THE EFFECT OF THE 55 MPH SPEED LIMIT ON MOTOR VEHICLE DEATH RATES IN MARYLAND

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The use of the roadway is of obvious economic concern. The "oil crisis" late in 1973 resulted in the reduction of maximum speed limits in 1974 for the purpose of conserving gasoline. This reduction in speed limits has had other consequences. Goods transported on high speed roadways have incurred higher transportation costs. This reduced speed limit has increased costs to consumers directly as well in the greater length of time consumed in personal trips. Unfortunately for public policy considerations, costs have not been publicized as much as the presumed gains of reduced gasoline consumption and the serendipitous benefit of lower motor vehicle death rates. Any study of the economic impact of the lowered speed limits must include the lives saved as well as reduced gas consumption on the benefit side. This paper examines the available evidence on the effectiveness of the reduced speed limit on motor vehicle deaths in Maryland.

The Federal-Aid Highway Amendments of 1974 voted by Congress in December of 1973 established a national speed limit of 55 MPH to take effect on January 4, 1974. Some states had lowered their speed limits in the last weeks of 1973. For convenience, the entire year of 1973 is represented in the period prior to adoption of a national 55 MPH speed limit while the years 1974 and 1975 are represented as the years in which the 55 MPH speed limit was in existence.

The absolute number of motor vehicle deaths in the U.S. as well as in Maryland has been increasing in an irregular pattern since the end of World War II. In this study, the examination of the absolute number of motor vehicle deaths in Maryland was limited to a five year period; a three year period prior to and a two year period following the imposition of the 55 MPH speed limit.

Primary data in the form of several thousand motor vehicle death records were classified as to place of occurence. Table I classifies motor vehicle deaths which took place on low speed roads and those which took place on roads having speed limits of 60 MPH or greater prior to the imposition of the 55 MPH speed limit.

Since 1973, the absolute number of deaths has declined in low speed as well as in previously high speed roads. Between 1973 and 1974, the absolute decline in total deaths in Maryland was 88, of which 22 occurred on roads which had been high speed. During 1974, deaths declined 21% on previously high speed roads as compared to a decline of only 10% on low speed roads. Before attributing this relatively greater decline in deaths on former high speed roads to the lowering of speed limits, an examination of the change that took place in the preceding year, 1973, a period with the speed limits unchanged, shows an increase in deaths for low speed roads and an absolute decrease of 23 deaths, or a decline of 19%, on high speed roads.

Change in road usage between high speed and low speed roads were not available. However, one would expect that a reduction in the speed limit would reduce some of the advantages of using high speed roads relative to low speed roads and would result in some incremental shift to the use of low speed roads. Therefore, comparisons of the absolute number of deaths before and after the change in speed limits would lead to an overestimate of the reduction in deaths attributable to the lowered speed limit.

TABLE 1

MARYLAND MOTOR VEHICLE DEATHS 1971 - 1975

Year	Total Deaths	Deaths on Routes $<$ 60 MPH Speed Limit	Deaths on Routes $\geq$ 60 MPH Speed Limit Prior to 1974
1971	795	683	112
1972	815	686	129
1973	822	715	106
1974	734	650	84
1975	688	627	61

Sources: Maryland Department of Transportation, Division of Traffic.

Unlike the picture presented by the statistics on absolute number of deaths, motor vehicle death rates have been declining in a consistent pattern. The use of the death rate, death per 100,000,000 motor vehicle miles travelled, avoids the problem of the impact of changes in the amount of travel resulting from periodic shortages and sharply rising prices of gasoline. Death rates for the U.S. and Maryland for a five year period preceding the change in speed limits and the two following years are shown in Table 2. The decline in the death rate for the U.S. from 1973 to 1974 of .66 (deaths per 100,000,000 MVM), a decline of approximately 16%, is three times the average annual decline in the preceding four years.

The National Highway Traffic Safety Administration in the U.S. Department of Transportation indicates that lower speed limits are the largest single factor in the reduction of deaths and account for half of the decline in number of deaths, about 8%. The Statistical Division of the National Safety Council has reported on the sharp decline in the number of deaths for the first four months of 1974 in the U.S. The number of deaths declined by 24%, of which 11% is attributed to the reduction in speed. The

TABLE 2

U.S. AND MARYLAND MOTOR VEHICLE DEATH RATES 1969 - 1975
(Deaths per 100,000,000 Motor Vehicle Miles)

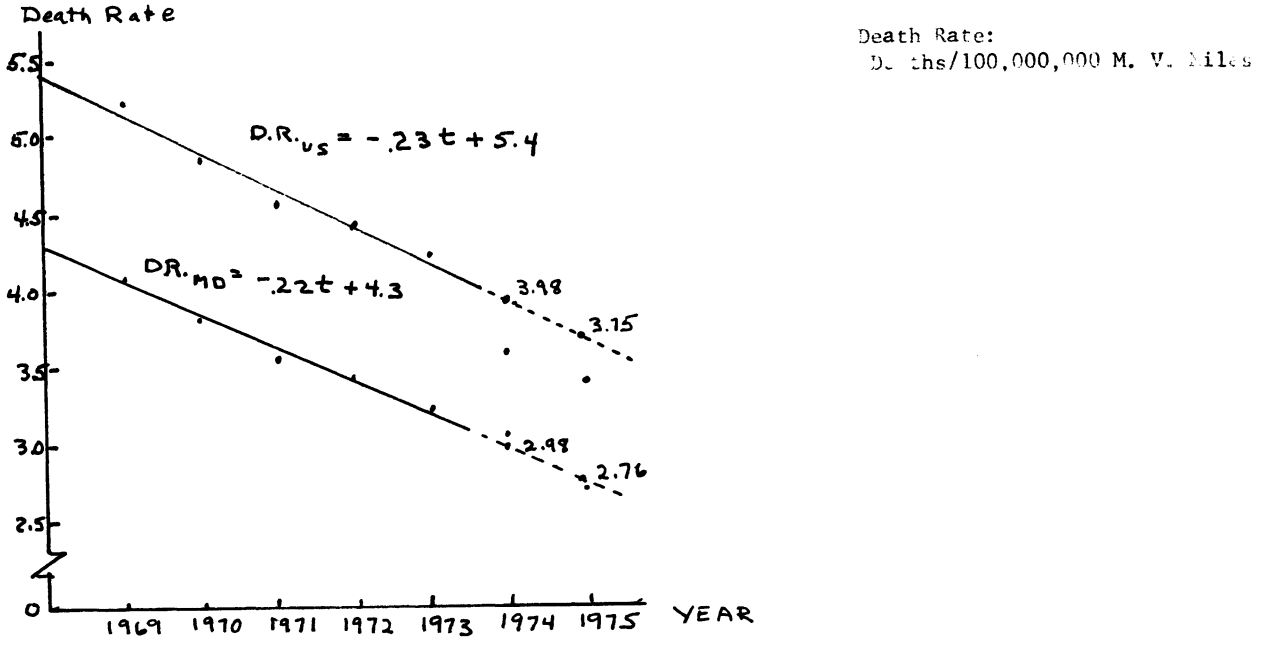
Year	U.S. Death Rate	Maryland Death Rate
1969	5.21	4.10
1970	4.88	3.84
1971	4.58	3.58
1972	4.44	3.45
1973	4.26	3.22
1974	3.60	3.08
1975	3.45	2.73

Sources: U.S. Department of Transportation, Federal Highway Administration, Highway Statistics

National Safety Council, Accident Facts, Annual Issues

FIGURE 1

TRENDS IN MOTOR VEHICLE DEATH RATES IN THE U.S. AND MARYLAND FOR THE FIVE YEAR PERIOD, 1969-1973



method used in the NSC analysis is to partial out each factor that affects motor vehicle fatalities, such as speed reduction, reduction in travel, change of road used and increased use of safety belts. To measure the role of reduced speed, nationally, sample information from previous state studies was used. This information is combined with other accident data to establish the roles of various factors in reducing the death rate.

The pattern of declining death rates for the U.S. and Maryland prior to the imposition of the 55 MPH speed limit is shown in Figure 1. Linear least squares trend lines were fitted to death rates in the U.S. and Maryland for the five year period 1969 to 1973 preceding the 55 MPH speed limit. The correlation coefficients for the U.S. and Maryland fitted lines were .98 and .97 respectively. The general downward trend has been attributed to the continuing improvements in the roadway, safer automobiles and improved driving habits. The 20% lower death rate for Maryland as compared to the U.S. reflects the higher than average degree of urbanization which is associated with lower death rates. It is, however, remarkable that both trend lines have the same approximate slope. However, since the institution of the 55 MPH speed limit, the U.S. death rate has dropped below trend, whereas Maryland's death rate was slightly above trend for 1974 and slightly below in 1975.

Based on trend, the U.S. expected death rate was 3.98 as compared to actual rate of 3.60 in 1974. If we attribute this difference to the lowered speed limits, then this 10% decline below the expected compares favorably with the 11% decline determined by the National Safety Council and U.S. Department of Transportation estimated decline in the death rate of 9%. Using the trend line as above, we estimate the 1975 effect of the lowered speed limits for the U.S. to be 8%.

Examining the trend line for Maryland, we find the actual death rate for 1974 slightly above trend, implying no effect or slight negative effect of the speed limit on death rates. For 1975, however, the actual death rate is about 3% below the expected death rate. Overall it appears that the reduced speed limit has had no appreciable effect on the death rate in Maryland.

A feasible hypothesis is that the differences in decline in death rates among the states is related to the proportion of miles travelled on high speed roads (subject to the reduced speed limit) to total miles travelled. In the West, where a relatively smaller proportion of each state is urbanized, there are generally higher proportions of high speed miles travelled. The reduction in the speed limit will have a greater effect on death rates in those states as compared to states like Maryland that are highly urbanized.

Data on the proportion of miles travelled on high speed roads by state was not available for testing the above hypothesis. However, population density was considered as a proxy, i.e. population density was assumedto be inversely related to the proportion of miles travelled on high speed roads to total miles travelled. Table 3 shows the results of two tests. The first test sorted the 48 contiguous states into the 24 most dense states and the 24 least dense states. The average decline in the death rate between the two year period prior to (1972 and 1973) and the two year period after (1974 and 1975) the imposition of the 55 MPH speed limit was computed for each state and the average decline for the twenty four least dense states was compared to the average decline for the twenty four most dense states. The 24 least dense states show a one-third greater decline than the 24 most dense states.

If we apply the same test to the extremes of the

Table 3

AVERAGE DECLINE IN DEATH RATE BETWEEN 1972-73 AND 1974-75
(States Grouped by Population Density)

	Decline in Death Rate
24 most dense states	.73
24 least dense states	1.05
8 most dense states	.42
8 least dense states	1.37

Sources: National Safety Council, Accident Facts, Annual Issues

U.S. Bureau of the Census, Statistical Abstract of the United States, 1976

distribution, taking the eight least and eight most dense states, the contrast is even more striking with the least dense states showing a three times greater decline. In addition, the Spearman rank correlation coefficient (r_s=.53, p=.001) computed from the above state data strongly supports the relationship between the change in death rates and population density.

These analyses are consistent with the assertion that the reduced speed limits have differential effect with respect to the density of the state. Maryland, a highly dense state with relatively small proportion of miles travelled on high speed roads, shows the expected lower impact of the reduced speed limit.