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August 2015

# VEHICLE SAFETY INSPECTIONS

## Improved DOT Communication Could Better Inform State Programs

# GAO Highlights

Highlights of [GAO-15-705](#), a report to the Honorable Claire McCaskill, U.S. Senate

## Why GAO Did This Study

In 2013, an estimated 5.7-million vehicle crashes resulted in approximately 32,700 fatalities and over 2.3-million injuries. One of NHTSA's guidelines to help states optimize the effectiveness of highway safety programs recommends that each state have a program to periodically inspect all registered vehicles to reduce the number of vehicles with conditions that may contribute to crashes or increase the severity of crashes.

GAO was asked to review these state programs and NHTSA's assistance to states. This report assesses: 1) what is known about the safety benefits and costs of operating state vehicle safety inspection programs, 2) challenges that states have faced in operating these programs, and 3) actions NHTSA could take to assist states with these programs. GAO analyzed NHTSA 2009—2013 data and state data for crash trends related to vehicle component failure; reviewed studies that analyzed relationships between safety inspections and outcomes; and interviewed officials in 15 states that have inspection programs. GAO also interviewed officials in 5 states that eliminated their programs since 1990, NHTSA officials, and representatives from safety groups and automotive industry groups.

## What GAO Recommends

DOT should establish a communication channel with states to convey relevant information to state safety inspection officials and respond to their questions. DOT officials reviewed this report and agreed with GAO's recommendation.

View [GAO-15-705](#). For more information, contact Susan Fleming at (202) 512-2834 or [flemings@gao.gov](mailto:flemings@gao.gov).

August 2015

## VEHICLE SAFETY INSPECTIONS

### Improved DOT Communication Could Better Inform State Programs

## What GAO Found

According to officials GAO interviewed from 15 state vehicle safety inspection programs, these programs enhance vehicle safety; however, the benefits and costs of such programs are difficult to quantify. State officials told GAO that inspections help identify vehicles with safety problems and result in repair or removal of unsafe vehicles from the roads. For example, Pennsylvania state data show that in 2014, more than 529,000 vehicles (about 20 percent of vehicles in the state) failed inspection and then underwent repairs to pass. Nationwide, however, estimates derived from data collected by the Department of Transportation's (DOT) National Highway Traffic Safety Administration (NHTSA) show that vehicle component failure is a factor in about 2 to 7 percent of crashes. Given this relatively small percentage as well as other factors—such as implementation or increased enforcement of state traffic safety laws—that could influence crash rates, it is difficult to determine the effect of inspection programs based on crash data. Studies GAO reviewed and GAO's analysis of state data examined the effect of inspection programs on crash rates related to vehicle component failure, but showed no clear influence. Finally, many states do not directly track the costs of operating safety inspection programs because costs may be comingled with other inspection programs, such as emissions.

State safety inspection program officials GAO interviewed primarily cited the oversight of inspection activities and paper-based data systems as challenges they have faced in operating vehicle safety inspection programs. For example, officials in 11 of the 15 states with programs GAO interviewed cited oversight efforts as a challenge, including ensuring that private inspection stations were conducting inspections consistent with program requirements, and officials in 4 of the 15 states also said that paper-based data systems can hinder oversight efforts. To address challenges, some states have taken actions such as implementing more stringent program rules and exploring the development of electronic data systems. Other states have eliminated their inspection programs altogether.

Program officials in all 15 states said that additional information from NHTSA—for example, information related to new vehicle safety technologies—would help in operating their programs. However, there is no designated channel for communication between NHTSA and program officials. Several state officials noted that they would like more information on new technologies such as light-emitting diode (LED) brake lights. State officials also said that it is not clear whether or how to inspect new safety technologies, such as tire pressure monitoring systems, required by NHTSA for new vehicles. Without information, states have implemented different inspection pass-fail criteria or chosen not to include new technologies in their inspections, potentially reducing the safety benefit of their programs. NHTSA officials told GAO they have adopted a hands-off approach to state vehicle inspection programs because the agency devotes its resources primarily to areas that contribute more heavily to crashes, such as driver behavior. However, consistent with NHTSA's mission to assist states in implementing traffic safety programs, improving communication with state officials on vehicle safety issues could help these officials in operating their inspection programs.

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### Abbreviations

AAMVA	American Association of Motor Vehicle Administrators
CI	confidence interval
DOT	Department of Transportation
FARS	Fatality Analysis Reporting System
LED	light-emitting diode
NASS-GES	National Automotive Sampling System General Estimates System
NHTSA	National Highway Traffic Safety Administration

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August 25, 2015

The Honorable Claire McCaskill  
United States Senate

Dear Senator McCaskill:

Driving is one of the riskiest activities in which average Americans engage. In 2013, an estimated 5.7 million motor vehicle crashes resulted in approximately 32,700 fatalities and over 2.3 million injuries.<sup>1</sup> The Department of Transportation's (DOT) National Highway Traffic Safety Administration (NHTSA) was established in 1970 with a mission to save lives, prevent injuries, and reduce the economic costs that result from such crashes.<sup>2</sup> As part of this mission, NHTSA supports state efforts to improve traffic safety and issues guidelines to help states optimize the effectiveness of highway safety programs at the state and local level. One of these guidelines recommends that each state have a program for periodic inspection of all registered vehicles to reduce the number of vehicles with existing or potential conditions that may contribute to crashes or increase the severity of crashes that do occur.<sup>3</sup> Between 1967 and 1976, DOT could withhold a percentage of federal-aid highway funds apportioned to a state that did not implement a periodic motor vehicle inspection program; the mid 1970's was the high-water mark for these programs, with 31 states and the District of Columbia implementing programs. Since 1976, after legislation limited NHTSA's authority to withhold federal-aid highway funding, the number of states with programs has declined. As of July 2015, we found 16 states with periodic inspection programs. You asked us to review state motor vehicle inspection programs and NHTSA's role in assisting these programs.<sup>4</sup> This report

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<sup>1</sup>National Highway Traffic Safety Administration. *Quick Facts 2013*. DOT HS 812 100, December 2014.

<sup>2</sup>Highway Safety Act of 1970, Pub. L. No. 91-605. 84 Stat. 1739 (1970).

<sup>3</sup>National Highway Traffic Safety Administration. *Uniform Guidelines for State Highway Safety Programs. Highway Safety Program Guideline No. 1: Periodic Motor Vehicle Inspection*, DOT HS 812 007A (April 2014).

<sup>4</sup>At the time of the request, Senator McCaskill was the Chair of the Senate Subcommittee on Consumer Protection, Product Safety, and Insurance.

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assesses: 1) what is known about the safety benefits and costs of operating state vehicle safety inspection programs, 2) any challenges that states have faced in operating these programs, and 3) any actions NHTSA could take to assist states with these programs.

For this assessment, we conducted a literature search for studies that analyzed relationships between safety inspections and outcomes, such as crash rates, vehicle component failure, and a vehicle fleet's age. We limited our literature search to articles and reports published after 1990—the last time that GAO conducted a comprehensive literature review on this topic.<sup>5</sup> We identified six studies published from 1992 through 2013 that were relevant to the research objective on the safety benefits and costs of operating state vehicle safety inspection programs and four studies relevant to the research objective on challenges that states face that were sufficiently reliable for the purposes of this report. We analyzed data for crashes related to vehicle component failure in two states before and after program elimination in each of those states and analyzed national data for crash trends related to vehicle component failure using data for 2009—2013 from NHTSA's National Automotive Sampling System General Estimates System (NASS-GES). For each of the data sets, we analyzed the data for possible errors, interviewed relevant officials, and determined the data were sufficiently reliable for the purposes of this report. We reviewed federal and state policy and program documents related to inspection programs. We also reviewed federal and state statutes, regulations, and guidelines. We reviewed Executive Order 13563 on Improving Regulation and Regulatory Review, which provides principles that agencies should follow in establishing regulations.<sup>6</sup> We compared these documents to NHTSA's actions related to state vehicle safety inspection programs. We conducted interviews with officials in 15 of the 16 states that currently have a safety inspection program using a structured set of interview questions.<sup>7</sup> We also interviewed officials in five of six jurisdictions (four states and Washington DC) that eliminated their state vehicle safety inspection program since

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<sup>5</sup>GAO, *Motor Vehicle Safety: NHTSA Should Resume Its Support of State Periodic Inspection Programs*, [GAO/RCED-90-175](#) (Washington, D.C.: July 5, 1990).

<sup>6</sup>Exec. Order. No.13563, 76 Fed. Reg. 3821 (Jan. 21, 2011).

<sup>7</sup>New Hampshire was the only state currently operating a vehicle safety inspection program that did not respond to our request for an interview.

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1990,<sup>8</sup> NHTSA officials, and representatives from safety groups and automotive industry groups. Some states require vehicle inspections that do not fall under the periodic motor vehicle inspection guideline and are therefore not reviewed in this report. For example, states may have required emissions inspections or safety inspections for specific types of vehicles, such as vehicles for-hire, commercial vehicles, and school buses. In some states emissions testing and safety inspections are administered as one inspection program; when this approach is the case, emissions information was incidentally reviewed and noted in this report. See appendix I for more information on our scope and methodology. See appendix II for a list of all of the states that have had a vehicle safety inspection program.

We conducted this performance audit from November 2014 through August 2015 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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## Background

NHTSA's mission is to prevent motor vehicle crashes and reduce injuries, fatalities, and economic losses associated with these crashes. To carry out this mission, NHTSA conducts a range of safety-related activities, including:

- setting vehicle safety standards;
- investigating possible safety defects and taking steps to help ensure that products meet safety standards and are not defective (through recalls if necessary);
- collecting and analyzing data on crashes; and
- providing guidance and other assistance to states to help address traffic safety issues, such as drunk driving and distracted driving.

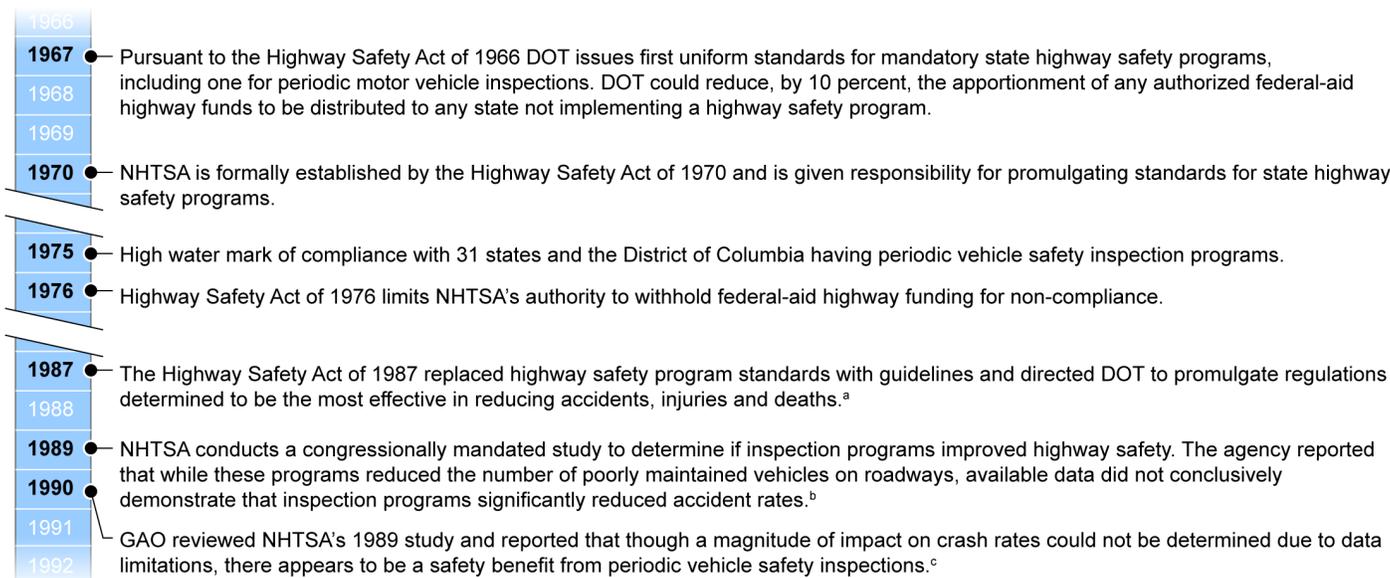
NHTSA also develops uniform guidelines for states' highway safety programs. In the past, these guidelines were referred to as standards,

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<sup>8</sup>Jurisdictions we spoke with and the year they eliminated their programs: Arkansas (1998), Oklahoma (2001), District of Columbia (2009), New Jersey (2010), and Mississippi (2015). South Carolina eliminated its program in 1995 and did not have knowledgeable program officials to speak with us.

and if a state failed to implement these standards, DOT could withhold a percentage of federal-aid highway funds apportioned to the state.<sup>9</sup> As shown in figure 1, this authority changed in 1976 when legislation limited NHTSA's authority to withhold apportioned funds.<sup>10</sup> Since that change, states have been able to choose whether or not to follow the guidelines in developing their highway safety programs.

**Figure 1: History Timeline for State Vehicle Safety Inspection Programs**



Source: GAO analysis. | GAO-15-705

<sup>a</sup>Highway Safety Act of 1987, Pub. L. No. 100-17, Title II, §206, 101 Stat. 132, 221 (1987).

<sup>b</sup>National Highway Traffic Safety Administration. Study of the Effectiveness of State Motor Vehicle Inspection Programs. Final Report. August 1989.

<sup>c</sup>GAO, Motor Vehicle Safety: NHTSA Should Resume Its Support of State Periodic Inspection Programs, [GAO/RCED-90-175](#) (Washington, D.C.: July 5, 1990).

<sup>9</sup>The Highway Safety Act of 1966, Pub. L. No. 89-564, title I, § 402, 80 Stat. 731 (1966) required each state to have a highway safety program in accordance with standards promulgated by DOT and authorized DOT to reduce, by 10 percent, the apportionment of any authorized federal-aid highway funds to be distributed to any state not implementing a highway safety program, unless determined by the Secretary of Transportation that it was not in the public interest,

<sup>10</sup>Pub. L. No. 94-280 § 208 (1976).

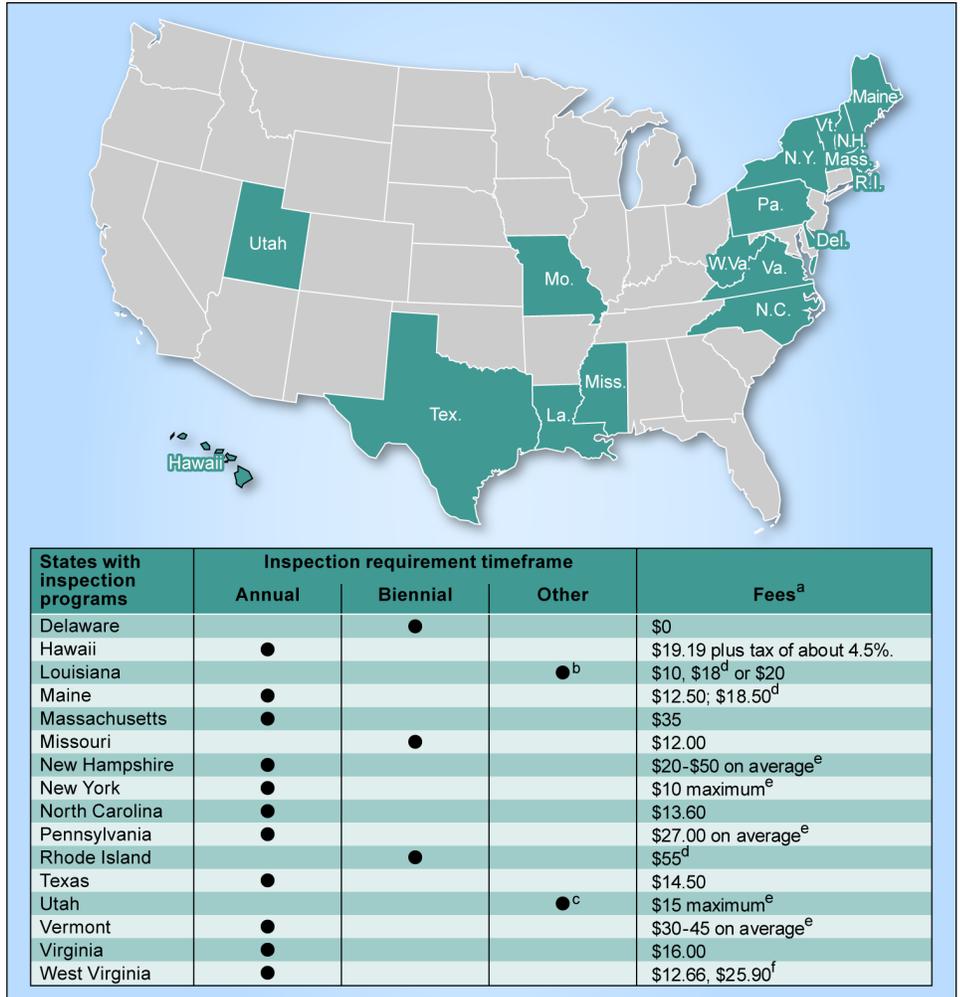
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NHTSA's guideline on state motor vehicle inspection programs, included in its Uniform Guidelines for State Highway Safety Programs, recommends that states should have a program for periodic inspection of all registered vehicles to reduce the number of vehicles with existing or potential conditions that may contribute to crashes or increase the severity of crashes that do occur, and should require the owner to correct such conditions. We found that 16 states operate periodic motor vehicle inspection programs. See figure 2 below. These states develop the specific rules that govern their programs. For example, 11 of the 16 states with inspection programs require an annual vehicle safety inspection, three states require a biennial inspection, and two states require time frames other than annual or biennial. Further, some states allow certain vehicles to be exempted from the safety inspections, such as newer model vehicles (up to 5 years from the model year) or vehicles at least 25 years old and registered as historical vehicles. Some states couple the safety inspection with emissions inspections.<sup>11</sup>

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<sup>11</sup>We did not actively collect information on emissions inspection because it is regulated by the Environmental Protection Agency in the Department of Energy and does not directly relate to a vehicle safety inspection other than the cases where states require vehicle owners to conduct both inspections at the same time.

**Figure 2: States with Vehicle Safety Inspection Programs, July 2015**



Sources: GAO; Fees paid by vehicle owners are as reported to GAO by state program officials or on state program websites as of July 2015; and Map Resources. | GAO-15-705

<sup>a</sup>Fees are paid by the consumer at the time of inspection.

<sup>b</sup>Annual in areas where emissions inspections are required; biennial in all other areas.

<sup>c</sup>Random roadside inspections.

<sup>d</sup>4 years after the model year, 8 years after the model year, 10 years after the model year, and annually after that.

<sup>e</sup>Includes emissions inspection.

<sup>f</sup>Market-driven.

<sup>g</sup>Fee for modified vehicles.

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Vehicle safety inspection programs are administered by the state motor vehicle administration, department of transportation, or law enforcement agency, and in all of the states, except Delaware, state-licensed private inspection stations perform the inspections. The number of these private inspection stations per state ranges from around 295 (Rhode Island) to 17,000 (Pennsylvania). With a few exceptions, states do not limit the number of private inspection stations that may participate in the safety inspection program; it is typically a market-driven process.<sup>12</sup> However, states require these inspection stations to obtain certification or licenses from the state. Delaware operates four state-run safety inspection sites. The fees charged to vehicle owners for safety inspections are mostly set by the state, though five states allow a market-driven fee which is set by individual inspection stations. State officials we spoke with provided information on the fees collected from drivers at the time of inspection. These fees ranged from \$0 (Delaware) to \$55 (Rhode Island, but this includes an emissions inspection).

In addition to the guideline for states on periodic motor vehicle inspection, NHTSA has issued Vehicle In Use Inspection Standards, which set inspection criteria for several vehicle systems.<sup>13</sup> NHTSA has developed system standards for brakes (hydraulic, vacuum, air, electric and service brakes), steering, suspension, tires, and wheel assemblies. For example, the standards specify that tread on a tire shall not be less than two thirty-seconds (2/32") of an inch deep and provides an inspection procedure for examining the tire for this depth. These minimum standards apply to all states that choose to implement a vehicle safety inspection program. However, states with programs include more vehicle systems in their inspections than are specified in the standards. For systems not covered by these standards, each state determines what will constitute a passed or failed component. Examples of other systems generally incorporated into state vehicle safety inspections are lighting (such as headlights, brake lights, and turn signals), seatbelts, horns, windshields, wiper blades and the vehicle's undercarriage.

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<sup>12</sup>Some safety inspection programs are combined with emissions programs and emissions program contracts may limit the number of private inspection stations a state may have, thus limiting the number of private safety inspection stations.

<sup>13</sup>49 C.F.R. Part 570 – Vehicle In Use Inspection Standards.

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## Impact of Safety Inspections on Vehicle Safety Is Unclear as Benefits and Costs Are Difficult to Quantify

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### Officials in States with Vehicle Safety Inspection Programs Said Their Programs Enhance Vehicle Safety

According to officials in 15 states with existing vehicle safety inspection programs whom we interviewed, these programs help improve the condition of vehicles; these officials point to data on the number of failed inspections as evidence of the safety benefit of these programs. Officials whom we interviewed from all 15 states said their programs help identify vehicles with safety problems and remove these unsafe vehicles from the roadways or compel owners to make repairs that otherwise might not be performed. Most of these states (12 of 15) collect data on the number of vehicles that fail inspection—the failure rate—and officials from 9 of these states cited their failure rate data to demonstrate the effectiveness of their programs. For example, Pennsylvania officials provided 2014 data showing that more than 529,000 vehicles (about 20 percent of the state’s 2.7-million registered vehicles) underwent repairs in order to pass inspection after initially failing. Virginia officials told us they believed that their state’s roadways were safer because their program identified safety problems in over 1.4 million—or 19 percent—of the state’s 7.5-million vehicles, in 2014. According to Virginia officials, 700,000 of those vehicles were rejected for brake-related issues such as worn, contaminated, or defective linings or drums, disc pads, or disc rotors. Safety problems most frequently found in other states in 2014 included: problems with glass, which resulted in 47,172 failed inspections in Utah;<sup>14</sup> malfunctioning brake lights, which resulted in more than 13,000 failed inspections in Delaware; and tire deficiencies, which resulted in almost 6,000 failed inspections in Rhode Island.

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<sup>14</sup>According to Utah state officials this includes glass that is broken, missing, shattered, or jagged, and also includes issues with tinting, wipers/washer, and mirrors.

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Additionally, officials in three states said that vehicle safety inspections are valuable because the average age of passenger vehicles is increasing and, in some areas, weather conditions and roadway treatments such as salt may contribute to vehicle deterioration. For example, Rhode Island officials stated that their inspection program is necessary in part because the state's snow and icy weather requires road treatments that can corrode a vehicle's chassis, steel brake lines, suspension, steering linkages, and ball joints. Further, these officials said that their inspection program is important because vehicles are staying in service longer—with some cars accruing more than 300,000 miles—exposing vehicle systems to more use and risk of developing safety issues. DOT data show that the average age of passenger vehicles has consistently increased from 1995 to 2013, from an average age of 8.4 to 11.4 years. Similarly, Vermont and West Virginia officials told us that their states' snow and associated road treatments, coupled with rough terrain and poor roadways, increase vehicle deterioration. They said that their programs mitigate seasonal weather challenges by reducing the number of unsafe cars in use.

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### Research Examining Effect on Crash Rates is Inconclusive, in Part Due to Limited Data

Despite the consensus among the state inspection program officials we interviewed that these programs improve vehicle condition, research remains inconclusive about the effect of safety inspection programs on crash rates. There is little recent empirical research on the relationship between vehicle safety inspection programs and whether these programs reduce crash rates. What is available has generally been unable to establish any causal relationship.<sup>15</sup> Since GAO last conducted a review on vehicle safety inspection programs in 1990, there have been three econometric studies conducted examining the relationship between vehicle inspections and crashes in the U.S. and three studies examining these programs in other countries. Among the three studies of U.S. vehicle inspection programs, none were able to establish a statistically significant effect of safety inspection programs on crashes involving either fatalities or injuries. Specifically, the studies examined crash rates in all 50 states and did not find statistically significant differences in crash rates in states with inspection programs compared to those without. International studies have also not been able to establish a link between

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<sup>15</sup>We reviewed 29 studies, including peer-reviewed articles, government publications, and trade publications. Of these studies, we determined the methodology and findings for 6 studies—published from 1992 through 2013—were reliable enough to include for the purposes of our report.

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safety inspection programs and crash rates involving either fatalities or injuries. For example, only one study suggested that safety inspections potentially reduce the likelihood of crashes, but noted the magnitude of the reduction could not be clearly established.<sup>16</sup> See appendix III for more information on each of the studies.

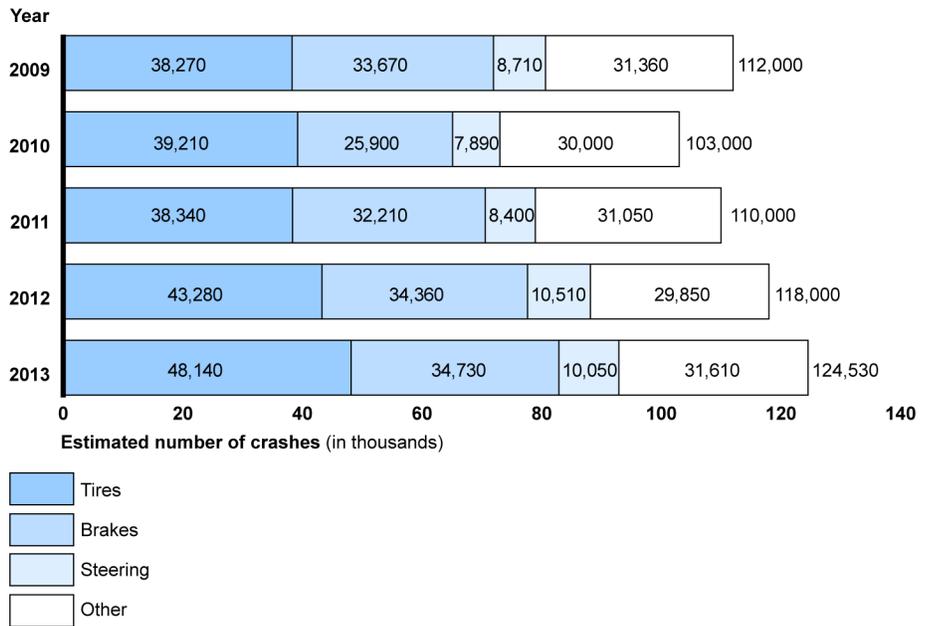
While our literature review did not yield any studies establishing that vehicle safety inspections reduce crashes, this does not necessarily demonstrate that inspections do not have such an effect. Nationwide studies involving crashes related to vehicle component failure are hindered, in part, due to a lack of nationwide crash data. There is no comprehensive database for all police reported crashes in the United States. NHTSA maintains two data sources that capture some vehicle crash incidents related to component failure. NHTSA's Fatality Analysis Reporting System (FARS) is a census of all fatal traffic crashes in the United States that provides uniformly coded, national data on police-reported fatalities, and contains information on crashes in which vehicle component failure was noted, but is limited to crashes involving fatalities. NASS-GES is a nationally representative sample of police-reported motor vehicle traffic crashes, which is also uniformly coded and contains information on crashes in which vehicle component failure was noted in the police report. However, the sample is not set up to be representative at the state level; therefore, it cannot be used to compare states with and without safety inspection programs. Some researchers have used FARS in their analyses in order to perform state-by-state comparisons, but detecting the effect of inspection programs on crash rates is difficult because few crashes involve fatalities, and relatively few of those fatal crashes are noted in police reports as having vehicle component failure as a potential contributing factor.

According to our analysis of NHTSA's NASS-GES crash data from 2009 through 2013, crashes with noted vehicle component failure constituted around 2 percent of all crashes nationwide. We also found that the three most common failures were related to 1) tires, 2) brakes, and 3) steering. These categories make up the majority of failures reported with the next biggest category being "other." (See fig. 3.) These components are inspected as part of all state inspection programs.

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<sup>16</sup>M. D. Keall, S. Newstead. "An evaluation of costs and benefits of a vehicle periodic inspection scheme with six-monthly inspections compared to annual inspections." *Accident Analysis & Prevention*, 58 (2013): 81-87.

**Figure 3: Estimated Number of Crashes Related to Vehicle Component Failure, 2009—2013**



Source: GAO Analysis of National Highway Traffic Safety Administration National Automotive Sampling System General Estimates System. | GAO-15-705

Note: The numbers presented in the graphic are the 95% confidence interval estimate rounded to the nearest 10 crashes. Numbers may not add due to rounding. For the upper and lower bound estimates see appendix IV.

In addition to looking at NASS-GES data, we attempted to examine crash rates before and after the elimination of safety inspection programs in four states and D.C., but were able to get sufficient crash data for two of these states, New Jersey and Oklahoma.<sup>17</sup> In both cases, crashes involving vehicle component failure were generally between 2 and 3 percent of all crashes and varied little from year to year, even after the elimination of the inspection programs. We also calculated the crash rate—controlling for vehicle miles traveled—and found that the rate did not significantly change for either state. However, this analysis does not provide sufficient

<sup>17</sup>We attempted to gather data for 5 years before and after the year of the program was eliminated for each state. South Carolina, (eliminated in 1995) could only provide crash data back to 2001; Arkansas (eliminated in 1993) could only provide data back to 1999; and, Washington D.C. (eliminated 2009) could only provide 2014 data.

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evidence to conclude that inspection programs did not have an effect on crash rates because additional factors—such as implementation or increased enforcement of traffic safety laws—could influence crash rates.

The number of crashes related to vehicle component failure may also be generally underreported. Some literature and safety advocate organizations we spoke with noted that police officers filling out accident reports often do not have the time and resources to conduct a thorough vehicle check to determine if a vehicle component failure contributed to the crash. Other factors, such as driver behavior, may be more easily ascertained. For a 2008 NHTSA crash causation survey, researchers conducted thorough investigations of over 5,000 crashes over a 2-year period (2005—2007) to determine factors that contributed to the crashes.<sup>18</sup> While this study did not identify vehicle component failure as necessarily the cause of the accident, vehicle component failures were found to be present in 6.8% of crashes. The crash causation survey utilized a more comprehensive mechanical examination of the vehicle(s) involved in crashes than the police accident reports used as the data collection instrument for the NASS-GES crash data. The results of the crash causation survey suggest that the percentage of crashes related to vehicle component failure is higher than the estimates produced by the NASS-GES because of the more detailed analysis of the vehicles involved in the crashes.

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### States Generally Do Not Directly Track Costs of Operating Safety Inspection Programs

States with vehicle safety inspection programs generally do not directly track the costs of managing and overseeing such programs. Officials from 8 of the 15 states with vehicle safety inspection programs we interviewed told us they do not track the cost of their vehicle inspection program. Officials from several of these states explained that costs for the inspection program cannot be broken out, because the costs for operating the inspection program are co-mingled with other programs or activities. For example, in New York, North Carolina, and Vermont, officials told us the staff who oversee the safety inspection programs also perform oversight of the emissions testing program, motorcycles or heavy-duty vehicles inspections, or have other state DOT duties. Consequently, the administrative costs for programs and activities were co-mingled. Similarly, officials from seven states reported tracking their program costs, but several of them also acknowledged some cost estimates

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<sup>18</sup>NHTSA. *National Motor Vehicle Crash Causation Survey: Report to Congress*, DOT HS 811 059 (July 2008).

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included costs from other programs, since inspection program staff and overhead may be multi-tasked for other related programs.

Funding for vehicle safety inspection programs comes from general state funding or through fees related to safety inspections. States typically receive some of the fee charged to drivers for safety inspections, while the remainder is retained by the inspection station. As explained by state officials, generally the amount that goes to the state is between \$0 and \$5 per inspection, though some states receive greater amounts with the most being \$33.25. In some cases, states generate revenue by selling inspection stickers to the stations that conduct the inspection; these stickers are used to indicate that a vehicle has passed the inspection. States may also collect fees at the time of vehicle registration. These revenue sources may go to the state's general fund, to other funds or departments (such as a highway maintenance fund), or to the larger programmatic department (state patrol or department of transportation), before being allocated to the inspection program. No state reported using federal funds to support its inspection program. NHTSA officials also said that no state had ever applied to use federal funding for a safety inspection program.

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## State Challenges Include Oversight and Paper-Based Data Systems

Officials in the 15 states we spoke with primarily cited oversight and paper-based data systems as challenges they have faced when operating their vehicle safety inspection programs.

- *Eleven of 15 states cited oversight efforts as a challenge.* Oversight efforts involve addressing or preventing fraudulent behavior and ensuring that private inspection stations perform inspections in compliance with program requirements. To conduct oversight, states with private inspection stations generally perform some combination of routine, random, and covert audits. Because the inspection station is a private entity, states do not have direct control over how inspections are performed. For example, one state official said it can be a challenge to ensure that stations do not attempt to make unneeded repairs for profitable gain, while officials in a second state said it was a challenge to ensure that stations do not intentionally pass vehicles that should have failed the inspection. Officials in a third state explained that it is challenging to ensure thoroughness and quality of the inspection because doing so is a labor-intensive process. Similarly, officials in four of the five states that we spoke with that had eliminated programs told us that oversight efforts were also a

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challenge for them in operating their programs. For example, officials in one state told us that inspection stations were able to make more money by providing other automotive services and believed the safety inspections were not as profitable. Consequently, some inspection station mechanics issued inspection stickers without properly conducting inspections. In addition, some states cited challenges with inadequate staffing resources for oversight efforts. For example, officials from four states mentioned that they had relatively few state auditors to oversee their safety inspection programs. According to officials in one state, oversight can be a particular problem because private inspection stations can span thousands of miles, and it can be difficult to retain qualified state personnel if state wages are relatively low.

- *Four of 15 states cited their paper-based data systems as a challenge.* Paper-based inspection data systems can be inefficient and, according to some state officials, can limit states' ability to monitor their programs. Generally, in a paper-based data system, private inspection stations record inspection results on paper forms rather than into an electronic database. Officials in one state said they would like an electronic database because inspection station results would be more quickly shared with the state, resulting in better program monitoring. These officials said they would first need to ensure that the benefits of an electronic database outweigh the costs and was a viable solution before requiring inspection stations to use it. Officials in another state physically scan and enter paper-based data received from inspection stations into the state's database, a process that they said is time consuming. To help manage the state's data-entry work flow, officials limit the number of safety inspections that inspection stations may conduct in a single day. These officials said that the lack of Internet access at some of the inspection stations in the state made it difficult to require the use of an electronic inspection database. Other states with paper-based systems do not collect statewide inspection data, preventing the state from analyzing data and determining, for example, the number of vehicles that fail inspections in a given year. Officials from one of these states cited a lack of funds as a major impediment to creating an electronic data system, and an official from the other state told us they were preparing a request for proposals to develop an electronic database.
- *Other Challenges:* State officials mentioned additional challenges, including state legislatures' attempts to eliminate or alter programs (two states) and customer service challenges or general public irritation with the program (two states). For example, officials in two

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states told us they either relaxed or eliminated some non-safety related standards (such as using certain tools to check headlight aim) or exempted newer-model vehicles from safety inspections as a compromise with state legislatures to continue their programs. With regard to customer service challenges, officials in two states told us it was challenging for them to deal with customers who complained when their vehicle failed the inspection, had to be re-inspected, or they endured long wait times.

Literature that we reviewed and other stakeholders whom we interviewed, including representatives from safety groups, vehicle manufacturer industry groups, and DOT officials, also cited challenges that states face in operating their programs. Four studies cited oversight challenges. For example, a 1999 study noted that inspectors can either intentionally or unintentionally fail to report safety problems—sometimes to minimize the level of trouble to customers and increase the number of inspections performed.<sup>19</sup> A 2008 state study found that one of the major criticisms of safety inspection programs is the difficulty that one state had in ensuring the quality and uniformity of inspections.<sup>20</sup> The study stated that a thorough inspection, if performed to state regulations, should take between 15 and 30 minutes, according to program managers and industry representatives. However, according to the study, safety inspections in this state were taking 5 minutes, on average, raising questions about whether consumers' vehicles were receiving thorough inspections. In addition, four stakeholders told us that state legislatures' attempts to eliminate states' programs either were or may be a challenge for states. Also, three stakeholders told us that public frustration associated with what the public perceives as unneeded repairs or the personal inconvenience vehicle owners feel when having to get their vehicles inspected either were or may be challenges for states.

Some states have taken action to address their challenges, including implementing more stringent program rules, preparing manpower studies,

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<sup>19</sup>David Merrell, Marc Poitras, and Daniel Sutter, "The Effectiveness of Vehicle Safety Inspections: An Analysis Using Panel Data," *Southern Economic Journal*, vol. 65, no. 3, (1999): 571-583.

<sup>20</sup>North Carolina General Assembly Program Evaluation Division. *Doubtful Return on the Public's \$141 Million Investment in Poorly Managed Vehicle Inspection Programs – Final Report to the Joint Legislative Program Evaluation Oversight Committee*, Report No. 2008-12-06 (2008).

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and developing electronic database systems. Officials in one state told us that in 2012, they implemented stricter program rules for inspection stations to follow in an attempt to reduce fraudulent behavior (specifically, issuing stickers for vehicles that should have failed the inspection). In addition, officials in a second state said they recently added requirements that inspection station mechanics use fingerprint scanners for proper identification before performing inspections.<sup>21</sup> To address challenges with staffing resources, officials in a third state told us they completed a manpower study to better identify the resources needed to operate their program. An official in another state told us that state officials were currently developing a request for proposals to create an electronic database system to replace its paper-based system.

While some states have tried various ways to address their program challenges, other states have eliminated their vehicle safety inspection programs altogether. Since we last reported on vehicle safety inspections in 1990, five states and the District of Columbia have dropped their programs, some citing a lack of evidence proving the program's effectiveness or saving financial resources as reasons. For example:

- In 2001, an Oklahoma Senate Press Release stated there was no evidence that vehicle safety inspection programs resulted in decreased highway accidents or injuries statewide and that eliminating the program would save Oklahomans \$12 million.
- In 2009, the District of Columbia eliminated its safety inspection program primarily because there was no available data to show that the program was beneficial, according to a District official. For example, a District official told us that an analysis of crash data before the program was eliminated showed that the majority of vehicle accidents resulted from driver behavior, not from vehicular mechanical failure.
- In 2010 when New Jersey eliminated its program, the New Jersey Motor Vehicle Commission Chief Administrator announced that with a lack of conclusive data on program effectiveness and with the current (2010) fiscal crisis, New Jersey could not justify the program's

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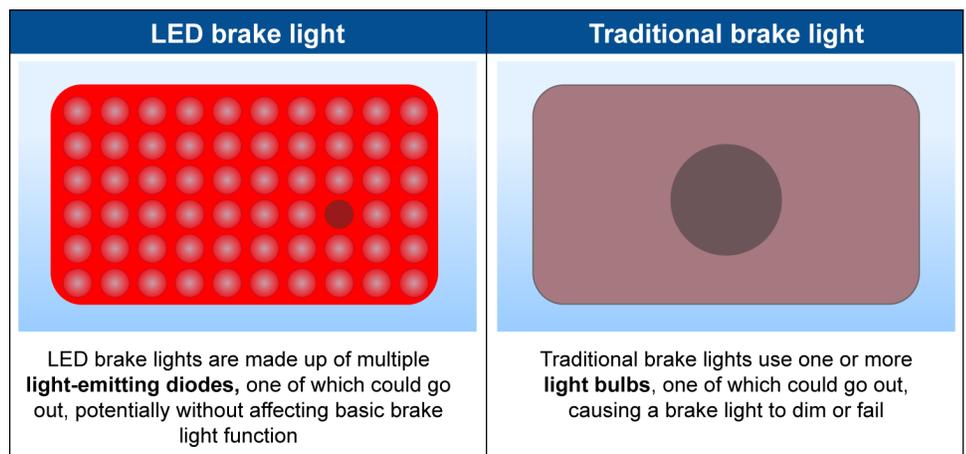
<sup>21</sup>A state official told us that the fingerprint scanning only applies to safety inspections performed on passenger vehicles that require an emissions test.

expense, and that dropping the program would yield an estimated annual savings of \$17 million.

## NHTSA Could Improve Communications with States

Officials in all 15 states with inspection programs that we spoke with told us that additional guidance and information from NHTSA would help in operating their programs. The majority of state officials (11 of 15) would like more guidance in the area of new vehicle safety technologies in order to determine how and whether new technologies should be incorporated into their inspection programs. The example most frequently cited by state officials was light-emitting diode (LED) brake lights. LED brake lights have multiple “light-emitting diodes” that contribute to the visibility of the light. See figure 4 below for a diagram of an LED light. The number of LEDs in a light can vary, depending on the vehicle manufacturer or model. According to state officials, they do not know how many diodes, if any, could malfunction before the light is considered unsafe, making it difficult for them to set pass or fail criteria for LED lights. Since brake lighting is critical to alert other drivers to changing conditions, it is important for states with inspection programs to have criteria to judge whether lights are working sufficiently well. Officials in three states also noted that such criteria are important because failing a car on the basis of individual diodes being out can result in a costly repair for consumers ranging from a few hundred to several thousand dollars, depending on the vehicle.

Figure 4: Diagram of a Light-Emitting Diode (LED) light.



Source: GAO. | GAO-15-705

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State officials provided a range of criteria they have chosen to use for LED brake lights:

- 50% of the diodes must function to pass inspection (5 states),
- 70% must function (1 state),
- 100% must function (3 states), and
- not yet specifically addressed in the inspection program (1 state).<sup>22</sup>

Officials in the state that has considered but not specifically addressed LED brake lights in the inspection program said they tried to contact NHTSA for guidance, but found it difficult to locate a NHTSA official to answer their question and did not receive a clear answer. NHTSA officials told us that they respond to inquiries and have provided guidance to state and local law enforcement officials. NHTSA's lighting standard sets a minimum luminosity for vehicle lights, but does not directly address LED lights, and NHTSA officials reiterated that they do not have information on how many diodes on a given light can fail before it no longer meets the federal standard.<sup>23</sup> NHTSA officials also said that since lights vary depending on the manufacturer only the manufacturer would know how much, if any, buffer is built into an LED light. NHTSA officials explained that manufacturers have flexibility in designing their lights, as long as the lights meet the minimum luminosity standard; therefore, they could not provide states with a specific number of LED lights that could malfunction for a given vehicle. One state official we spoke with said that it would require too many resources to contact all the different manufacturers to seek guidance on LED lights. While NHTSA may not directly address LED lights in the lighting standard at this time, there may be other information NHTSA could provide to states concerning LED brake lights if there were a designated communication channel for states to bring these kinds of issues to NHTSA's attention. For example, if found appropriate,

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<sup>22</sup>Officials in two states also told us that they did not need to specifically address LED lights in their inspections because the state's current standard is based on visibility from a specific distance. Officials in the remaining 3 states did not provide information on how they inspect LED brake lights.

<sup>23</sup>Federal Motor Vehicle Safety Standard No. 108: Lamps, reflective devices, and associated equipment, 49 C.F.R. § 571.108.

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NHTSA could sponsor research in the area of LED brake lighting as it has done in the past that might be helpful to states.<sup>24</sup>

Further, officials in two states said that they are concerned about how their programs may be impacted by new autonomous vehicle technologies. Officials did not state specific concerns, but said that with new advanced vehicle technologies coming on the market, it is not clear how or what they should be inspecting. We have previously reported that automobile manufacturers have begun to equip some newly manufactured vehicles with sensor-based crash avoidance and autonomous technologies intended to prevent accidents.<sup>25</sup> However, officials from these two states noted that such technologies may add a new layer to their inspection programs if the state decides the technologies need to be included in inspections.

State officials in eight states with safety programs we interviewed also said that additional information from NHTSA on new safety technologies required by the agency's safety standards for vehicle manufacturers would help them in operating their inspection programs. These state officials told us they generally track new vehicle safety standards implemented by NHTSA, but it is not always clear to program officials whether or how new standards might be incorporated into their inspection programs. Two recent vehicle standards cited by state officials were the requirements for tire-pressure monitoring systems (three state officials) and back-up cameras (two state officials).<sup>26</sup> Specifically, these states would like guidance on whether they should check to see that these technologies are functioning correctly for vehicles that were manufactured

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<sup>24</sup>NHTSA has sponsored research in the area of LED lighting. For example, Walter W. Wierwille, Robert E. Llaneras, and Lucas M. Neurauder, *Evaluation of Enhanced Brake Lights Using Surrogate Safety Metrics: Task 1 Report: Further Characterization and Development of Rear Brake Light Signals*. (Report No. DOT HS 811 127 National Highway Traffic Safety Administration, Washington, D.C.: April 2009) and N. K. Greenwell, *Effectiveness of LED Stop Lamps for Reducing Rear-End Crashes: Analyses of State Crash Data*. (Report No. DOT HS 811 712 National Highway Traffic Safety Administration, Washington, D.C.: February 2013).

<sup>25</sup>GAO. *Intelligent Transportation Systems: Vehicle-to-Vehicle Technologies Expected to Offer Safety Benefits, but a Variety of Deployment Challenges Exist*, [GAO-14-13](#) (Washington, D.C.: November 2013).

<sup>26</sup>Federal Motor Vehicle Safety Standard No. 138: Tire pressure monitoring systems, 49 C.F.R. § 571.138, was implemented in 2009, and the revision to the Federal Motor Vehicle Safety Standard No. 111: Rear visibility, 49 C.F.R. § 571.111, was implemented in 2014.

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with the technologies. Officials in one state told us that their state required the tire-pressure monitoring system to work and then eliminated that requirement because the system often malfunctioned and the inspectors could readily check whether the tires are properly inflated and holding air. A 2013 study contracted by NHTSA to gather information for updating inspection standards found “State directors welcomed the suggestion that, when NHTSA issues a new regulation, the rulemaking be accompanied by guidance on how to inspect a vehicle to ensure that the required equipment is still functioning.” However, the last update to the standards was in 1979, thus technologies that have been developed since that time—such as anti-lock brake systems—are not included. NHTSA officials told us that the determination of whether or how to include new vehicle safety technologies in inspection programs should be made by the states.

Further, NHTSA conducts research that could be useful to states with inspection programs, but state officials may not be aware of this information. For example, in April 2015, NHTSA issued the results of a defect investigation on brake lines, which recommended to consumers who drive vehicles from model year 2007 and earlier and live in cold-weather states to have a qualified mechanic inspect brake lines and other components under the vehicle at least twice a year, which is more frequent than the most strict state inspection requirements.<sup>27</sup> Although the recommendation was not directed at state inspection officials, this information could help state inspection officials identify such problems during their inspections. However, NHTSA did not disseminate this information directly to states with inspection programs. According to officials from the American Association of Motor Vehicle Administrators (AAMVA)—the national group representing motor vehicle and law enforcement agencies, which administer safety inspection programs in states—they would share this type of information from NHTSA with their members. However, the AAMVA officials were not aware of this study. According to NHTSA officials, NHTSA issues press releases to the media and stakeholders on a regular distribution list, but AAMVA is not currently on this distribution list.

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<sup>27</sup>National Highway Traffic Safety Administration. *NHTSA Safety Advisory: Preventing Brake Pipe Failures Due to Corrosion* (Apr. 9, 2015.)

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According to NHTSA officials, there are no NHTSA staff designated to answer questions related to state inspection programs or disseminate relevant information to program officials because agency resources are currently focused on areas that have a greater impact on crash rates, such as driver behavior. NHTSA officials also noted that current evidence on vehicle safety inspection programs does not warrant a more prescriptive approach and that state officials should make determinations on what is most effective for their individual programs. Considering the variation among state programs and state needs it seems appropriate for states to determine much of their vehicle safety inspection program's structures. However, state vehicle safety inspection program officials sometimes have questions about incorporating new technologies in their programs. Given that NHTSA has a guideline recommending that states implement vehicle inspection programs and that the agency's mission includes assisting states with traffic safety programs, it is reasonable that state officials would look to NHTSA for guidance when these questions arise. While NHTSA does not dedicate staff to vehicle inspection issues, the agency has a broad range of vehicle technical experts in various parts of the organization who are knowledgeable about related issues. For example, NHTSA officials said the agency currently has 20 engineers who work on Federal Motor Vehicle Safety Standards that are relevant to vehicle inspection guidelines, along with 10 support professionals, such as economists and lawyers. Although NHTSA could update or produce additional regulation, Executive Order 13563<sup>28</sup> states that agencies should be identifying and assessing available alternatives to regulation including providing information upon which choices can be made. Establishing a communication channel, such as by designating a point of contact, could provide information transfer between knowledgeable NHTSA staff and state vehicle inspection program officials, and could help state inspection program officials operate their programs more effectively. Once established, such a channel would not necessarily require extensive NHTSA resources. For example, NHTSA could leverage the communication channel that AAMVA currently has with states, or set up a web-based forum through which state officials can ask questions, receive information from NHTSA, and share information with other states on how they are addressing new vehicle technologies and standards in their programs.

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<sup>28</sup>76 Fed. Reg. 3821.

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## Conclusions

While the benefits and costs of state vehicle inspection programs are difficult to quantify, state program officials we spoke to are confident that their programs improve vehicle safety, despite the challenges they face in operating the programs. However, some state officials told us they sometimes have questions about new technologies and other issues related to vehicle safety, and have not been able to get clear answers from NHTSA. With no recent federal guidance, state officials have implemented different criteria or chosen not to include new technologies in their inspection programs, potentially reducing the safety benefits of their inspection program. Further, NHTSA's work in the areas of Federal Motor Vehicle Safety Standards and defects investigation touches on vehicle component and safety information that could be useful to state vehicle safety inspection program officials, but this information is not being provided directly to these officials nor to the national group that represents these officials. NHTSA's decision to not devote significant resources to state vehicle inspection programs is consistent with research showing that vehicle component failures are a relatively minor contributor to traffic crashes. However, establishing a communication channel to answer questions from state officials and convey information could assist states in improving their vehicle safety inspection programs. To minimize resources needed to establish and maintain a communication channel, NHTSA could potentially create a web-based forum to share information and respond to questions and collaborate with AAMVA to disseminate information to state officials.

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## Recommendation

To improve assistance to states in regard to the periodic motor vehicle inspection guideline, the Secretary of Transportation should direct the Administrator of NHTSA to establish and maintain a communication channel with states to convey relevant information related to vehicle inspections and respond to questions from state safety inspection program officials.

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## Agency Comments and our Response

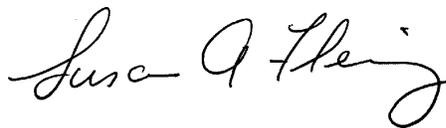
We provided a draft of this report to DOT for review and comment. DOT provided written comments, which are reprinted in appendix V. In its written comments, DOT stated that NHTSA agreed with our recommendation, and supports our conclusion that establishing a communication channel with state vehicle safety inspection program officials would be beneficial.

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We are sending copies of this report to the appropriate congressional committees, and the Secretary of Transportation. This report will also be available at no charge on the GAO website <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-2834 or [flemings@gao.gov](mailto:flemings@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix VI.

Sincerely yours,

A handwritten signature in black ink that reads "Susan Fleming". The signature is written in a cursive style with a large, looping "S" and "F".

Susan Fleming  
Director, Physical Infrastructure Issues

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# Appendix I: Objectives, Scope, and Methodology

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We conducted a review of state motor vehicle inspection programs and National Highway Traffic Safety Administration's role in assisting these programs.<sup>1</sup> This report assesses: 1) what is known about the safety benefits and costs of operating state vehicle safety inspection programs, 2) any challenges states have faced in operating these programs, and 3) any actions NHTSA could take to assist states with these programs.

To identify what is known about the costs and safety benefits of state vehicle inspection programs, we conducted a literature search for studies that analyzed relationships between safety inspections and outcomes, such as crash rates, vehicle component failures, and vehicle fleet age. We limited our literature search to those articles and reports published since 1990—the last time GAO conducted a comprehensive literature review. We identified existing studies from peer-reviewed journals, government reports, trade publications, and conference papers based on searches of various databases, such as ProQuest, Academic OneFile, and Transportation Research International Documentation. Search parameters included studies across the United States and in other countries. We also conducted interviews with organizations that assist states with traffic safety efforts and asked them to recommend additional research. The literature review parameters and interviews resulted in 185 abstracts or studies. Of these, we determined that 29 studies appeared to be relevant—eliminating, for example, studies that focused on emissions inspections. We assessed the relevance and methodological quality of the selected studies by performing an initial review of the findings (here we eliminated any studies based on data from before 1980), and then performed an independent assessment of the study's methodology. After these reviews, we determined that 6 studies published from 1992 through 2013 were sufficiently reliable for the research objective on the safety benefits and costs of operating state vehicle safety inspection programs (see appendix III) and 4 studies were sufficiently reliable for the research objective on any challenges that states face in operating these programs.

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<sup>1</sup>Some states have inspections that do not fall under the periodic motor vehicle inspection guideline reviewed in this report. For example, states require safety inspections at the time of registration or for specific types of vehicles, such as vehicles for-hire, commercial vehicles and school buses, but since these inspection programs are not applied periodically and to all registered motor vehicles they do not fall under the periodic motor vehicle inspection guideline. Some states have required emissions testing, which are also not covered in this report. However, in some states emissions testing and safety inspections are administered as one inspection program; when this is the case emissions information was incidentally reviewed and noted in this report.

To determine what is known about safety benefits of state vehicle inspections, we also analyzed crash data. Because of known data limitations raised in the studies we reviewed during the literature search, we attempted to compare crash rates related to vehicle component failure before and after program elimination in states that eliminated their inspection program since 1990. Six states fit this criterion: South Carolina (1995), Arkansas (1998), Oklahoma (2001), Washington D.C., (2009), New Jersey (2010), and Mississippi (2015). Because Mississippi dropped its program during the course of our assessment, we did not do a before and after comparison. For the other five states, we attempted to collect data on the number of crashes recorded in the state and the number of crashes recorded with vehicle component failures 5 years before and 5 years after program elimination. We were only able to obtain this data for two of the five states: Oklahoma and New Jersey. For Oklahoma we were able to obtain data for 1995-2013. We focused on the five years before and after 2001 when the program was eliminated to see if there was a difference in trend. Because New Jersey eliminated its program in 2010, we were not able to get 5 years of crash data after the program was eliminated. For New Jersey we reviewed data from 2005 to 2013. We also analyzed national level crash data from NHTSA's National Automotive Sampling System General Estimates System (NASS-GES) for the years 2009-2013. NASS-GES consists of data collected from an annual sample of about 50,000 police accident reports and is statically weighted to be a nationally representative of all police-reported crashes that occur in the United States each year. We analyzed this data to determine the estimated number of total crashes with vehicle factors nationwide as well as the specific vehicle component failures that were reported, such as issues with brakes, tires, and steering. We express our confidence in the precision of estimates as 95 percent confidence intervals. This is the interval that would contain the actual population values for 95 percent of the NASS-GES samples that NHTSA could have drawn. Because of the sample design used to collect GES, we are limited to reporting trends on a national level and could not use this data to look at individual state trends. For each of these data sets, we interviewed relevant officials and analyzed the data for possible errors. We determined that these data were sufficiently reliable for the purposes of estimating the number of reported crashes that occur with vehicle component failures.

To determine challenges states faced in operating their inspection programs and what actions, if any, NHTSA could take to assist states with their vehicle safety inspection programs, we reviewed federal and state policy and program documents related to inspection programs. We

reviewed federal statutes, regulations, guidelines, and guidance documents, state laws authorizing safety inspection programs, state program reports, state officials' testimony before their state legislators and state inspection guidance and manuals. We observed safety inspections in Delaware at a state-run inspection station and in Virginia at a privately owned and operated inspection station. In selecting these sites we worked with state officials to identify an inspection station where we could view an actual inspection take place. We conducted structured interviews with officials in 15 of the 16 states that currently have a safety inspection program. We attempted multiple times to speak with the one remaining state—New Hampshire—but were unsuccessful. We also interviewed state officials in five of six jurisdictions (four states and the District of Columbia) that eliminated their programs since 1990. South Carolina eliminated its program in 1995 and did not have any officials knowledgeable about the program. We also interviewed NHTSA officials, researchers at Carnegie Mellon University, and representatives from the American Association of Motor Vehicle Administrators, safety groups (Center for Auto Safety and Public Citizen), and automotive industry groups (Automotive Service Association, Auto Care Association, and Motor & Equipment Manufacturers Association).

# Appendix II: List of States that Have Required Vehicle Safety Inspections, 1929-2015

States Currently Requiring Annual Safety Inspections		States that Repealed Inspection Programs		
State	Started	State	Started	Ended
Pennsylvania	1929	Colorado	1937	1981
Maine	1930	New Jersey	1938	2010
Massachusetts	1930	District of Columbia	1939	2009
New Hampshire	1931	New Mexico	1953	1977
Virginia	1932	Mississippi	1961	2015
Delaware	1933	Georgia	1965	1982
Utah	1936	Wyoming	1967	1977
Vermont	1936	Florida	1968	1981
Texas	1951	Idaho	1968	1976
West Virginia	1955	Kentucky	1968	1978
New York	1957	South Carolina	1968	1995
Rhode Island	1959	South Dakota	1968	1979
Louisiana	1961	Arkansas	1969	1998
Hawaii	1961	Indiana	1969	1980
North Carolina	1966	Nebraska	1969	1982
Missouri	1969	Oklahoma	1969	2001

Source: GAO and GAO-90-175 App. I for initial start dates of the vehicle safety inspection program and for all repealed safety inspection date prior to 1991. | GAO-15-705

# Appendix III: Studies Reviewed that Examine Vehicle Inspections and Crash Rates

	Article	Methodology	Conclusions
U.S. studies	Sutter, David and Poitras, Marc (2002). The Political Economy of Automobile Safety Inspections. <i>Public Choice</i> , 133 (3-4), 367-387.	Regression analysis using 1981-1993 panel data of 50 states.	Unable to establish a statistically significant effect of vehicle inspection program on fatalities or injury rates.
	Merrell, David, Poitras, Marc, and Sutter, Daniel (1999). The Effectiveness of Vehicle Safety Inspections: An Analysis Using Panel Data. <i>Southern Economic Journal</i> , 65 (3), 571-583.	Regression analysis using 1981-1993 panel data of 50 states.	Unable to establish a statistically significant effect of vehicle inspection program on fatalities or injury rates.
	Holdstock, J., Hagarty, D., & Zalinger, D. (1994). Review of a mandatory vehicle inspection program. Project report.	Regression analysis using 1990-1991 data for 50 states, District of Columbia, and 10 Canadian provinces.	Unable to establish a statistically significant effect of vehicle inspection program on fatalities or injury rates.
International Studies	Keall, M. D., & Newstead, S. (2013). An evaluation of costs and benefits of a vehicle periodic inspection scheme with six-monthly inspections compared to annual inspections. <i>Accident Analysis &amp; Prevention</i> , 58, 81-87.	Regression analysis using merged New Zealand crash data (2004-2009), licensing data (2003-2008), and inspection data (2003-2009).	Going from annual to biannual inspections may reduce likelihood of crashes (8%) and the prevalence of vehicle defects (13.5%), but the wide confidence interval for the drop in crash rate (0.4–15%) indicated considerable statistical uncertainty.
	Christensen, Peter and Elvik, Rune (2007). Effects on Accidents of Periodic Motor Vehicle Inspection in Norway. <i>Accident Analysis and Prevention</i> 39, 47-52.	Observational study using insurance data and 1998-2002 inspection data in Norway.	Inspections improved the technical condition of inspected cars, but did not have a statistically significant effect on crash rates.  The study's findings suggested that following inspections, the accident rate of inspected cars did not decline, but rather showed a weak tendency to increase.
	Fosser, Stein (1992). An Experimental Evaluation of the Effects of Periodic Motor Vehicle Inspection on Accident Rates. <i>Accident Analysis and Prevention</i> 24 (6), 599-612.	Experimental design over 4 years (1986-1990) in Norway.	Inspection improved the technical condition of inspected cars, but the differences found in technical condition had no influence on accident rates.

Source: GAO Analysis of Articles. | GAO-15-705

# Appendix IV: Estimated Number of Crashes Listed with Vehicle Component Failure 2009-2013 with Lower and Upper Bound 95% Confidence Intervals (CI)

Year	Vehicle Factor	Estimated Crashes Listed with Vehicle Component Failure	Lower Bound 95% CI	Upper Bound 95% CI
<b>2013</b>				
	Total	124,530	108,960	140,100
	Tires	48,140	39,550	56,730
	Brakes	34,730	28,050	41,420
	Steering	10,050	6,190	13,910
	Other	31,610	24,920	38,300
<b>2012</b>				
	Total	118,000	99,640	136,360
	Tires	43,280	35,380	51,180
	Brakes	34,360	27,800	40,930
	Steering	10,510	7,870	13,140
	Other	29,850	23,990	35,710
<b>2011</b>				
	Total	110,000	93,410	126,590
	Tires	38,340	31,350	45,340
	Brakes	32,210	26,180	38,250
	Steering	8,400	6,160	10,630
	Other	31,050	25,020	37,080
<b>2010</b>				
	Total	103,000	87,710	118,290
	Tires	39,210	32,060	46,350
	Brakes	25,900	20,590	31,220
	Steering	7,890	5,560	10,2210
	Other	30,000	24,120	35,880
<b>2009</b>				
	Total	112,000	93,930	130,070
	Tires	38,270	30,500	46,030
	Brakes	33,670	26,630	40,710
	Steering	8,710	6,020	11,390
	Other	31,360	24,680	38,040

Source: GAO Analysis of the National Highway Traffic Safety Administration National Automotive Sampling Generalized Estimate System. | GAO-15-705

Note: The numbers presented are the 95% confidence interval estimate as well as the upper and lower bound estimates, all numbers are rounded to the nearest 10 crashes. Numbers may not add as a result of rounding.

# Appendix V: Comments from the Department of Transportation



U.S. Department  
of Transportation

Office of the Secretary  
of Transportation

Assistant Secretary  
for Administration

1200 New Jersey Avenue, SE  
Washington, DC 20590

AUG 07 2015

Susan Fleming  
Director, Physical Infrastructure Issues  
U.S. Government Accountability Office  
441 G Street NW  
Washington, DC 20548

Ms. Fleming,

The National Highway Traffic Safety Administration (NHTSA) is responsible for reducing deaths, injuries and economic losses resulting from motor vehicle crashes. This is accomplished by a comprehensive approach that includes researching and developing transportation safety countermeasures, working with States to enforce traffic safety laws, and setting and enforcing safety performance standards for motor vehicles and motor vehicle equipment. As part of this effort, NHTSA recommends each State conduct periodic safety inspections of all registered vehicles. By reducing the number of vehicles with existing or potential safety conditions, these inspections may contribute to a reduction in crashes and in the severity of crashes that do occur. NHTSA also encourages vehicle owners to properly maintain their vehicles to keep them safe.

Although periodic State safety inspections may provide safety benefits through proper maintenance, research is inconclusive on whether vehicle inspection programs significantly decrease crash rates.

- Vehicle related safety issues are a relatively small portion of the traffic safety problem when compared to driver-caused crashes. NHTSA's 2008 crash causation survey found that vehicle component failures were the critical reason (the last event in the crash causal chain) in only 2 percent of crashes. The critical reason was assigned to the driver in 94 percent of crashes.
- The police accident reports that form the basis of NHTSA's Generalized Estimate System may produce overestimates of the size of the component failure problem. Past reviews of police accident reports have found that the mention of component failures is often based on drivers' self-reporting that their vehicles were somehow at fault, such as "my brakes failed," without verification.

Upon preliminary review of the draft report, NHTSA agrees with the GAO recommendation. NHTSA supports GAO's conclusion that establishing a communication channel with States is a more beneficial alternative to issuing regulations. The Department will provide a detailed response to the recommendation within 60 days of the GAO report issuance.

We appreciate the opportunity to offer our comments on the GAO draft report. Please contact Patrick D. Nemons, Deputy Director of Audit Relations, at (202) 366-4986 with any questions or if you would like any additional information about these comments.

Sincerely,

Jeff Marootian  
Assistant Secretary for Administration

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# Appendix VI: GAO Contacts and Staff Acknowledgements

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## GAO Contact

Susan Fleming, (202) 512-2834 or [Flemings@gao.gov](mailto:Flemings@gao.gov)

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## Staff Acknowledgements

In addition to the contact named above, Sara Vermillion (Assistant Director), Carl Barden, Namita Bhatia Sabharwal, Timothy Bober, Melissa Bodeau, Jennifer Clayborne, Leia Dickerson, Amanda Miller, Sara Ann Moessbauer, Josh Ormond, Cheryl Peterson, Oliver Richard, Stephen Sanford, Amy Suntoke, Friendly Vang-Johnson, Michelle Weathers, and Jade Winfree made key contributions to this report.

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## Public Affairs

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