ROADWAY SAFETY IN ILLINOIS

EXAMINING THE NEEDS, ECONOMIC COSTS, AND POTENTIAL IMPROVEMENTS

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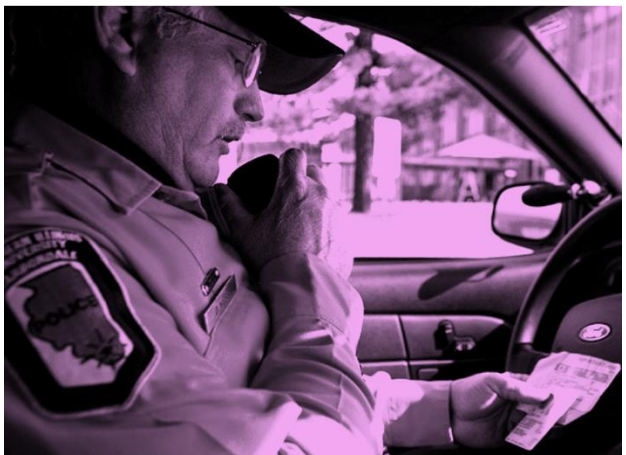


EXECUTIVE SUMMARY

One of the most important goals in planning and maintaining transportation infrastructure is safety. Every motorist in Illinois depends on safe roadways, but fatalities and serious injuries are far too common. This report by the Illinois Economic Policy Institute examines current fatality and injury rates in Illinois, the most prevalent types of crashes, and the broader economic costs attributed to motor vehicle crashes.

Safety remains one of the most important transportation issues in Illinois.

- In 2016, there were 1,078 fatalities from motor vehicle crashes on Illinois roadways.
- In 2016, Illinois saw over 324,400 crashes involving motor vehicles, resulting in 66,703 injuries.
- While the number of fatalities decreased between 2007 and 2009 – 1,248 to 911 – they have generally increased since, reaching 1,078 in 2016.

Beyond the pain and personal costs endured by directly-affected individuals, motor vehicle crashes also impose widespread costs to the economy and society on the whole.

- Increased medical costs are borne by society in the form of higher insurance premiums and diversions of medical resources away from other needs.
- Due to an increase in demand for emergency medical services, state and local governments require additional resources to accommodate the needs of motor vehicle crashes.
- Both the state and individual households suffer from foregone productivity as a result of a person experiencing a debilitating injury or fatality.
- Motor vehicle crash related workplace absences increase costs associated with retraining new employees, overtime expenditures, and administrative expenses that accompany personnel changes.
- In Illinois, the total economic cost of fatalities and injuries related to motor vehicle crashes in 2016 is estimated to be $3.8 billion.

Additional infrastructure investment can help reduce the frequency and severity of fatal and serious motor vehicle crashes.

- Roadway departures and intersection related crashes produce the most fatal and serious injury crashes in Illinois and are most effectively addressed through engineering improvements.
- 78% of roadway departure fatalities and serious injuries in Illinois were on undivided roadways or divided roadways without median barriers, which could be addressed by adding rumble strips and median barriers.
- 68% of fatalities and serious injuries at intersection related crashes involved two vehicles, which could be improved by eliminating certain vehicle interactions by installing roundabouts, J-turns, and median U-turns.
- Other treatments like the paving of shoulders, redesigning curves, or constructing grade separation at major intersections and railroads can help Illinois address roadway safety issues.

A safe and efficient roadway system not only saves lives and prevents injuries, it also reduces the economic drain of medical, emergency, insurance, and other crash-related costs. Improvements can be made, and policymakers should carefully consider the benefits of addressing safety when contemplating adequate infrastructure investment.

INTRODUCTION

One of the most important goals in planning and maintaining transportation infrastructure is safety. Every motorist in Illinois depends on safe roadways to travel on, but fatalities and serious injuries are far too common.

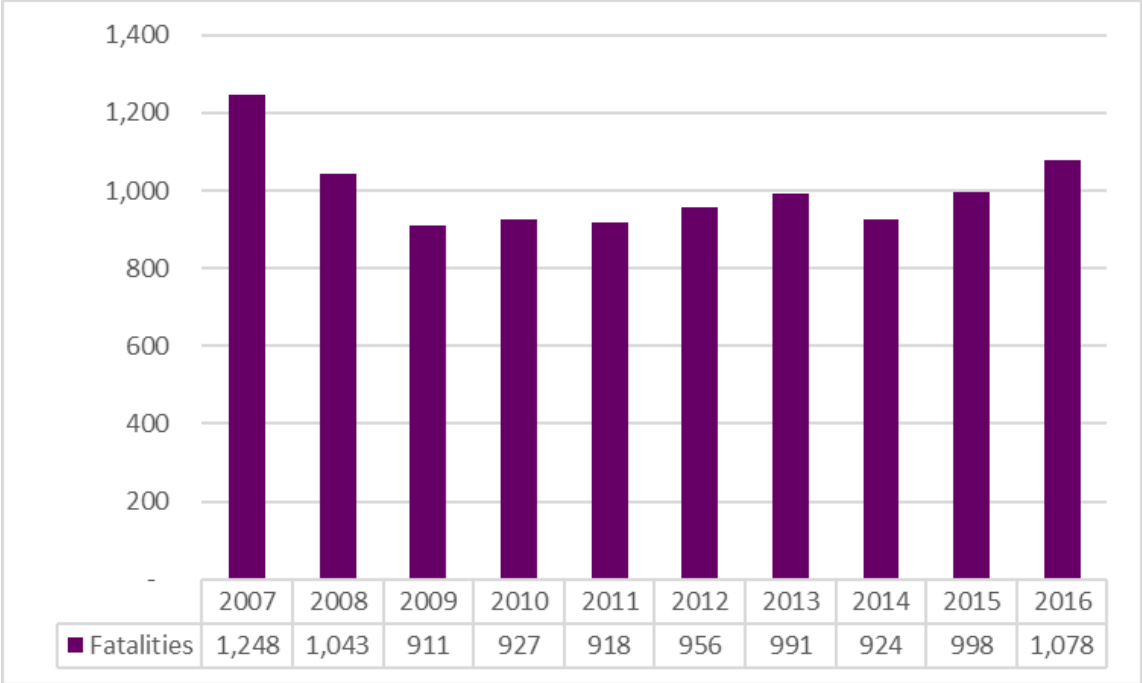
In 2016, there were 1,078 fatalities from motor vehicle crashes on Illinois roadways. Overall, the state saw over 324,400 crashes involving motor vehicles, resulting in 66,703 injuries (IDOT, 2018). Nationwide, motor vehicle crashes ranked 13th among leading causes of death in 2015. They fall within the top 10 leading causes of death for age groups ranging from infant to age 64, and are the leading cause of death for people within the 8-15, 16-20, and 21-24 age groups (NHTSA, 2018).

Ultimately, the goal should be zero fatalities on Illinois' roadways. Safety remains one of the most important reasons to address the existing transportation funding shortfall that currently exists in Illinois (Craighead, 2018).

Safety issues and vehicle crashes, however, cannot be entirely avoided solely by increased investment, with human error still playing a key role. However, the question remains: how many crashes could have been avoided if additional safety measures were implemented?

MOTOR VEHICLE CRASHES IN ILLINOIS

Figure 1: Fatalities in Illinois, 2007-2016



Source(s): IDOT, 2017; IDOT, 2019

Over 12,700 fatal and serious injuries occurred on state and local roadways from vehicle crashes in 2016 (IDOT, 2019). Looking at the last decade, this was a decrease of approximately 4,400 fatalities and serious injuries compared to 2007 – likely due to safer vehicle designs and more prevalent use of seatbelts statewide. However, this decrease has not been sustained. As illustrated in Figure 1, while the number

of fatalities decreased between 2007 and 2009, they have generally increased since, reaching 1,078 in 2016. There is still more work to be done.

THE ECONOMIC COSTS OF CRASHES

While it is essential to recognize the human toll of motor vehicle crashes, it is also important to understand the overall economic costs. One crash will impact not only the immediate family of a victim, but the broader economy and society on the whole. In order to understand the significant economic impact of roadway safety, detailed analyses have been performed to determine the costs of different types of crashes. The following section summarizes the economic costs of motor vehicle crashes in Illinois, as developed in two different reports on the topic.

Estimating Nationwide Costs

A 2015 report, *The Economic and Societal Impact Of Motor Vehicle Crashes, 2010 (Revised)*, by the National Highway Traffic Safety Administration, estimated nationwide economic costs to be over $242 billion, taking into account the lifetime economic costs for 32,999 fatalities, 3.9 million non-fatal injuries, and 24 million damaged vehicles (Blincoe et al., 2015). This widely-used report performed a detailed analysis of different types of motor vehicle crashes, considering the severity of the crash and injuries, to compute overall economic costs.

The components of the total cost assessments include productivity losses, property damage, medical expenses, rehabilitation, increased traffic congestion, legal and court costs, emergency services, insurance administration costs, and the costs to employers. Additionally, while the most obvious costs from motor vehicle crashes are carried by those personally impacted, it is important to also understand the greater, societal consequences (Blincoe et al., 2015).

- Medical Care: Primarily, medical care costs impact the individual requiring care, in the form of payments for insurance, deductibles for uncovered costs, and uninsured expenses. However, they are also borne by society on the whole, as a result of higher insurance premiums and diversions of medical resources away from other needs, such as medical research and disease prevention and control.
- Emergency Services: Motor vehicle crashes increase demands on emergency medical services, including incident management, fire, and police services. As a result, state and local governments require additional resources to accommodate these needs.
- Market Productivity: The state on the whole suffers from foregone productivity when a person experiences a debilitating injury or fatality. Also, additional funds for public programs are often necessary to support the victim or their dependents.
- Household Productivity: As result of a debilitating injury or fatality, a person's household suffers from loss of income.
- Workplace Costs: Due to an employee's absence, a workplace is disrupted, increasing costs associated with retraining new employees, overtime required to perform the work of the injured employee, and administrative expenses that accompany personnel changes.
- Congestion: Motor vehicle crashes result in delays to other motorists, inconvenienced by lane closures, emergency services activity, and general slowdowns. Additionally, congestion can result in wasted fuel, increased greenhouse gas emissions, and increased pollution as motorists are

caught in slowed traffic. Economically, congestion is measured by the value of time lost, wasted fuel, and pollution costs due to delay.

Estimating Costs by State

Building off of this analysis, a tool – the Motor Vehicle Prioritizing Interventions and Cost Calculator for States (MV PICCS0) – was developed by the Centers for Disease Control (CDC) to estimate total economic costs of motor vehicle crashes by state and potential intervention measures to aid in preventing fatalities and injuries. This tool uses the data developed by the National Highway Traffic Safety Administration, with slight updates to tailor costs to each state. Specifically, the per-life and per-injury costs were adjusted for inflation to 2017 dollars and to account for state-level variation. State-specific adjustments were made to the market productivity, household productivity, and medical costs (Ecola et al., 2018). In Illinois, it is estimated that the value of preventing an injury is $22,292 and the value of saving a life is $1.6 million on average (Ecola et al., 2018).

Estimating Costs in Illinois

The total economic costs of fatalities and injuries related to motor vehicle crashes in Illinois can be estimated using the updated state-specific values developed by the CDC. Looking specifically at 2016, total economic costs in Illinois due to fatalities and injuries can be estimated at $3.8 billion. Of that, over $1.7 billion alone can be attributed to the 1,078 fatalities.

Figure 2: Economic Cost of Fatalities and Injuries from Motor Vehicle Crashes in Illinois, 2016 (2017$)

	Number	Cost Per	Total
Fatalities	1,078	$1,592,000	$1,716,176,000
All Injuries	93,160	$22,292	$2,076,722,720
TOTAL			$3,792,898,720

Source(s): IDOT, 2019 (number); Ecola, et al., 2018 (cost per)

It is important to note that these estimates reflect average costs per fatality or injury and do not account for severity. Some injuries may be fairly minor, leading to minimal costs and impacts. However, other injuries may be life-threatening and take an extended period of time for an individual to recover, or may cause permanent harm and costs. While these variations are not accounted for in the above calculations, the average is an appropriate method for estimating statewide economic impacts.

POTENTIAL IMPROVEMENTS

Understanding the significant impacts of motor vehicle crashes, both in terms of lives and economic costs, state policymakers and transportation officials should strive to reduce the number and severity of crashes. A variety of strategies – including engineering, education, and enforcement – may be implemented to improve safety conditions. The following section examines the types of crashes observed in Illinois and best strategies to address potential safety issues contributing to them.

IDOT completed a Strategic Highway Safety Plan in 2017 to understand the broader issues contributing to crashes that led to fatalities and serious injuries and develop a framework to reduce them. This plan analyzed all crashes that led to fatalities and serious injuries between 2010 and 2014. As summarized in Figure 3, 14 different contributing factors were identified.

Most significantly, roadway departures were the most common type of fatal crash and the second most observed type of serious injury crash. These crashes include any that involve a vehicle crossing an edge line, centerline, or otherwise leaves the travel lane. Intersection related crashes are another serious concern, ranking forth in fatalities and first in serious injuries. Speeding and impaired driver crashes are also significant – with fatal crashes reaching 2,088 and 1,108, respectively, over five years (Figure 2).

Figure 3: Types of Crashes that Caused Fatalities and Serious Injuries in Illinois, 2010-2014

Type of Crash	Fatalities	Serious Injuries	Fatalities & Serious Injuries
Roadway Departure	2,483	19,279	21,762
Impaired Driver	2,088	8,331	10,419
Unrestrained Occupants	1,377	5,041	6,418
Intersection Related	1,178	26,397	27,575
Speeding/Agressive Driver	1,108	12,884	13,992
Older Driver	848	9,593	10,441
Young Driver	694	12,240	12,934
Motorcycle	694	5,271	5,965
Heavy Vehicle	672	4,426	5,098
Pedestrian	641	4,525	5,166
Pedalcyclist	137	2,047	2,184
Work Zone	133	980	1,113
Distracted/Fatigued/Drowsy Driver	123	3,264	3,387
Highway-Railroad Grade Crossings	45	54	99

*It is important to note that these numbers cannot be totaled to represent total fatalities or total serious injuries; these numbers are representing different types of crashes that caused a fatality or injury, however each particular crash can be classified under two or more types. For example, one particular crash may have been a roadway departure and involved speeding and a young driver.

Source(s): IDOT, 2017

Figure 4: Potential Infrastructure Improvements to Address Safety Issues

ROADWAY DESIGN	SIGNAGE, LIGHTING, AND OTHER SAFETY FEATURES
Widen/pave shoulders	Intersection signage
Improve geometry for curves	Dynamic message signs for delays
Slopes and ditches to prevent rollovers	Intersection lighting
Intersection geometry and skew of the road	Intersection advance warning devices
Left- and right-turn channelization and storage	Intersection signal placements
Access management	Guardrails that pass crashworthy tests
New/inventive intersection designs	Highway-railroad crossing improvements
Enhanced shoulders for sharp curves	
Grade separations at railroads	
OPERATIONS	**PAVEMENT UPGRADES**
Address bottlenecks and improve traffic flow	Rumble strips
Reduce delays	Enhanced pavement markings
Improve signal timing	Skid resistance pavements
	Intersection pavement friction

Source: IDOT, 2017

IDOT's Strategic Highway Safety Plan also identifies specific treatments to improve safety and reduce the number of fatal and serious motor vehicle crashes. While enforcement and education are important strategies when addressing many crash types, in reference to the most deadly and serious motor vehicle crashes – roadway departure and intersection related – engineering strategies are the most effective solution. As a result, only infrastructure improvements will be discussed in this section. These specific improvements have been consolidated and summarized in Figure 4. They include a range of strategies, from roadway design, pavement upgrades, and operations to signage, lighting, and other installments.

Roadway design encompasses treatments that actually change the existing design, either through paving shoulders, redesigning curves or the alignment of intersections, or constructing grade separation at major intersections and railroads. Pavement upgrades refer to specific treatments that can be added to improve safety, including rumble strips, enhanced pavement markings, or improved pavement to create friction or resistance skids. Signage, lighting, and other safety features, like dynamic messaging or guardrails, are added improvements to existing roads and intersections that improve a driver's understanding of what to expect and enhance visibility. Lastly, operational improvements largely seek to improve traffic flow and movements. While specific treatments beyond general suggestions to minimize bottlenecks and improve signal timing are not offered, the identification of operational improvements overall provides additional reasons congestion should be addressed on Illinois roadways.

These treatments can be specifically applied to different crash types, addressing defined risk factors. For example, 78% of roadway departure fatalities and serious injuries were on undivided roadways or divided roadways without median barriers. This can be addressed by simple treatments like rumble strips and median barriers. Approximately half the roadway departure crashes also happened at night, and 59% occurred in darkness without roadway lighting. The installation of lighting could reduce these incidents. Other treatments like the widening and paving of shoulders, installation of guardrails, and evaluating pavement and skid resistance could also help keep cars on the road (IDOT, 2017).

Intersection related crashes – the second most problematic crash type – could be addressed by improving geometry and intersection lines of sight. Approximately 39% of all two-vehicle intersection related fatalities and serious injuries were attributed to angle crashes and could potentially be reduced with these improvements. Additionally, different intersection designs – like roundabouts, J-turns, and median U-turns – can eliminate certain vehicle interactions, reducing the potential or severity of crashes. As 68% of fatalities and serious injuries were caused by two-vehicle crashes, these improvements would go a long way towards addressing these issues. The addition of left- and right-turn lanes and improved lighting and signage can also improve general visibility in order to reduce the number of crashes (IDOT, 2017).

Overall, this list is not meant to be comprehensive, nor does it suggest that these improvements must be made on every roadway or at every intersection. It is meant to convey the simplicity of some treatments that can be used to prevent deadly, costly motor vehicle crashes. Expanded education and enforcement should also continue to be pursued.

CONCLUSION

Every motorist in Illinois relies on a safe and efficient transportation system. Not only does a safe roadway save lives and prevent injuries, it also saves in overall economic costs incurred due to medical, emergency, insurance, and a variety of other costs. Improvements can be made, and policymakers should carefully consider the benefits of addressing safety when contemplating infrastructure investment.

From the installation of center medians that address roadway departures to reconstruction that eliminates conflicts at both intersections and railroad crossings, a variety of tactics can be employed to improve safety. Even a reduction in delays, by addressing bottlenecks and congestion, can reduce aggressive driver related crashes. However, while improvements are feasible, they are not always possible without adequate funding.

There is no one-size-fits-all method to cure safety issues on Illinois roadways. Although this report has primarily focused on engineering and infrastructure improvements, education and enforcement also play important roles. Ultimately, far too many people are being killed or seriously injured on Illinois roadways. Transportation safety is a matter of life and death, and it must be thoughtfully considered at all levels of government.

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