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<p>16. Abstract</p> <p>Two sources of accident data were used to describe the accident experience of combination vehicles (tractor trailers) over a five-year period. The Fatal Accident Reporting System (FARS), operated by the National Highway Safety Administration, and the highway accident data prepared by the Texas Department of Public Safety form the bases of this study. The accident experience of combination vehicles is contrasted to that of passenger cars throughout the report, and while the document is generally a straightforward presentation of facts from the two data sources, obvious trends and relationships are noted.</p>			
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COMBINATION VEHICLES

Five-Year  
Accident Experience

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July, 1980



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## FIVE-YEAR ACCIDENT EXPERIENCE OF COMBINATION VEHICLES

### Preface

This booklet has been prepared to illustrate the accident experience of combination vehicles (tractor-trailers) and to contrast this with the experience of passenger vehicles. The obvious differences in size and patterns of use between these classes of vehicles make this examination of interest to those concerned with the safety-related phenomena that may be discerned from the accident data.

The facts presented here are generally in the form of univariate distributions, that is, the presentation of frequencies or percentages for the various levels of a single variable. These distributions are presented for a five-year time period so that one may evaluate any trends over that period. It must be noted, however, that adequate explanations of phenomena in the highway safety field can rarely be given in terms of single variables. The tables and figures presented in this document should be used as a starting point for more sophisticated inquiries.

Two sources of data have been used in the generation of this booklet: the Fatal Accident Reporting System (FARS) and the highway accident data prepared by the Texas Department of Public Safety. Each data set contains somewhat different information, and in a sense they complement each other in this presentation. The FARS data are relatively new, the first complete year being 1975, and as a developing system some changes in format and content have occurred over time. FARS represents the best available census of U.S. fatal accidents. The Texas data, while comprising only about six percent of the reported accidents in the country, represent a consistent reporting system over a longer period of time. The latter, then, are used primarily to look at non-fatal accident factors as they may vary with time.

An additional purpose of including both state and national statistics is to permit a comparison of observed trends. Much attention has been drawn to the increase in commercial vehicle accident involvement over the period from 1975 to the present, and there has been speculation that a part of the increase could be attributed to an economic downturn in 1975 which resulted in an unusually low exposure. Further, since most of the evidence for the increase comes from the FARS data, it should be of interest to learn whether the base year of 1975 suffers from incomplete reporting.

On page 62 a trend line showing combination vehicle involvements over the period 1973-1977 indicates that, at least for Texas, the number of such accidents was about 9% lower than expected (from the trend) in the year 1975. If the Texas statistics are assumed to correlate well with actual travel, one might infer that the large increase (about 18%) in FARS-reported combination vehicle accidents from 1975 to 1976 could be partly accounted for by less than normal travel in the earlier year.

As noted above, there have been some changes in the quality of the

FARS files since 1975. Of particular interest to this inquiry is the coding of commercial vehicle types. For this report we have centered on combination vehicles (and a small number of tractors without trailers). In the FARS tabulations by state there are some apparent instances of underreporting, suggesting that coding changes in the later years permitted better identification of combination vehicles. This factor also seems large enough to account for a substantial fraction of the reported 1975-1976 increase. This matter is discussed in more detail in the National section of this report.

We have attempted to minimize transcription errors in the tables by preparing them from computerized files. Hopefully the numbers in the individual tables truly represent the numbers available in the provided data tapes. As to errors in the original data, no great amount of checking has been done. In other work we have observed that occasionally vehicles identified as "combination vehicles" (in both FARS and Texas files) were subsequently reported (in an interview with the driver or owner) to be straight trucks. But the opposite situation also occurred at times. We have no reason to believe that such errors are frequent enough to alter the general inferences that might be drawn from these data.

It is possible, and perhaps likely, that errors of transcription still exist. We plan to produce an updated version of this report as further data become available, and would appreciate notification from readers when errors are discovered.



NATIONAL STATISTICS

FARS Data

1975 - 1979



COMBINATION VEHICLE ACCIDENTS  
IN THE FATAL ACCIDENT REPORTING SYSTEM DATA

This section of the report presents statistical information about the frequency of combination vehicle involvement in the U.S. fatal accidents over the period 1975-1979. The purpose of the following displays is to place the accident statistics in a form to permit some understanding of the nature of the observed increases in such accidents. The 1979 data have been derived from Version 68 of the FARS file, which is missing a major fraction of cases from the last several months of the year. The absolute numbers shown for 1979, then, are probably about 10% too low. The rate entries, however, can be considered reasonably reliable.

The accident section of the FARS data follows this introduction. Generally the information is presented in pairs of tables--the left-hand page showing the count of accidents in each identified group, and the right-hand page showing (as a percentage) the ratio of combination vehicle fatal accidents to all fatal accidents in the same groups. The interpretation of the right hand pages is important. The percentage shown represents the proportion of all fatal accidents which involve combination vehicles for the group identified. For example the last entry on page 9 indicates that in 1979 22.3% of all the fatal accidents in Wyoming involved a combination vehicle. When this statistic is much larger than the average for the year (about 9.5% for 1979) this suggests an overrepresentation worthy of study. Tables are presented for major categories of interest as reported in the FARS program. Following this the data pertaining to vehicles, drivers, and fatally injured occupants are presented in a similar form.

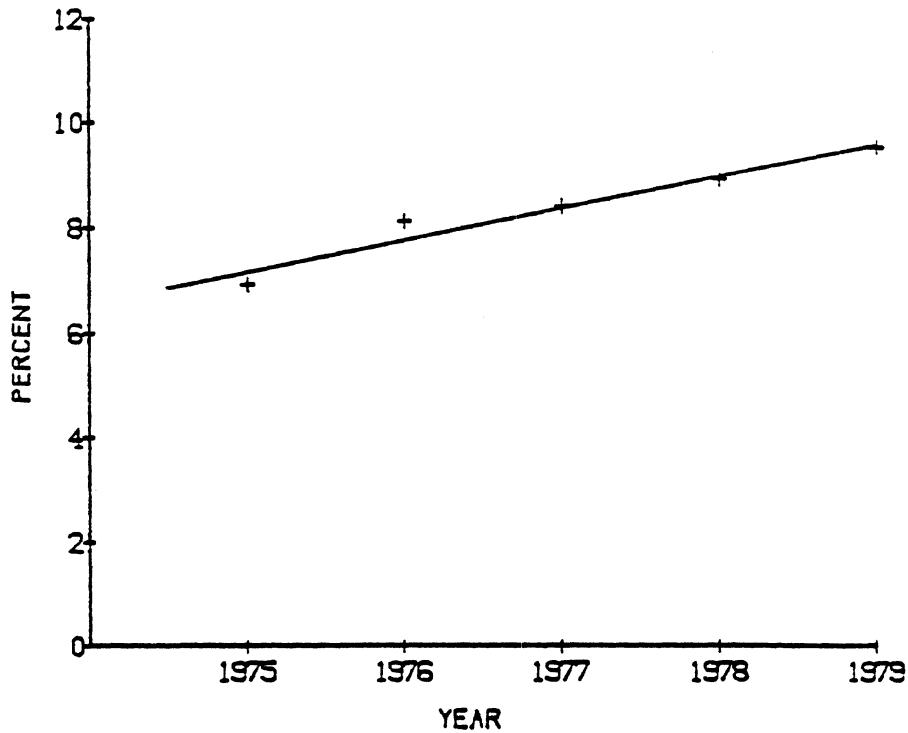
The FARS program has made some changes in definitions from time to time, and, as a result, there are some discrepancies between adjacent years in detail. For example, the definition of cloudy weather was changed to "heavy overcast," with a subsequent reduction in the number of cases in that category from 1976 to 1977. Where appropriate, tables have been footnoted to indicate such changes.

Of greater importance, perhaps, are the changes in FARS reporting practice which are not so obvious. In the state tabulations on pages 8 and 9, there is a remarkable increase in the number of combination vehicle accidents reported for several states between 1975 and 1976, and to some extent between 1976 and 1977. South Carolina, for example, shows only three such accidents in 1975, 37 in 1976, and 63 in 1977. Further inspection of the FARS files suggests that a number of tractor-trailers were probably coded as "unknown type trucks" in the earlier years. Similar circumstances exist for Kentucky, Michigan, Louisiana, Connecticut, and Vermont, although the use of alternate codes seems to vary from state to state. We must conclude that the later years probably have more precise data.

There is a single set of exposure information provided in connection with the summary table at the beginning of this section. These data have come from published FHWA reports, and are intended to serve as a baseline for comparing the increase in accident frequency.

## NATIONAL STATISTICS

For the most part, the increases in accident frequency track with increases in exposure--suggesting that the observed increases can be accounted for by increased travel of combination vehicles over the period displayed. The distributions of the various accident factors have changed little, also supporting the idea that the increase is largely the result of exposure change. Exceptions to this are noted on individual tabulations.



COMB-VEH FATAL ACCIDENTS  
RELATIVE TO ALL FATAL ACCIDENTS

The graph above shows a picture of the overall relation of combination-vehicle fatal accidents to all fatal accidents. The numbers for the points on the graph appear in the table below, and it can be seen that this trend is gradually increasing over the five-year period. The values in the right-hand-page tables from this point in the booklet to page 41 can be compared to the values below to determine the under- or over-involvement of combination vehicles in fatal accidents.

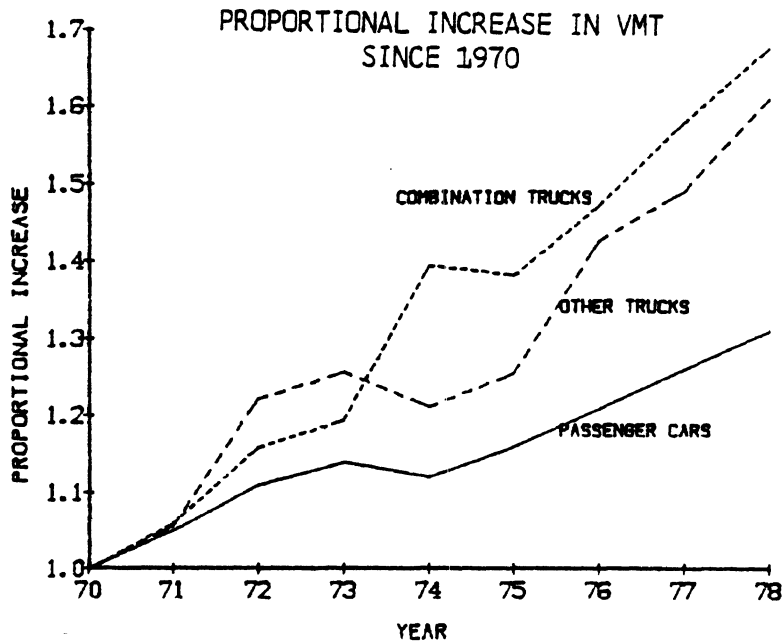
Year	1975	1976	1977	1978	1979
Percent Combination Vehicle	6.9	8.1	8.4	8.9	9.5

Fatal Traffic Accidents in the U.S. for 1975-1979:  
Frequency, Vehicles, and Number of Fatalities

	Year of Accident				
	1975	1976	1977	1978	1979
<u>Number of Accidents</u> . . . . .					
All Fatal Accidents . . . . .	39631	40208	42668	44780	38613
Accidents involving combination vehicles . . . . .	2724	3239	3574	3996	3673
All Other Accidents . . . . .	36907	36969	39094	40784	34940
<u>Number of Vehicles Involved in Accidents</u> . . . . .					
All Vehicles . . . . .	56012	57325	61830	65420	56206
Combination vehicles . . . . .	2897	3418	3788	4231	3774
All other vehicles . . . . .	53115	53907	58042	61189	52432
<u>Number of Persons Killed</u> . . . . .					
Total . . . . .	45021	46020	48375	50728	43674
In combination vehicle accidents . . . . .	3334	3925	4263	4746	4390
In all other accidents . . . . .	41687	42095	44112	45982	39284
<u>Killed in Combination Vehicle Accidents</u> . . . . .					
Combination-Vehicle Occupants . . . . .	678	831	920	971	891
All Others . . . . .	2656	3094	3343	3775	3499

Estimated Billions of Vehicle Miles Traveled (VMT)  
and  
Percentage Increase Since 1970  
for Selected Vehicle Types  
(Source: FHWA)

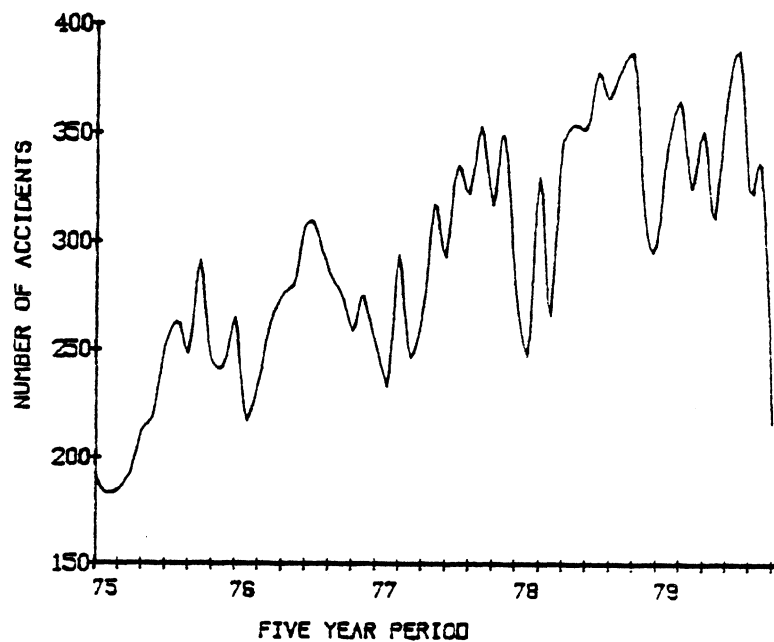
	Year								
	1970	1971	1972	1973	1974	1975	1976	1977	1978
<b>All Passenger Vehicles</b>									
VMT (billions) . . .	906.0	959.3	1008.6	1041.4	1018.1	1055.6	1103.9	1147.1	1194.2
% Increase since 1970	100.0%	105.9%	111.3%	114.9%	112.4%	116.5%	121.8%	126.6%	131.8%
<b>Trucks (Excluding Combination Vehicles)</b>									
VMT (billions) . . .	174.4	184.4	213.1	219.1	211.5	218.9	248.8	260.0	280.6
% Increase since 1970	100.0	105.7	122.2	125.6	121.2	125.5	142.6	149.0	160.8
<b>Combination Vehicles</b>									
VMT (billions) . . .	40.2	42.6	46.6	48.0	56.1	55.6	59.2	63.5	67.3
% Increase since 1970	100.0%	106.0%	115.9%	119.4%	139.4%	138.1%	147.1%	157.8%	167.4%
<b>All Vehicles</b>									
VMT (billions) . . .	1120.7	1186.3	1268.3	1308.6	1285.6	1330.1	1411.9	1476.6	1548.2
% Increase since 1970	100.0%	105.9%	113.2%	116.8%	114.7%	118.7%	126.0%	131.8%	138.1%
<b>Combination Vehicle VMT as a % of All VMT</b>	3.59%	3.59%	3.68%	3.67%	4.36%	4.18%	4.19%	4.30%	4.35%



Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by Month of the Year

Month	Year of Accident				
	1975	1976	1977	1978	1979*
January .	192	265	253	280	299
February	183	217	233	247	345
March . .	185	234	294	330	365
April . .	192	262	246	266	325
May . . .	212	275	265	346	351
June . .	220	280	317	354	311
July . .	251	307	293	352	365
August .	263	305	335	378	388
September	248	286	322	366	324
October .	291	277	353	380	335
November	245	259	317	387	217
December	242	275	349	313	48

\* The 1979 data for November and December were incomplete at the time of preparation of this report.





Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Month of the Year

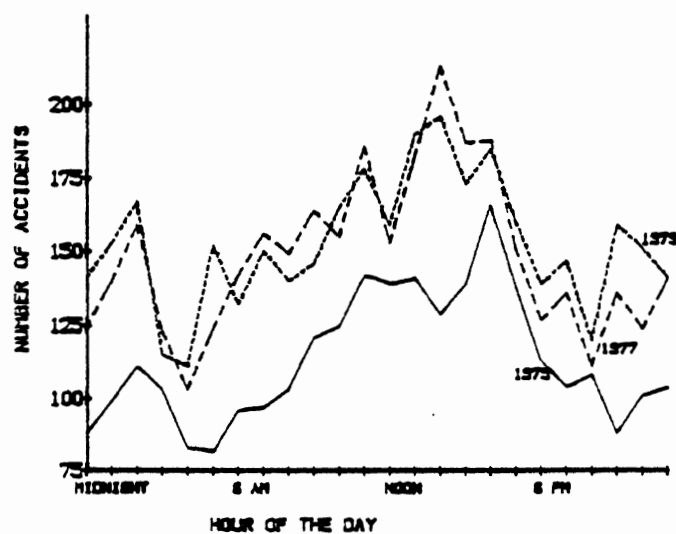
Month	Year of Accident				
	1975	1976	1977	1978	1979
January .	7.0	9.8	10.1	11.3	10.7
February	7.2	8.1	8.8	10.3	12.5
March . .	6.4	8.2	9.4	10.5	10.1
April . .	6.6	8.3	7.4	7.6	8.8
May . . .	6.0	7.6	7.3	8.8	9.1
June . .	6.1	7.9	8.2	8.5	8.0
July . .	6.6	7.6	6.7	7.9	9.0
August .	6.8	7.9	8.1	8.4	9.7
September	7.2	8.0	8.5	8.5	8.0
October .	8.2	7.3	8.6	8.9	10.1
November	7.2	8.2	8.6	10.0	9.8
December	7.3	7.8	9.3	7.8	8.8

+-----+  
 | The average increase in combination vehicle fatal accidents, as the |  
 | regression line in the figure shows, has been about 1% per month |  
 | (based on monthly compounding). |  
 +-----+

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by Hour of Day

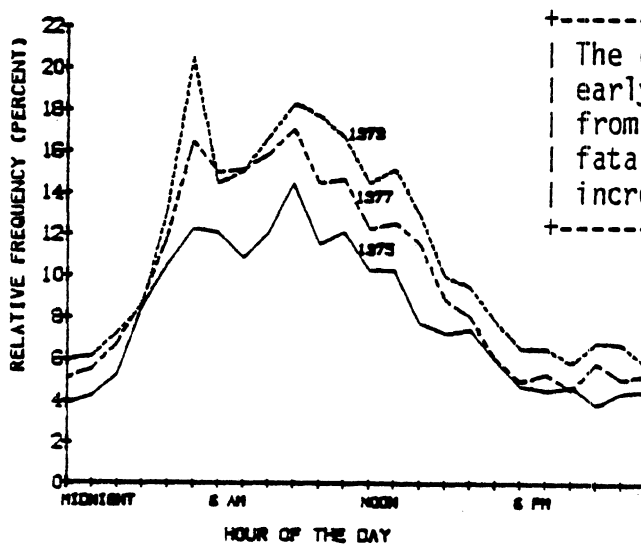
Hour	Year of Accident				
	1975	1976	1977	1978	1979
12:01 am - 12:59 am	88	113	124	156	141
1:00 am - 1:59 am	99	126	140	154	153
2:00 am - 2:59 am	111	150	159	206	167
3:00 am - 3:59 am	103	115	123	109	115
4:00 am - 4:59 am	83	105	103	126	111
5:00 am - 5:59 am	82	105	124	153	152
6:00 am - 6:59 am	96	123	142	136	132
7:00 am - 7:59 am	97	125	156	149	150
8:00 am - 8:59 am	103	132	149	167	140
9:00 am - 9:59 am	121	114	164	142	146
10:00 am - 10:59 am	125	152	155	171	165
11:00 am - 11:59 am	142	150	186	197	178
12:00 pm - 12:59 pm	139	163	153	182	159
1:00 pm - 1:59 pm	141	174	182	186	190
2:00 pm - 2:59 pm	129	194	213	229	196
3:00 pm - 3:59 pm	139	185	187	224	173
4:00 pm - 4:59 pm	166	168	188	202	185
5:00 pm - 5:59 pm	138	135	151	181	160
6:00 pm - 6:59 pm	113	141	127	164	139
7:00 pm - 7:59 pm	104	127	136	149	147
8:00 pm - 8:59 pm	108	92	111	124	120
9:00 pm - 9:59 pm	88	94	136	146	120
10:00 pm - 10:59 pm	101	116	124	158	151
11:00 pm - 11:59 pm	104	135	141	184	141

The peak-to-trough frequencies by hour differ by a factor of two in all five years. The maximum hourly frequency occurs in mid-afternoon in all five years, and the minimum frequencies appear in both morning and evening hours.



Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Hour of Day

Hour	Year of Accident				
	1975	1976	1977	1978	1979
12:01 am - 12:59 am	3.9	4.9	5.1	5.9	6.0
1:00 am - 1:59 am	4.3	5.3	5.4	5.6	6.2
2:00 am - 2:59 am	5.3	6.9	6.8	8.2	7.3
3:00 am - 3:59 am	8.5	9.3	8.8	8.1	8.6
4:00 am - 4:59 am	10.6	13.6	11.9	12.8	13.2
5:00 am - 5:59 am	12.3	15.4	16.5	17.9	20.5
6:00 am - 6:59 am	12.1	13.7	15.0	13.1	14.5
7:00 am - 7:59 am	10.9	13.6	15.2	13.7	15.1
8:00 am - 8:59 am	12.1	14.9	15.9	17.8	16.7
9:00 am - 9:59 am	14.5	12.9	17.1	14.9	18.3
10:00 am - 10:59 am	11.6	14.6	14.5	15.7	17.7
11:00 am - 11:59 am	12.2	12.7	14.7	15.2	16.7
12:00 pm - 12:59 pm	10.3	12.5	12.3	13.4	14.5
1:00 pm - 1:59 pm	10.3	12.2	12.6	11.7	15.2
2:00 pm - 2:59 pm	7.8	11.6	11.6	12.5	13.0
3:00 pm - 3:59 pm	7.3	9.4	8.9	10.2	10.0
4:00 pm - 4:59 pm	7.5	7.7	8.1	8.9	9.5
5:00 pm - 5:59 pm	6.0	5.9	6.1	7.2	7.9
6:00 pm - 6:59 pm	4.8	5.8	5.0	6.3	6.6
7:00 pm - 7:59 pm	4.6	5.3	5.4	5.7	6.6
8:00 pm - 8:59 pm	4.8	4.2	4.6	5.1	5.9
9:00 pm - 9:59 pm	4.6	4.2	5.9	5.5	6.9
10:00 pm - 10:59 pm	4.5	5.2	5.1	6.3	6.8
11:00 pm - 11:59 pm	4.6	5.4	5.7	6.6	5.8



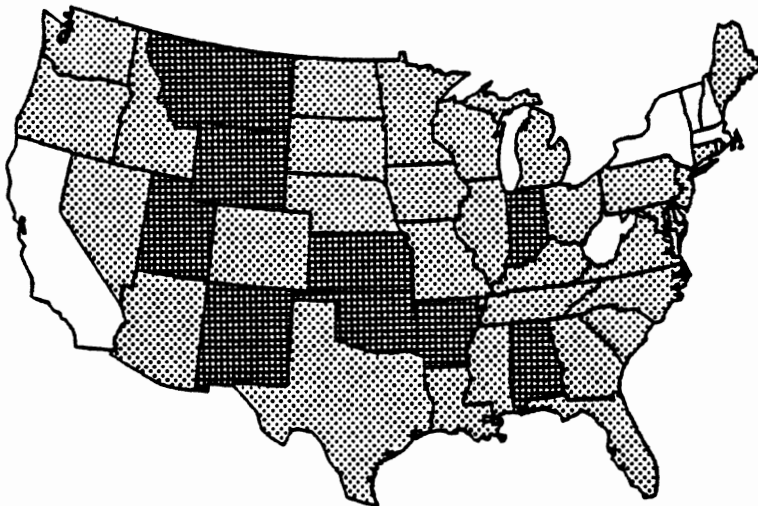
The elevated percentages in the early morning hours result more from a decrease in passenger car fatal accidents than from an increase in combination fatalities.

Combination Vehicle Fatal Accident Frequencies for 1975-1979 by State

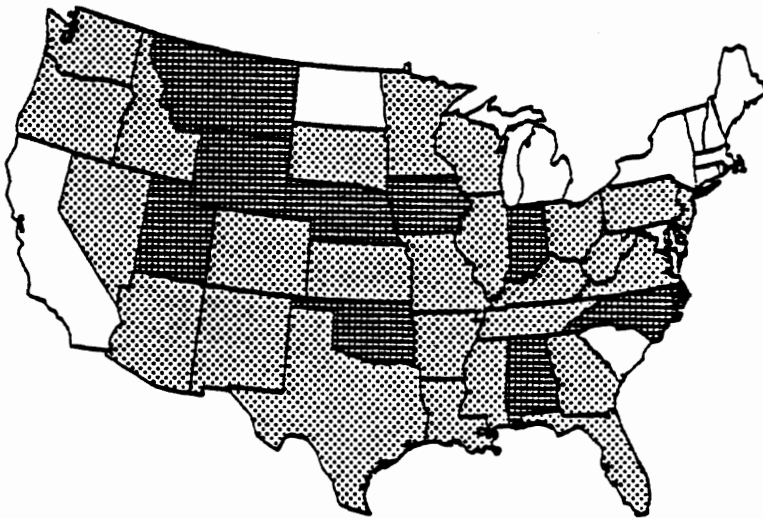
State	Year of Accident				
	1975	1976	1977	1978	1979
Alabama . . .	58	96	141	124	124
Arizona . . .	44	51	51	61	65
Arkansas . . .	58	47	60	80	83
California . .	204	207	234	264	266
Colorado . . .	39	46	59	53	45
Connecticut .	9	18	29	20	16
Delaware . . .	8	14	0	2	12
Florida . . .	126	118	156	192	150
Georgia . . .	80	108	92	116	122
Idaho . . . .	28	21	17	23	37
Illinois . . .	140	147	181	174	131
Indiana . . .	122	152	141	168	140
Iowa . . . . .	58	75	58	74	56
Kansas . . . .	38	38	59	64	49
Kentucky . . .	24	69	85	87	63
Louisiana . .	19	68	79	77	59
Maine . . . . .	7	11	12	3	10
Maryland . . .	39	19	56	49	26
Massachusetts	13	38	28	29	24
Michigan . . .	41	34	109	139	102
Minnesota . .	55	61	67	69	69
Mississippi .	29	53	55	67	77
Missouri . . .	63	89	97	110	98
Montana . . .	29	30	33	32	32
Nebraska . . .	39	39	30	46	46
Nevada . . . .	10	13	17	22	20
New Hampshire	7	8	5	6	4
New Jersey . .	56	61	91	84	83
New Mexico . .	39	49	70	64	40
New York . . .	86	91	105	119	105
North Carolina	106	146	116	150	116
North Dakota .	14	8	10	11	3
Ohio . . . . .	120	139	150	187	189
Oklahoma . . .	65	82	94	103	77
Oregon . . . .	39	39	45	33	43
Pennsylvania .	152	169	180	250	240
Rhode Island .	2	6	0	0	0
South Carolina	3	37	63	63	85
South Dakota .	10	16	16	13	18
Tennessee . .	83	76	108	107	33
Texas . . . . .	289	287	303	367	402
Utah . . . . .	23	25	34	38	37
Vermont . . . .	2	4	2	5	5
Virginia . . .	66	77	68	75	79
Washington . .	41	46	52	50	56
West Virginia	30	39	11	10	9
Wisconsin . . .	53	69	67	51	76
Wyoming . . .	19	29	31	50	44

Combination Fatals as a % of all Fatals for 1975-1979 by State

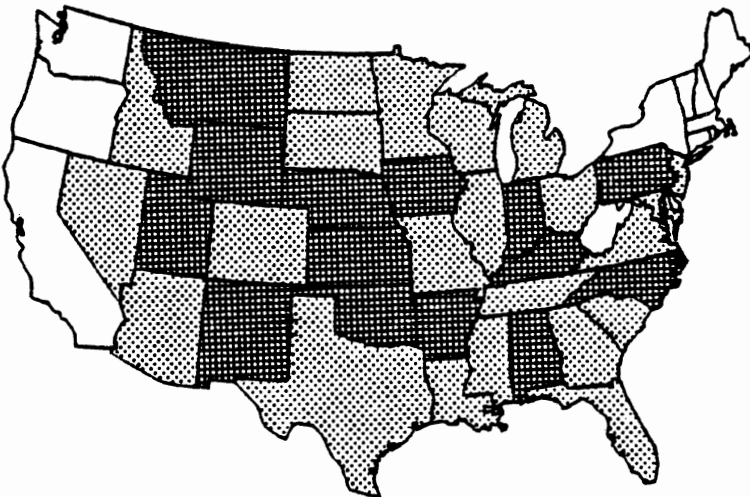
State	Year of Accident				
	1975	1976	1977	1978	1979
Alabama . . .	7.6	11.5	14.8	12.5	14.1
Arizona . . .	7.4	8.0	6.3	6.7	8.9
Arkansas . . .	12.2	10.5	12.3	16.2	18.0
California . .	5.6	5.3	5.3	5.5	6.0
Colorado . . .	7.7	8.4	9.6	8.8	9.4
Connecticut .	2.5	4.8	7.1	4.7	3.5
Delaware . . .	7.6	13.4	0.0	1.8	13.8
Florida . . .	7.1	6.8	8.6	9.4	8.6
Georgia . . .	6.8	9.6	7.7	8.9	10.8
Idaho . . . .	11.9	9.0	6.1	8.3	13.4
Illinois . . .	7.7	8.2	9.6	9.2	9.7
Indiana . . .	12.5	14.0	13.2	14.9	15.7
Iowa . . . . .	10.1	11.4	10.5	13.4	11.5
Kansas . . . .	8.8	8.2	12.2	12.8	11.8
Kentucky . . .	3.2	9.2	10.6	11.2	8.5
Louisiana . .	2.3	8.1	9.0	8.1	6.5
Maine . . . . .	3.5	5.4	6.1	1.4	5.6
Maryland . . .	6.5	3.2	9.3	7.5	5.9
Massachusetts	1.6	5.4	4.0	3.6	3.9
Michigan . . .	2.6	4.9	6.3	7.7	8.0
Minnesota . .	8.3	8.5	9.1	8.2	10.2
Mississippi .	6.0	10.6	9.5	10.0	14.0
Missouri . . .	7.0	8.7	9.5	10.5	11.2
Montana . . .	12.0	12.0	12.7	13.7	12.5
Nebraska . . .	12.3	11.7	10.4	15.8	18.2
Nevada . . . .	5.3	6.9	7.6	8.3	7.9
New Hampshire	5.1	5.4	3.6	3.8	3.0
New Jersey . .	6.1	6.6	9.3	8.2	8.8
New Mexico . .	8.4	10.6	12.3	11.1	8.4
New York . . .	4.1	4.4	4.9	5.4	5.3
North Carolina	7.9	11.1	9.2	11.2	9.5
North Dakota .	10.2	5.2	6.6	7.4	17.6
Ohio . . . . .	7.5	8.3	9.1	10.3	10.5
Oklahoma . . .	10.0	11.9	12.7	13.4	14.5
Oregon . . . .	7.8	6.9	7.8	5.3	9.6
Pennsylvania .	8.1	9.4	9.6	13.2	14.4
Rhode Island .	2.0	5.3	0.0	0.0	0.0
South Carolina	0.4	5.3	7.8	8.0	10.7
South Dakota .	6.2	8.6	8.9	7.8	12.8
Tennessee . .	8.4	7.5	10.0	9.7	8.2
Texas . . . . .	10.0	10.5	9.5	10.7	12.3
Utah . . . . .	11.5	11.3	11.1	12.2	14.7
Vermont . . . .	1.7	4.0	1.9	4.5	4.9
Virginia . . .	7.6	8.7	6.9	7.8	9.2
Washington . .	6.1	6.6	6.5	5.7	7.3
West Virginia	7.5	9.1	2.4	2.5	2.7
Wisconsin . . .	6.6	8.5	8.4	6.0	9.3
Wyoming . . .	11.0	13.9	14.9	24.3	22.3



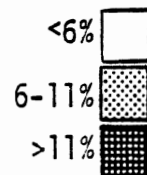
Proportion of a state's fatal accidents involving combination vehicles--1976



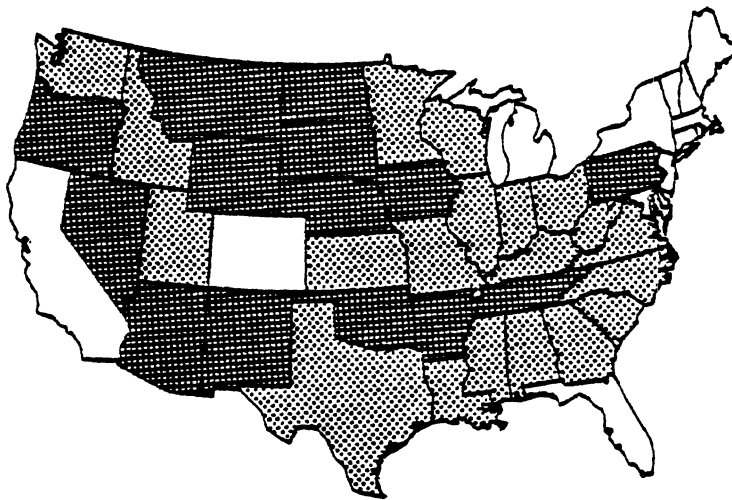
Proportion of a state's fatal accidents involving combination vehicles--1977



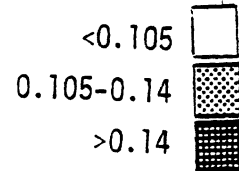
Proportion of a state's fatal accidents involving combination vehicles--1978



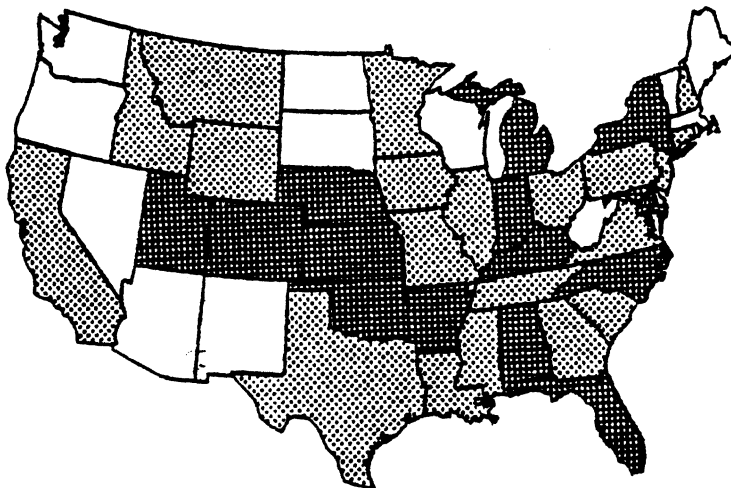
These three maps indicate those states with a larger or smaller proportion of combination vehicle fatal crashes. While there are some changes from year to year--and indeed more states with a proportion over 11% in the later years--the states with a high rate are mainly in the mid-section of the country. Exact values of the rates may be seen in the tables of the previous pages.



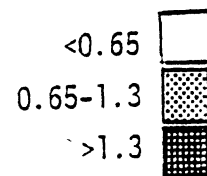
Fuel Consumption Ratio--1978  
Ratio of consumption of special fuels  
(diesel) to gasoline for private and  
commercial use on highways by state



The heavily shaded states are those with the fourteen highest ratios of diesel fuel consumption (purchases) to gasoline consumption. This can be compared to the 1978 map in the preceding page which highlights the fourteen states with the highest proportion of fatal accidents involving combination vehicles for the same year. While there are differences, as would be expected, there is also an overall similarity; a heavy band through the middle with lower ratios on the West Coast and in the New England states.



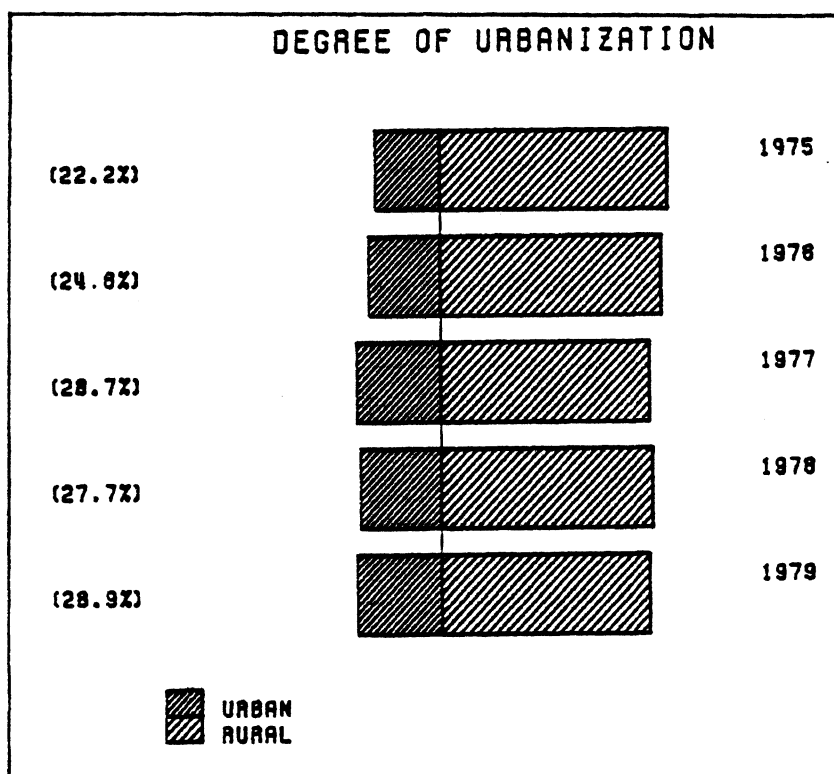
Relative involvements of combination  
vehicles in fatal accidents based on  
fuel consumption ratios--1978



The relative involvement is the proportion of fatal accidents which involve combination vehicles, divided by the proportion of fuel consumed which is special (diesel) fuel, normalized to have an average across all states of one. The states with the highest fourteen values are cross-hatched. Maryland has the highest value: 1.6.

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by Character of Location

Location	Year of Accident				
	1975	1976	1977	1978	1979
Urban	605	797	1026	1095	1040
Rural	2119	2445	2543	2854	2563

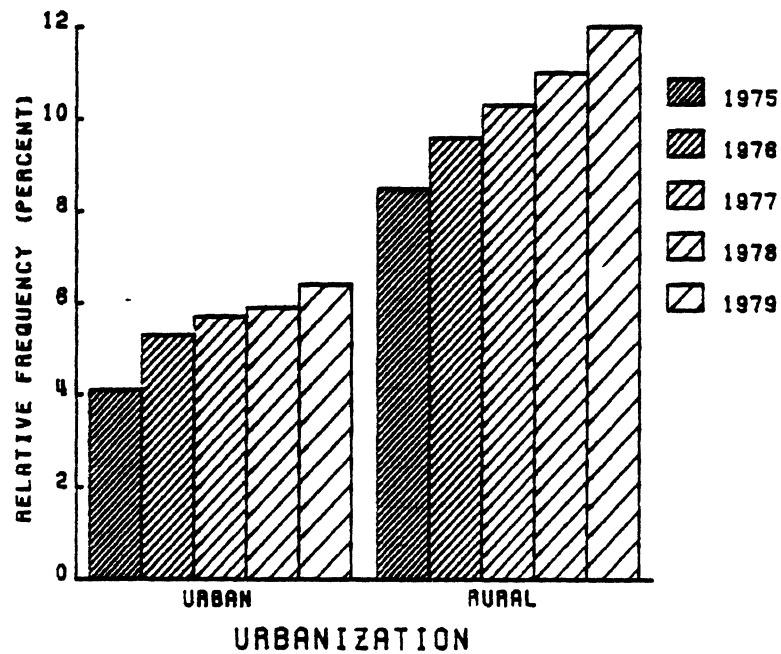




Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Character of Location

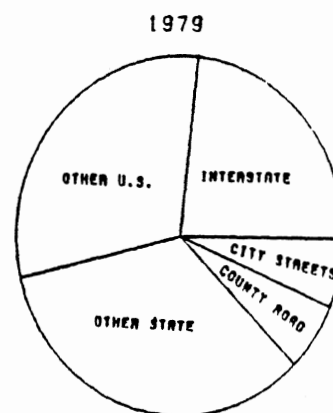
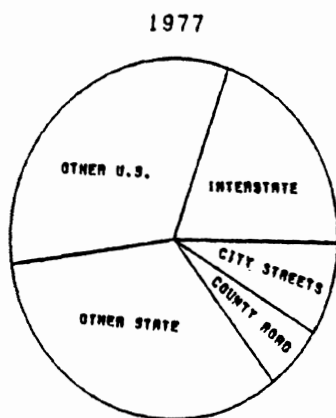
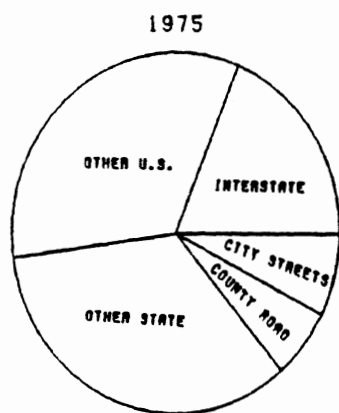
Location	Year of Accident				
	1975	1976	1977	1978	1979
Urban	4.1	5.3	5.7	5.9	6.4
Rural	8.5	9.6	10.3	11.0	12.0

| About three-quarters of combination vehicle |  
 | fatal accidents are reported to occur in rural |  
 | areas. This pattern holds for all five years. |



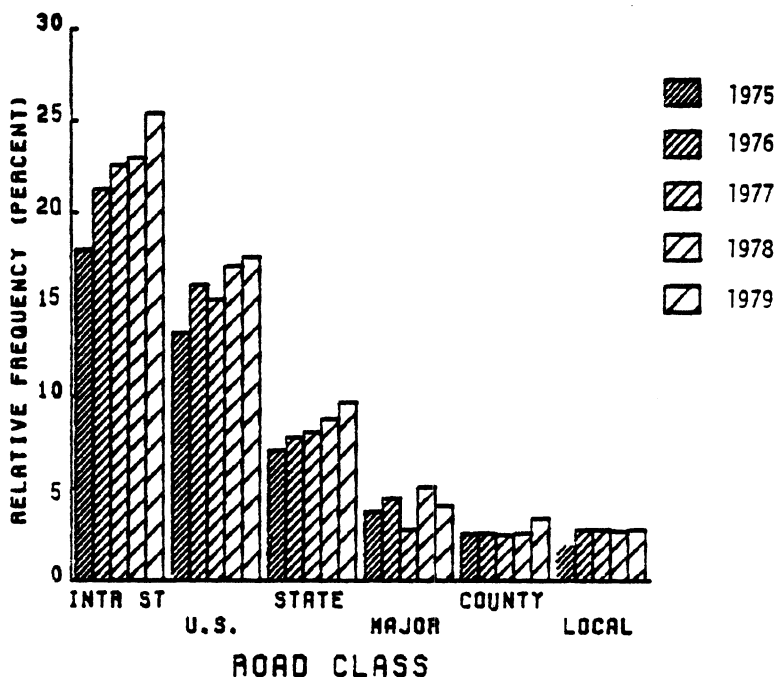
Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by Road Class

Road Class	Year of Accident				
	1975	1976	1977	1978	1979
Interstate . . . . .	498	630	808	901	830
Other limited access	63	65	62	45	36
Other U.S. route . . . . .	880	1023	1101	1217	1077
Other State route . . . . .	899	1048	1132	1288	1192
Other major artery . . . . .	20	25	38	56	38
County road . . . . .	167	185	174	187	220
Local street . . . . .	179	245	239	239	206
Other road . . . . .	16	19	13	20	14
Unknown road class . . . . .	2	2	10	46	60



Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Road Class

Road Class	Year of Accident				
	1975	1976	1977	1978	1979
Interstate . . . . .	18.0	21.3	22.6	23.0	25.4
Other limited access	11.5	10.1	11.9	8.3	11.7
Other U.S. route .	13.5	16.1	15.3	17.1	17.6
Other State route .	7.1	7.8	8.1	8.8	9.7
Other major artery .	3.8	4.5	2.8	5.1	4.1
County road . . . .	2.6	2.6	2.5	2.6	3.4
Local street . . . .	1.9	2.8	2.8	2.7	2.8
Other road . . . . .	1.8	2.6	1.3	2.2	1.7
Unknown road class .	1.1	4.7	7.9	6.2	6.0



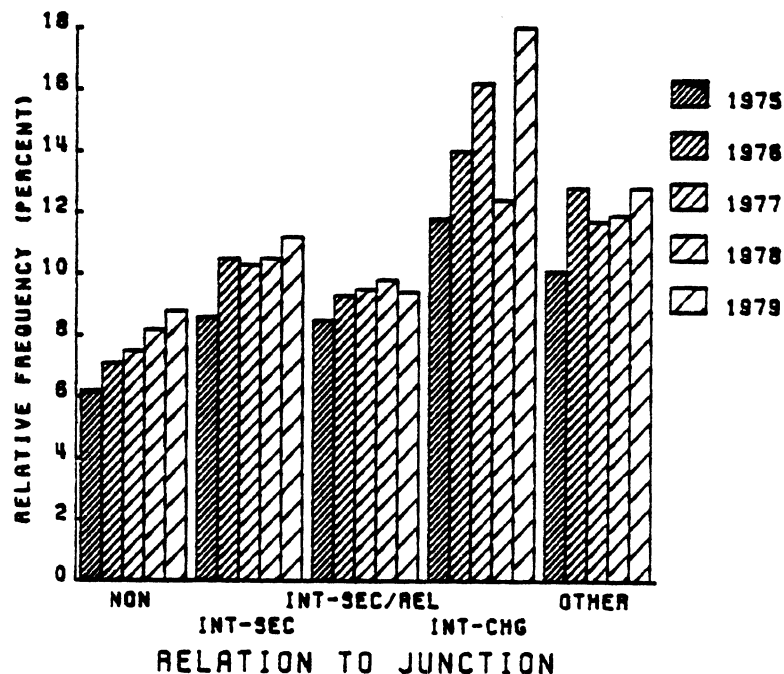
Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by Relation to Junction

Junction	Year of Accident				
	1975	1976	1977	1978	1979
Non-junction . . . . .	1828	2155	2425	2746	2446
Intersection . . . . .	681	823	838	904	826
Intersection related . . . . .	58	50	67	60	48
Interchange area . . . . .	40	64	94	108	54
Driveway, alley, access . . . . .	117	150	152	189	200

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Relation to Junction

Junction	Year of Accident				
	1975	1976	1977	1978	1979
Non-junction . . . . .	6.2	7.1	7.5	8.2	8.8
Intersection . . . . .	8.6	10.5	10.3	10.5	11.2
Intersection related . . . . .	8.5	9.3	9.5	9.8	9.4
Interchange area . . . . .	11.8	14.0	16.2	12.4	18.0
Driveway, alley, access . . . . .	10.1	12.8	11.7	11.9	12.8

The largest number of combination vehicle fatal accidents occurs in non-junction areas, but congested areas account for a disproportionately high percentage of such accidents.



Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by Speed Limit in Force

Speed Limit	Year of Accident				
	1975	1976	1977	1978	1979
Five MPH . . .	0	1	0	0	0
Ten MPH . . . .	0	0	0	2	1
Fifteen MPH . .	5	5	5	1	1
Twenty MPH . .	7	8	7	12	8
Twenty-five MPH	60	60	65	70	58
Thirty MPH . .	57	92	89	113	99
Thirty-five MPH	111	136	162	189	193
Forty MPH . . .	79	106	103	143	111
Forty-five MPH	174	225	240	256	218
Fifty MPH . . .	196	235	221	221	191
Fifty-five MPH	1732	1967	2322	2668	2421

+-----+  
 | The largest number of combination vehicle fatal accidents |  
 | occurs in 55-mph speed limit areas. This reflects the |  
 | rural nature of these accidents as well as the fact that |  
 | they occur largely on major arterials. |  
 +-----+

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Speed Limit in Force

Speed Limit	Year of Accident				
	1975	1976	1977	1978	1979
Five MPH . . .	0.0	11.1	0.0	0.0	0.0
Ten MPH . . . .	0.0	0.0	0.0	11.1	5.6
Fifteen MPH . .	6.8	6.6	5.8	1.5	1.8
Twenty MPH . .	3.8	4.0	3.6	6.0	5.8
Twenty-five MPH	2.4	2.6	2.7	2.7	2.5
Thirty MPH . .	2.2	3.6	3.1	3.7	3.8
Thirty-five MPH	3.1	3.5	3.8	4.0	4.7
Forty MPH . . .	4.6	5.6	4.7	6.0	5.1
Forty-five MPH	6.5	8.0	7.8	7.1	7.6
Fifty MPH . . .	8.6	10.1	8.6	9.4	9.4
Fifty-five MPH	10.8	12.0	12.6	13.2	14.3

Combination vehicle fatal accidents are a smaller proportion of the moderate-speed-limit fatalities, but become a substantial fraction of those where higher speed limits prevail.

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by Lighting Conditions

Lighting Condition	Year of Accident				
	1975	1976	1977	1978	1979
Daylight . . . .	1492	1789	1991	2136	1962
Dark . . . . .	895	1113	1201	1377	1286
Dark but lighted	186	212	258	314	250
Dawn or dusk . .	106	126	124	168	171



Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Lighting Condition

Lighting Condition	Year of Accident				
	1975	1976	1977	1978	1979
Daylight . . . . .	8.9	10.3	10.9	11.3	12.2
Dark . . . . .	6.2	7.2	7.5	8.3	9.1
Dark but lighted	3.3	3.6	3.8	4.2	3.7
Dawn or dusk . .	7.1	8.0	7.0	9.3	11.0

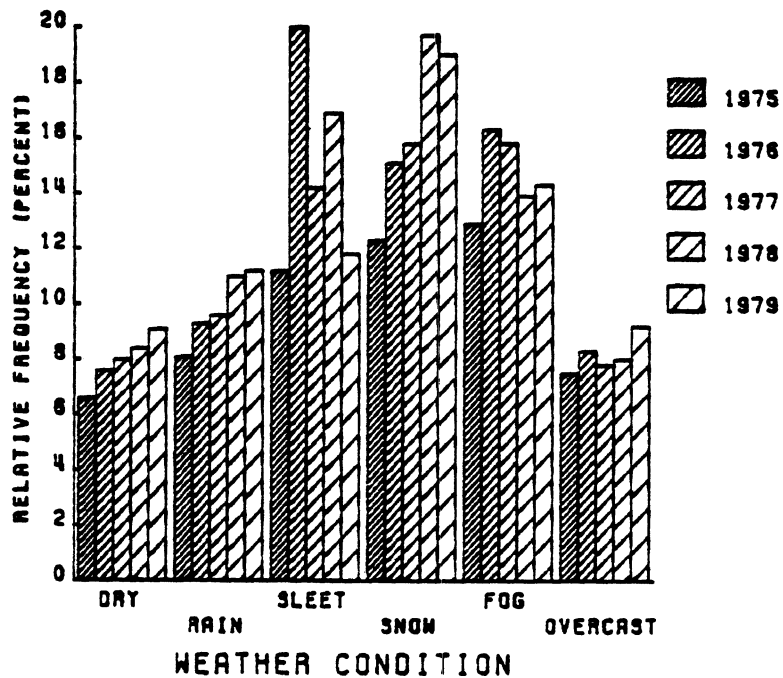
Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by Weather Condition

Weather Condition	Year of Accident				
	1975	1976	1977	1978	1979
None . . . . .	2159	2553	2563	2844	2548
Rain . . . . .	322	329	377	437	430
Sleet . . . . .	9	14	11	23	12
Snow . . . . .	91	98	120	126	104
Fog, smog, smoke, etc.	94	89	99	111	96
Heavy overcast* . . . .	43	95	384	433	465
Other . . . . .	0	57	16	14	8
Unknown . . . . .	6	7	7	11	10

\* The FARS code for this value was changed from "Heavy Overcast" in 1976 to "Cloudy" for later years, accounting for the large increase from 1976 to 1977.

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Weather Condition

Weather Condition	Year of Accident				
	1975	1976	1977	1978	1979
None . . . . .	6.6	7.6	8.0	8.4	9.1
Rain . . . . .	8.1	9.3	9.6	11.0	11.2
Sleet . . . . .	11.2	20.0	14.2	16.9	11.8
Snow . . . . .	12.3	15.1	15.8	19.7	19.0
Fog, smog, smoke, etc. . . . .	12.9	16.3	15.8	13.9	14.3
Heavy overcast . . . . .	7.5	8.3	7.8	8.0	9.2
Other . . . . .	1.9	9.5	17.3	17.9	14.0



Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by Alignment of Roadway

Alignment	Year of Accident				
	1975	1976	1977	1978	1979
Straight	2078	2460	2856	3181	2872
Curve	513	615	705	799	781

Combination Vehicle Fatal Accidents in the U.S. for 1979-1979:  
Frequency by Grade of Roadway

Grade	Year of Accident				
	1975	1976	1977	1978	1979
Level	1913	2266	2365	2667	2472
Grade	678	809	1089	1187	1111

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Alignment of Roadway

Alignment	Year of Accident				
	1975	1976	1977	1978	1979
Straight	7.6	8.9	9.2	9.8	10.4
Curve	5.6	6.5	6.4	6.9	7.5

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Grade of Roadway

Grade	Year of Accident				
	1975	1976	1977	1978	1979
Level	7.0	8.1	8.1	8.7	9.2
Grade	7.4	8.9	10.0	10.2	10.8

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
by Contributing Factor (at Accident Level)

Contributing Factor	Year of Accident				
	1975	1976	1977	1978	1979
Rain, snow, fog, smoke, etc.	176	175	173	137	121
Reflected glare, bright sun .	16	25	16	20	24
Curve, hill, design features	40	76	101	52	44
Building, billboard, etc . .	3	1	5	4	5
Trees, crops, vegetation . .	8	8	18	13	17
Moving vehicle (include load)	14	14	22	21	17
Parked vehicle . . . . .	9	11	6	7	11
Other object . . . . .	9	11	5	10	3
Severe crosswind . . . . .	7	7	13	5	6
Wind from passing truck . . .	0	0	0	1	1
Slippery surface . . . . .	138	136	163	218	165
Avoiding debris in road . . .	5	4	13	4	11
Ruts/holes/bumps in road . .	5	4	3	3	9
Avoiding animals in road . .	5	9	7	4	6
Avoiding vehicle in road . .	43	69	51	65	73
Avoiding phantom vehicle . .	6	10	12	12	6
Avoid pedestrian, cyclist . .	7	6	2	27	24
Avoiding water, snow, oil . .	3	1	0	3	2
Traffic controls not function	6	3	3	1	3
Inadequate warning of exits .	4	3	2	3	2
Uncontrolled intersection . .	2	2	5	5	3
Shoulder too low or high . .	7	6	12	4	2
Shoulders too narrow . . . .	3	2	6	4	2
Roadway maintenance cond. . .	6	5	10	21	21
Roadway construction cond. .	19	22	26	23	33
Other construction cond. . .	3	3	2	3	3
No/obscured pavement marking	1	2	2	1	5
Surface underwater/washout .	1	1	3	4	2

+-----+  
| Entries occur in this table for only a small fraction of the |  
| combination vehicle accidents. Most accidents, not |  
| shown in this table, have no specific contributing factor. |  
+-----+

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Contributing Factor (at Accident Level)

Contributing Factor	Year of Accident				
	1975	1976	1977	1978	1979
Rain, snow, fog, smoke, etc.	11.2	14.4	14.5	17.8	15.3
Reflected glare, bright sun .	5.7	7.4	5.4	7.0	8.9
Curve, hill, design feature .	5.8	8.0	9.0	8.6	9.1
Building, billboard, etc. . .	9.7	2.3	9.4	11.4	12.8
Trees, crops, vegetation . .	3.8	3.9	9.5	6.7	9.8
Moving vehicle (include load)	6.6	7.3	8.8	8.5	8.2
Parked vehicle . . . . .	3.5	4.7	2.6	3.1	5.7
Other object . . . . .	7.9	13.9	5.2	9.0	4.1
Severe crosswind . . . . .	13.5	20.5	24.5	19.2	13.6
Wind from passing truck . . .	0.0	0.0	0.0	16.6	50.0
Slippery surface . . . . .	9.5	11.1	11.8	14.2	14.1
Avoiding debris in road . . .	6.7	6.5	23.2	8.1	21.2
Ruts/holes/bumps in road . .	4.4	3.1	2.5	2.7	9.6
Avoiding animals in road . .	3.4	11.1	8.2	5.0	7.4
Avoiding vehicle in road . .	12.7	17.9	15.2	20.7	19.8
Avoiding phantom vehicle . .	12.2	14.4	13.0	12.3	12.2
Avoid pedestrian, cyclist . .	5.9	6.3	2.2	9.4	9.4
Avoiding water, snow, oil . .	20.0	7.6	0.0	17.6	11.8
Traffic controls not function	18.8	12.0	12.5	5.2	15.0
Inadequate warning of exits .	8.9	8.8	8.3	12.0	8.7
Uncontrolled intersection . .	4.7	3.2	9.4	9.0	7.5
Shoulder too low or too high	6.5	5.8	13.0	5.7	16.1
Shoulders too narrow . . . .	4.2	1.7	5.1	6.4	4.9
Roadway maintenance cond. . .	7.2	8.7	10.4	16.9	20.6
Roadway construction cond. .	17.4	17.3	23.2	21.1	25.8
Other construction cond. . .	17.6	17.6	9.0	18.7	20.0
No/obscured pavement marking	3.8	8.0	11.1	6.2	21.7
Surface underwater/washout .	2.6	4.0	13.6	9.3	5.4

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by Number of Persons Killed in Accident

Number Killed	Year of Accident				
	1975	1976	1977	1978	1979
One .	2273	2738	3064	3448	3129
Two .	346	387	395	423	426
Three	75	76	83	79	83
Four	21	27	24	33	23
Five	5	10	6	13	7
Six .	1	2	2	3	1
Seven	2	1	2	0	1
Eight	0	1	1	0	1



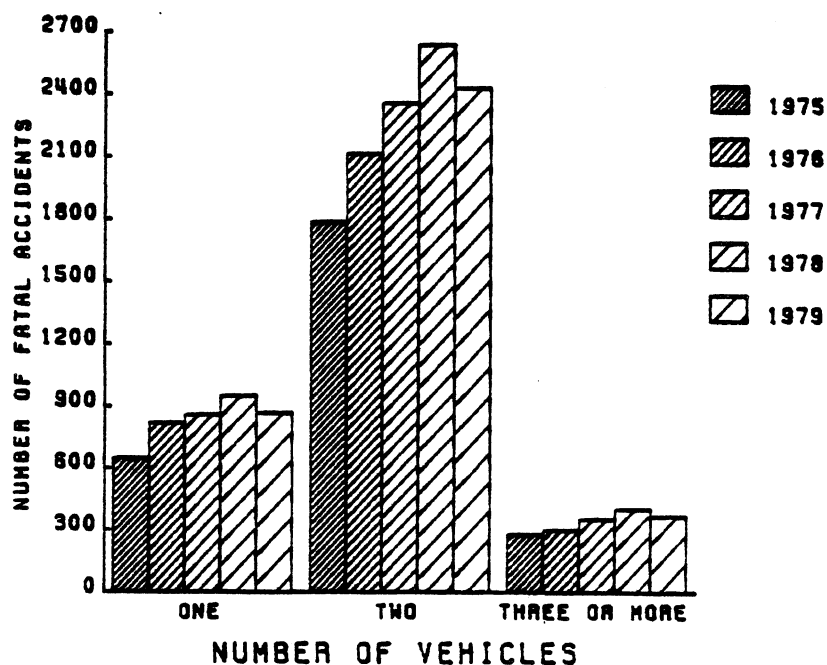
Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Number of Persons Killed in Accident

Number Killed	Year of Accident				
	1975	1976	1977	1978	1979
One . . . . .	6.4	7.6	8.0	8.5	9.0
Two . . . . .	10.6	11.6	11.2	11.6	13.5
Three . . . . .	11.8	11.2	12.9	12.0	14.2
Four . . . . .	12.7	13.3	13.2	15.7	14.9
Five . . . . .	11.4	16.3	12.5	21.3	21.2
Six . . . . .	5.0	9.5	11.7	30.0	18.8
Seven . . . . .	28.6	8.3	25.0	0.0	50.0
Eight or more	33.3	11.1	25.0	0.0	16.7

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by Number of Vehicles Involved in the Accident

Number of Vehicles	Year of Accident				
	1975*	1976	1977	1978	1979
One vehicle involved .	821	860	952	867	
Two vehicles involved .	2116	2359	2640	2433	
Three vehicles involved .	222	256	315	281	
Four vehicles involved .	56	57	59	61	
Five vehicles involved .	11	25	17	15	
Six vehicles involved .	6	7	7	11	
Seven vehicles involved .	3	7	4	3	
Eight vehicles involved .	3	1	0	0	
Nine vehicles involved .	1	2	0	0	
Ten vehicles involved .	0	0	2	0	

\* Not available for 1975.



Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Number of Vehicles Involved in Crash

Vehicles Involved	Year of Accident				
	1975	1976	1977	1978	1979
One vehicle involved .	3.2	3.3	3.5	3.8	
Two vehicles involved .	15.5	15.6	16.4	17.6	
Three vehicles involved	16.5	17.3	18.3	20.4	
Four vehicles involved	29.3	23.4	23.6	28.4	
Five vehicles involved	32.3	33.7	27.4	29.4	
Six vehicles involved .	54.5	58.3	38.8	64.7	
Seven vehicles involved	75.0	63.6	66.6		
Eight vehicles involved	100.0	100.0	0.0	0.0	
Nine vehicles involved	100.0	100.0	100.0	0.0	

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by First Harmful Event

Event	Year of Accident				
	1975	1976	1977	1978	1979
Overturn . . . . .	162	195	199	248	213
Fire/Explosion . . . . .	4	0	1	1	0
Immersion . . . . .	2	2	0	1	0
Gas inhalation . . . . .	0	0	0	0	0
Fell from vehicle . . . . .	14	17	19	21	0
Injured in vehicle . . . . .	2	2	2	3	0
Other non-collision . . . . .	8	11	9	9	17
Pedestrian . . . . .	173	244	234	292	230
Pedalcycle . . . . .	37	45	39	39	42
Railway train . . . . .	31	32	55	34	34
Animal . . . . .	11	12	7	10	11
Motor veh. in transport	1962	2292	2586	2877	2602
Motor veh. in other road	50	46	55	46	83
Parked motor vehicle . . . . .	24	39	40	58	55
Other object (not fixed)	11	8	8	14	11
Bridge or overpass . . . . .	29	29	40	63	55
Building . . . . .	4	2	2	2	0
Culvert/Ditch . . . . .	27	23	24	33	24
Curb or wall . . . . .	7	10	11	12	19
Divider . . . . .	11	6	7	11	8
Embankment . . . . .	23	37	48	48	44
Fence . . . . .	11	8	10	9	3
Guard rail . . . . .	70	96	112	106	124
Light support . . . . .	0	3	4	3	1
Sign post . . . . .	4	8	13	8	9
Tree/Shrubbery . . . . .	23	34	24	15	28
Utility pole . . . . .	14	16	16	14	11
Other poles/support . . . . .	3	11	7	3	9
Other fixed object . . . . .	7	14	5	15	23

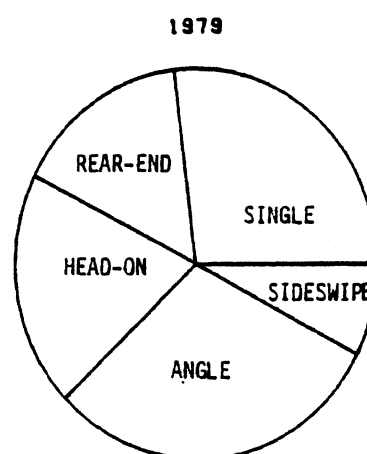
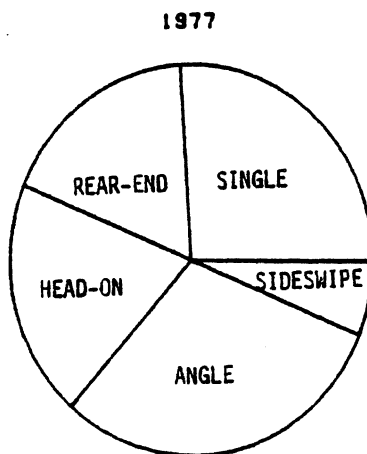
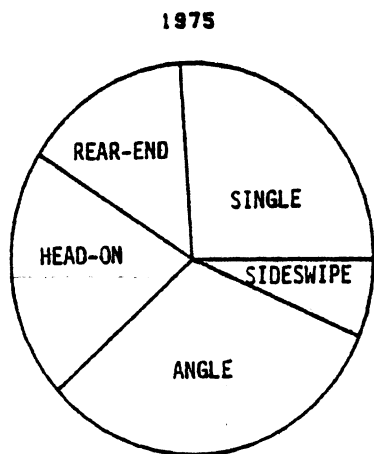
Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by First Harmful Event

Event	Year of Accident				
	1975	1976	1977	1978	1979
Overturn . . . . .	5.8	4.9	4.5	5.8	6.2
Fire/Explosion . . . . .	6.2	0.0	6.2	11.1	0.0
Immersion . . . . .	1.2	1.3	0.0	0.9	0.0
Gas inhalation . . . . .	0.0	0.0	0.0	0.0	0.0
Fell from vehicle . . . . .	3.5	4.2	4.3	5.0	4.2
Injured in vehicle . . . . .	18.2	20.0	18.1	27.2	0.0
Other non-collision . . . . .	8.6	16.4	12.1	9.1	14.3
Pedestrian . . . . .	2.4	3.3	3.1	3.8	3.7
Pedalcycle . . . . .	3.7	4.9	4.2	4.4	5.3
Railway train . . . . .	4.5	4.1	7.8	4.5	6.6
Animal . . . . .	13.1	13.1	8.3	12.8	13.2
Motor veh. in transport	13.8	15.9	16.2	16.8	18.0
Motor veh. in other road	15.7	19.3	21.2	15.8	21.8
Parked motor vehicle . . . . .	3.6	5.7	5.2	6.6	6.4
Other object (not fixed)	11.0	9.6	7.7	10.4	7.1
Bridge or overpass . . . . .	3.1	3.3	4.3	6.8	7.7
Building . . . . .	3.0	1.4	1.6	1.4	
Culvert/Ditch . . . . .	2.6	2.1	2.1	2.5	2.0
Curb or wall . . . . .	1.2	1.3	1.5	1.4	
Divider . . . . .	6.0	3.7	4.7	6.0	5.4
Embankment . . . . .	2.3	3.4	4.3	3.6	3.8
Fence . . . . .	2.9	2.0	2.4	2.5	0.7
Guard rail . . . . .	6.1	8.2	8.9	7.9	9.7
Light support . . . . .	0.0	1.5	2.0	1.6	0.8
Sign post . . . . .	1.2	2.1	3.6	1.9	2.7
Tree/Shrubbery . . . . .	0.8	1.2	0.8	0.5	1.1
Utility pole . . . . .	1.0	1.0	1.0	0.9	0.8
Other poles/support . . . . .	0.9	3.5	2.2	0.9	3.4
Other fixed object . . . . .	1.8	2.9	0.9	2.3	3.7

+-----+  
 | Combination vehicles are relatively infrequently |  
 | involved in fatal crashes with trees or utility poles, |  
 | but about average for guard rail accidents. |  
 +-----+

Combination Vehicle Fatal Accidents in the U.S. for 1975-1979:  
Frequency by Type of Collision

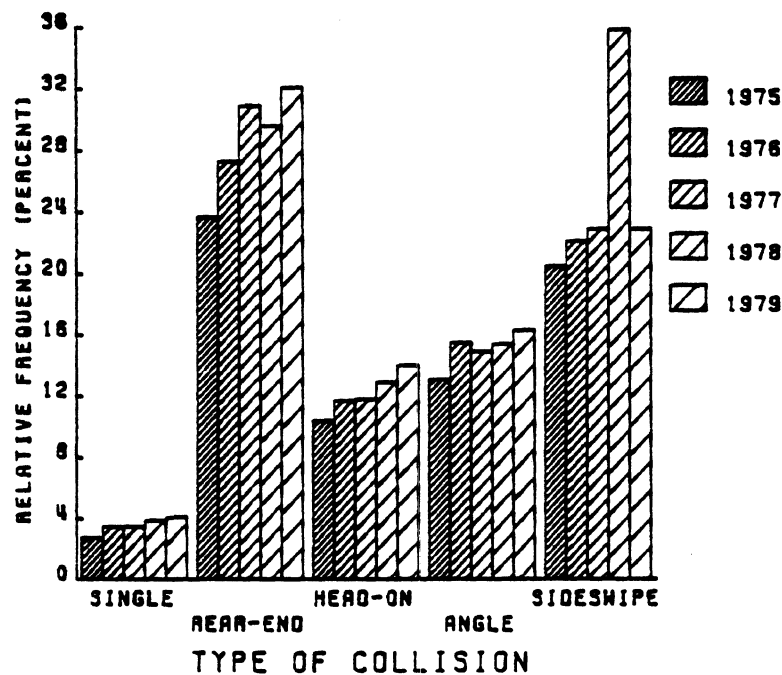
Collision Type	Year of Accident				
	1975	1976	1977	1978	1979
Single vehicle	705	898	929	1075	983
Rear-end . . .	406	476	636	621	574
Head-on . . .	559	625	702	778	713
Rear-to-rear .	13	4	4	10	7
Angle . . . .	864	1056	1085	1202	1109
Sideswipe . .	174	178	219	305	280
Unknown . . .	3	5	2	8	7



Combination Vehicle Fatal Accidents in the U.S. for 1975-1979  
as a Percentage of all U.S. Fatal Traffic Accidents  
by Type of Collision

Collision Type	Year of Accident				
	1975	1976	1977	1978	1979
Single vehicle	2.8	3.5	3.5	3.9	4.1
Rear-end . . .	23.7	27.3	30.9	29.6	32.1
Head-on . . .	10.4	11.7	11.8	12.9	14.0
Rear-to-rear .	21.3	19.0	20.0	50.0	70.0
Angle . . . .	13.1	15.5	14.9	15.4	16.3
Sideswipe . .	20.5	22.1	22.9	35.8	22.9
Unknown . . .	3.8	7.9	3.8	10.8	8.0

| Rear-end accidents which result in a fatality are  
 | quite likely to involve a combination vehicle. The  
 | same is true for sideswipe accidents.







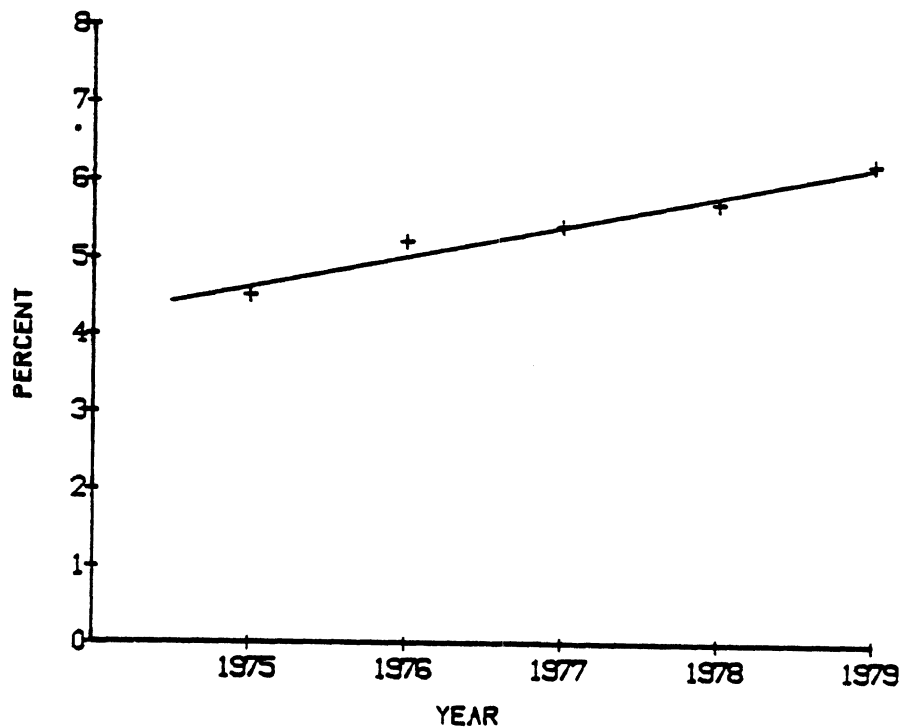
Vehicle, Driver, and Occupant Descriptors

The data on the next twelve pages pertain to the vehicles, their drivers, and their occupants involved in Combination Vehicle fatal crashes. The first six tables are shown in pairs, the left-hand page indicating the frequencies of truck or driver involvements, and the right-hand page indicating the proportion that that frequency is of all vehicles or drivers in fatal accidents.

The table and graph on this page show the average proportion of combination vehicle involvements for each year, and the reader should use these figures to compare with those in the following pages.

In interpreting the right-hand tables, percentages above the average for any given year indicate that trucks (or their drivers) are overrepresented in that category. For example, on the average in 1979 combination vehicles (drivers) constitute 6.2% of all fatal accident vehicles (drivers). In the first table of percentages, it can be seen that trucks associated with fire or explosion constitute 13.6% of all vehicles in fatal accidents. Such an overrepresentation deserves an explanation.

Year	1975	1976	1977	1978	1979
C-V Involvements	4.5	5.2	5.4	5.7	6.2



COMB-VEH INVOLVEMENTS  
RELATIVE TO ALL INVOLVEMENTS

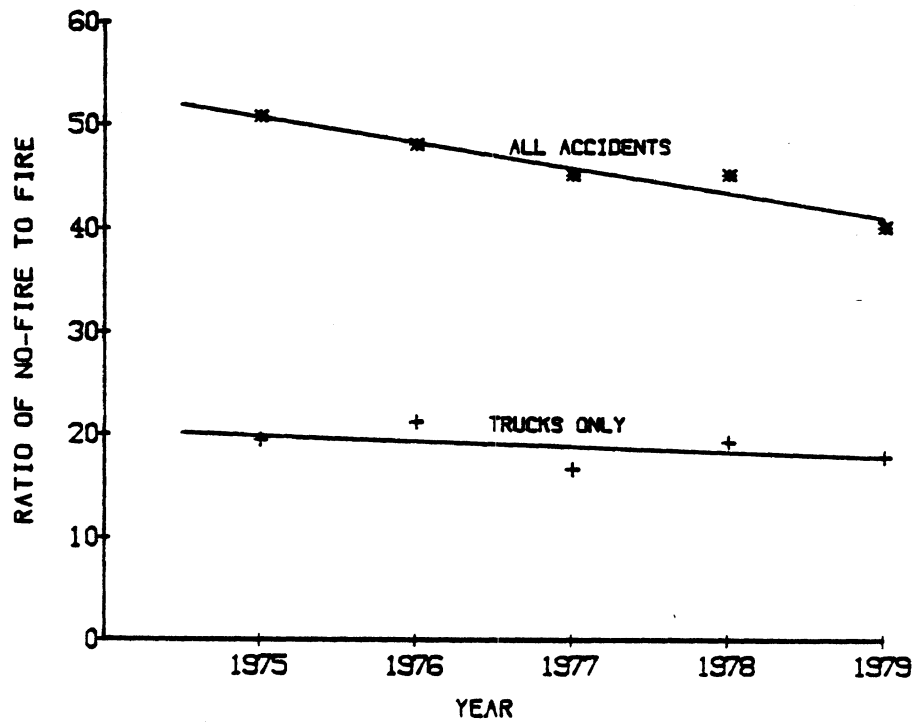
Combination Vehicles Involved in Fatal Accidents in the U. S.  
for 1975-1979  
Frequency of Fire or Explosion

Fire/ Explosion	Year of Accident				
	1975	1976	1977	1978	1979
No fire/explosion	2755	3263	3572	4022	3687
Fire/explosion	142	155	216	209	208

+-----+  
 | Fires in accidents are quite rare events, but combination |  
 | vehicles have fires associated with them more than twice |  
 | as often as do all vehicles in fatal accidents. The ratio |  
 | of non-fires to fires for combination vehicles in these |  
 | accidents remains fairly constant at approximately 20:1 |  
 | (that is, about 5% of the vehicles have fires), whereas |  
 | for all vehicles in fatal accidents the ratio is declining |  
 | from 50:1 (2%) in 1975 to 40:1 (2.5%) in 1979. |  
 +-----+

Combination Vehicle Involvements in Fatal  
Accidents in the U. S. for 1975-1979  
by Fire or Explosion as a Percentage of All  
U. S. Vehicles in Fatal Traffic Accidents

Fire/ Explosion	Year of Accident				
	1975	1976	1977	1978	1979
No fire/explosion	4.3	5.1	5.2	5.6	6.0
Fire/explosion	11.3	11.8	14.3	13.1	13.6



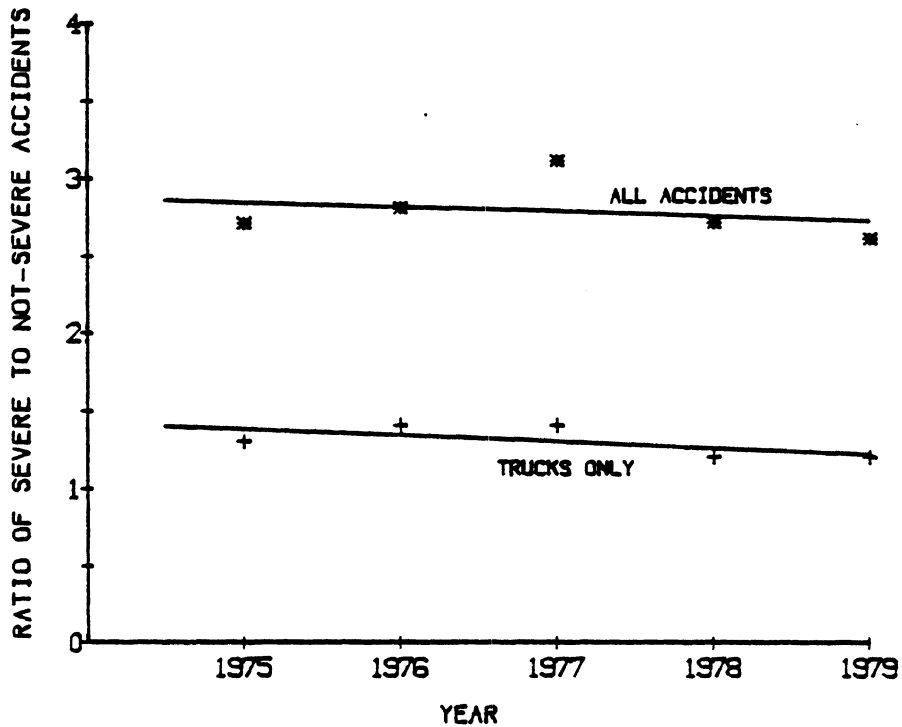
Combination Vehicles Involved in Fatal Accidents in the U. S.  
for 1975-1979  
Frequency of Extent of Deformation

Extent of Deformation	Year of Accident				
	1975	1976	1977	1978	1979
None . . . . .	201	239	207	278	237
Other (minor) . .	417	538	629	668	673
Functional (mod) .	584	609	717	915	849
Disabling (severe)	1583	1913	2186	2305	2091

+-----+  
| The ratio of the severity of damage to vehicles at just |  
| two levels--roughly equivalent to "totalled" or "not |  
| totalled"--has been plotted on the following page. It is |  
| clear that combination vehicles more often survive the |  
| crash. For all vehicles involved in fatal accidents, |  
| severe damage occurs three times as often as does not- |  
| severe damage. For combination vehicles the ratio is 1.5 |  
| to 1. No significant trend is observed over the five-year |  
| period. |  
+-----+

Combination Vehicle Involvements in Fatal  
Accidents in the U. S. for 1975-1979  
by Extent of Deformation as a Percentage of All  
U. S. Vehicles in Fatal Traffic Accidents

Extent of Deformation	Year of Accident				
	1975	1976	1977	1978	1979
None . . . . .	8.3	10.2	9.2	11.9	11.7
Other (minor) . .	7.2	8.9	9.3	9.7	11.6
Functional (mod) .	9.5	9.9	10.2	11.6	11.5
Disabling (severe)	4.0	4.8	4.9	4.9	5.3



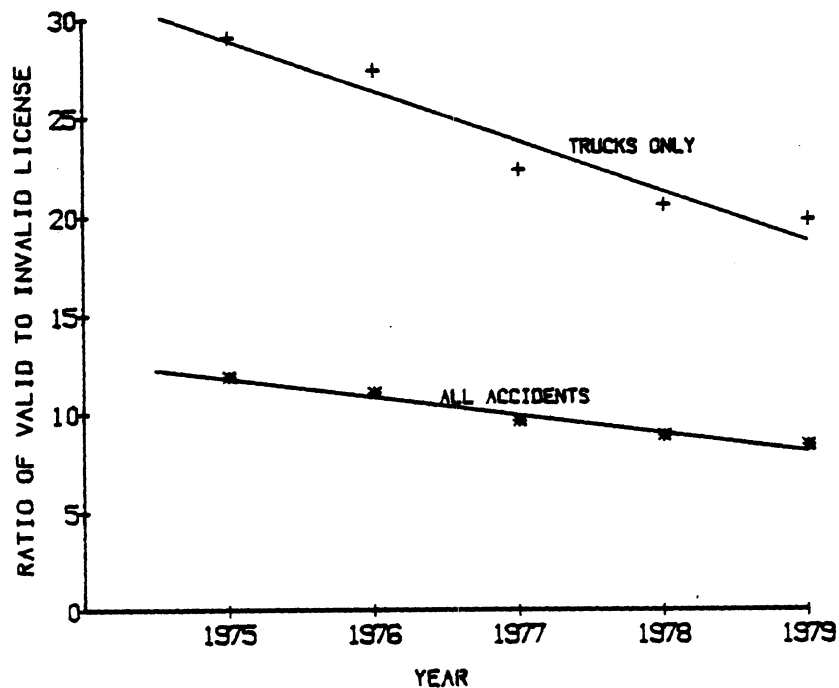
Combination Vehicles Involved in Fatal  
Accidents in the U. S. for 1975-1979  
Frequency by License Status of Driver

License Status	Year of Accident				
	1975	1976	1977	1978	1979
No license . . .	17	27	22	26	22
License, diff veh	40	31	58	82	63
Valid license . .	2671	3138	3485	3932	3571
Suspended license	22	30	33	50	62
Revoked license .	9	8	5	9	9
Expired license .	4	17	37	25	25

+-----+  
 | Combination-vehicle drivers in fatal accidents have a much |  
 | greater proportion of valid licenses than do the drivers |  
 | of all vehicles. It is interesting to note that the ratio |  
 | of valid to invalid licenses is steadily declining for |  
 | both groups, and more rapidly for combination-vehicle |  
 | drivers. It is not possible to determine from these data |  
 | alone whether this is a true change in driver behavior or |  
 | the result of changes in the reporting system. |  
 +-----+

Combination Vehicle Involvements in Fatal  
Accidents in the U. S. for 1975-1979  
by License Status as a Percentage of All  
U. S. Vehicles in Fatal Traffic Accidents

License Status	Year of Accident				
	1975	1976	1977	1978	1979
No license . . .	0.8	1.3	1.0	1.0	1.0
License, diff veh	8.4	7.0	8.0	9.2	6.9
Valid license . .	5.3	6.2	6.5	6.9	7.4
Suspended license	3.4	3.4	3.1	3.7	5.0
Revoked license .	2.7	2.3	1.4	2.4	2.4
Expired license .	1.3	3.7	4.7	2.9	3.2



Selected Characteristics about Combination Vehicles  
and Their Drivers  
U. S. Fatal Traffic Accidents 1975-1979

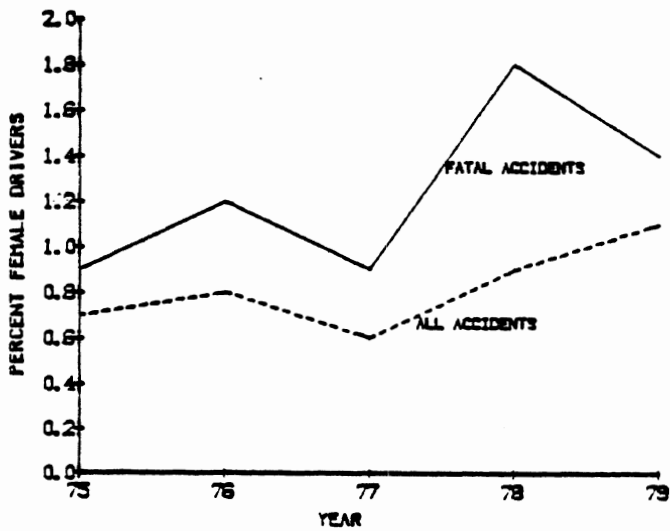
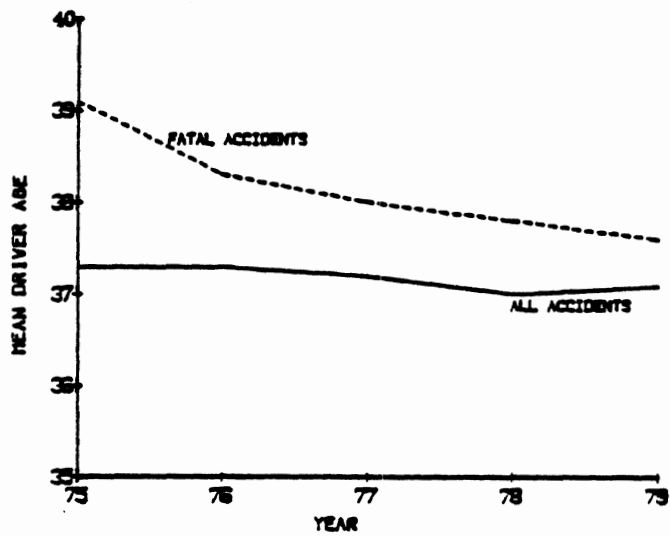
		1975	1976	1977	1978	1979
Age of the Truck Driver (in years)						
All Involved Truck Drivers	Mean age	37.3	37.3	37.2	37.0	37.1
	Std.Dev.	11.8	11.6	11.3	11.3	11.4
Drivers Who Died	Mean Age	39.1	38.3	38.0	37.8	37.6
	Std.Dev.	12.7	12.7	11.8	11.8	12.0
Sex of Truck Driver						
All Involved Truck Drivers	% Female	0.7%	0.8%	0.6%	0.9%	1.1%
Drivers Who Died	% Female	0.9%	1.2%	0.9%	1.8%	1.4%
Reported Travel Speed (in mph)						
All Involved Truck Drivers	Mean Speed	59.9	56.5	42.5	42.9	42.0
	Std.Dev.	30.2	28.7	18.7	18.2	19.4
Drivers Who Died	Mean Speed	66.7	62.9	53.1	53.7	54.2
	Std.Dev.	24.0	23.9	14.3	14.8	15.3
Average Model Year of Tractor						
All Involved Trucks	Mean Mod.Yr.	1970.9	1971.4	1972.6	1973.5	1974.4
	Std.Dev.	4.0	4.0	3.8	3.8	4.2
Trucks in Which a Driver Died	Mean Mod.Yr.	1970.7	1971.2	1972.4	1973.6	1974.4
	Std.Dev.	4.2	4.0	4.1	3.6	5.2



The mean age of all combination-vehicle drivers in fatal accidents varies little over the five-year period, but the mean age of drivers who died is decreasing. The percent of female drivers is increasing over the years, and the females are consistently overrepresented among those drivers who died.

The average reported travelling speed shifts markedly between 1976 and 1977, and would seem to be a reporting artifact rather than a real change.

The difference in average model year from one year to the next may reflect the rate at which new trucks are being introduced into service.

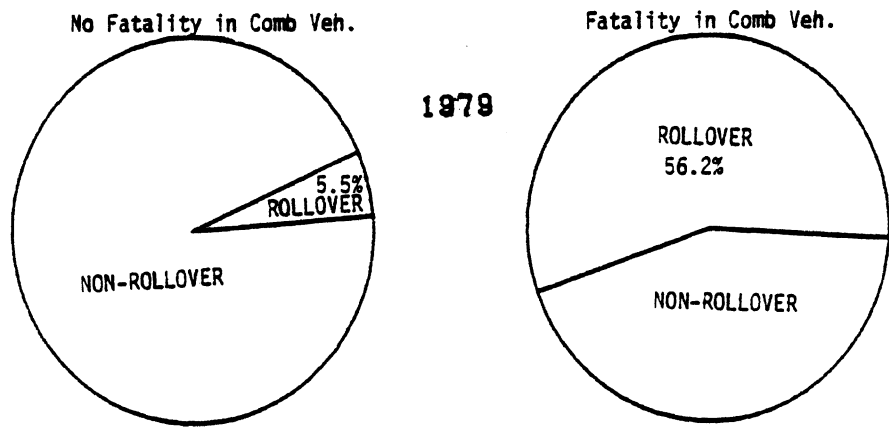


Number of Tractor Trailer Occupants who Died  
vs. Type of Rollover  
FARS--1975-1979

Type of Rollover	1975*	1976*	1977*	1978	1979
Rollover was First Event in Accident . . . (Column %) . . .	167 (24.6%)	205 (24.7%)	205 (22.3%)	251 (25.7%)	207 (23.2%)
Rollover was Subsequent Event in Accident . . . (Column %) . . .				276 (28.3%)	294 (33.0%)
No Rollover (or unknown) . . . (Column %) . . .				449 (46.0%)	390 (43.8%)
<b>Total . . . . .</b>	<b>678</b>	<b>831</b>	<b>920</b>	<b>976</b>	<b>891</b>

\*In 1975-77 only the "first event" rollover was coded in FARS. In 1978-79 an additional entry was made if the vehicle rolled over subsequent to an initial impact.

-----  
 | Among combination vehicles involved in fatal accidents |  
 | in 1979 and in which no person was killed, only 166 |  
 | (5.5%) rolled over. This is not shown in the table, but is |  
illustrated in the accompanying plots.



Number of Tractor Trailer Occupants who Died  
by Class of Road on which Accident Occurred  
FARS--1975-1979

Road Class	1975	1976	1977	1978	1979
Interstate and Other Limited Access . . . . .	236	286	361	364	367
(Column %) . . . . .	(34.8%)	(34.4%)	(39.2%)	(37.3%)	(41.2%)
Other U. S. Routes . . . . .	186	207	203	254	199
(Column %) . . . . .	(27.4%)	(24.9%)	(22.1%)	(26.0%)	(22.3%)
Other State Routes . . . . .	188	249	237	261	215
(Column %) . . . . .	(27.7%)	(30.0%)	(25.8%)	(26.7%)	(24.1%)
County Roads . . . . .	37	45	61	45	49
(Column %) . . . . .	(5.5%)	(5.4%)	(6.6%)	(4.6%)	(5.5%)
City Streets and Others . . . . .	31	44	58	52	61
(Column %) . . . . .	(4.6%)	(5.4%)	(6.6%)	(4.6%)	(5.5%)
Total . . . . .	678	831	920	976	891

+-----+  
 | Over the five-year period there has been a substantial |  
 | increase in the proportion of combination-vehicle |  
 | occupants who died in accidents on interstate roads. |  
 +-----+

Number of Tractor Trailer Occupants who Died  
vs. Location in Cab  
FARS--1975-1979

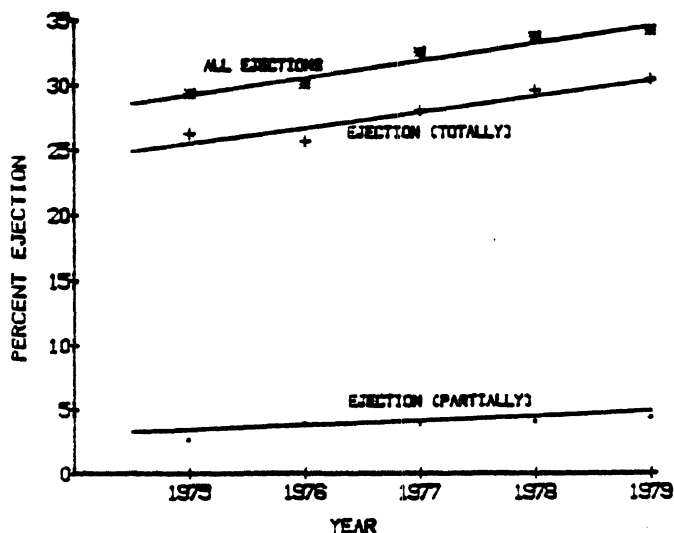
Location in Cab	1975	1976	1977	1978	1979
Driver . .	559	688	772	814	725
Right Front	61	77	74	95	94
In Sleeper	29	22	30	25	39
Other . . .	29	44	44	32	33
Total . . .	678	831	920	976	891

Most of the fatalities in the trucks are drivers, but the proportion of right-front occupants who died seems to be increasing. The "other" category includes a small number of persons in the front-center seated position, and a smaller number "riding on the vehicle exterior."

Number of Tractor Trailer Occupants who Died  
by Degree of Ejection  
FARS--1975-1979

Degree of Ejection	1975	1976	1977	1978	1979
Not Ejected (and unknown) . .	479	582	622	641	578
Totally Ejected .	178	213	258	286	270
Column Percent .	26.2%	25.6%	28.0%	29.5%	30.3%
Partially Ejected	21	36	40	44	43
Column Percent .	3.1%	4.3%	4.3%	4.5%	4.8%
Percent Ejected (Total or Partial)	29.3%	30.0%	32.4%	33.6%	34.0%
Total . . . . .	678	831	920	971	891

+-----+  
 | The proportion of ejected fatal occupants in combination |  
 | vehicle crashes seems to be increasing over the years. |  
 | It is difficult to determine whether this is a real |  
 | increase, or an artifact of a change in reporting |  
 | procedure. If it is the latter, the most recent year |  
 | probably provides the best estimate of this factor. |  
 +-----+



NATIONAL STATISTICS

STATE STATISTICS

Texas Data

1973 - 1977

## TRACTOR-TRAILER ACCIDENTS IN TEXAS

The next section of the report presents data describing the experience of tractor-trailers involved in accidents from the state of Texas. Texas was selected because their coding of trucks is far more detailed than that for most states and because we have aggregated their data files for several years.<sup>1</sup> These data are desirable because they span a different and potentially longer time-period than the FARS data. Further, the experience of tractor-trailers in personal-injury and property-damage-only accidents can be examined as well.

Data are presented for the five-year period from 1973-1977. 1973 was chosen because, beginning then, the definition of "truck" for the HSRI Texas truck files, and hence the contents of the files, was changed. The result is that findings from 1972 and earlier are not directly comparable to those for 1973 and later. 1977 is the last year for which data were available at the time of preparing this report. It is planned to include 1978 and subsequent years as they become available.

The Texas data tables contain results for tractor-trailers and for passenger cars. Tractor-trailers were selected because they comprise the bulk of the combination vehicles that are the focus of this study without including the unusual combinations of unknown configuration. This category (the 'Truck tractor and semi-trailer' class of the 'Specific Vehicle Type' variable--V61:06 in 1973-1974 and V105:06 in 1975-1977) is also likely to be consistently coded by investigating officers from year-to-year because it is defined unambiguously. Similar reasoning led to the selection of the 'Passenger Car' (V61:01 in 1973-1974 and V105:01 in 1975-1977) category for comparison purposes.

As noted earlier, the tractor-trailer data are taken from the traffic-unit (vehicle) truck files (data keyword TXT77VEH, for example) for 1973-1977. Those files contain census data for each of the years for all large trucks, or, equivalently, the files contain a complete enumeration of the accident experience. The passenger-car data are obtained from the sample files (data keyword TXS77VEH, for example), each of which is a 5%, random sample of all of the accidents occurring in the state for the year in question. Thus some small sampling variations might be present in the passenger-car frequencies, but these are considered of no consequence for the present purposes. Further information about the Texas files is contained in Texas Motor Vehicle Crash Data Sets at HSRI (UM-HSRI-78-24, John A. Green and James O'Day, Highway Safety Research Institute, September 1978).

The general format employed in this section is that tractor-trailer data are presented first, and these are followed directly by the comparable passenger-car data. Two important points should be noted about the data. The first is that all frequencies and percentages are based on involvements rather than accidents. For single-vehicle

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<sup>1</sup> The continuing cooperation of the Texas Department of Public Safety in providing these data is gratefully acknowledged.

## STATE STATISTICS

accidents, the number of involvements and the number of accidents are equal. For two-vehicle accidents, the number of involvements is twice the number of accidents. Consider, for example, the following accidents: one single-vehicle truck accident; two single-vehicle car accidents; three 2-vehicle, truck-truck accidents, four 2-vehicle, truck-car accidents; and five 2-vehicle, car-car accidents. These 15 accidents produce 27 traffic unit involvements, 11 of which are truck involvements and 16 of which are car involvements. It should be noted that 2-vehicle accidents, both vehicles of which are tractor-trailers, are relatively infrequent. The result is that the frequency of tractor-trailer accidents is closely approximated by the frequency of tractor-trailer involvements, with the frequency of accidents necessarily smaller than the frequency of involvements. This choice of the data to be presented was dictated by the structure of the data files.

The second topic of considerable importance is the choice of which injury information to associate with the tractor-trailer and passenger-car involvements, and two sub-choices are available here. Texas uses the traditional "K" (fatal), "A" (serious injury), "B" (moderate injury), and "C" (minor injury) scale in use by most police departments throughout the country. Fatal accidents are such rare events that the use of fatality information produces statistical irregularities due to chance variations alone, particularly when the data are partitioned into subsets; use of the FARS dataset is superior for examining fatal accidents both because it represents nationwide experience and because there are far more cases for study. On the other hand, the choice of injury level is difficult and somewhat arbitrary at best, resulting in incompatible interpretations of injury level in different states. The result of these considerations is that we have elected to combine all injury information, regardless of severity, into a simple injury-no injury dichotomy except for the summary information in the first table. The central interest here is in examining tractor-trailer injury experience from 1973 through 1977, and the injury-no injury classification is believed to best serve this purpose in the detailed tables that follow.

The second of the injury issues involves choosing between accident-level injury data or traffic-unit-level injury data for assignment to the tractor-trailer and passenger-car involvements. For example, suppose a 2-vehicle, truck-car accident results in no injury to any truck occupant but an injury (of any severity whatsoever) to any of the car occupants. This would be classified, of course, as an injury accident. Further, the truck involvement would be considered an injury involvement at the accident level but a no-injury involvement at the traffic-unit (vehicle) level.

A choice between the accident-level injury data and the traffic-unit level injury data would ordinarily be made on the basis of some specific question under consideration. In this report, the interest is on more general issues, and both kinds of injury data can be useful. In the tables that follow, we have presented accident-level injury data--as a percentage of tractor-trailer involvements in injury-producing accidents--with accident descriptors such as time of day or weather conditions. We have also presented traffic-unit (vehicle) level injury



data--also as a percentage of involvements--for those variables that are specific to a particular vehicle, such as driver age or vehicle damage. Thus we have tried to strike a balance between two extremes: focusing solely on vehicle-level injury data for tractor-trailers understates their injury-producing potential in accidents, while focusing on accident-level injury data for tractor-trailers overstates the injury-reduction potential of tractor-trailer design features and modifications. The kind of injury information presented is, in all tables, contained in the table title.

Tractor-Trailer Involvements in Texas for 1973-1977  
Summary Information

	1973	1974	1975	1976	1977
Tractor-Trailer Involvements (TTI) . . . . .	14990	14424	13561	14772	16982
TTI in fatal accidents . . . . .	321	286	309	268	312
TTI in "A"-injury accidents . . . . .	709	564	536	614	690
TTI in "B"-injury accidents . . . . .	1177	1099	1174	1189	1486
TTI in "C"-injury accidents . . . . .	853	927	899	981	1168
TTI in no-inj. (P.D. only) accidents	11930	11548	10643	11720	13326
Total fatalities in T-T accidents . . . . .	395	324	384	321	355
"A"-injured persons in T-T accidents	956	745	735	780	914
"B"-injured persons in T-T accidents	1668	1540	1598	1685	2014
"C"-injured persons in T-T accidents	1317	1400	1508	1577	1842
Tractor trailers with fatality . . . . .	79	75	83	65	76
TT with "A"-injured occupants . . . . .	218	195	189	190	239
TT with "B"-injured occupants . . . . .	497	466	526	530	673
TT with "C"-injured occupants . . . . .	311	329	336	385	436
TT with no injury (prop. dam. only)	13885	13359	12427	13602	15558
Total fatalities among T-T occupants	83	81	91	70	87
Total "A"-injured T-T occupants . . . . .	239	221	210	212	267
Total "B"-injured T-T occupants . . . . .	556	530	587	615	768
Total "C"-injured T-T occupants . . . . .	369	385	394	442	520
Average number of fatalities per TT having a fatality . . . . .	1.051	1.080	1.096	1.077	1.145
Total injured among T-T occupants . . . . .	1164	1136	1191	1269	1555
TT with "A" or "B" or "C" injury . . . . .	1026	990	1051	1105	1348
Average number of injured per TT having an injured occupant . . . . .	1.135	1.147	1.133	1.148	1.154

The 1977 total frequency for tractor-trailer involvements is 13.3% higher than that for 1973. However, comparable ratios show that involvements in fatal accidents have decreased 2.8%, the number of tractor trailers with a fatality has decreased 3.8%, and fatalities in all accidents have decreased 10%.

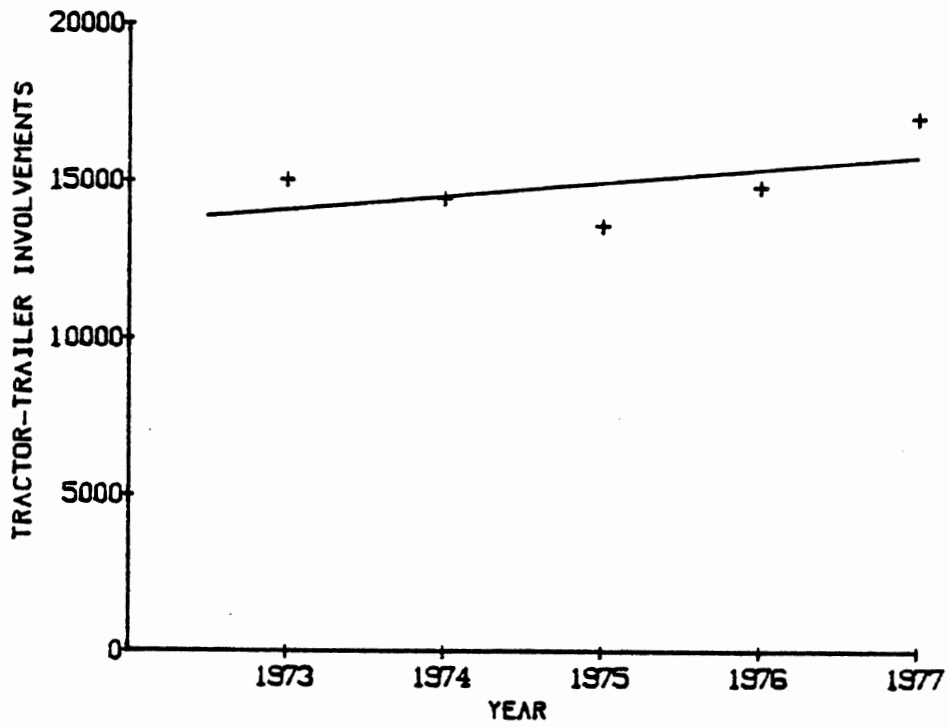
Fatalities among tractor-trailer occupants, during the same period, increased 4.8%. It can be seen that the average number of fatalities occurring in those tractor-trailers having a fatality increased from 1.05 in 1973 to 1.15 in 1977. Increasing tractor occupancy is a possible explanation, but the comparable injury data do not support this conjecture.

Tractor-Trailer Involvements in Texas for 1973-1977  
Regression Line Information

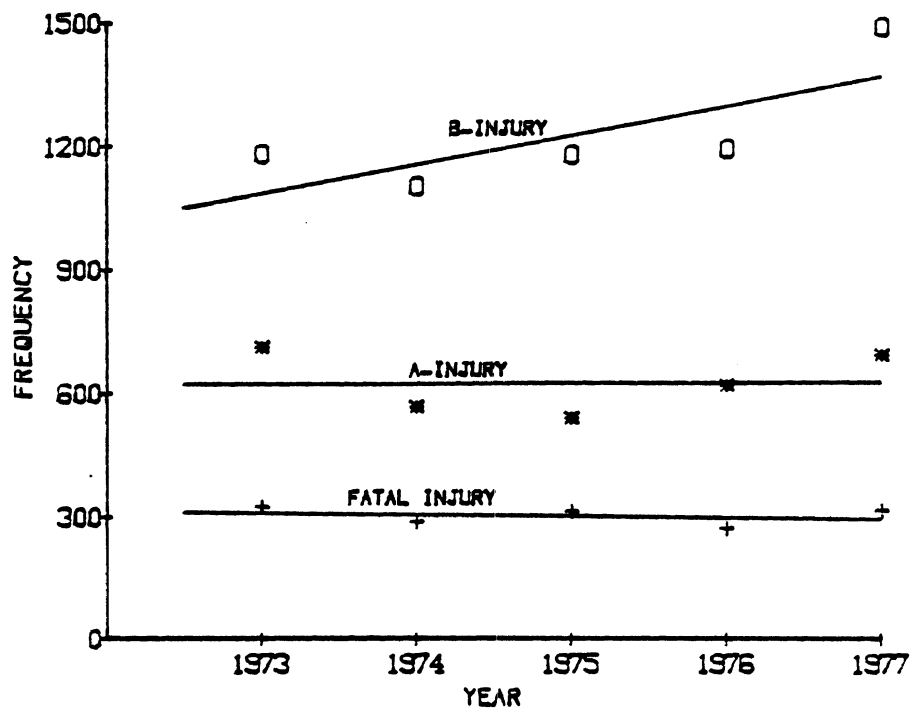
	Mean	Slope	Ratio for 1977 (Actual/Regression)
Tractor-Trailer Involvements (TTI)	14945.8	+433.2	1.074
TTI in fatal accidents . . . . .	299.2	- 3.6	1.068
TTI in "A"-injury accidents . . . . .	622.6	+ 1.2	1.104
TTI in "B"-injury accidents . . . . .	1225	+ 70.8	1.087
TTI in "C"-inj. plus prop.dam. acc.	12799	+364.8	1.071
Total fatalities in TT accidents . . .	355.8	- 8.3	1.047
Tractor trailers with fatality . . . .	75.6	- 1.6	1.050
Total fatalities among TT occupants	82.4	- 0.3	1.064

The table above and the accompanying figures show that tractor-trailer involvements in all accidents are increasing about 3% per year. Generally, the actual data points for 1973 and 1977 exceed the corresponding regression points and the middle three years have data points below the regression line.

The slopes of the regression lines summarize the fact that the majority of the increase in tractor-trailer involvements occurred among property-damage and minor-injury accidents for this 5-year period in Texas. The linear regressions over the five years for both fatal and "A"-injury involvements are essentially flat, with all of the slopes relative to fatal experience actually being somewhat downward. However, as the last column shows, all of the actual data points for 1977 exceed the corresponding regression-line data points by from 4.6% to 10.4%. Whether this trend continues will be examined when the 1978 data become available.



FREQUENCY AND REGRESSION LINE  
OF TEXAS TRACTOR-TRAILER INVOLVEMENTS 1973-1977



FREQUENCY AND REGRESSIONS BY INJURY LEVELS

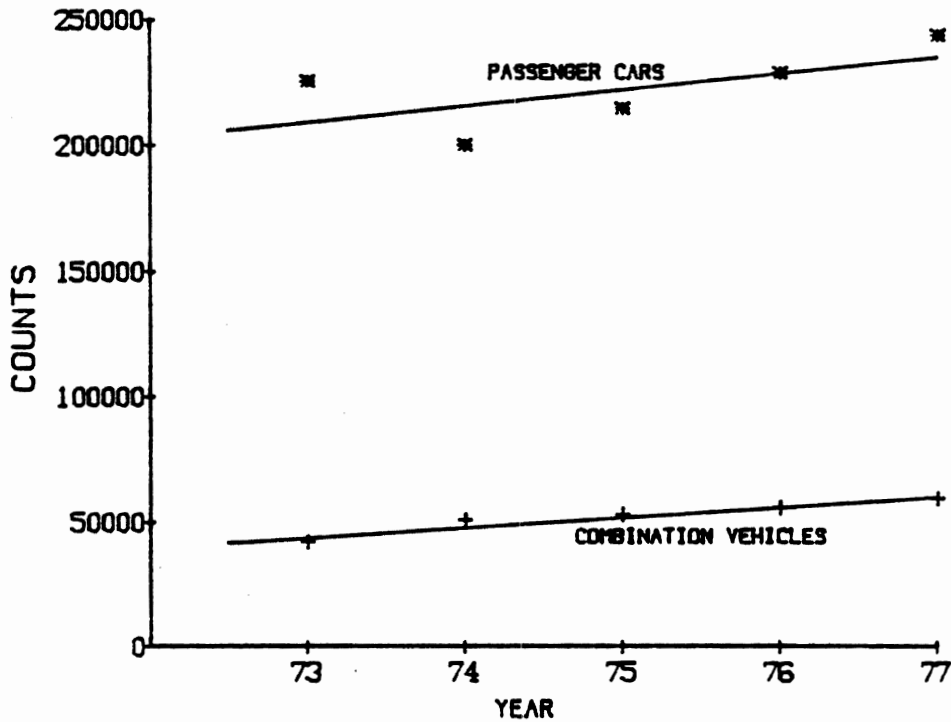
Aggregate Annual Average Daily Number of Vehicles  
by Vehicle Type  
at Twenty-Eight Fixed Stations in Texas for 1973-1977

Vehicle Type	Year				
	1973	1974	1975	1976	1977
Combination Vehicles	41749	50092	52430	55374	58979
Passenger Cars . . .	224691	199441	213750	228046	242915

Definitive exposure data are not available to assist in interpreting the summary accident statistics. However, the Texas State Department of Highways and Public Transportation has for many years conducted manual counts of vehicles by vehicle type at many manual count stations. These data are published in an annual Manual Count Annual Report. The 1977 report, for example contains counts at 279 different manual count stations.

The vehicles are counted by the following classifications: passenger cars; single unit trucks, with 3 sub-classes; combination trucks, with semi-trailer, semi-trailer-trailer, and truck trailer sub-classes; busses; and motorcycles and motorscooters. About 90% of the trucks in the combination-vehicle class are contained in the semi-trailer sub-class.

Tabulated above are the aggregate 24-hour AADT counts at 28 of the manual count stations (L-16, L-20-1, L-20-3, L-30-1, L-37-1, L-45-2, L-72, M-620-A, M-1042-A, M-1065, M-1070, M-1072, M-1075, M-1083, MA-8-A, MA-16, MA-26-A, MS-1, MS-4, MS-14, MS-74, MS-97, MS-118, MS-121, MS-125, MS-150, MS-152, and MS-164). These were selected both because they were in operation in each of the years of interest and because there were no known changes in the number of lanes being counted, the direction of vehicles, and the like. The 28 stations are not, of course, a statistically representative sample of the Texas counting stations, but they are scattered throughout the state. Thus they provide a very good indication of the trends in tractor-trailer traffic during the 1973-1977 period.



FREQUENCIES AND REGRESSIONS FOR  
AGGREGATE AADT COUNTS AT 28 STATIONS

The table on the preceding page and the regression plots above show that the combination-vehicle count at the 28 selected count stations is increasing far more rapidly from 1973 to 1977 than is the passenger-car count. The actual c-v count for 1977 is 41% higher than that for 1973, while the comparable increase for passenger cars is only 8%.

The two regression lines indicate that the (compounded) annual increase for combination vehicles for this time period is about 8% per year, while the (compounded) annual increase for passenger cars is 3% per year.

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Month

Month	Year				
	1973	1974	1975	1976	1977
January . .	1273	1395	1102	1064	1314
(% Injury)	(18.1)	(18.3)	(21.9)	(21.1)	(19.2)
February . .	1039	1023	1021	1038	1182
	(18.4)	(21.2)	(21.5)	(19.7)	(20.3)
March . . .	1192	1098	1105	1188	1454
	(20.5)	(19.9)	(23.3)	(18.9)	(20.9)
April . . .	1104	1106	978	1260	1319
	(20.7)	(19.8)	(21.7)	(22.3)	(19.5)
May . . . .	1254	1148	1105	1136	1323
	(21.0)	(18.9)	(23.0)	(21.1)	(23.0)
June . . . .	1345	1253	1171	1366	1553
	(21.3)	(19.6)	(20.9)	(21.8)	(21.6)
July . . . .	1395	1433	1279	1313	1492
	(21.2)	(20.5)	(20.3)	(20.6)	(21.8)
August . . .	1371	1357	1220	1299	1566
	(20.5)	(21.5)	(20.4)	(19.7)	(21.4)
September .	1289	1131	1139	1259	1439
	(20.7)	(20.4)	(21.1)	(21.4)	(21.0)
October . .	1356	1216	1265	1318	1488
	(19.3)	(19.8)	(22.1)	(20.3)	(23.5)
November . .	1264	1120	1039	1255	1400
	(20.7)	(20.8)	(20.7)	(20.7)	(22.4)
December . .	1108	1144	1137	1276	1452
	(22.4)	(18.6)	(21.6)	(19.9)	(23.3)
TOTAL . . .	14990	14424	13561	14772	16982
(% Injury)	(20.4)	(19.9)	(21.5)	(20.7)	(21.5)



Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Month

Month	Year				
	1973	1974	1975	1976	1977
January . . . (% Injury)	2671 (15.8)	2285 (17.7)	2391 (16.3)	2280 (17.9)	2711 (17.7)
February . . .	2270 (16.1)	1809 (16.6)	2227 (18.6)	2122 (18.8)	2258 (18.7)
March . . . .	2719 (17.7)	2296 (18.0)	2648 (17.2)	2670 (19.0)	2674 (20.5)
April . . . .	2577 (18.2)	2288 (19.3)	2392 (19.1)	2623 (18.6)	2671 (20.5)
May . . . . .	2558 (19.0)	2283 (17.9)	2740 (18.8)	2600 (20.7)	2516 (21.5)
June . . . . .	2542 (18.4)	2293 (19.2)	2468 (16.9)	2504 (18.8)	2572 (19.0)
July . . . . .	2496 (20.1)	2232 (17.3)	2619 (19.3)	2644 (19.4)	2720 (20.6)
August . . . .	2594 (19.4)	2626 (18.1)	2616 (19.8)	2555 (19.8)	2762 (20.1)
September . .	2637 (20.1)	2488 (18.9)	2469 (19.7)	2459 (19.8)	2579 (21.0)
October . . .	2782 (18.7)	2530 (19.6)	2530 (18.3)	2834 (19.2)	2788 (21.1)
November . . .	2507 (18.2)	2585 (17.8)	2414 (19.3)	2723 (19.9)	2655 (21.8)
December . . .	2452 (18.8)	2837 (21.0)	2778 (18.6)	2825 (19.4)	2791 (21.1)
TOTAL . . . . (% Injury)	30805 (18.4)	28552 (18.5)	30292 (18.5)	30839 (19.3)	31697 (20.3)

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Day of Week

Day of Week	Year				
	1973	1974	1975	1976	1977
Sunday . . . (% Injury)	687 (25.9)	669 (28.4)	669 (27.7)	753 (27.2)	871 (27.6)
Monday . . .	2390 (18.8)	2420 (18.3)	2251 (19.7)	2449 (19.6)	2735 (21.0)
Tuesday . .	2442 (20.3)	2431 (19.9)	2319 (20.7)	2489 (20.2)	2934 (19.9)
Wednesday .	2566 (20.4)	2433 (19.0)	2255 (21.8)	2490 (19.7)	2848 (20.8)
Thursday . .	2627 (20.4)	2534 (19.1)	2309 (21.2)	2507 (21.1)	2955 (20.4)
Friday . . .	2849 (19.0)	2754 (19.7)	2518 (20.0)	2785 (19.0)	3192 (21.1)
Saturday . .	1429 (23.7)	1183 (22.7)	1240 (26.2)	1299 (24.2)	1447 (26.7)
TOTAL . . . (% Injury)	14990 (20.4)	14424 (19.9)	13561 (21.5)	14772 (20.7)	16982 (21.5)

+-----+  
 | During each of the five years, Fridays had the most and |  
 | Sundays the fewest tractor-trailer involvements, with |  
 | about a 4:1 ratio between the two. Weekends accounted for |  
 | 13.7% of the accidents, but more of these involved |  
 | injuries than those during the week. |  
 +-----+

Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Day of Week

Day of Week	Year				
	1973	1974	1975	1976	1977
Sunday . . . (% Injury)	3355 (23.7)	3007 (23.4)	3231 (21.7)	3452 (24.9)	3485 (24.2)
Monday . . .	4172 (16.4)	3944 (16.9)	4222 (15.4)	4160 (17.4)	4272 (19.3)
Tuesday . .	4135 (17.3)	3840 (17.4)	4032 (18.1)	4127 (17.9)	4106 (19.1)
Wednesday .	4231 (17.7)	3903 (17.0)	4368 (17.4)	4119 (17.4)	4371 (19.9)
Thursday . .	4197 (17.7)	4066 (18.5)	4142 (18.4)	4352 (17.2)	4546 (18.3)
Friday . . .	5705 (17.3)	5161 (17.8)	5464 (18.0)	5719 (19.8)	5691 (19.1)
Saturday . .	5010 (19.8)	4631 (19.7)	4833 (21.1)	4910 (21.0)	5226 (23.1)
TOTAL . . . (% Injury)	30805 (18.4)	28552 (18.5)	30292 (18.5)	30839 (19.3)	31697 (20.3)

Tractor-Trailer Involvements in Texas for 1973-1977 by Hour of Day

Hour of Day	1973	1974	1975	1976	1977
12:01-12:59 a.m. (% Injury) . .	275 (34.9)	258 (37.6)	257 (37.0)	258 (33.3)	287 (35.2)
1:00-1:59 a.m. .	257 (32.3)	219 (37.0)	242 (39.3)	251 (36.7)	278 (34.5)
2:00-2:59 a.m. .	273 (35.9)	230 (30.4)	219 (31.1)	248 (35.5)	316 (34.8)
3:00-3:59 a.m. .	232 (34.5)	218 (27.1)	209 (39.2)	203 (34.0)	257 (36.6)
4:00-4:59 a.m. .	233 (36.1)	191 (27.2)	189 (36.5)	184 (31.5)	216 (41.7)
5:00-5:59 a.m. .	272 (30.9)	236 (29.7)	247 (39.7)	234 (35.0)	286 (38.8)
6:00-6:59 a.m. .	388 (26.5)	356 (27.0)	361 (30.2)	405 (29.4)	431 (26.9)
7:00-7:59 a.m. .	746 (20.6)	701 (21.5)	616 (22.4)	769 (20.8)	781 (23.7)
8:00-8:59 a.m. .	875 (16.5)	805 (17.5)	819 (17.6)	840 (21.5)	1007 (18.0)
9:00-9:59 a.m. .	869 (15.5)	862 (17.9)	799 (19.5)	919 (18.8)	998 (16.8)
10:00-10:59 a.m.	976 (16.1)	983 (18.3)	878 (18.6)	985 (18.1)	1043 (17.6)
11:00-11:59 a.m.	974 (16.9)	1076 (16.2)	983 (18.1)	1008 (17.6)	1193 (17.9)
12:00-12:59 p.m.	1059 (17.3)	937 (17.6)	881 (15.6)	1019 (16.3)	1131 (17.4)
1:00-1:59 p.m. .	981 (17.1)	957 (16.7)	914 (18.6)	916 (17.2)	1101 (18.6)
2:00-2:59 p.m. .	1048 (16.7)	1030 (16.5)	939 (18.3)	1068 (17.5)	1233 (18.1)
3:00-3:59 p.m. .	1103 (15.8)	1036 (15.6)	996 (16.3)	1110 (17.6)	1288 (17.9)
4:00-4:59 p.m. .	1146 (17.1)	1122 (16.8)	1016 (19.2)	1138 (17.9)	1307 (17.6)
5:00-5:59 p.m. .	922 (19.7)	945 (14.7)	867 (17.8)	888 (15.5)	1055 (17.9)
6:00-6:59 p.m. .	584 (22.4)	583 (22.5)	530 (20.4)	595 (21.8)	721 (21.8)
7:00-7:59 p.m. .	417 (21.8)	407 (20.9)	388 (22.4)	425 (22.4)	519 (20.0)
8:00-8:59 p.m. .	363 (23.4)	353 (24.4)	331 (26.0)	373 (23.1)	404 (25.2)
9:00-9:59 p.m. .	344 (26.5)	327 (26.3)	314 (27.4)	322 (23.0)	392 (28.6)
10:00-10:59 p.m.	344 (32.6)	303 (26.1)	292 (29.8)	302 (23.8)	373 (30.6)
11:00-11:59 p.m.	309 (28.8)	289 (34.6)	274 (28.8)	312 (26.9)	365 (39.5)

Passenger-Car Involvements in Texas for 1973-1977 by Hour of Day

Hour of Day	1973	1974	1975	1976	1977
12:01-12:59 a.m.	676	671	738	671	791
(% Injury) . .	(26.0)	(30.1)	(31.4)	(28.3)	(30.0)
1:00-1:59 a.m. .	565	480	579	538	609
	(28.7)	(31.3)	(29.2)	(33.3)	(28.7)
2:00-2:59 a.m. .	433	488	515	502	579
	(27.3)	(29.3)	(31.3)	(32.5)	(31.4)
3:00-3:59 a.m. .	161	168	165	247	225
	(26.1)	(26.2)	(37.6)	(30.0)	(34.2)
4:00-4:59 a.m. .	116	112	96	88	120
	(25.0)	(18.8)	(29.2)	(37.5)	(30.8)
5:00-5:59 a.m. .	125	104	98	120	136
	(33.6)	(27.9)	(30.6)	(30.0)	(27.9)
6:00-6:59 a.m. .	424	328	321	386	450
	(20.5)	(21.6)	(18.4)	(19.4)	(24.9)
7:00-7:59 a.m. .	1533	1412	1310	1496	1501
	(14.7)	(18.6)	(15.9)	(15.4)	(18.5)
8:00-8:59 a.m. .	1560	1353	1472	1579	1512
	(15.5)	(15.7)	(16.3)	(16.7)	(15.3)
9:00-9:59 a.m. .	1032	948	978	955	1007
	(14.4)	(15.7)	(16.0)	(15.6)	(18.6)
10:00-10:59 a.m.	1266	1149	1226	1179	1281
	(15.9)	(16.2)	(15.2)	(19.0)	(18.6)
11:00-11:59 a.m.	1595	1396	1520	1655	1614
	(15.0)	(13.8)	(15.1)	(14.7)	(17.6)
12:00-12:59 p.m.	2034	1932	2065	2023	2122
	(14.4)	(15.6)	(14.9)	(16.6)	(17.3)
1:00-1:59 p.m. .	1698	1626	1815	1804	1821
	(16.0)	(17.0)	(15.2)	(17.3)	(16.6)
2:00-2:59 p.m. .	1928	1749	1777	1847	1932
	(18.3)	(17.7)	(15.6)	(15.7)	(17.8)
3:00-3:59 p.m. .	2435	2156	2408	2397	2330
	(15.9)	(15.3)	(16.3)	(19.9)	(19.1)
4:00-4:59 p.m. .	2852	2633	2741	2894	2836
	(17.5)	(16.3)	(18.4)	(17.3)	(17.7)
5:00-5:59 p.m. .	3015	2800	2911	2896	3201
	(17.8)	(16.5)	(15.3)	(18.3)	(20.1)
6:00-6:59 p.m. .	1896	1824	2015	1929	1969
	(21.8)	(20.1)	(19.2)	(20.7)	(22.7)
7:00-7:59 p.m. .	1530	1392	1487	1519	1549
	(19.4)	(20.7)	(19.8)	(20.9)	(20.7)
8:00-8:59 p.m. .	1123	1074	1192	1172	1172
	(24.3)	(20.5)	(22.0)	(21.3)	(22.4)
9:00-9:59 p.m. .	1042	1043	1045	1103	1044
	(20.5)	(22.1)	(25.8)	(21.8)	(25.5)
10:00-10:59 p.m.	915	883	939	955	1046
	(22.8)	(24.5)	(24.2)	(23.4)	(23.7)
11:00-11:59 p.m.	851	831	879	884	850
	(24.4)	(24.2)	(23.0)	(24.0)	(26.5)

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Urbanization

Urbanization	Year				
	1973	1974	1975	1976	1977
Rural . . . . . (% Injury) . . .	4251 (31.4)	4056 (30.1)	3911 (33.0)	4221 (31.2)	4942 (33.2)
Under 25,000 . . .	3134 (19.7)	3051 (19.5)	2874 (20.4)	3142 (19.7)	3638 (18.5)
25,000-250,000 . .	2235 (16.5)	2224 (15.2)	2133 (15.9)	2373 (16.8)	2653 (17.0)
250,000 and larger	5370 (13.8)	5093 (14.2)	4643 (15.2)	5036 (14.2)	5749 (15.5)
TOTAL . . . . . (% Injury) . . .	14990 (20.4)	14424 (19.9)	13561 (21.5)	14772 (20.7)	16982 (21.5)

+-----+  
| The injury percentage increases steadily in going from |  
| large cities to rural areas, with about a 2:1 ratio |  
| between the two for each of the five years. |  
+-----+

Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Urbanization

Urbanization	Year				
	1973	1974	1975	1976	1977
Rural . . . . .	2818	2392	2502	2644	2836
(% Injury) . . .	(30.5)	(28.2)	(30.1)	(31.6)	(30.5)
Under 25,000 . . .	5924	5606	6045	6098	6169
	(17.2)	(16.5)	(16.2)	(18.3)	(18.0)
25,000-250,000 . .	7598	7198	7812	8000	8260
	(16.8)	(18.2)	(17.6)	(18.4)	(19.8)
250,000 and larger	14465	13356	13933	14097	14432
	(17.4)	(17.8)	(17.9)	(17.9)	(19.6)
TOTAL . . . . .	30805	28552	30292	30839	31697
(% Injury) . . .	(18.4)	(18.5)	(18.5)	(19.3)	(20.3)

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Road Class

Road Class	Year				
	1973	1974	1975	1976	1977
Interstate . . . . .	4045	3789	3623	4055	4664
(% Injury) . . . . .	(22.3)	(20.8)	(22.7)	(20.5)	(23.3)
U.S. and state trunkline	6922	6778	6485	6830	7823
	(23.4)	(22.6)	(24.4)	(24.1)	(23.9)
State secondary road . .	652	668	633	737	850
	(24.8)	(29.0)	(27.2)	(26.9)	(29.5)
County road . . . . .	219	249	227	272	330
	(25.6)	(21.7)	(27.8)	(22.8)	(30.6)
City street . . . . .	3087	2907	2543	2805	3233
	(10.0)	(10.3)	(10.7)	(10.8)	(10.4)
Other . . . . .	65	33	50	73	82
	(20.0)	(15.2)	(14.0)	(12.3)	(13.4)
TOTAL . . . . .	14990	14424	13561	14772	16982
(% Injury) . . . . .	(20.4)	(19.9)	(21.5)	(20.7)	(21.5)

+-----+  
 | State secondary and county roads exhibit the highest |  
 | percentage of injury involvements, but together they |  
 | account for under 10% of all tractor-trailer involvements. |  
 | City streets, with about 20% of the involvements, have the |  
 | lowest injury percentage. Interstate and U.S. and state |  
 | trunklines together account for about three-fourths of the |  
 | tractor-trailer involvements, and from 20%-25% of these |  
 | have an injury in at least one of the accident-involved |  
 | vehicles. |  
 +-----+



Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Road Class

Road Class	Year				
	1973	1974	1975	1976	1977
Interstate . . . . .	3100	2711	2830	2945	3133
(% Injury) . . . . .	(19.9)	(18.7)	(18.7)	(19.8)	(21.3)
U.S. and state trunkline	9156	8176	8745	8958	9149
	(20.3)	(20.4)	(20.6)	(21.1)	(22.6)
State secondary road . .	1592	1381	1623	1832	1909
	(23.4)	(23.0)	(23.2)	(23.9)	(24.7)
County road . . . . .	649	749	774	779	842
	(27.9)	(26.2)	(27.1)	(26.4)	(24.7)
City street . . . . .	16266	15495	16244	16248	16561
	(16.1)	(16.7)	(16.5)	(17.4)	(18.2)
Other . . . . .	42	40	76	77	103
	(23.8)	(30.0)	(10.5)	(15.5)	(15.5)
TOTAL . . . . .	30805	28552	30292	30839	31697
(% Injury) . . . . .	(18.4)	(18.5)	(18.5)	(19.3)	(20.3)

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Intersection Type

Intersection Type	Year				
	1973	1974	1975	1976	1977
No intersection . . . . .	9250	8603	8066	8552	9893
(% Injury) . . . . .	(22.4)	(21.3)	(23.1)	(22.8)	(23.9)
Main lanes-numbered highway .	1532	1597	1752	1907	2079
	(21.7)	(20.7)	(22.4)	(21.6)	(23.6)
Frontage road-numbered highway	30	24	267	289	376
	(20.0)	(8.3)	(15.0)	(10.0)	(10.6)
Y connection . . . . .	123	142	167	186	188
	(14.6)	(11.3)	(15.6)	(23.1)	(11.7)
Ramp . . . . .	325	275	268	318	356
	(19.1)	(18.2)	(19.0)	(20.4)	(20.2)
County road or city street . .	3727	3768	3037	3515	4077
	(15.2)	(16.9)	(17.8)	(15.7)	(16.3)
Crossover . . . . .	3	15	4	5	13
	(33.3)	(26.7)	(25.0)	(0.0)	(15.4)
TOTAL . . . . .	14990	14424	13561	14772	16982
(% Injury) . . . . .	(20.4)	(19.9)	(21.5)	(20.7)	(21.5)

+-----+  
 | About 60% of accidents involving tractor trailers are not |  
 | associated with an intersection, and these have only a |  
 | slightly higher injury rate than the overall injury |  
 | percentage. Intersections with the main lanes of numbered |  
 | highways--about 12% of the total--show similar injury |  
 | percentages. The only type of intersection having a lower |  
 | injury percentage is that of the frontage road of a |  
 | numbered highway, but these account for only 2% of all |  
 | tractor-trailer involvements. |  
 +-----+

Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Intersection Type

Intersection Type	Year				
	1973	1974	1975	1976	1977
No intersection . . . . .	15206	13377	14137	14126	14632
(% Injury) . . . . .	(17.6)	(18.1)	(18.7)	(19.0)	(19.4)
Main lanes-numbered highway .	1346	1310	2066	2230	2218
	(21.2)	(18.9)	(19.8)	(21.6)	(24.3)
Frontage road-numbered highway	28	23	481	502	545
	(21.4)	(21.7)	(16.2)	(12.4)	(17.1)
Y connection . . . . .	147	167	148	143	153
	(19.7)	(13.2)	(12.8)	(9.1)	(17.6)
Ramp . . . . .	493	391	440	475	381
	(10.8)	(21.5)	(14.8)	(15.2)	(17.3)
County road or city street . .	13584	13282	13020	13363	13767
	(19.2)	(18.9)	(18.3)	(19.8)	(20.9)
Crossover . . . . .	1	2	0	0	1
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
TOTAL . . . . .	30805	28552	30292	30839	31697
(% Injury) . . . . .	(18.4)	(18.5)	(18.5)	(19.3)	(20.3)

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Light Conditions

Light Conditions	Year				
	1973	1974	1975	1976	1977
Daylight . . . . .	11338	11022	10317	11303	12957
(% Injury) . . . . .	(17.2)	(17.2)	(18.4)	(18.2)	(18.3)
Dawn . . . . .	123	131	108	104	110
	(35.0)	(32.8)	(30.6)	(33.7)	(33.6)
Dark-no street light .	2930	2716	2598	2770	3265
	(30.9)	(29.0)	(32.2)	(29.2)	(32.9)
Dark-with street light	437	409	434	474	516
	(29.1)	(28.4)	(31.1)	(27.6)	(29.5)
Dusk . . . . .	162	146	104	121	134
	(19.8)	(20.5)	(18.3)	(19.8)	(20.1)
TOTAL . . . . .	14990	14424	13561	14772	16982
(% Injury) . . . . .	(20.4)	(19.9)	(21.5)	(20.7)	(21.5)

+-----+  
| About three-quarters of the tractor-trailer involvements |  
| during the 5-year period occurred during daylight. All |  
| other light conditions have elevated injury percentages, |  
| with those for dawn being nearly twice those for daylight. |  
| A higher proportion of rural travel during non-daylight |  
| hours, and possibly fatigue as well, probably account for |  
| this fact. |  
+-----+

Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Light Conditions

Light Conditions	Year				
	1973	1974	1975	1976	1977
Daylight . . . . .	22691	21042	22418	22496	23229
(% Injury) . . . . .	(16.5)	(16.6)	(16.2)	(17.3)	(18.3)
Dawn . . . . .	119	160	127	99	122
	(19.3)	(26.9)	(21.3)	(22.2)	(22.1)
Dark-no street light .	5573	4974	5185	5449	5651
	(23.0)	(23.4)	(24.4)	(23.7)	(24.2)
Dark-with street light	1779	1940	2125	2243	2278
	(26.1)	(26.0)	(28.4)	(27.3)	(30.7)
Dusk . . . . .	643	436	437	552	417
	(23.8)	(19.3)	(15.3)	(22.8)	(23.3)
TOTAL . . . . .	30805	28552	30292	30839	31697
(% Injury) . . . . .	(18.4)	(18.5)	(18.5)	(19.3)	(20.3)

As with tractor-trailers, about three-quarters of the passenger-car involvements also occur during daylight, with the non-daylight periods having higher injury percentages. Somewhat surprisingly, and contrary to the tractor-trailer situation, the "Dark-with street light" category injury percentages exceed those of the "Dark-no street light" category.

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Weather Conditions

Weather Conditions	Year				
	1973	1974	1975	1976	1977
Clear . . . (% Injury)	12543 (19.8)	12162 (19.6)	11717 (20.7)	12698 (20.1)	14851 (20.8)
Raining . .	2100 (23.7)	1988 (21.1)	1566 (25.2)	1846 (23.1)	1832 (25.8)
Snowing . .	131 (13.0)	44 (18.2)	53 (18.9)	63 (20.6)	60 (23.3)
Foggy . . .	204 (29.4)	220 (27.7)	209 (37.8)	152 (35.5)	188 (37.8)
Dust . . . .	10 (20.0)	9 (44.4)	12 (58.3)	8 (50.0)	45 (28.9)
Other . . .	2 (0.0)	1 (100.)	4 (75.0)	5 (20.0)	6 (0.0)
TOTAL . . . (% Injury)	14990 (20.4)	14424 (19.9)	13561 (21.5)	14772 (20.7)	16982 (21.5)

+-----+  
| Over 85% of both tractor-trailer and passenger-car |  
| accident involvements occur during clear weather |  
| conditions. Raining conditions--about 13% in both cases-- |  
| have a higher percentage of injury involvements for tractor- |  
| trailers but a lower percentage for passenger cars. |  
+-----+

Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Weather Conditions

Weather Conditions	Year				
	1973	1974	1975	1976	1977
Clear . . . (% Injury)	25785 (18.6)	24408 (18.7)	26368 (18.6)	26330 (19.3)	27912 (20.4)
Raining . .	4634 (17.6)	3881 (17.6)	3633 (17.9)	4231 (18.9)	3514 (19.2)
Snowing . .	201 (9.5)	32 (25.0)	104 (20.2)	139 (18.0)	72 (22.2)
Foggy . . .	176 (23.3)	212 (17.9)	180 (20.6)	117 (20.5)	166 (26.5)
Dust . . . .	8 (37.5)	17 (5.9)	6 (0.0)	18 (16.7)	31 (16.1)
Other . . .	1 (100.)	2 (0.0)	1 (100.)	4 (50.0)	2 (0.0)
TOTAL . . . (% Injury)	30805 (18.4)	28552 (18.5)	30292 (18.5)	30839 (19.3)	31697 (20.3)

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Road Alignment

Road Alignment	Year				
	1973	1974	1975	1976	1977
Straight-level . . . (% Injury) . . .	13713 (19.9)	13261 (19.2)	12404 (20.9)	13703 (19.6)	15830 (20.7)
Straight-grade . . .	137 (22.6)	98 (31.6)	95 (36.8)	77 (39.0)	56 (23.2)
Straight-hillcrest	111 (31.5)	110 (35.5)	95 (36.8)	95 (41.1)	96 (41.7)
Curve-level . . .	991 (25.0)	912 (26.6)	931 (26.4)	872 (31.9)	961 (32.9)
Curve-grade . . .	24 (45.8)	23 (34.8)	29 (34.5)	12 (75.0)	25 (36.0)
Curve-hillcrest .	14 (28.6)	18 (27.8)	7 (28.6)	13 (84.6)	14 (28.6)
Missing data . . .		2 (0.0)			
TOTAL . . . . . (% Injury) . . .	14990 (20.4)	14424 (19.9)	13561 (21.5)	14772 (20.7)	16982 (21.5)

+-----+  
| Over 92% of tractor-trailer involvements and 96% of |  
| passenger-car involvements occur under straight-level road |  
| alignments. Other alignments, although few in number, |  
| have higher injury percentages. |  
+-----+



Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Road Alignment

Road Alignment	Year				
	1973	1974	1975	1976	1977
Straight-level . . . (% Injury) . . .	29361 (18.1)	27449 (18.2)	29099 (18.1)	29702 (19.0)	30577 (20.0)
Straight-grade . . .	123 (28.5)	51 (19.6)	76 (10.5)	34 (11.8)	39 (28.2)
Straight-hillcrest	84 (27.4)	82 (13.4)	79 (27.8)	58 (22.4)	76 (27.6)
Curve-level . . .	1211 (24.5)	951 (26.6)	1028 (29.7)	1037 (28.5)	988 (30.4)
Curve-grade . . .	16 (37.5)	15 (53.3)	5 (60.0)	5 (20.0)	5 (20.0)
Curve-hillcrest .	10 (40.0)	4 (0.0)	5 (20.0)	3 (66.7)	12 (66.7)
TOTAL . . . . . (% Injury) . . .	30805 (18.4)	28552 (18.5)	30292 (18.5)	30839 (19.3)	31697 (20.3)

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Accident Type

Accident Type	Year				
	1973	1974	1975	1976	1977
Pedestrian . . (% Injury) .	39 (100.)	45 (100.)	42 (100.)	38 (100.)	32 (100.)
Another vehicle	10667 (21.0)	10164 (20.4)	9577 (21.9)	10544 (20.4)	12192 (21.2)
Railroad train	101 (37.6)	81 (42.0)	68 (23.5)	81 (40.7)	94 (31.9)
Parked car . .	606 (5.3)	554 (5.1)	443 (4.5)	553 (5.4)	635 (7.6)
Bicyclist . . .	10 (100.)	13 (84.6)	10 (80.0)	12 (91.7)	7 (85.7)
Animal . . . .	266 (5.3)	326 (8.3)	381 (7.3)	301 (6.6)	357 (7.3)
Other object .	88 (11.4)	82 (7.3)	74 (23.0)	80 (10.0)	114 (21.1)
All others . .	3213 (20.9)	3159 (20.7)	2966 (23.4)	3163 (23.9)	3551 (25.5)
TOTAL . . . . . (% Injury) .	14990 (20.4)	14424 (19.9)	13561 (21.5)	14772 (20.7)	16982 (21.5)

+-----+  
 | About 70% of the tractor-trailer accidents involve another |  
 | vehicle. The comparable figure for passenger cars is 85% |  
 | For both the injury percentage has varied little over the |  
 | 5-year period. |  
 +-----+

Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Accident Type

Accident Type	Year				
	1973	1974	1975	1976	1977
Pedestrian . . (% Injury) .	201 (100.)	179 (100.)	188 (100.)	184 (100.)	183 (100.)
Another vehicle	26136 (16.6)	24440 (16.7)	25952 (16.4)	26438 (17.4)	27204 (18.6)
Railroad train	48 (37.5)	38 (50.0)	40 (40.0)	40 (45.0)	45 (33.3)
Parked car . .	1423 (11.8)	1278 (10.3)	1324 (11.3)	1323 (11.1)	1367 (11.2)
Bicyclist . . .	115 (79.1)	122 (81.1)	122 (86.9)	85 (92.9)	110 (90.0)
Animal . . . .	217 (10.1)	175 (5.1)	190 (4.7)	182 (8.2)	185 (9.7)
Other object .	77 (22.1)	62 (12.9)	58 (15.5)	61 (14.8)	85 (18.8)
All others . .	2588 (31.4)	2258 (33.4)	2418 (35.6)	2526 (35.4)	2518 (35.3)
TOTAL . . . . . (% Injury) .	30805 (18.4)	28552 (18.5)	30292 (18.5)	30839 (19.3)	31697 (20.3)

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Vehicle Mix

Vehicle Mix	Year				
	1973	1974	1975	1976	1977
Truck-fixed object . . . . .	2585	2525	3718	3935	4426
(% Injury) . . . . .	(12.8)	(11.9)	(18.3)	(19.3)	(20.5)
Truck-pedestrian/bicycle .	48	54	55	55	45
	(100.)	(96.3)	(100.)	(100.)	(100.)
Truck-lost control . . . . .	1180	1202	84	114	165
	(29.9)	(30.9)	(25.0)	(17.5)	(24.8)
Truck-other object . . . . .	474	454	27	30	48
	(10.3)	(12.1)	(0.0)	(10.0)	(14.6)
Car-truck . . . . .	7672	7224	6721	7432	8437
	(19.1)	(18.5)	(19.8)	(18.3)	(19.4)
Truck-truck . . . . .	2762	2691	2706	2907	3567
	(22.5)	(21.1)	(24.1)	(22.3)	(22.7)
Truck-motorcycle . . . . .	37	50	48	50	43
	(83.8)	(76.0)	(81.3)	(68.0)	(69.8)
Truck-other vehicle type .	68	53	78	70	94
	(20.6)	(26.4)	(21.8)	(18.6)	(27.7)
Three or more traffic units	145	138	119	164	150
	(100.)	(98.6)	(100.)	(100.)	(100.)
Missing data . . . . .	19	33	5	15	7
	(15.8)	(9.1)	(0.0)	(6.7)	(0.0)
TOTAL . . . . .	14990	14424	13561	14772	16982
(% Injury) . . . . .	(20.4)	(19.9)	(21.5)	(20.7)	(21.5)

+-----+  
| Use of the "Truck-fixed object," "Truck-lost control," and |  
| "Truck-other object" classes of this table, and comparable |  
| classes in the next table, changed from 1974 to 1975. |  
+-----+

Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Accident-Injury Percentage by  
Vehicle Mix

Vehicle Mix	Year				
	1973	1974	1975	1976	1977
Car-fixed object . . . . .	3278	2919	3909	3953	4014
(% Injury) . . . . .	(19.7)	(19.8)	(25.5)	(25.2)	(25.3)
Car-pedestrian/bicycle . .	310	295	293	259	280
	(92.3)	(92.2)	(100.)	(100.)	(100.)
Car-lost control . . . . .	999	836	47	84	92
	(35.2)	(36.7)	(19.1)	(25.0)	(25.0)
Car-unknown object . . . .	49	30	16	23	22
	(24.5)	(46.7)	(6.3)	(8.7)	(22.7)
Car-car . . . . .	21176	19622	20661	20602	20810
	(15.6)	(15.7)	(15.2)	(16.4)	(17.3)
Car-truck . . . . .	4261	4082	4573	5107	5589
	(14.3)	(14.2)	(15.5)	(14.9)	(16.9)
Car-motorcycle . . . . .	301	313	283	255	291
	(68.1)	(67.1)	(65.7)	(74.1)	(71.8)
Car-other vehicle type . .	101	111	212	185	212
	(6.9)	(14.4)	(11.8)	(12.4)	(14.2)
Three or more traffic units	225	220	234	302	331
	(100.)	(98.6)	(100.)	(100.)	(100.)
Missing data . . . . .	105	124	64	69	56
	(11.4)	(7.3)	(7.8)	(11.6)	(14.3)
TOTAL . . . . .	30805	28552	30292	30839	31697
(% Injury) . . . . .	(18.4)	(18.5)	(18.5)	(19.3)	(20.3)

+-----+  
 | The injury %'s for "Car-truck" here are lower than those |  
 | preceding. "Trucks" in the first table are tractor- |  
 | trailers; "trucks" here include all truck classes. |  
 +-----+

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Vehicle-Injury Percentage by  
Driver Sex

Driver Sex	Year				
	1973	1974	1975	1976	1977
Male . . . . (% Injury)	14093 (7.8)	13545 (7.7)	12756 (8.7)	13870 (8.3)	15933 (8.8)
Female . . .	54 (9.3)	80 (12.5)	76 (17.1)	97 (13.4)	118 (14.4)
Missing data	843 (0.1)	799 (0.8)	729 (1.1)	805 (0.5)	931 (0.3)
TOTAL . . . . (% Injury)	14990 (7.4)	14424 (7.4)	13561 (8.4)	14772 (7.9)	16982 (8.4)

+-----+  
 | This is the first table in which the injury percentage is |  
 | based on the occurrence of an injury in the tractor |  
 | trailer rather than to any occupant of any vehicle |  
 | involved in the accident. Thus in 1973, for example, 7.4% |  
 | of the involved tractor trailers had an injury--of any |  
 | severity--to a tractor-trailer occupant. |  
 | |  
 | From this table it can be seen that although females |  
 | comprise only 0.6% of the accident-involved tractor- |  
 | trailer drivers, their injury percentage is about 1.6 |  
 | times that of male drivers. Among accident-involved |  
 | passenger-car drivers, females appear over one-third of |  
 | the time, and there is less discrepancy in the percentage |  
 | of injury involvements. |  
 +-----+

Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Vehicle-Injury Percentage by  
Driver Sex

Driver Sex	Year				
	1973	1974	1975	1976	1977
Male . . . . .	18379	16630	17530	17636	17996
(% Injury)	(12.1)	(11.8)	(12.0)	(12.3)	(13.6)
Female . . . .	10987	10591	11301	11830	12312
	(13.7)	(13.8)	(13.8)	(14.7)	(15.4)
Missing data	1439	1331	1461	1373	1389
	(1.3)	(1.0)	(1.8)	(1.5)	(1.3)
TOTAL . . . .	30805	28552	30292	30839	31697
(% Injury)	(12.2)	(12.1)	(12.2)	(12.7)	(13.8)

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Vehicle-Injury Percentage by  
Driver Age

Driver Age	Year				
	1973	1974	1975	1976	1977
19 and under (% Injury)	319 (11.0)	638 (8.5)	194 (10.3)	177 (10.7)	223 (11.2)
20-24 . . .	1860 (8.2)	2051 (8.2)	1461 (10.8)	1677 (8.8)	2030 (8.7)
25-34 . . .	4786 (7.6)	4456 (8.4)	4307 (8.8)	4667 (8.6)	5558 (9.9)
35-44 . . .	3516 (8.1)	3285 (6.7)	3209 (8.7)	3442 (8.6)	3887 (9.1)
45-54 . . .	2503 (7.1)	2241 (8.3)	2443 (8.0)	2597 (7.9)	2801 (7.9)
55-64 . . .	868 (9.0)	744 (7.3)	947 (8.8)	1106 (8.4)	1197 (7.4)
65-74 . . .	107 (8.4)	61 (8.2)	102 (7.8)	116 (6.9)	131 (4.6)
75 and over	3 (0.0)	2 (0.0)	6 (16.7)	2 (0.0)	6 (0.0)
Missing data	1028 (0.4)	946 (0.2)	892 (1.3)	988 (0.2)	1149 (0.3)
TOTAL . . . (% Injury)	14990 (7.4)	14424 (7.4)	13561 (8.4)	14772 (7.9)	16982 (8.4)

+-----+  
| For all five years, among both tractor trailers and |  
| passenger cars, younger drivers have a higher percentage |  
| of injury involvements. |  
+-----+



Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Vehicle-Injury Percentage by  
Driver Age

Driver Age	Year				
	1973	1974	1975	1976	1977
19 and under (% Injury)	6469 (12.4)	7315 (13.1)	5217 (12.2)	5218 (12.8)	5235 (13.5)
20-24 . . .	5554 (13.8)	4773 (13.7)	5893 (13.7)	6127 (14.4)	6538 (15.5)
25-34 . . .	6390 (13.7)	5489 (12.4)	6794 (14.5)	7115 (13.6)	7578 (14.8)
35-44 . . .	3833 (13.2)	3231 (12.1)	3546 (11.9)	3454 (13.7)	3555 (15.4)
45-54 . . .	3047 (11.6)	2758 (13.5)	2905 (11.9)	2921 (14.1)	2797 (13.9)
55-64 . . .	1971 (12.6)	1678 (11.1)	2062 (11.3)	2038 (12.9)	2074 (13.6)
65-74 . . .	1225 (10.8)	1208 (11.3)	1322 (12.9)	1387 (10.9)	1348 (14.2)
75 and over	414 (11.8)	336 (11.9)	575 (12.7)	638 (13.3)	661 (14.8)
Missing data	1902 (0.9)	1764 (1.2)	1978 (1.5)	1941 (1.2)	1911 (1.2)
TOTAL . . . (% Injury)	30805 (12.2)	28552 (12.1)	30292 (12.2)	30839 (12.7)	31697 (13.8)

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Vehicle-Injury Percentage by  
Driver Residence

Driver Residence	Year				
	1973	1974	1975	1976	1977
Texas Resident . . . (% Injury) . . .	11977 (7.3)	11484 (7.3)	10374 (8.3)	11253 (8.1)	12904 (8.2)
Non-Texas resident	2541 (9.1)	2512 (8.9)	2768 (9.8)	3063 (8.4)	3506 (10.3)
Missing data . . .	472 (0.0)	428 (0.2)	419 (1.0)	456 (0.0)	572 (0.2)
TOTAL . . . . . (% Injury) . . .	14990 (7.4)	14424 (7.4)	13561 (8.4)	14772 (7.9)	16982 (8.4)

+-----+  
 | About 80% of accident-involved, tractor-trailer drivers |  
 | are Texas residents, compared to 95% for passenger-car |  
 | drivers. In both cases, and slightly more so for truck |  
 | drivers, non-residents tend to be overinvolved among |  
 | injury accidents. This probably results from differing |  
 | exposure factors but may also suggest unfamiliarity with |  
 | the local environment. |  
 +-----+

Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Vehicle-Injury Percentage by  
Driver Residence

Driver Residence	Year				
	1973	1974	1975	1976	1977
Texas resident . . . . .	29153	27107	28065	28523	29364
(% Injury) . . . . .	(12.5)	(12.3)	(12.4)	(13.0)	(14.0)
Non-Texas resident	908	764	1484	1543	1533
	(11.8)	(13.5)	(13.5)	(13.0)	(16.2)
Missing data . . . . .	744	681	743	773	800
	(1.3)	(0.9)	(1.2)	(1.2)	(1.3)
TOTAL . . . . .	30805	28552	30292	30839	31697
(% Injury) . . . . .	(12.2)	(12.1)	(12.2)	(12.7)	(13.8)

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Vehicle-Injury Percentage by  
Driver License Status

Driver License Status	Year				
	1973	1974	1975	1976	1977
Licensed . . (% Injury)	13983 (7.8)	13472 (7.7)	12741 (8.8)	13834 (8.3)	15912 (8.8)
Unlicensed .	77 (2.6)	90 (11.1)	67 (9.0)	102 (13.7)	102 (9.8)
Missing data	930 (0.9)	862 (1.4)	753 (1.2)	836 (0.7)	968 (0.7)
TOTAL . . . (% Injury)	14990 (7.4)	14424 (7.4)	13561 (8.4)	14772 (7.9)	16982 (8.4)

+-----+  
| Unlicensed drivers are infrequent--0.6%--among accident- |  
| involved drivers of tractor trailers, but they are |  
| somewhat overrepresented in the injury involvements. |  
+-----+

Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Vehicle-Injury Percentage by  
Driver License Status

Driver License Status	Year				
	1973	1974	1975	1976	1977
Licensed . . (% Injury)	27585 (12.5)	25639 (12.2)	27175 (12.5)	27738 (13.1)	28476 (14.2)
Unlicensed .	1369 (18.5)	1262 (21.5)	1383 (19.7)	1428 (18.0)	1568 (19.0)
Missing data	1851 (2.4)	1651 (2.8)	1734 (2.3)	1673 (2.2)	1653 (2.1)
TOTAL . . . (% Injury)	30805 (12.2)	28552 (12.1)	30292 (12.2)	30839 (12.7)	31697 (13.8)

Tractor-Trailer Involvements in Texas for 1973-1977  
Frequency and Vehicle-Injury Percentage by  
Damage Scale

Damage Scale	Year				
	1973	1974	1975	1976	1977
"0" No damage . . . . .	1653	1609	1448	1493	1739
(% Injury) . . . . .	(0.2)	(0.1)	(0.1)	(0.3)	(0.3)
"1" Minor damage . . . . .	4380	4322	4097	4698	5252
	(1.4)	(1.6)	(1.9)	(1.6)	(1.7)
"2" . . . . .	1651	1555	1534	1671	1993
	(5.8)	(6.9)	(7.2)	(7.8)	(7.8)
"3" . . . . .	1093	1091	1004	1025	1223
	(15.1)	(14.0)	(17.5)	(18.0)	(18.6)
"4" . . . . .	458	422	418	441	543
	(34.1)	(43.4)	(40.9)	(43.3)	(45.3)
"5" . . . . .	262	236	245	252	300
	(50.4)	(48.7)	(55.5)	(53.6)	(57.7)
"6" . . . . .	221	204	188	193	216
	(58.8)	(62.7)	(68.6)	(76.7)	(69.9)
"7" Very severe damage	292	246	248	245	271
	(74.7)	(76.4)	(82.3)	(76.3)	(81.5)
Missing data . . . . .	4980	4739	4379	4754	5445
	(2.9)	(2.5)	(2.9)	(2.4)	(2.9)
TOTAL . . . . .	14990	14424	13561	14772	16982
(% Injury) . . . . .	(7.4)	(7.4)	(8.4)	(7.9)	(8.4)

Passenger-Car Involvements in Texas for 1973-1977  
Frequency and Vehicle-Injury Percentage by  
Damage Scale

Damage Scale	Year				
	1973	1974	1975	1976	1977
"0" No damage . . . . .	549	460	494	509	500
(% Injury) . . . . .	(0.4)	(3.5)	(2.4)	(2.4)	(2.8)
"1" Minor damage . . . . .	10135	9813	10417	10391	10642
	(2.6)	(2.8)	(3.0)	(3.6)	(3.9)
"2" . . . . .	7551	6992	7399	7768	8162
	(6.9)	(7.9)	(7.9)	(8.7)	(9.6)
"3" . . . . .	5170	4616	4865	5064	5228
	(19.1)	(18.7)	(18.8)	(21.6)	(23.3)
"4" . . . . .	1603	1490	1565	1541	1612
	(51.9)	(48.9)	(54.4)	(51.7)	(55.3)
"5" . . . . .	625	550	557	594	621
	(62.7)	(62.9)	(64.6)	(64.0)	(65.5)
"6" . . . . .	413	315	319	289	340
	(70.0)	(74.3)	(74.9)	(72.0)	(72.4)
"7" Very severe damage	294	189	210	212	205
	(82.0)	(83.6)	(78.6)	(80.7)	(87.3)
Missing data . . . . .	4465	4127	4466	4471	4387
	(4.9)	(6.7)	(5.9)	(4.9)	(4.8)
TOTAL . . . . .	30805	28552	30292	30839	31697
(% Injury) . . . . .	(12.2)	(12.1)	(12.2)	(12.7)	(13.8)

+-----+  
| The damage scale data are quite consistent over the 5-year |  
| period, and the injury percentage increases, as expected, |  
| with increasing damage within each year. Over 61% of the |  
| tractor trailers have no damage or minor damage compared |  
| to 41% for passenger cars. Further, the injury percentage |  
| at these low damage levels, while low for both, is much |  
| lower for the trucks. On the other end of the damage |  
| scale, over 7% of the tractor trailers have "5" or higher |  
| compared to 4.4% for passenger cars. The injury |  
| percentage for tractor trailers with extensive damage is |  
| still less than that of passenger cars, but the relative |  
| difference is somewhat less than that at lower damage |  
| levels. Damage data are missing for 32% of the tractor |  
| trailers and for 14% of the passenger cars. |  
+-----+



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