

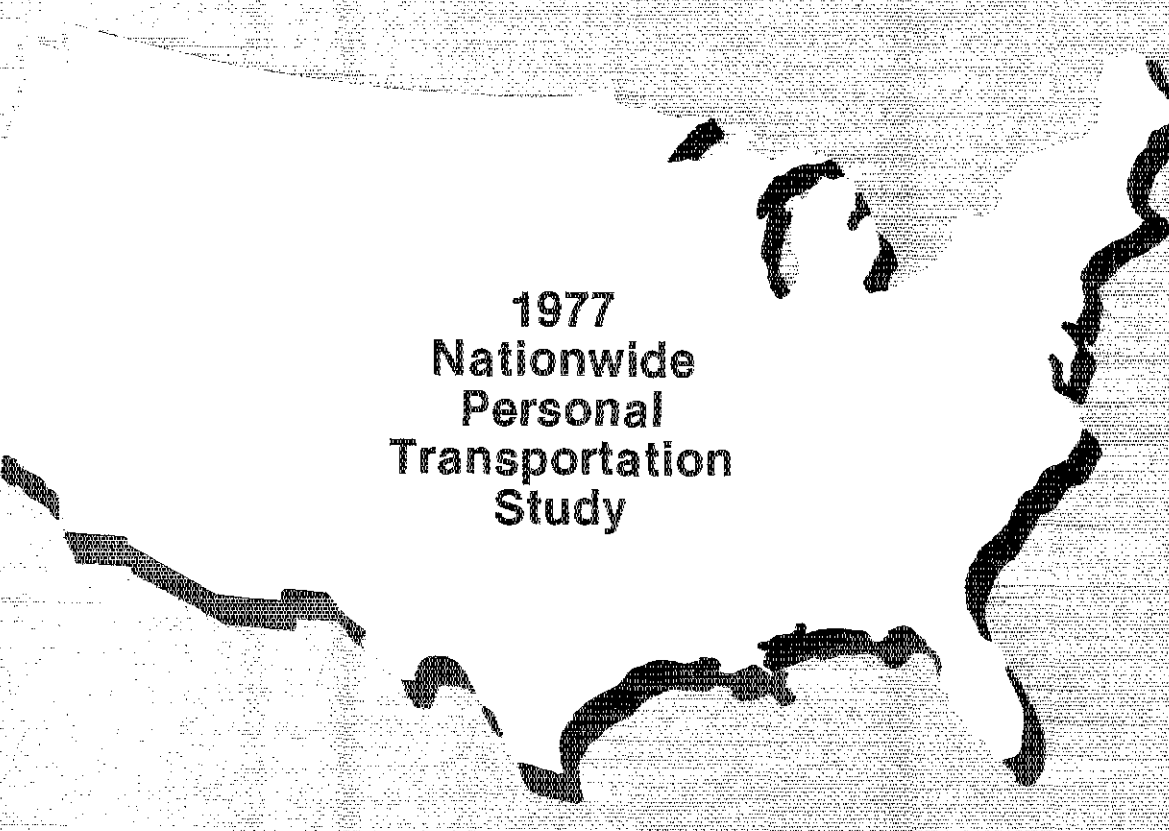


U.S. Department
of Transportation
**Federal Highway
Administration**

Vehicle Occupancy

Office of Highway Planning
April 1981

Report No. 6

A large, stylized map of the United States, rendered in a high-contrast, black-and-white format. The map is centered on the page and serves as a background for the title text.

**1977
Nationwide
Personal
Transportation
Study**

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1977 NATIONWIDE PERSONAL TRANSPORTATION STUDY

VEHICLE OCCUPANCY

Report 6

April 1981

U.S. Department of Transportation
Federal Highway Administration
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1. HIGHLIGHTS

- o Private vehicle occupancy in 1977 averaged 1.68 persons per vehicle trip and 1.87 persons per vehicle mile.
- o Private vehicle occupancy averages 1.32 persons per vehicle mile for earning a living travel, 2.02 for family business, 1.95 for civic, educational and religious travel, and 2.44 for social and recreational travel.
- o Occupancy rates by trip purpose either remained constant or declined slightly between 1969 and 1977.
- o Vehicle occupancy rates are higher for households located outside SMSA's (1.96 persons per vehicle mile) than for households located inside SMSA's (1.83 persons per vehicle mile).
- o Travel occurring outside urban areas has a higher average occupancy rate, 1.86, than travel inside urban areas, 1.67.
- o Vehicle occupancy increases with trip length, from 1.64 persons per vehicle mile for trips under 4 miles (one way) to 1.69 for trips from 4 to 10 miles to 1.97 for trips over 10 miles.
- o Vehicle occupancy is higher on weekends (2.32 persons per vehicle mile) than on weekdays (1.72 persons per vehicle mile). Average vehicle occupancy is higher for each trip purpose on weekends than on weekdays, except travel for medical or dental purposes.
- o With regard to time of day of travel, the lowest rate of occupancy (1.63 persons per mile) occurs during the 6:00 a.m. to 9:00 a.m. morning peak travel period. Vehicle travel in the 4:00 p.m. to 7:00 p.m. evening peak period has a higher average occupancy of 1.84 persons per vehicle mile. Average vehicle occupancy for work travel is higher in the a.m. peak at 1.35 than the p.m. peak at 1.27 persons per vehicle mile. The highest vehicle occupancy rate of 2.14 persons per vehicle mile occurs between 7:00 p.m. and 10:00 p.m.
- o The average number of occupants per vehicle mile declines as average household income increases, from 1.91 in households with incomes under \$5,000 to 1.86 for household incomes between \$15,000 and \$25,000 to 1.64 for household incomes of \$50,000 or more.
- o Average occupancy increases as the number of persons in the household increases, from 1.46 persons per vehicle mile in one-person households to 1.69 in two-person households, 1.78 in three-person households, 1.99 in four-person households, and 2.22 in households of five or more persons.

- o Occupancy declines as the number of household vehicles owned increases, from 1.99 persons per vehicle mile in households with no vehicles to 1.91 in one-vehicle households to 1.76 persons per vehicle mile in households with four or more vehicles.
- o Travel in single-occupant vehicles constitutes 59.9 percent of all private vehicles trips and 52.0 percent of all private vehicle miles of travel. Travel in two-occupant vehicles comprises 24.7 percent of all private vehicle trips and 27.6 percent of all vehicle miles, while 15.4 percent of all trips and 20.4 percent of all miles are made in vehicles with three or more occupants.
- o The average occupancy rate for travel by auto vehicles only--standard auto, station wagon, personal-use taxi, vanbus/minibus, as defined by the 1969 NPTS--was 1.9 persons per vehicle trip and 2.2 persons per vehicle mile in 1977. This represents no change from the 1969 occupancy levels.

II. INTRODUCTION

A. PURPOSE OF REPORT

This report presents findings from the 1977 Nationwide Personal Transportation Study (NPTS), describing occupancy characteristics of trips made by households in private motor vehicles.

Vehicle occupancy is an important measure for gauging efficiency in use of transportation facilities, energy and other resources. In addition, this measure provides valuable insight into household travel behavior to better evaluate transportation investments and related policies and programs.

The convenience of the private motor vehicle has significantly enhanced personal mobility. However, this freedom has contributed to changing residential patterns and lifestyles, which involve a significant amount of travel in vehicles with relatively few occupants. Vehicles carrying only a driver comprise approximately 60 percent of all private vehicle trips and 52 percent of all vehicle miles of travel. By contrast, only 15 percent of all vehicle trips and 20 percent of all vehicle miles of travel are made in vehicles with three or more occupants. Moreover, vehicle occupancy rates are not increasing over time despite the rising costs of vehicle ownership and operation.

B. ORGANIZATION OF FINDINGS

This report presents relationships between private vehicle occupancy and both travel determinants (trip purpose, trip length, time of day and day of week of travel) and household characteristics (income, number of persons, number of drivers and vehicle ownership). The presentation of these findings from the 1977 NPTS is followed by comparisons with selected findings from the 1969 NPTS. Concluding the presentation of relationships is a summary of key findings on vehicle occupancy.

C. DESCRIPTION OF DATA

Comparisons and relationships presented in this report are derived from information on the household characteristics and daily travel compiled from the 1977 NPTS survey. A nationwide probability sample of 18,000 households contacted and interviewed over the period April 1977 through March 1978 provides the information base for this survey. The sample information was expanded to approximate the characteristics and behavior of the entire U.S. population in 1977.

The NPTS survey collected information on the social and economic characteristics of each household and household member, the characteristics of each household vehicle and a description of each household trip made during a previous 24-hour period designated as the travel day.

Information describing the NPTS survey procedures and data processing, including sample design, survey methodology, processing procedures, provisions for obtaining special tabulations, and subject areas planned for 1977 reports is found in Appendix B of this report. An order form with description and price of the NPTS public use tapes is contained in Appendix C. A glossary of NPTS terms is found in Appendix D.

D. COMPARING 1977 and 1969 NPTS RESULTS

The 1977 NPTS is a repeat of a similar survey conducted in 1969. Comparing results from the two surveys provides insight into changes over time in personal travel behavior. The data presented in this report is similar to that in Report 1 of the 1969 NPTS, *Automobile Occupancy*, published by the U.S. Department of Transportation.

As often happens when surveys are repeated after a lengthy passage of time, the information acquired and the survey procedures used are modified to better address current issues and improve upon the earlier effort. Important changes have taken place between the 1969 and 1977 NPTS surveys, and these changes affect the direct comparability of data from the two surveys.

One important change is the extension of the coverage of the 1977 survey to include all motor vehicles owned by households. In the 1969 survey, private vehicle occupancy statistics reflect only travel in automobiles (standard auto, station wagon, personal-use taxi, and vanbus/minibus vehicles). In the 1977 survey, the definition of private vehicles expands to include trucks, vans other than vanbuses, recreational vehicles, and motorcycles and mopeds. The 1977 vehicle occupancy statistics are therefore based on all household vehicles, with the exception of motorcycles and mopeds. Where direct comparisons are made between the 1969 and 1977 data, 1977 vehicle occupancy statistics are computed for the auto group only for consistency with 1969.

A second factor affecting the direct comparability of the 1969 and 1977 data is the method of calculating the vehicle occupancy rate. In the 1969 report, occupancy rates are computed based on number of occupants per vehicle trip. For analysis of energy consumption and other issues, a better measure of vehicle occupancy is derived from the number of persons transported per vehicle mile. Hence, the vehicle occupancy statistics for 1977 are based on occupants per vehicle mile. When 1969 and 1977 vehicle occupancy rates are compared, the comparisons are made using the 1969 trip-based method of calculating occupancy.

Still a third factor that impacts the direct comparability of 1977 and 1969 vehicle occupancy rates is the universe of trips used in calculating the rates. The trips used in calculating the 1977 occupancy rates featured in this report (Section III) are limited

to those in which a household member was a driver, either in whole or part. This limitation was employed to eliminate statistical double counting, which would occur if the same trip were reported by two different households and counted twice as a multi-occupant trip. In contrast, the 1969 vehicle occupancy rates are based on all vehicle trips reported by the surveyed household, including those in which a household member was not driving. For this reason, the 1977 occupancy rates used for comparison in Section V, Trends Over Time, are also based on all vehicle trips.

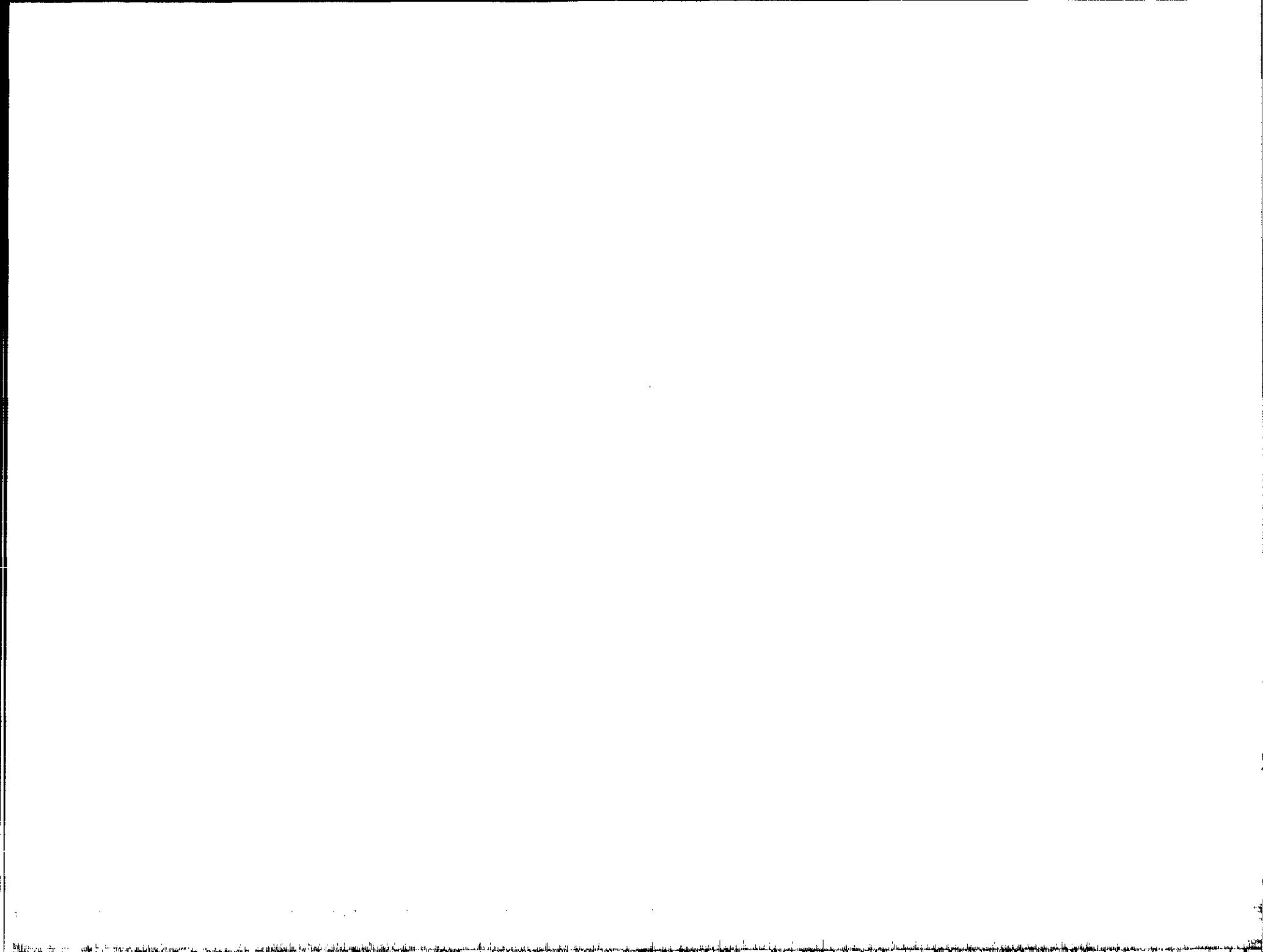
For all three factors affecting comparability, differences in definition and calculation procedures are stated in the tables and the discussions.

Because of the differences stated above, the reader is cautioned that the 1977 rates shown in Section III and those in the Trends Over Time section are computed in a different manner and cannot be compared directly. In addition, when comparing 1977 and 1969 rates, only those 1977 occupancy rates shown in the Trends Over Time section should be used.

E. COMPUTATION OF OCCUPANCY RATES

Three different sets of occupancy rates from the 1977 NPTS data have been included in this report. The rates presented in Section III are considered to provide the best measure of vehicle occupancy. Rates included in Trends Over Time (Section V) are computed to achieve comparability with the 1969 data. Finally, the rates contained in Appendix A allow the reader to compare data on occupants per vehicle trip to the rates for occupants per vehicle mile which are presented in Section III.

Because the methods and assumptions used in producing these rates vary, Section IV of this report is included to provide a discussion of the computation of occupancy rates from NPTS data.



III. ANALYSIS OF VEHICLE OCCUPANCY

CHARACTERISTICS OF VEHICLE OCCUPANCY IN 1977

This section presents vehicle occupancy rates which are characteristic of private vehicle travel in 1977. Rates are calculated by dividing total person miles by total vehicle miles for trips which are made in privately-owned four-wheel vehicles. Travel by motorcycle or moped is excluded.

Average Occupancy by Trip Purpose

Figure 1 introduces the discussion of vehicle occupancy with an overview of occupancy's relationship to trip purpose.

Figure 1 indicates that average vehicle occupancy is 1.87 persons per vehicle mile, ranging from a low of 1.32 persons per vehicle mile for travel related to earning a living to a high of 2.44 persons per vehicle mile for social and recreational travel. Family business travel and civic, educational and religious travel average about two persons per vehicle mile.

Average Occupancy by Trip Purpose and SMSA Size

Table 1 illustrates variations in vehicle occupancy rates by trip purpose and household residential location by population size of Standard Metropolitan Statistical Area (SMSA). These data reflect only the residential location of the traveling household, and not necessarily the location where the travel occurred.

Overall and for almost every trip purpose, households living outside SMSA's travel with more occupants per vehicle mile than households living within SMSA's. Households outside SMSA's travel with an average of 1.96 occupants per vehicle mile, compared to 1.83 persons per mile inside SMSA's.

The highest rate of occupancy for travel by residents within SMSA's is 2.44 persons per mile for social and recreational travel, reaching a maximum of 2.88 persons per mile for the pleasure driving portion of social and recreational travel. The lowest occupancy rates occur in earning a living travel, averaging 1.28 persons per mile. The travel to work portion of this travel averaged only 1.26 persons per mile. Family business travel averages 1.97 persons per mile, and travel for civic, educational or religious purposes averages 1.86 persons per mile. The average number of vehicle occupants for other trip purposes is slightly more than two persons per mile traveled.

Average vehicle occupancy generally declines as SMSA population size increases. The highest overall rate of occupancy, 2.03, occurs in

TABLE 1. AVERAGE VEHICLE* OCCUPANCY BY TRIP PURPOSE AND SMSA SIZE

SMSA Population Size	TRIP PURPOSE													All Purposes	Percent of Vehicle Miles of Travel	
	Earning a Living			Family and Personal Business			Civic, Educational & Religious			Social and Recreational			Other and Unknown			
	To Work	Work Related	All	Shopping	Medical- Dental	Other	All	Visit Friends & Relatives	Pleasure Driving	Vacation	Other	All				
Under 250,000	1.33	1.28	1.32	1.96	2.26	1.86	1.92	2.01	1.99	2.38	1.69	2.44	2.22	2.16	1.83	8.0
250,000 to 499,999	1.35	1.40	1.36	2.31	2.43	1.72	2.05	1.87	2.48	2.57	2.00	3.00	2.74	2.35	2.03	10.4
500,000 - 999,999	1.20	1.37	1.23	2.17	2.12	2.19	2.17	1.96	2.37	2.43	2.87	2.36	2.39	2.03	1.85	10.9
1 Million to 3 Million	1.26	1.37	1.28	1.92	1.71	1.81	1.85	1.97	2.17	3.41	3.03	2.51	2.40	2.07	1.78	22.2
Over 3 Million	1.22	1.35	1.25	1.85	2.07	2.01	1.94	1.55	2.25	2.24	2.85	2.54	2.42	2.05	1.74	14.3
All SMSA's	1.26	1.36	1.28	2.02	2.02	1.91	1.97	1.86	2.25	2.88	2.70	2.57	2.44	2.13	1.83	65.8
Non SMSA's	1.39	1.46	1.40	2.12	2.34	2.03	2.09	2.13	2.27	3.58	2.33	2.56	2.45	2.34	1.96	34.2
All Places	1.30	1.39	1.32	2.06	2.14	1.96	2.02	1.95	2.25	3.19	2.68	2.59	2.44	2.20	1.87	-
Percent of Vehicle Miles of Travel	30.4	7.3	37.7	10.0	1.7	11.2	22.9	4.7	11.3	0.8	0.6	11.3	24.0	10.7	-	100.01

* Includes all private vehicles except motorcycles and mopeds.

† Total vehicle miles of travel = 902,755,000,000 (907,603,000,000 less 4,848,000,000 by motorcycles and mopeds).

SMSA's between 250,000 and 500,000 population, which then decreases with increasing SMSA size to a low of 1.74 in SMSA's over 3 million population.

The relationship between SMSA population size and vehicle occupancy also prevails for individual trip purposes. The highest occupancy rates for travel to work occur in SMSA's of 250,000 to 500,000 population at 1.35, declining to a low of 1.22 for work travel in SMSA's over 3 million population. Average vehicle occupancy for shopping travel is also highest at 2.31 in the second SMSA size group, declining to 1.85 in the largest SMSA group.

Generally, the trips that average the lowest number of occupants account for the largest portion of vehicle travel. Of all travel, 37.7 percent is related to earning a living, but average vehicle occupancy for such trips is only 1.32 persons per vehicle mile.

Average Occupancy by Trip Purpose and Household Location Inside or Outside SMSA's

As initially seen in Table 1, average vehicle occupancy is higher for travel of households located outside SMSA's (1.96 occupants per mile) than inside SMSA's (1.83 occupants per mile). Table 2 further explains this difference in travel occupancy by individual trip purpose and by where the household is located inside or outside SMSA's.

As compared to households inside SMSA's, vehicle occupancy rates for households outside SMSA's are 8.7 percent higher for travel to work (1.39 versus 1.26), about the same difference for travel related to earning a living (1.40 versus 1.28), 6.1 percent higher for family business travel (2.09 versus 1.97), 14.5 percent higher for civic, educational and religious travel (2.13 versus 1.86), and about the same for social and recreational travel (2.45 versus 2.44). Only in the case of vacation travel are vehicle occupancy rates for SMSA households higher than households outside SMSA's (2.70 versus 2.33). It should be noted, that while almost two-thirds of all vehicle travel is made by households living inside SMSA's, average vehicle occupancy is 7.1 percent lower per vehicle mile traveled by SMSA residents than by those outside SMSA's.

Inside SMSA's travel by households living inside central cities occurs at approximately the same level of occupancy as vehicle travel of households located outside central cities. The average vehicle occupancy rate in travel for earning a living is slightly higher for households outside central cities (1.29 versus 1.26), as is the case for civic, educational and religious travel (1.89 versus 1.81).

Overall vehicle occupancy rates are similar for all households outside SMSA's, those located in places under 5,000 population (1.95) and those located in places of 5,000 or more (1.97). The vehicle travel of households in areas under 5,000 population has 4.4 percent more occupants per vehicle mile for family business travel (2.13

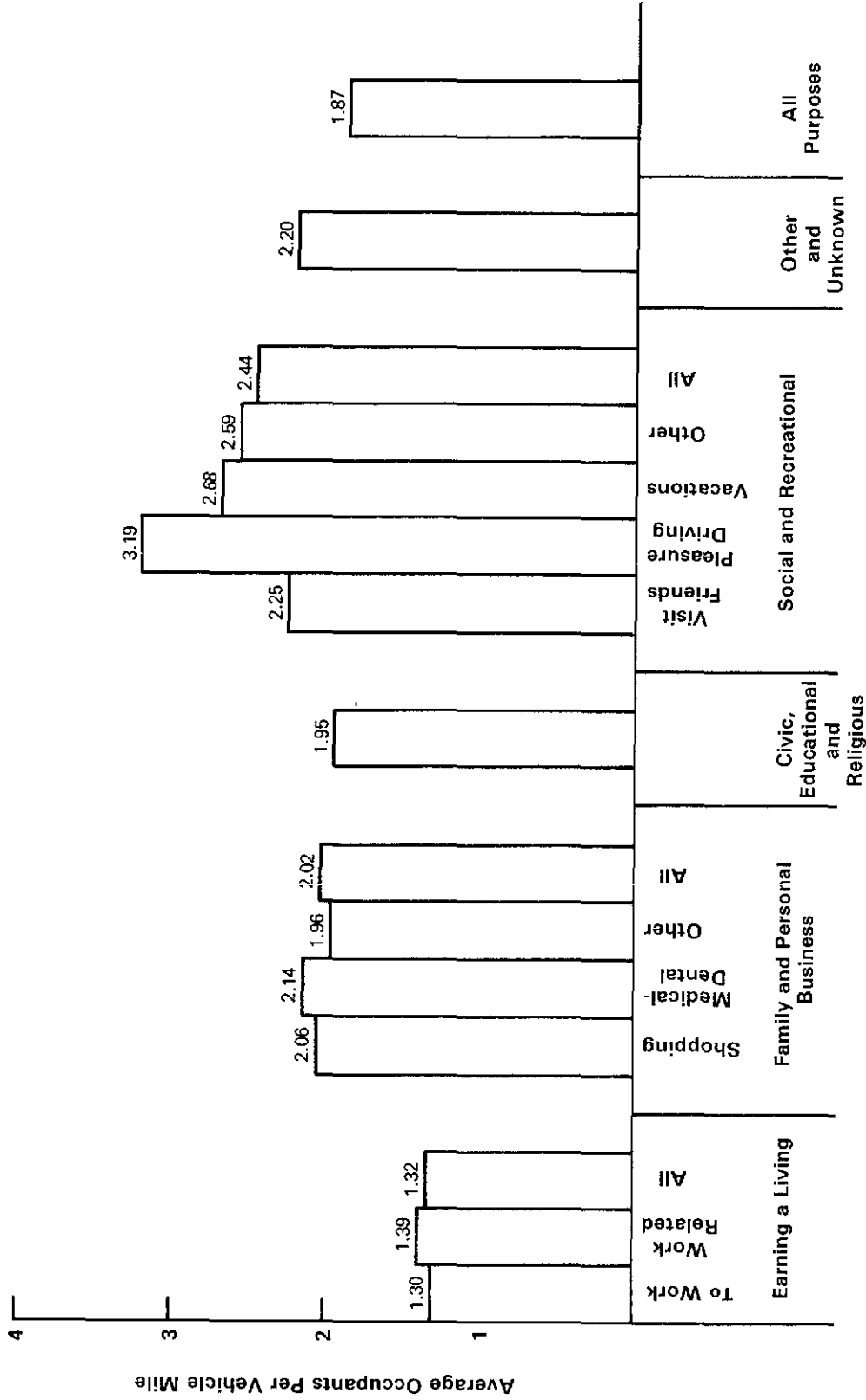
TABLE 2. AVERAGE VEHICLE* OCCUPANCY BY TRIP PURPOSE AND HOUSEHOLD LOCATION INSIDE OR OUTSIDE SMSA's

Place of Residence	TRIP PURPOSE													All Purposes	Percent of Vehicle Miles of Travel	
	Earning a Living			Family and Personal Business			Civic, Educational & Religious	Social and Recreational				Other and Unknown				
	To Work	Work Related	All	Shopping	Medical-Dental	Other		All	Visit Friends & Relatives	Pleasure Driving	Vacation		Other			All
<u>Inside SMSA's</u>																
Inside Central City	1.24	1.34	1.26	2.04	2.00	1.90	1.97	1.81	2.28	3.24	2.48	2.62	2.48	2.08	1.83	27.0
Outside Central City	1.28	1.37	1.29	2.01	2.03	1.91	1.97	1.89	2.22	2.68	2.80	2.53	2.41	2.17	1.83	38.8
All-Inside SMSA	1.26	1.36	1.28	2.02	2.02	1.91	1.97	1.86	2.25	2.88	2.70	2.57	2.44	2.13	1.83	65.8
<u>Outside SMSA's</u>																
Areas Under 5,000 Population	1.37	1.39	1.38	2.20	2.33	2.03	2.13	2.02	2.23	4.01	2.82	2.59	2.49	2.31	1.95	19.2
Areas Over 5,000 Population	1.40	1.55	1.43	1.98	2.37	2.04	2.04	2.25	2.31	2.49	1.93	2.51	2.40	2.37	1.97	15.0
All-Outside SMSA	1.39	1.46	1.40	2.12	2.34	2.03	2.09	2.13	2.27	3.58	2.33	2.56	2.45	2.34	1.96	34.2
All Places	1.30	1.39	1.32	2.06	2.14	1.96	2.02	1.95	2.25	3.19	2.68	2.59	2.44	2.20	1.87	--
Percent of Vehicle Miles of Travel	30.4	7.3	37.7	10.0	1.7	11.2	22.9	4.7	11.3	0.8	0.6	11.3	24.0	10.7	--	100.0†

* Includes all private vehicles except motorcycles and mopeds.

† Total vehicle miles of travel: 902,755,000,000 (907,603,000,000 less 4,848,000,000 by motorcycles and mopeds).

FIGURE 1
AVERAGE VEHICLE OCCUPANCY BY TRIP PURPOSE



Source: Based on Table 2.

versus 2.04) and 3.8 percent more occupants for social and recreational travel (2.49 versus 2.40). Conversely, households in places with populations of 5,000 or more have higher occupancy rates for travel related to earning a living (1.43 versus 1.38) and travel for civic, educational and religious purposes (2.25 versus 2.02).

Households residing outside SMSA's, but in areas of 5,000 or more population, have the highest vehicle occupancy rates, while the lowest occupancy rates are among households residing inside SMSA's.

Vehicle Trips by Trip Purpose and Number of Occupants

Table 3 portrays vehicle occupancy in terms of the percent of vehicle trips by purpose and by number of occupants. As indicated through this distribution the majority, or 59.9 percent, of all household vehicle trips are made in single-occupant vehicles. An additional 24.7 percent of all trips are made in two-occupant vehicles, while only 15.4 percent are made in vehicles with three or more occupants.

Of all trip purposes, the journey to work is the most likely to be in a single-occupant vehicle (83.7 percent of all such trips). In contrast, most social and recreational trips are made in vehicles with more than one occupant. Only 11 percent of all vacation trips, 26.8 percent of all pleasure driving trips, and 48.8 percent of all trips to visit friends and relatives are made in single-occupant vehicles. Equal proportions of shopping and civic, educational, and religious trips are made in single- and multiple-occupant vehicles.

Vehicle Miles of Travel by Trip Purpose and Number of Occupants

Table 4 presents a breakdown of vehicle occupancy similar to Table 3, except that the breakdown is based on vehicle miles of travel (VMT) rather than vehicle trips. Comparing Tables 4 and 3 illustrates some interesting characteristics of travel behavior concerning occupancy.

First, the proportion of vehicle miles traveled in multiple-occupant vehicles is greater than the proportion of vehicle trips occurring in multiple-occupant vehicles, or 48.0 percent of vehicle miles versus 40.1 percent of vehicle trips. This indicates that trips carrying multiple occupants are longer, on the average, than those with a single occupant.

This relationship is generally consistent for all trip purposes. In the case of home-to-work travel, 83.7 percent of all such trips are in single-occupant vehicles, but only 81.3 percent of home-to-work vehicle miles are in single-occupant vehicles. For shopping trips, 50.5 percent of all vehicle trips are in single-occupant vehicles, while only 38.5 percent of the travel is in single-occupant vehicles. For the purpose of visiting friends and relatives, 48.8 percent of all such trips and 52.5 percent of such

TABLE 3. DISTRIBUTION OF VEHICLE* TRIPS BY TRIP PURPOSE AND NUMBER OF OCCUPANTS

Number of Occupants	TRIP PURPOSE														
	Earning a Living			Family and Personal Business			Civic Education Religious			Social and Recreational			Other and Unknown Purposes		
	To Work	Work Related	All	Shopping	Medical-Dental	Other	All	Education	Religious	Visit Friends & Relatives	Pleasure Driving	Vacation		Other	All
Single Occupant	83.7	80.1	83.0	50.5	42.7	60.3	54.5	50.2	48.8	26.8	11.0	34.3	40.5	43.3	59.9
Multi Occupant															
2	12.0	13.7	12.3	31.2	38.4	25.6	29.0	27.0	29.4	37.2	60.0	36.7	33.5	33.1	24.7
3	2.9	3.8	3.1	10.5	10.4	8.0	9.4	10.4	11.4	16.6	1.3	12.3	12.0	13.2	8.2
4	0.9	1.3	1.0	4.6	5.6	4.1	4.4	7.0	6.7	11.0	3.3	10.1	8.6	6.0	4.4
5	0.3	0.5	0.3	2.2	2.0	1.4	1.8	3.1	2.2	4.6	14.1	4.0	3.2	2.3	1.7
6 or More	0.2	0.6	0.3	1.0	0.9	0.6	0.9	2.3	1.5	3.8	10.3	2.6	2.2	2.1	1.1
Subtotal	16.3	19.9	17.0	49.5	57.3	39.7	45.5	49.8	51.2	73.2	89.0	65.7	59.5	56.7	40.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0†
Percent of Vehicle Trips	27.8	5.1	32.9	17.0	1.3	14.0	32.3	6.4	8.4	0.4	0.1	10.4	19.3	9.1	100.0‡

* Includes all private vehicles except motorcycles and mopeds.

† Total vehicle miles of travel = 902,755,000,000 (907,603,000,000 less 4,848,000,000 by motorcycles and mopeds).

‡ Total vehicle trips = 108,430,000 (108,826,000,000 less 396,000,000 by motorcycles and mopeds).

TABLE 4. DISTRIBUTION OF VEHICLE* MILES OF TRAVEL
BY TRIP PURPOSE AND NUMBER OF OCCUPANTS

Number of Occupants	TRIP PURPOSE													
	Earning a Living			Family and Personal Business			Civic Education Religious		Social and Recreational			Other and Unknown Purposes		
	To Work	Work Related	All	Shopping	Medical-Dental	Other	All	Religious	Education	Visit Friends & Relatives	Pleasure Driving	Vacation	Other	All
Single Occupant	81.3	75.1	80.1	38.5	32.8	44.2	40.9	53.8	32.5	17.2	9.2	22.9	26.9	52.0
Multi Occupant														
2	12.8	17.3	13.6	36.4	38.3	33.0	34.8	23.4	36.2	38.8	65.8	39.1	38.4	27.6
3	3.3	4.0	3.4	14.0	16.5	11.3	12.9	8.7	14.7	13.1	2.0	14.6	14.3	9.6
4	1.6	2.0	1.7	6.3	8.1	7.4	6.9	7.4	10.0	8.5	3.8	13.0	11.3	6.2
5	0.5	0.7	0.6	3.1	3.7	2.7	3.0	4.1	4.5	12.9	9.1	5.3	5.2	2.8
6 or More	0.5	0.9	0.6	1.7	0.6	1.4	1.5	2.6	2.1	9.5	10.1	5.1	3.9	1.8
Subtotal	18.7	24.9	19.9	61.5	67.2	55.8	59.1	46.2	67.5	82.8	90.8	77.1	73.1	48.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percent of Vehicle Miles of Travel	30.4	7.3	37.7	10.0	1.7	11.2	22.9	4.7	11.3	0.8	0.6	11.3	24.0	10.7

* Includes all private vehicles except motorcycles and mopeds.

1 Total vehicle miles of travel 902,755,000,000 (907,603,000,000 less 4,848,000,000 by motorcycles and mopeds)

travel are in single-occupant vehicles. This indicates little difference in the trip length of single- and multiple-occupant work trips, but that single-occupant discretionary trips, like shopping or visiting friends or relatives, are shorter trips.

Average Occupancy by Trip Purpose and Trip Length

Average vehicle occupancy generally increases with length of trip, as shown in Table 5. Average occupancy is at a minimum of 1.61 for trips which are 1 mile in length and reaches a maximum of 2.34 for trips of 41 miles or longer.

The tendency toward higher occupancy with longer trips is less significant among individual trip purposes. The average occupancy rate for home-to-work travel declines from 1.24 for trips of 1/2 mile or less to a minimum of 1.13 for trips of 5 miles in length and then increases of 1.66 for trips of 41 miles or longer.

Occupancy rates of shopping trips increase uniformly with trip distance, from 1.61 for trips of 1 mile to 2.41 for trips of 41 miles or more. The same is true for travel to visit friends and relatives, where occupancy increases from an average of 1.65 persons per mile for trips under 1/2 mile to 2.56 persons per mile for trips of 41 miles or more. Vehicle occupancy rates do not increase uniformly with trip length for medical trips, pleasure driving, and civic, educational and religious trips.

The tendency for vehicle occupancy to increase with trip length is also illustrated in Figure 2.

Average Occupancy by Trip Purpose and Day of Week

Table 6 illustrates how vehicle occupancy rates vary by day of the week. The table shows that weekday travel is characterized by lower occupancy rates (1.72 persons per vehicle mile) than weekend travel (2.32 persons per vehicle mile). This difference is chiefly due to the concentration of low-occupancy earning-a-living travel on weekdays.

Some variation in vehicle occupancy exists among weekdays. The travel with the fewest occupants occurs from Mondays to Wednesdays (1.63 to 1.66). Average vehicle occupancy increases on Thursdays (1.70) and reaches a maximum on Fridays (1.84).

On weekends, Sunday travel has the highest vehicle occupancy rate at 2.49 persons per mile, while Saturday travel averages 2.18.

Similar occupancy relationships are seen within individual trip purpose categories. In general, occupancy for all trip purposes is higher on weekends than weekdays, except for medical travel. Also, average vehicle occupancy for Sunday travel exceeds Saturday travel

TABLE 5. AVERAGE VEHICLE* OCCUPANCY BY TRIP PURPOSE AND TRIP LENGTH

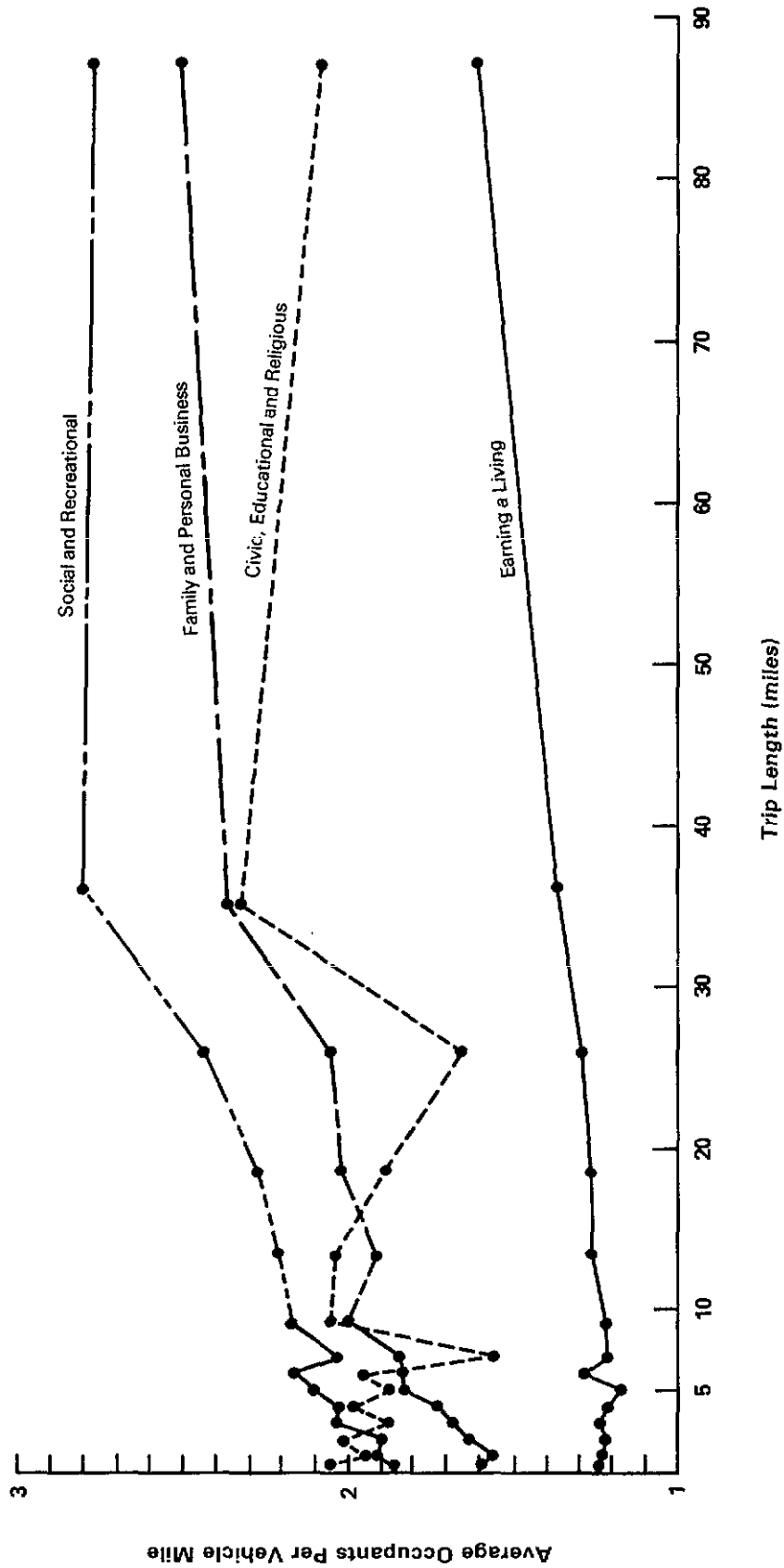
One-Way Trip Length In Miles	TRIP PURPOSE														All Purposes Percent of Vehicle Miles of Travel	
	Earning a Living			Family and Personal Business			Civic, Educational & Religious			Social and Recreational			Other and Unknown			
	To Work	Work Related	All	Shopping	Medical- Dental	Other	All	Visit Friends & Relatives	Pleasure Driving	Vacation	Other	All				
Less than 1/2	1.24	1.25	1.24	1.64	1.77	1.51	1.59	2.05	1.65	**	**	2.05	1.86	2.06	1.64	0.6
1	1.23	1.19	1.23	1.61	1.73	1.49	1.56	1.94	1.78	**	**	1.99	1.91	1.99	1.61	1.6
2	1.22	1.24	1.22	1.72	1.61	1.53	1.63	2.01	1.69	**	**	2.03	1.89	1.96	1.63	3.2
3	1.23	1.25	1.24	1.80	1.98	1.51	1.68	1.87	1.76	**	**	2.23	2.03	1.92	1.65	3.7
4	1.19	1.30	1.21	1.83	1.67	1.60	1.73	1.98	1.78	**	**	2.20	2.02	1.94	1.66	3.0
5	1.13	1.34	1.17	1.91	1.65	1.75	1.83	1.87	1.87	**	**	2.26	2.10	2.01	1.68	4.7
6	1.27	1.36	1.28	1.98	1.77	1.62	1.83	1.95	2.04	**	**	2.25	2.16	1.82	1.72	2.9
7	1.21	1.36	1.22	2.00	2.05	1.65	1.84	1.57	1.96	**	**	2.07	2.03	2.06	1.63	3.1
8 to 10	1.20	1.39	1.22	2.14	2.12	1.82	2.00	2.05	2.30	**	**	2.30	2.17	1.99	1.72	10.9
11 to 15	1.26	1.30	1.26	1.96	1.97	1.84	1.92	2.04	2.03	**	**	2.35	2.21	1.95	1.67	13.1
16 to 20	1.25	1.32	1.26	2.05	1.93	2.00	2.02	1.88	2.02	**	**	2.46	2.27	1.96	1.69	10.2
21 to 30	1.28	1.35	1.29	2.28	1.88	1.90	2.05	1.65	2.17	**	**	2.72	2.43	1.95	1.74	12.4
31 to 40	1.35	1.37	1.36	3.00	1.88	2.06	2.36	2.32	2.47	**	**	3.10	2.80	2.23	2.02	6.1
41 and Over	1.66	1.50	1.61	2.41	2.80	2.47	2.50	2.08	2.56	**	**	2.91	2.77	2.46	2.34	24.5
ALL	1.30	1.39	1.32	2.06	2.14	1.96	2.02	1.95	2.25	3.19	2.68	2.59	2.44	2.20	1.87	--
Percent of Vehicle Miles of Travel	30.4	7.3	37.7	10.0	1.7	11.2	22.9	4.7	11.3	0.8	0.6	11.3	24.0	10.7	100.0 [†]	

* Includes all private vehicles except motorcycles and mopeds.

** Insufficient data.

† Total vehicle miles of travel 902,755,000 (907,603,000 less 4,848,000 by motorcycles and mopeds).

FIGURE 2
AVERAGE OCCUPANCY BY TRIP LENGTH AND TRIP PURPOSE



Source: Based on Table 5.

TABLE 6. AVERAGE VEHICLE* OCCUPANCY BY TRIP PURPOSE AND DAY OF WEEK

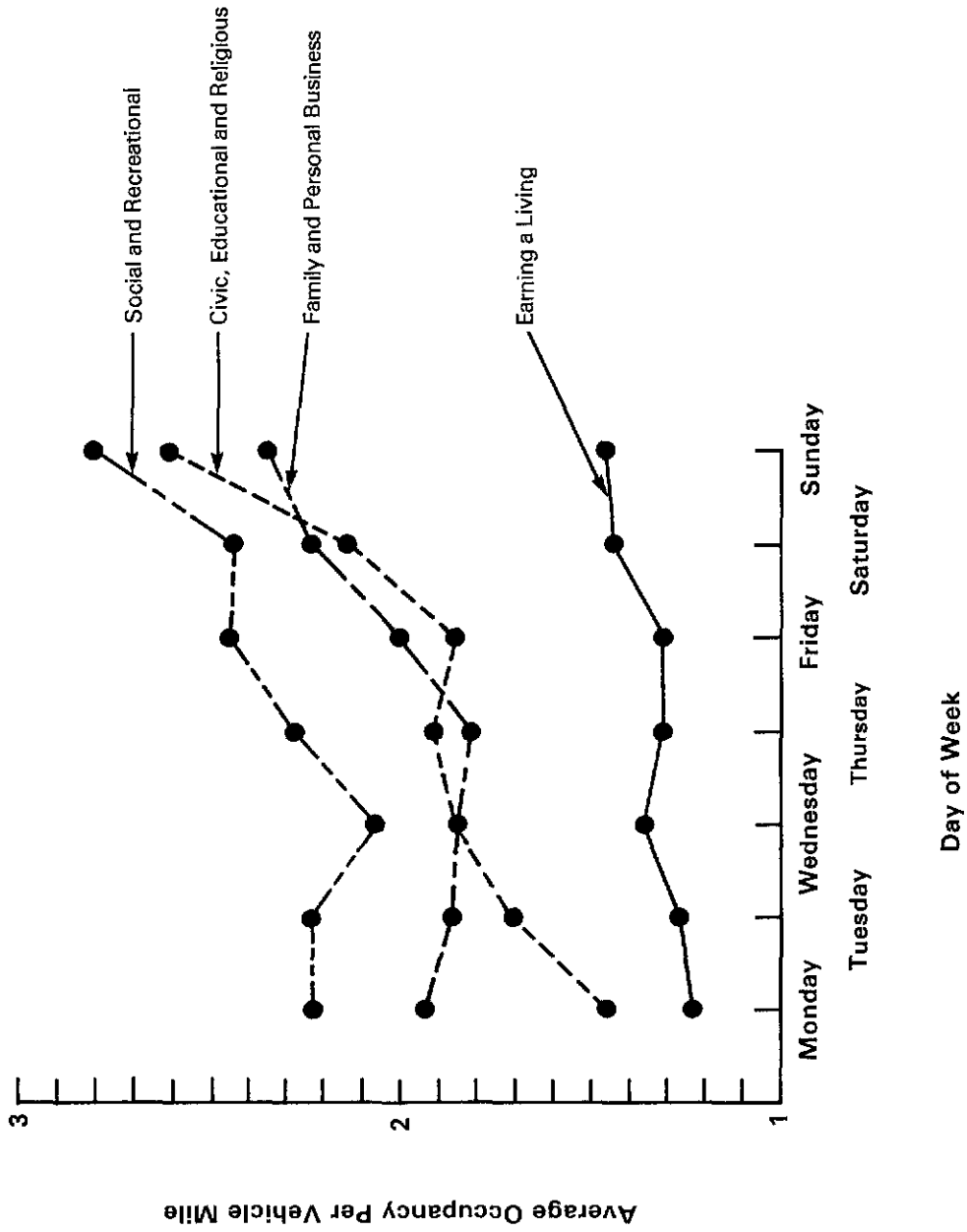
Day of Week	TRIP PURPOSE													All Purposes of Vehicle Miles of Travel	
	Earning a Living			Family and Personal Business			Civic, Educational & Religious		Social and Recreational			Other and Unknown			
	To Work	Work Related	All	Shopping	Medical-Dental	Other	All	Visit Friends & Relatives	Pleasure Driving	Vacation	Other	All	Other Unknown		
Weekday	1.29	1.35	1.30	1.91	2.17	1.84	1.90	1.72	2.06	2.15	2.56	2.28	2.12	1.72	72.2
Monday	1.23	1.23	1.23	1.91	2.12	1.89	1.93	1.46	1.89	1.74	2.00	2.23	2.11	1.63	12.3
Tuesday	1.26	1.29	1.27	1.96	1.79	1.79	1.87	1.71	2.10	2.30	3.02	2.23	2.14	1.66	14.0
Wednesday	1.35	1.40	1.36	1.79	2.24	1.83	1.85	1.85	1.82	2.20	3.01	2.07	1.99	1.64	14.7
Thursday	1.30	1.44	1.32	1.88	2.35	1.66	1.82	1.92	2.14	2.14	2.69	2.28	2.08	1.70	14.6
Friday	1.30	1.40	1.32	1.98	2.33	1.97	2.00	1.86	2.20	2.25	2.34	2.45	2.27	1.84	16.6
Weekend	1.38	1.63	1.45	2.31	1.95	2.25	2.27	2.49	2.45	4.00	2.87	2.62	2.34	2.32	27.8
Saturday	1.38	1.63	1.44	2.26	1.95	2.20	2.23	2.14	2.33	2.33	2.65	2.44	2.34	2.18	15.6
Sunday	1.37	1.62	1.46	2.43	1.95	2.32	2.35	2.61	2.56	4.75	**	2.81	2.34	2.49	12.2
ALL	1.30	1.39	1.32	2.06	2.14	1.96	2.02	1.95	2.25	3.19	2.68	2.44	2.20	1.87	100.0
Percent of Vehicle Miles of Travel	30.4	7.3	37.7	10.0	1.7	11.2	22.9	4.7	11.3	0.8	0.6	11.3	10.7	100.0	

* Includes all private vehicles except motorcycles and mopeds.

** Insufficient data.

† Total vehicle miles of travel = 902,755,000,000 (907,603,000,000 less 4,848,000,000 by motorcycles and mopeds).

FIGURE 3
AVERAGE OCCUPANCY BY DAY OF WEEK AND TRIP PURPOSE



for most purposes. Weekday home-to-work travel has an occupancy rate 6.5 percent lower than weekend home-to-work travel (1.29 versus 1.38). During the weekdays, the occupancy rate for travel to work is highest on Wednesdays (1.35), lowest on Mondays (1.23), and generally higher toward the end of the week, Thursdays and Fridays (1.30).

The weekday shopping travel occupancy rate is 17.3 percent lower than weekends (1.91 versus 2.31). Within the week, occupancy is generally greater at the beginning and end of the week, i.e., Mondays, Tuesdays or Fridays (1.91 or greater), and lowest at midweek (1.79).

Travel to visit friends and relatives has vehicle occupancy rates which are irregular among the days of the week. However, average occupancy rates are higher on weekends (2.45) than weekdays (2.06). Among weekdays, vehicle occupancy for visiting friends and relatives is highest on Fridays.

The tendency of vehicle occupancy rates to increase on weekends is also illustrated in Figure 3.

Average Occupancy by Trip Purpose and Time of Day

Vehicle occupancy rates vary according to the time of day that the travel takes place. As shown in Table 7, on the basis of overall travel, occupancy rates are at their lowest during the morning and evening peak travel periods. Vehicle occupancy averages 1.63 persons per vehicle mile during the a.m. peak (6:00 a.m. to 9:00 a.m.) and 1.84 during the p.m. peak (4:00 p.m. to 7:00 p.m.). This compares to an average of 1.94 during the midday period (9:00 a.m. to 4:00 p.m.), 2.14 during the evening (7:00 p.m. to 10:00 p.m.), and 1.84 for travel from 10:00 p.m. to 6:00 a.m.

For earning a living travel, there is little variation in occupancy rates among the different time periods. However, some of the highest occupancy rates for work travel occur during the portion of the a.m. peak from 6:00 a.m. to 8:00 a.m. (when occupancy ranges from 1.37 to 1.38), while the lowest occupancies occur during the 5:00 p.m. to 7:00 p.m. period of the p.m. peak (from 1.20 to 1.22). A possible reason for this reduction in vehicle occupancy from morning to evening is the inability of some persons engaged in ride-sharing to maintain the commitment on the return trip, due to schedule conflicts and after-work activities.

The highest vehicle occupancy rates for family business travel occur in the evening (7:00 p.m. to 10:00 p.m.) and late evening to early morning travel period (10:00 p.m. to 6:00 a.m.), when occupancy averages 2.36 and 2.45 persons per mile, respectively. Occupancy rates for family business travel during the morning and evening peaks are similar, between 2.00 and 2.02 persons per mile, but somewhat higher than the midday occupancy rate of 1.95.

TABLE 7. AVERAGE VEHICLE* OCCUPANCY BY TRIP PURPOSE AND TIME OF DAY

Time of Day	TRIP PURPOSE						Percent of Vehicle Miles of Travel
	Earning a Living	Family and Personal Business	Civic, Educational, and Religious	Social and Recreational	Other	All Purposes	
10 pm to 6 am	1.34	2.45	1.56	2.24	2.31	1.84	9.0
Morning Peak							
6 am to 7 am	1.38	1.82	1.64	3.14	2.01	1.63	4.7
7 am to 8 am	1.37	2.12	1.93	2.45	1.99	1.58	7.6
8 am to 9 am	1.30	1.97	2.09	2.46	1.70	1.69	5.6
6 am to 9 am	1.35	2.00	1.99	2.63	1.89	1.63	17.9
Midday							
9 am to 10 am	1.31	2.02	2.00	2.49	2.75	2.01	4.9
10 am to 12 pm	1.42	1.87	2.06	2.33	2.14	1.95	10.6
12 pm to 3 pm	1.26	1.92	1.79	2.51	2.22	1.95	16.9
3 pm to 4 pm	1.31	2.11	2.18	2.36	2.11	1.86	7.9
9 am to 4 pm	1.31	1.95	1.97	2.43	2.25	1.94	40.3
Evening Peak							
4 pm to 5 pm	1.34	1.97	1.81	2.62	2.02	1.81	9.4
5 pm to 6 pm	1.20	1.95	2.11	2.42	2.09	1.72	7.8
6 pm to 7 pm	1.22	2.20	1.95	2.47	2.55	2.05	5.7
4 pm to 7 pm	1.27	2.02	1.96	2.50	2.18	1.84	22.9
7 pm to 10 pm	1.34	2.36	1.95	2.41	2.39	2.14	9.9
ALL	1.32	2.02	1.95	2.44	2.20	1.87	100.0
Percent of Vehicle Miles of Travel	37.7	22.9	4.7	24.0	10.7	100.0†	

* Includes all private vehicles except motorcycles and mopeds.

† Total vehicle miles of travel = 902,755,000 (907,603,000 less 4,848,000 by motorcycles and mopeds).

The highest occupancy rates for social and recreational and civic, educational and religious travel occur during the peak travel periods. Social and recreational vehicle occupancy reaches a maximum of 2.63 in the a.m. peak and a minimum of 2.24 from 10:00 p.m. to 6:00 a.m. However, this travel averages two or more vehicle occupants during each daily time period.

Travel in Single-Occupant Vehicles by Trip Purpose and Time of Day

Table 8 presents a different view of trends in vehicle occupancy by time of day. The table shows the proportions of total daily vehicle travel that occur in single-occupant vehicles. The information is subdivided by the time of day and travel purpose.

The highest proportion of single-occupant vehicle travel is for earning a living, with 80 percent of all vehicle miles for that purpose occurring in single-occupant vehicles. Civic, educational, and religious travel is the next highest at 53.7 percent. Family business is third at 40.8 percent, and social and recreational travel is lowest at 26.9 percent.

The largest share of single-occupant vehicle travel for earning a living occurs during the evening peak when it reaches 82.5 percent. Fewer earning a living travel miles are driven alone in the morning peak, 78.6 percent, while 80.5 percent of all midday travel miles for this purpose are driven in single-occupant vehicles.

The heaviest occurrence of single-occupant vehicle travel for family business occurs during the midday (43.8 percent). During the morning peak or the evening peak approximately 40 percent of family business travel is done in single-occupant vehicles. This proportion drops to 28 percent between 7:00 p.m. and 10:00 p.m. and to 26 percent between 10:00 p.m. and 6:00 a.m.

Civic, educational, and religious travel is most often single occupant in the 10:00 p.m. to 6:00 a.m. period (60.9 percent) and is between 54 and 55 percent the rest of the day, declining slightly in the evening peak to 49.1 percent.

The highest proportion of travel in single-occupant vehicles for social and recreational purposes occurs in the "off hours"--28.8 percent in the period 7:00 p.m. to 10:00 p.m. and 34.2 percent from 10:00 p.m. to 6:00 a.m. During the other periods of the day single-occupant social and recreational travel ranges from 21.3 percent to 26.4 percent.

Vehicle Trips by Work and Nonwork Trip Purposes, Number of Occupants and Trip Length

Table 9 illustrates how trips with different numbers of occupants compare in terms of average trip length. The table also distinguishes between trips to or from work and trips made for all other purposes.

TABLE 8. PROPORTION OF VEHICLE* TRAVEL OCCURRING IN ONE-OCCUPANT VEHICLES BY TRIP PURPOSE AND TIME OF DAY

Time of Day	TRIP PURPOSE					All Purposes	Percent of Vehicle Miles of Travel
	Earning a Living	Family and Personal Business	Civic, Educational, and Religious	Social and Recreational	Other		
10 pm to 6 am	77.8	26.2	60.9	34.2	32.0	54.0	9.0
Morning Peak							
6 am to 7 am	77.8	35.4	59.9	12.5	33.4	64.0	4.7
7 am to 8 am	77.2	38.2	55.3	13.5	32.4	64.6	7.6
8 am to 9 am	82.5	41.2	53.7	32.3	41.7	61.4	5.6
6 am to 9 am	78.6	40.0	54.9	21.3	35.9	64.0	17.9
Midday							
9 am to 10 am	80.9	36.2	50.8	21.7	19.2	44.1	4.9
10 am to 12 pm	77.2	47.5	49.1	26.1	31.0	45.5	10.6
12 pm to 3 pm	82.7	45.1	61.2	25.2	29.0	47.6	16.9
3 pm to 4 pm	79.6	38.7	52.7	28.2	30.6	51.8	7.9
9 am to 4 pm	80.5	43.8	54.4	25.6	28.6	47.4	40.3
Evening Peak							
4 pm to 5 pm	80.5	42.3	56.8	25.7	42.8	56.7	9.4
5 pm to 6 pm	84.3	43.8	49.6	29.8	41.1	59.6	7.8
6 pm to 7 pm	84.6	31.1	44.0	24.2	29.9	44.2	5.7
4 pm to 7 pm	82.5	39.9	49.1	26.4	38.9	54.6	22.9
7 pm to 10 pm	79.5	28.3	54.0	28.8	29.2	40.9	9.9
ALL	80.0	40.8	53.7	26.9	32.6	51.9	100.0
Percent of Vehicle Miles of Travel	37.7	22.9	4.7	24.0	10.7	100.0†	

* Includes all private vehicles except motorcycles and mopeds.

† Total vehicle miles of travel = 902,755,000,000 (907,603,000,000 less 4,848,000,000 by motorcycles and mopeds).

TABLE 9. DISTRIBUTION OF VEHICLE* TRIPS BY WORK AND NONWORK TRIP PURPOSE, NUMBER OF OCCUPANTS AND TRIP LENGTH

One-Way Trip Length in Miles	To Work					Work Related and Nonwork					All Purposes				
	Single-Occupant	Multi-Occupant			Single-Occupant	Multi-Occupant			All	All					
		2	4	5 or More		2	4	5 or More							
Less than 1/2	5.4	5.3	7.1	5.5	3.2	5.5	5.4	13.0	10.4	9.6	8.2	9.6	9.9	11.5	9.8
1	9.6	10.1	10.8	5.1	12.0	10.0	9.7	17.1	14.2	13.6	11.2	10.9	13.4	15.3	13.7
2	10.7	11.2	10.0	11.0	5.1	10.8	10.8	15.5	14.4	12.8	12.6	11.1	13.7	14.7	13.5
3	9.2	9.4	8.5	9.1	12.7	9.3	9.2	11.1	10.4	10.4	9.6	8.7	10.2	10.7	10.3
4	6.5	5.4	6.0	5.0	2.5	5.4	6.3	6.3	6.5	6.7	6.0	5.3	6.4	6.3	6.3
5	8.3	6.1	3.0	3.1	1.3	5.2	7.8	7.7	8.0	8.0	9.0	8.1	8.1	7.9	7.9
6	4.3	5.3	4.4	5.1	3.8	5.1	4.4	3.8	4.0	4.2	4.1	4.7	4.1	4.0	4.1
7	4.6	4.8	4.5	3.7	0.0	4.6	4.6	3.3	3.3	3.2	2.8	4.5	3.3	3.3	3.7
8 to 10	13.5	12.2	8.4	11.2	8.2	11.3	13.0	8.0	9.3	10.3	12.2	11.3	10.0	9.0	10.1
11 to 15	12.2	12.9	15.5	14.1	14.5	13.5	12.4	5.9	7.2	7.5	7.2	8.2	7.3	6.6	8.2
16 to 20	6.7	7.3	7.7	7.4	7.0	7.4	6.8	3.2	4.2	4.6	5.3	3.9	4.4	3.8	4.6
21 to 30	5.9	5.2	9.4	8.5	10.8	6.3	6.0	2.8	3.4	3.9	4.5	4.3	3.7	3.2	4.0
31 to 40	1.5	2.5	2.5	1.5	4.4	2.5	1.7	1.0	1.3	1.6	2.7	3.2	1.7	1.3	1.4
41 and Over	1.6	2.3	2.2	9.7	14.5	3.1	1.9	1.3	3.4	3.6	4.6	6.2	3.8	2.6	2.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percent of Vehicle Trips	23.2	3.3	0.8	0.3	0.2	4.6	27.8	36.7	21.2	7.4	4.2	2.7	35.5	72.2	100.0†

* Includes all private vehicles except motorcycles and mopeds.
† Total vehicle trips : 108,430,000 (108,826,000 less 396,000 by motorcycles and mopeds).

For travel to work, Table 9 shows that the proportion of trips that are multi-occupant increases slightly as trip length increases. While 16.4 percent of all trips to work are over 15 miles, 19.3 percent of multi-occupant trips are over 15 miles, compared to 15.7 percent of single-occupant trips.

Trips made for work-related and nonwork travel show a much greater difference in the proportions which are single and multi-occupant as trip length increases. Trips for work-related and nonwork travel in single-occupant vehicles are considerably shorter than those in multi-occupant vehicles, as seen by the fact that 56.7 percent of single-occupant vehicle trips are 3 miles or less in length, compared to 47.2 percent of multi-occupant trips.

In the case of both work and nonwork travel, the longer the vehicle trip, the greater the number of persons likely to be making the trip.

Average Occupancy by Trip Purpose and Urban/Rural Split of Travel

Earlier in this report, relationships between vehicle occupancy and household location inside or outside of SMSA's and by size of SMSA were explored. In a different analysis of the link between occupancy and location, Table 10 shows the variation in average vehicle occupancy by trip purpose based on where the travel itself occurred -- within an urban area, within a rural area, and travel in both urban and rural locations.

The urban/rural distinction in travel location is the result of trip-mapping procedures used by the Federal Highway Administration (FHWA). More information on this subject will be available in the report on urban/rural travel, which is a part of the 1977 NPTS series.

Instead of using SMSA's as the measure for defining urban locations, Table 10 uses the FHWA concept of urban area, which is defined as a place with a population of 5,000 or more. This provides a different measure of the influence of travel location on the average number of vehicle occupants. Use of SMSA's as a means of distinguishing urban from rural development and travel conditions is weak because of the large variation in population density within SMSA's.

Travel occurring within urban areas has the lowest rate of vehicle occupancy of all locations, and this is generally true for all trip purposes.

Travel occurring in rural areas has higher vehicle occupancy rates than urban travel for all trip purposes. Average vehicle occupancy per travel mile in urban areas is 10.3 percent less than in rural areas for all travel (1.67 versus 1.86), 4.6 percent lower for earning a living (1.24 versus 1.30), 8.0 percent lower for family business (1.85 versus 2.01), 30.0 percent lower for civic, educational and religious (1.73 versus 2.47), and 5.0 percent lower for social and recreational (2.26 versus 2.38).

TABLE 10. AVERAGE VEHICLE OCCUPANCY BY TRIP PURPOSE AND URBAN/RURAL SPLIT OF TRAVEL

Location of Travel	Trip Purpose					All	Percent of Vehicle Miles of Travel
	Earning a Living	Family and Personal Business	Civic, Educational and Religious	Social and Recreational	Other		
Entire Trip Occuring Within Urban Area	1.24	1.85	1.73	2.26	1.95	1.67	43.6
Entire Trip Occuring Within Rural Area	1.30	2.01	2.47	2.38	1.97	1.86	13.2
Trip Involving Both Urban and Rural Areas	1.44	2.24	2.08	2.59	2.40	2.10	40.3
Location Unknown	1.38	3.24	1.00	1.93	1.66	1.86	2.9
All Travel	1.32	2.02	1.95	2.44	2.20	1.87	100.0
Percent of Vehicle Miles of Travel	37.7	22.9	4.7	24.0	10.7	100.0 [†]	

† Total Vehicle Miles = 902,775,000,000 (907,603,000,000 less 4,848,000,000 by motorcycles and mopeds).

Average Occupancy by Trip Purpose and Annual Household Income

Vehicle occupancy is affected by the level of household income.* As seen in Table 11, vehicle occupancy is generally highest for travel by persons in the lower income ranges and declines with rising income. Higher income households, which own more vehicles, generally realize less pressure to make group trips.

Considering travel for all purposes, average vehicle occupancy is greatest for incomes under \$15,000, 1.91 occupants per mile,** declining to 1.64 for incomes of \$50,000 or more. Occupancy rates are highest for the \$10,000 to \$15,000 income group at 1.93 for all travel, and this group is also the highest for each trip purpose, except social and recreational.

For travel related to earning a living, the highest vehicle occupancy rate is 1.38, which occurs in the \$10,000 to \$15,000 group, falling to 1.28 for incomes of \$50,000 or more. The highest occupancy rate for family business is 2.08 in the \$10,000 to \$15,000 group, declining to 1.78 for household incomes of \$35,000 or more. In travel for civic, educational and religious purposes, average occupancy is greatest at 2.14 for incomes between \$10,000 and \$15,000, declining to 1.49 for incomes over \$50,000. For social and recreational travel, the highest rate of occupancy shifts to the \$25,000 to \$35,000 range at 2.76 and then drops as income either increases or decreases.

Average Occupancy by Trip Purpose and Number of Persons per Household

Vehicle occupancy increases directly with the number of persons in the driver's household. Table 12 shows that average occupancy per vehicle mile for all travel increases from a low of 1.46 in one-person households, to 1.69 in two-person households, 1.78 in three-person households, 1.99 in four-person households, and 2.22 in households with five or more persons.

The tendency toward higher vehicle occupancy rates as the number of persons in the household increases occurs for all major purposes of travel, ranging from 1.19 to 1.44 for one-person to five-or-more person households respectively for earning a living travel, 1.42 to 2.50 for family business travel, 1.26 to 2.37 for civic, educational and religious travel, and 1.76 to 3.10 for social and recreational travel.

*Combined annual income of the driver's household.

**Average for income groups under \$5,000, \$5,000 to \$10,000, and \$10,000 to \$15,000.

TABLE 11. AVERAGE VEHICLE* OCCUPANCY BY TRIP PURPOSE AND ANNUAL HOUSEHOLD INCOME

Annual Household Income	Trip Purpose						Percent of Vehicle Miles of Travel
	Earning a Living	Family and Personal Business	Civic, Educational and Religious	Social and Recreational	Other	All	
Less than \$5,000	1.31	1.97	1.87	2.30	2.04	1.91	6.3
\$5,000 to 9,999	1.32	2.04	2.03	2.29	2.09	1.88	15.6
\$10,000 to 14,999	1.38	2.08	2.14	2.49	2.39	1.93	22.1
\$15,000 to 24,999	1.30	2.06	1.89	2.47	2.29	1.86	35.0
\$25,000 to 34,999	1.31	1.93	2.00	2.76	2.01	1.89	13.3
\$35,000 to 49,999	1.24	1.78	1.59	2.24	2.09	1.70	5.3
\$50,000 or More	1.28	1.78	1.49	2.05	1.69	1.64	2.4
All Households	1.32	2.02	1.95	2.44	2.20	1.87	100.0
Percent of Vehicle Miles of Travel	37.7	22.9	4.7	24.0	10.7	100.0†	

* Includes all private vehicles except motorcycles and mopeds.

† Total vehicle miles of travel = 902,755,000,000 (907,603,000,000 less 4,848,000,000 by motorcycles and mopeds).

**TABLE 12. AVERAGE VEHICLE* OCCUPANCY BY TRIP PURPOSE
AND NUMBER OF PERSONS PER HOUSEHOLD**

Number of Persons Per Household	Trip Purpose					All	Percent of Vehicle Miles of Travel
	Earning a Living	Family and Personal Business	Civic, Educational and Religious	Social and Recreational	Other		
One	1.19	1.42	1.26	1.76	1.71	1.46	7.9
Two	1.27	1.76	1.62	2.11	1.91	1.69	27.1
Three	1.33	1.90	1.75	2.31	2.01	1.78	21.2
Four	1.29	2.17	2.09	2.77	2.50	1.99	21.9
Five or More	1.44	2.50	2.37	3.10	2.65	2.22	21.9
All Households	1.32	2.02	1.95	2.44	2.20	1.87	100.0
Percent of Vehicle Miles of Travel	37.7	22.9	4.7	24.0	10.7	100.0†	

* Includes all private vehicles except motorcycles and mopeds.

† Total vehicle miles of travel = 902,755,000,000 (907,603,000,000 less 4,848,000,000 by motorcycles and mopeds).

Average Occupancy by Trip Purpose and Number of Vehicles per Household

Vehicle occupancy decreases directly with the number of vehicles owned by the household.* As shown in Table 13, average occupancy for all travel is at a maximum of 1.99 for households with no vehicles and declines to 1.91 for households with one vehicle, 1.90 for two vehicles, 1.82 for households with three vehicles, and 1.76 for households with four or more vehicles. If all other household characteristics are similar, greater numbers of vehicles available mean greater freedom for individual mobility.

The relationship between average vehicle occupancy and vehicle ownership is apparent for earning a living and family business trips, but less obvious for civic, educational and religious and social and recreational trips.

The highest occupancy rate for earning a living travel, 1.42, occurs in households with no vehicles, declines to a minimum of 1.26 for households with three vehicles, and then increases again slightly to 1.33 for households with four or more vehicles. Similarly, for family business, the highest occupancy rate, 2.58, occurs in households with no vehicles and declines to 1.87 for households with four or more vehicles. For civic, educational and religious and social and recreational travel, however, the relationships between occupancy rate and vehicle ownership are less clear.

Average Occupancy by Trip Purpose and Number of Licensed Drivers

Overall, households with two licensed drivers have the highest vehicle occupancy rates. As shown by Table 14, average occupancy for all travel is 1.92 for two-driver households, compared to 1.80 for households with one driver and three or more drivers. The probable reason for this is that two-driver households account for 55.6 percent of all vehicle miles of travel but only 42.8 percent of all vehicles owned.

For earning a living travel there is a change in this relationship, and average vehicle occupancy increases directly with the number of drivers, from 1.30 for one-driver households to 1.31 for two-driver households to 1.35 for households with three or more drivers.

For family business, civic, educational and religious, social and recreational and other travel, the highest occupancy rates are found in two-driver households.

Average Occupancy by Trip Purpose, Number of Household Vehicles and Number of Licensed Drivers

Table 15 explores the relationship between vehicle occupancy rates, and both household vehicle ownership and the number of household

*Refers to household of the vehicle driver.

TABLE 13. AVERAGE VEHICLE* OCCUPANCY BY TRIP PURPOSE AND NUMBER OF VEHICLES PER HOUSEHOLD

Number of Household Vehicles	Trip Purpose					All	Percent of Vehicle Miles of Travel
	Earning a Living	Family and Personal Business	Civic, Educational and Religious	Social and Recreational	Other		
None	1.42	2.58	3.27	2.05	2.10	1.99	0.4
One	1.35	2.00	2.05	2.40	2.14	1.91	23.3
Two	1.32	2.11	1.96	2.56	2.26	1.90	45.8
Three	1.26	1.93	2.02	2.39	2.11	1.82	19.8
Four or More	1.33	1.87	1.61	2.24	2.29	1.76	10.7
All Households	1.32	2.02	1.95	2.44	2.20	1.87	100.0
Percent of Vehicle Miles of Travel	37.7	22.9	4.7	24.0	10.7	100.0†	

* Includes all private vehicles except motorcycles and mopeds.

† Total vehicle miles of travel = 902,755,000,000 (907,603,000,000 less 4,848,000,000 by motorcycles and mopeds).

**TABLE 14. AVERAGE VEHICLE* OCCUPANCY BY TRIP PURPOSE
AND NUMBER OF LICENSED DRIVERS**

Number of Licensed Drivers	Trip Purpose					All	Percent of Vehicle Miles of Travel
	Earning a Living	Family and Personal Business	Civic, Educational and Religious	Social and Recreational	Other		
One	1.30	1.96	1.80	2.24	2.05	1.80	20.7
Two	1.31	2.10	2.07	2.60	2.26	1.92	55.6
Three or More	1.35	1.86	1.86	2.24	2.18	1.80	23.7
All Households	1.32	2.02	1.95	2.44	2.20	1.87	100.0
Percent of Vehicle Miles of Travel	37.7	22.9	4.7	24.0	10.7	100.0†	

* Includes all private vehicles except motorcycles and mopeds.

† Total vehicle miles of travel = 902,755,000,000 (907,603,000,000 less 4,848,000,000 by motorcycles and mopeds).

**TABLE 15. AVERAGE VEHICLE* OCCUPANCY BY TRIP PURPOSE,
NUMBER OF HOUSEHOLD VEHICLES AND
NUMBER OF LICENSED DRIVERS**

Trip Purpose	Number of Drivers	Number of Household Vehicles					
		None	One	Two	Three	Four or More	All
Earning a Living	One	1.36	1.33	1.23	1.19	1.21	1.30
	Two	1.64	1.39	1.30	1.28	1.28	1.31
	Three or More	1.97	1.32	1.49	1.25	1.36	1.35
	All	1.42	1.35	1.32	1.26	1.33	1.32
Family and Personal Business	One	2.65	1.84	2.27	2.07	1.59	1.96
	Two	2.67	2.18	2.10	1.96	2.03	2.09
	Three or More	1.00	2.25	1.82	1.90	1.81	1.86
	All	2.63	1.99	2.09	1.93	1.87	2.02
Civic, Educational, and Religious	One	3.04	1.76	1.83	1.46	2.79	1.78
	Two	3.46	2.40	2.00	1.99	1.97	2.07
	Three or More	2.16	2.09	1.89	2.07	1.53	1.87
	All	3.06	2.05	1.96	2.02	1.62	1.95
Social and Recreational	One	2.08	2.20	2.39	1.98	1.78	2.24
	Two	2.06	2.60	2.59	2.63	2.73	2.60
	Three or More	2.96	2.60	2.44	2.22	2.08	2.24
	All	2.08	2.36	2.54	2.39	2.23	2.44
Other	One	1.86	1.90	2.27	2.39	1.91	2.05
	Two	2.47	2.17	2.27	2.25	2.40	2.26
	Three or More	1.70	3.76	2.16	1.92	2.20	2.18
	All	2.10	2.13	2.26	2.11	2.29	2.20
All Purposes	One	1.88	1.75	1.95	1.78	1.47	1.80
	Two	2.12	2.07	1.89	1.89	1.92	1.92
	Three or More	2.12	2.41	1.88	1.76	1.71	1.79
	All	1.96	1.89	1.89	1.81	1.76	1.87

* Includes all private vehicles except motorcycles and mopeds.

drivers. As expected, occupancy tends to increase as the number of household drivers goes up and declines with higher levels of vehicle ownership.

It might be expected that households with one driver and one vehicle would have similar rates of occupancy as households with two drivers and two vehicles, and households with three drivers and three vehicles. This similarity by equivalent driver/vehicle ratio is not evident, however, except for earning a living travel, where occupancy averages 1.33 for the one-driver/one-vehicle households, 1.30 for two-driver/two-vehicle households, and 1.25 for households with three or more drivers and three vehicles.

For family business travel no consistency occurs in the relationship between occupancy rates, vehicles and drivers. In one-vehicle households, occupancy rises with number of drivers, as is predictable. But in two-or three-vehicle households, occupancy drops with additional drivers.

Consistency is also lacking in the occupancy, vehicle, driver relationships for social and recreational and civic, educational and religious travel.

Average Occupancy by Trip Purpose and Vehicle Type

Occupancy rates do vary among the different types of vehicles and the purpose for which they are used. From Table 16, the average occupancy rate for travel in standard autos is 1.81, which is below the average of 1.87 for all vehicles. Station wagons (2.20), vanbus/minibus vehicles (2.20), other vans (2.12) and camper coach vehicles (1.91) are used at above average rates of occupancy. Conversely, pickups, with and without camper (1.72), and other trucks (1.45) are used at below average rates of occupancy.

The relationships between occupancy and vehicle type vary among the different trip purposes. Vanbus/minibus vehicles generally have the highest occupancy for all travel. Station wagons, which have occupancy characteristics similar to vanbus/minibus vehicles, are used like standard automobiles for work travel (1.39). However, station wagons are driven at higher occupancies for nonwork travel than automobiles, averaging 2.34 persons per vehicle mile for family business travel and 3.14 persons per mile for social and recreational travel. Other vans and camper coach vehicles are used at low occupancies when used for work travel, averaging only 1.10 and 1.00 persons per mile, respectively. However, other vans have above average occupancy, 2.23 persons per mile for family business travel, 2.35 for civic, educational and religious travel and 2.75 for social and recreational travel.

TABLE 16. AVERAGE VEHICLE* OCCUPANCY BY TRIP PURPOSE AND VEHICLE TYPE

Vehicle Type	Trip Purpose						Percent of Vehicle Miles of Travel
	Earning a Living	Family and Personal Business	Civic, Educational and Religious	Social and Recreational	Other	All	
Automobiles	1.29	2.02	1.90	2.41	2.10	1.86	84.7
Standard Auto	1.28	1.97	1.87	2.32	2.06	1.81	75.1
Station Wagon	1.39	2.34	2.11	3.14	2.58	2.20	9.6
Vans, Trucks, Recreational Vehicles	1.38	1.96	2.09	2.37	2.38	1.81	15.3
Vanbus/Minibus	1.87	2.25	3.05	2.74	2.21	2.20	2.3
Other Van	1.10	2.23	2.35	2.73	**	2.12	0.9
Pickup with and without camper	1.31	1.90	1.88	2.26	2.30	1.72	11.6
Other Truck	1.43	1.48	2.14	1.91	1.04	1.45	0.4
Camper Coach	1.00	1.74	**	**	1.09	1.91	0.1
All Vehicles	1.32	2.02	1.95	2.44	2.20	1.87	100.0
Percent of Vehicle Miles of Travel	37.7	22.9	4.7	24.0	10.7	100.0†	

* Includes all private vehicles except motorcycles and mopeds.

** Insufficient Data.

† Total vehicle miles of travel = 902,755,000 (907,603,000 less 4,848,000 by motorcycles and mopeds).

Vehicle Trips and Travel by Number of Household and Nonhousehold
Occupants

Table 17 indicates that 59.9 percent of all vehicle trips and 51.9 percent of all private vehicle miles of travel are made in single-occupant vehicles. Furthermore, 84.4 percent of all trips and 78.9 percent of all travel occurs in vehicles where only household members are occupants. In 11.1 percent of all trips and 15.2 percent of all travel only one household member is involved, with all additional occupants being nonhousehold members. Finally, in 15.6 percent of all trips and 21.1 percent of all travel, one or more nonhousehold members are present on the trip. The same relationships are also illustrated in Figure 4.

**TABLE 17. DISTRIBUTION OF VEHICLE* TRIPS AND TRAVEL
BY NUMBER OF HOUSEHOLD AND NONHOUSEHOLD OCCUPANTS**

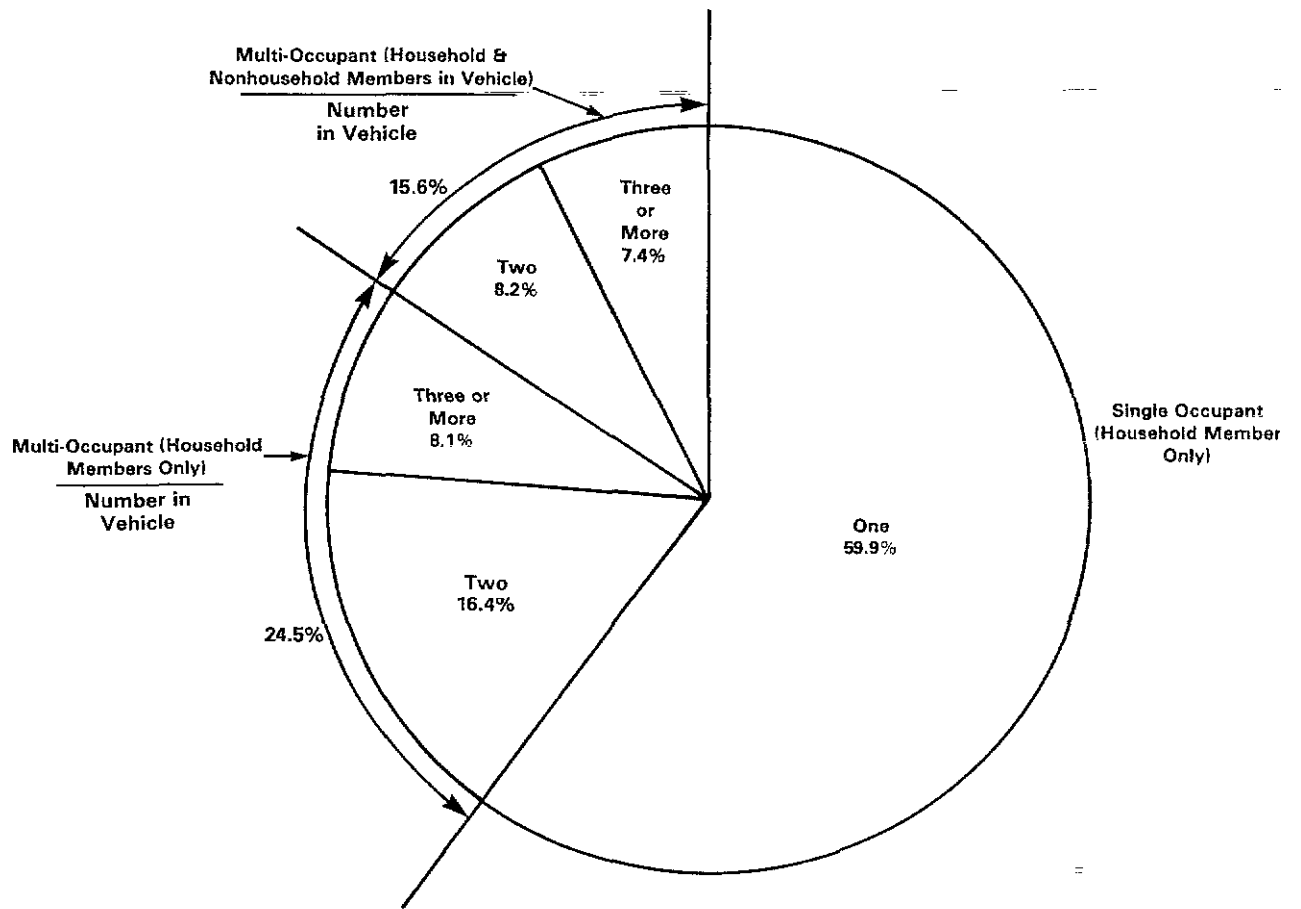
Nonhousehold Occupants Per Trip	Household Occupants Per Trip			
	One	Two	Three or More	All
Vehicle Trips				
None	59.9	16.4	8.1	84.4
One	8.2	1.7	1.0	10.9
Two	1.7	0.8	0.4	2.9
Three or More	1.2	0.3	0.3	1.8
All	71.0	19.2	9.8	100.0†
Vehicle Travel				
None	51.9	17.1	9.9	78.9
One	10.5	2.0	1.2	13.7
Two	2.3	1.4	0.5	4.2
Three or More	2.4	0.4	0.4	3.2
All	67.1	20.9	12.0	100.0‡

* Includes all private vehicles except motorcycles and mopeds.

† Total vehicle miles of travel = 902,755,000,000 (907,603,000,000 less 4,848,000,000 by motorcycles and mopeds).

‡ Total vehicle trips = 108,430,000,000 (108,826,000,000 less 396,000,000 by motorcycles and mopeds).

FIGURE 4
DISTRIBUTION OF VEHICLE TRIPS
BY NUMBER OF HOUSEHOLD AND NONHOUSEHOLD OCCUPANTS



Source: Based on Table 17.

IV. COMPUTATION OF OCCUPANCY RATES

In computing occupancy rates, the methods used and assumptions made can have a significant impact on the results obtained. Because the rates presented in this report have been calculated using different methods and assumptions, this section is included to describe the methods that have been used and the results obtained from each.

Table 18 contains 10 sets of occupancy rates, each calculated using either a different method of computation or a different group of trips. All of the rates presented for 1977 have been calculated from 1977 NPTS travel day data. Likewise, both 1969 rates contained in Table 18 are from 1969 NPTS data.

In analyzing the differences in the rates contained in Table 18, there are three factors that must be considered:

Computation of Occupancy - Occupancy is generally calculated on either a "trip" basis (occupants per vehicle trip) or a "travel" basis (occupants per vehicle mile). Generally, rates computed on occupants per vehicle trip result in lower levels of average vehicle occupancy, since the number of occupants increases with trip length. Because rates computed on the travel basis have a more direct relationship to energy consumption, those rates have been used for the presentation of 1977 findings in Section III of this report. However, when 1977 NPTS findings are compared to those from the 1969 survey, rates computed on a trip basis must be used to achieve comparability with the 1969 data.

Type of Vehicles - As explained in subsection D of the Introduction to this report, the definition of private vehicle in the 1977 NPTS was expanded from that used in the 1969 survey. In 1969, data was collected on automobile trips only, including standard autos, station wagons, personal-use taxis, and vanbuses or minibuses. In 1977, the definition of private vehicle was expanded to also include pickup trucks and other trucks, vans other than vanbuses, recreational vehicles, motorcycles and mopeds as well as automobiles. In the presentation of 1977 findings in Section III of this report, trips in all private vehicles except motorcycles and mopeds are used in the computation of occupancy. When 1977 findings are compared to 1969 in Section V of this report, only those trips in the auto group of vehicles are used to achieve consistency with 1969 data.

Table 18. COMPARISON OF OCCUPANCY RATES BY METHOD OF COMPUTATION

	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10
Survey Year	1977	1977	1977	1977	1977	1977	1977	1977	1969	1969
Computation of Rate*	Travel All	Trip All	Travel All	Trip All	Travel Autos Household Driver	Trip Autos Household Driver	Travel Autos	Trip Autos	Travel Autos	Trip Autos
Type of Vehicles**	All	All	All	All	All	All	All	All	All	All
Type of Trips***	Household Driver	Household Driver	All	All	Household Driver	Household Driver	All	All	All	All
<u>Trip Purpose</u>										
Earning a Living To Work	1.32	1.23	1.50	1.37	1.29	1.24	1.50	1.38	1.6	1.4
Work Related	1.30	1.22	1.50	1.36	1.28	1.23	1.49	1.37	1.6	1.4
	1.39	1.30	1.52	1.42	1.38	1.31	1.55	1.44	1.7	1.6
Family & Personal Business	2.02	1.73	2.17	1.86	2.03	1.73	2.20	1.88	2.3	2.0
Shopping	2.06	1.80	2.20	1.92	2.05	1.80	2.21	1.92	2.2	2.0
Medical/Dental	2.14	1.87	2.28	2.02	2.17	1.89	2.29	2.03	2.6	2.1
Other	1.96	1.62	2.13	1.78	1.98	1.63	2.16	1.80	2.2	1.9
Civic, Educational, and Religious	1.95	1.93	2.27	2.33	1.94	1.92	2.28	2.33	2.5	2.5
Social & Recreational	2.44	2.08	2.72	2.36	2.41	2.08	2.72	2.37	2.9	2.5
Visit Friends & Relatives	2.25	1.89	2.48	2.10	2.24	1.88	2.49	2.10	2.7	2.3
Pleasure Driving	3.19	2.43	2.83	2.58	2.70	2.33	2.78	2.54	3.0	2.7
Vacation	2.68	2.84	2.96	3.15	2.70	2.86	2.77	2.94	3.3	3.3
Other	2.59	2.22	2.90	2.53	2.55	2.24	2.91	2.55	3.0	2.6
Other	2.20	1.97	2.51	2.14	2.15	1.98	2.48	2.15	--	--
All Purposes	1.87	1.67	2.13	1.88	1.86	1.68	2.15	1.90	2.2	1.9
Presented in this report in:	Sect. III	App. A						Sect. V (1977)		Sect. V (1969)

* Computation of Rate - "Travel rate" is computed by dividing person miles of travel by vehicle miles of travel. "Trip rate" is computed by dividing person trips by vehicle trips.

** Type of Vehicles - "Autos" includes automobiles, station wagons, minibuses, and personal-use taxis. "All" includes autos as well as all other private vehicles, except motorcycles and mopeds.

*** Type of Trips - "Household Driver" includes only trips in which a member of an interviewed household was the driver. "All" includes all trips reported regardless of whether the driver was a member of an interviewed household or not.

Since 86 percent of all private vehicle trips in the 1977 NPTS are in auto-type vehicles, the difference in occupancy rates for all private vehicles versus autos only is not significant. When all other factors are the same, trips in the auto group of vehicles have the same or slightly higher occupancies than those in all private vehicles.

Type of Trips - The NPTS collected data on all trips made by a household on a specified travel day. Weighting factors were then applied to expand trip and travel data to annual, national estimates.

Data published on vehicle trips and travel in the 1977 NPTS reports is in most cases limited to only those trips in which a household member is the driver. This is done to give a more accurate picture of trips and travel without the potential of double counting when members of two households go on the same trip.

Thus in Section III of this report, 1977 vehicle occupancy rates correspond to trips in which a household member was the driver. However, in the Trends Over Time section, 1977 occupancy rates are computed on the basis of all travel day trips reported by the household, including those in which the driver was not a household member. This was done to achieve consistency with the procedures used to calculate the 1969 occupancy rates and to provide an accurate basis to compare results between the 1969 and 1977 surveys.

Because each calculation factor discussed above has its own impact on occupancy rates, Table 18 has been included to provide a comparison of the rates generated when each of the three factors is applied. Table 18 contains eight sets of occupancy rates from the 1977 NPTS findings showing the possible combinations of all three factors. Travel-based rates are presented for all private vehicles and household driver trips only (column 1), all private vehicles and all trips (column 3), autos only and household driver trips only (column 5), and autos only and all trips (column 7). For each possible combination of vehicle and trip types, trip-based rates follow travel-based rates. Also included on Table 18 are the rates from the 1969 survey which are computed on all trips and auto vehicles (columns 9 and 10).

In considering the rates presented in Table 18, the method of computing the rate (travel versus trip) and the types of trips included (all trips versus household driver only) have the biggest impact on the variation in the resultant rates.

Because the number of persons in the vehicle tends to increase with trip length, travel-based occupancy rates are higher than those computed on a trip basis. When the other two factors in the computation of the rates are the same, travel-based rates are 0.2 to 0.3 persons higher than those based on occupants per vehicle trip.

The difference in occupancy rates between "household driver" trips and "all" trips is also considerable. As expected, "all" trips have a consistently higher occupancy than those trips in which a household member was the driver. This is because trips reported by households in which the driver was not a household member would, by definition, have at least two people in the vehicle--the driver and the household member who reported the trip. Household driver trips comprise 86.3 percent of all vehicle trips and 82.3 percent of all vehicle miles of travel. The remaining 13.7 percent of trips and 17.7 percent of travel have significantly different occupancy characteristics and the inclusion of these trips results in a higher average occupancy rate. When the other two factors in the computation of the rates are the same, occupancy rates based on "all" trips show an average of 0.3 persons per vehicle mile or 0.2 persons per vehicle trip more than those based on "household driver" trips only.

In reviewing only 1977 travel-based rates (occupants per vehicle mile), the highest average vehicle occupancy, 2.15, is found in the auto group for all trips. The equivalent rate for travel in all private vehicles for all trips is less, or 2.13 persons per mile. If trips are further limited to the household driver criteria, rates fall to 1.87 for all private vehicles and 1.86 for the auto group.

Similar findings occur in the 1977 trip-based rates. When all trips are considered, rates are higher, showing 1.88 for all private vehicles and 1.90 for autos only. When only household driver trips are selected, rates decline to 1.67 for all private vehicles and 1.68 for autos only.

Differences in occupancy rates by individual trip purposes generally follow the differences discussed above for all purposes. It should be noted, however, that average occupancy for social and recreational trips increases considerably when a travel basis is used rather than a trip-based rate. This is due to the fact that trips for social and recreational purposes tend to be longer than other trips and generally have higher occupancies, therefore, a greater change results when occupancy is calculated from the travel-based formula.

To recap, the methods and assumptions used in calculating occupancy can have considerable impact on the rates obtained. The 1977 occupancy rates presented in Section III of this report are computed based on a) occupants per vehicle mile, b) travel in all private

vehicles except motorcycles and mopeds, and c) travel generated in trips in which a household member was the driver. For those interested in comparing occupants per vehicle mile to occupants per vehicle trip, Appendix A contains selected tables using trip-based occupancy rates that can be compared to the travel-based rates presented in Section III. Rates for the Appendix A tables are computed using trips in the same vehicle types (i.e., all private vehicles except motorcycles and mopeds) and the same types of trips (i.e., household member is the driver) as those used in the Section III tables.

V. TRENDS OVER TIME IN VEHICLE OCCUPANCY

COMPARISON OF 1969 AND 1977 NPTS

One of the benefits of having the NPTS conducted in 1969 and 1977 is the ability to examine changes in travel behavior over time. This section examines trends in vehicle occupancy between 1969 and 1977 related to trip purpose, household location, trip length and other factors.

There are several differences in the way in which private vehicle occupancy rates were calculated in 1969 and the way in which they have been calculated from the 1977 NPTS, as presented in Section III of this report. However, to properly make comparisons between the two surveys, it is necessary to modify the computation of occupancy within the 1977 NPTS to achieve compatibility with its predecessor. Because of these differences in the computation of occupancy rates, the rates presented in this Trends Over Time section cannot be compared to those in Section III of this report.

For a full discussion of the differences in calculation of occupancy rates, see the Introduction to the report (Subsection D) and Section IV, Computation of Occupancy Rates.

Average Automobile Occupancy by Trip Purpose in 1969 and 1977

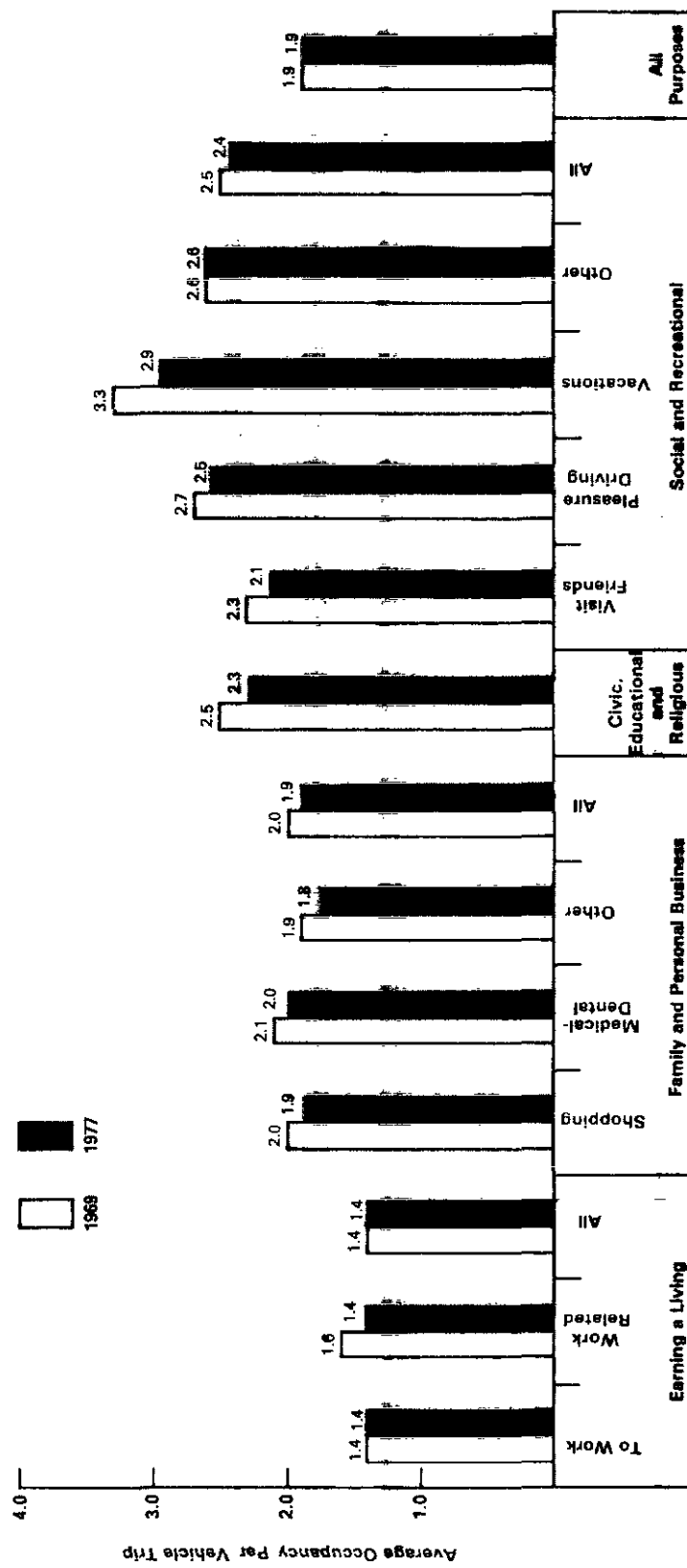
The overall average auto occupancy rate remained constant at 1.9 persons per trip from 1969 to 1977, as shown in Figure 5. The occupancy rates by individual trip purpose either stayed the same or showed a slight decline over this time period. Auto occupancy in trips for earning a living remained at 1.4 persons per trip in 1969 and 1977. Trips for family and personal business averaged 2.0 occupants in 1969 and 1.9 in 1977. For civic, educational, and religious trips, average occupancy decreased from 2.5 in 1969 to 2.3 in 1977. Social and recreational trips showed a slight decline from 2.5 occupants in 1969 to 2.4 in 1977.

Average Automobile Occupancy by Trip Purpose and SMSA Size in 1969 and 1977

Average occupancy per auto trip by residents of SMSA's remained at 1.9 over the period of 1969 to 1977. Table 19 indicates that declines in occupancy rates for all trip purposes occurred only in the smallest and the largest SMSA's. In both cases, occupancy decreased by 0.1 persons per trip.

Occupancy in trips for earning a living remained constant at 1.4 for all SMSA's over this period with only a decrease of 0.1 occupants per trip shown in SMSA's of 500,000 to 1 million. Family business trip occupancy fell by 0.1 occupants per trip (about 5 percent) in each

FIGURE 5
AVERAGE AUTOMOBILE OCCUPANCY BY TRIP PURPOSE IN 1969 AND 1977



Source: Based on Figure 1 in 1969 NPTS Report: Vehicle Occupancy (p. 9) and 1977 Table 20.

**TABLE 19. COMPARISON OF AVERAGE AUTOMOBILE* OCCUPANCY
BY TRIP PURPOSE AND SMSA SIZE IN 1969 AND 1977**

SMSA Population Size	Trip Purpose				
	Earning a Living	Family Business	Civic, Educational and Religious	Social and Recreational	All
Less than 250,000					
1969	1.4	2.0	2.5	2.5	2.0
1977	1.4	1.9	2.3	2.3	1.9
250,000 to 499,999					
1969	1.4	2.0	2.5	2.4	1.9
1977	1.4	1.9	2.2	2.5	1.9
500,000 to 999,999					
1969	1.4	2.0	2.3	2.5	1.9
1977	1.3	1.9	2.4	2.4	1.9
1 Million to 3 Million					
1969	1.4	1.9	2.5	2.8	1.9
1977	1.4	1.8	2.4	2.3	1.9
Over 3 Million					
1969	1.3	1.9	2.5	2.5	1.9
1977	1.3	1.8	2.1	2.3	1.8
All SMSA's					
1969	1.4	2.0	2.5	2.5	1.9
1977	1.4	1.9	2.3	2.4	1.9

* Includes standard auto, station wagon, vanbus/minibus and personal use taxi.

Source: 1969 data based on Table 2 (p.10) in 1969 NPTS Report, Automobile Occupancy; 1977 data direct from 1977 NPTS Survey.

SMSA group. The civic, educational, and religious trip occupancy rates decreased between 0.1 and 0.4 occupants per trip, with the largest single change occurring in SMSA's over 3 million population, where the decline was from 2.5 to 2.1, or 16 percent. In SMSA's of 500,000 to 1 million, a slight increase from 2.3 to 2.4 occupants occurred for civic, educational and religious trips. Occupancy rates for social and recreational trips declined between 0.1 and 0.5 occupants per trip, except in SMSA's of 250,000 to 500,000 population where the rate increased from 2.4 in 1969 to 2.5 in 1977.

Percent of Automobile Trips by Number of Occupants and Trip Purpose for SMSA Residents in 1969 and 1977

The proportion of trips made by SMSA residents in single-occupant automobiles remained relatively constant between 1969 and 1977. As shown in Table 20, 50.9 percent of all trips in 1969 and 51.1 percent in 1977 were made in single-occupant autos.

The largest change between 1969 and 1977 in the proportion of single-occupant trips occurred in trips for civic, educational, and religious purposes, increasing from 33.7 percent to 41.6 percent, a 23.4 percent change. The percent of single-occupant trips for family and personal business showed a slight increase from 44.4 to 47.9. The proportion of single-occupant trips for earning a living also showed a slight increase from 73.2 to 75.9 percent. Single-occupant trips for social and recreational purposes remained at 30 percent for both 1969 and 1977.

Average Automobile Occupancy by Trip Purpose and Trip Length in 1969 and 1977

Average auto occupancy by trip length remained relatively constant over the period 1969 to 1977, as shown in Table 21.

Occupancy rates for work trips either remained the same or declined slightly between 1969 and 1977, except trips longer than 30 miles which showed increases of 0.2 to 0.3 occupants per trip.

Average occupancy for work-related trips fell by 0.2 persons overall, but declined by 0.3 to 0.4 occupants for trips between 10 and 20 miles in length.

For civic, educational, and religious trips, average auto occupancy decreased by 0.2 persons per trip overall, with a slightly larger decline shown for most trip lengths over 6 miles.

Changes in the average automobile occupancy rate for other trip purposes do not show a pattern by trip length.

TABLE 20. COMPARISON OF PERCENT OF AUTOMOBILE* TRIPS BY NUMBER OF OCCUPANTS AND TRIP PURPOSE FOR SMSA RESIDENTS IN 1969 AND 1977

Number of Occupants	Trip Purpose									
	Earning a Living		Family Business		Civic, Educational and Religious		Social and Recreational		All Purposes	
	1969	1977	1969	1977	1969	1977	1969	1977	1969	1977
1	73.2	75.9	44.4	47.9	33.7	41.6	30.1	30.0	50.9	51.1
2	18.4	16.9	33.0	32.2	26.5	27.6	34.5	36.9	27.3	28.5
3	4.5	4.2	12.0	11.3	15.8	12.6	13.6	14.5	9.9	10.3
4	1.8	1.7	5.4	5.3	10.8	8.7	10.6	10.9	5.7	5.9
5	1.0	0.8	2.7	2.1	5.5	3.8	5.1	4.0	2.9	2.3
6	0.4	0.2	1.1	0.7	3.6	2.6	3.2	2.2	1.5	1.1
7	—	0.1	0.7	0.3	1.6	1.6	1.5	0.7	0.7	0.4
8	0.1	0.1	—	0.1	0.6	0.7	0.4	0.5	0.2	0.2
9 or More	—	0.1	0.2	0.1	0.5	0.8	0.5	0.3	0.3	0.2
Unknown	0.6	—	0.5	—	1.4	—	0.5	—	0.6	—
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Percent of Total Trips	37.1	36.1	31.1	35.6	9.2	7.1	22.6	21.2	100.0†	100.0‡

* Includes standard auto, station wagon, vanbus/minibus and personal use taxi.

† Auto trips in 1969 = 58,811,000,000 for SMSA residents (59,846,860,000 less 1,036,000,000 of other or unspecified purpose)

‡ Auto trips in 1977 = 57,897,000,000 for SMSA residents (64,145,000,000 less 6,248,000,000 of other or unspecified purpose)

Source: 1969 data based on Table 3 (p.12) in 1969 NPTS Report *Automobile Occupancy*; 1977 data direct from 1977 NPTS Survey.

VI. SUMMARY

Private vehicle occupancy in 1977 averaged 1.87 persons per vehicle mile and 1.68 persons per vehicle trip. Expressed another way, 59.9 percent of all private vehicle trips in 1977 were made in single-occupant vehicles.

Average vehicle occupancy is lowest for travel related to earning a living and highest for social and recreational travel. Occupancy for earning a living travel averages 1.32 persons per vehicle mile, ranging from 1.30 for work travel to 1.39 for work-related travel. Family business travel averages 2.02 occupants per vehicle mile, including average occupancy rates of 2.06 for shopping travel and 2.14 for medical travel. Civic, educational and religious travel averages 1.95 occupants per vehicle mile. The highest rate of vehicle occupancy occurs in social and recreational travel, which ranges from 2.25 for visiting friends and relatives to 3.19 for pleasure driving.

In 1977, average vehicle occupancy was greater for households living outside SMSA's than for households inside SMSA's (1.96 occupants per vehicle mile compared to 1.83). Those SMSA households living outside central cities have the same average vehicle occupancy rate as persons living inside central cities, 1.83 persons per vehicle mile. Outside SMSA's, households living in areas of 5,000 or more population have slightly higher travel occupancy rates, at 1.97 persons per mile than households in areas under 5,000 population at 1.95 persons per mile. Based on the definition of where travel *actually occurred*, average vehicle occupancy for travel entirely outside urban areas is higher than for travel entirely within the limits of urban areas, or 1.86 versus 1.67 persons per vehicle mile.

Average vehicle occupancy increases with trip length. The average number of occupants per vehicle mile ranges from 1.64 for trips under 4 miles to 1.69 for trips from 4 to 10 miles to 1.97 for trips over 10 miles (one-way). The increase in occupancy with increasing length of trip is common for each trip purpose.

Occupancy varies by day of week and time of day. Vehicle occupancy for weekday travel averages 1.72 persons per vehicle mile compared to 2.32 for weekend travel. Occupancy rates for each major trip purpose are lower on weekdays than on weekends. The occupancy rate for family business travel is 2.27 on weekends and 1.90 on weekdays; social and recreational travel falls from 2.62 on weekends to 2.28 on weekdays; civic, educational and religious travel falls from 2.49 to 1.72. Even occupancy for travel to work is higher on weekdays, 1.38 compared to 1.29 on weekdays.

Vehicle occupancy rates vary by time of day, with the lowest rates for travel occurring in the a.m. peak period (1.63), followed by travel in the p.m. peak (1.84) and 10:00 p.m. to 6:00 a.m. period (1.84). The highest occupancy rates occur in the midday (1.94) and the 7:00 p.m. to 10:00 p.m. period (2.14). Rankings vary by trip purpose, however. The occupancy rate for work travel is lowest in the p.m. peak (1.27). Family business travel averages about two persons per mile during the main part of the day (6:00 a.m. to 7:00 p.m.), but increases to about 2.5 persons per mile in the evening and early morning period (7:00 p.m. to 6:00 a.m.). Conversely, the occupancy rate for social and recreational travel is highest during the main part of the day (6:00 a.m. to 7:00 p.m.), averaging 2.43 to 2.63, and falls in the evening and early morning hours (7:00 p.m. to 6:00 a.m.) to between 2.41 and 2.24.

Occupancy rates are influenced substantially by the sociodemographic characteristics of the household, such as income and number of household members. Occupancy generally declines with the level of household income. Average occupants per vehicle mile declines from 1.91 in households with incomes under \$5,000 per year to 1.86 in households with incomes from \$15,000 to \$25,000 to 1.64 in households with incomes of \$50,000 or more.

Occupancy rates increase with the number of persons in the household and decrease with household vehicle ownership. The average number of occupants per vehicle mile of travel increases from 1.46 in one-person households to 2.22 in households of five persons or more. In contrast, average occupancy declines from 1.99 in households with no vehicles to 1.76 in households with four or more vehicles.

Occupancy rates are not consistently related to the number of licensed drivers in the household, unless the number of vehicles owned by the household is also considered. Then, average occupancy tends to decrease as household vehicle ownership increases, and then the rate goes up again as more drivers are available to compete for the available vehicles. These trends may be seen clearly in earning a living travel, but are not evident for other trip purposes.

Occupancy rates vary with vehicle type. The highest occupancy rates are associated with station wagon and vanbus/minibus travel, both with rates of 2.20 persons per mile. Vans other than vanbus/minibus average 2.12 persons per mile. Camper coaches, which are often used for multi-occupant vacation travel, average 1.91 persons per mile. Standard autos average 1.81 passengers per mile, slightly less than the average of 1.87 for all vehicles. Pickup trucks at 1.72 and other trucks at 1.45 persons per mile have the lowest occupancy rates of all vehicles.

Average occupancy for automobiles* was 1.9 persons per vehicle trip and 2.2 persons per vehicle mile in both 1969 and 1977. The proportion of trips made in multi-occupant automobiles remained about the same over this time period, 49.1 percent in 1969 and 48.9 percent in 1977.

Average automobile occupancy either remained the same or declined slightly for all trip purposes between 1969 and 1977. For earning a living trips, occupancy was 1.4 persons in both 1969 and 1977. For all other purposes, occupants per trip decreased slightly, from 2.0 to 1.9 for family business, from 2.5 to 2.3 for civic, educational and religious, and from 2.5 to 2.4 for social and recreational purposes.

*Defined as standard autos, station wagons, personal-use taxis, and vanbus/minibus vehicles. Occupancy rates for automobiles computed for comparability with 1969 rates.

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Table A-1. AVERAGE OCCUPANTS PER TRIP* BY TRIP PURPOSE AND SMSA SIZE

SMSA POPULATION SIZE	EARNING LIVING		FAMILY AND PERSONAL BUSINESS			CIVIC, EDUCATIONAL, & RELIGIOUS	SOCIAL AND RECREATIONAL			OTHER AND UNKNOWN	ALL PURPOSES	Percent of Vehicle Trips			
	To Work	Work Related	All	Medical, Dental	Shopping		Other	All	Visit Friends & Relatives				Pleasure Driving	Vacation	Other
Under 250,000	1.23	1.28	1.24	1.83	1.84	1.58	1.73	2.00	1.73	2.08	1.88	2.01	2.00	1.67	8.9
250,000 to 499,999	1.21	1.40	1.24	1.98	2.04	1.61	1.83	1.91	2.00	2.71	2.00	2.23	1.96	1.73	11.0
500,000 to 999,999	1.19	1.27	1.20	1.85	1.84	1.61	1.75	1.80	1.88	2.47	2.66	2.10	1.99	1.65	11.6
1 Million to 3 Million	1.22	1.29	1.23	1.73	1.66	1.62	1.68	1.89	1.85	2.75	3.36	2.09	1.94	1.65	21.8
Over 3 Million	1.17	1.28	1.19	1.69	1.67	1.65	1.67	1.64	1.79	2.08	3.94	2.03	1.89	1.59	13.5
All SMSA's	1.20	1.31	1.22	1.80	1.77	1.62	1.72	1.84	1.85	2.54	2.99	2.09	1.95	1.65	66.8
Non-SMSA's	1.26	1.29	1.26	1.80	2.12	1.63	1.73	2.10	1.95	2.30	3.89	2.05	2.01	1.69	33.2
All Places	1.22	1.30	1.23	1.80	1.87	1.62	1.73	1.93	1.89	2.43	2.84	2.08	1.97	1.67	-
Percent of Vehicle Trips	27.8	5.1	32.9	17.0	1.3	14.0	32.3	6.4	8.4	0.4	0.1	10.4	9.1	-	188.0**

*Includes trips in all private vehicles except motorcycles and mopeds.

**Total vehicle trips = 108,430,000 (108,826,000 less 396,000,000 by motorcycles and mopeds).

Table A-2. AVERAGE OCCUPANTS PER TRIP* BY TRIP PURPOSE AND HOUSEHOLD LOCATION INSIDE OR OUTSIDE SMSA's

PLACE OF RESIDENCE	EARNING A LIVING			FAMILY AND PERSONAL BUSINESS				CIVIC, EDUCATIONAL, & RELIGIOUS	SOCIAL AND RECREATIONAL					OTHER AND UNKNOWN	ALL PURPOSES	Percent of Vehicle Trips
	To Work	Work Related	All	Shopping	Medical, Dental	Other	All		Visit Friends & Relatives	Pleasure Driving	Vacation	Other	All			
<u>Inside SMSA's</u>																
Inside Central City	1.20	1.33	1.22	1.84	1.80	1.61	1.75	1.80	1.86	2.75	2.40	2.23	2.08	1.96	1.66	30.4
Outside Central City	1.20	1.28	1.22	1.76	1.75	1.62	1.70	1.88	1.84	2.39	3.46	2.30	2.10	1.94	1.65	16.4
All - Inside SMSA's	1.20	1.31	1.22	1.80	1.77	1.62	1.72	1.84	1.85	2.54	2.99	2.26	2.09	1.95	1.65	66.8
<u>Outside SMSA's</u>																
Areas Under 5,000 Population	1.28	1.28	1.28	1.82	2.18	1.66	1.75	2.09	1.98	2.27	1.99	2.19	2.09	1.95	1.70	16.3
Areas Over 5,000 Population	1.23	1.29	1.24	1.78	2.04	1.61	1.70	2.11	1.92	2.37	1.54	2.08	2.01	2.08	1.67	16.9
All - Outside SMSA's	1.26	1.29	1.26	1.80	2.12	1.63	1.73	2.10	1.95	2.30	1.89	2.13	2.05	2.01	1.69	53.2
All Places	1.22	1.30	1.23	1.80	1.87	1.62	1.73	1.93	1.89	2.43	2.84	2.22	2.08	1.97	1.67	-
Percent of Vehicle Trips	27.8	5.1	32.9	17.0	1.3	14.0	32.3	6.4	6.4	0.4	0.1	10.4	19.3	9.1	-	100.0**

*Includes trips in all private vehicles except motorcycles and mopeds.

**Total vehicle trips = 108,430,000 (108,826,000 less 396,000,000 by motorcycles and mopeds).

Table A-3. AVERAGE OCCUPANTS PER TRIP* BY TRIP PURPOSE AND TRIP LENGTH

ONE-WAY TRIP LENGTH IN MILES	EARNING A LIVING		FAMILY AND PERSONAL BUSINESS		CIVIC, EDUCATIONAL, & RELIGIOUS		SOCIAL AND RECREATIONAL		OTHER AND UNKNOWN	ALL PURPOSES	Percent of Vehicle Trips				
	To Work	Work Related	Medical, Shopping	Other	All	Vol. Friends & Relatives	Pressure Driving	Vacation				Other	All		
Less than 1/4	1.24	1.23	1.63	1.76	1.53	1.58	2.00	1.63	**	**	2.04	1.84	2.02	1.63	9.8
1	1.21	1.18	1.59	1.67	1.48	1.54	1.91	1.77	**	**	1.99	1.90	1.99	1.60	13.8
2	1.21	1.22	1.71	1.61	1.51	1.62	2.00	1.69	**	**	2.03	1.88	1.95	1.62	13.5
3	1.23	1.24	1.79	1.88	1.49	1.66	1.86	1.76	**	**	2.23	2.03	1.88	1.64	10.2
4	1.19	1.30	1.82	1.65	1.59	1.72	1.96	1.77	**	**	2.19	2.02	1.94	1.65	6.3
5	1.15	1.32	1.89	1.64	1.77	1.83	1.86	1.87	**	**	2.23	2.09	1.99	1.67	7.9
6	1.25	1.36	1.98	1.74	1.61	1.82	1.94	2.04	**	**	2.23	2.15	1.82	1.71	4.1
7	1.19	1.37	1.99	2.08	1.65	1.83	1.56	1.94	**	**	2.05	2.00	2.01	1.62	3.7
8 to 10	1.18	1.41	2.12	2.11	1.81	1.99	2.03	1.98	**	**	2.29	2.16	1.94	1.70	10.1
11 to 15	1.25	1.29	1.95	1.97	1.84	1.90	2.03	2.02	**	**	2.34	2.20	1.92	1.65	8.2
16 to 20	1.24	1.32	2.04	1.91	2.02	2.02	1.88	2.02	**	**	2.45	2.26	1.97	1.69	4.6
21 to 30	1.27	1.35	2.33	1.89	1.89	2.07	1.66	2.09	**	**	2.65	2.37	1.94	1.71	4.0
31 to 40	1.34	1.31	2.99	1.88	2.08	2.37	2.33	2.46	**	**	3.10	2.78	2.14	1.99	1.4
41 and Over	1.51	1.47	2.32	2.82	2.38	2.42	1.97	2.47	**	**	2.90	2.70	2.45	2.22	2.4
All Trips	1.22	1.30	1.80	1.87	1.62	1.73	1.93	1.89	2.43	2.84	2.22	2.08	1.97	1.67	
Percent of Vehicle Trips	27.8	5.1	17.0	1.3	14.0	32.3	6.4	8.4	0.4	0.1	10.4	19.3	9.1	-	100.0**

*Includes trips in all private vehicles except motorcycles and mopeds.

**Insufficient data

***Total vehicle trips = 108,530,000 (108,826,000 less 296,000 by motorcycle and mopeds).

Table A-4. AVERAGE OCCUPANTS PER TRIP* BY TRIP PURPOSE AND ANNUAL HOUSEHOLD INCOME

ANNUAL HOUSEHOLD INCOME	EARNING A LIVING	FAMILY AND PERSONAL BUSINESS	CIVIC, EDUCATIONAL AND RELIGIOUS	SOCIAL AND RECREATIONAL	OTHER	ALL PURPOSES	PERCENT OF VEHICLE TRIPS
Less than \$5,000	1.30	1.73	1.77	1.87	1.94	1.69	7.4
\$5,000 to 9,999	1.26	1.74	1.91	2.06	1.97	1.69	16.6
\$10,000 to 14,999	1.25	1.77	2.08	2.12	2.06	1.70	22.3
\$15,000 to 24,999	1.22	1.74	1.96	2.10	1.95	1.65	33.8
\$25,000 to 34,999	1.22	1.68	1.85	2.16	1.93	1.64	12.4
\$35,000 to 49,999	1.21	1.57	1.74	1.99	1.84	1.58	5.2
\$50,000 or More	1.19	1.48	1.87	2.15	2.08	1.62	2.3
All Households	1.23	1.73	1.93	2.08	1.97	1.67	-
Percent of Vehicle Trips	32.9	32.2	6.4	19.3	9.1	-	100.0**

*Includes trips in all private vehicles except motorcycles and mopeds.

**Total vehicle trips = 108,430,000 (108,826,000 less 396,000 by motorcycles and mopeds).

Table A-5. AVERAGE OCCUPANTS PER TRIP* BY TRIP PURPOSE AND NUMBER OF HOUSEHOLD VEHICLES

NUMBER OF HOUSEHOLD VEHICLES	EARNING A LIVING	FAMILY AND PERSONAL BUSINESS	CIVIC, EDUCATIONAL AND RELIGIOUS	SOCIAL AND RECREATIONAL	OTHER	ALL PURPOSES	PERCENT OF VEHICLE TRIPS
None	1.49	2.12	2.22	2.56	1.91	2.03	0.4
One	1.29	1.75	1.96	2.05	1.98	1.71	25.8
Two	1.23	1.75	1.97	2.19	2.03	1.69	45.0
Three	1.18	1.68	1.89	1.99	1.91	1.61	18.5
Four or More	1.21	1.59	1.80	1.84	1.75	1.53	10.3
All Households	1.23	1.73	1.93	2.08	1.97	1.67	-
Percent of Vehicle Trips	32.9	32.2	6.4	19.3	9.1	-	100.0**

*Includes trips in all private vehicles except motorcycles and mopeds.

**Total vehicle trips = 108,430,000 (108,826,000 less 396,000 by motorcycles and mopeds).

Table A-6. AVERAGE OCCUPANTS PER TRIP* BY TRIP PURPOSE AND NUMBER OF LICENSED DRIVERS PER HOUSEHOLD

NUMBER OF HOUSEHOLD DRIVERS	EARNING A LIVING	FAMILY AND PERSONAL BUSINESS	CIVIC, EDUCATIONAL AND RELIGIOUS	SOCIAL AND RECREATIONAL	OTHER	ALL PURPOSES	PERCENT OF VEHICLE TRIPS
None	1.96	1.82	2.34	2.42	1.92	2.04	0.3
One	1.24	1.69	1.79	1.91	1.98	1.63	21.4
Two	1.24	1.78	2.08	2.26	2.05	1.72	54.2
Three or More	1.21	1.63	1.79	1.88	1.78	1.57	24.1
All Households	1.23	1.73	1.93	2.08	1.97	1.67	-
Percent of Vehicle Trips	32.9	32.2	6.4	19.3	9.1	-	100.0**

*Includes trips in all private vehicles except motorcycles and mopeds.

** Total vehicle trips = 108,430,000 (108,826,000 less 396,000 by motorcycles and mopeds).

SURVEY PROCEDURES AND DATA PROCESSING

Background

The 1977 NPTS was conducted by the Bureau of the Census under the joint sponsorship of the Federal Highway Administration, and the National Highway Traffic Safety Administration of the Department of Transportation (DOT), as part of the expanded scope of the National Travel Program. The National Travel Program is part of the Census of Transportation, which is conducted every five years by the Bureau of the Census and includes the National Travel Survey (NTS). In 1977, the National Travel Program also included the 1977 NPTS and provided profiles of the volume and characteristics of travel by the civilian population.

Sample Design

The 1977 NPTS was based on a national probability sample of 24,466 households selected from each of the 50 States and the District of Columbia and representing the total civilian noninstitutional population of the United States. Of the 24,466 household, 3,433 units were found to be vacant, demolished, converted to nonresidential use, or otherwise ineligible for the survey. Some 3,084 households were not interviewed because the occupants were not at home after repeated calls, refused to participate in the survey, or were unavailable for some other reason.

All of the sample units consisted of households that had previously been interviewed for the Current Population Survey (CPS). The CPS is a stratified multistage cluster sample. In the first stage, the United States was divided into 1,030 primary sampling units (PSU's) consisting of counties, groups of counties, or independent cities, which were grouped into 376 strata. Among these strata, 156 consisted of a single PSU, designated as self-representing (SR) areas, and generally contained the larger metropolitan areas. The remaining 220, contained one or more PSU's that are relatively homogeneous according to socioeconomic characteristics. From each stratum, a single PSU was selected for the sample with a probability proportionate to its 1970 census population; these PSU's are referred to as non-self-representing (NSR). The CPS portion of the NPTS was selected from these 376 PSU's (156 SR and 220 NSR).

Methodology

As indicated previously, the 1977 NPTS was conducted as part of the expanded scope of the National Travel Program which also included the National Travel Survey (NTS). The NTS/NPTS included a common sample of 13,365 households interviewed from April-November 1977 and January 1978; these households were referred to as the basic sample, and were interviewed four times for NTS data and once for NPTS data. An additional 4,584 addresses, referred to as the supplemental sample, were divided into three equal parts and were interviewed in December 1977, February 1978, and March 1978. This arrangement spread the total NPTS data collection over a 12-month period from April 1977-March 1978, with approximately 1500 households to be interviewed each month.

The households within each monthly sample were divided into 14 equal parts, with each part assigned to one of the first 14 days of the interview month. The assigned day was referred to as the designated travel day. In addition, each household was interviewed for trips of 75 miles and longer for the 14 days preceding the travel day; this was

referred to as the 14-day travel period. Thus each household was interviewed for trips and travel during a 15-day period.

Data Processing

The major steps performed by the Bureau of the Census for the 1977 NPTS included clerical editing and coding of the NTS-2 Questionnaire, (Sections I-VI); the NTS-2A (Section VII) was edited and coded by the FHWA DOT personnel; full transcription of the data to magnetic tapes; computer edit of the data to ensure completeness and consistency; calculation of the weighting factors for each household; and computation of variance and calculation of statistical reliability of the data. The the data was tabulated upon receipt of the edited, weighted data tapes from the Bureau of the Census.

Subject Areas Planned for 1977 NPTS Reports

The following is a list of subject areas for which 1977 NPTS reports are presently planned. The sequence does not necessarily indicate the order in which the reports will be prepared and published. It is offered as an indication of current plans as well as to give transportation researchers and planners a general indication of the variety and scope which the 1977 NPTS data encompasses. For those reports that have been published, the correct title, report number and publication date are shown.

CHARACTERISTICS OF 1977 LICENSED DRIVERS AND THEIR TRAVEL

(Report 1, October 1980)

HOUSEHOLD VEHICLE OWNERSHIP

(Report 2, December 1980)

PURPOSES OF VEHICLE TRIPS AND TRAVEL

(Report 3, December 1980)

HOME-TO-WORK TRIPS AND TRAVEL

(Report 4, December 1980)

HOUSEHOLD VEHICLE UTILIZATION

(Report 5, April 1981)

VEHICLE OCCUPANCY

(Report 6, April 1981)

A life cycle of travel by the American household
Multi-occupant vehicle travel - public and private
Rural vs. urban travel
Mapping as a travel data collection technique
Survey description and tables of variance
Discretionary travel
Household travel rates
Person-trip characteristics

Special Tabulations

There are some applications that require the use of data items on the Census file, such as those related to place of residence of individual respondents, that cannot be included on the public use tape without possible disclosure of the individual respondents. If disclosure can be avoided, the Bureau of the Census will undertake special tabulations in accordance with its policy that "Special tabulation or transcriptions of data in the files of the Bureau of the Census will be undertaken on a cost basis, insofar as Bureau facilities are available. Those requesting special tabulations should understand that the data are based on surveys paid for by public funds and, therefore, are public property.

The purpose for which such tabulations are obtained must not be contrary to the public interest, or be used to give unfair commercial or other advantage to any person or group."

Requests for special tabulations should be addressed to: Chief, Demographic Surveys Division, Bureau of the Census, Washington, D.C. 20233.

Survey Questionnaire

Copies of the NPTS Survey Questionnaire are available upon written request from the Office of Highway Planning (HHP-44), Federal Highway Administration, Washington, D.C. 20590

APPENDIX C

NPTS PUBLIC USE TAPE REQUEST

Single copies of the tapes are available through the Federal Highway Administration (FHWA).

For governmental agencies and educational institutions, there no charge for tape copying. If no tapes are furnished with the request, there is a \$25 charge for each tape provided by FHWA.

For private individuals and all nongovernment or noneducation organizations, there is a \$36 charge per tape copied. In addition, if no tapes are forwarded with the request, there is an added charge of \$25 for each tape provided by FHWA.

All tapes provided to FHWA should be 9-track.

Appropriate user documentation will be provided with each request.

All orders should be documented on the attached form and should clearly indicate:

1. Which (or all) of the four (4) quarters of data that are desired.
2. Name and/or title of the individual or organization making the request.
3. Number of tapes, if any, included with the request (or being shipped separately).
4. Amount of payment enclosed if applicable.

All checks or money orders should be made payable to Federal Highway Administration. Request and payment should be forwarded to:

Federal Highway Administration
Highway Statistics Division
HHP-44 (NPTS)
400 Seventh Street, SW
Washington, D.C. 20590

NPTS Public Use Tape Request

1. Data desired
 - Tape 1 - First Quarter
 - Tape 2 - Second Quarter
 - Tape 3 - Third Quarter
 - Tape 4 - Fourth Quarter
 - Tapes 1-4 - All Quarters
2. Number of tapes submitted
 - None (tape payment included) ; 1 tape ; 2 tapes ; 3 tapes ; 4 tapes
3. Method of tape submittal
 - With order
 - Under separate cover
4. Type of tape labeling desire
 - Standard IBM labels
 - No labels
5. Recording density (9-track)
 - 800 BPI
 - 1600 BPI
6. Type of organization, Name and Address
 - Educational Government
 - Private Organization Private Individual
 - Other (specify)

Name _____
Title _____
Organization _____
Address _____
City, State, Zip _____
7. Total fee enclosed
 - Tape copy on user furnished tape(s), _____ quarters @ \$36 per quarter
\$ _____
 - Tape copy on FHWA furnished tape(s), _____ quarters @ \$61 per quarter
\$ _____
8. Payment enclosed as
 - Money order
 - Check

APPENDIX D

GLOSSARY OF TERMS USED IN NPTS

This glossary is provided to assist the user in the interpretation of the data.

Airport: A commercial facility that services regularly scheduled airlines.

Carpool: A regularly scheduled traveling arrangement whereby two or more persons ride together in the same vehicle, sharing the driving and/or the cost of the trip, or simply riding together regularly with one or more persons doing the driving. If two or more household members regularly ride to work in the same vehicle, it is also considered a carpool.

Central City: A city of 50,000 inhabitants or more in the 1970 Census or twin cities i.e., cities with contiguous boundaries and constituting, for general social and economic purposes, a single community with a combined population of at least 50,000, and with the smaller of the twin cities having a population of at least 15,000.

Destination: For travel period trips, the destination is the farthest point of travel from the point of origin of a one-way trip of 75 miles or more.

In travel day trips, the destination is the point at which there is a break in travel.

Driver: A person who operates a motorized vehicle. If more than one person drives on a single trip, the person who drives the most miles is classified as the *principal driver*. If *one or more household members share the driving*, the percent of driving done by each household member is recorded separately. If nonhousehold members share the driving, the total percent of driving done by all nonhousehold members is recorded.

Education Level: The number of years of regular schooling completed in graded public, private, or parochial schools, or in colleges, universities, or professional schools, whether day school or night school. Regular schooling is that which advances a person toward an elementary or high school diploma, or a college, university or professional school degree.

Employed: A person is considered employed if there is a definite arrangement for regular full-time or part-time work for pay every week or every month. A formal, definite arrangement with one or more employers to work a specified number of hours a week, or days a month, but on an irregular schedule during the work month is also considered employment. A person who is on call to work whenever there is a need for his (her) services, is not considered employed.

Family Income: The money income of all persons in a household, including those temporarily absent. Includes wages and salary (before deductions), commissions, tips, cash bonuses; net income from a person's own (unincorporated) business, professional practice, or farm (gross receipts minus business expenses); pensions, dividends, interest, unemployment or workmen's

compensation, social security, veterans' payments, rent received from owned property (minus the operating costs); public assistance payments, regular gifts of money from friends or relatives not living in the household, alimony, child support, and other kinds of periodic money income other than earnings. Excludes income in kind, such as room and board, insurance payments, lump-sum inheritances, occasional gifts of money from persons not living in the same household, money received from selling one's house, car, or other personal property, withdrawal of savings from banks, and tax refunds.

Federal-aid rural area: Any area outside of federal-aid urban areas.

Federal-aid urban area: An urban place of 5,000 or more population as determined by the Bureau of the Census.

Freeway, tollway, or expressway: A divided arterial highway for through traffic with full or partial control of access and grade separations at major intersections.

Head of household: The one person who is regarded as the head by the members of the household. In most cases the husband is the head, if living in the household. In some cases, the head may be a parent of the chief wage earner or the only adult member of the household. An Armed Forces member is considered as the head only if he lives at home and is a household member. Only one head is designated for each household.

Household: A group of persons whose usual place of residence is a specific housing unit; these persons may or may not be related to each other. The total of all U.S. households represents the total civilian noninstitutionalized population.

Household trip: One or more household members traveling together.

Household vehicle: A motorized vehicle that is owned, leased, rented or company owned and left at home to be regularly used by household members during the reference period. Includes vehicles used solely for business purposes if kept at home, e.g., taxicabs, police cars, etc., which may be owned by, or assigned to, household members for their regular use. Includes vehicles brought home by a car sales person or auto mechanic, only if the vehicle was available for use by him (her) during the entire reference period. Includes all vehicles that were owned or available for use by members of the household during the reference period even though a vehicle may have been sold before the interview. Excludes vehicles that were not working and not expected to be working within 60 days, and vehicles that were purchased or received after the designated travel day.

Licensed driver: Any person who holds a valid driver's license from any State.

Means of transportation: A personal mode used for going from one place (origin) to another (destination). Includes private and public motorized modes, as well as walking. For all travel day trips, each change of mode constitutes a separate trip. The following personal transportation modes are included:

- Automobile: A privately owned and/or operated licensed motorized vehicle including cars, jeeps, dune buggies and stationwagons. Also includes leased and rented cars if they are privately operated and not picking up passengers in return for fare.
- Vanbus/Minibus: Privately owned and/or operated vans and buses designed to carry from 5-13 passengers.
- Pickup truck/other van: A small open-body motorized vehicle, privately owned and/or operated, with four to six tires, built on a chassis comparable to that of a passenger car. Accommodates fewer than five passengers. Includes travel trucks (service trucks) when they are not being used for commercial purposes.
- Other truck (personal use): The private use, either as a passenger or driver, of all other types of trucks, i.e., dump trucks, trailer trucks, etc., when they are not being used for commercial purposes.
- Motorcycle: Includes large, medium and small motorcycles. Does not include minibikes, etc., which can not be licensed for highway use.
- Self-contained recreational vehicle: Includes recreational vehicles that are operated as a self-contained unit without being hitched to another vehicle: for example, a motor home.
- Taxi (personal use): The use of a passenger vehicle either by a driver or a passenger, which does not involve the duties of a professional driver for the payment of a fare by a passenger.
- Bus: Includes intercity buses, etc.; mass transit systems and shuttle buses that are available to the general public. Also includes senior citizen buses or similar bus services that are available to the public. Does not include shuttle buses operated by a government agency or private industry for the convenience of employees, contracted or chartered buses or school buses. These latter types are included in "other."
- Train: Includes commuter trains and passenger trains other than elevated trains and subways.
- Streetcar: Includes trolleys, streetcars, and cable cars.
- Elevated rail or subway: Includes elevated train and subway trains.
- Airplane: Includes commercial airplanes and smaller planes that are available for use by the general public in exchange for a fare. Private planes and helicopters are included under "other."
- Taxi (commercial use): The use of a taxicab by a driver for hire or by a passenger for fare. Also includes airport limousines. Does not include rental cars if they are privately operated and not picking up passengers in return for fare.
- Truck (commercial use): Includes the commercial use, either as a driver or a passenger, of pickups, dump trucks and trailer trucks being operated for business-related purposes.

- Bicycles: Includes bicycles of all speeds and sizes and minibikes.
- Walk: Includes jogging, walking etc., provided the origin and destination are not the same.
- Schoolbus: Includes county school buses, private school buses, and buses chartered from private companies for the express purpose of carrying students to or from school and/or school-related activities. Does not include school buses chartered or reserved for other trips, such as church outings; these are included under "other."
- Motorized bicycle/(often called a Moped): Includes bicycles equipped with both pedals and a small engine, typically a horsepower or less.
- Other: Includes any types of transportation not included above.

Motorized vehicle: Includes all vehicles that are licensed for highway driving. Specifically excluded are snowmobiles, minibikes, etc.

Origin: Starting point of a trip.

Owned vehicle: Includes all vehicles that one or more household members have purchased for private use regardless if paid for in full, or a gift or legacy to a household member for private use.

Passenger: For a specific trip, any occupant of a motorized vehicle other than the driver.

Person (household member): All people, whether present or temporarily absent, whose usual place of residence is the sample unit, or people staying in the sample unit who have no other usual place of residence elsewhere.

Person miles: A measure of person travel. When one person travels one mile, one person mile of travel results. Where two or more persons travel together in the same vehicle, each person makes the same number of person miles as the vehicle miles. Therefore, four persons traveling five miles in the same vehicle, make 4 times 5 vehicle miles or twenty person miles.

Person nights: The number of nights spent by each person away from home on a travel period trip. For example, two persons on a trip spending 5 nights away from home would result in ten person nights.

Person trip: A unit of person travel. When two or more persons travel together in the same vehicle, each person is counted as making one person trip.

Rural area: Any area outside of an urban place.

Standard Metropolitan Statistical Area (SMSA): Except in the New England States, a standard metropolitan statistical area is a county or group of contiguous counties which contains at least one city of 50,000 inhabitants or more, or "twin cities" with a combined population of at least 50,000. In addition, contiguous counties are included in an SMSA if, according to certain criteria, they are socially and economically integrated with the central city.

In the New England States, SMSA's consist of towns and cities instead of counties.

Station wagon: A passenger vehicle, having an enclosed body of paneled design with two or more seats, where the rear seats can be removed or folded down to create larger luggage or freight compartments.

Stop: For travel period trips, a break in travel other than for gasoline, rest and food. For travel day trips, each stop is treated as a separate trip.

Train station: A depot where regularly scheduled trains may be boarded for travel to cities at least 30 miles away.

Travel day: A 24-hour period from 4:00 a.m. to 3:59 a.m. designated by the Bureau of the Census as the reference period for studying trips and travel of a particular household.

Travel period: The 14 days immediately preceding the travel day of a household.

Traveler: A person reporting a travel day and/or travel period trip(s).

Traveling household: A household reporting at least one travel day and/or travel period trip.

Trip(travel day): A travel day trip is defined as any one-way travel from one address (place) to another by private motor vehicle, public transportation, bicycle, or walking. Jogging and walking for exercise are excluded. When travel is to more than one destination, a separate trip exists each time one or both of the following criteria is satisfied:

- a. The traveltime between two destinations exceeds 5 minutes.
- b. The purpose for travel to one destination is different from the purpose for travel to another.

The one exception is travel within a shopping center or mall. It is to be considered travel to one destination, regardless of the number of stores visited.

Trip(travel period): A travel period trip is one-way to a destination which is 75 miles or more from place of origin.

Trip duration: For travel period trips, the number of nights spent away from home on a single trip, including time (nights) spent enroute and at the destination. For travel day trips, usually measured in minutes.

Trip purpose: The main reason that motivated the trip. For purposes of this survey, there are 21 trip reasons. If there are more reasons than one, and the reasons do not involve different destinations, then only the main reason is chosen. If there are two or more reasons, and they each involve different destinations, then each reason is classified as a separate trip. The 21 trip reasons are defined as follows:

- To place of work: Includes travel to a place where one reports for work. It does not include any other work-related travel.
- Work-related business: Trips related to business activities except to the place of work; for example, a plumber drives to a wholesale dealer to purchase supplies for his business.
- Convention: Trips made to attend business, professional, special interest, and other types of conventions.
- Civic/Education/Religious: Trips to political rallies, legislative hearings, voting places, etc.; to school, college, or university for class(es), PTA meetings, seminars, etc.; to church services or to participate in other religious activities. Social activities that take place at a church or school are not classified as religious or educational.
- Eat meal: Trips taken to eat a meal in a public place. Trips taken to a friend's house for dinner are classified "visit friends or relatives."
- Doctor or dentist: Trips made for medical, dental or psychiatric treatment or other related professional services.
- Shopping: Includes "window shopping" and purchases of commodities such as groceries, furniture, textiles, etc., for use or consumption elsewhere.
- Family or personal business: Trips taken to attend organized functions of the family or friends, such as weddings, graduations, reunions, etc. Includes purchase of services such as cleaning garments, beauty parlor treatments, servicing of an auto, etc.
- Visit friends or relatives: Trips made to visit friends or relatives but not prompted by organized family affairs or an emergency.
- Pleasure driving: Includes driving trips made with no other purpose listed here but to "go for a drive" with no destination in mind: for example, a Sunday drive in the country.
- Sightseeing: Trips taken to sightsee or tour with a particular place planned to visit. This distinguishes "sightseeing" from "pleasure driving."
- Entertainment: Trips taken to go to a movie, the theatre, opera, concert, discotheque, cabaret, spectator sports, such as a ball game, races, track meet, or an amusement park.
- Recreation (participant): Trips taken to participate in sporting or outdoor activities, such as fishing, hunting, golf, swimming, picnicking, skiing, skating, bowling, basketball, etc.
- Vacation: Trips reported by the respondent as "vacation."
- Change of vehicle: Trips made specifically to change from one vehicle to another within the same "means of transportation" category. (For example, transferring from one bus to another, one plane to another, or from one passenger car to another.)

- Pick up or leave off passenger: Trips that are made to serve a passenger. For example, a trip by Mrs. Columbo to pick up her mother and drive her to the store on travel day would be reported as two trips: the trip to her mother's home for the purpose of picking up a passenger and the trip to the store for the purpose of shopping. If Mr. Hersholt drives from Washington to Chicago during the 14-day travel period and stops in Baltimore to pick up his son, the purpose of his first stop on his trip to Chicago will be reported in Part B of Section VI as "picking up a passenger."
- Return home: The trip made to the residence of the respondent at the time of the trip. In the case of a college student who lives on campus and is interviewed at school, trips to the dormitory or other living quarters on campus are considered "return home."
- Lodging: Trips made for the purpose of taking overnight accommodations. This category is also used in lieu of "return home" when return trips are to this lodging.
- Social: Trips taken to enjoy some form of social activity involving friends or acquaintances, such as a party, playing cards, dancing, etc.
- Other: Any purpose for a trip that does not fit into one of the above categories.

Type Z noninterview: A person in an interviewed household for which trip information is incomplete but certain demographic information is available.

Urban place: Defined by the Bureau of the Census as follows:

- a. A place of 2,500 inhabitants or more incorporated as a city, borough, village, or town, (except towns in New England, New York, and Wisconsin);
- b. The densely settled fringe, whether incorporated or not, of urbanized areas;
- c. Towns in New England and townships in New Jersey and Pennsylvania that contain no incorporated municipalities as subdivisions and have either 25,000 inhabitants or more, or a population of 2,500 to 25,000 and a density of 1,500 persons or more per square mile;
- d. Counties in States other than the New England States, New Jersey, and Pennsylvania that have no incorporated municipalities within their boundaries and have a density of 1,500 persons or more per square mile; or
- e. Unincorporated places of 2,500 inhabitants or more.

Urbanized area: Defined by the Bureau of the Census as:

- 1. Any area made up of:
 - a. A central city of 50,000 inhabitants or more in 1960, or in a special census conducted by the Census Bureau since 1960, or in the 1970 census; or

b. Twin cities, i.e. cities with contiguous boundaries and consisting for general social, and economic purposes, a single community with a combined population of at least 50,000 and with the smaller of the twin cities having a population of at least 15,000.

2. Surrounding closely settled territory, including the following (but excluding the rural portions of extended cities):

a. Incorporated places of 2,500 inhabitants or more.

b. Incorporated places with fewer than 2,500 inhabitants provided that each has a closely settled area of 100 housing units or more.

c. Small parcels of land, normally less than one square mile in area, having a population density of 1,000 inhabitants or more per square mile. The areas of large nonresidential tracts devoted to such urban land uses as railroad yards, airports, factories, parks, golf courses, and cemeteries are excluded in computing the population density.

d. Other similar small areas in unincorporated territory with lower population density provided that they serve

- to eliminate enclaves, or
- to close indentations in the urbanized areas of one mile or less across the open end, or
- to link outlying enumeration districts of qualifying density that are not more than $1\frac{1}{2}$ miles from the main body of the urbanized area.

Vehicle mile: A unit to measure vehicle travel made by a household vehicle: automobile, vanbus/minibus, pickup truck/other van, other truck (personal use), motorcycle, self-contained recreational vehicle, and taxi (personal use).

Vehicle occupancy: The number of persons, including driver and passenger(s) in a vehicle; also includes persons who did not complete a whole trip.

Vehicle trip: For purposes of this study, a vehicle trip is a trip made in a private vehicle regardless of the number of persons in the vehicle.

Vehicle type: For purposes of the study, one of the 12 vehicle types used for coding purposes in the household motorized vehicle record of the NTS-2 Questionnaire.