



WHITE PAPER | SEPTEMBER 2022

# Reducing Roadway Fatalities: Implementing a Proven Strategy with Safety Inspection & Maintenance Programs



## Executive Summary

In 2020, roadway fatalities were one of the leading causes of death in the United States. But what if you knew you could reduce the loss of lives by implementing one strategy? Federal and state governments have regulated vehicle safety through seatbelt laws and new vehicle standards and by setting the precedent for the implementation of safety inspection and maintenance (I/M) programs. Fourteen states in America have already implemented I/M programs, and the result is clear. States who have these programs in place experience a 5.5% reduction in fatalities.<sup>1</sup>

### Implementing Inspection & Maintenance Programs: A Birds-Eye View

An officer pulls up to the scene of a fatal vehicle crash. Some of the officer's immediate goals are to provide assistance, clear the roadway, and help traffic move along. The officer must also make a report, which will be submitted to the National Highway Traffic Safety Administration (NHTSA). The officer notes that the vehicle's brakes failed, causing the crash. This fatality will be added to the 6.5 million roadway crashes occurring annually in the United States, costing upward of \$240 billion. Unfortunately,

it will also be one of the approximately 30,000 fatal vehicle crashes in the U.S. each year.

What if two weeks before, the driver had been required to stop in for a safety and maintenance inspection and the vehicle did not pass because the brakes were worn and needed to be replaced? And, instead of continuing to operate an unsafe vehicle, the driver had made the repairs in order to pass the inspection? The crash would not have occurred because of the state's safety inspection and maintenance program.

## The Data

States submit data to the NHTSA, detailing every vehicle crash that results in at least one fatality. This data informs regulations and long-term policy in Congress and the U.S. Department of Transportation. Since the 1970s, there have been studies made on the effectiveness of I/M programs, utilizing this data. But, typically, studies model only a subset of states or cover a relatively short time (five to fifteen years). These studies are insufficient to support current considerations of I/M programs. At the conclusion of a far more robust study conducted by Carnegie Mellon University, taking a more holistic approach yields results that are increasingly applicable toward the originally intended goal. This study provides vital information needed, as jurisdictions seek to make policy decisions about I/M programs.

Comprehensively examining fatal-crash data from all 50 states and the District of Columbia over 44 years, the average reduction in fatality rates between 1980 and 2017, in comparison to states without I/M programs in place, showed a reduction in fatalities by 5.5% per 100,000 registered vehicles (95% CI: 0.4% to 10.6%). The results of this study provide ample evidence that the presence of an active I/M program for passenger vehicles is directly correlated with lower crash-fatality rates. Additionally, some other studies suggest similar results for nonfatal vehicle crashes when an I/M program is in place.

## Developing Automotive Technology Demands Increases in Safety Requirements

Data suggests that the mean age of vehicles involved in crashes was found to be positively correlated with the fatality rate. This is supported by a study showing that “occupants of older vehicles are more likely to be fatally injured.”<sup>ii</sup> Inspection of vehicles becomes increasingly imperative for older vehicles, but we would also press that inspections are imperative for newer vehicles as well.

Safety inspection and maintenance programs could become even more necessary with the increasing prevalence of advanced driver-assistance systems and autonomous vehicle technology. A driver may not know, or be aware, of a system failure before that failure becomes an imminent threat. However, regular

inspections and maintenance can catch a system failure before it becomes the cause of a crash. Internationally, safety inspections have already been adopted to include testing and calibrating these systems, but the U.S. lags in adopting these programs across the board. The majority of Europe requires periodic technical inspections of all passenger vehicles. Adoption and implementation of safety inspection and maintenance programs would save lives while ensuring that the U.S. remains up to date on current best practices in vehicle safety as technology continues to evolve.

## Taking Inspections From Theory Into Practice

Ideally, safety inspection and maintenance programs would require an annual inspection, which would check for compliance to set standards in that jurisdiction. The inspection would identify factors contributing directly to vehicle fatalities as a preventive measure. The inspection might include check for tire-tread depth or worn brakes, as well as the steering, seat belts, turn signals, and head lamps. Failure points would then either be repaired or replaced before passing inspection. As an example, in Texas (which has an I/M program in place), there is a 7.5% to 12.5% failure rate of all passenger vehicles that are tested.<sup>iii</sup> Vehicles that fail inspection are repaired before passing. Requiring inspection identifies those vehicles in need of maintenance, and that requirement, ultimately, reduces the crash-fatality rate.

## Conclusion

Results from Carnegie Mellon University’s comprehensive study affirm that the presence or implementation of safety inspection and maintenance programs are directly related to a reduction in roadway fatalities. If all other states implemented a safety inspection and maintenance program, there could be 5.5% fewer fatalities annually compared to states without an I/M program in place. That would mean 1,400 passengers per year of the United States’ 30,000 annual crash fatalities, would go home to their families, instead of becoming a fatality statistic. Therefore, these programs are effective in mitigating roadway fatalities. Ideally, these programs would be implemented in all 50 states and the District of Columbia, as state and federal legislative bodies recognize a reduction in fatalities as a statistically significant benefit.

### Endnotes:

i Acharya, P. S., AitBihiOuali, L., Matthews, H. S., & Graham, D. J. (2022, January 28). The impact of periodic passenger vehicle safety inspection programs on roadway fatalities: Evidence from U.S. states using panel data. Carnegie Mellon University; Carnegie Mellon University.

ii Martin, Jean-Louis & Lenguerrand, Erik. (2008). A population based estimation of the driver protection provided by passenger cars: France 1996-2005. Accident; analysis and prevention. 40. 1811-21. 10.1016/j.aap.2008.07.001.

iii Murphy, Jiang, Han, et al. (2018) Economic and Safety Considerations: Motor Vehicle Safety Inspections for Passenger Vehicles in Texas. The University of Texas at Austin Center for Transportation Research.