	
		BEFORE	AFTER
2008	473	363	367
2009	351	340	360
2010	390	392	395
2011	373	341	345
2012	378	381	342
2013	371	342	347
6-year avg.	*389*	*360*	

Source: FARS.

Table 3. Holiday Estimate Evaluation

YEAR	ESTIMATE	90% C. I.	ACTUAL	YEAR	ESTIMATE	90% C. I.	ACTUAL
New Year's Day				Labor Day			
1995		(no estimate)		1995	512	457 – 574	490
1996	392	331 – 461	414	1996	544	494 – 598	508
1997	184	124 – 254	176	1997	492	426 – 566	485
1998	514	453 – 581	532	1998	498	447 – 554	447
1999	391	348 – 439	349	1999	468	422 – 518	469
2000	364	322 – 411	* 458	2000	481	430 – 538	514
2001	399	359 – 443	* 338	2001	474	420 – 533	432
2002	533	467 – 608	554	2002	474	413 – 542	536
2003	184	140 – 235	203	2003	488	429 – 555	490
2004	524	450 – 609	549	2004	486	421 – 558	480
2005	392	338 – 453	449	2005	475	420 – 537	500
2006	399	347 – 457	432	2006	533	477 – 595	487
2007	405	354 – 463	387	2007	490	440 – 544	508
2008	498	447 – 555	* 407	2008	439	384 – 501	473
2009	445	394 – 502	458	2009	404	356 – 457	* 351
2010	301	260 – 347	286	2010	368	320 – 422	390
2011	308	259 – 364	304	2011	400	337 – 472	373
2012	297	249 – 353	348	2012	405	336 – 485	378
2013	407	347 – 475	* 343	2013	394	338 – 459	371
Memorial Day				Thanksgiving Day			
1995	456	381 – 543	471	1995	527	465 – 596	519
1996	478	411 – 552	494	1996	528	465 – 597	570
1997	473	408 – 546	498	1997	541	480 – 609	554
1998	470	419 – 528	* 383	1998	541	485 – 603	586
1999	470	414 – 534	494	1999	500	441 – 566	* 567
2000	461	404 – 525	451	2000	497	432 – 570	497
2001	468	419 – 523	499	2001	532	455 – 619	580
2002	498	423 – 582	484	2002	575	493 – 667	527
2003	464	396 – 542	472	2003	544	459 – 642	544
2004	476	409 – 551	496	2004	556	476 – 646	556
2005	471	410 – 540	512	2005	610	505 – 735	605
2006	541	487 – 601	493	2006	555	500 – 615	* 623
2007	497	450 – 548	475	2007	564	499 – 635	542
2008	468	420 – 520	* 414	2008	479	415 – 551	484
2009	366	324 – 415	* 462	2009	447	392 – 508	401
2010	353	319 – 391	389	2010	441	378 – 513	417
2011	406	351 – 468	389	2011	434	368 – 509	375
2012	420	361 – 489	367	2012	451	384 – 528	405
2013	407	358 – 461	* 334	2013	436	365 – 517	* 360

Source: Estimates from National Safety Council; actual counts from FARS. * = outside of 90% confidence interval.

Table 3. Holiday Estimate Evaluation (cont.)

Year	Estimate	90% C. I.	Actual	Year	Estimate	90% C. I.	Actual
Independence Day				Christmas Day			
1995	636	553 – 731	631	1995	422	351 – 502	* 342
1996	653	580 – 734	609	1996	145	113 – 182	136
1997	469	411 – 535	492	1997	563	458 – 680	466
1998	498	448 – 552	458	1998	406	350 – 468	354
1999	503	446 – 567	499	1999	369	316 – 428	* 456
2000	645	578 – 719	683	2000	359	300 – 424	419
2001	198	144 – 260	173	2001	522	417 – 641	575
2002	648	565 – 743	662	2002	160	131 – 193	* 114
2003	520	449 – 602	500	2003	529	438 – 636	488
2004	522	451 – 602	502	2004	440	356 – 536	370
2005	498	444 – 557	* 565	2005	443	352 – 546	383
2006	751	680 – 828	* 629	2006	415	332 – 507	379
2007	203	160 – 251	184	2007	497	424 – 579	454
2008	449	396 – 507	472	2008	432	371 – 500	409
2009	381	336 – 431	398	2009	317	253 – 388	* 248
2010	361	310 – 420	365	2010	303	233 – 384	249
2011	374	320 – 436	405	2011	287	220 – 365	256
2012	173	135 – 219	157	2012	377	320 – 441	351
2013	540	477 – 610	* 461	2013	105	82 – 132	88

Source: Estimates from National Safety Council; actual counts from FARS. * = outside of 90% confidence interval.