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Report to the Chairman, Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce

July 1990

MOTOR VEHICLE SAFETY

NHTSA Should Resume Its Support of State Periodic Inspection Programs

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GAO

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Resources, Community, and
Economic Development Division

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The Honorable John D. Dingell
Chairman, Subcommittee on Oversight
and Investigations
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

In response to your July 26, 1989 request, this report evaluates the Department of Transportation's exercise of its state motor vehicle inspection program responsibilities through its National Highway Traffic Safety Administration (NHTSA).

We focused our work on determining whether (1) NHTSA's 1989 report accurately represented the safety benefits of state inspection programs, (2) available evidence indicates that state inspection programs reduce accident rates, and (3) NHTSA appropriately carried out its legislative responsibilities toward inspection programs. Our report recommends that NHTSA resume its support of periodic inspection programs, and we provide suggestions for ways NHTSA can promote these programs.

As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies of this report to the Secretary of Transportation, the Administrator of NHTSA, and other interested parties.

This work was performed under the direction of Kenneth M. Mead, Director, Transportation Issues, who can be reached at (202) 275-1000. Other major contributors to the report are listed in appendix III.

Sincerely yours,

J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

Currently, 21 states and the District of Columbia require annual inspections of motor vehicles as part of their safety programs. The effectiveness of periodic motor vehicle inspection programs has been a controversial issue for many years. In 1988, the Congress requested the Department of Transportation's (DOT) National Highway Traffic Safety Administration (NHTSA) to study state inspection programs to determine whether they improve highway safety. NHTSA's report, issued in 1989, concluded that periodic inspection programs reduce the number of poorly maintained vehicles on the highways, but that available data did not conclusively demonstrate that inspection programs significantly reduced accident rates.

NHTSA's report has been criticized by various industry groups for not accurately representing the safety benefits of inspection programs. Because of this, the Chairman, Subcommitee on Oversight and Investigations, House Committee on Energy and Commerce, asked GAO to evaluate NHTSA's 1989 report to determine whether: (1) NHTSA's report accurately represented the safety benefits of state inspection programs, (2) available evidence indicated that state inspection programs reduce accident rates, and (3) NHTSA carried out its legislative responsibilities toward inspection programs.

Background

The Highway Safety Act of 1966 required the Secretary of Transportation to prescribe uniform standards for mandatory state highway safety programs. A state not complying with the standards could lose its highway safety grant funds and 10 percent of its federal highway construction funds. From 1967 to 1972, DOT issued 18 standards, 1 of which required states to conduct periodic motor vehicle inspections. In 1973, NHTSA issued specific inspection standards, such as minimum thickness of brake linings and minimum tire tread depth.

By 1975, 31 states and the Distict of Columbia had periodic inspection programs. NHTSA attempted to use funding sanctions against certain states to enforce the adoption of its various highway safety standards. However, the Congress passed the Highway Safety Act of 1976, deleting the Secretary's authority to withhold highway construction funds and providing that state safety programs could be approved without meeting every program standard. Subsequently, 10 states repealed their periodic inspection programs.

For its 1989 report, NHTSA considered most of the available studies of periodic inspection programs and also did five analyses of accident data

available at its headquarters. NHTSA acknowledged that all of these studies, including NHTSA's analyses, had limitations of scope, age, and/or methodological completeness.

Results in Brief

NHTSA's 1989 report accurately concluded that state periodic inspection programs reduce the number of poorly maintained vehicles on the highways. This is an important finding because vehicles with worn or defective brakes, tires, lights, or other safety-related components are a hazard to both their owners and other motorists. For example, Virginia officials provided data showing that 25 percent of the vehicles inspected in 1986 had brake defects. NHTSA's report showed that accidents involving vehicle defects occur less often in states requiring periodic inspections.

NHTSA's conclusion that available data did not conclusively demonstrate that inspection programs significantly reduced accident rates was based primarily on two analyses it did using fatal accident data. Whether intended or not, this conclusion conveyed undue skepticism about the effectiveness of inspection programs and tended to overshadow NHTSA's finding that inspection programs improve the safety condition of vehicles. GAO found that analyses such as NHTSA's have been hindered by the limitations of available accident data. For example, police accident reports are the source of most data, but they tend to understate the number of accidents in which defective vehicle components contributed to the cause. If driver error or poor road conditions are involved, the investigating officer may not recognize that worn brakes or tires helped cause or aggravate the accident.

GAO considered all the studies and analyses in NHTSA's report and others not discussed by NHTSA. Even taking into account the limitations of individual studies, their relative consistency in pointing to a safety benefit from periodic inspection justifies a conclusion that these programs reduce accident rates. The magnitude of accident reduction could not be determined because of the data limitations and the methodological problems encountered by those who have studied it.

While NHTSA met its obligations under the 1966 legislation to prescribe standards for state inspection programs, the agency did not promote periodic inspection after the Congress restricted its sanction authority in 1976. Although NHTSA was not required after 1976 to support periodic inspection, it could have sponsored research and provided information to help states initiate and improve programs. Recently, NHTSA indicated

a renewed interest in inspection programs and is considering how it can provide such assistance to states. GAO is making a recommendation in this regard.

Principal Findings

NHTSA's Report Indicated That Inspection Programs Have Safety Benefits

NHTSA reviewed eight studies which compared the condition of safety-related components on vehicles subject to periodic inspection with those in non-inspection jurisdictions. All eight showed that vehicles subject to periodic inspection had fewer defective components than those in areas not requiring inspections. For example, one study in the 1970s found that Pennsylvania, when it still required semiannual inspections, had 45 percent fewer vehicles with defective equipment than California, which used random police inspections. NHTSA's report also indicated that existing state programs vary in their reliability in detecting and correcting vehicle defects.

NHTSA's report also discussed an Indiana study that investigated 420 accidents in depth and found that 12.6 percent were caused or aggravated by defective or worn vehicle equipment. Several other studies, including two by NHTSA itself, showed that accidents involving worn or defective equipment occurred less in states requiring periodic inspections.

Studies that have compared fatal accident rates between inspection and non-inspection states have found mixed results in trying to estimate the effect of inspection programs. These studies have been hindered by the limitations of available accident data and the difficulty of accounting for the various factors that can affect accident rates. Also, fatal accidents are less than 1 percent of all accidents and are not typical of the universe of accidents.

NHTSA found that fatal accident rates were about the same in inspection states as in non-inspection states. NHTSA also compared total accidents in four inspection states with those in six non-inspection states, and concluded that there was no significant difference in accident rates. In fact, the reported accident rate was 17 percent lower in the inspection states, but NHTSA questioned the comparability of the data and adjusted it to largely eliminate the difference between the two groups of states. For several reasons discussed in this report, GAO did not agree with NHTSA's

adjustment, and considered the 17-percent difference to be further evidence that inspection programs reduce accident rates.

Taken together, the studies discussed in NHTSA's report as well as several other studies identified by GAO indicated that inspection programs reduce accident rates. These studies included estimates of accident reduction ranging from less than 1 percent to as high as 27 percent. The actual magnitude of the reduction is unknown. GAO agrees with NHTSA that all of the studies had limitations either of scope, age, or methodological completeness. Thus, while the large majority of studies point to a safety benefit from inspection programs, they do not provide a reliable basis for judging how much effect the programs have on accident rates.

NHTSA Intends to Resume Its Support of Vehicle Inspection Programs

NHTSA officials told GAO that the agency intends to resume its support of periodic vehicle inspection. The contribution these programs make to highway safety provides a basis for NHTSA's support of such programs. After reviewing NHTSA's actions under the 1966 and subsequent legislation, GAO concluded that the agency met its legislative obligations. As mandated, NHTSA issued a standard requiring states to inspect vehicles at least annually, and in 1973 issued specific standards for vehicle inspection. NHTSA officials acknowledged, however, that the agency did not promote inspection programs after the Congress in 1976 deleted NHTSA's authority to withhold highway construction funds. Under the law, NHTSA was not required to support inspection programs, but it could have continued to promote and help improve programs by sponsoring research and providing information to states on effective ways to operate programs.

Recommendation

GAO is recommending that the Secretary of Transportation direct NHTSA to support state periodic motor vehicle inspection programs through such actions as (1) sponsoring research, (2) assisting inspection states to share their experiences and adapt to changing automotive technology, and (3) promoting public awareness of the need to properly maintain the safety-critical components of vehicles.

Agency Views

As requested, GAO did not obtain official agency comments on a draft of this report. However, GAO discussed the report's contents with NHTSA officials, and they generally agreed with GAO's findings. GAO incorporated their clarifying comments as appropriate. These officials said that NHTSA welcomes suggestions for ways to promote and improve inspection programs.

Contents

Abbreviations

DOT	Department of Transportation
GAO	General Accounting Office
NHTSA	National Highway Traffic Safety Administration

Background

In order to reduce the toll of highway accidents, the Congress created the National Highway Traffic Safety Administration (NHTSA) within the Department of Transportation[1] (DOT) to enforce federal motor vehicle safety standards, sponsor safety research and development, and support state highway safety programs.

In 1966, traffic accidents killed 50,894 persons in the United States. In 1988, the traffic death toll had decreased to 47,093. The number of vehicle miles traveled, estimated at 926 billion in 1966, had increased to over 2 trillion by 1988. Measured in terms of vehicle miles traveled, the fatality rate in 1988 was 58 percent lower than in 1966. Many factors have contributed to this decline, including improved vehicles, improved highways, and programs to raise the safety consciousness of drivers. NHTSA has estimated that one major initiative, safety belts, saved 4,500 lives in 1988. Among the many programs intended to reduce the number and severity of accidents are the requirements in 21 states and the District of Columbia for periodic inspection of motor vehicle brakes, tires, steering, and other safety-related components.

NHTSA's Involvement in Periodic Motor Vehicle Inspection Programs

The Highway Safety Act of 1966 (P.L. 89-564) and the National Traffic and Motor Vehicle Safety Act of 1966 (P.L. 89-563) both established responsibilities for the Secretary of Transportation.[2] The National Traffic Safety Bureau (later NHTSA) was created to administer these acts on behalf of the Secretary.

The first act required the Secretary to prescribe uniform standards for mandatory state highway safety programs. The Secretary was required to approve each state's program and withhold highway safety grant funds and 10 percent of highway construction funds from states not complying with the program standards. The act specifically mentioned vehicle inspection among the potential subjects for state program standards. The second act required the Secretary to establish safety standards for new vehicles, and standards for the inspection of vehicles in use.

[1]The agency was originally called the National Highway Safety Bureau and was under the Department of Commerce. It moved to the Department of Transportation (when that agency began operations on Apr. 1, 1967), where it was under the Federal Highway Administration until it was established as a separate agency within the Department in 1970.

[2]The legislation actually referred to the Secretary of Commerce, but these responsibilities were transferred to the newly created Secretary of Transportation in 1967.

NHTSA's Issuance and Enforcement of State Safety Program Standards

In carrying out the Highway Safety Act of 1966, DOT issued 18 standards for state highway safety programs from 1967 through 1972. The first standard required each state to have a program for periodically inspecting all registered vehicles or an experimental, pilot, or demonstration program approved by the Secretary. NHTSA officials said that in 1973, under pressure from a court order, the agency established the specific standards for inspecting vehicles required by the National Traffic and Motor Vehicle Safety Act of 1966. These standards applied to brakes, tires, wheels, and steering and suspension components, and included such items as minimum brake lining thickness and tire tread depth.

In response to the DOT requirements, 11 states adopted periodic inspection laws between 1967 and 1972, bringing the total to 31 plus the District of Columbia. In 1975, NHTSA prepared to use the authorized funding sanctions to enforce state compliance with safety program standards, particularly those involving blood alcohol content for drunk driving, motorcycle helmet use, and periodic vehicle inspection. The sanction process was suspended when the Congress passed the Highway Safety Act of 1976, deleting the Secretary's authority to enforce the safety program standards by withholding highway construction funds. The act also specified that the Secretary should not "require compliance with every uniform standard, or with every element of every standard, in every state."

NHTSA's Reaction to the Highway Safety Act of 1976

While the 1976 act did limit NHTSA's authority to require state program activities, it did not eliminate the Secretary's authority to approve state highway safety programs and withhold highway safety program funds from states not having approved programs. And it did not repeal the statement in the National Traffic and Motor Vehicle Safety Act of 1966 that "it is the policy of Congress to encourage and strengthen the enforcement of State inspection of used motor vehicles." Nonetheless, DOT adopted a policy that all highway safety program standards would be optional and states could determine their own priorities. DOT reported to the Congress in 1977 that it could not statistically demonstrate the effectiveness of any of its 18 program standards, including periodic vehicle inspections. DOT stated: "This is not to say that the highway safety program and the standards do not improve safety. Rather, this is an admission of our inability to produce statistically verifiable data which convincingly demonstrate what our common sense tells us." Since 1977, NHTSA has not withheld highway safety funds from any state for

noncompliance with a safety program standard.[3] Regarding periodic inspection programs, NHTSA officials agreed that the agency stopped promoting them after 1976.

From 1976 through 1982, 10 states repealed their periodic inspection laws, including 7 of the states that adopted their laws in response to the Highway Safety Act of 1966. Currently, 21 states and the District of Columbia require annual motor vehicle safety inspections. All but three of these programs predate the 1966 act, with some going back to the 1930s and one to 1929. These states are primarily on the eastern seaboard or the Gulf Coast. (See app. I.) New Jersey, Delaware, and the District operate facilities which perform the inspections. The remaining 19 states license private garages to do inspections, monitored by the state police or another state agency. For a fee, the mechanics inspect the condition of brakes, tires, steering components, lights, and other safety-related equipment on the vehicles. Vehicles not meeting state standards must be repaired and reinspected. Federal funds are not used to support state inspection operations.

NHTSA Required to Report on Inspection Program Effectiveness

We reported in 1977 that many states were reluctant to adopt periodic inspection programs because they were not convinced of the benefits of such programs.[4] Therefore, we recommended that NHTSA undertake priority research to demonstrate program effectiveness. NHTSA did not, however, undertake any new research on the effects of inspection programs.

In 1988, the Congress requested that NHTSA study existing state inspection programs and determine whether they reduce the number of poorly maintained vehicles on the highway and help reduce accident rates. NHTSA reviewed prior studies, surveyed the current status of vehicle inspection programs, and performed analyses using data available at NHTSA headquarters. NHTSA also held public hearings and solicited comments from state officials and other interested persons. NHTSA reported in 1989[5] that periodic inspection programs reduce the number of poorly

[3]In 1987, the Congress changed the highway safety program standards to guidelines.

[4]Effectiveness of Vehicle Safety Inspections Neither Proven Nor Unproven (CED-78-18, Dec. 20, 1977), pp. 20-22.

[5]Study of the Effectiveness of State Motor Vehicle Inspection Programs. NHTSA (Washington, D.C.: Aug. 1989).

maintained vehicles on the highways, but reported that it could not conclusively demonstrate that the programs significantly reduce accident rates.

Objectives, Scope, and Methodology

Various organizations have criticized NHTSA for alleged shortcomings in its 1989 report and for its lack of support for periodic vehicle inspection. Consequently, the Chairman, Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce, asked us to assess whether NHTSA has adequately carried out its vehicle inspection responsibilities and what safety benefits can be attributed to such programs.

In agreement with the Chairman's office, we focused our work on determining whether: (1) NHTSA's 1989 report accurately represented the safety benefits of state inspection programs, (2) available evidence indicated that state inspection programs reduce accident rates, and (3) NHTSA appropriately carried out its legislative responsibilities toward inspection programs.

To carry out the first objective, we reviewed NHTSA's 1989 report and discussed it with the NHTSA personnel who prepared it. We involved methodological experts on our staff in assessing NHTSA's analyses of available data. We reviewed some of the prior studies cited by NHTSA, most of which were done before 1980, and in other cases, accepted NHTSA's summarization of them. We considered whether, given the information contained in NHTSA's report, we would have arrived at similar conclusions.

For the second objective, we reviewed comments submitted to NHTSA by states and other interested parties to determine if there was other information or studies that NHTSA did not consider in its 1989 report. We also reviewed an available literature search and asked officials from NHTSA, states, and interested organizations if they were aware of other relevant studies or analyses. From this effort, we identified four studies not discussed by NHTSA in arriving at its conclusions. We used this additional information along with the studies discussed by NHTSA to assess the relationship between periodic vehicle inspection programs and accident rates.

For the third objective, we reviewed legislation, regulations, and other documents relating to NHTSA's safety programs and discussed their implemention with officials of NHTSA; the American Association of Motor

Vehicle Administrators; and the Coalition for Safer, Cleaner Vehicles. Specifically, we considered whether NHTSA met its minimum obligations under the 1966 legislation and whether it adopted an appropriate role in response to the 1976 legislative changes.

We also considered whether NHTSA should encourage periodic inspection programs and how the programs could be improved. As requested by the Chairman, we interviewed officials of interested organizations and visited states with inspection programs (New Jersey, Pennsylvania, and Virginia) as well as states without them (Florida, Indiana, and Ohio). In Indiana and Florida, we discussed the reasons why previous inspection laws were repealed. We also attended a conference on vehicle inspection at which officials from a number of other states participated.

We conducted our audit work between September 1989 and February 1990 in accordance with generally accepted goverment auditing standards. We discussed the report's contents with NHTSA officials and incorporated their clarifying comments as appropriate. However, as requested, we did not obtain offical NHTSA comments on a draft of this report.

NHTSA's 1989 Report and Other Data Show That Periodic Inspection Programs Reduce Accident Rates

NHTSA's 1989 report accurately concluded that state periodic inspection programs reduce the number of poorly maintained vehicles on the highways. This is an important finding because vehicles with worn or defective brakes, tires, lights, or other safety-related components are a hazard to both their owners and other motorists. NHTSA's report also showed that accidents involving vehicle defects occur less often in states requiring periodic inspections.

NHTSA's conclusion that available data did not conclusively demonstrate that inspection programs significantly reduced accident rates was based primarily on two analyses it did using fatal accident data. Whether intended or not, this conclusion conveyed undue skepticism about the effectiveness of inspection programs and tended to overshadow NHTSA's finding that inspection programs improve the safety condition of vehicles. Analyses such as NHTSA's have been hindered by the limitations of available accident data. We considered all the studies and analyses in NHTSA's report and others not discussed by NHTSA. Even taking into account the limitations of individual studies, their relative consistency in pointing to a safety benefit from periodic inspection justifies a conclusion that these programs reduce accident rates. The magnitude of accident reduction could not be determined because of the data limitations and the methodological problems encountered by those who have studied it.

NHTSA's Report Indicated That Inspection Programs Have Safety Benefits

NHTSA's 1989 report demonstrated that periodic inspection programs improve the condition of the safety-related components of vehicles subject to inspection. The report also contained consistent evidence that fewer accidents involving defective or worn vehicle equipment occur in states requiring inspections. While this would seem to be persuasive evidence that the programs reduce overall accident rates, comparisons of fatal accident rates do not always show such an effect. Unfortunately, most comparisons have been confined to fatal accident data because of their availability and reliability. However, fatal accidents represent less than 1 percent of all accidents and may not be the type of accidents most affected by defective vehicle equipment. Also, it is difficult in any comparison of accident rates to control the various other factors that can influence them.

In assessing NHTSA's report, we considered all the evidence and noted that most of the studies indicated a safety benefit from inspection programs. We believe NHTSA may have focused too much on its own comparisons of state accident rates, considering the limitations of such

comparisons. While NHTSA may not have intended to draw negative conclusions about the effectiveness of inspection programs, it did seem to place emphasis on the analyses that did not support the programs. This left the impression that NHTSA was skeptical of the benefit of inspection programs.

NHTSA's Report Showed That Inspection Programs Improve Vehicle Condition

To determine whether periodic inspections improve vehicle condition, NHTSA reviewed eight studies which compared the condition of safety-related components on vehicles subject to periodic inspection with those in non-inspection jurisdictions. All eight studies showed that vehicles not subject to periodic inspection had more defective components than those in areas requiring inspections. For example, Tennessee found in the 1970s that vehicles in Memphis and Chattanooga, which required inspections, had fewer safety defects than those in Knoxville, which did not. As another example, two NHTSA-sponsored studies in the early 1970s compared results from diagnostic centers in 10 states. The three states with the lowest defect rates were states that required periodic inspections. Pennsylvania, which at that time required semiannual inspections, had 45 percent fewer vehicles with defective equipment than California, which used random police inspections. These studies indicated that semiannual inspections were more effective than annual inspections, which in turn were more effective than random inspections. NHTSA concluded from its review of these eight studies that periodic inspection programs limit the number of poorly maintained vehicles on the highways.

NHTSA's Report Demonstrated That Inspection Programs Reduce Accidents Caused by Vehicle Defects

If periodic inspection programs are effective, they should reduce the number of accidents caused or aggravated by worn or defective vehicle equipment. To determine if this was so, NHTSA reviewed a study done in Indiana on the causes of accidents, and three studies comparing the rate of vehicle defects cited in accident reports. NHTSA also performed two data analyses comparing accident reports from inspection and non-inspection states.

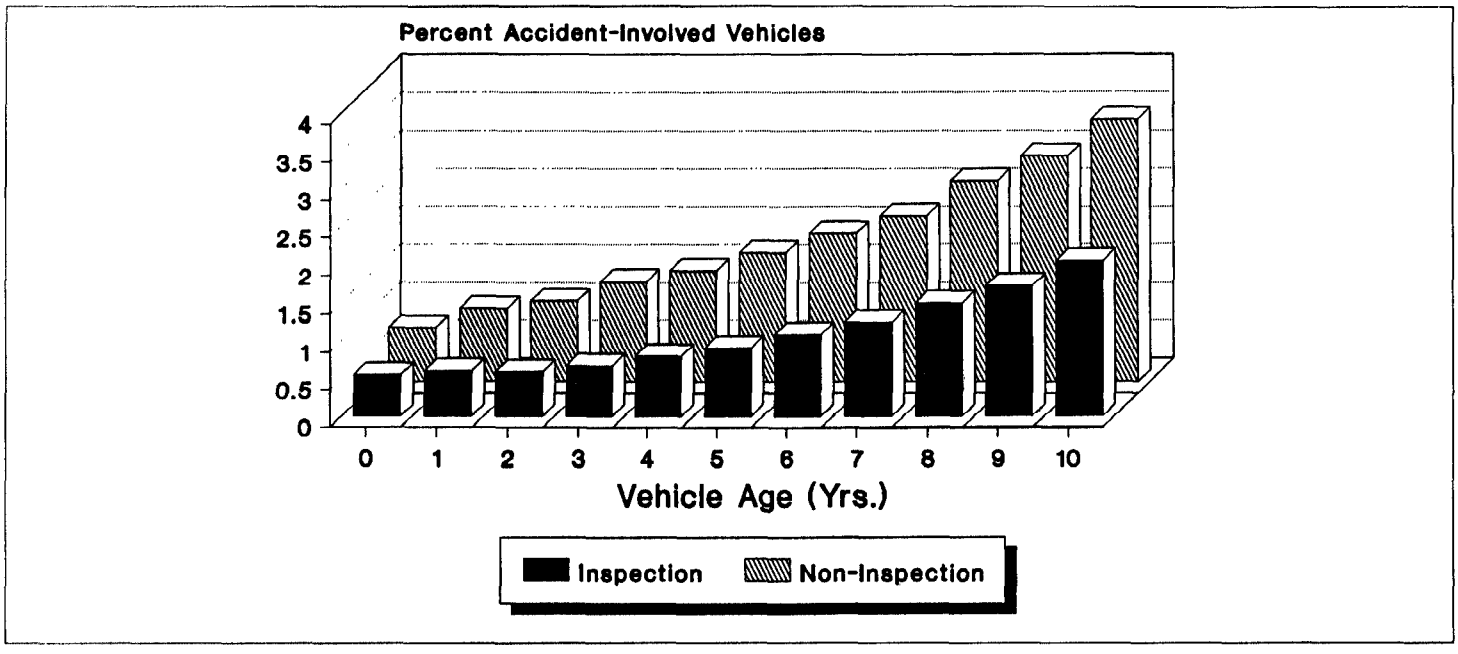
NHTSA sponsored a study in Monroe County, Indiana, in the early 1970s to determine the causes of traffic accidents. As part of that study, large, multidisciplinary teams conducted in-depth follow-up investigations of 420 accidents. The study concluded that defective vehicle components were the sole cause or a contributing cause of 12.6 percent of the accidents (4.5 percent definite, 8.1 percent probable). Failure or

underperformance by brakes and tires were the most commonly noted deficiencies that contributed to accidents.

The three other studies of vehicle-defect involvement in accidents all indicated that periodic inspection programs reduce accidents caused by vehicle defects. For example, a 1975 NHTSA study cited data showing that reported vehicle-defect accidents declined from 12 to 4 percent of all accidents in Texas and from 6.1 to 2.6 percent in rural Nebraska in the years following implementation of inspection programs. Another of these studies found a lower rate of vehicle-defect accidents on the Pennsylvania Turnpike than on the Indiana and Ohio Turnpikes during a period when Pennsylvania was the only one of these states requiring inspections.

NHTSA did two analyses of computerized accident reports to determine how often vehicle equipment failures were noted on vehicles involved in accidents. One involved all accidents in four states and the other involved fatal accidents in all states. In the four-state study, NHTSA found that vehicle equipment failures were reported on about 1 percent of the vehicles involved in accidents in the inspection states (Pennsylvania and Texas) and about 2 percent in the non-inspection states (Maryland and Washington). As shown in figure 2.1, the difference between the states was greater for older vehicles than for newer ones, which indicates that inspection programs have more effect on older vehicles. This confirmed NHTSA's hypothesis that the effect of inspection programs would be most evident for older vehicles.

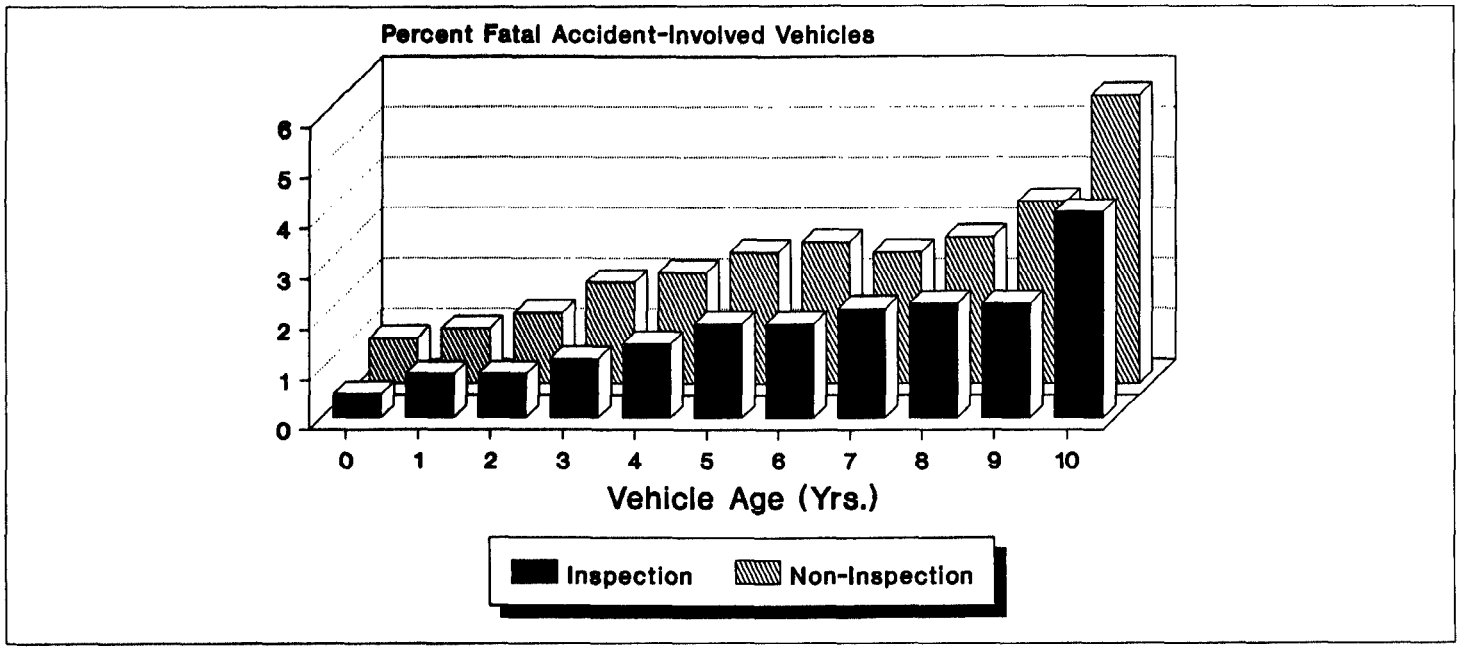
Figure 2.1: Defective Equipment Reported on Vehicles Involved in Accidents, 1984-86



Source: NHTSA

NHTSA's second analysis, using nationwide fatal accident data from 1985 through 1987, also showed that defects were noted on vehicles involved in fatal accidents less often in inspection states than in non-inspection states. Once again, as shown in figure 2.2, NHTSA found that the difference between inspection and non-inspection states widened for older vehicles. Thus, NHTSA's analysis of fatal accidents in all states confirmed its four-state analysis of total accident data.

Figure 2.2: Defective Equipment Reported on Vehicles Involved in Fatal Accidents, 1985-87



Source: NHTSA

NHTSA considered the differences between the states too small to be of any practical significance. However, police accident reports may understate the percentage of accidents caused by defective vehicle equipment. The Indiana study found that police officers did not identify all of the vehicle defects that contributed to the accidents studied. The Indiana researchers noted that police officers must try to determine who was legally responsible for an accident, and may not look further for causal relationships. As New York officials pointed out in comments to NHTSA, police officers are not mechanics, and their first concern at an accident scene must be the care of the injured and clearing the site of hazards.

Accident Rate Comparisons Have Been Inconclusive Because of Data Limitations

In addition to studying the role of vehicle defects in accidents, NHTSA also reviewed studies which compared accident rates (mostly fatal accident rates) between inspection and non-inspection states. Fatal accident data are more readily available and more reliable, but fatal accidents represent less than 1 percent of all accidents. On the other hand, total accident data are difficult to interpret because of different reporting practices among the states.

Among eight studies NHTSA reviewed, six compared fatal accident rates between states with and without inspection programs. Three found

lower accident rates in states requiring periodic inspections, one found higher rates, and two found inconclusive results. The remaining two studies were done within single states. One of these, done in Huntsville, Alabama, compared a sample of inspected vehicles with other vehicles in Huntsville. The authors estimated that the inspected vehicles were involved in 9-21 percent fewer accidents. The other, a historical study done in New Jersey, compared total accident rates for a number of years before and after the state's adoption of an inspection program. Controlling for a number of other factors, the study estimated an accident reduction of 23 percent from the state's inspection program.

While each of the previous studies had limitations, taken together, they suggested that periodic inspections reduce accident rates. However, NHTSA did three data analyses comparing accident rates among the states which produced apparently conflicting evidence. Two of these used fatal accident data from 49 states and found fatal accident rates to be about the same in inspection states as in non-inspection states. In the first of these two analyses, a comparison by age of vehicle also showed little difference, although vehicles 9-12 years old were more likely to be involved in fatal accidents in states not requiring periodic inspection. In the second analysis, NHTSA looked at fatal accidents involving 1975 vehicles over an 11-year period, and did not find a trend favoring inspection states as the vehicles got older.

NHTSA's third analysis of accident rates used state accident data files to compare total accidents in four inspection states with those in six non-inspection states. The inspection states showed a 17-percent lower accident rate than the non-inspection states. However, NHTSA doubted the comparability of the data because it showed that relatively new vehicles (0-21 months old) also had higher accident rates in the non-inspection states. NHTSA assumed that newer vehicles have few defects and thus should not have higher accident rates in non-inspection states.

NHTSA adjusted the data from this analysis and largely eliminated the difference between the two groups. NHTSA justified this in its report by stating that the inspection states were not reporting as many accidents because they had higher damage thresholds for reporting accidents than the non-inspection states. We found the reverse to be true: the inspection states in NHTSA's sample had lower thresholds for reporting accidents than the non-inspection states.

We also question NHTSA's reason for adjusting the data. According to the U.S. Department of Commerce, more than a third of new vehicles are

used for business purposes. Such vehicles may be driven 25,000 miles in their first year, according to the American Automotive Leasing Association. They could develop problems with brakes, tires, or steering at an early age, problems that an inspection program would identify. Moreover, older vehicles in non-inspection states may involve new vehicles in more accidents than would occur if the older vehicles were subject to periodic inspection.

NHTSA's comparisons of accident rates are also limited by the fact that, except for vehicle age, NHTSA did not control for other factors that can influence state accident rates. We found, for example, that traffic density was higher in the inspection states. Motorists in these states traveled 20 percent more per mile of roadway in 1988 than motorists in non-inspection states.

NHTSA also reviewed several studies that had attempted to estimate costs and benefits of periodic inspection programs. The majority of these studies, including NHTSA's own 1975 study, indicated that the programs were cost-effective. NHTSA questioned their assumptions, however, and concluded that "none of the reviewed studies provide credible evidence that current programs are cost-effective." NHTSA officials told us they did not do a new cost-benefit analysis for their report.

Additional Studies Not Discussed by NHTSA Also Indicated That Periodic Inspection Programs Reduce Accidents

In addition to the information discussed in NHTSA's report, we identified four other studies, all of which indicated an accident-reduction benefit from periodic inspection programs:

- Florida officials provided us two studies showing that the percentage of accidents caused by vehicle defects decreased when periodic inspections were begun, and increased when the inspection law was repealed.
- In comments submitted to NHTSA for its report, the Illinois Department of Transportation discussed the effect of terminating the semiannual inspection of pickup trucks and vans in 1984. It reported a sharp increase in the rate of accidents and injuries involving pickup trucks and a small increase for vans in the 3 years following repeal.
- A study done at Rutgers University used 12 different variables in a regression analysis of fatal accident data from 1979.[1] The author concluded that inspection programs can reduce fatal accident rates by a significant amount.

[1]Peter D. Loeb, "The Determinants of Automobile Fatalities With Special Consideration to Policy Variables," Journal of Transport Economics and Policy, Sept. 1987, pp. 279-287.

Conclusion

A large majority of the studies NHTSA reviewed, and four additional ones that we identified, indicated that inspection programs improve highway safety. We believe that when all the studies and analyses are considered together, even taking into account their individual limitations, their relative consistency justifies a conclusion that periodic inspection programs reduce accident rates. None of the studies, however, produced a reliable estimate of the magnitude of accident reduction that can be expected from an inspection program. Various studies have placed it as low as less than 1 percent to as high as 27 percent. While it would be reasonable, on the basis of current evidence, for NHTSA to encourage the adoption of periodic inspection programs, states would have a better basis for considering such programs if NHTSA sponsored a carefully controlled research project to estimate their accident-reduction potential. Ideally, such research would follow the accident experience of a randomly selected group of inspected vehicles and a control group of vehicles not subject to inspection.

We discussed our interpretation of the data with NHTSA officials responsible for the 1989 report, who said that their views are now close to ours. According to these officials, NHTSA agrees that periodic inspection programs contribute to highway safety and should be supported.

NHTSA Intends to Resume Its Support of Vehicle Inspection Programs

NHTSA met its obligations under the 1966 legislation to prescribe uniform standards for state inspection programs. However, when the Congress restricted its sanction authority in 1976, the agency chose not to continue promoting vehicle inspection programs. Some states have recently considered initiating or reinstating inspection programs. It also appears that inspection programs could be improved to enhance their contribution to traffic safety. NHTSA could promote and help improve inspection programs by sponsoring research and providing information to states on effective ways to operate inspection programs.

NHTSA Met Its Original Obligations but Has Not Actively Supported Vehicle Inspections Since 1976

After reviewing the history of NHTSA actions under the 1966 legislation, we conclude that NHTSA met its legislative obligations. As required by the Highway Safety Act of 1966, NHTSA issued standards for state highway safety programs, including a requirement that states inspect motor vehicles at least annually. In 1973, NHTSA complied with a requirement in the National Traffic and Motor Vehicle Safety Act of 1966 by issuing specific standards for vehicle inspection. NHTSA was prepared to enforce its safety program standards through federal funding sanctions until the Congress deleted its authority to withhold highway construction funds in the Highway Safety Act 1976 and provided that state safety programs could be approved without meeting every program standard.

NHTSA officials acknowledged that after 1976, the agency did not continue promoting vehicle inspection programs. NHTSA sponsored only one more piece of original research: a study in Idaho that showed that the condition of vehicles' brakes, steering, and suspension deteriorated after inspections were discontinued in the state in 1977. In 1978, NHTSA abolished the office responsible for vehicle inspection.

NHTSA's withdrawal from the area of periodic inspection may have reflected its earlier reservations about inspection programs. As early as 1972, NHTSA testified before the Senate Commerce Committee that it was skeptical about the effectiveness of vehicle inspection programs. While acknowledging that four studies from the 1960s had shown positive correlations between inspection programs and lower traffic fatality rates, NHTSA said that more recent data did not support such a relationship. It said that an analysis with more variables was needed to determine whether inspection programs reduce fatalities. NHTSA's subsequent actions, issuing vehicle-in-use inspection criteria and beginning the sanction process to enforce safety program standards, were taken under pressure from court orders.

NHTSA officials believe their withdrawal from the area was supported by comments they received from states in 1981. The Congress had directed NHTSA to determine by rulemaking which of its 18 state safety programs should be eligible for continued federal funding. When vehicle inspection was not one of the programs the states identified, NHTSA assigned it to the category of non-priority programs. A NHTSA official commented recently that the agency may have misinterpreted this response, since inspection programs are generally self-supporting and do not require federal funds.

Of the 11 states that initiated periodic inspection programs from 1967 through 1969, 7 repealed their programs after NHTSA's authority to withhold highway construction funds was deleted by the Highway Safety Act of 1976. No states have initiated mandatory safety inspection programs since 1969. Florida and Colorado officials told us that safety testing may be reinstated in the near future, while Connecticut has initiated demonstration safety inspection facilities. Michigan's written comments for NHTSA's 1989 report indicated a possible interest in starting a periodic safety inspection program. In Missouri, on the other hand, the state's inspection program has been questioned in the state legislature.

Several state officials told us that NHTSA could be helpful by sponsoring research to test new technologies and determine the most effective approaches to vehicle inspection. They also said there is a need to disseminate information on state program experiences. For example, Pennsylvania and New Jersey officials said that information on the hazards of modified (raised) vehicles would be useful to many states. Other states might also profit from New Jersey's approach of using its inspection procedure to check drivers' licenses, registrations, license plates, and mandatory insurance coverage.

Inspection Programs Could Be More Effective

As NHTSA pointed out in its report, existing state inspection programs vary in their effectiveness. For example, Pennsylvania allows its licensed private garages to charge one-half hour of shop labor for an inspection and requires removal of two wheels and a road test for brake inspection. Pennsylvania rejects about 17 percent of its vehicles for brake problems. Virginia requires its licensed private garages to pull one wheel but some pull two anyway. Virginia's stations found a 25-percent deficiency rate for brakes. By improving its monitoring of stations, Virginia raised its overall vehicle rejection rate from 22 percent in 1982 to 34 percent in 1986, and recorded a 48-percent decline in accidents that it attributed to vehicle defects over the same period. New Jersey charges

$2.50 and takes about 5 minutes to move a vehicle through its state-operated safety lanes, including a brake test on an old style of platform tester. New Jersey does not pull wheels and rejects about 12 percent of vehicles for brake problems (including the parking brake).

Some officials believe that more effective and efficient testing can be achieved with the application of new technology. For example, Florida has contracted with private companies to build and operate facilities for its required emissions testing. Each facility must include one lane which offers free voluntary safety tests using modern equipment for detecting the wear of brakes, steering linkage, and alignment. Florida officials hope to build public support for reinstatement of periodic safety inspections. Connecticut, which does not require safety inspections, has a pilot project to demonstrate the operation of safety inspection facilities using modern testing equipment.

For states which rely on private garages to perform inspections, vigorous monitoring and adequate fees are important for an effective program. Studies have shown that lax inspections are more often a problem than unneeded repairs. Indiana and Colorado officials told us that public support for their programs was undermined by reports of perfunctory inspections and garage owners selling inspection stickers without performing the inspections. Indiana had 19 state police officers assigned to monitor 4,500 stations. In the final years of the program, they spent much of their time investigating allegations of stickers being sold without inspections.

As previously mentioned, some states have set very low inspection fees. Political considerations may make it difficult to raise fees, but such states run a risk of losing the credibility of their inspections. If inspection fees are too low, garage owners may be tempted to do lax inspections or to reject vehicles unnecessarily in hopes of getting repair orders. Ideally, the fee should be set high enough to cover the cost of a legitimate inspection that would enhance highway safety and also give the individual motorist timely advice about the condition of safety-related equipment on his or her vehicle.

Conclusions

The experience of 11 states which initiated programs in the late 1960s under threat of federal funding sanctions demonstrated the importance of building public support for inspections. Seven of these states repealed their programs when the threat was lifted in 1976. State officials told us that NHTSA's lack of a positive stance on the value of periodic inspection

programs has made it more difficult to develop support for inspection programs.

NHTSA met its original legislative obligations, but it could do more to support inspection programs by taking a positive position, supporting research, and providing information services to the states. Through such efforts, NHTSA could help improve the effectiveness of existing programs and encourage other states to initiate or reinstate periodic inspections.

Recommendation

We recommend that the Secretary of Transportation direct NHTSA to support periodic motor vehicle inspection through such actions as (1) sponsoring research that would assist states considering the initiation or reinstatement of inspection programs, (2) assisting inspection states so that they share their experiences and adapt to changing automotive technology, and (3) promoting public awareness of the need to properly maintain the safety-critical components of vehicles.

Agency Views

As requested, we did not obtain official agency comments on a draft of this report. However, we discussed the report's contents with NHTSA officials, and they generally agreed with our findings. We incorporated their clarifying comments as appropriate. They indicated that NHTSA has reconsidered its position on the value of periodic motor vehicle inspections and that NHTSA now welcomes suggestions for activities it can undertake in support of inspection programs.

States Requiring Periodic Vehicle Inspections

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

Principal Studies Discussed in NHTSA's Report

The following eight studies compared the condition of safety-related components on vehicles subject to periodic motor vehicle inspections with those in non-inspection jurisdictions:

1. McCutcheon, Robert W. The Influence of Periodic Motor Vehicle Inspection on Mechanical Condition. Ann Arbor: Highway Safety Research Institute, July 1968.

This study compared vehicle condition in the metropolitan areas of Washington, D.C.; Cincinnati, Ohio; and Memphis, Tennessee, which required inspections, to non-inspection Ann Arbor, Michigan. It showed that inspection leads to better maintained vehicles and that the condition of the vehicles improves with the frequency of inspection.

2. Fisher, Franklin G., Jr., Randolph Eidemiller, and Peter Biche. Vehicle-in-Use Safety Standards Study: Summary and Final Report (also 12 other vols.). NHTSA Reports DOT HS-800 559, 560. Newport Beach, Calif.: Ultrasystems, Aug. 1971.

By comparing various inspection and non-inspection areas, this study found that inspection states had fewer vehicle component defects. The areas included were six diagnostic centers in California, one in Pennsylvania, one in NewJersey, and two city inspection stations in Washington, D.C.

3. Fisher, Franklin G., Jr., Peter Biche, and Randolph Eidemiller. Status of Vehicle-in-Use Study: Summary Final Report and Final Contract Report. NHTSA Reports DOT HS-800 894, 898. Newport Beach, Calif.: Ultrasystems, July 1973.

The non-inspection states in this study, Alabama, Connecticut, Illinois, Maryland, and Washington, had higher defective vehicle component rates than the inspection states in the previous study. However, Missouri had higher defective component rates despite its inspection program.

4. Hatch, William, James De Armon, and Cheryl Louie. State Inspection Program Evaluation and Data Analysis: Vol. I, Summary Report; Vol. II, Technical Report. NHTSA Reports DOT HS-802 149, 150. Silver Spring, Md.: Automated Sciences Group, Inc., Dec. 1976.

By comparing selected inspection and non-inspection states using NHTSA's mobile inspection van, this study found that 16 components

were defective less often in inspection states and 6 were defective less often in non-inspection states. The mobile inspection van sampled five cities in each of the following six states: California, Illinois, Maryland, Missouri, Pennsylvania, and Texas.

5. Innes, Joseph J. and Leslie E. Eder. Motor Vehicle Diagnostic Inspection Demonstration Program-Summary Report. NHTSA Report DOT HS-802 760. Washington: Department of Transportation, Oct. 1977.

By comparing the inspection and non-inspection states of Alabama, Arizona, the District of Columbia, and Puerto Rico, this study found vehicle condition in inspection states to be better than in non-inspection states.

6. Eder, Leslie E., Noel Bleich, and Mario Damiata. The NHTSA Trial Substitute Motor Vehicle Inspection Programs. NHTSA Technical Report DOT HS-803 535. Washington: NHTSA, July 1978.

The authors found that Cincinnati, which required inspections, had fewer vehicles with defects than did the rest of Ohio. Memphis and Chattanooga, with inspection programs, had fewer defective vehicles than non-inspection Knoxville.

7. Final Report on Motor Vehicle Inspection Experiment. California Highway Patrol. Sacramento: Dec. 1974.

This study is a comparison of vehicle defects in areas with different levels of random inspection in the state of California. It found that vehicles in counties with more frequent random inspections tended to be in better condition.

8. Eder, Leslie E. Impact of Discontinuing Idaho's Periodic Motor Vehicle Inspection Program (A Before and After Outage Rate Study). NHTSA Technical Report DOT HS-803 535. Washington: NHTSA, July 1978.

By comparing vehicle condition before and after Idaho repealed its inspection law in 1976, this study found that repeal had a somewhat negative effect on vehicle condition.

The following is the Indiana study of accident causation and the role of vehicle component failures in accidents:

1. Treat, John R. and Ricky L. Stansifer. "Vehicle Problems as Accident Causes—An Overview of Available Information," SAE Paper 770117. Warrendale, Pa.: Society of Automotive Engineers, Mar. 1977.

In this study, in-depth follow-up accident investigations were conducted by multidisciplinary teams in Monroe County, Indiana. It concluded that vehicle defects were definitely causal or severity-increasing in 4.5 percent, probably causal or severity-increasing in a further 8.1 percent, and possibly causal or severity-increasing in a further 12.6 percent of the 420 crashes studied.

The following three studies compared the rate of vehicle defects cited in accident reports:

1. Costs and Benefits of Motor Vehicle Inspection. NHTSA, Office of State Vehicle Programs. NHTSA Technical Note DOT HS-801-614. Washington: NHTSA, Jan. 1975.

This analysis showed a decline in crashes involving defective vehicles in Nebraska and Texas after inspection laws were enacted in those states.

2. Eder, Leslie E., Noel Bleich, and Mario Damiata. The NHTSA Trial Substitute Motor Vehicle Inspection Programs. NHTSA Technical Report HS-803-535. Washington: NHTSA, July 1978.

By comparing crashes caused by vehicle defects in Cincinnati, which required semiannual inspections, to Ohio as a whole, which had a random inspection program, this study showed that fewer crash-involved vehicles had defects in Cincinnati.

3. O'Day, James and William L. Carlson. "Detection of Defects in Accidents." SAE Paper 730584. Warrendale, Pa.: Society of Automotive Engineers, 1973.

By comparing vehicle defect-related crashes on the Ohio Turnpike, Pennsylvania Turnpike, Indiana Turnpike, and in the state of Texas, this study found that the areas with a periodic inspection program had fewer crash-involved vehicles with defects.

The following two NHTSA data analyses compared accident reports from inspection and non-inspection states:

1. "Analysis Using CARDfile," Study of the Effectiveness of State Motor Vehicle Inspection Programs. Washington: NHTSA, Aug. 1989, p. 45.

By comparing accident reports from two inspection states (Pennsylvania and Texas) and two non-inspection states (Maryland and Washington), the authors found that the non-inspection states reported a significantly higher percentage of defects on crash-involved vehicles. The difference between the states was largest for older vehicles.

2. "Further Analysis Using FARs Data," Study of the Effectiveness of State Motor Vehicle Inspection Programs. Washington: NHTSA, Aug. 1989, p. 49.

By comparing fatal accident reports from all inspection and non-inspection states, the authors found that vehicles involved in fatal accidents had more defects in non-inspection states than in inspection states.

The following six prior studies compared fatal accident rates between states with and without inspection programs:

1. Mayer, Albert J., and Thomas F. Hoult. Motor Vehicle Inspection: A Report on Current Information, Measurement, and Research. Detroit: Wayne State University, Institute for Regional and Urban Studies, Jan. 1963.

In this comparison of death rates per mile traveled during the period 1948-59, the authors reported that states with state-operated inspection programs had lower death rates than did states with other inspection systems, which in turn had lower death rates than states with no inspection systems.

2. Buxbaum, Robert C. and Theodore Colton. "Relationship of Motor Vehicle Inspection to Accident Mortality." American Journal of Public Health 197 (1). July 1966, pp. 101-107.

In this analysis of 1960 traffic death rates among men aged 45-54, the authors reported results favorable to periodic inspection programs.

3. Little, Joseph W. The Fallacy of Evaluating Periodic Motor Vehicle Inspection by Death Rates. Ann Arbor: Highway Safety Research Institute, 1968.

By comparing death rates in six states that introduced periodic inspection after WWII, six states that already had inspection programs, and six states that never had programs, the author found inspections to have no effect on death rates. He also concluded that fatal crash rates are not a good measure for evaluating the effectiveness of inspection programs.

4. Wort, Larry F. "Periodic Motor Vehicle Inspection: Its Accident Prevention Potential, Costs, and Benefits." Springfield: Illinois Department of Transportation, Apr. 1976.

By analyzing death rate trends in inspection and non-inspection states from 1949 to 1973, the author found that the trend had changed in 1968 to favor the non-inspection states for the last 5 years of his series.

5. Motor Vehicle Inspection. Harrisburg, Pa.: Pennsylvania Office of Budget and Administration, Jan. 1981.

This is a regression analysis of state injury and crash data. The authors did not find significant differences between inspection and non-inspection states when controlling for other important factors.

6. An Assessment of Pennsylvania's Periodic Motor Vehicle Inspection System. Pittsburgh: Carnegie-Mellon University, Program in Engineering and Public Affairs, Dec. 1975.

This study found that random-inspection states had the lowest fatality rates in relation to miles traveled, followed by states with semiannual inspection, states with annual inspection, and states with no inspection program.

The following two studies compared accident rates within single states:

1. Schroer, Bernard J. and William F. Peyton. The Effects of Automobile Inspections on Accident Rates. Huntsville, Ala.: University of Alabama, Aug. 1977.

This comparison of crash rates of inspected and non-inspected vehicles in Huntsville, Alabama, found that inspected vehicles had a lower crash rate, estimated at between 9 and 21 percent.

2. Jackson, Barry, Peter D. Loeb, and Karen A. Franck. Comprehensive Analysis of the New Jersey Motor Vehicle Inspection System. Newark: New Jersey Institute of Technology, Aug. 1982.

This is a regression analysis that uses data from 1929 to 1979 in the state of New Jersey. The authors concluded that the existence of an inspection program saved an average of 304 lives and avoided 37,910 crashes per year.

The following three data analyses compared accident statistics among states:

1. "Comparison of Fatal Crash Rates Across Model Years in a One-Year Crash Period," Study of the Effectiveness of State Motor Vehicle Inspection Programs. Washington: NHTSA, Aug. 1989, p. 39.

By using fatal accident crash data from 49 states, the authors concluded there is no clear indication that crash involvement rates across vehicle model years are consistently different in non-inspection states and inspection states.

2. "Comparison of Fatal Crash Rates Across Crash Years," Study of the Effectiveness of State Motor Vehicle Inspection Programs. Washington: NHTSA, Aug. 1989, p. 41.

Comparing fatal accident rates of 1975 vehicles from 1975 to 1986, the authors found no trends favoring inspection states as the vehicles got older.

3. "Analysis of Total Crash Involvement Rates," Study of the Effectiveness of State Motor Vehicle Inspection Programs. Washington: NHTSA, Aug. 1989, p. 43.

NHTSA found that 4 inspection states had a 17-percent lower total accident rate than 6 non-inspection states. After adjusting the data, NHTSA concluded that there was no evidence in the data examined to suggest that periodic motor vehicle inspection programs affect the crash involvement rates of older vehicles compared with newer vehicles.

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