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Comparison of Motor Vehicle Traffic Death Rate Trends In Iowa, Washington and the U.S.

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Introduction

In a recent study (3) by the author on trends in motor vehicle fatalities, extrapolations were made for 20 years hence. The trends indicated a definite reduction in traffic death rates (deaths per 100 million vehicle miles). The rates and trends were based on data for the 20-year period, 1935-1954. The data used were from official figures published by the National Safety Council (2).

As stated, rates are decreasing, yet we do find annual fluctuations sometimes greater than expected in each state and for the total U.S. for which it is at times difficult to give a satisfactory explanation. In certain instances a particular state may show up very well in its rate for one or two years then regress. When its rate is compared to the total U.S. rate for the same year, it may not be as favorable as it would first appear. The reverse may also be true.

The present study was designed to test the hypothesis that apparent trends in fatality rates are not always indicative of progress or regress being made.

Let us consider the mileage rate reduction for Iowa during the period 1937-1938. During that time there was a reduction in fatalities of from 571 to 486. This is an absolute difference of 85 in number.

State officials, educational institutions, newspapers and others responsible are to be commended for any action on their part that may have led to this reduction. However, there also appeared to be a slight economic recession during that time which may have been a contributing factor. Further, the total U. S. rate was reduced sharply during the same year. (See Figure 1)

Suppose a comparison of the total U.S. rate and the state's rate is made on a ratio or percentage basis. We find that Iowa's reduction was in approximately the same ratio as the U.S. reduction for that year. This is an example of the need for making comparisons by ratios and percentages as will be further developed in this study.

Interpretation of Methods Used

Actual Rates—

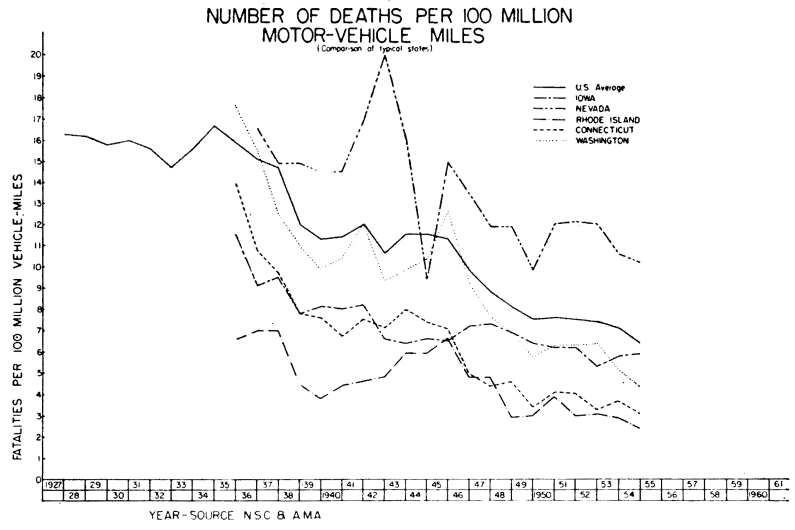
The method being suggested for interpretation of a rate for any state is relatively simple. Iowa and Washington were states chosen to demonstrate this comparison ratio. The actual rate for each year was divided by the total U.S. rate for the same year. A

ratio and percentage are thus obtained which are based on the total U.S. rate as being unity or 100 per cent.

Iowa, in the year 1935, had a traffic death rate of 11.5, compared to a total U.S. traffic death rate of 15.9. For the same year Washington's rate was 17.7. Dividing each by the total U.S. rate of 15.9 yields a ratio of 1 to 0.73 and 1 to 1.11, respectively.

The computation was carried out for Iowa and Washington for the years 1935 to 1954. The results are shown in Table 1.

Figure 1



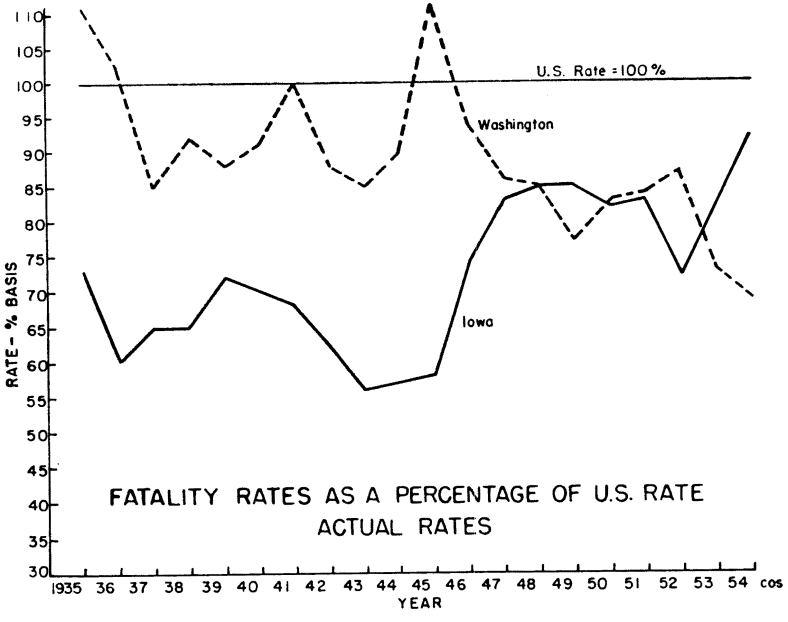
The graphic representation of these data are shown in Figure 2. A solid straight line indicates the total U.S. rate as unity and each year's percentage for the two states according to ratios is shown by a solid line for Iowa and a broken line for Washington.

Extrapolated Rates—

The purpose in this presentation is to show a comparison of actual traffic death rates with the projected logarithmic and reciprocal rate trends. Data from Iowa only is used to illustrate. The same precedure could be applied in a like manner to any of the other states once the constants have been computed.

By using reciprocal or logarithmic trend as unity, the actual rates may be considered as deviations from the extrapolations. Using the year 1935, the actual rate for Iowa (11.5) was divided by the extrapolated reciprocal rate (9.42) and the logarithmic rate (9.38), to obtain the values of 1:1.22 and 1:1.23. These are expressed in percentages, 122 and 123 per cent, respectively. These values thus indicate the percentage deviation of the actual from the extrapolated trend values.

FIGURE 2



A graph of each percentage as determined for the years 1935 to 1954 is shown in Figure 3. In this instance it will be noted that each extrapolated trend varies in the same direction from the base line of 100 per cent. The reciprocal trend appears to be the better of the two extrapolations as shown by the least squares method. Figure 3 indicates further this fact.

Summary and Conclusions

The fatal accident records of many states show a noticeable reduction in the fatality rate per 100 million vehicle miles during any given year, or over a period of years. The specific factors which account for the reduction in rate are not always known. More than likely in each instance, there are a number of contributing causes or reasons and some are mere chance fluctuations.

It is probably unsafe to assume that specific reasons have been established and to place complete reliance upon them as those alleged to operate may not be sound. A search for contributing factors should be made when a rate increase continues in one direction for succeeding years. This is one of the problems which public safety officials have to solve, although frequently the approach made is very unscientific.

Neither is it clear whether variations noted are real or whether they are artifacts. By determining trend curves based upon some substantial hypothesis a way may be established for evaluating

Table 1

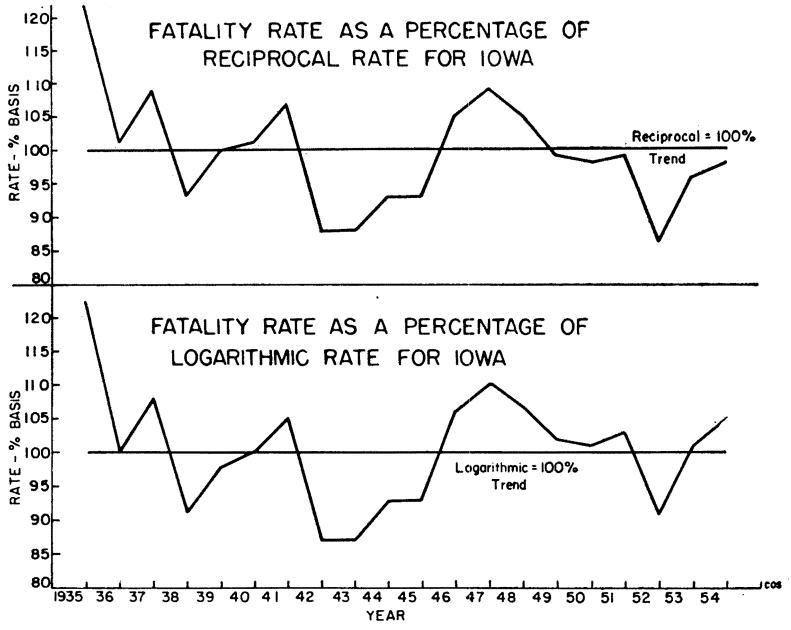
Comparison of Actual and Extrapolated Fatality Rates on a Percentage Basis for Iowa, Washington and the U. S.

	Actual Rates*					Rates on Curve Fitted** (Iowa only)			
Year	Iowa	Wash.	U. S.	*Iowa* / U. S. in Per Cent	*Wash.* / U. S. in Per Cent	Rate Reciprocal Trend	Rate Log Trend	*Actual* Recip. Trend in Per Cent	*Actual* Log Trend in Per Cent
1935	11.5	17.7	15.9	73	111	9.42	9.38	122	123
1936	9.1	15.4	15.1	60	102	9.04	9.08	101	100
1937	9.5	12.5	14.7	65	85	8.70	8.79	109	108
1938	7.8	11.0	12.0	65	92	8.40	8.53	93	91
1939	8.1	9.9	11.3	72	88	8.13	8.26	100	98
1940	8.0	10.4	11.4	70	91	7.89	8.02	101	100
1941	8.2	12.0	12.0	68	100	7.67	7.78	107	105
1942	6.6	9.3	10.6	62	88	7.48	7.56	88	87
1943	6.4	9.8	11.5	56	85	7.29	7.35	88	87
1944	6.6	10.3	11.5	57	90	7.12	7.15	93	93
1945	6.5	12.6	11.3	58	111	6.97	6.96	93	93
1946	7.2	9.2	9.8	74	94	6.83	6.78	105	106
1947	7.3	7.6	8.8	83	86	6.70	6.60	109	110
1948	6.9	6.9	8.1	85	85	6.58	6.44	105	107
1949	6.4	5.8	7.5	85	77	6.46	6.48	99	99
1950	6.2	6.3	7.6	82	83	6.36	6.13	98	101
1951	6.2	6.3	7.5	83	84	6.26	5.99	99	103
1952	5.3	6.4	7.4	72	87	6.17	5.85	86	91
1953	5.8	5.2	7.1	82	73	6.08	5.72	96	101
1954	5.9	4.4	6.4	92	69	6.00	5.60	98	105

*Fatality rates per 100 million miles from data compiled by the National Safety Council.

**Rates stated in fatalities per 100 million miles vehicular travel.

FIGURE 3



short-time fluctuations which are found in most all empirical data.

The ability to appraise a rate reduction or increase, which ever the case may be, on a comparative basis for rate trends aids in the interpretation of results obtained. Improvement trends of specific states may actually be invalid when natural and general trends are considered.

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2. National Safety Council, Motor-vehicle deaths and death rates for each state and for the U.S. from 1935 to 1954. (Special Bulletin)
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