DELAWARE VALLEY

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REGIONAL
PLANNING COMMISSION

Analysis of Crashes in the Delaware Valley, 2008-2010

April, 2012

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The Delaware Valley Regional Planning Commission is dedicated to uniting the region's elected officials, planning professionals, and the public with a common vision of making a great region even greater. Shaping the way we live, work, and play, DVRPC builds consensus on improving transportation, promoting smart growth, protecting the environment, and enhancing the economy. We serve a diverse region of nine counties: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey. DVRPC is the federally designated Metropolitan Planning Organization for the Greater Philadelphia Region — leading the way to a better future.

The symbol in our logo is adapted from the official DVRPC seal and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

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Executive Summary

An average of 377 people lost their lives in crashes on the roads of the Delaware Valley each year between 2008 and 2010. Approximately 45,000 people were injured each year.

The data for 2010 continued the trend of the previous three years with decreases in crashes and fatalities, though in a less dramatic manner. Even if this positive trend continues, the loss of life and limb would remain high. This memorandum focuses on understanding the data to help make effective decisions that improve safety. This memorandum is prepared before each update of DVRPC's *Safety Action Plan*. The current analysis will be used in the *2011 Safety Action Plan* (Publication 12005). This is the third round of crash analyses and the second using the same methodology. The same seven emphasis areas had the most fatalities when analyzing 2008–2010 data as when 2005–2007 data was analyzed, although the order in number of fatalities changed a bit.

If we all work together on just seven safety emphasis areas, we could significantly improve travel safety. Based on 2008–2010 data, seven emphasis areas were contributing factors for 95 percent of the crashes that resulted in fatalities. The highlights of what the analysis suggests would reduce the number of people being killed are:

▶ Curb aggressive driving, which is a factor in half the traffic fatalities. Focus on Philadelphia, Chester, and Delaware counties. In Chester County, aggressive driving was a factor in more than 65 percent of fatalities.

▶ Reduce impaired driving, focusing on Philadelphia and Chester counties.

▶ Reduce roadway departure crashes, especially in Montgomery County where leaving the road was a factor in almost 60 percent of crash fatalities.

▶ Increase seat belt usage, especially in Bucks, Chester, Montgomery, and Philadelphia counties. In Chester County, this is a factor in almost 50 percent of road fatalities.

▶ Improve intersections, and also make it safer to walk and cross streets. It would be efficient to focus work in Philadelphia because the number of fatalities is significantly higher here for both of these emphasis areas. Improvements benefit people who live or work in the City and benefit the region in terms of reducing traffic from crashes which can affect the broader transportation network.

Transportation Safety Overview

Numbers and Rates of Crashes

Are fewer people losing their lives due to crashes?

Perhaps the most meaningful question to ask of efforts to improve transportation safety is whether they result in fewer loved ones and neighbors dying in transportation crashes in the nine-county Delaware Valley. The numbers have been down for the past three years, but it is not yet known if this recent trend is related to other factors. Nationally, 40,000 to 43,000 fatalities occurred each year from 1994 to 2005, when they peaked at 43,510. Fatalities have been declining since 2006 to 32,885 in 2010. Regionally, the peak occurred in 2007 and the decline began in 2008.

Figure 1: Road Crash Fatalities in the Delaware Valley
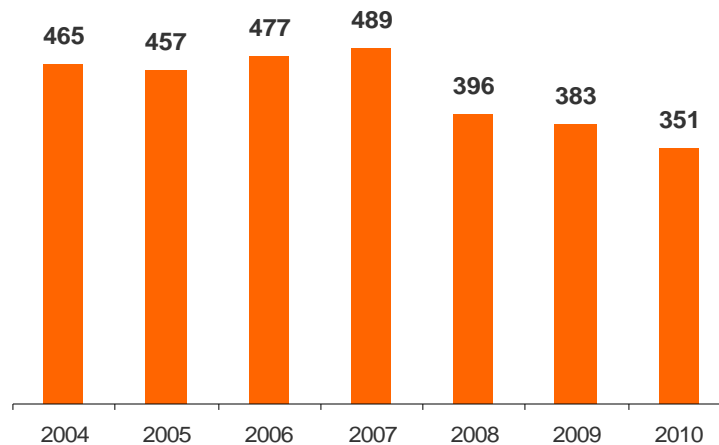
Source: NJDOT and PennDOT data, analyzed in Road Crash Fatalities in Delaware Valley.xls

Crash analysis is interesting in that a great deal of data is available, but it can also be confusing. Here are three basic concepts that help explain Table 1:

▶ Data is reported in two ways: crashes and number of people involved in the crash.

▶ The total number of crashes is the sum of crashes that resulted in injuries, fatalities, and property damage. The numbers are based on reportable crashes. In Pennsylvania, this is any crash that results in an injury (or death), and/or a vehicle being towed from the scene. In New Jersey the definition is any crash resulting in $500 or more of property damage.

▶ Data can vary considerably from one year to the next, so it is more meaningful to consider three- or five-year averages. In this document, three-year averages are used.

Table 1: Average Crashes per Year in the Delaware Valley, 2008–2010

County	Crashes that caused:			People who were:	
	Injury	Fatality	Property Damage	Injured	Killed
Bucks	3,082	52	3,151	4,324	54
Chester	1,834	31	2,606	2,452	34
Delaware	2,325	21	2,060	3,292	21
Montgomery	4,082	37	4,137	5,638	40
Philadelphia	8,235	85	2,259	11,881	93
PA Counties Average	19,558	226	14,213	27,587	242
Burlington	3,156	42	9,864	4,425	44
Camden	4,510	39	12,136	6,316	43
Gloucester	2,069	24	6,006	2,919	26
Mercer	2,737	20	10,881	3,761	21
NJ Counties Average	12,472	125	38,887	17,421	134
Regional Average	32,030	351	53,100	45,008	376

Source: NJDOT and PennDOT data, analyzed in Regional Injuries by Fatal, Injury, and Property 08-10.xls

There were just over 85,000 crashes per year on average in the Delaware Valley between 2008 and 2010. Over 32,000 people were injured in crashes per year in this period. To put these numbers in context, you could restate them in the following ways:

► The number of crashes in an average year is a third greater than if every fan at a sold-out Eagles game crashed a vehicle on their way home. Lincoln Financial Field holds 66,000 fans.

▶ The number of people who are injured in crashes each year is greater than the total population of most of the townships or boroughs in the Delaware Valley. Seventy-nine percent of municipalities in the region have a population of 32,000 or less according to the 2010 Census.

Another way to think about safety data is by using crash rate. An example would be the number of crashes per hundred million vehicle miles traveled (VMT) in a county. This allows for uniform comparisons among counties or states.

In the following figures, crash fatality rates were calculated based on the most recent data available at the time the analysis was done. Fatality rate by population was calculated using 2010 Census data. Fatality rates by VMT and Roadway Miles were calculated using 2009 data, the most recent data available then from PennDOT and NJDOT.

Figure 2 shows how the crash rate per million VMT is changing over time. It reveals a significantly different trend than was reported in the 2009 version of this memorandum. The 2005–2007 data depicted an upward trend in the nine-county region, while 2007–2009 values show an overall downward trend.

Figure 2: Fatality Rate per Hundred Million VMT
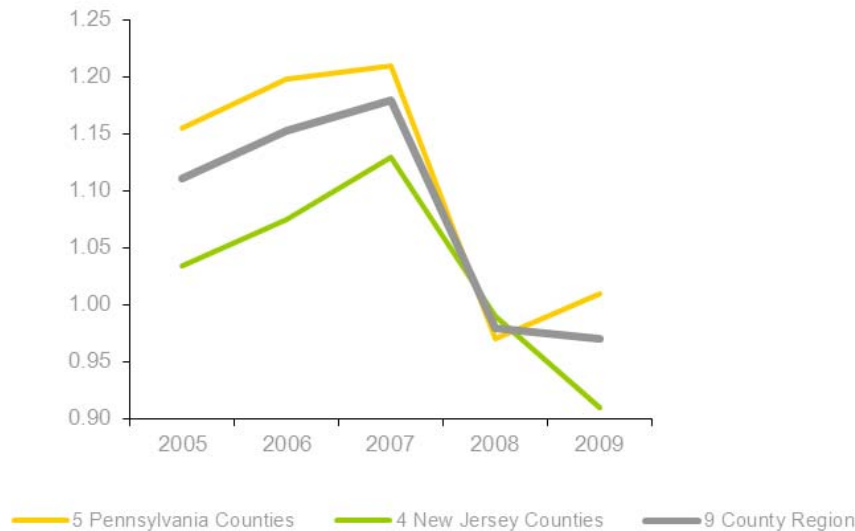
Source: Crash Data from NJDOT and PennDOT analyzed in VMT Calculations.xls

Figure 3 displays variation in fatality rates by population. In the Delaware Valley, New Jersey's three southernmost counties have significantly higher fatality rates than counties in the rest of the region.

Figure 3: Fatality Rate by Population, 2010
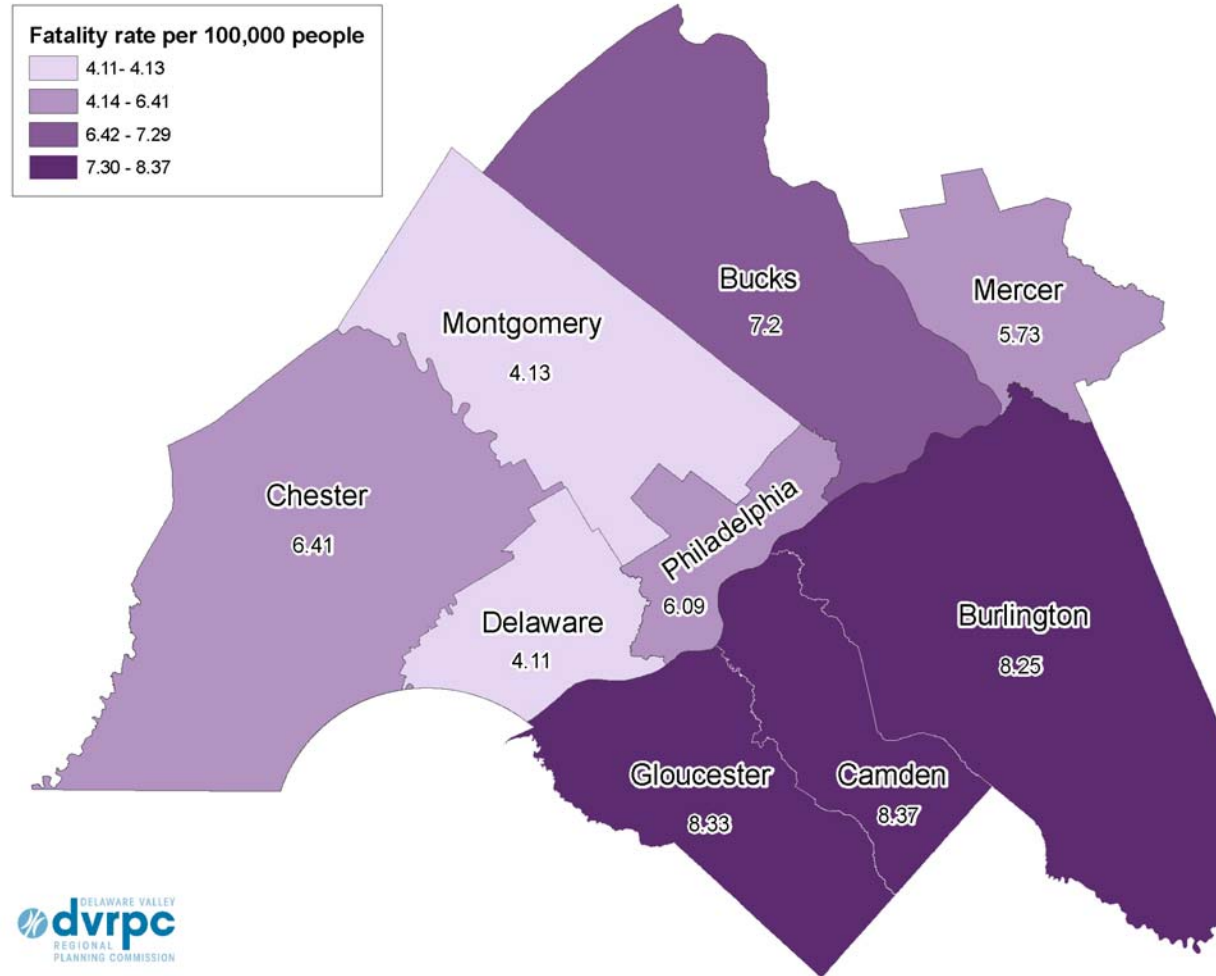
Source: Crash Data from PennDOT and NJDOT, US Census 2010 population. Documented in P:\12-41-090 Transportation Safety\Crash Data Memo Update\Maps

Figure 4 shows fatality rate per 100 miles of roadway, though it only takes into account state-owned roads. Philadelphia, in contrast to surrounding counties, owns most of its roads. As a result, the numbers for Philadelphia are skewed.

Figure 4: Fatality Rate by Roadway Miles, 2009
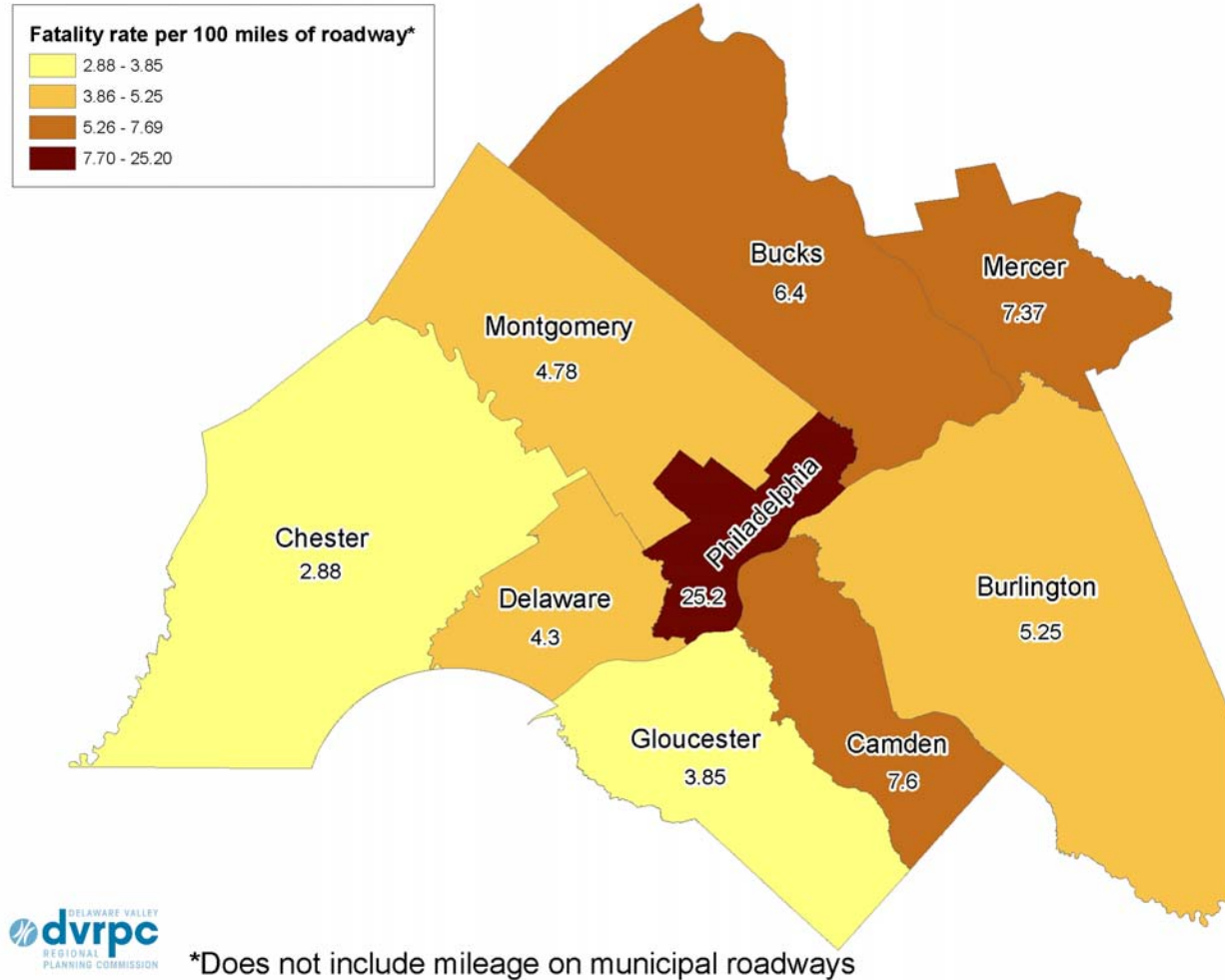
Source: Crash and Road Data from PennDOT and NJDOT. P:\12-41-090 Transportation Safety\Crash Data Memo Update\Maps

Figure 5 represents fatality rates by VMT across the region. Surprisingly, Bucks County's fatality rate is close to that of Philadelphia, the county with the highest rate.

Figure 5: Fatality Rate by VMT, 2009
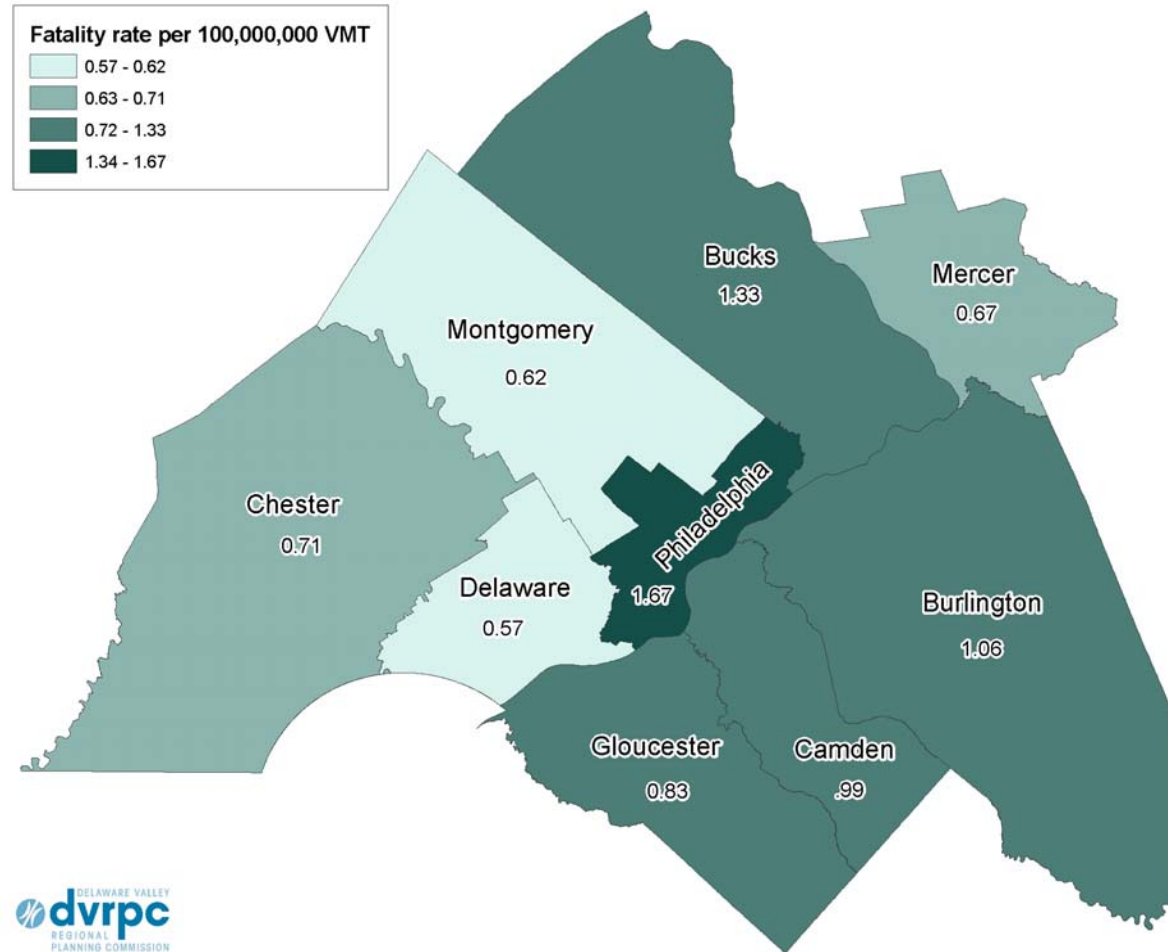
Source: Data from PennDOT and NJDOT. Documentation is in P:\12-41-090 Transportation Safety\Crash Data Memo Update\Maps

Drivers in Crashes

Up to this point, this memorandum has focused on the fatalities resulting from crashes, which include drivers, passengers, pedestrians, bicyclists, and others. The analysis in this section is only about drivers. Specifically, only the age of the driver is the focus. In the *Safety Action Plan* s) there is discussion of special needs of younger drivers and senior drivers, including strategies to maintain mobility for people age 65 or older. The *Safety Action Plan* also discusses the needs of younger drivers, but concludes that they are helped by strategies in most all the safety emphasis areas.

In crash data, there is no indication of who was responsible for the crash. If one driver were sitting at a red light and another driver rear-ended him or her, there would be data on two drivers. Additionally, New Jersey and Pennsylvania do not use the same definitions in reporting crash data. In Pennsylvania, a young driver is age 16 or 17, while in New Jersey, young drivers are between the ages of 16 and 20. Starting with the next edition of this memorandum, it will be possible to compare for 16 to 20 year olds in both states. Senior drivers are defined in both states as 65 or older.

Figure 6: Summary of Age Groups of Drivers in Crashes, Average 2008–2010
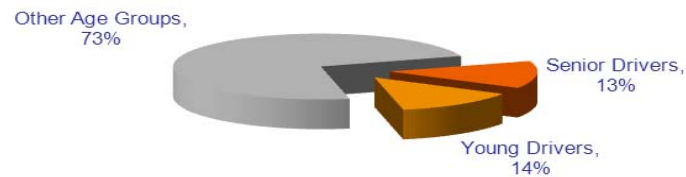
Source: Crash Data from PennDOT and NJDOT prepared in Population, Roadway, and Collision Type.xls

Figure 6 clarifies that while crashes involving young or senior drivers may be more publicized, approximately 73 percent of crashes involve people who are in neither of those age groups. With that said, there are two important points that emerge from the analysis of young and senior drivers.

The first point is that people who might qualify as young drivers make up approximately four percent of the population of the Delaware Valley but are over-represented in crashes. In the four New Jersey counties, people who are 16–20 years of age are seven percent of the population; keep in mind that not all of these people have licenses or drive. Unfortunately, licensed driver data is not available at the county level. However, people in this age group are involved in 19 percent of crashes. As noted previously, the driver may have had a role in the crash or just been in the vehicle that was hit.

Table 2: Young Drivers in the Delaware Valley

Geography	Group of Drivers	Percent of All Crashes in Region, 2008–2010
PA Counties	Young Drivers (16/17)	5%
NJ Counties	Young Drivers (16-20)	19%
Regional Total	Young Driver	14%

Source: NJDOT and PennDOT data analyzed in Population, Roadway, and Collision Type.xls.

Approximately 16 percent of residents of the Delaware Valley are people over 65 years of age. As some people age, they start to have physical or mental constraints that increase the risk of certain crash types. This raises concerns but does not seem to result in higher crash fatality rates. At the national level, drivers 65 and older have lower involvement rates in fatal crashes per 100,000 licensed drivers when compared to drivers 21 to 64 years old ("Drivers 65 and Older Have Lower Involvement Rates in Fatal Crashes" NHTSA, 2007). Not all senior people have driver's licenses or drive.

Table 3: Senior Drivers in the Delaware Valley

Geography	Group of Drivers	Percent of All Crashes in Region, 2008-2010
PA Counties	Senior Drivers (65+)	13%
NJ Counties	Senior Drivers (65+)	14%
Regional Total	Senior Driver (65+)	13%

Source: NJDOT and PennDOT data analyzed in Population, Roadway, and Collision Type.xls. Note licensed driver data only found at state level.

Both young and senior drivers log similar, relatively low numbers of miles per year compared to drivers of other ages. At the national level, average annual miles per driver by age group for each of these two age groups is approximately half (56 percent) of the average miles driven per year (www.fhwa.dot.gov/ohim/onh00/bar8.htm).

Roadway Type

The number of crashes varies significantly by roadway type. Roadway type refers to whether a road is an interstate highway, a state or county road, a local road or street, or if the crash occurred on private property such as in a parking lot. Understanding how crashes vary by roadway type helps to determine where to invest effort and what type of strategies to use to reduce crashes. For example, this analysis highlights the importance of addressing safety on county and local roads, where there are slightly more crashes than on state highways. For more information, see the *Local and County Roads Safety Newsletter* (Publication NL10017).

There are important differences in the classification of road types between Pennsylvania and New Jersey. Very briefly, the state is responsible for many more miles of the road system in Pennsylvania than in New Jersey, in absolute terms and by percent, so more crashes occur on state roads in Pennsylvania. In New Jersey, counties play a larger role in responsibility for roads than in Pennsylvania.

There are many useful analyses possible as a result of the differentiation of road types, such as examining the miles of each type of road or severity of the crashes. The crash rate per million vehicle miles traveled by road type shows a smaller amount of crashes on interstate highways than on other road types.

Figure 7: Crashes by Type of Road in the Delaware Valley, 2008–2010
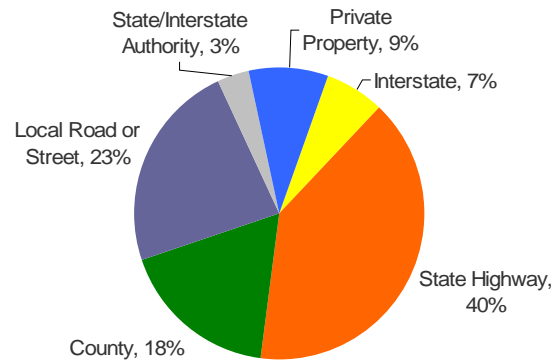
- State/Interstate Authority, 3%
- Private Property, 9%
- Interstate, 7%
- Local Road or Street, 23%
- State Highway, 40%
- County, 18%

Source: Crash Data from PennDOT and NJDOT prepared in Population, Roadway, and Collision Type.xls

Collision Types

Multiple types of vehicular crashes are tracked. For example, rear-end collisions, head-on collisions, hit a fixed object, and hit a pedestrian or bicyclist. These different types of crashes require different strategies to improve safety. Figure 8 suggests that it would be effective to focus efforts on reducing rear-end crashes and angle crashes which frequently occur at intersections.

While this analysis is useful in considering how to reduce all crashes, not all crash types contribute equally to fatalities. For example, rear-end crashes were the most commonly reported between 2008 and 2010, but contributed to only seven percent of fatalities. On the other hand, hit-fixed-object crashes represented 19 percent of all crashes, but contributed to 37 percent of fatalities.

Figure 8: Crashes by Type in the Delaware Valley, 2008–2010
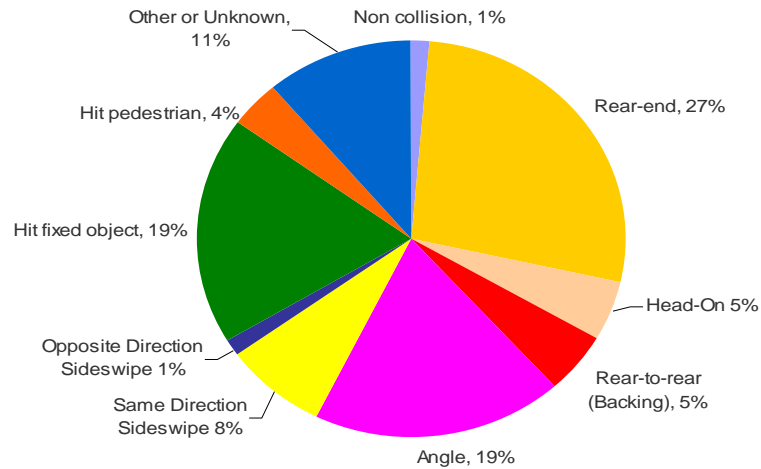
Source: Crash Data from PennDOT and NJDOT prepared in Population, Roadway, and Collision Type.xls

Additional Kinds of Analysis

This memorandum has provided information about crashes by type of road (such as interstate, county, and local roads) and about types of crashes (such as head-on or rear-end). People planning projects to improve safety may be interested in more in-depth analysis such as types of crashes by road type. These analyses are all steps making transportation safer. Additional analysis requests are coordinated with PennDOT and NJDOT. Extensive requests for specific in-depth analysis will require a funding source.

DVRPC maintains a crash data management system. It focuses more on analysis of crash data for specific roads and using that knowledge as a factor in selecting and focusing projects. A product of that work may be useful for those interested in further use of crash data. *Using Crash Data to Improve Safety in the Delaware Valley* (DVRPC Publication 09020) is available for free download from http://www.dvrpc.org/reports/09020.pdf.

The analysis covered so far has focused on drivers and passengers in vehicles, although fatality totals also include anyone else who may have been killed.   Later in this document, Emphasis Area 6 analyzes pedestrian safety. The 2011*Safety Action Plan* also briefly addresses safety of transit passengers and bicyclists. The DVRPC safety program coordinates with the transit, bicyclist and pedestrian, and freight programs within the agency. Data is shared with these programs for their projects and more analysis of the range of modes may be incorporated in future versions of this document.

Transportation Safety Emphasis Areas

Safety Emphasis Areas Overview

Concerted efforts in just seven emphasis areas could have a significant impact on reducing driving-related deaths in the Delaware Valley. Based on analysis of 2008–2010 data, the seven emphasis areas addressed in the following pages were contributing factors in 95 percent of crash fatalities. The data-driven process used by DVRPC and its Regional Safety Task Force (RSTF) to select these seven emphasis areas employed the same methodology that was used in the previous analysis of 2005–2007 data. Unexpectedly, the same seven emphasis areas rose to the top again.

The appendices have additional background information, and the *Safety Action Plan* includes the methodology and strategies for action.

Any one crash can have multiple contributing factors. For example, a crash in which an intoxicated driver ran over a pedestrian before the car hit a house would show up in analysis for reducing impaired driving, ensuring pedestrian safety, and reducing roadway departure crashes. Actions in one or more of these emphasis areas could reduce crashes such as the example provided. Philadelphia has many more pedestrians than any other county; since a fatality could be a person in a vehicle or a pedestrian or bicyclist this somewhat skews Philadelphia's numbers and percentages upwards.

Three questions were answered for each emphasis area, as follows:

▶ *How many people died in crashes for which that emphasis area was a contributing factor, by county?* Reducing fatalities is the federal focus and is reported on here; data for crashes and injuries by emphasis area is in Appendix B.

▶ *What percent of all the fatalities from crashes in a county had a specific emphasis area as a contributing factor?* The answers to these two questions are presented in one figure to assist the reader in drawing conclusions. The number of fatalities for which the given emphasis area was a contributing factor is shown as a bar for each county. The dot above the county represents the percent of all crash fatalities in that county to which the emphasis area was a contributing factor. A county might have relatively few fatalities compared to other counties, but a high percent might have one emphasis area as a contributing factor, so it would be effective to apply strategies in that county to address that emphasis area.

▶ *How are the numbers changing over time?* Eight years of data are provided in the accompanying tables for historical context. It is more usual to analyze five years of data in Pennsylvania and to analyze three years of data in New Jersey.

Emphasis Area 1: Curb Aggressive Driving

Aggressive driving was a contributing factor for 50 percent of the annual traffic fatalities in the Delaware Valley, on average, for the period 2008 to 2010. **This is the most significant emphasis area to address to improve safety.**

The highest number of fatalities in which aggressive driving was a factor occurred in Philadelphia, where 53 people died per year on average from 2008 to 2010. In Chester County, 23 people died per year in crashes where aggressive driving was a factor, which was over 65 percent of the total traffic fatalities in that County. This suggests that more focus on reducing aggressive driving might be especially effective in Chester County as well as Philadelphia. Pennsylvania and New Jersey are both interested in shifting to the National Highway Traffic Safety Administration (NHTSA) definition of aggressive driving. Each state has used a different definition for many years. See Appendix A for more information.

Figure 9: Importance of Curbing Aggressive Driving by County
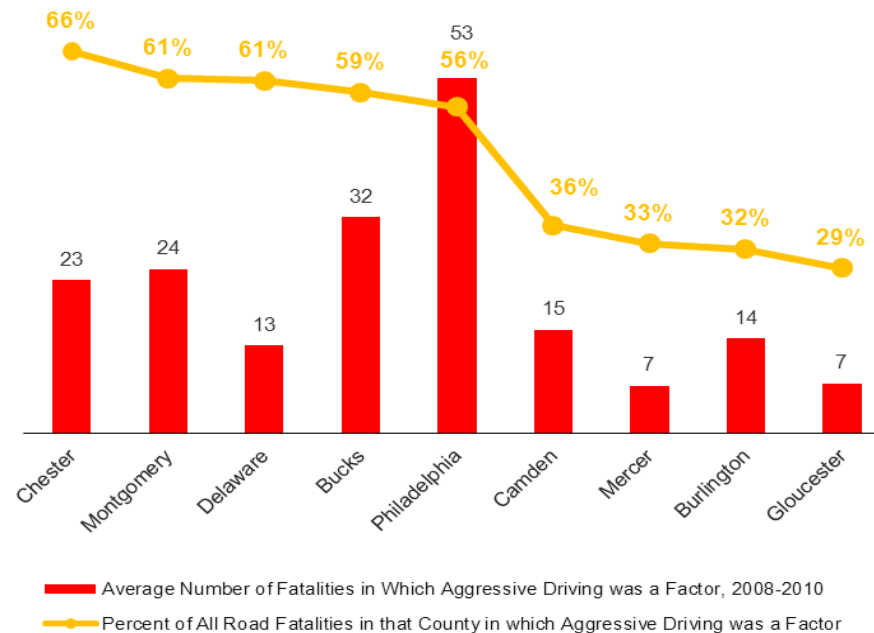
Average Number of Fatalities in Which Aggressive Driving was a Factor, 2008-2010

Percent of All Road Fatalities in that County in which Aggressive Driving was a Factor

Source: NJDOT and PennDOT data, analyzed in Regional Fatalities by Emphasis Area Charts.xls

Aggressive driving is a combination of dangerous, deliberate, and hostile behaviors or actions by a motor vehicle operator that endanger other persons and disregard public safety. This can include excessive speeding, frequent lane changes without signaling, following too closely, driving on shoulders to pass, and other reckless behaviors and actions.

See the *Safety Action Plan for the Delaware Valley* for how to reduce aggressive driving.

Table 4 provides background about the changes over time in fatalities where aggressive driving was a contributing factor.

Three-year averages were used in the figure on the previous page to account for annual variations. Also see "Numbers and Rates of Crashes" in Chapter 1 regarding characteristics of counties and the road network.

Table 4: Trend in Fatalities Where Aggressive Driving was a Factor

County	2003	2004	2005	2006	2007	2008	2009	2010
Philadelphia	58	45	41	55	67	47	54	57
Bucks	45	29	49	44	43	32	41	23
Montgomery	51	35	28	34	31	29	21	23
Chester	24	35	36	35	33	25	23	20
Delaware	18	29	21	18	16	13	13	13
PA Counties	196	173	175	186	190	146	152	136
Camden	16	15	17	21	21	14	18	14
Burlington	20	13	13	21	28	16	15	11
Mercer	14	11	11	15	9	6	7	8
Gloucester	16	16	12	16	23	12	7	3
NJ Counties	66	55	53	73	81	48	47	36
Regional Total	262	228	228	259	271	194	199	172

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls, PA Emphasis Area Tables.xls and Regional Fatalities by Emphasis Area Charts.xls

Emphasis Area 2: Keep Vehicles on the Roadway and Minimize the Consequences of Leaving the Roadway

In 34 percent of the crashes that resulted in fatalities, one or more vehicles left the roadway. This is the average annual number for the Delaware Valley for the period 2008 to 2010. The figure below depicts data for fatalities that resulted from vehicles leaving the roadway. A related emphasis area is minimizing the consequences of leaving the road. Both emphasis areas refer to many of the same crashes, but the strategies for each will be somewhat different in the forthcoming *2011 Safety Action Plan*. Definition queries can be found in Appendix A.

The highest numbers of fatalities, per average year, in which a vehicle leaving the roadway was a factor occurred in Philadelphia County. In Montgomery County, somewhat fewer people died in such crashes, but they represented almost 60 percent of the total traffic fatalities in the county. The percent of fatalities that involved leaving the roadway was also high in Delaware County. This suggests that safety strategies that help keep vehicles on the roadway may be especially effective in these counties.

Keeping vehicles on the roadway helps reduce crashes in which vehicles hit fixed objects, overturn, and/or roll. Roadway departure crashes are often deadly.

See the *Safety Action Plan for the Delaware Valley* for strategies to reduce roadway departure crashes.

Figure 10: Importance of Reducing Roadway Departure Crashes by County

Average Number of Fatalities in Which Roadway Departure was a Factor, 2008-2010

Percent of All Road Fatalities in that County in which Roadway Departure was a Factor

Source: NJDOT and PennDOT data, analyzed in Regional Fatalities by Emphasis Area Charts.xls

Table 5 provides background about the changes over time in fatalities where vehicles leaving the roadway was a contributing factor.

The figure on the previous page used three-year averages to account for annual variations. Also see "Numbers and Rates of Crashes" in Chapter 1 regarding characteristics of counties and the road network.

Table 5: Trend in Fatalities Where Vehicles Leaving the Roadway was a Factor

County	2003	2004	2005	2006	2007	2008	2009	2010
Philadelphia	40	42	36	26	37	20	35	25
Chester	31	20	22	20	27	16	8	19
Montgomery	36	27	27	34	29	26	23	19
Bucks	41	24	35	29	34	25	22	16
Delaware	23	15	14	10	6	13	10	5
PA Counties	171	128	134	119	133	100	98	84
Camden	11	10	5	11	10	10	14	17
Burlington	13	21	17	24	23	17	14	13
Gloucester	17	5	7	10	24	12	12	8
Mercer	3	11	11	14	1	7	2	2
NJ Counties	44	47	40	59	58	46	42	40
Regional Total	215	175	174	178	191	146	140	124

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls, PA Emphasis Area Tables.xls and Regional Fatalities by Emphasis Area Charts.xls

Emphasis Area 3: Improve the Design and Operation of Intersections

Intersections were a contributing factor for 29 percent of the annual traffic fatalities in the Delaware Valley, on average, for the period 2008 to 2010. Note that these numbers include drivers, passengers, pedestrians, bicyclists, and others.

The highest number of crash fatalities in which intersections were a factor occurred in Philadelphia, where 40 people died per year on average. In addition, intersection issues were a factor in approximately 43 percent of crash fatalities in Philadelphia. It is especially productive to focus attention on improvements where both numbers of fatalities and percent related to an emphasis area are high. The data indicates it would be effective in improving safety for Philadelphia to continue and enhance efforts that improve the design and operation of intersections. It should be noted that Philadelphia has by far the highest number of intersections in the region.

Figure 11: Importance of Making Intersections Safer by County

Average Number of Fatalities in which Intersections were a Factor, 2008-2010

Percent of All Road Fatalities in that County in which Intersections were a Factor
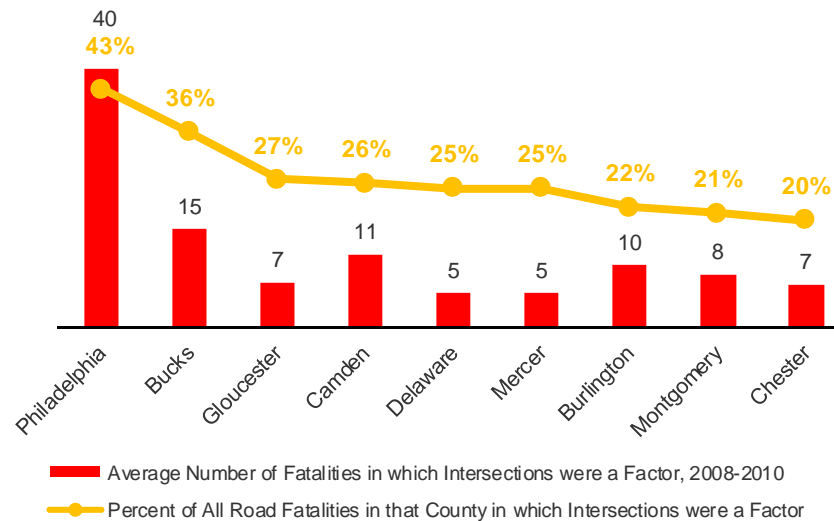
Improving the design and operation of intersections means reducing crashes at both signalized and unsignalized intersections. In locations with pedestrians and bicyclists, it is important to also address their need to cross intersections.

See the *Safety Action Plan for the Delaware Valley* for strategies to improve intersection safety.

Source: NJDOT and PennDOT data, analyzed in Regional Fatalities by Emphasis Area Charts.xls

Table 6 provides background about the changes over time in fatalities where intersections were a contributing factor.

Looking at both states, the highest number of crash fatalities in which intersections were a contributing factor in 2010 occurred in Philadelphia (clearly the highest numbers) and Camden counties. In New Jersey the numbers relating to intersections are much lower and closer among the counties than in Pennsylvania. The figure on the previous page used three-year averages to account for annual variations. Also see "Numbers and Rates of Crashes" in Chapter 1 regarding characteristics of counties and the road network.

Table 6: Trend in Fatalities at Intersections

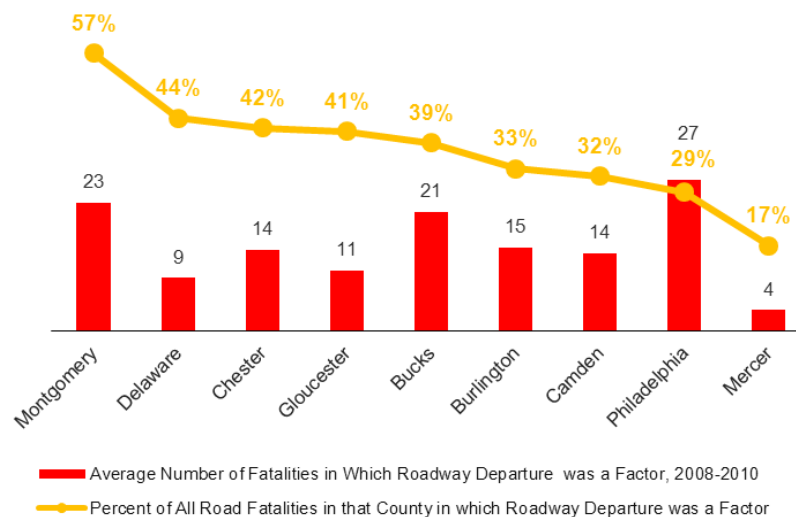| County	2003	2004	2005	2006	2007	2008	2009	2010
Philadelphia	57	58	34	47	50	42	38	41
Bucks	16	14	23	29	14	18	18	10
Montgomery	22	18	14	21	18	8	8	9
Delaware	15	12	9	13	7	6	3	7
Chester	10	9	9	12	8	7	10	3
PA Counties	120	111	89	122	97	81	77	70
Camden	9	9	7	7	10	15	8	11
Gloucester	11	12	10	11	13	8	4	9
Burlington	14	11	12	2	12	12	11	6
Mercer	9	7	8	9	8	6	7	3
NJ Counties	43	39	37	29	43	41	30	29
Regional Total	163	150	126	151	140	122	107	99

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls, PA Emphasis Area Tables.xls and Regional Fatalities by Emphasis Area Charts.xls

Emphasis Area 4: Reduce Impaired and Distracted Driving

Impaired driving, walking, or bicycling due to alcohol was a contributing factor for 28 percent of the annual traffic fatalities in the Delaware Valley, on average, for the period 2008 to 2010. Drivers, pedestrians, and bicyclists distracted by activities such as speaking on a cell phone or texting are a lesser contributing factor, but this is also harder to record accurately. Although data related to distracted driving is not reflected in this analysis, it is discussed with impaired driving because several strategies, particularly educational and enforcement efforts, are similar between the two emphasis areas.

The highest number of fatalities in which impaired driving was a factor occurred in Philadelphia, where 29 people died per year on average. In Chester County, approximately 13 people died per year, but that was over 39 percent of its traffic fatalities. This suggests that reducing impaired driving might be especially effective in these two counties.

Figure 12: Importance of Reducing Impaired Driving by County

Average Number of Fatalities in Which Impaired Driving was a Factor, 2008-2010

Percent of All Road Fatalities in that County in which Impaired Driving was a Factor
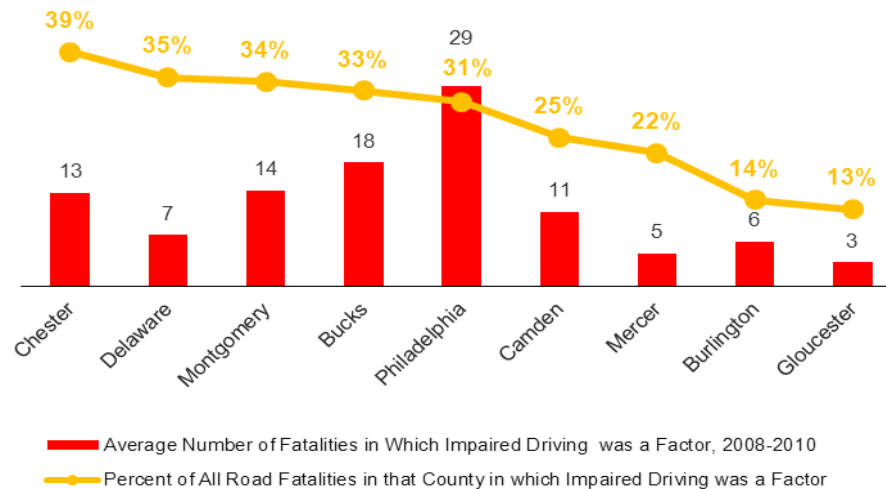
Impaired driving refers to driving under the influence of alcohol in this analysis. It also refers to driving while drug-impaired, or sleep-deprived, but the data for these is less reliable and complete than alcohol-related crash data.

See the *Safety Action Plan for the Delaware Valley* for strategies to reduce impaired and distracted driving.

Source: NJDOT and PennDOT data, analyzed in Regional Fatalities by Emphasis Area Charts.xls

Table 7 provides background about the changes over time in fatalities where impaired driving was a contributing factor.

Three-year averages were used in the figure on the previous page to account for annual variations. Also see "Numbers and Rates of Crashes" in Chapter 1 regarding characteristics of counties and the road network.

Table 7: Trend in Fatalities Where Impaired Driving was a Factor

| County	2003	2004	2005	2006	2007	2008	2009	2010
Philadelphia	31	42	27	23	40	27	34	25
Bucks	25	17	23	27	24	18	21	14
Chester	27	16	16	20	25	20	8	12
Montgomery	24	20	16	23	23	14	17	10
Delaware	19	13	13	9	8	7	7	8
PA Counties	126	108	95	102	120	86	87	69
Camden	6	5	10	6	14	10	10	12
Mercer	9	4	3	3	12	3	4	7
Burlington	4	4	9	9	7	8	5	6
Gloucester	6	2	2	6	4	4	1	5
NJ Counties	25	15	24	24	37	25	20	30
Regional Total	151	123	119	126	157	111	107	99

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls, PA Emphasis Area Tables.xls and Regional Fatalities by Emphasis Area Charts.xls

Emphasis Area 5: Increase Seat Belt Usage

Not using seat belts was a contributing factor for 32 percent of the annual traffic fatalities in the Delaware Valley, on average, for the period 2008 to 2010. This counts crashes where any person in a vehicle did not wear a seatbelt.

The highest number of fatalities in which not using a seat belt was a factor occurred in Bucks County, where 18 people died per year on average. Chester, Montgomery and Philadelphia counties followed close behind with 17 deaths. In Chester County, those fatalities were approximately 50 percent of the total traffic fatalities. This suggests that more focus on increasing seat belt usage might have a big effect in these counties. Figure 13 places Chester and Montgomery counties first to highlight the need to plan effective safety measures.

Figure 13: Importance of Increasing Seat Belt Use by County

Average Number of Fatalities in which Seat Belt Usage was a Factor, 2008-2010

Percent of All Road Fatalities in that County in which Seat Belt Usage was a Factor

Increasing seat belt usage is highly effective for preventing crash fatalities. All occupants of a vehicle should wear seatbelts. Children's safety equipment is often installed incorrectly and should be checked periodically.

See the *Safety Action Plan for the Delaware Valley* for strategies to increase seat belt usage.

Source: NJDOT and PennDOT data, analyzed in Regional Fatalities by Emphasis Area Charts.xls

Table 8 provides background about the changes over time in fatalities for which not wearing a seatbelt was a contributing factor.

The highest number of crash fatalities in 2010 in which not using a seat belt was a contributing factor occurred in Chester and Philadelphia counties in Pennsylvania, and Camden County in New Jersey. The figure on the previous page used three-year averages to account for annual variations. Also see "Numbers and Rates of Crashes" in Chapter 1 regarding characteristics of counties and the road network.

Table 8: Trend in Fatalities Where Seat Belts Were Not Used

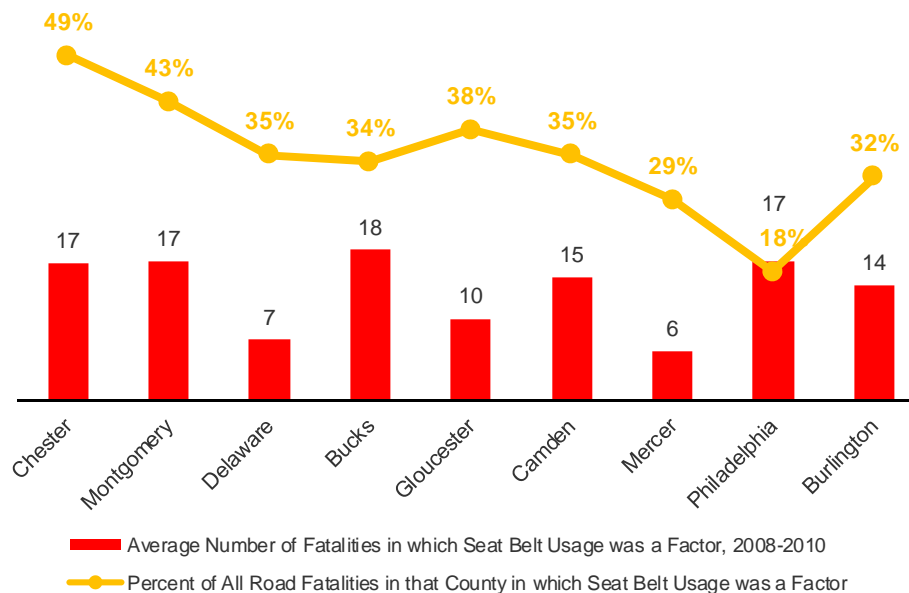| County	2003	2004	2005	2006	2007	2008	2009	2010
Chester	28	32	21	30	29	21	10	19
Philadelphia	29	27	21	18	26	18	14	19
Montgomery	39	29	26	20	24	13	22	16
Bucks	42	20	39	23	26	20	21	14
Delaware	19	19	13	15	13	10	5	7
PA Counties	157	127	120	106	118	82	72	75
Camden	18	13	10	18	21	16	13	16
Gloucester	15	14	10	12	20	17	6	8
Burlington	26	21	20	21	12	17	13	13
Mercer	11	14	12	12	16	7	6	5
NJ Counties	70	62	52	63	69	57	38	42
Regional Total	227	189	172	169	187	139	110	117

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls, PA Emphasis Area Tables.xls and Regional Fatalities by Emphasis Area Charts.xls

Emphasis Area 6: Ensuring Pedestrian Safety

Crashes involving pedestrians were a contributing factor for 22 percent of the traffic fatalities per year in the Delaware Valley, on average, for the period 2008 to 2010. While the majority of people who died were pedestrians, these numbers include drivers, passengers, and others. Everyone is a pedestrian at some point in a trip, including walking to a car or to a transit stop. Safety for bicyclists is a related concern; however, bicyclist fatalities are only approximately 10 percent of those of pedestrians. The *2011 Safety Action Plan* provides strategies that primarily address pedestrian safety issues, but also includes a section of strategies that benefit both pedestrian and bicyclist safety.

The highest number of fatalities that involved pedestrians occurred in Philadelphia, where 32 people died per year on average, contributing to 34 percent of the county's crash fatalities. It is especially productive to focus attention on improvements in counties where an emphasis area is high in both number of fatalities and percent. Note that Philadelphia has by far the highest amount of pedestrian activity of any of the nine counties.

Figure 14: Importance of Ensuring Pedestrian Safety by County
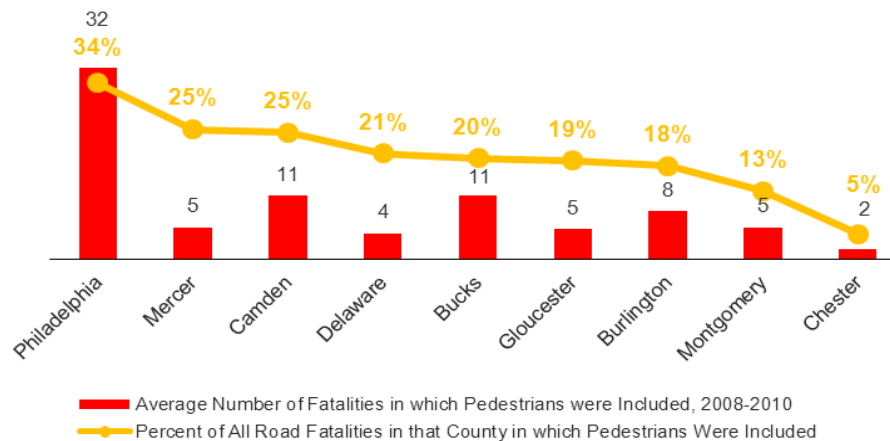
Ensuring pedestrian safety involves improving the design and availability of pedestrian facilities on and near roadways, as well as increasing awareness of the risks and responsibilities both drivers and pedestrians must consider during their interactions.

See the *Safety Action Plan for the Delaware Valley* for strategies to improve pedestrian safety.

Source: NJDOT and PennDOT data, analyzed in Regional Fatalities by Emphasis Area Charts.xls

Table 9 provides background about the changes over time in fatalities where people walking or crossing streets was a contributing factor.

Looking at both states, the highest number of crash fatalities in which people walking or crossing streets was a contributing factor in 2010 occurred in Philadelphia and (in much lower numbers) Camden counties. Gloucester County had a jump in fatalities in 2010 as compared to 2009 or most of the previous years. The figure on the previous page used three-year averages to account for annual variations. Also see "Numbers and Rates of Crashes" in Chapter 1 regarding characteristics of counties and the road network.

Table 9: Trend in Fatalities Involving Pedestrians

| County	2003	2004	2005	2006	2007	2008	2009	2010
Philadelphia	34	42	31	37	36	33	33	30
Bucks	9	8	10	13	9	9	15	8
Montgomery	14	8	5	5	9	5	8	3
Delaware	13	3	7	8	2	3	6	4
Chester	3	1	3	4	7	2	2	1
PA Counties	73	62	56	67	63	52	64	46
Camden	11	5	5	9	11	13	9	10
Gloucester	1	2	6	8	4	4	3	8
Burlington	1	4	13	6	12	12	7	5
Mercer	7	5	8	6	3	4	9	3
NJ Counties	20	16	32	29	30	33	28	26
Regional Total	93	78	88	96	93	85	92	72

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls, PA Emphasis Area Tables.xls and Regional Fatalities by Emphasis Area Charts.xls

Emphasis Area 7: Sustain Safe Senior Mobility

Drivers over 65 years of age were involved in crashes that led to 18 percent of traffic fatalities per year in the Delaware Valley, on average, for the period 2008 to 2010. This number does not relate to whether the senior driver was at fault or was hit. The fatalities include people of all ages. People 65 or older make up 16 percent of the total population of the Delaware Valley. Data for licensed drivers by age is not available by county. Senior driver data was discussed in further detail on pages 11-13.

The highest number of fatalities in crashes involving a senior driver per average year occurred in Bucks County. In Burlington County, the numbers were lower but made up approximately 25 percent of the total traffic fatalities. The number and percent of fatalities were both relatively high in Camden County. More focus on improving senior mobility might be especially effective in these counties. Figure 15 shows these counties first to focus on effective improvements.

Figure 15: Importance of Sustaining Safe Senior Mobility by County

Average Number of Fatalities in which Safe Senior Mobility was a Factor, 2008-2010

Percent of All Road Fatalities in that County in which Safe Senior Mobility was a Factor

Source: NJDOT and PennDOT data, analyzed in Regional Fatalities by Emphasis Area Charts.xls

Sustaining safe senior mobility includes recognizing that although many older drivers are still capable, the effects of aging have negative effects on the safe driving abilities of some seniors. It is important to address the range of mobility alternatives in addition to driver safety issues of seniors.

See the *Safety Action Plan for the Delaware Valley* for strategies to sustain safe senior mobility.

Table 10 provides background about the changes over time in crash fatalities involving a driver over 65.

Looking at both states, the highest number of crash fatalities involving a senior driver in 2010 occurred in Bucks, Philadelphia, Burlington, and Camden counties. Delaware County shows a sharp increase in these crashes in 2010 compared to the previous two years though not compared to years before. The figure on the previous page used three-year averages to account for annual variations. Also see "Numbers and Rates of Crashes" in Chapter 1 regarding characteristics of counties and the road network.

Table 10: Trend in Crash Fatalities for People Over 65

County	2003	2004	2005	2006	2007	2008	2009	2010
Bucks	14	12	19	13	11	5	21	12
Philadelphia	7	12	17	10	15	6	8	10
Delaware	15	8	6	10	7	3	2	9
Montgomery	17	13	13	6	7	6	9	7
Chester	9	16	11	5	9	7	6	6
PA Counties	62	61	66	44	49	27	46	44
Burlington	9	14	2	7	8	7	18	8
Camden	9	6	4	5	7	10	11	8
Gloucester	10	8	7	11	9	4	5	3
Mercer	6	6	6	6	12	3	8	1
NJ Counties	34	34	19	29	36	24	42	20
Regional Total	96	95	85	73	85	51	88	64

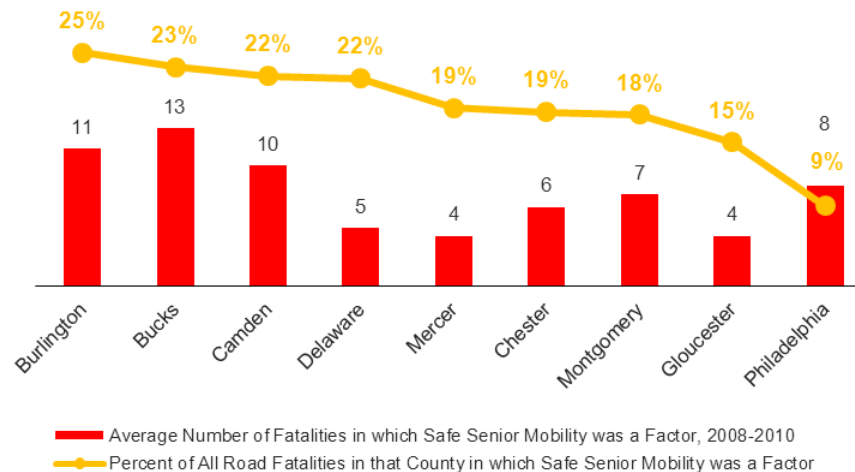Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls, PA Emphasis Area Tables.xls and Regional Fatalities by Emphasis Area Charts.xls

APPENDIX A

Detailed Regional Analysis by Emphasis Areas

▶ List of AASHTO Emphasis Areas

▶ Regional Analysis by Emphasis Areas, 2008–2010 Average

▶ How DVRPC Analyzed Emphasis Areas in Pennsylvania

▶ How DVRPC Analyzed Emphasis Areas in New Jersey

Detailed Regional Analysis by Emphasis Areas

DVRPC started analysis for the *2011 Safety Action Plan* by reviewing the previous analysis for the 2009 version. That Plan was prepared in close coordination with the RSTF and especially the safety staff of PennDOT and NJDOT. There was extensive follow-up with each state to understand details and changes since then. DVRPC staff continues to participate in the development of each state's Strategic Highway Safety Plan (SHSP) and to appreciate the help from the states in developing the bi-state Delaware Valley *Safety Action Plan*. Wherever reasonable, DVRPC's work is consistent with how each state does their analysis. In some cases, a middle ground is necessary. Table A-1 lists the full range of American Association of State Highway and Transportation Officials (AASHTO) emphasis areas. Analysis of fatalities by emphasis area is an important starting element in SHSPs and in DVRPC's work. This analysis is summarized in Table A-2, which is sorted by number of fatalities in descending order. Some additional information on crashes and people injured is included in this table. Tables A-3 and A-4 shift to regional analysis by crash type, rather than by effect on people. They cover all emphasis areas for which data is available. How each query was performed is covered in the remaining tables of Appendix A, tables A-5 and A-6.

List of AASHTO Emphasis Areas

Table A-1: AASHTO Safety Emphasis Areas

AASHTO #	AASHTO Emphasis Area
1	Instituting Graduated Licensing for Young Drivers
2	Ensuring Drivers Are Fully Licensed and Competent
3	Sustaining Proficiency in Older Drivers
4	Curbing Aggressive Driving
5	Reducing Impaired Driving
6	Keeping Drivers Alert (Reduce Distracted Driving)
7	Increasing Driver Safety Awareness
8	Increasing Seat Belt Usage and Improving Air Bag Effectiveness
9	Making Walking and Street Crossing Safer
10	Ensuring Safer Bicycle Travel
11	Improving Motorcycle Safety and Increasing Motorcycle Awareness
12	Making Truck Travel Safer
13	Increasing Safety Enhancements in Vehicles
14	Reducing Vehicle–Train Crashes
15	Keeping Vehicles on the Roadway
16	Minimizing the Consequences of Leaving the Road
17	Improving the Design and Operation of Highway Intersections
18	Reducing Head-On and Across-Median Crashes
19	Designing Safer Work Zones
20	Enhancing Emergency Medical Capabilities to Increase Survivability
21	Improving Information and Decision Support Systems
22	Creating More Effective Processes and Safety Management Systems

Source: AASHTO Strategic Highway Safety Plan (AASHTO; Washington DC, 2004): available at http://safety.transportation.org/plan.aspx

Regional Analysis by Emphasis Area, 2008-2010 Average

Table A-2: Regional Analysis by Emphasis Area, 2008-2010 Average

AASHTO #	Emphasis Area	Crashes	People Who Were:		Order in 2011 Safety Action Plan	Order in 2009 Safety Action Plan
			Injured	Killed*		
4	Curb Aggressive Driving	34,740	22,844	**188**	1	1
15	Keep Vehicles on the Roadway	13,906	7,551	**137**	2	3
16	Minimize Consequence of Leaving Roadway	16,701	7,460	**133**	2	3
17	Improve Design/operation of Intersections	26,813	20,250	**109**	3	6
5	Reduce Impaired Driving	4,822	3,316	**106**	4	2
8	Increase Seat Belt Use/Air Bag Effectiveness	5,200	5,491	**122**	5	5
9	Make Walking/Street Crossing Easier	3,030	3,055	**83**	6	7
3	Sustain Proficiency in Older Drivers	11,631	6,889	**68**	7	4
6	Keep Drivers Alert (Distracted Driving)	29,411	11,725	**64**	4	2
11	Improve Motorcycle Safety	1,463	1,422	**60**		
12	Make Truck Travel Safer	4,751	1,796	**42**		

Table A-2 (Continued)

AASHTO #	Emphasis Area	Crashes	People who were:		Order in 2011 Safety Action Plan	Order in 2009 Safety Action Plan
			Injured	Killed		
1	Institute a Graduated Driver's License	11,693	5,322	31		
18	Reduce Head-on Crashes/ Across median	2,350	2,431	30		
10	Ensure Safer Bicycle Travel	1,103	1,054	9		
19	Design Safer Work Zones	1,844	751	9		

Notes:
*This table is sorted by total fatalities, which was the starting point for selecting emphasis areas.
This table includes only emphasis areas for which data is available for both states.
In the last two columns, if two emphasis areas have the same number, it is because they were addressed together.

Source: NJDOT and PennDOT data, analyzed in Regional Analysis by Emphasis Area.xls

Table A-3: Crash Severity by Emphasis Area, 2008-2010 Average

AASHTO #	Emphasis Area	Crashes	Crashes that Caused:		% of Crashes that Caused Injuries	% of Crashes that Caused Fatalities
			Injury	Fatality		
4	Curb Aggressive Driving	34,740	15304	171	44%	0.5%
15	Keep Vehicles on the Roadway	13,906	5900	128	42%	0.9%
16	Minimize Consequence of Leaving Roadway	16,701	5960	125	36%	0.7%
17	Improve Design/operation of Intersections	26,813	13707	104	51%	0.4%
5	Reduce Impaired Driving	4,822	2330	96	48%	2%
8	Increase Seat Belt Use/Air Bag Effectiveness	5,200	3413	109	66%	2%
9	Make Walking/Street Crossing Easier	3,030	2855	81	94%	3%
3	Sustain Proficiency in Older Drivers	11,631	4778	65	41%	0.6%
11	Improve Motorcycle Safety	1,463	1243	59	85%	4%
6	Keep Drivers Alert (Distracted Driving)	29,411	8366	58	28%	0.2%
12	Make Truck Travel Safer	4,751	1276	37	27%	0.8%
18	Reduce Head-on Crashes/ Across median	2,350	1423	29	61%	1.2%

Table A-3 (Continued)

AASHTO #	Emphasis Area	Crashes	Crashes that Caused:		% of Crashes that Caused Injuries	% of Crashes that Caused Fatalities
			Injury	Fatality		
1	Institute a Graduated Driver's License	11,693	3550	26	30%	0.2%
10	Ensure Safer Bicycle Travel	1,103	1027	9	93%	0.8%
19	Design Safer Work Zones	1,844	537	8	29%	0.4%

Note:
The third possible outcome of a crash is Property Damage Only. This least-severe outcome is not shown in the table.

Source: NJDOT and PennDOT data, analyzed in Crash Severity by Emphasis Area.xls

Table A-4: Crash Severity by State by Emphasis Area, 2008-2010 Average

AASHTO #	Emphasis Area	Pennsylvania					New Jersey				
		Crashes	Crashes that caused:		% of Crashes that Caused Injuries	% of Crashes that Caused Fatalities	Crashes	Crashes that caused:		% of Crashes that Caused Injuries	% of Crashes that Caused Fatalities
			Injury	Fatality				Injury	Fatality		
1	Institute a Graduated Driver's License	1,839	862	7	47%	0.4%	9,854	2,688	19	27%	0.2%
2	Ensure Drivers Licensed/Competent	447	274	4	61%	0.9%	1,038	320	2	31%	0.2%
3	Sustain Proficiency in Older Drivers	4,476	2,808	39	63%	0.9%	7,155	1,970	26	28%	0.4%
4	Curb Aggressive Driving	19,211	10,572	131	55%	0.7%	15,529	4,732	40	30%	0.3%
5	Reduce Impaired Driving	2,862	1,545	73	54%	3%	1,960	785	23	40%	1%
6	Keep Drivers Alert	3,478	1,867	9	54%	0.3%	25,933	6,499	49	25%	0.2%
7	Increase Driver Safety Awareness										
8	Increase Seat Belt Use/Air Bag Effectiveness	3,705	2,633	68	71%	2%	1,495	780	41	52%	3%
9	Make Walking/Street Crossing Easier	2,317	2,259	52	97%	2%	713	596	29	84%	4%
10	Ensure Safer Bicycle Travel	712	705	5	99%	0.7%	391	322	4	82%	1%
11	Improve Motorcycle Safety	925	841	44	91%	5%	538	402	15	75%	3%
12	Make Truck Travel Safer	1,223	653	20	53%	2%	3,528	623	17	18%	0.5%

| AASHTO # | Emphasis Area | Pennsylvania | | | | | New Jersey | | | | |
| | | Crashes | Crashes that caused: | | % of Crashes that Caused Injuries | % of Crashes that Caused Fatalities | Crashes | Crashes that caused: | | % of Crashes that Caused Injuries | % of Crashes that Caused Fatalities |
			Injury	Fatality				Injury	Fatality		
13	Increase Safety Enhancements in Vehicles										
14	Reducing Vehicle-Train Crashes	119	45	0	38%	0%					
15	Keep Vehicles on the Roadway	9,603	4,270	89	44%	0.9%	4,303	1,630	39	38%	0.9%
16	Minimize Consequence of Leaving Roadway	8,427	3,630	82	43%	1%	8,274	2,330	43	28%	0.5%
17	Improve Design/Operation of Intersections	15,562	9,937	71	64%	0.5%	11,251	3,770	33	34%	0.3%
18	Reduce Head-on Crashes/ Across median	1,659	1,108	26	67%	2%	691	315	3	46%	0.4%
19	Design Safer Work Zones	320	173	4	54%	1%	1,524	364	4	24%	0.3%
	Enhance EMS to Increase Survivability										
21	Improve Data/decision Support Systems										
22	Create More Effective Processes/Safety Management Systems (SMS)										

Notes: This table includes only emphasis areas for which data is available for both states.
Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls and PA Emphasis Area Tables.xls

How DVRPC Analyzed Emphasis Areas in Pennsylvania

Table A-5: Query Formats for Pennsylvania Crash Data

AASHTO #	Emphasis Area	Criteria	Pennsylvania Database Query	Notes
1	Instituting Graduated Driver's License	Drivers Age 16-17	(FLAG.DRIVER_16YR=1 OR FLAG.DRIVER_17YR=1)	Changes in data will allow analysis of 16-20 next update
2	Ensuring Drivers Licensed/Competent	Unlicensed Driver	FLAG.UNLICENSED=1	
3	Sustaining Proficiency in Older Drivers	Drivers age >65	(FLAG.DRIVER_65_74YR=1 OR FLAG.DRIVER_75_PLUS=1)	
4	Curbing Aggressive Driving	See notes following this table	FLAG.AGGRESSIVING DRIVING<>0	Currently the query is any one of the criteria
5	Reducing Impaired Driving	Impairment Due to Alcohol	FLAG.ALCOHOL_RELATED=1	
6	Keeping Drivers Alert	Driver Inattention	FLAG.DISTRACTED=1	
8	Increasing Seat Belt Use/Air Bag Effectiveness	Unbelted	FLAG.UNBELTED=1	This query checks <u>all</u> occupants.
9	Making Walking and Street Crossing Safer	Pedestrian	FLAG.PEDESTRIAN=1	
10	Ensuring Safer Bicycle Travel	Bicycle	FLAG.BICYCLE=1	
11	Improving Motorcycle Safety and Increasing Motorcycle Awareness	Motorcyclist	FLAG.MOTORCYCLE=1	
12	Making Truck Travel Safer	Heavy Truck Related	FLAG.HEY_TRUCK_RELATED =1	
14	Reducing Vehicle-Train Crashes	Train and Trolley Crashes	FLAG.TRAIN_TROLLEY=1	
15	Keeping Vehicles on the Roadway	Ran Off Road	FLAG.SV_RUN_OFF_RD=1 AND CRASH.FATAL_COUNT>0	
16	Minimizing Consequences of Leaving Roadway	Fixed Object	FLAG.HIT_FIXED_OBJECT=1	
16	Minimizing Consequences of Leaving Roadway	Overturn	FLAG.OVERTURNED=1	
17	Improving the Design/Operation of Intersections	Crash at Intersection	FLAG.INTERSECTION=1	

AASHTO #	Emphasis Area	Criteria	Pennsylvania Database Query	Notes
18	Reducing Head-On Crashes and Across-Median Crashes	Head-on	CRASH.COLLISION_TYPE="2"	
		Across Median Collision	FLAG.CROSS_MEDIAN=1	
		Head-on and Across Median Collision	FLAG.CROSS_MEDIAN=1 AND CRASH.COLLISION_TYPE="2"	
		No Duplicates		
19	Designing Safer Work Zones	Work Zone	FLAG.WORK_ZONE=1	

Note: Not all AASHTO emphasis areas are able to be queried in current databases.

The definition of aggressive driving that PennDOT has used for many years is a crash with any one of the contributing circumstances:
- Making illegal U-turn
- Making improper or careless turn
- Turning from wrong lane
- Proceeding w/o clearance after stop
- Running stop sign
- Running red light
- Failure to respond to TCD
- Tailgating
- Sudden slowing or stopping
- Careless passing or lane change
- Passing in no passing zone
- Making improper entrance to highway
- Making improper exit from highway
- Speeding
- Driving too fast for conditions
- Driver fleeing police (police chase)

PennDOT also started calculating the newer NHTSA definition of aggressive driving in 2009. That definition is "the operation of a motor vehicle involving two or more moving violations as part of a single continuous sequence of driving acts, which is likely to endanger any person or property." This more-stringent definition results in a much lower number.

Source: AASHTO and PennDOT guidance and PennDOT crash data.

How DVRPC Analyzed Emphasis Areas in New Jersey

Table A-6: Query Formats for New Jersey Crash Data

AASHTO #	Emphasis Area	Criteria	Criteria Details	New Jersey Database Criteria	Notes
1	Instituting Graduated Driver's License	Drivers Age 16-20	Occupants.Position In/On vehicle = "01" and Age between 16 and 20	Flag.YOUNGDRIVER = Yes	Using age from Occupants table provides better data for young driver.
2	Ensuring Drivers Licensed/ Competent	Unlicensed Driver or Suspended or Revoked License	Charge = 39:3-10 (unlicensed driver); 39:3-40 (suspended or revoked license)	Flag.UNLICENSED = Yes	
3	Sustaining Proficiency in Older Drivers	Drivers Age 65+	Drivers.Driver DOB	Flag.OLDERDRIVER = Yes	Using DOB from Driver table has better data for older driver.
4	Curbing Aggressive Driving	Aggressive Driving (unsafe speed, failed to obey traffic control device, failed to yield right of way to vehicle/pedestrian, improper passing, improper lane change, following too closely)	Contributing circumstance = unsafe speed, failed to obey traffic control device, failed to yield right of way to vehicle/pedestrian, improper passing, improper lane change, following too closely	Flag.AGGRESSIVE_DRIVING = Yes	Any one of these contributing circumstances. See further notes at end of table.
5	Reducing Impaired Driving	Impairment Due to Alcohol	Alcohol Involved Crash = yes	Flag.ALCOHOL_RELATED = Yes	
6	Keeping Drivers Alert	Driver Inattention	Contributing circumstance = driver inattention	Flag.DRIVERINATTENTION = Yes	
7	Increasing Driver Safety Awareness	Increase Driver Safety Awareness	None		
8	Increasing Seat Belt Use/Air Bag Effectiveness	No Safety Equipment Used	Occupants.safety equipment used = none	Flag.NoSafetyEqpt = Yes	Any person in vehicle. Also see note below table.
9	Making Walking and Street Crossing Easier	Pedestrian	Collision w/MV code = Pedestrian	Flag.PEDESTRIAN = Yes	
10	Ensuring Safer Bicycle Travel	Bicyclist (pedalcycle)	Collision w/MV code = Pedalcycle	Flag.BICYCLE = Yes	
11	Improving Motorcycle Safety and Increasing Motorcycle Awareness	Motorcyclist	Vehicle Type = Motor Cycle	Flag.MOTORCYCLE = Yes	

AASHTO #	Emphasis Area	Criteria	Criteria Details	New Jersey Database Criteria	Notes
12	Making Truck Travel Safer	Truck-Related	Vehicle type = truck/trailer, truck/trailer (bobtail), tractor/semi-trailer, tractor/doubles, tractor/triples, heavy truck other	Flag.TRUCK_RELATED = Yes	
13	Increasing Safety Enhancements in Vehicles	Increase Safety Enhancements in Vehicles	None		
14	Reducing Vehicle-Train Crashes[1]	Highway Rail incidents	Highway Rail Incidents		
		Trespasser Incidents	Trespasser Incidents		
15	Keeping Vehicles on the Roadway	Ran Off Road	Sequence of Events (1 = Ran off Road, or 1 = MV in Transport and 2 = Ran Off Road)	Flag.RUNOFFROAD = Yes	
16	Minimizing Consequences of Leaving Roadway	Hit Fixed Object	Collision w/MV code = Fixed Object	Flag.HIT_FIXED_OBJECT = Yes	
		Overturned	Collision w/MV code = Overturn	Flag.OVERTURNED = Yes	
17	Improving Design/Operation of Intersections	Crash at Intersection	Intersection = at intersection	Flag.INTERSECTION = Yes	
18	Reducing Head-on Crashes	Head-on Collision	Collision w/MV code = Head on	Flag.HEADON = Yes	.
19	Designing Safer Work Zones	Work Zone	Road under construction = yes & workers present	Flag.WORKZONE = Yes	
20	Enhancing EMS to Increase Survivability	Enhance EMS to Increase Survivability	None		
21	Improving Data/decision Support Systems	Improve Data/Decision Support Systems	None		
22	Creating More Effective Processes/Safety Management Systems (SMS)	Create More Effective Processes for Safety Management Systems	None		
N/A	Driving More Safely in Inclement Weather	Rain or Snow	Weather = rain, snow and more		

AASHTO #	Emphasis Area	Criteria	Criteria Details	New Jersey Database Criteria	Notes
N/A	Driving More Safely in Inclement Road Surface	Wet, Snowy, Icy, Slushy or Water Conditions	Surface Condition = Wet, Snowy, Icy, Slush, Water	Flag.ICY_ROAD = Yes Or Flag.WET_ROAD = Yes Or Flag.OTHER_INCLEMENT_ ROAD = Yes Or Flag.SNOW_SLUSH_ROAD = Yes	
N/A	Reducing Deer/Animal Crashes	Collision with an Animal	Collision w/MV code = Animal	Flag.ANIMAL = Yes	
N/A	Reducing Crashes on Local Roads	Local Road	Road system = county or municipal	Flag.LOCAL_ROAD = Yes	
N/A	School Bus Safety	School Bus-Related	Vehicle type = school bus		The new vehicle lookup code doesn't have school bus
N/A	Speeding	Unsafe Speed	Contributing circumstance = unsafe speed	Flag.SPEEDING = Yes	

Note: Not all AASHTO emphasis areas are able to be queried in current databases. NJDOT does some additional analysis beyond the AASHTO emphasis areas; they are marked N/A in the AASHTO number field.

NJDOT has been using a definition of aggressive driving that involves any one of the list of contributing circumstances. They are interested in shifting to the newer NHTSA definition, which is "the operation of a motor vehicle involving two or more moving violations as part of a single continuous sequence of driving acts, which is likely to endanger any person or property." This more-stringent definition inherently results in a much lower number. Also, initial reviews indicate issues with the data for the second contributing circumstance as of 2010.

In original work between NJDOT and DVRPC on safety planning, the seat belt query was whether no safety equipment was used, meaning no seat belt or no air bag. This query was still used in the current analysis, but future editions will change to only whether no seat belt was used to be consistent with Pennsylvania and because increasing seat belt use is an actionable item. Coordination is underway with NJDOT to update this query.

Source: AASHTO and NJDOT guidance and NJDOT crash data

Crashes and Injuries by Emphasis Areas, 2008-2010 Average

▶ Crash and Injury Data for Seven Emphasis Areas

Crashes and Injuries by Emphasis Area

Fatalities are the saddest and most reported-upon result of crashes; however, it is also useful to analyze total crashes and number of people injured. Fatalities can be somewhat random, while the higher number of crashes may make this data a more reliable source for locations in need of improvement. Analysis of where people were injured helps filter out fender-benders, which are somewhat less important to reduce than injuries and fatalities.

Crash and Injury Data for Seven Emphasis Areas

Table B-1: Crashes and Injuries Where Aggressive Driving was a Factor

Five years of data are shown in the tables that follow to be consistent with a common PennDOT analysis period. NJDOT more commonly uses three years.

County	Total Crashes					Total Injuries				
	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010
Bucks	3,986	4,109	3,723	3,989	3,594	3,166	3,156	2,770	2,931	2,649
Chester	2,824	2,980	2,868	2,730	2,511	1,868	1,813	1,591	1,540	1,499
Delaware	3,128	2,813	2,695	2,535	2,534	2,347	2,156	2,031	1,871	1,998
Montgomery	6,253	5,868	5,113	5,121	5,061	4,611	3,850	3,488	3,659	3,693
Philadelphia	4,640	4,760	4,689	4,973	5,498	6,141	5,914	5,362	6,009	6,484
PA Counties	20,831	20,530	19,088	19,348	19,198	18,133	16,889	15,242	16,010	16,323
Burlington	3,933	3,770	3,463	3,729	3,799	1,765	1,631	1,521	1,650	1,728
Camden	5,841	5,741	5,389	5,840	5,378	2,835	2,690	2,624	2,726	2,471
Gloucester	2,746	2,534	2,570	2,805	2,603	1,426	1,344	1,284	1,384	1,224
Mercer	3,871	3,875	3,671	3,721	3,618	1,553	1,473	1,508	1,418	1,418
NJ Counties	16,391	15,920	15,093	16,095	15,398	7,579	7,138	6,937	7,178	6,841
Regional Total	37,222	36,450	34,181	35,443	34,596	25,712	24,027	22,179	23,188	23,164

Note: Due to the reduction in force, Camden City police will respond to a crash only if it involves an injury or fatality. As a result, there has been a decrease in reported crashes. There has been an increase in self-reported crashes on SR-1 forms but these are not included in the state-reported totals.

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls and PA Emphasis Area Tables.xls

Table B-2: Crashes and Injuries Where Roadway Departure Crashes were a Factor

County	Total Crashes					Total Injuries				
	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010
Bucks	2,456	2,256	2,196	2,201	1,895	1,232	1,345	1,155	1,100	931
Chester	1,992	1,810	2,003	1,857	1,643	924	931	910	808	747
Delaware	1,346	1,260	1,368	1,277	1,095	647	696	713	638	580
Montgomery	2,969	2,758	2,594	2,568	2,434	1,365	1,384	1,267	1,271	1,242
Philadelphia	1,855	1,922	1,941	1,874	1,864	1,755	1,516	1,498	1,446	1,524
PA Counties	10,618	10,006	10,102	9,777	8,931	5,923	5,872	5,543	5,263	5,024
Burlington	1,852	1,710	1,455	1,510	1,334	1,021	829	792	794	729
Camden	1,786	1,509	1,214	1,139	973	962	769	634	603	521
Gloucester	1,326	1,330	1,129	1,162	1,032	772	742	623	635	622
Mercer	554	597	617	689	656	254	254	287	294	288
NJ Counties	5,518	5,146	4,415	4,500	3,995	3,009	2,594	2,336	2,326	2,160
Regional Total	16,136	15,152	14,517	14,277	12,926	8,932	8,466	7,879	7,589	7,184

Note: Due to the reduction in force, Camden City police will respond to a crash only if it involves an injury or fatality. As a result, there has been a decrease in reported crashes. There has been an increase in self-reported crashes on SR-1 forms but these are not included in the state-reported totals.

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls and PA Emphasis Area Tables.xls

Table B-3: Crashes and Injuries at Intersections

County	Total Crashes					Total Injuries				
	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010
Bucks	2,827	2,827	2,601	2,610	2,605	2,402	2,206	2,021	2,009	1,996
Chester	1,804	1,685	1,796	1,657	1,581	1,247	1,093	1,069	1,032	1,015
Delaware	2,425	2,070	2,063	1,918	1,982	1,945	1,673	1,672	1,645	1,698
Montgomery	4,344	3,922	3,553	3,528	3,559	3,483	2,769	2,688	2,687	2,682
Philadelphia	7,197	6,694	5,867	5,687	5,679	9,387	8,555	7,276	7,280	6,952
PA Counties	18,597	17,198	15,880	15,400	15,406	1,8464	16,296	14,726	14,653	14,343
Burlington	2,473	2,530	2,376	2,325	2,654	1,280	1,340	1,231	1,339	1,432
Camden	3,630	3,977	3,738	3,368	3,317	2,096	2,269	2,109	1,926	1,846
Gloucester	1,708	1,712	1,709	1,938	1,969	1,107	1,041	1,004	1,057	982
Mercer	3,867	3,840	3,460	3,423	3,475	1,622	1,602	1,515	1,178	1,408
NJ Counties	11,678	12,059	11,283	11,054	11,415	6,105	6,252	5,859	5,500	5,668
Regional Total	30,275	29,257	27,163	26,454	26,821	24,569	22,548	20,585	20,153	20,011

Note: Due to the reduction in force, Camden City police will respond to a crash only if it involves an injury or fatality. As a result, there has been a decrease in reported crashes. There has been an increase in self-reported crashes on SR-1 forms but these are not included in the state-reported totals.

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls and PA Emphasis Area Tables.xls

Table B-4: Crashes and Injuries Where Impaired Driving was a Factor

County	Total Crashes					Total Injuries				
	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010
Bucks	688	713	696	639	554	545	527	530	443	405
Chester	425	433	451	445	396	290	308	279	271	255
Delaware	439	408	375	387	331	295	273	278	314	251
Montgomery	856	772	750	943	677	565	521	495	684	439
Philadelphia	734	677	624	675	644	822	760	648	732	646
PA Counties	3,142	3,003	2,896	3,089	2,602	2,517	2,389	2,230	2,444	1,996
Burlington	566	565	571	516	538	345	316	298	276	330
Camden	841	807	790	689	662	509	459	451	410	392
Gloucester	435	371	394	358	313	251	216	207	203	176
Mercer	399	424	352	337	361	210	208	176	162	198
NJ Counties	2,241	2,167	2,107	1,900	1,874	1,315	1,199	1,132	1,051	1,096
Regional Total	5,383	5170	5,003	4,989	4,476	3,832	3,588	3,362	3,495	3,092

Note: Due to the reduction in force, Camden City police will respond to a crash only if it involves an injury or fatality. As a result, there has been a decrease in reported crashes. There has been an increase in self-reported crashes on SR-1 forms but these are not included in the state-reported totals.

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls and PA Emphasis Area Tables.xls

Table B-5: Crashes and Injuries Where a Seat Belt Was Not Used

County	Total Crashes					Total Injuries				
	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010
Bucks	851	770	724	723	699	973	869	756	762	728
Chester	574	521	483	415	369	657	476	424	347	375
Delaware	723	581	557	505	598	715	653	580	530	660
Montgomery	1,106	972	831	833	801	1,212	1,026	895	910	889
Philadelphia	1,618	1,441	1,257	1,169	1,152	2,352	1,995	1,585	1,551	1,522
PA Counties	4,872	4,285	3,852	3,645	3,619	5,909	5,019	4,240	4,100	4,174
Burlington	525	472	404	374	393	471	432	313	317	371
Camden	766	714	597	530	453	740	676	541	521	465
Gloucester	378	318	266	269	261	402	303	246	265	241
Mercer	404	364	326	319	292	340	313	262	212	205
NJ Counties	2,073	1,868	1,593	1,492	1,399	1,953	1,724	1,362	1,315	1,282
Regional Total	6,945	6,153	5,445	5,137	5,018	7,862	6,743	5,602	5,415	5,456

Note: Due to the reduction in force, Camden City police will respond to a crash only if it involves an injury or fatality. As a result, there has been a decrease in reported crashes. There has been an increase in self-reported crashes on SR-1 forms but these are not included in the state-reported totals.

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls and PA Emphasis Area Tables.xls

Table B-6: Crashes and Injuries Involving Pedestrians

County	Total Crashes					Total Injuries				
	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010
Bucks	101	116	115	119	119	101	115	117	124	116
Chester	66	61	66	56	67	69	62	70	59	70
Delaware	191	175	193	180	184	175	173	198	202	200
Montgomery	221	233	219	197	207	221	225	231	221	221
Philadelphia	2,027	1,979	1,773	1,743	1,713	2,126	2,088	1,840	1,833	1,801
PA Counties	2,606	2,564	2,366	2,295	2,290	2,692	2,663	2,456	2,439	2,408
Burlington	118	123	139	110	124	106	119	118	93	110
Camden	320	333	328	301	270	301	301	289	277	245
Gloucester	90	83	81	99	106	80	77	72	90	89
Mercer	203	191	170	195	215	178	172	145	151	184
NJ Counties	731	730	718	705	705	665	669	624	611	628
Regional Total	3,337	3,294	3,084	3,000	2,995	3,357	3,332	3,080	3,050	3,036

Note: Due to the reduction in force, Camden City police will respond to a crash only if it involves an injury or fatality. As a result, there has been a decrease in reported crashes. There has been an increase in self-reported crashes on SR-1 forms but these are not included in the state-reported totals.

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls and PA Emphasis Area Tables.xls

Table B-7: Crashes and Injuries Involving Drivers Over 65

County	Total Crashes					Total Injuries				
	2006	2007	2008	2009	2010	2006	2007	2008	2009	2010
Bucks	885	901	914	968	964	771	792	779	815	778
Chester	514	561	570	557	588	380	420	385	355	400
Delaware	729	686	669	608	704	584	590	586	540	645
Montgomery	1,390	1,373	1,184	1,264	1,346	1,179	1,030	977	993	1,114
Philadelphia	1,139	1,128	1,004	990	1,099	1,446	1,374	1,198	1,232	1,284
PA Counties	4,657	4,649	4,341	4,387	4,701	4,360	4,206	3,925	3,935	4,221
Burlington	1,950	1,918	1,999	2,039	2,161	803	773	810	780	852
Camden	1,903	2,076	2,067	2,153	2,021	899	1,011	936	949	898
Gloucester	990	1,009	1,091	1,147	1,200	478	514	466	461	520
Mercer	1,689	1,751	1,801	1,881	1,905	647	650	672	625	618
NJ Counties	6,532	6,754	6,958	7,220	7,287	2,887	2,948	2,884	2,815	2,888
Regional Total	11,189	11,403	11,299	11,607	11,988	7,247	7,154	9,809	6,750	7,109

Note: Due to the reduction in force, Camden City police will respond to a crash only if it involves an injury or fatality. As a result, there has been a decrease in reported crashes. There has been an increase in self-reported crashes on SR-1 forms but these are not included in the state-reported totals.

Source: NJDOT and PennDOT data, analyzed in NJ Emphasis Area Tables.xls and PA Emphasis Area Tables.xls

Abstract: Understanding crashes on the roads in the Delaware Valley is an important step in increasing safety. This publication analyzes information about crashes and the seven key safety emphasis areas for the region developed in conjunction with the 2011 update of the *Safety Action Plan* (Publication 12005).

Analysis includes numbers and rates of crashes, as well as information about who was involved, where, and how the crashes occurred to better understand why. Analysis of national and state emphasis areas resulted in focusing on seven emphasis areas for the Delaware Valley. These seven emphasis areas were contributing factors for 95 percent of crash fatalities. Information is provided on in which counties these emphasis areas might most efficiently be addressed in order to increase safety. The *Safety Action Plan* recommends strategies to use for each emphasis area.

Staff Contact: Zoe Neaderland, AICP
Manager, Office of Transportation Safety
& Congestion Management
☎ (215) 238-2839
🖱 ZNeaderland@dvrpc.org

Delaware Valley Regional Planning Commission
190 N. Independence Mall West, 8th Floor
Philadelphia PA 19106
Phone: (215) 592-1800
Fax: (215) 592-9125
Internet: www.dvrpc.org