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Status Report

Insurance Institute for Highway Safety | Highway Loss Data Institute

On foot, at risk

Study highlights rising pedestrian deaths, points toward solutions

ALSO IN THIS ISSUE

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- ▶ Subaru crash avoidance system cuts pedestrian crashes
- ▶ Michigan sees higher insurance payouts for motorcyclist injuries

The March crash of an Uber vehicle that killed a woman in Tempe, Arizona, was unusual for involving a self-driving vehicle. But in other ways, it was typical of fatal pedestrian crashes: an SUV traveling on an urban arterial road struck a person crossing midblock in the dark.

Pedestrian deaths have jumped 46 percent since reaching their lowest point in 2009, as pedestrian crashes have become both deadlier and more frequent. The increase has been mostly in urban or suburban areas, at nonintersections, on arterials — busy roads designed mainly to funnel vehicle traffic toward freeways — and in the dark, a new IIHS study shows. Crashes were increasingly likely to involve SUVs and high-horsepower vehicles.

“Understanding where, when and how these additional pedestrian crashes are happening can point the way to solutions,” says IIHS President David Harkey. “This analysis tells us that improvements in road design, vehicle design and lighting and speed limit enforcement all have a role to play in addressing the issue.”

A total of 5,987 pedestrians were killed in crashes in 2016, accounting for 16 percent of all crash fatalities. The number of pedestrians killed each year has declined 20 percent since 1975, but the 2016 toll was the highest since 1990.

For the new study, IIHS researchers looked at pedestrian crash trends during 2009–16 to pinpoint the circumstances under which the largest increases occurred. Using federal fatality data and crash numbers, the researchers looked at roadway, environmental, personal and vehicle factors to see

Pedestrian crashes have become both deadlier and more frequent. The increase has been mostly in urban or suburban areas, away from intersections, on busy main roads and in the dark. Crashes are increasingly likely to involve SUVs and high-horsepower vehicles.

how they changed over the study period. They also looked at changes in the number of pedestrian deaths relative to the number of pedestrians involved in crashes.

The researchers found that not only did pedestrian crashes increase, they also became deadlier. Deaths per 100 crash involvements increased 29 percent from 2010, when they reached their lowest point, to 2015, the most recent year that data on all crashes, including nonfatal ones, were available.

From 2009 to 2016, the largest increases in pedestrian deaths occurred under the circumstances that historically have seen the highest numbers of pedestrian fatalities. Pedestrian deaths increased 54 percent in urban areas, which include both cities and what most people consider suburbs. They also increased 67 percent on arterials, 50 percent at nonintersections and 56 percent in the dark.

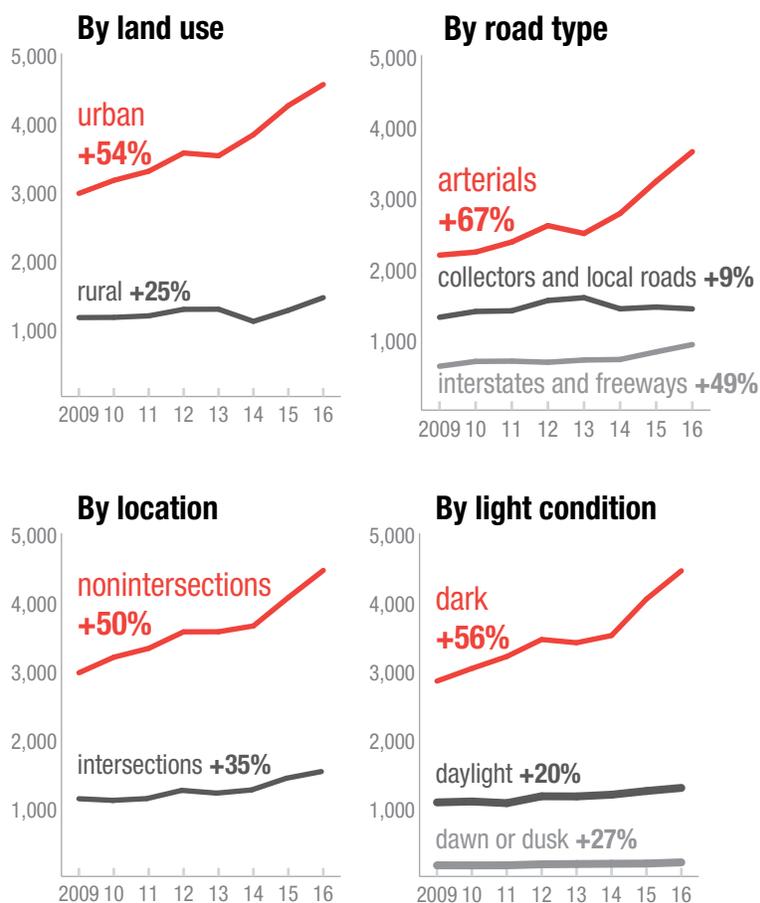
Although pedestrian crashes most frequently involved cars, fatal single-vehicle crashes involving SUVs increased 81 percent, more than any other type of vehicle. The power of passenger vehicles involved in fatal single-vehicle pedestrian crashes, as measured by the ratio of horsepower to weight, also increased, with larger increases at the top of the scale.





Pedestrian deaths

2009–16



Among age groups, the largest increase in pedestrian fatalities per population was for people ages 20–69.

Designing roads for pedestrians

The large increase in pedestrian deaths on arterials isn't surprising. These roads often have a shortage of convenient and safe crossing locations.

“When people are forced to walk long distances to the nearest signalized intersection, they are more likely to choose the riskier option of sprinting across multiple lanes of traffic,” Harkey says. “Communities can improve safety by providing more options to safely cross.”

But, Harkey warns, it's not enough to simply paint more crosswalks on the pavement. Midblock crossings need features that alert drivers to stop, such as pedestrian-activated beacons.

One example is the pedestrian hybrid beacon, which stays dark until a pedestrian pushes a button, at which point it flashes yellow, and then moves to solid yellow before activating two solid red lights. This type of beacon, formerly known as a HAWK, has been shown to reduce crashes (see *Status Report*, Sept. 28, 2010, at iihs.org).

Other improvements, such as curb extensions or median crossing islands, can shorten the distance people must walk across or



A woman crosses at a pedestrian hybrid beacon in Arlington, Virginia. The beacon remains dark until a pedestrian activates it. First, it flashes yellow before moving to solid yellow and then to solid double red.

allow them to traverse just a couple of lanes and a single direction of traffic at a time.

Adding sidewalks is an obvious way to reduce the risk to pedestrians walking along a road.

These elements can be part of broader reconfigurations known as road diets, in which the number of travel lanes for vehicle traffic is reduced. In addition to reducing the number of lanes for pedestrians to cross and sometimes providing room for bike lanes, road diets have been shown to lower vehicle speeds.

“Good design should prioritize the safety of all road users,” Harkey says. “It’s possible to improve streets for pedestrians while still allowing vehicle traffic to get where it needs to go.”

Reining in speed increases

Of course, allowing vehicles to get where they need to go doesn’t mean they need to go quite as fast as people are used to.

Faster speeds make for more frequent and deadlier crashes. The faster a car is moving, the less time the driver has to see a pedestrian and slow or stop. Higher impact speeds also result in more injurious crashes.

Reliable information on vehicle speeds is not available in fatality data, but IIHS researchers did find that the vehicles involved in fatal pedestrian crashes, like the overall vehicle fleet, are increasingly powerful. Previous IIHS research has shown that vehicles with higher horsepower-to-weight ratios tend to be driven faster and are more likely to violate posted speed limits (see *Status Report*, May 24, 2016).

Despite the dangers of high speeds, the story of speed limits in recent decades has been one of continual increases.

In addition to lower speed limits, broader use of speed cameras to enforce existing

limits is a proven solution. Institute research has shown that automated speed enforcement reduces speed limit violations and injury crashes (see *Status Report*, Oct. 1, 2015).

Improving vehicles

Some risks to pedestrians could be lessened by making changes to vehicles.

A large majority of pedestrian fatalities occur in the dark, and that number increased much faster than the number of pedestrians killed in other light conditions. In 2016, 4,453 pedestrians were killed in the dark, compared with 1,290 in daylight and 205 at dawn or dusk.

Although better street lighting may be needed in some locations, another obvious solution is better headlights. IIHS has been working to encourage improvements in this area through its headlight rating program, launched in 2016. Headlights have been gradually improving. In the 2016 model year, there were just two models with available good-rated headlights. So far for the 2018 model year, there are 26 good headlight packages.

Vehicles with front crash prevention systems that recognize pedestrians also would help — particularly if they are designed to work in low light. A recent HLDI analysis found that Subaru vehicles equipped with pedestrian detection had claim rates for pedestrian injuries that were 35 percent lower than the same vehicles without the system (see adjacent sidebar).

Finally, vehicle design changes could help lessen the severity of crashes, especially when it comes to SUVs. These make up an increasingly large percentage of registered vehicles, and previous studies have found that SUVs, pickups and vans are associated with higher risks of pedestrian deaths or severe injuries to pedestrians. Such vehicles have higher and often more vertical front ends than cars and are more likely to strike a pedestrian in the head or chest. Changes in the front-end design of these vehicles could help lessen the severity of injuries when they strike pedestrians (see *Status Report*, Dec. 30, 2013).

For a copy of “An examination of the increases in pedestrian motor vehicle crash fatalities during 2009–16” by W. Hu and J.B. Cicchino, email publications@iihs.org. ■



Subaru crash avoidance system cuts pedestrian crashes

Front crash prevention systems are known to reduce crashes with other vehicles (see *Status Report*, Jan. 28, 2016, at iihs.org). At least one system is also preventing vehicles from striking pedestrians, a new HLDI analysis shows.

Subaru's EyeSight performs several functions, including forward collision warning, automatic emergency braking, adaptive cruise control, lane departure warning and lead vehicle start alert. It also includes pedestrian detection, enabling the system to brake automatically for pedestrians in addition to other vehicles. The system relies on two cameras mounted to the interior roof behind the windshield, a set-up that leads to lower repair costs than other front crash prevention systems that rely on equipment embedded in the vehicle exterior.

The new study found that EyeSight cut the rate of likely pedestrian-related insurance claims by 35 percent.

"The data clearly show that EyeSight is eliminating many crashes, including

pedestrian crashes," says HLDI Senior Vice President Matt Moore.

To study the system's effect on pedestrian crashes, analysts looked at bodily injury liability claims that lacked an associated claim for vehicle damage. Past HLDI investigations have found that such claims tend to represent injured pedestrians or cyclists. They compared the rate of these claims per insured vehicle year for Subaru vehicles with EyeSight, compared with the rate for the same models without the optional system.

The first generation of EyeSight, which used black and white cameras, was available in the U.S. on the 2013–14 Legacy and Outback and the 2014–16 Forester. The second generation, introduced on the Legacy and Outback in 2015 and on the Forester in 2017, uses color cameras and has longer and wider detection ranges and other improvements.

EyeSight was offered for the first time on the Crosstrek and the Impreza sedan and hatchback in 2015. Only the second-generation system was offered on these vehicles.

A HLDI analysis shows that Subaru EyeSight cuts the rate of likely pedestrian-related insurance claims by 35 percent.

Today, all models except the BRZ are available with EyeSight.

Looking at the Legacy, Outback, Forester, Crosstrek and Impreza individually, HLDI found reductions in claim frequency for each of them, though only the results for the Legacy and Outback were statistically significant.

HLDI also separated out first-generation and second-generation results for the Legacy, Outback and Forester. The first-generation system reduced claim frequency 33 percent, while the second-generation system lowered it 41 percent.

"Subaru has taken a good system and made it even better," Moore says. "It's great to see the company moving quickly to deploy the technology through its fleet."

For a copy of the HLDI Bulletin Vol. 34, No. 39, email publications@iihs.org. ■



Insurance payouts still rising for motorcyclist injuries under Michigan's weak helmet law

It's springtime in Michigan, and that means motorcyclists will be pulling their bikes out of storage and, in many cases, hitting the road without a helmet. Six years after the state weakened its helmet use law to exempt most riders, a new HLDI analysis indicates that the average insurance payment for injuries to motorcyclists in crashes has risen by 40 percent, compared with losses in nearby control states.

May marks the start of the seventh riding season in Michigan since lawmakers relaxed the motorcycle helmet law to cover only riders younger than 21. Motorcyclists 21 and older may ride without a helmet if they have either passed a motorcycle safety course or have held the motorcycle endorsement on their driver's license for at least two years. In addition, riders who choose not to wear helmets must have at least \$20,000 in medical payment coverage and higher coverage for any passengers who ride unhelmeted, too. More motorcyclists are opting for the higher policy limits since the law change, HLDI has found.

This is HLDI's third look at the effects of Michigan's partial helmet law repeal. A 2013 HLDI analysis found that the average insurance payment on a motorcycle injury claim rose 22 percent in Michigan after the helmet law change took effect (see *Status Report*, May 30, 2013, at ihs.org). The analysis controlled for policy limits to account for the new medical payment insurance requirement. HLDI updated the study in 2016 to add three more years of loss data and found a 37 percent increase in insurance losses. The latest study adds a fifth year of data to cover the 2010–16 May-to-September riding seasons.

HLDI examines motorcycle insurance loss data under collision and medical payment, or MedPay, coverages. Motorcycle collision coverage insures against physical damage to a motorcycle in a crash when the rider is at fault. MedPay covers injuries sustained by the motorcycle operator.

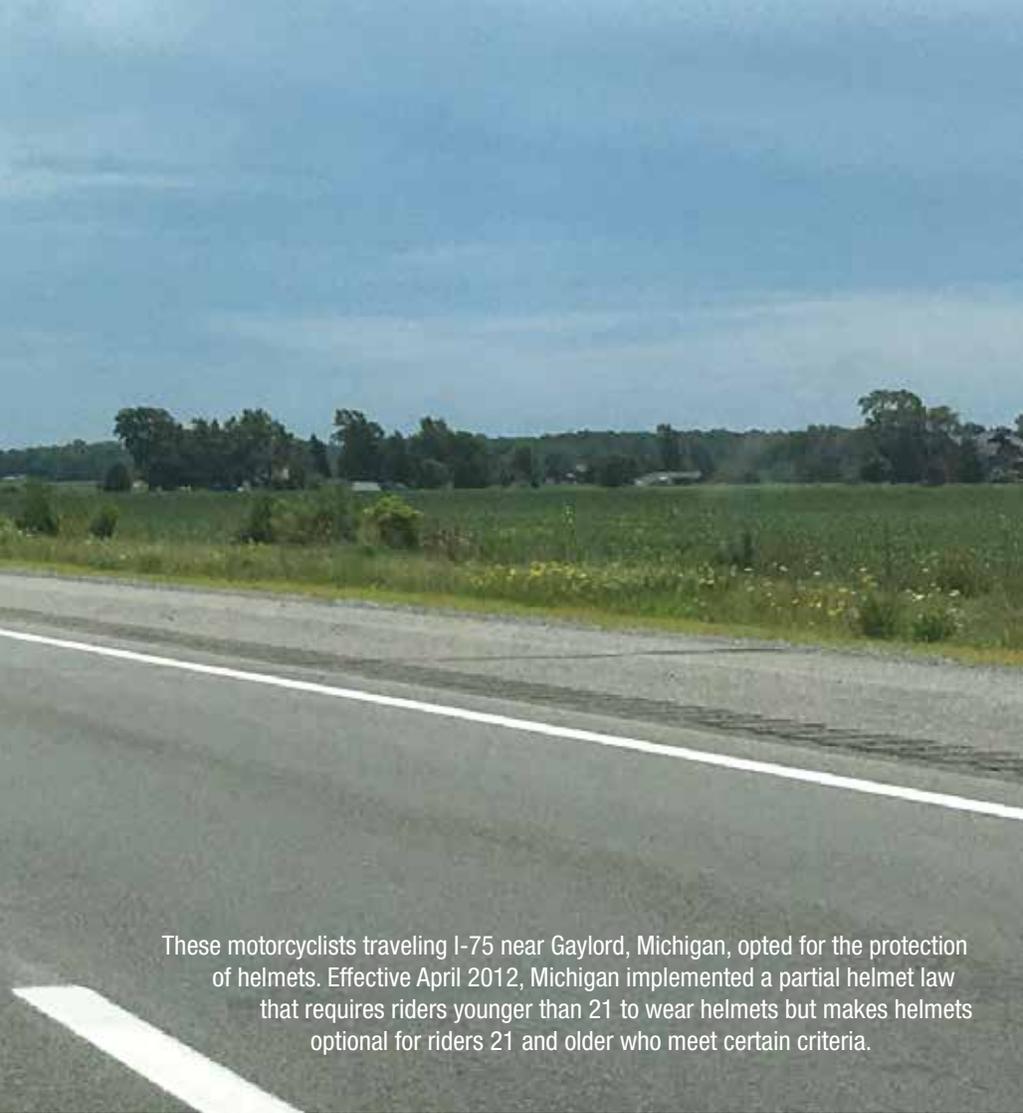
Insurance losses are measured as claim frequency, claim severity and overall losses. Claim frequency is the number of claims

for a group of vehicles divided by the exposure for that group, expressed in the study as claims per 1,000 insured vehicle years. An insured vehicle year is one vehicle insured for one year, two vehicles insured for six months each. Claim severity is the average loss payment per claim.

For all three analyses, Illinois, Indiana, Ohio and Wisconsin were used as control states because their laws on helmet use didn't change during the period. Analysts controlled for motorcycle age and class, rider demographic factors, geographic factors and weather. They also controlled for insurance policy limits for MedPay coverage.

A separate analysis that didn't take into account policy limits found that MedPay claim severity was 68 percent higher in Michigan after the law change, compared with the control states.

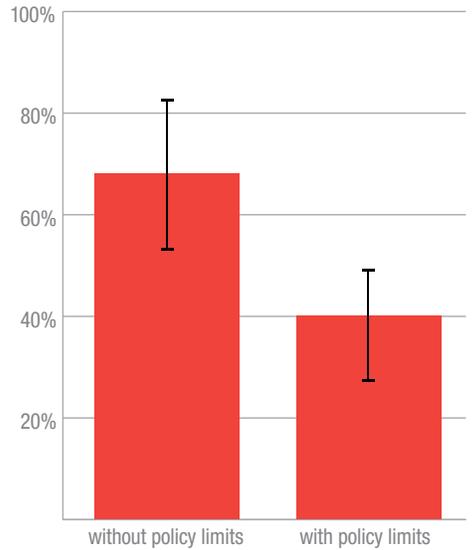
"With each year, the evidence against Michigan's weakened motorcycle helmet use law continues to mount," says Matt Moore, senior vice president of HLDI. "If lawmakers in Lansing are committed to the



These motorcyclists traveling I-75 near Gaylord, Michigan, opted for the protection of helmets. Effective April 2012, Michigan implemented a partial helmet law that requires riders younger than 21 to wear helmets but makes helmets optional for riders 21 and older who meet certain criteria.

Estimated increase in medical payment claim severity after Michigan helmet law change

Michigan vs. control states, 2010–16



Michigan motorcyclists 21 and older who ride bareheaded must carry at least \$20,000 in medical payment coverage. The average payout under MedPay rose 68 percent after the law change, compared with the control states. Adjusting for the policy limits, the average payout rose 40 percent.



Wolverine state’s ‘Toward Zero Deaths’ goal, requiring all motorcyclists to wear helmets is one proven way to save lives.”

HLDI data don’t include information on the type of injury or where a crash occurred. In this analysis, Michigan crashes are crashes of motorcycles insured and garaged in the state. Likewise, the control-state crashes are

only crashes of motorcycles insured and garaged in those states. There also is no way to know how many of the claims involved unhelmeted motorcyclists.

Weakening Michigan’s helmet law also has been associated with increases in the number of head injuries among hospitalized trauma patients and the proportion of

injured riders with skull fractures, a 2016 study by IIHS and the University of Michigan found (see *Status Report*, Sept. 1, 2016). A separate study published in *The American Journal of Surgery* in 2016 found that the average acute care cost of unhelmeted riders at a single Michigan trauma center was nearly \$28,000, 32 percent higher than for helmeted riders. What is more, the Spectrum Health Butterworth Hospital study found that 10 percent of riders involved in a crash who weren’t wearing helmets died, compared with 3 percent of riders involved in a crash who wore helmets.

Michigan is one of 28 states that have helmet laws covering only some riders, usually those under 18. Illinois, Iowa and New Hampshire have no helmet requirements. Only 19 states and the District of Columbia require helmets for all motorcyclists.

The National Highway Traffic Safety Administration estimates that helmets cut the risk of a motorcycle fatality by 37 percent.

For a copy of the HLDI Bulletin Vol. 34, No. 36, email publications@iihs.org. ■

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Inquiries/print subscriptions:
StatusReport@iihs.org

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Editor: Kim Stewart
Writer: Sarah Karush
Art Director: Steve Ewens
Photographers: Steve Ewens,
Craig Garrett, Dan Purdy, Kim Stewart

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IIHS is an independent, nonprofit scientific and educational organization dedicated to reducing the losses — deaths, injuries and property damage — from motor vehicle crashes.

HLDI shares and supports this mission through scientific studies of insurance data representing the human and economic losses resulting from the ownership and operation of different types of vehicles and by publishing insurance loss results by vehicle make and model.

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