

# The Mortality Consequences of Raising the Speed Limit to 65 MPH on Rural Interstates

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**Abstract:** As of April 1987, states were permitted to raise the speed limit on rural interstates to 65 mph without incurring federal sanctions; 38 states elected to do so in 1987. Fatality data for the months when the new limit was in effect in 1987 were compared with fatalities in the same months of 1982–86 on rural interstates and other rural roads. Fatalities on rural interstates in the states with increased

speed limits in 1987 were conservatively estimated to be 15 percent higher than they would have been if the states had retained the 55 mph limit (95% CI = 6, 24). Among states that retained the 55 mph limit, fatalities on rural interstates were 6 percent lower than expected (95% CI = -23, 13). (*Am J Public Health* 1989; 79:1392–1395.)

## Introduction

Speed limit laws, which date back to 1901, have traditionally been the responsibility of the states. However, in 1974, Congress responded to the oil embargo by directing the US Department of Transportation to withhold highway funding from states that did not adopt the national maximum speed limit of 55 mph (PL 92-239 and 93-643).

The National Research Council (NRC) attributed 4,000 fewer fatalities from 1973 to 1974 to the decreased speeds. Despite some increases in travel speeds since 1974, the NRC concluded that in 1983 the 55 mph speed limit was responsible for approximately 3,000 fewer fatalities, 3,500 fewer serious, severe, and critical injuries, and 47,000 fewer minor and moderate injuries.<sup>1</sup> The NRC estimated that returning the speed limit on rural interstates to their pre-1974 level in all states would result in 500 more fatalities annually, a 20–25 percent increase on these highways.<sup>1</sup>

In 1987, Congress enacted the Surface Transportation and Uniform Relocation Act (PL 100-17), which allowed states to increase the speed limits on rural interstate highways up to 65 mph. By the end of 1987, 38 states had raised their speed limits on rural interstates to 65 mph. Two additional states, Georgia and Virginia, followed suit in 1988. The District of Columbia, Delaware, and Alaska had no eligible miles of highway, leaving eight states with eligible mileage that have not increased speed limits (Figure 1). In December 1987, Congress established a four-year demonstration project that expanded the list of eligible highways to include turnpikes and other highways that meet federal interstate standards. Consequently, Alaska increased the speed limits to 60 mph on some roads, and some other states raised the speed limit on non-interstate rural roads.

Recent observational studies in several states found that, although the previous 55 mph speed limits had been exceeded frequently, the increased speed limits resulted in more motorists traveling at faster speeds.<sup>2</sup> In New Mexico, the percentage of passenger cars exceeding 65 mph went from 37 percent in the first month of implementation to 61 percent in the eighth month; the percentage of passenger cars exceeding 70 mph quadrupled, from 5 percent to 21 percent. In Virginia, the percentage of passenger cars exceeding 65 mph went from

26 percent immediately before the change to 54 percent immediately after, and the percentage exceeding 70 mph went from 7 to 15 percent.<sup>3</sup>

The National Highway Safety Administration (NHTSA) issued a report in January 1989 on the effects of the higher speed limit. NHTSA noted that it was too early to assess the long-term impact of the new speed limit on highway safety. However, the most sophisticated of the report's analyses (a regression model that controlled for fatalities on other roads, and the change in rural interstate mileage, for each year since 1975) indicated that rural interstate fatalities were 16 percent higher than expected.<sup>4</sup>

An American Automobile Association (AAA) sponsored analysis of the effect of the 65 mph limits in Indiana showed no effect on fatalities.<sup>5</sup> However, individual state analyses can often be misleading because the number of crashes on rural interstates are few and the statistical variation associated with these counts can be quite large. In Indiana, for example, there are about 90 fatalities annually on rural interstates. By chance, this count would vary by as much as 20 percent (the standard error of a Poisson distribution with a mean of 90 is  $\pm 9.5$ ). Further, one month after the speed limit was raised, Indiana's mandatory seat belt use law went into effect, and the AAA analysis did not adequately address this change.

This paper presents analyses of fatalities on highways with increased speed limits for the 38 states that raised limits in 1987. By including all these states, the analysis minimizes the problem of statistical unreliability inherent in individual state analyses. In addition, to help control for other contemporaneous changes that might affect fatal crashes on rural interstates, the analysis also examined the fatal crash experience on other roads that might be expected to respond

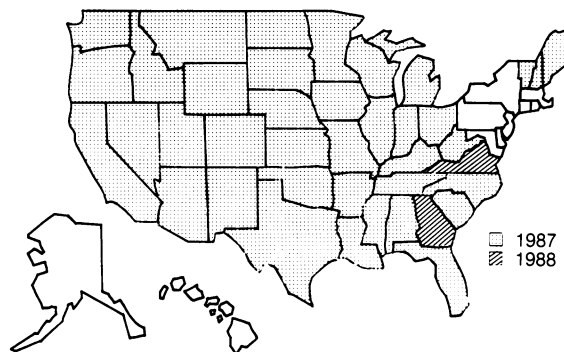


FIGURE 1—States with 65 MPH Speed Limits on Rural Interstates

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similarly to many of these changes. Fatality data for the months of higher limits in 1987 were compared to the average for the same months during the previous five years.

### Method

Fatality data are from the Fatal Accident Reporting System (FARS), the federal data base of detailed reports on all fatal motor vehicle crashes on public roads in the United States.<sup>6</sup> States enacted the higher speed limits on various dates throughout 1987 (Table 1). As shown in the table, fatalities on rural interstates in 1987 were counted for each state for all months following the month in which the speed limit was raised to 65 mph. For example, in Alabama where the increased limit became effective on July 20, fatalities were included for August through December. The month in which the change occurred was excluded because of possible delays in posting signs. Rural interstate fatality counts were also obtained for the same calendar months in each of the previous five years, 1982–86. Both overall fatality counts and counts of fatalities among occupants of passenger vehicles (cars, light trucks, and vans) were examined.

Under the 1987 law, a state can post a 65 mph limit on a "highway on the interstate system located outside of an urbanized area of 50,000 or more persons." This definition of eligible highways does not correspond exactly with the highway designations used in FARS; all interstates in FARS

that are coded as rural meet the Act's definition, but a small percentage of FARS designated urban highways also meet the definition. However, because 96 percent of the interstate highway miles eligible to be posted at 65 mph are rural interstates as defined by FARS, and 97 percent of these eligible miles were posted at higher limits, these highways were used to represent those with 65 mph limits.<sup>4</sup> An alternative way to count fatalities was to tabulate using the actual posted speed limit recorded in FARS to indicate eligible highways; however, this approach would have precluded comparisons prior to 1987.

Because motor vehicle crash fatalities fluctuate from year to year for a variety of known and unknown reasons, changes observed on rural interstates might be due to other trends in motor vehicle crashes. Therefore, fatality counts on rural interstates were compared to those on all other rural roads.

The odds that a fatality occurred on a rural interstate road (versus all other roads or all other rural roads) were compared to the same odds averaged over the previous five years (1982–86). The 95 percent confidence limits for this odds ratio were computed by methods given in Fleiss.<sup>7</sup>

The fatality experience of states that increased the speed limit was not compared directly to the experience of states that retained the 55 mph limit. As shown in Figure 1, most states that retained the 55 mph limit are in the densely populated northeast and differ on a number of factors that could affect traffic fatalities. In addition, the fatality experience of these states may have been affected by the spillover of higher speeds from states that changed, thereby making a direct comparison inappropriate. Nevertheless, the fatality experience of the states that retained 55 mph limits was examined for any evidence that changes in the 65 mph states were simply part of a larger national trend. Odds ratios, similar to those for the 38-state analysis, were constructed using data from eight states (Connecticut, Georgia, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, and Virginia) that had 55 mph limits and at least 25 miles of rural interstate highway. Fatalities were counted only during the months of May through December to simulate a speed limit change in April of 1987. If there were no larger national trend in rural interstate fatalities in 1987, this odds ratio would be expected to equal unity.

### Results

The numbers of fatalities on rural interstates during the months with higher speed limits in 1987 and the same months in 1982–86 for the 38 states with changed limits are shown in Figure 2. This figure shows that fatalities on rural interstates posted with 65 mph limits in 1987 were considerably higher than in any of the previous five years.

Although the number of fatalities on rural interstates increased slightly over the five baseline years, a similar trend was also found for the control series of fatality counts on other rural roads. The yearly odds of fatalities on rural interstates compared to other rural roads remained fairly constant until 1987. Specifically, for 1982 through 1986, the ratios were 0.097, 0.106, 0.109, 0.107, and 0.100, respectively.

There were 19 percent more fatalities on rural interstates in 1987 than the average for the previous five years, while there were only 4 percent more fatalities on other rural roads. For all fatalities, the odds of death on rural interstates versus other rural roads were 15 percent (95% CI = 6, 24) greater in

TABLE 1—Effective Dates for 65 mph Speed Limit and Months of Data Included in Analysis, 38 States

State	1987 Effective Date	Analysis Months
Alabama	July 20	August–December
Arizona	April 15	May–December
Arkansas	April 20	May–December
California	May 28	June–December
Colorado	April 6–10	May–December
Florida	April 27	May–December
Idaho	May 2	June–December
Illinois	April 27	May–December
Indiana	June 1	July–December
Iowa	May 12	June–December
Kansas	May 14	June–December
Kentucky	June 8	July–December
Louisiana	April 8	May–December
Maine	June 17	July–December
Michigan	November 29	December
Minnesota	June 17	July–December
Mississippi	April 14	May–December
Missouri	May 1	June–December
Montana	April 16	May–December
Nebraska	April 27	May–December
Nevada	April 13	May–December
New Hampshire	April 16	May–December
New Mexico	April 2	May–December
North Carolina	August 10	September–December
North Dakota	April 16	May–December
Ohio	July 15	August–December
Oklahoma	April 6	May–December
Oregon	September 27	October–December
South Carolina	July 15	August–December
South Dakota	April 15	May–December
Tennessee	May 8	June–December
Texas	May 9	June–December
Utah	May 21	June–December
Vermont	April 21	May–December
Washington	April 20	May–December
West Virginia	April 20	May–December
Wisconsin	July 17	August–December
Wyoming	May 19	June–December

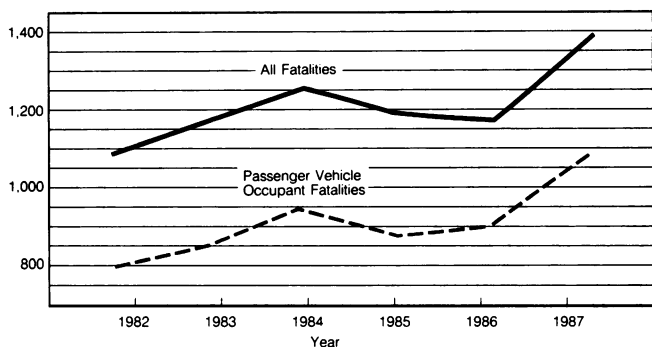


FIGURE 2—Fatalities on Rural Interstates during Months of Higher Speed Limits in 1987 and Same Months in 1982–86

1987 than the average for 1982–86 (Table 2). If all other roads are used for the comparison, the ratio yields a 16 percent effect.

The odds ratio for passenger vehicle occupant deaths showed a similar increase—16 percent (95% CI = 6, 28). There were 25 percent more passenger vehicle occupant fatalities on rural interstates in 1987 than the average of the previous five years, while on other rural roads the increase was only 8 percent. When all other roads were used as the comparison group, the odds for passenger vehicle occupant fatalities on rural interstates were 17 percent higher than expected.

A number of other factors that might affect the relation between speed limit changes and fatalities were also examined. These factors included different speed limits for cars and trucks, mandatory seat belt laws, daytime (6 am–9 pm) versus nighttime crashes, and the proportion of single or multiple vehicle fatal crashes. These analyses were done by subdividing the data for rural interstates and other rural roads for all fatalities by the appropriate factor and comparing the odds ratios. The estimated effect of 14 percent for the eight states with different speed limits for cars and trucks (California, Illinois, Michigan, Missouri, Ohio, Oregon, Texas, and Washington) was similar to the 15 percent effect for states with uniform limits. The effects were also similar in states with belt use laws (15 percent) and without belt laws (13 percent). For daytime and nighttime crashes, the effects were also similar (16 percent and 14 percent). The effect for fatalities involving single vehicles was 17 percent, and for fatalities involving multiple vehicles it was 10 percent. A test for homogeneity of the odds ratios was not significant implying no difference between the odds ratios.

The analysis for the eight states that retained 55 mph

limits in 1987 indicated no effect during the comparison period. There was a 4 percent increase in all fatalities on rural interstates, but this was offset by an even larger increase on other rural roads (12 percent). The estimated odds ratio was 0.94 (95% CI = 0.77, 1.13).

Discussion

In the 38 states that set higher speed limits in 1987, fatalities on rural interstates were conservatively estimated to be 15 percent greater than they would have been if the states had retained the 55 mph limit on these roads. Increased fatalities were seen in 24 of the 38 states. In human terms, there were nearly 200 additional fatalities in 1987 during the months when the higher speed limits were in effect. This number will be larger for 1988 because two additional states have raised their speed limits, more miles of highways were eligible, and states will have had a whole year of experience.

In a 1988 interim report on the effect of the higher speed limit, NHTSA had expressed concern that the observed 1987 increase in fatalities began in the months prior to initiation of the higher limits.<sup>8</sup> To test this possibility, an alternative analysis examined fatalities for January through March of 1987 versus those for 1982–86. The odds ratio for fatalities on rural interstates versus other rural roads indicated that fatalities on rural interstates were about 6 percent higher than expected during the first quarter of 1987. Although the odds ratios in Table 2 could be adjusted for this first quarter increase, the odds ratio for the first quarter included 1.0 suggesting that the observed difference was due to random fluctuation. In addition, fatalities during winter months tend to fluctuate greatly from year to year because of varying weather patterns, and the current analysis could not control for these patterns. Moreover, there is the possibility that some drivers began increasing their travel speeds even before the speed limits were raised. Such anticipatory speed increases could have been triggered by news reports and publicity regarding possible federal action in early February and again in March.<sup>9,10</sup> For these reasons, it would have been inappropriate to adjust the estimated effects of the higher speed limits for the nonsignificant differences observed in January through March.

The estimated 15 percent increase in these data is somewhat smaller than the 20–25 percent increase predicted by the NRC partly because of the NRC assumption that all states would return to pre-1974 speed limits, often 70 and 75 mph. Because the energy associated with a crash increases exponentially with the speed of the crash, the likelihood of serious injury and fatality increases very rapidly as travel speeds increase in this range.<sup>11</sup> Therefore, even larger effects

TABLE 2—Number of Fatalities by Road Type and Time Period for All Fatalities and Passenger Vehicle Occupants

	Average 1987 Number	Average 1982–86 Number	Chi-Square Statistic	Odds Ratio	(95% Confidence Limit)
<b>All Fatalities</b>					
Rural Interstates	1,393.0	1,169.2			
vs Other Rural Roads	11,713.0	11,259.2	10.40	1.15	(1.06, 1.24)
vs All Other Roads	19,607.0	19,110.2	13.20	1.16	(1.07, 1.26)
<b>Passenger Vehicle Occupants</b>					
Rural Interstates	1,084.0	864.8			
vs Other Rural Roads	9,321.0	8,632.4	9.53	1.16	(1.06, 1.28)
vs All Other Roads	13,906.0	13,031.8	11.50	1.17	(1.07, 1.29)

than estimated here would have been expected if states had returned to these higher limits.

In addition, the 15 percent increase in fatalities found here probably underestimates the true effect of the 65 mph limits. The effect was measured by comparing the odds of a fatality on rural interstates to other roads. If higher travel speeds on rural interstates spill over onto some of these roads, as suggested by research on speed adaptation, then the number of fatalities would have increased on these other roads as well.<sup>12-14</sup> Such a spillover would reduce the estimated effect (but not the true effect) of the higher speed limits as measured in this analysis.

The NHTSA report highlighted two factors that argued against a large increase in fatalities attributable to the 65 mph speed limits: the states that did not increase their speed limits also had an increase in fatalities on rural interstates and six states accounted for 64 percent of the excess fatalities in 1987.<sup>4</sup> The current analysis examined the odds ratio for the unchanged states for 1982-86 versus 1987 and found rural interstate fatalities were marginally fewer than expected for May-December of 1987 in states that retained 55 mph speed limits. Thus, there is no evidence of a larger national trend toward more fatalities on rural interstates in 1987.

When odds ratios were computed for each state, they were greater than unity in 24 states. Therefore, despite the dominance in the absolute numbers by six states, the trend of higher crash fatalities on rural interstates than on other rural roads was observed in more than three of five states that increased their speed limits. The fact that rural interstate fatality counts were not higher than expected in a minority of states is consistent with the statistical uncertainty associated with analyses of data from individual states.

In summary, the results of this analysis show that the 65 mph limits increased rural interstate fatalities in 1987 by approximately 15 percent, there was no evidence of a similar trend in states that retained 55 mph limits, and the increase

was not limited to only a few states.

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