Thanksgiving Holiday Period Traffic Fatality Estimate, 2016

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Holiday period definition
Thanksgiving is observed on the fourth Thursday in November. It is always a 4.25-day weekend consisting of Wednesday evening, Thursday, Friday, Saturday, and Sunday. In 2016, the holiday period extends from 6:00 p.m. Wednesday, November 23, to 11:59 p.m. Sunday, November 27.[1]

Method and results
The objective is to estimate the number of deaths that will occur in traffic crashes during the Thanksgiving holiday period based on data available approximately six to eight weeks 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 the coming month in which the holiday falls 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 November deaths are the estimates published in *Injury Facts*® two years after the year of the estimate. 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 November and fatalities from crashes that occurred during the holiday period. Over the 6 years 2010-2015, fatalities during the Thanksgiving holiday period averaged 12.84% of the total fatalities in November.

Time series model and projection. A time series model was developed to forecast an estimate of total traffic deaths for November 2016. An Autoregressive Integrated Moving Average (ARIMA) model was constructed based on 48 months of traffic deaths recorded from October 2012 through September 2016. 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 November 2016 to be 3,408.

Holiday estimate. Multiplying the projected total fatalities for November 2016 by the fraction obtained in the first step gives an estimate of 437 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 November deaths is 3,148 to 3,690. If we assume that the fraction of November deaths that occur during the Thanksgiving period is normally distributed, then the 90% confidence interval for that fraction is 12.19% to 13.48%. Combining these two gives the confidence interval for the Thanksgiving period estimate: 384 to 498 traffic deaths.

Nonfatal injuries
Nonfatal injury is defined as medically consulted injuries and these are injuries serious enough that a medical professional was consulted. Medically consulted injuries are not comparable to previous disabling injury estimates. Based on the current medically consulted injury to death ratio of 115:1, and rounded to the nearest hundred, the estimate of the number of nonfatal disabling injuries that will result from crashes during the holiday period is 50,300 with a range of 44,100 to 57,200.

Holiday comparison
A frequently asked question is "How much more dangerous is travel over the Thanksgiving 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. Wednesday to 11:59 p.m. Sunday of the weeks immediately before and after the Thanksgiving weekend. Table 2 shows the fatality data from FARS for 2010 to 2015 for comparable weekends. The average number of traffic deaths during Thanksgiving over those six years was 3.7% *lower* than the average number of traffic deaths during the comparison periods (391 vs. 406 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 non-holiday weekends. If that is in fact true, then with greater travel and fewer deaths, the risk of dying in a traffic crash during the Thanksgiving holiday period is less than comparable non-holiday 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., Thursdays in November). For the Thanksgiving holiday period, they found that fatalities rose 42% on the Wednesday before Thanksgiving and were 19% higher than normal on Thanksgiving Day. Fatalities were normal on the Friday, Saturday, and Sunday following the holiday.

Evaluation
Table 3 compares the actual FARS counts with the Council's estimates for all holidays for which data are available. One-hundred-five of the 125 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. Monday morning in its published tabulations of holiday deaths. Operation C.A.R.E. begins the counting period at 12:01 a.m. Wednesday.

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 Thanksgiving Holiday Period as a Percent of Total November Traffic Deaths.

YEAR	NOVEMBER	THANKSGIVING PERIOD	PERCENT
2010	3,030	417	13.76
2011	2,860	375	13.11
2012	2,990	405	13.55
2013	3,060	360	11.76
2014	3,175	403	12.69
2015	3,180	386	12.14
6-year avg.	*3,049*	*391*	*12.84*

Source: 2010-2014 November totals from *Injury Facts*®, 2015 November total from August 2016 Motor Vehicle Fatality Report; Thanksgiving period from FARS.

Table 2. Traffic Deaths During Thanksgiving Holiday Periods and Equivalent Nonholiday Periods.

YEAR	THANKSGIVING PERIOD	EQUIVALENT PERIODS	
		BEFORE	AFTER
2010	417	428	387
2011	375	415	392
2012	405	421	411
2013	360	396	356
2014	403	417	383
2015	386	407	458
6-year avg.	*391*	*406*	

Source: FARS.

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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
2014	156	124 – 194	126	2014.................	395	338 – 460	362
2015	421	367 – 481	* 355	2015.................	395	336 – 461	394
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
2014	382	327 – 445	337	2014.................	418	367 – 474	403
2015	383	329 – 442	367	2015.................	433	371 – 502	386

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

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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
2014	385	328 – 450	347	2014..................	366	330 – 407	355
2015	409	351 – 475	366	2015..................	307	259 – 362	273

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