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1. INTRODUCTION

The Puget Sound Transportation Panel (PSTP) was designed as a population tracking device (Murakami and Watterson, 1990). One of its objectives is to provide unbiased measures of changes occurring in the period considered here, which is between 1989 and 1995. For example, it provides descriptive statistics on demographic changes and concomitant changes in activity participation and travel behavior during the panel period in the four counties covered by the Puget Sound region (King, Kitsap, Pierce, and Snohomish) in the northwestern United States.

When samples are collected, sampling error (i.e., the deviation between sample characteristics and population characteristics) is always present. The extent and effect of this deviation can be examined using diagnostic tests applied to the joint frequencies of key variables in PSTP and the census-based 5 percent Public Use Microdata Sample (PUMS). Because PUMS is a large sample of the Puget Sound population, joint frequencies for common variables between PUMS and PSTP can be created and compared using PUMS as the benchmark sample.

The method here reflects findings from preliminary diagnostic analyses revealing that:

- The initial telephone random digit dialing (RDD) sample is not entirely representative of the Puget Sound region.
- The transit sample recruited households need Merent treatment than their **RDD** counterpart sample.
- Systematic self-selection and missing information due to the composition of the initial RDD sample, refusal to provide income information, refusal to participate in the travel diary phase, failure to return travel diaries, and panel attrition. need to be accounted for.
- Exogenous (county of residence) and endogenous (mode choice-based) stratification should be reflected in the weighting scheme.

Before proceeding, further clarification is needed on PSTP data quality. Scrutiny of PSTP data has been unprecedented in transportation. This has resulted in diagnosing a variety

of data problems that may give an impression of poor data quality in PSTP. The same type of effort in searching for data problems is not taking place when one deals with the usual transportation surveys and has to work within tighter time constraints. It should be noted, however, that the data quality in PSTP is substantially superior to many surveys encountered in practice. In this report, the PSTP sample evolution stages are provided first. Then, the sample weight algorithm and the models used to create the weights are presented. The report concludes with a comparative analysis of the weight algorithm performance in terms of its ability to aid in making PSTP representative of the Puget Sound population.

PSTP SAMPLE EVOLUTION

The PSTP sampling phases also define the sample composition. Figure 1 provides a time-sequenced depiction of the sample composition. Initially, the telephone RDD survey technique was employed to recruit households from each of the four counties in the Puget Sound region in the fall of 1989. This was done by specifying the prefixes of telephone numbers that differentiated the counties, resulting in 4,867 initial RDD contacts (called RDDs herein). As transit users in the region were very few, compared to the single occupancy vehicle (SOV) users, endogenous stratification sampling was used adding 308 transit user households (initial transit contacts, called transits herein). These transits were recruited primarily through letters sent to passengers on selected bus lines or from participants in past transit surveys. These two sample components-initial RDD contacts and initial transit contacts--made up the 5,175 households (initial contacts). When the 5,175 households were contacted, they were asked questions regarding sociodemographic information such as household income, household size, number of children in the household, etc. In addition, they were invited to participate in the travel diary panel survey.

Of the 5,175 households, 2,944 initial contacts (called initial respondents) agreed to be panel members, while the remainder (called initial non-respondents) refused to be members and lost contact. All 308 initial transit contacts indicated willingness to participate in the subsequent step. It should be noted, however, that whether or not these 308 households were the actual initial contacts is unknown from the data. Because such information is unknown,

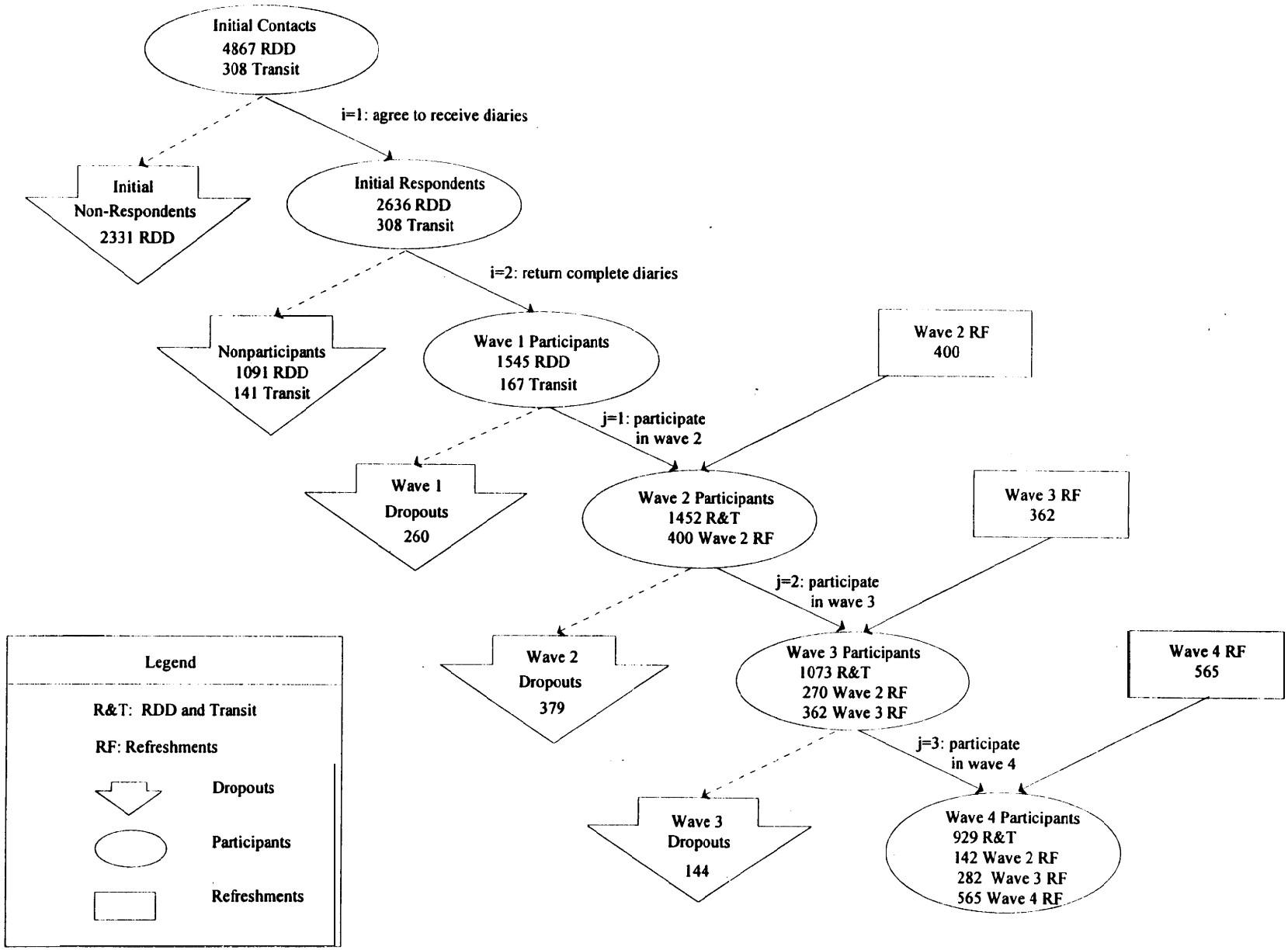

Figure 1. Time sequence of PSTP participation.

the households&e treated as if they experienced only one selection, i.e., return or not return of completed travel diaries. From among the 4,867 initial RDD contacts, only 2,636 respondents agreed to participate in the travel diary portion of the survey. Preliminary analysis showed that the remaining 2,231 households were systematically different from the 2,636 RDD respondents. The 2,944 initial respondents (RDDs and transits) received two-day travel diaries and were required to complete them during an assigned two-day period. From among the 2,944 initial respondents, 1,712 returned completed travel diaries, making up the wave 1 panel (called wave 1 participants). Of the 1,712 households, 1,545 were **RDDs (called** wave 1 RDD participants) and 167 were in special transit groups (called wave 1 transit participants). Those who did not return complete travel diaries or who returned incomplete information are called wave 1 nonparticipants. The 1,545 households that returned travel diaries and were from the 2,636 RDD sample were systematically different from the initial 2,636 respondents. The 167 households, from among the 308 initial transit contacts, that returned their diaries were also systematically self-selected. Since systematic self-selection took place even before the true panel survey commenced (i.e., repeated contact over time), some form of data adjustment is needed.

A year later, wave 1 participants were contacted and requested to fill out wave 2 travel diaries. Of the 1,712 wave 1 participants, 260 (15.2 percent of the sample) were lost due to panel attrition or moving out of the region. Regarding this point, it should also be mentioned that out-of-the-region residential relocation and panel attrition cannot be differentiated in PSTP. The effects of this on descriptive statistics, behavioral models, and weight creation are always confounded (for a PSTP example see Chung and Goulias, 1995). These “lost” wave 1 participants are called wave 1 dropouts, while the wave 1 participants who returned complete wave 2 data are called wave 1 stayers. At this point, an attempt was made to maintain PSTP representative of the population and additional households were recruited (wave 2 new recruits) immediately after wave 1 stayers returned their travel diaries. Wave 2 new recruits were identified in an attempt to replace wave 1 dropouts. Among them, 400 newly recruited households returned completed travel diaries (wave 2 refreshments). No information is available on comparisons between wave 2 new recruits and wave 2 refreshments. The wave 1

stayers and wave 2 refreshments, 1852 households, are the wave 2 participants. The wave 2 participants received travel diaries for the wave 3 survey in fall 1992. Some of them dropped out, and additional households were recruited in the same way as that for wave 2. This process continues today with the fifth and sixth panel waves.

Figure 1 does not show the stratification of PSTP, in which the population is classified into several categories based on some predetermined or dependent variable. Within each population category, households were drawn randomly. Thus, weights are needed to account for stratification. If the definition of categories of a given stratification variable is predetermined, the sample is called an exogenous stratified sample (county of residence). If the definition of categories for the stratification variable (here part of the sample is recruited from transit using households and we would like to explain mode choice using the panel data) is dependent on other predetermined variables, the sample is an endogenous stratified sample. When a population is stratified several times, each according to a different variable (the number of strata based upon each variable can vary), and a fraction of the sample is drawn from each of several stratifications, a pooled sample consisting of all the fractions is called a multi-stratified sample. The PSTP is a multi-stratified sample and its stratification is based on household geographic location and typical travel modes chosen by households.

THE NEED FOR PSTP SAMPLE WEIGHTS ALGORITHM

At each stage of sampling in PSTP, something happens that subtracts from its ability to represent the population. One remedial way to counteract this process is to devise weights for each stage. The main sources of "bias" are stratication, pre-wave 1 self-selection, and panel attrition and refreshment.

Stratification

Stratification based on county of residence and mode used introduced systematic bias in the sample that consists of the initial contacts. The former is exogenous stratification, while the latter is endogenous stratification. Households in a county were selected disproportionally

to the population and, thus,-a county is either over- or underrepresented in the sample. In addition, transit users were overrepresented in the sample because additional transit users from other sources were added to the sample. Statistical inferences based on this multi-stratified sample would be biased toward the overrepresented population segments.

Pre-Wave Self-Selection

Prior to wave 1 data collection, households that refused to participate in the panel survey and households that agreed to participate but failed to return completed wave 1 travel diaries may share common observed, unobserved, and unobservable characteristics. Without consideration of the differences between these two groups (participants and nonparticipants), statistical analyses would be invalid because of systematically missing observations.

Panel Attrition and Refreshment

Households that returned completed travel diaries but failed to do so in the subsequent surveys may also share some common characteristics (resulting in systematic attrition). Although additional households with similar so&demographic characteristics were recruited to resemble the dropout households, the representativeness of the replacement sample (refreshment) is unknown, adding another dimension of potential nonrandomness to the panel sample.

To obtain valid statistical inferences, the three sources of nonrandomness in the sample evolution need to be considered in every data analysis (e.g., the models need to include an array of variables that reflect self-selection, the usual standard error of coefficient estimates need to be adjusted to account for nonrandom sampling, and the simple descriptive statistics need to be reported by specific categories with the proper cautionary remarks). This is cumbersome and may need complex estimation procedures that may not be available. A more convenient and appropriate approach is to adjust the sample composition such that it represents the true population. This approach requires a benchmark sample of the true population against which the PSTP can be adjusted and a model system that can reshape the distribution of the

PSTP to **account** for the missing or partially missing observations. The benchmark sample used here is the 5 percent PUMS database from the 1990 census, and the model system. includes cross-classification techniques and probabilistic models for self-selection. This is the first comprehensive sample weighting scheme for PSTP.

2. WEIGHT ALGORITHM COMPONENTS

The weighting scheme devised here is described by the flowchart in figure 2. First, weights are derived to account for county of residence stratifcation. These weights are based on the household frequencies by county in the 1990 census. Then, income is imputed for a small portion of the sample based on the number of children and employment composition in the household. This is necessary because income is missing in PSTP in a systematic way. In the next step, weights are created (using the inverse of probability of selection) for the initial refusal to complete travel diaries and the failure to return diaries for RDDs jointly. In parallel, the transit sample is also adjusted for failure to return travel diaries. The subsequent step taking into account systematic panel participation by households is similar to the model system derived by Pendyala et al. (1993) and Kitamura et al. (1993) for waves 1 and 2 data but is modified to account for multiwave panel attrition.

PUMS AS POPULATION

In this study, the 5 percent PUMS is used as the benchmark sample. PUMS is from the "long form" of the 1990 census questionnaire, and it contains two distinct data sets: household and person records (consisting of all items collected in the 1990 census). The PUMS sample is expanded using census provided weights to represent the population. Therefore, it is a sample of microunits representing the Puget Sound population. The PUMS can be used as the benchmark sample for PSTP for three reasons. First, the time span between the census data collection and PSTP is very short for some so&demographic variables such as household size, car ownership, and employment. Second, the income variable in the 1990 census is household income in 1989 coinciding with the first wave of PSTP. Third, the PUMS is the only large sample that has relevant information on microunits with a sufficient number of anchors, i.e., common variables in both data sets. Thus, it has the ability to produce multivariate joint frequencies that can be used as a reference distribution. It should be noted, however, that with the availability of the 1980 and 1990 censuses, one way to

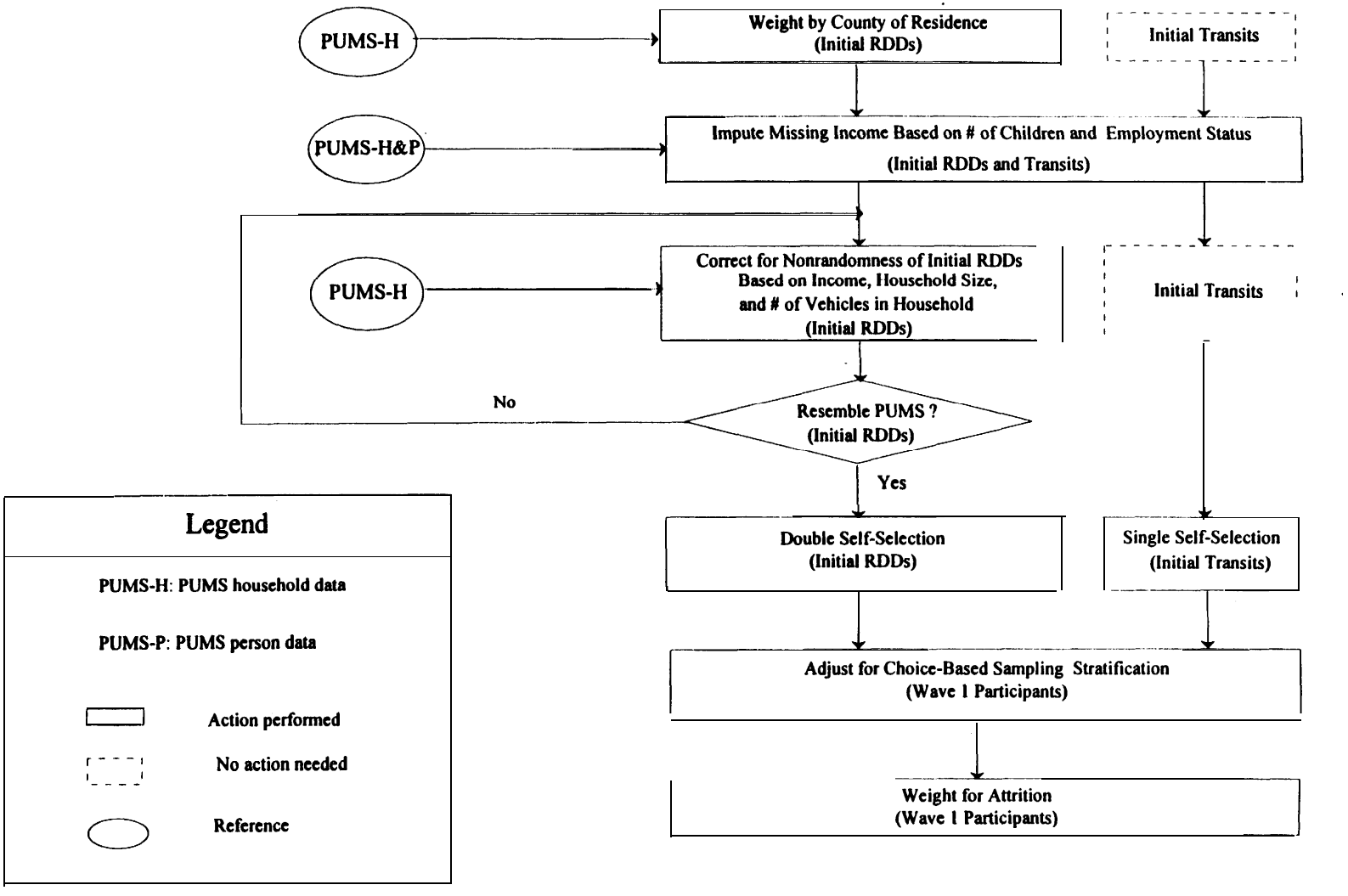

Figure 2. PSTP weighting scheme flowchart.

account for the sample evolution would be to interpolate (e.g., use a deterministic trend function to predict intermediate time points) or microsimulate (e.g., use a stochastic set of functions to predict the intermediate time points as in Goulias, 1992) the population characteristics at a given time point and compare the sample at hand (in this case PSTP) to the corresponding microsimulated year in PUMS. Such an approach was not needed here due to the time closeness between PUMS and PSTP.

INITIAL CONTACTS AND COUNTY OF RESIDENCE

For the initial RDD contacts, weights that correct unequal probability of selection (exogenous stratification based on county of residence) are applied prior to any data treatment. The weight is simply the inverse of the ratio of the selection probability in the sample **over** the probability of being drawn from the population. To do this, one needs the household proportion in the region residing in each of the four counties in the Puget Sound (from the 1990 census). These proportions are reported in table 1. The derived weight is shown in the last column of the table.

Table 1. Household weights by county of residence.

County	PSTP		PUMS		Weight
	Count	%	Count	%	$[PSTP\%/PUMS\%]^{-1}$
King	1954	0.4015	601960	0.579	1.341779
Kitsap	491	0.1009	66920	0.0634	0.603601
Pierce	1148	0.2359	208981	0.201	0.980177
Snohomish	1274	0.2618	161798	0.1556	0.605636
Total	4867	1.0000	1039659	1.0000	

After the weight for county of residence is applied, a weighted initial RDD sample is obtained. If the initial RDD sample is truly random, the resulting weighted initial RDD sample should be representative of the entire population, which means that the distribution of

any population segment in the weighted initial RDD sample should be identical to that of the PUMS. This hypothesis is tested by comparing distributions of some representative variables from the weighted initial RDD sample to those from the PUMS. Restricted by the number of available variables in both PUMS and PSTP, the control variables or anchors selected are household income (Income), household size (HHSIZE), and the number of vehicles owned by a household (NUMWZQ. Because a significant sample portion has missing income information, a treatment for income is needed. This issue is presented in the next section, followed by comparisons of distributions of the anchors used here.

IMPUTATION OF MISSING INCOME

In PSTP, an additional complication arises. Approximately 14.6 percent of households have missing or incomplete income information, whereas only 0.06 percent are missing in the PUMS. For PUMS it is assumed that missing income occurs randomly. If the missing data are simply unavailable for unknown reasons to the analyst and unrelated to the fact that other households in the sample contain complete information, we can assume that income is missing randomly. This type of missing data is called the ignorable case (Greene, 1993) and ignoring these households would result in simply inefficient regression coefficients estimates (i.e., the coefficients in a regression equation are not minimum variance estimates). However, if missing data are systematically related to the phenomenon being modeled, inference drawn exclusively from the households with complete information would be qualitatively different. This kind of missing data can be due to self-selection. To diagnose potential nonrandomly missing income in PSTP, a binary logit model is used for PSTP and PUMS by pooling the two data sets. The missing income logit model uses a dichotomous dependent variable with 0 indicating missing income and 1 indicating the contrary. In addition to commonly used demographic variables, a dummy variable that differentiates records between PSTP and PUMS is also included in the binary response model. T-tests show that the coefficient of the dummy variable is significant at a 5 percent significance level, suggesting that the income is missing in a different way in the PUMS and PSTP data sets. This model is not shown here, however, the comparison of income distributions in both samples is shown in table 2. Households with very

low (less than $7,500) and very high incomes (more than $70,000) are underrepresented in PSTP. This phenomenon is well known in telephone interviews because low income households may not have telephones and high income households may not answer the telephone calls at all. This hypothesis is tested by including missing income as a category and repeating the same test for equal frequencies between PSTP and PUMS.

Table 2. Comparison of income distribution in PUMS and the weighted initial RDD sample in PSTP.

Category	Income ($)	PUMS		PSTP		χ^2 Contribution	
		Count	Percentage	Count	Percentage	W/ missing	W/o missing
1	<7,500	77163	7.2	124	2.5	146	103
2	7,500-14,999	109353	10.2	414	8.5	14	0
3	15,000-24,999	179136	16.7	699	14.4	16	0
4	25,000-29,999	90006	8.4	440	9.0	2	23
5	30,000-34,999	90153	8.4	561	11.5	55	125
6	35,000-49,999	218559	20.4	1090	22.4	9	67
7	50,000-69,999	168960	15.8	520	10.7	80	29
8	≥70,000	135288	12.6	310	6.4	151	88
	Missing	612	0.06	709	14.6	82943	N/A
Total		1069230	100.0	4867	100.0	83418	436

Similarity, in a statistical sense, between PUMS and weighted PSTP is tested primarily using the Pearson &i-squared statistic of frequency comparison. For each anchor variable in PUMS and PSTP (unweighted and weighted frequencies using a variety of weighting schemes) this measure is used as a performance indicator to test the closeness between PUMS and PSTP. The Pearson &i-squared statistic is calculated as:

$$\chi^2 = \sum_i \frac{(F_i^{PSTP} - F_i^{PUMS})^2}{F_i^{PUMS}} \qquad (1)$$

where:

F_i^{PSTP} = the frequency distribution of a given anchor variable in PSTP, either unweighted or weighted according to the variety of weighting schemes considered here

F_i^{PUMS} = the frequency distribution of a given anchor variable in PUMS, which is considered the population to be represented and, thus, is treated as the expected frequency distribution

The degrees of freedom equal the number of categories used to segment a given anchor variable minus one. In addition, tests on joint frequencies are also used as measures of weight performance.

Using equation 1, x^2 is calculated for the hypothesis that the initial RDD sample is random. As the x^2 is extremely large for the category of missing income, we also conduct a &i-squared test without considering missing income households. There are dramatic decreases in the x^2 values, as shown in table 2. Note, however, that the total x^2 is still large enough to reject the hypothesis that the income distributions of the weighted initial RDDs and the PUMS are the same. To fully use the information available in PSTP we need to impute income. After detecting that missing income occurs in a systematic way (using the pooled logit and the table 2 comparison), a second logit model is estimated for missing income in PSTP.

The results suggest that household employment status and the number of children are the major contributors in determining missing income. A common approach to the missing value problem is to replace the missing values with some sort of predicted values. Predicted values for missing incomes may be obtained from a linear regression or an ordered discrete response model (e.g., an ordered probit) of which the employment status and the number of children are the explanatory variables. On one hand, the coefficients in the regression models may be unbiased and appear to bring a gain in efficiency. However, Greene (1993) suggests that "the gain in efficiency from using these fitted values may be illusory." On the other hand, in practice, it is very difficult to generate ordered discrete response models that predict the dependent variable well when the discrete outcomes are more than three. As an alternative, a

pseudo "Monte Carlo simulation/replication" is used to impute missing income based on employment status and the number of children (the two determinants of missing income). This requires the variables of employment status and the number of children to have complete information.

In the PSTP, six out of 5,175 households do not have employment status. Income of these six households is also missing. In addition, all of the **six** households are two-adult households without any children, and none of the six households agreed to participate in the panel survey. The employment status is imputed in such a way that they are assigned to one of the three employment categories (0, 1, and 2, representing no employed, one employed, and two employed members in a household, respectively) proportionally to the sample portions consisting of households that have two adults and no children. There are 477, 381, and 848 households for employment categories 0, 1, and 2, respectively. This is done by randomly drawing a number from a uniform distribution and assigning it to one of the three categories according to the probabilities that equal the proportions of the sample, which are 0.2796, 0.2233, and 0.4971 for employment categories 0, 1, and 2, respectively.

Suppose there are K income categories, indexed by k. Further assume that there are I employment status categories and J categories for the number of children, indexed by i and j, respectively. Employment status is expressed as a binary variable with 1 indicating employed and 0 unemployed. The number of children is censored when it is more than 3, i.e., the variable has four discrete outcomes: 0, 1, 2, and 3+ (3 or more) children. Using this notation, for income category k, we can cross-classify the income by employment status and the number of children. Table 3 illustrates such a cross-classification using general notation.

Table 3. A general notation of cross-classification for income category k by employment status and number of children.

Income category k		**Number of Children**				
		0	**1**	**2**	**3+**	**Total**
Employment Status	**0 (Unemployed)**	X_{11k}	X_{12k}	X_{13k}	X_{14k}	$X_{1.k}$
	1 (Employed)	X_{21k}	X_{22k}	X_{23k}	X_{24k}	$X_{2.k}$
	Total	$X_{.1k}$	$X_{.2k}$	$X_{.3k}$	$X_{.4k}$	$X_{1.k}$

For each income category, a similar cross-tabulation table can be produced. The ratio $X_{11k}/X_{11.}$ is an estimate of the probability that a household with missing income would belong to the income category k if the household members are unemployed and there are no children. In general terms, for a missing income household with employment status i and number of children category j, the probability that the household is in income category k, P_{ijk}, is:

$$P_{ijk} = \frac{X_{ijk}}{X_{ij.}} \qquad i=0,...,I; \quad j=0,...,J; \quad k=1,...,K.$$
$$X_{ij.} = \sum_{k=1}^{K} X_{ijk} \tag{2}$$

where: X_{ijk} = number of households with complete income information that are in ith category of employment status, jth category of children, and income category k

$X_{ij.}$ = total number of households with complete income information that have employment status in category i and are in children category j

Let Y_{ij} denote a missing income household that has employment status i and children category j. Y_{ij} is assigned to income category k according to the probability P_{ijk}.

This is done in three steps:

1. Transform probability P_{ijk} , for all k = 1,...,K, to a cumulative distribution function P'_{ijk}, i.e.,

$$P'_{ijk} = \sum_{l=1}^{k} P_{ijl}$$

2. Draw a random number z from a uniform distribution over interval [0,1].

3. If $P'_{ij(k-1)} \le z < P'_{ijk}$, then Y_{ij} is assigned into income category k.

Once this is applied, all observations in PSTP have complete income information. Comparisons of frequencies of income, HHSIZE, and NUMVEH between PSTP and PUMS are presented in table 4. Thetotal x^z of income, including imputed income, is 361.42 (compared with PUMS) with 7 degrees of freedom. This leads to the rejection of the hypothesis that households from the PUMS and the PSTP are from the same income population. The x^2 values of HHSIZE and NUMVEH are 596.62 and 767.56, with degrees of' freedom 9 and 7, respectively. These values also lead to the conclusion that HHSIZE and VEiHNUM in the PSTP are significantly different from those in the PUMS.

Table 4. Comparisons of distributions of income, HHSIZE, and NUMVEH between PUMS and PSTP.

Category	Income[1]		HHSIZE		NUMVEH[2]	
	PSTP	PUMS	PSTP	PUMS	PSTP	PUMS
1	3.81	7.20	16.17	26.25	3.7	7.8
2	10.09	10.23	35.55	34.22	23.14	31.6
3	16.81	16.76	18.84	16.32	39.96	38.9
4	10.29	8.42	18.22	14.40	19.95	15.2
5	12.76	8.44	7.4	5.69	7.97	4.6
6	25.21	20.45	2.53	1.96	2.81	1.3
7	12.78	15.81	0.76	0.75	1.19	0.4
8	8.22	12.66	0.41	0.24	1.27	0.3
9	N/A	N/A	0.06	0.10	N/A	N/A
10	N/A	N/A	0.06	0.07	N/A	N/A
Total χ^2	361.42		596.62		767.56	

[1]Definition of each category is the same as in table 2.
[2]Category 1 represents the category without any vehicle. Category 2 denotes 1 vehicle, and so on.

PUMS-BASED WEIGHTS

Since the initial RDD sample and the PUMS do not have the same frequency distribution for a given variable of interest, we need to weight the households in the PSTP so

that the modified distribution resembles that of the PUMS in "every" aspect. This requires considering all variables simultaneously. For instance, consider a sample with **M** variables each having Ni categories. The sample can be cross-classified into N, $XN_2X \ldots \mathbf{X}\, N_M$ categories. The weights for each category will simply be the ratios of the PUMS cell frequencies over those in the PSTP. Households belonging to the same category have the same weight. Ideally, all possible variables with all possible categories should be cross-classified in order to have a perfect match between PUMS and PSTP. However, this cross-classification produces many empty cells (zero frequency) in both PSTP and PUMS. Empty cells in the PUMS can be ignored as they may simply mean that such categories do not exist in the population. To the contrary, cells that are empty in the PSTP sample but not empty in the PUMS may be problematic because there are no sample observations in PSTP to replicate and match PUMS. In fact, there is a very large chance that a cell is empty in the PSTP but not in the PUMS as the PUMS has a considerably larger sample size than the PSTP. To reduce empty cells, we can decrease the total number of cross-classification categories, either by reducing the number of variables used in the classification or by aggregating the values of variables. Such a remedy to the problem of empty cells will decrease the accuracy of the resulting weighted PSTP sample due to lack of sufficient dimensions to properly characterize the population features. Selection of control variables and the degree of category aggregation are decided on the basis of "experimental trials." Two sets of experimental trials have been designed for this study. One is to examine the effect of different numbers of control variables. The other is to investigate the effect of various degrees of category aggregation. In addition to income, the number of people in the household (HHSIZE), and the number of vehicles owned by a household (NUMWB), county of residence (COUNTY) is also considered an anchor variable. It should be noted that whenever COUNTY is involved, the PSTP is referred to the original PSTP, i.e., the sample without applying the weight for the county of residence.

The original income, HHSIZE, and NUMVEH in the PSTP were classified into eight, ten, and eight categories, respectively. For HHSIZE, there is only one observation in each of the ninth and tenth categories. The last two categories are combined with the eighth category in HHSIZE, yielding eight categories for HHSIZE as well. The actual values of the variables in each category are provided in table 5 together with an example of category aggregation.

When the original categorii are used, we get 8 x 8 **x** 8 (512) cells. Of these, 163 cells in PSTP are empty, which leads to 14,340 (1.34 percent) unused observations in PUMS. If the number of unused observations is very small (e.g., when the sample size in PUMS is scaled down to the same sample size as the PSTP, the number of unused observations becomes less than l), there is no problem encountering empty cells in the PSTP because these empty cells simply indicate that such a population segment is too rare to be included in the PSTP. However, if this number is large (e.g., larger than 1 when the PUMS is scaled similarly), it implies that population segments are not present in the PSTP, which would cause the same problems as if they were missing systematically from the PSTP. To solve this problem, control variables are aggregated (collapsing their categories).

Table 5. Aggregation scheme for the anchor variables.

Original Category				Aggregated Category			
Category	Income ($)	HHSIZE	NUMVEH	Category	Income ($)	HHSIZE	NUMVEH
1	<7,500	1	0	1	<7,500	1	0
2	7,500-14,999	2	1	2	7,500-14,999	2	1
3	15,000-24,999	3	2	3	15,000-24,999	3	2
4	25,000-29,999	4	3	4	25,000-34,999	4	3
5	30,000-34,999	5	4	5	35,000-49,999	5+	4+
6	35,000-49,999	6	5	6	50,000-69,999	N/A	N/A
7	50,000-69,999	7	6	7	≥70,000	N/A	N/A
8	≥70,000	8+	7+				

Table 6 provides schemes of aggregation with associated x^2 values. The notation a-b-c stands for the combination of income, HHSIZE, and NUMVEH aggregated into a, b, and c categories, respectively. When COUNTY is used, the notation becomes a-b-c-d with d representing the number of categories in COUNTY. The column named "Aggregated" is the x^2 of the aggregated categories that are used to create the weights. After applying the associated weights derived using the different combinations of variables and categories, the weighted initial RDD sample frequencies are compared to those in PUMS.

Table 6. The effect of number of variables and number of categories on the comparative chi-squared tests.

Data Type	Variable	Combinations of Control Variables				
		5-5-4	6-5-5	7-5-5	6-5-5-4	7-5-5-4
Aggregated	Income	0.71	0.08	0.16	0.25	2.88
	HHSIZE	0.43	0.07	0.15	0.46	1.28
	NUMVEH	13.19	0.24	0.59	1.82	3.95
	COUNTY	N/A	N/A	N/A	0.53	0.46
	Total χ^2	14.33	0.39	0.90	3.06	8.57
Original (8×8×8)	Income	79.29	79.29	5.84	60.13	7.00
	HHSIZE	20.97	23.87	21.41	20.96	24.43
	NUMVEH	146.04	54.54	48.76	52.07	54.57
	COUNTY	N/A	N/A	N/A	0.53	0.46
	Total χ^2	246.30	157.70	76.01	133.69	86.40

In addition, separate sets of weights are derived based on the original categories, i.e., 8x8x8, and their performance in terms of x^2s is also shown in the lower part of table 6. Clearly, substantial similarity in frequencies, between weighted RDD in PSTP and PUMS is obtained using income, HHSIZE, and NUMVEH and the 6-5-5 or 7-5-5 categories. Because the combination 7-5-5 yields the smallest x^2, it is used to create the weights. It should be noted that the relationship between the number of variables used, the number of categories used, and x^2 is complex and nonlinear. This is the direct result of the effect of bias due to aggregation when too few cells are used and the presence of empty cells when too many categories are used.

PRE-WAVE SELF-SELECTION

Prior to the data collection of the first wave survey, the initial RDD contacts were given the option to become wave 1 participants. However, initial RDD contacts and initial transit contacts are treated here as if they are subject to quite different selection processes.

Initial RDD oontacts faced two sequential decisions: first, receiving travel diaries, and second, returning completed travel diaries. Initial transit contacts are treated as if **they face** only one decision, i.e., to return or not to return completed travel diaries, due to the records kept for the transit sample. This "self-selection" difference between initial RDD contacts and initial transit contacts motivates separate treatment for the **two** sample components.

Because the self-selection of initial RDD contacts involves two sequential choices, the way to model such a choice process depends upon the underlying choice mechanism. If the two choices were made independent of each other, two separate choice models would suffice. In this case, the first self-selection (i.e., either to receive or not to receive travel diaries) is applied to the initial RDD contacts and the second self-selection to the initial RDD respondents. However, if the two choices were related to each other in some fashion, the approach of the two independent choices would suffer from inconsistent estimation of the associated model coefficients (e.g.; a household that agreed to receive a travel diary may be more likely to return a completed travel diary than its counterpart household that refused to receive a travel diary). Model estimation based upon the assumption of independence between the two self-selections would overestimate the probability of returning complete travel diaries of the population. Thus, in this case, a bivariate model that allows for correlation between the two self-selection equations should be applied.

The approach of two independent probability of participation equations (probit models) is straightforward. However, the problem of insufficient information arises when attempting to depict the correlation between the two decisions (e.g., by applying a bivariate probit model). This is due to the inability to observe a portion of the sample (nonparticipants) in returning complete questionnaires. The same issue in a different but related context was encountered in Chung and Goulias (1995) and was solved using the method devised by Tunali (1986).

Consider a double self-selection process that is formulated as follows. The choice mechanism of each household can be characterized by two discrete-outcome decisions, denoted by two dichotomous variables, Y, and Y_2, representing the two decisions.

The selection "rules" in terms of explanatory variables for each of the two decision outcomes and the regression equation can be written as:

$$Y_{1i}^{*} = \beta_1' X_{1i} + \epsilon_{1i}$$

$$Y_{1i} = \begin{cases} 0 & if\ Y_{1i}^{*} < 0 \\ 1 & if\ Y_{1i}^{*} \geq 0 \end{cases} \qquad \textbf{(3a)}$$

$$Y_{2i}^{*} = \beta_2' X_{2i} + \epsilon_{2i}$$

$$Y_{2i} = \begin{cases} 0 & if\ Y_{2i}^{*} < 0 \\ 1 & if\ Y_{2i}^{*} \geq 0 \end{cases} \qquad \textbf{(3b)}$$

where:

X_{ki} = a vector of explanatory variables (k=1, 2)

β_k = a vector of unknown regression coefficient (k =1, 2)

ϵ_{1i} , ϵ_{2i} = error terms

ρ = correlation between ϵ_{1i} and ϵ_{2i}

There are four possible joint outcomes, which are shown in table 7 in a four-cell table containing the frequency of the number of households in each combination of outcomes. Individual cells (i.e., values for N, and N_3) cannot be obtained because the second self-selection behavior of initial RDD non-respondents is not observable. Instead, these two cells "collapse" into one cell, which is the sum of N, and N_P In terms of table 7, there are only three distinct cells:

$N_1 + N_3$ — Initial RDD non-respondents with unknown willingness to return completed travel diaries if they had received travel diaries.

N_2 — Wave 1 RDD nonparticipants.

N_4 — Wave 1 RDD participants.

Table 7. The four discrete outcomes.

Frequencies		Self-selection 2— Return completed travel diaries 0 = No 1 = Yes	
Self-selection 1 – Agree to receive a travel diary			
	0 = No	N_1	N_3
	1 = Yes	N_2	N_4

The estimating log-likelihood function of the bivariate probit model with collapsed cells can be expressed as:

$$lnL = \sum_{i=1}^{N_1+N_3}\left[\ln\int_{-\infty}^{-\beta_1'X_{1i}}\phi(\epsilon_1)d\epsilon_1\right] + \sum_{i=1}^{N_2}\left[\ln\int_{-\infty}^{\beta_1'X_{1i}}\int_{-\infty}^{-\beta_2'X_{2i}}h(\epsilon_1,\epsilon_2,\rho)d\epsilon_1 d\epsilon_2\right] + \sum_{i=1}^{N_4}\left[\ln\int_{-\infty}^{\beta_1'X_{1i}}\int_{-\infty}^{\beta_2'X_{2i}}h(\epsilon_1,\epsilon_2,\rho)d\epsilon_1 d\epsilon_2\right] \quad (4)$$

where:

$\phi(.)$, $h(.)$ = standard univariate and bivariate normal density functions, respectively

The log-likelihood function consists of three components: the summation of logarithms of the univariate normal cumulative distribution function for non-respondents ($N_1 + N_3$) and two terms of summations of logarithms of bivariate normal cumulative distribution functions for wave 1 RDD nonparticipants (N_2) and wave 1 RDD participants (N_4), respectively. The presence of the univariate normal function is a direct effect of collapsing the two non-respondent cells. For details of the log-likelihood function and the parameter estimation, see Tunali (1989). This method has also been applied on PSTP to study residential relocation and panel attrition (Chung and Goulias, 1995).

To avoid any potential inconsistent estimation, both univariate and bivariate probit model structures are examined. Table 8 shows the defininitons of the variables used in the models. The model results, including two indepedent univariate probits and a bivariate probit (for each decision separately), are provided in table 9.

Table 8. Descriptions of variables in self-selectivity models (equations 3a and 3b).

Variable Name	Description
BUSPASS	Indicator, 1 = at least one household member has a buspass, 0 = otherwise
CAR1	Indicator, 1 = have one car, 0 = otherwise
CAR2	Indicator, 1 = have two cars, 0 = otherwise
CAR3	Indicator, 1 = have three or more cars, 0 = otherwise
CAR_CHLD	Indicator, 1 = car required to pick up children
CAR_REQD	Indicator, 1 = car required at work, 0 = otherwise
DIST1/4	Indicator, 1 = the nearest bus stop is within one-forth mile
HHSIZE	Number of household members
KING	Indicator, 1 = the household lives in King county
LARGEHH	Indicator, 1 = at least five household members, 0 = otherwise
LICENSEN	Number of valid driver licenses in the household
LIVEGOOD	Indicator, 1 = county livability rate is at least good, 0 = otherwise
LOWINC	Indicator, 1 = household income is than $15,000, 0 = otherwise
MALEN	Number of males who are 15 years or older
NUM_EMP	Number of employed people in the household
PIERCE	Indicator, 1 = the household lives in Pierce County, 0 = otherwise
SNOHOMISH	Indicator, 1 = the household lives in Snohomish county, 0 = otherwise
STUDENT	Indicator, 1 = at lest one student in the household, 0 = otherwise
TOTADULT	Number of adults in the household
TOT1_17	Number of children under 17 in the household
TRAFGOOD	Indicator, 1 = traffic congestion is not a serious problem in the residence area
YRHM1	indicator, 1 = live in current residence less than one year
YRHM5LES	Indicator, 1 = live in current residence less than 5 years, 0 = otherwise

Table 9. Model estimation case I (insignificant correlations, equations 3a and 3b).

	Univariate		Bivariate	
Willing to Receive Travel Diaries (Yes = 1):				
	Coefficient	"T-ratio"	Coefficient	"T-ratio"
Constant	0.40575	4.532	0.41217	4.561
TOTADULT	-0.22934	-7.004	-0.23236	-7.024
TOT1_17	0.04391	2.354	0.04388	2.368
CAR0	-0.45188	-5.383	-0.45564	-5.315
CAR1	-0.17451	-3.687	-0.17756	-3.717
PIERCE	-0.12681	-2.685	-0.12699	-2.696
LIVEGOOD	0.16861	2.871	0.17000	2.923
YRHM5LES	0.18426	4.890	0.17894	4.743
NUM_EMP	0.04525	1.745	0.04627	1.796
TRAFGOOD	-0.13788	-3.029	-0.13531	-2.992
LOWINC	-0.30674	-5.437	-0.30634	-5.404
LL = -3242.1				
$\chi^2_{(10)}$ = 229.2				
% correctly predicted = 58.4%				
Return Completed Travel Diaries (Yes = 1):				
Constant	0.77485	8.473	0.88740	5.562
TOT1_17	-0.07267	-1.979	-0.08142	-2.152
CAR3	-0.12443	-1.829	-0.12115	-1.808
YRHM1	-0.15759	-2.406	-0.16388	-2.511
NUM_EMP	-0.13752	-3.459	-0.14049	-3.508
DIST1/4	-0.12301	-2.161	-0.12166	-2.139
MALEN	-0.17049	-3.137	-0.16136	-2.978
CAR_REQD	-0.13420	-2.434	-0.13757	-2.528
CAR_CHLD	-0.25581	-3.356	-0.25175	-3.333
STUDENT	-0.17178	-2.678	-0.16951	-2.678
LICENSEN	0.12844	2.490	0.13371	2.618
LOWINC	-0.40821	-4.968	-0.35149	-3.140
LARGEHH	-0.23026	-1.876	-0.21051	-1.688
$\rho(\varepsilon_1,\varepsilon_2)$	N/A	N/A	-0.18902	-0.792
LL = -1707.9			LL = -5389.2	
$\chi^2_{(12)}$ = 191.9				
% correctly predicted = 61.1%				

$\rho(\varepsilon_1,\varepsilon_2)$ = Correlation between the error terms
LL = Log-likelihood function at convergence
$\chi^2_{(n)}$ = -2(L(0) - L(β)) with n degrees of freedom, measure of goodness-of-fit measure

The model in table 9 for the first self-selection (i.e., accepting or rejecting to receive travel diaries) shows that households with a large number of children and employed household members are more likely to opt for receipt of travel diaries. Households with more adults, less than two cars, and lower income tend to reject receiving travel diaries. In addition, residence and attitudes have significant influence on households' decision to volunteer for travel diary receipt. Households that reside in Pierce county are less likely to be involved in panel surveys. However, if households have lived in their current home for less than five years, they are more likely to participate. In addition, households that perceive a good living environment in their residence county are likely to participate in the travel diary portion of the survey. Finally, when households do not face serious traffic congestion they show less interest in the survey.

The second self-selection equation reported in the second part of table 9 shows (i.e., return completed travel diaries) that households having more children, more than three cars, more male household members, less employed members, and lower incomes are less likely to return completed travel diaries. Households that have lived in their current residence for less than a year, need cars to go to work or pick up children, are within two blocks of the nearest bus stop, and have at least one student in the household are less likely to fill out complete diaries as well. Only the households with many drivers are more likely to fill out complete travel diaries. It is interesting that attitudes do not influence household decisions at this level. This may occur because the second self-selection is more dependent on the individual members instead of the entire household.

The univariate probit models assume independence between the two decisions (to participate in the travel diary portion and to return the travel diary). The bivariate model attempts to include possible dependence between the two decisions and this is reflected in the correlation coefficient, Þ, between the two participation equations. However, Þ is not significantly different from zero as the t-test attests. When the model specification is changed, however, Þ becomes significantly Merent from zero, implying a strong correlation between the two-selection equations and related decision making. The results of this model are presented in table 10. This model specification excludes the effects of the number of employed household members, the distance to the nearest bus stop, large households, and car

Table 10: Model estimation case II (significant correlations equations 3a and 3b).

	Univariate		Bivariate	
Willing to Receive Travel Diaries (Yes = 1):				
	Coefficient	"T-ratio"	Coefficient	"T-ratio"
Constant	0.40575	4.532	0.41504	4.738
TOTADULT	-0.22934	-7.004	-0.24148	-7.428
TOT1_17	0.04391	2.354	0.04277	2.317
CAR0	-0.45188	-5.383	-0.42193	-5.178
CAR1	-0.17451	-3.687	-0.17413	-3.754
PIERCE	-0.12681	-2.685	-0.11195	-2.479
LIVEGOOD	0.16861	2.871	0.14445	2.605
YRHM5LES	0.18426	4.890	0.18648	5.079
NUM_EMP	0.04525	1.745	0.06614	2.646
TRAFGOOD	-0.13788	-3.029	-0.13370	-3.077
LOWINC	-0.30674	-5.437	-0.30203	-5.360
LL = -3242.1				
$\chi^2_{(10)}$ = 229.2				
% correctly predicted = 58.4%				
Return Completed Travel Diaries (Yes = 1):				
Constant	0.71073	8.473	0.31844	1.951
TOTADULT	-0.16148	-2.232	-0.23458	-3.355
TOT1_17	-0.11131	-4.097	-0.08423	-2.937
CAR2	0.11191	2.118	0.13622	2.861
SNOHOMISH	-0.12326	-1.780	-0.10146	-1.617
YRHM1	-0.16844	-2.593	-0.11459	-1.808
MALEN	-0.15785	-2.731	-0.13496	-2.620
CAR_CHLD	-0.30463	-4.212	-0.25932	-3.713
STUDENT	-0.20403	-3.208	-0.17874	-3.036
LOWINC	-0.29040	-3.593	-0.42401	-5.270
LICENSEN	0.11317	1761	0.13624	2.312
$\rho(\varepsilon_1,\varepsilon_2)$	N/A	N/A	0.58202	3.235
LL = -1718.9			LL = -4959.9	
$\chi^2_{(10)}$ = 169.8				
% correctly predicted = 62.1%				

$\rho(\varepsilon_1,\varepsilon_2)$ = Correlation between the error terms
LL = Log-likelihood function at convergence
$\chi^2_{(n)}$ = -2(L(0) - L(β)) with n degrees of freedom, measure of goodness-of-fit measure

requirements for work. Instead, it adds the number of adults and the county of residence. All the variables in this model are significant at a 90% confidence level. However, this model does not fit the data as well as the previous model since the x^2 value is about 169.7 for 10 degrees of freedom, compared to 191.9 for 12 degrees of freedom in the previous model. **Two** additional variables in the previous model increase the value of x^2 by 22.1, which is a clear indication that the previous model specification is better than that of the second. **To** evaluate how the weights are affected by the correlation coefficient, both model specifications are included in the following analysis. To differentiate between the two approaches these two model specifications are named as univariate and bivariate probit models, respectively.

The weight that accounts for self-selection for a given household is the reciprocal of the probability to participate in the subsequent stage of the survey. This probability is computed directly from the model estimates by applying the usual probit equation. When applying the weights that correct for county of residence, nonrandomness in the RDD, and self-selection to wave 1 RDD participants (1,543, we expect to make the sample representative of the true population. Alternate model specifications (univariate probit vs. bivariate probit) may produce different weights that can be applied to the PSTP sample and then comparisons made to PUMS. This allows us to choose the best performing model in terms of sample frequency closeness to PUMS. Table 11 provides the results of the chi-squared tests. From a large set of models, a few best-performing models were chosen and compared in more detail leading to similar weights (i.e., the weights corresponding to correlated and uncorrelated equations are statistically indistinguishable).

The initial transit contacts faced only one decision (returning completed travel diaries or not) and the usual univariate binary probit model is used for them (variable definitions are provided in table 8 and model results are shown in table 12). It is found that large-size households in King and Snohomish counties that have more employed members and more male members tend not to return their travel diaries. Households that have more drivers and that have people with bus passes are likely to complete travel diaries. It is very clear then that the factors influencing self-selection within the RDD sample are very different from those in the transit sample. This conforms with our effort to create weights for initial RDD contacts and initial transit contacts separately.

Table 11. The x^2 values of weighted wave 1 participants.

Data Type	Variables	RDD Participants		RDD & Transit Participants		Choice-Based Weight	
		Univariate	Bivariate	Univariate	Bivariate	Univariate	Bivariate
Aggregated (7×5×5)	Income	36.99	35.32	48.61	48.48	64.84	63.72
	HHSIZE	7.82	10.49	6.45	13.88	11.32	16.58
	NUMVEH	5.46	8.66	8.06	5.25	43.84	54.16
	Total	50.27	54.47	63.13	67.61	120.00	134.46
Original (8×8×8)	Income	49.95	48.04	60.09	60.20	75.64	73.86
	HHSIZE	56.86	54.00	46.57	54.11	55.46	62.97
	NUMVEH	6.97	9.83	9.38	6.49	46.23	56.48
	County	28.66	22.68	17.95	25.54	7.02	7.59
	Total	142.44	134.55	133.99	146.34	184.36	200.90

Table 12. The binary probit model for initial transits (equation 3b).

Return Travel Diaries (Y = 1):

	Coefficient	"T-ratio"
Constant	0.86218	3.511
HHSIZE	-0.27880	-4.732
KING	-0.81842	-4.047
SNOHOMISH	-0.56784	-2.927
NUM_EMP	-0.25039	-2.131
MALEN	-0.24113	-1.541
LICENSEN	0.58739	4.315
BUSPASS	0.21453	1.353

LL = -186.4
$\chi^2_{(10)} = -2(L(0) - L(\beta)) = 52.0$
% correctly estimated = 65.9%

LL = Log-likelihood function at convergence
$\chi^2_{(n)} = -2(L(0) - L(\beta))$ with n degrees of freedom, measure of goodness-of-fit measure

The x^2 values of weighted wave 1 transit participants, together with weighted wave 1 RDD participants, are shown in table 11. For wave 1 participants, it seems that the univariate probit model perfoms better than the bivariate probit model, although it is the other way around for wave 1 RDD participants alone.

CHOICE-BASED WEIGHTS

Choice-based sample stratification is accounted for after considering county of residence, nonrandomness in RDD, and pre-wave self-selection. The weighted RDD sample is assumed to represent the true population, based on which the choice-based sample is corrected. The weight for SOV and Carpool is calculated in a similar way as for county of residence. Table 13 provides the choice-based distributions for each mode in wave 1 participants and wave 1 RDD participants and the weight used. This weight is needed because the weighted RDD sample (that resembles PUMS closely) is pooled with the transit sample.

Table 13. Weight for choice-based sampling stratication.

Travel Mode	Wave 1 Participants %	Wave 1 RDD Participants %	Weight
SOV	0.646717	0.684839	1.062127
Transit	0.240945	0.196050	1.062127
Carpool	0.112338	0.119111	0.460722
Total	1.00000	1.000000	

The weight is for both sampling strata. It is the inverse of the sum of the ratios of SOV or carpool and the transit respondents. The ratio of SOV or carpool is the SOV and carpool percentage in the PSTP over that of the PUMS. Similarly, the ratio of transit is the transit percentage in the PSTP over that of the PUMS.

MULTI-WAVE PANEL ATTRITION

The final stage of sample adjustments is the multi-wave panel attrition, which is modeled by an ordered probit model (Greene, 1990). The model system can be expressed as:

$$Y_i^* = \beta' X_i + \epsilon_i$$

$$Y_i = \begin{cases} 0, & \text{if } Y_i^* < 0 \\ 1, & \text{if } 0 \le Y_i^* < u_1 \\ 2, & \text{if } u_1 \le Y_i^* < u_2 \\ 3, & \text{if } u_2 \le Y_i^* \end{cases} \quad (5)$$

where:

Y_i^* = the latent unobserved variable

Y_i = indicator of attrition

β = coefficient vector

X_i = vector of explanatory variables

ϵ_i = random error term

The latent unobserved variable represents panel participation propensity and depends on certain so&demographic and attitudinal characteristics of each household. The observed dependent variable is the number of waves that a household missed in the panel surveys, i.e., waves 1, 2, and 3. Dropouts missed 3, 2, and 1 surveys, respectively, while the four-wave stayers missed none. Explanatory variables include household socioeconomic characteristics and the random error term is assumed to be normally distributed.

The variables used in the model are presented in table 14 and the model estimates are shown in table 15. All variables in the model significantly contribute in explaining panel attrition behavior. The model parameters show that households without a car, more employed members, and more household members are less likely to continue participating in the panel. In addition, households with young adults tend to leave the panel. As found in earlier studies (Pendyala et al., 1993a; Pendyala et al., 1993b; Kitamura et al., 1993; and Pendyala and Kitamura, 1994), households recruited by RDD appear more likely to drop out of the panel. However, households with a positive attitude toward their living environment are more likely to continue staying in the panel. The incentive method used also affects attrition behavior.

Table 14. Variable definitions in the ordered probit model (equation 5).

Variable Name	Definition
CAR0	Indicator, 1 = 0 car, 0 = otherwise
NUMEMP	Number of employed members in the household
YRHM5LES	Living in the current residence less than 5 years
LOWINC	Indicator, 1 = incomes less than $15,000, 0 = otherwise
S35	Indicator, 1 = single adult household under 35 years old, 0 = otherwise
M35	Indicator, 1 = multi-adults household under 35 years old, 0 = otherwise
HHSIZE	Number of persons in the household
RDD	Indicator, 1 = recruited by Tele-RDD, 0 = otherwise
LICENSEN	Number of driver licenses in the household
LIVEGOOD	Indicator, 1 = household's perception toward the living environment is good in the county of residence; 0 = otherwise
INCENT2	Indicator, 1 = Incentive method 2; 0 = otherwise
u_1	Estimate, a cutoff point that separates second and third categories
u_2	Estimate, a cutoff point that separates third and forth categories

Table 15. Model estimates of the ordered probit model (equation 5).

	Coefficient	"T-ratio"
Constant	-0.64178	-6.273
CAR0	0.32397	10.082
NUM_EMP	0.04616	3.607
YRHM5LES	0.36064	20.636
LOWINC	0.22812	8.722
S35	0.52365	12.383
M35	0.36199	9.007
HHSIZE	0.10303	12.290
RDD	0.29123	3.006
LICENSEN	-0.08040	-5.288
LIVEGOOD	-0.19907	-8.053
INCENT2	0.07486	4.094
u_1	0.20261	38.583
u_2	0.95702	93.588

LL = -5378.9
% corrected predicted = 55.1%

LL = Log-likelihood at convergence

WAVE 2 REFRESHMENTS

Because wave 2 refreshments were recruited to replace wave 2 dropouts, they are not representative of the population. Thus, the method in Pendyala and Kitamura (1994) is not applicable to wave 2 refreshments. Indeed, a chi-squared test examining whether the wave 2 refreshment sample has the same distribution as PUMS failed. Therefore, weights are created for the wave 2 refreshment sample using a similar method developed for the initial contacts. That is, wave 2 refreshments are first weighted by county of residence and then by the joint categories of income, household size, and number of vehicles. As the sample size of wave 2 refreshments is very small, the 7x5x.5 aggregated categories, used for the initial contacts, result in many empty cells and a more compact scheme is used (with 5x4x4 categories).

The x^2 values of comparison between original and weighted wave 2 refreshments to the PUMS are provided in table 16. When the weights are applied to the aggregated sample, the x^2 values are very small, which results in the rejection of the alternative hypothesis that the weighted refreshment sample and the population are different. However, the x^2 values expand almost eight times when the weights are applied to the original sample categories. The expansion of the x^2 values is possibly due to errors of aggregation.

Table 16. Comparison between wave 2 refreshments and the PUMS (x^2 values).

Variable	Unweighted		Weighted	
	Aggregated (5×4×4)	Original (8×8×8)	Aggregated (5×4×4)	Original (8×8×8)
Income	18.93	39.07	0.97	24.82
HHSIZE	9.49	14.51	0.15	7.94
NUMVEH	27.68	38.19	4.34	5.38
County	N/A	86.24	N/A	2.56
Total	56.10	178.06	5.46	40.70

3. WEIGTS COMPARISON IN WAVE 2 (1990)

After all the weights have been applied, the weighted stayer sample should represent the true population. Similar to what has been done previously, chi-squared tests are employed to test the hypothesis that the weighted stayer sample characteristics in wave 2 and the PUMS are from the same distribution in terms of the frequency of each variable considered. Five such tests are performed between PUMS and weighted wave 2 stayers, weighted wave 2 stayers plus unweighted wave 2 refreshments, weighted wave 2 stayers plus weighted wave 2 refreshments, unweighted wave 2 stayers, and unweighted wave 2 stayers plus unweighted **wave** 2 refreshments. These tests are performed on the marginal frequencies. To avoid sample size inflation and ensure comparability between PSTP and PUMS, the weights are normalized and then applied to the, sample. In this way, the original actual sample size is maintained.

In table 17 comparisons among different weighting schemes are provided. Besides deriving weights through a series of probabilistic models to account for sample selectivity and attrition (called herein comprehensive weights and used for the first, second, and third columns of table 17), a naive approach that directly adjusts the wave 2 sample, including stayers and refreshments, using the PUMS is considered here (fourth column in table 17). This approach discards any information prior to wave 2 data collection and redistributes the wave 2 sample according to PUMS. The resulting weights are called the direct PUMS weights. It should be noted, however, that in applying this method, 68 households were discarded because of missing data on the anchor variables. In addition, whenever PUMS weights are created for the wave 2 refreshment a more compact categorization of the anchors is used because of the excessive presence of zero cell frequencies (i.e., we use 5x4x4 joint categories of income, HHSIZE, and NUMVEH). The last two columns of table 17 provide the comparison between PUMS frequencies and original PSTP data with no weights applied to them.

The significant decrease in all x^2 values among weighted and unweighted frequencies (e.g., compare the first to the fifth column and the second to the sixth column in table 17) is

Table 17. Comparisons between wave 2 and the PUMS using normalized weights (x^2 values).

Data Type	Variables	Weighted Wave 2 Stayers			PUMS weighted Wave[4]	Unweighted Wave 2 Stayers	
		Stayers[1]	Stayers & refreshments[2]	Stayers & weighted refreshments[3]		Stayers	Stayers & refreshments
Aggregated(7×5×5)	Income	26.70	39.22	43.14	0.02	191.73	209.75
	HHSIZE	5.42	6.85	6.21	0.09	80.52	88.7
	NUMVEH	5.88	20.34	9.06	1.55	118.14	139.32
	Total	38.00	66.41	58.41	1.66	390.39	437.77
Original (8×8×8)	Income	30.32	51.37	50.74	58.71	199.15	226.12
	HHSIZE	10.76	9.68	10.38	20.29	85.14	91.46
	NUMVEH	7.78	20.55	9.17	5.36	118.93	143.67
	COUNTY	7.66	12.83	4.97	1.86	252.44	284.28
	Total	56.52	94.43	75.26	86.22	655.66	745.53
Weighted Sample Size		1452	1852	1852	1784	1452	1852

[1]Weighted stayers using the comprehensive weights.
[2]Weighted stayers using the comprehensive weights. Refreshments are not weighted at all.
[3]Stayers weighted as in the first column. Refreshments weighted using a more compact category PUMS weights as explained in the paper.
[4]The wave 2 data in this column are weighted using PUMS-based weights only. Missing data in wave 2 on income, HHSIZE, and NUMVEH decreased the sample size by 68 households.

clear proof that PSTP data can be adjusted using the comprehensive weights. The performance of comprehensive weights is comparable and sometimes better than the direct PUMS weights (i.e., compare the fourth column to the second and third in table 17). Recalling that a PUMS adjustment was made before the survey participation weights were applied, (to adjust the initial RDD contacts), the results here are a measure of the success probabilistic weights for self-selection may have. Indeed, here the model-based weights succeeded in closing the gap between PUMS and wave 2 stayers, although not at 100 percent. This is the factual proof that weights are simply remedial measures and not a true fix for nonrandomness in samples.

In addition to testing distributions of PUMS and various PSTP samples, a less stringent comparison, comparison of means of variables that are both available in the PUMS and PSTP, is made. Table 18 provides the sample means for the PUMS and the five aforementioned PSTP subsets and the direct PUMS-weighted wave 2 sample (including stayers and refreshments). It can be seen that the means of weighted wave **2** sample (i.e., weighted wave 2 alone and weighted wave 2 plus refreshments) are closer to PUMS, compared with unweighted wave 2 samples (the exception to this is the number of workers for which PUMS and PSTP use different definitions). Up to this point, weighting methods were compared using the frequency distributions of each variable considered separately (i.e., marginal frequencies). The performance of comprehensively weighted PSTP is examined here using the joint frequencies of income, HHSIZE, and NUMVEH. To do this, loglinear models of cross-classification (Fienberg, 1987) are employed to identify the anchor variables contributing to the slight difference between PUMS and weighted PSTP frequencies in table 17. Loglinear models are based on the joint frequencies of the explanatory variables and, thus, can identify factors that are major contributors to the difference by examining the significance of the interactions among the variables considered.

To perform the test, the weighted PSTP and PUMS are pooled together. A new indicator variable labeled “sample” (one category indicates PSTP and the other PUMS) is introduced to reflect the origin of the sample observations used in the cross classification. Then cross classification is done with four variables, i.e., sample, income, HHSIZE, and NUMVEH, using the pooled sample. The observed frequency of the cross-classification cell is the dependent variable. The “explanatory variables” are the main effects of each of the four

Table 18. Comparisons of the sample means between wave 2 and the PUMS.

Variable	PUMS	Weighted Wave 2 Stayers		PUMS	Unweighted Wave 2 Stayers	
		Stayers	Stayers & refreshments	Stayers & weighted refreshments	weighted wave 2	Stayers	Stayers & refreshments
COUNTY	1.75	1.92	1.94	1.92	1.96	2.31	2.35
HHSIZE	2.50	2.48	2.49	2.48	2.45	2.56	2.58
NUMVEH	1.84	1.87	1.88	1.87	1.87	2.14	2.14
INCOME	4.91	4.92	4.93	4.91	4.91	5.01	5.31
# of Workers[1]	1.73	1.28	1.28	1.28	1.15	1.33	1.25
HHTYPE	4.11	4.31	4.30	4.30	4.36	4.63	4.55
TOT1_5	0.24	0.26	0.26	0.26	0.21	0.22	0.22
TOT6_17	0.40	0.40	0.41	0.41	0.43	0.41	0.45
TOTADULT	1.86	1.82	1.83	1.82	1.81	1.93	1.91
Sample Size	1069230	7700	8100	8100	400	1452	1852

[1]For the PSTP, this value is the number of employed persons who work outside the home. Thus, it is less than that of the PUMS, which is the number of employed persons in a household.

cross classified variables and their interaction effects. Using this setting, one can test for significant contribution in explaining the cross-classification frequencies for a variety of interaction effects among the variables that are cross classified. Of particular interest here are the interaction effects between the sample indicator and the three other variables, which are the indicators of significant difference in the cell frequency between PSTP and PUMS.

Based on the saturated model (including all possible interaction effects) it was found that the three-way and four-way interactions are not significant contributors to the cell frequencies. A base model was then created that consisted of the main effects of all four variables and the two-way effects of income, HHSIZE, and NUMVEH. A series of alternate models was then formulated by adding a two-way interaction(s) of the sample indicator and one of the three anchor variables to the base model. Nested tests were also performed. The weight effectiveness performance test is based on the likelihood-ratio statistic, which is calculated as:

$$L^2 = 2\sum_i F_i \ln \frac{F_i}{F_i^{MODEL}} \qquad (6)$$

where:

F_i and F_i^{MODEL} = observed and expected frequencies, respectively (i.e., under the null hypothesis that the model is formulated correctly)

The degrees of freedom equal the number of categories minus one. When two models are compared, the difference in the likelihood-ratio test statistics between the alternate model and the base model is also &i-square distributed with degrees of freedom equal the difference in the number of parameters estimated between the two models. This can be expressed as:

$$L^2_{(2)} - L^2_{(1)} \sim \chi^2_{(df2-df1)} \qquad (7)$$

where:

$L^2_{(2)}$ and $L^2_{(1)}$ = the likelihood-ratio test statistics for the alternate and base models, respectively

df_2 and df_1 = the degrees of freedom of the alternate and base models, respectively

If the difference in L^2 exceeds the critical value of the chi-square distribution for a certain significance level, the added interaction term(s) would have a significant influence on the joint cell frequency. The base log-linear model is:

$$\ln(F_{ijkl}^{MODEL}) = \mu + \lambda_i^{Income} + \lambda_j^{HHSIZE} + \lambda_k^{NUMVEH} + \lambda_l^{SAMPLE} + \lambda_{ij}^{Income*HHSIZE} + \lambda_{jk}^{HHSIZE*NUMVEH} + \lambda_{ik}^{Income*NUMVEH} \quad (8)$$

The nested models in table 19 are obtained by adding an interaction term to the base model in equation 8.

Several loglinear models are estimated to investigate the Merence between the weighted PSTP and PUMS. Table 19 provides the decreases in likelihood-ratio test statistics when additional terms that interact with the sample indicator are added to the base model. At a significance level of 5 percent the interaction between income and sample is the only significant term among all the other two-way interactions considered. This suggests that the joint distributions of income in the weighted PSTP and PUMS are still different. This coincides with survey experience with income related problems. A more in-depth investigation reveals that a considerable amount of this difference is due to the joint cells of households with very low income (less than $15,000) and very high income (more than $70,000). This is in agreement with the early finding that very low and very high income population segments are missing from the PSTP sample.

Table 19. Differences in likelihood-ratio statistics between alternative and base models.

Interactions with Sample	Decrease in χ^2	Decrease in d.f.	Significance
Income	15.97	7	Significant
HHSIZE	6.35	7	Insignificant
NUMVEH	3.95	7	Insignificant
Income and HHSIZE	22.41	14	Insignificant
Income and NUMVEH	18.46	14	Insignificant
HHSIZE and NUMVEH	10.99	14	Insignificant
Income, HHSIZE, and NUMVEH	15.61	21	Insignificant

4. SUMMARY AND CONCLUSIONS

Methods for sample weight creation to account for the bias introduced by sample stratification, pre-wave self-selection, missing data, and multi-wave panel attrition are presented in this paper. The different weighting schemes shown here are tested using PUMS, from the U.S. census, as a benchmark sample. One such scheme is found to be performing as expected and desired, thus, achieving good representation of the Puget Sound population. However, due to sampling and non-sampling errors, possible incorrect model selection, and a limited number of explanatory variables in the proabilistic models, there are noticeable differences between the weighted PSTP and PUMS data (using a variety of weighting schemes), especially after applying the weight that considers the multi-wave panel attrition. The comparison presented here offers a factual proof that probabilistic weights for self-selection not only are theoretically sound but they perform well in adjusting cross-sectional samples (e.g., the weights for pre-wave self-selection) and panel survey samples (e.g., the weights derived for attrition).

Further improvements may be made during data collection using a variety of more complex model systems and weighting mechanisms. The true population distribution remains a hard target to achieve even when direct adjustments are made such as the direct PUMS weights to wave 2. Therefore, during survey administration one needs to recover as much participation as possible and to avoid the thorny selective participation in the survey. In addition, households that move out of the region and, thus, are dropped out of the panel (e.g., in the current version of PSTP) may need to be recruited so that panel attrition behavior can be differentiated from out-of-the region residential relocation.

Missing population segments and/or information for specific variables in the PSTP (e.g., household income) is another factor that causes the PSTP to diverge from the PUMS. Since the weights created using the anchor variables are the inverses of the ratios of the PSTP frequencies over the PUMS frequencies, the missing segments have zero weights. In other words, when a certain population segment is not present in the PSTP, it cannot be recovered in the weighting process. Other things being equal, the closeness of a weighted sample to the true population depends on how many population segments are retained in the sample. By

increasing the hissing segments we increase the dissimilarity between the weighted sample **and** the true population. Therefore, an essential way to reduce the gap between the weighted **sample and** the true population is to-decrease the missing population segments in the sample. Quality control and assurance during data collection can prevent the occurrence of missing population segments. However, this requires information on the true population. The decennial census, with detailed household and person socioeconomic information, is an **excellent** source and is a strong argument against discontinuing the U.S. census "long form," which contains important information on travel behavior. Alternatively, a transportation census (e.g., an expanded Nationwide Personal Transportation Survey) will always be needed as benchmark information. If information is needed for years that are between two consecutive censuses, methods to "microsimulate" detailed population characteristics exist and can be used to obtain benchmark samples (for an example see Citro and Hanushek, 1991, and an application in travel demand forecasting Goulias, 1992).

The significant residual x^2 values (e.g., in correspondence of income in tables 18 and 19) lead to the conclusion that the missing income algorithm used may need further refinement. In addition, the attrition model needs further refinement and alternate formulations may perform better than the ordered probit model used here. A variety of other models are currently being estimated to determine if a better solution can be achieved in terms of assumptions and model specifications. For household-based applications, however, the weights presented here are sufficient for the creation and testing of trip generation, trip distribution, and modal split models. Based on the results here, we believe that the application of panel attrition weights in waves subsequent to the second will bring the PSTP sample closer to the true population and PSTP can be used as a tracking device of the Puget Sound region.

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ANALYSIS OF LONGITUDINAL DATA FROM THE PUGET SOUND TRANSPORTATION PANEL

Task E: **Modal Split Analysis**

DRAFT FINAL REPORT

Volumes 1, 2, 3, **and 4**

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TASK E - VOLUME 1

Overview of Travel Trends in the Puget Sound Panel Data 19894993

Participants Completing All Four Waves

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Introduction

The following description summarizes the trends in travel patterns over four waves of the Puget Sound Panel Data. The waves of the survey were conducted in the years 1989, 1990, 1992, and 1993. Frequencies and means were calculated for a variety of purposes and by a variety of modes, and these were compared from wave to wave. The primary goal was to study travel behavior using only those participants of the survey who completed travel in all four waves. The 1527 participants and their trip records were included in calculating the summary statistics used in the following report. This eliminated the biases in frequencies (and conceivably means) resulting from drop-outs from and add-ins to the sampling population. Therefore, these statistics may be interpreted only as a reflection of the population if it can be assumed that the sample of people who participated in all four waves of the survey is a representative sample of the population.

The trips were categorized by purpose (destinations):

(A) work,
(B) shopping
(C) socio-recreational (visiting, free-time), or
(D) other (not including home).

The trips were further categorized by mode:

(1) driving alone,
(2) HOV-pool (carpool, vanpool, taxi),
(3) HOV-transit (bus, paratransit), or
(4) non-motor (biking, walking).

Each trip of each wave is characterized by three variables:

- Total Trips = the total number of trips made by the traveler that day,
- Duration = the length (in minutes) of the trip, and
- Distance = the length (in miles) of the trip.

Sample means for these variables were calculated along with their estimated standard error. Column charts depicting the changes in these means with increasing waves were also examined along with individual confidence intervals. Error bars at 2 standard errors above and below the sample means mark approximate 95% confidence intervals.

Work Trips

Overview of means

The number of work trips generally increased over the four waves for all mode types, with the **exception** of HOV-transit. The changes in frequency appeared to be proportional to the magnitude of the frequencies, so relative increases in the frequencies were calculated (p. A-l). The number of work trips made by driving alone increased by 21.05% **from** wave 1 to wave 4. The number of work trips made by HOV-pool and non-motor also increased by a comparable 21.50% and 14.02% respectively. The **increases in** work trip frequencies for these three modes **was the** result of **a sharp increase in frequency** from wave 1 to wave 2, followed by **a small** decrease in wave 3, **and a slight increase in**

wave 4. It appears there was a great surge of work trips in wave 2 followed by a drop in **wave 3** and a slight increase again in wave **4.** In contrast, the number of work trips made by HOV-transit decreased by 27.13% from wave 1 to wave 4. This also was marked by an increase, though barely perceptible, in frequencies from wave 1 to wave 2, and a dramatic decrease in wave 3. Similar to the other three waves, there was a slight increase in wave **4.** However, the overall changes for HOV-transit work trips amount to a general decrease stemming mainly from the dramatic decrease between wave 2 and wave 3.

Total Trips (pp. A-2 & A-3):

The mean total trips for trips taken to work was highest for non-motor trips (approximately 7 over the four waves), and lowest for HOV-transit trips (approximately 5). This implies that a typical non-motor trip to work was made by a person who traveled approximately 7 trips daily while a typical HOV-transit trip to work was made by a person who traveled approximately 5 trips daily.

Trends with wave:

The mean total trips for work trips made driving alone was 5.35 during wave 1, and increased to 6.04 during wave 2. This is a radical increase when compared using the standard errors for the mean, which in both waves is 0.07 (p. A-2). This implies that the typical work trip made by driving alone in wave 1 was made by a traveler who took approximately 5.35 total trips daily. This number increased significantly to 6.04 for wave 2. **Total** trips for waves 3 and 4 decreased some and leveled off. In general, the commuters who drove to work alone made significantly more total trips during waves 2, 3, and 4 than they did when driving to work alone in wave 1. Similarly, the mean total trips for HOV-pool work trips was 5.72 for wave 1, and increased to 6.85 by wave **4. As** with commuters who drove alone, the commuters who used HOV-pool to go to work made significantly more total trips in waves 2, 3, and 4 than they did in wave 1. Conversely, the mean total trips for work trips made by both HOV-transit and non-motor modes appeared to decrease as a general trend However, the sample sizes for trips made by these modes were small and, as a result, the standard errors for these means are large. It is not clear that a signficant decrease exists for total trip means for these modes.

Duration (pp. A-2 & A-4):

The relationship between work trip modes with respect to the mean duration of trips was opposite that of the relationship with respect to the mean total trips. For example, the mean total trips was greatest for non-motor trips whereas the mean duration was smallest for non-motor trips. Also, the mean total trips was smallest for HOV-transit trips while the mean duration was largest for HOV-transit trips. The typical non-motor work trip was approximately 10 minutes while the typical HOV-transit work trip was approximately 35 minutes. Work trips made by both modes driving alone and HOV-pool were approximately 20 minutes.

Trends with wave:

Mean durations were relatively stable from wave to wave. However, there was a slight decreasing trend in mean duration for work trips taken by HOV-pool There was

also a slight increasing trend in mean duration for work trips taken by **HOV-transit. The** mean duration for non-motor work trips fluctuated too much to reveal any trends.

Distance (pp. A-2 & A-5):

The relationship between the work trip modes with respect to the mean distance of trips was similar to the relationship with respect to the mean durations in that trips made by HOV-transit held the highest mean distance at 1 l-12 miles. Mean distance was next highest with the two modes, driving alone and taking HOV-pool, at approximately 9 miles. Non-motor work trips were shortest at 1-2 miles.

Trends with wave:

Mean distances were relatively stable from wave to wave for trips made by driving alone and non-motor trips. The mean distance for HOV-pool work trips varied over the four waves without revealing any patterns.

Overview of distributions

Total Trips:

Driving alone (pp. A-6 & A-10): The distributions of total trips were zig-zag with peaks occuning at even numbers of total trips. With respect to wave, frequencies for all values of total trips generally increased uniformly, though the frequencies tended to be highest in the second or third waves.

Taking HOV-pool **(pp. A-7 & A-13): The** distributions of total trips were zig-zag with peaks occurring at even numbers of total trips. With respect to **wave, the frequencies** for HOV-pool work trips made by travelers taking 3 or fewer daily trips decreased Conversely, the frequencies for HOV-pool work trips made by travelers taking 4 or more daily trips generally increased with wave. This undoubtedly contributed to a shifting of the central tendency towards higher total trips associated with HOV-pool work trips and is consistent with our observation of a rising mean for total trips in this category.

Taking HOV-transit **(pp.** A-8 & **A-16): The distributions of** total trips were zig-zag with peaks ocurring at even numbers of total trips. With respect to wave, the frequencies for HOV-transit **work** trips generally decreased for travelers taking 3 **or** fewer daily trips. Similarly, there was also a decrease in HOV-transit work trips for travelers taking 9 or more daily trips. In other words, the tail ends of the distribution of total trips for HOV-transit work trips became smaller, resulting in a smaller variance for the distribution of total trips in this category. The frequencies for other values of total trips fluctuated with no pattern.

Taking non-motor (pp. A-9 & A-19): The distributions **of** total trips were zig-zag with peaks occurring **at even** numbers **of total trips.** With respect to wave, the frequencies increased for larger values of total trips, implying that more non-motor work trips were

made by people who take many daily trips. The frequencies fluctuated with no apparent pattern with respect to wave.

Duration:

The graphs depict the frequency distributions for duration. Since the scaling for the horizontal axis is not broken into equal intervals, the interpretation for the shapes of the distributions should be done carefully. Distributions which are skewed to the right will appear to be bimodal on the graphs. Distributions which are symmetric will appear to be skewed to the left.

Driving alone (pp. A-6 & A-l 1): The distributions of durations were skewed to the right indicating that while a majority of work trips were within 15-20 minutes, the commute times stretched out as high as 60 minutes. With respect to wave, the frequencies of trips uniformly increased for all durations, though the frequencies tended to be highest in the second or third waves.

Taking HOV-pool (pp. A-7 & A-14): The distributions of durations were also skewed to the right; a majority of the trips to work were within 15 minutes while the commute times stretched out to 60 minutes. With respect to wave, the frequencies for HOV-pool work trips taking 6-20 minutes increased, while the frequencies for other trip durations did not appear to change according to any pattern.

Taking; HOV-transit (pp. A-8 & A-17): Unlike the distributions of duration times for the two modes above, the majority of trips were greater than 20 minutes. With respect to wave, the frequencies for HOV-transit work trips generally decreased for trips taking less than 30 minutes, however, the frequencies were relatively constant for trips taking greater than 30 minutes (with an exception of a peak during wave 2 for trips taking between 30 minute to an hour).

Taking non-motor (pp. A-9 & A-20): The distributions were skewed to the right indicating a majority of non-motor trips taking less than 10 minutes, but occasionally as long as an hour. With respect to wave, the frequencies fluctuated with no apparent pattern with respect to wave.

Distance:

The graphs depict the frequency distributions for distance. Since the scaling for the horizontal axis is not broken into equal intervals, the interpretation for the shapes of the distributions should be done carefully. Distributions which are skewed to the right will appear to be bimodal on the graphs. Distributions which are symmetric will appear to be skewed to the left.

Driving alone (pp. A-6 & A-12): The distributions of distances were skewed to the right indicating that while a majority of work trips were within 10 miles, the commute distances

stretched out as high **as 30** miles. With respect to wave, the frequencies of trips uniformly increased for all distances, with the notable exception that the frequency for tripstaken **within 5** miles peaked in the second wave.

Taking HOV-pool (pp. A-7 & A-15): The distributions of distances were also skewed to the right; a majority of the trips to work were within 10 miles while the commute distances stretched out to 30 miles. With respect to wave, the frequencies were increasing uniformly for all trip distances after wave 1, however, this was not an apparent continuing trend for later waves.

Taking HOV-transit (pp. A-8 & A-18): The distributions of distances may either have been skewed slightly to the right or relatively symmetric. A majority of trips to work were **within 20** miles. With respect to wave, there was a substantial decrease in HOV-transit work trips less than 20 miles long while the number of HOV-transit work trips remained somewhat constant for trips at least 20 miles long.

Taking non-motor (pp. A-9 & A-21): The distributions were skewed to the right indicating a majority of non-motor trips taking 5 miles or less. With respect to wave, the frequencies fluctuated with no apparent pattern.

Shopping Trips

Overview of means

The number of shopping trips consistently decreased over the four waves for ah mode types. The number of shopping trips made by driving alone decreased by 27.23% from wave 1 to wave 4. The number of shopping trips made by HOV-pool, HOV-transit also decreased by 38.94% and 63.41% respectively. The frequency of non-motor shopping trips decreased by 36.36% from wave 1 to wave 3, however, the frequency increased in wave **4,** giving only a 25.76% overall decrease relative to wave 1.

Total Trips (pp. B-2 & B-3):

The mean Total Trips for shopping trips were comparable for all modes (approximately 6.5) with the exception of HOV-transit, which had considerably less total trips (approximately 5). This implies that a typical shopping trip made by HOV-transit was made by a person who traveled approximately 5 trips daily while a typical shopping trip made by any other mode was made by a person who traveled at least 6 trips daily.

Trends with wave:

The means for all modes changed from wave to wave. HOV-pool shopping trips were characterized by increasing total trips and shopping trips made by other modes were characterized by decreasing total trips For the HOV-transit and non-motor modes, however, the difference is not striking when compared using the standard errors, which are large due to small sample sizes.

Duration (pp. B-2 & B-4):

The relationship-between shopping trip modes with respect to the mean duration of trips was opposite that of the relationship with respect to the mean total trips. For example, the mean total trips was smallest for HOV-transit trips **whereas the** mean duration was greatest for HOV-transit trips. As with mean total trips, the mean duration for the 3 other trip modes were relatively equal. The typical HOV-transit shopping trip took approximately 25-30 minutes while the typical shopping trip by any other mode took only 10- 15 minutes.

Trends with wave:

Mean durations were relatively stable from wave to wave, with the exception of trips made by HOV-transit. The mean duration of HOV-transit shopping trips decreased from 34 minutes to 24 minutes over the span of the four waves. However, not only was this based on **a** small sample, but one whose durations had a large variance, so the trend may not be statistically significant.

Distance (pp. B-2 & B-5):

The mean distances for shopping trips were relatively equal (approximately 4 miles) for trips made by driving alone, HOV-pool, and HOV-transit. The distances for non-motor trips however were substantially less at 1 mile.

Trends with wave:

Mean distances were relatively stable from wave to wave for trips made by driving alone and non-motor trips. The mean distance for HOV-pool shopping trips substantially increased from 4.39 miles to 5.65 miles over the span of the four waves. The mean distance for HOV-transit shopping trips were stable throughout the first three waves but dropped at the fourth wave. With a sample size of only 15 for the **HOV-transit** shopping trips, the drop is not a significant one.

Overview of distributions

Total Trips:

Driving alone (pp. B-6 & B-10): With respect to wave, the **frequencies** of driving-alone **shopping trips** characterized with 4 or less total trips were relatively constant with respect to wave, while the frequencies for driving-alone shopping trips characterized by 5 or more total trips decreased. This implies a decrease, with wave, in the number of driving-alone shopping trips being traveled by people who took 5 or more daily trips.

Taking HOV-pool (pp. B-7 **&** B-13): With respect to wave, the frequencies of **HOV-pool shopping trips** made by travelers taking 5 or fewer daily trips fluctuated with no discernible pattern, however the frequencies of HOV-pool shopping trips made by travelers taking more than 5 trips daily dropped This implies **that there were** a fewer

number of HOV-pool shopping trips being traveled by people who took 5 or more daily trips

Taking HOV-transit (pp. B-8 & B-16): The frequency distributions for HOV-transit shopping trips fluctuated wildly, probably as a result of small sample sizes. No patterns with wave are apparent.

Taking non-motor (pp. B-9 & B-19): The frequency distributions for non-motor shopping trips also fluctuated greatly, as a result of small sample sizes. No patterns with wave are apparent.

Duration:

The graphs depict the frequency distributions for duration. Since the scaling for the horizontal axis is not broken into equal intervals, the interpretation for the shapes of the distributions should be done carefully. Distributions which are skewed to the right win appear to be bimodal on the graphs. Distributions which are symmetric will appear to be skewed to the left.

Driving; alone (pp. B-6 & B-l 1): The **distributions** of durations were skewed to the right indicating that while a majority of work trips were within 15-20 minutes, the commute times stretched out as high as 60 minutes. The frequencies of trips uniformly decreased with respect to wave for all durations.

Taking HOV-pool (pp. B-7 & B-14): The distributions of durations were also skewed to the right; a majority of the trips to work were within 15 minutes the the commute times stretched out to 60 minutes. The frequencies of trips generally decreased with respect to wave for all durations.

Taking HOV-transit (pp. B-8 & B-17): Unlike the skewed distributions of duration times for the two modes above, the distributions of duration times were spread out over commute times ranging from 0 to 60 minutes. The frequencies of trips generally decreased with respect to wave for all durations.

Taking non-motor (pp. B-9 & B-20): The distributions of durations were skewed to the right indicating a majority of non-motor trips taking less than 15 minutes, but occasionally as long as an hour. The frequencies fluctuated with no apparent pattern, though generally decreased with respect to wave for all durations.

Distance:

The graphs depict the frequency distributions for distance. Since the scaling for the horizontal axis is not broken into equal intervals, the interpretation for the shapes of the distributions should be done carefully. Distributions which are skewed to the right will

appear to be bimodal on the graphs Distributions which are metric will appear to be skewed to the left.

Driving alone (pp. B-6 & B-12): The distributions of distances were skewed to the right indicating that while a majority of shopping trips were within 5 miles, the commute distances stretched out as high as 30 miles. With respect to wave, the frequencies of trips uniformly decreased for all distances.

Taking HOV-pool (pp. B-7 & B-15): The distributions of distances were also skewed to the right; a majority of the shopping trips were within **5** miles while the commute distances stretched out to **30** miles. with respect to wave, the frequencies were generally smaller for all distances, especially for trip distances within **5 miles.**

Taking HOV-transit (pp. B-8 & B- 18): The distributions of distances were also skewed to the right; **a majority** of the shopping trips were within 5 miles while the distances stretched out to 20 miles. With respect to wave, the frequencies were generally decreasing.

Taking non-motor (pp. B-9 & B-21): The distributions were skewed to the right indicating **a majority** of non-motor shopping trips taking 5 miles or less. The frequencies decreased over the first three waves, but increased somewhat in the fourth wave.

Socio-Recreational Trips

Overview of means

The number of sock-recreational trips consistently decreased over the four waves for all mode types with the exception of HOV-transit which peaked during wave **2** and remained relatively high with respect to wave 1. However, the numbers of **HOV-transit** trips used for so&-recreation were very small (on the order of 20 as compared with the hundreds of trips made by driving alone and HOV-pool). The number of socio-recreational trips made by driving alone decreased by 15.36% from **wave** 1 to wave **4.** The number of s&o-recreational trips made by HOV-pool and non-motor also decreased by 31.36% **and** 41.53% respectively. The frequency of HOV-transit trips increased by **28.57%,** but with the small sample sizes for this category, this amounted to an increase of **only 4 trips.**

Total Trips (pp. C-2 & C-3):

The mean total trips for so&-recreational trips were comparable for all modes (approximately 6.5) with the exception of HOV-transit, which had considerably less total trips during the last three waves (approximately **5).** This implies that **a** typical HOV-transit socio-recreational trip was made by **a** person who traveled approximately 5 trips daily while **a** typical sock-recreational trip by any other mode was made by **a** person who traveled at least 6 trips daily.

Trends with wave:

The means fix all modes changed from wave to wave. Socio-recreational trips made by driving alone and HOV-pool were characterized by slightly decreasing total trips, socio-recreational trips made by HOV-transit were characterized by dramatically decreasing total trips (from 8.21 in wave 1 down to 4.50 in wave 2), and non-motor sock-recreational trips were characterized by unchanging total trips. For all three motor modes, the decreases are striking when compared using the standard errors.

Duration (pp. C-2 & C-4):

The relationship between socio-recreational trip modes with respect to the mean duration of trips was opposite that of the relationship with respect to the mean total trips. For example, the mean total trips was smallest for HOV-transit trips whereas the mean duration was greatest for HOV-transit trips. As with mean total trips, the mean durations for the 3 other trip modes were relatively equal, though durations for non-motor socio-recreational trips decreased with wave. The typical HOV-transit trip fluctuated between **10** and 50 minutes while all other trips tended to be around 10 to 20 minutes.

Trends with **wave:**

Mean durations were relatively stable from wave to wave for socio-recreational trips made by driving alone (approximately 15 minutes) and HOV-pool (approximately 20 minutes). The mean durations of HOV-transit so&-recreational trips increased from 12.57 minutes to 49.71 minutes over the first three waves and dropped down to 37.28 in the fourth wave. Although the sample sizes for this group were small the differences are significant when compared with the standard errors. The mean durations of non-motor socio-recreational trips also changed significantly with **a** decrease from 17.79 minutes to 8.55 minutes over the span of the four waves.

Distance (pp. C-2 & C-5):

The mean distances for so&-recreational trips were relatively equal (approximately 5 **or 6** miles) for trips made by driving alone and HOV-pool The distances for non-motor trips however were substantially less at 1 mile, and the distances for HOV-transit ranged from 2 to 14 miles over the four waves.

Trends with wave:

Mean distances increased slightly for socio-recreational trips made by driving alone (from 5.13 to 6.18 miles) and HOV-pool (from 5.42 to 7.50 ‘miles) over the span of the four waves. Distances for HOV-transit socio-recreational trips fluctuated wildly from 1.53 to 14.31 miles in the first three waves and down to 6.29 miles in the fourth wave. Although the sample sizes for this group were small, the standard errors imply the changes are significant. There were no outstanding changes in mean distances for non-motor socio-recreational trips.

Overview of distributions

T o t a l T r i p s :

Driving alone (pp. C-6 & C-10): With respect to wave, the frequencies of driving alone so&-recreational trips characterized by 3 or less total trips appeared to increase with wave, while the frequencies for driving alone socio-recreational trips characterized by 4 or more total trips decreased. This implies that there were a greater number of driving alone socio-recreational trips being traveled by people who took 3 or less daily trips, and a fewer number of driving alone socio-recreational trips being traveled by people who took 4 or more daily trips.

Taking HOV-pool (pp. C-7 & C-13): The frequencies of HOV-pool socio-recreational trips made by travelers taking 4 or less daily trips fluctuated with no discernible pattern, however the frequencies of HOV-pool socio-recreational trips made by travelers taking more than 4 trips daily decreased with wave. This implies that there were a fewer number of HOV-pool socio-recreational trips being traveled by people who took more than 5 daily trips.

Taking HOV-transit (pp. C-8 & C-16): The frequency distributions for HOV-transit socio-recreational trips fluctuated wildly, probably as a result of small sample sizes. No sensible patterns are apparent.

Taking non-motor (pp. C-9 & C-19): The frequencies of non-motor socio-recreational trips decreased after wave 1 but it is not apparent that this trend continued for the last three waves.

Duration:

The graphs depict the frequency distributions for duration. Since the scaling for the horizontal axis is not broken into equal intervals, the interpretation for the shapes of the distributions should be done carely. Distributions which are skewed to the right will appear to be bimodal on the graphs. Distributions which are symmetric will appear to be skewed to the left.

Driving alone (pp. C-6 & C-l 1): The distributions of durations were skewed to the right indicating that while a majority of work trips were within 15 minutes, the commute times stretched out as high as 60 minutes. The frequencies of trips generally decreased tier wave 1 for all durations though it is not apparent that this trend continued through the last three waves

Taking HOV-pool (pp. C-7 & C-14): The distributions of durations were also skewed to the right; a majority of the trips to work were within 15 minutes while the commute times stretched out to 60 minutes. The frequencies of trips uniformly decreased with respect to **wave** for all durations.

Taking HOV-transit (pp. C-8 & C-17): The frequency disbrutions for HOV-transit socio-recreational trip's fluctuated wildly, probably as a result of small sample sizes No sensible patterns are apparent.

Taking non-motor (pp. C-9 & C-20): The distributions of durations were skewed to the right indicating a majority of non-motor socio-recreational trips taking less than 15 minutes, but occasionally as long as an hour. The frequencies decreased after wave 1 for all durations, though it is not apparent that this was a continuing trend for the remaining three waves.

Distance:

The graphs depict the frequency distributions for distance. Since the scaling for the horizontal axis is not broken into equal intervals, the interpretation for the shapes of the distributions should be done carefully. Distributions which are skewed to the right will appear to be bimodal on the graphs. Distributions which are symmetric will appear to be skewed to the left.

Driving alone (pp. C-6 & C-12): The distributions of distances were skewed to the right indicating that while a majority of so&-recreational trips were within 5 miles, the commute distances stretched out as high as 30 miles. With respect to wave, the frequencies of trips decreased for all distances, though not necessarily a continuing trend for the remaining three waves.

Taking; HOV-pool (pp. C-7 & C-15): The distributions of distances were also skewed to the right; a majority of the socio-recreational trips were within 5 miles while the commute distances stretched out to 30 miles With respect to wave, the frequencies were generally smaller for all distances, especially for trip distances within 5 miles.

Taking: HOV-transit (pp. C-8 & C-18): The distributions of distances were also skewed to the right; a majority of the so&-recreational trips were within 5 miles while the distances stretched out to 20 miles. With respect to wave, the frequencies increased after wave 1 for all distances though not necessarily a continuing trend for the remaining three waves.

Taking non-motor (pp. C-9 & C-21): The distributions of distances were skewed to the right indicating a majority of non-motor socio-recreational trips taking 5 miles or less. With respect to wave, the frequencies decreased after the first wave, but stabilized for the last three waves.

Other Trips

Overview of means

The number of other trips consistently decreased over the four waves for all mode types with the exception of non-motor which decreased during waves 2 and 3 but increased in wave 4 back to its wave 1 1evel The number of other trips made by driving alone decreased by 17.00% from wave 1 to wave 4. The number of other trips made by HOV-pool and HOV-transit also decreased by 16.41% and 63.81% respectively. The frequency of non-motor trips decreased by as much as 19.23% in wave 2, but increased to only 1.92% down from its original wave 1 level in wave **4.**

Total Trips (pp. D-2 & **D-3):**

The mean total trips for other trips were comparable for all modes (approximately 7 with the exception of HOV-transit, which had considerably less total trips during the Last three waves (approximately 5.5). This implies that a typical HOV-transit other trip was made by a person who traveled approximately 5.5 trips daily while a typical other trip by any other mode was made by a person who traveled at least 6 trips daily.

Trends with wave:

Other trips made by driving alone and HOV-pool were characterized by decreasing total trips, other trips made by HOV-transit were characterized by slightly and probably insignificant decreasing total trips, and non-motor other trips were characterized by a peak in wave **2** which appears dramatically larger than the mean total trips for wave 1.

Duration (pp. D-2 & D-4):

The relationship between other trip modes with respect to the mean duration of trips was opposite that of the relationship with respect to the mean total trips. For example, the mean total trips was smallest for HOV-transit trips whereas the mean duration was greatest for HOV-transit trips, As with mean total trips, the mean durations for the 3 other trip modes were relatively equal, though durations for non-motor other trips decreased with wave. The typical HOV-transit trip was approximately 30 minutes long as compared with the typical driving-alone or HOV-pool trip which was 15 minutes long. Non-motor trips were more on the order of 12 minutes.

Trends with wave:

Mean durations were relatively stable from wave to wave for other trips made by driving alone and HOV-pool (approximately 15 minutes). The mean durations of HOV-transit other trips was also stable at approximately 30 minutes. Non-motor was the only mode which changed with wave and it decreased down from 13.29 minutes to 10.12 minutes over the span of the four waves.

Distance (pp. D-2 & D-5):

The mean distances for other trips were relatively equal (approximately 5.5 miles) for trips made by driving alone and HOV-pool The distances for non-motor trips were

substantially less **at** 1 mile, and the distances for **HOV-transit ranged from 5** to 8 miles **over the** four waves

Trends with wave:

Mean distances were stable for other trips made by driving alone, HOV-pool, and **non-motor.** Distances for HOV-transit other trips decreased from 7.96 to 4.7 1 between wave 1 and wave 4. The sample sizes for this group were not too small (order of 100) but since the variance in the sample was large, then it is not obvious that the decrease is a significant one.

Overview of distributions

Total Trips:

Driving alone (pp. D-6 & D-10): With respect to wave, the frequencies of driving-alone other trips characterized by 4 or less total trips appeared to remain constant with wave, while the frequencies for driving-alone other trips characterized by 5 or more total trips decreased. This implies that there was a smaller number of driving-alone other trips being traveled by people who took 5' or more daily trips.

Taking HOV-pool (pp. D-7 & D- 13): The frequencies of HOV-pool other trips made by travelers taking 7 or less daily trips fluctuated with no discernible pattern, however the frequencies of HOV-pool other trips made by travelers taking more than 7 trips daily decreased with **wave.** This implies that there were a fewer number of HOV-pool other trips traveled by people who took more than 7 daily trips.

Taking HOV-transit (pp. D-8 & D-16): The frequencies of HOV-transit other trips fluctuated widely but appears to have generally decreased with wave.

Taking non-motor (pp. D-9 & D- 19): The frequencies of non-motor other trips fluctuated with no obvious trend

Duration:

The graphs depict the frequency distributions for duration. Since the scaling for the horizontal axis is not broken into equal intervals, the interpretation for the shapes of the distributions should be done carefully Distributions which are skewed to the right will appear to be bimodal on the graphs. Distributions which are symmetric will appear to be skewed to the left.

Driving alone (pp. D-6 & D-1 1): The distributions of durations were skewed to the right indicating that while a majority of work trips were within 15 minutes, the commute times stretched **out as high** as. 60 minutes. The frequencies of trips generally decreased after wave 1 for all durations though it is not apparent that this trend continued through the last three waves.

Taking HOV-pool (pp. D-7 & D-14): The distributions of durations were also skewed to the right; a majority of the trips to work were within 15 minutes while the commute times stretched out to 60 minutes The frequencies of trips decreased for those trips taking less than 15 minutes, and appeared unchanged for those trips taking more than 15 minutes.

Taking HOV-transit (pp. D-8 & D-17): The distributions appear relatively spread out over the hour. The frequencies of HOV-transit other trips generally decreased after wave 1 for all durations though it is not apparent that this trend continued through the last three waves.

Taking non-motor (pp. D-9 & D-20): The distributions of durations were skewed to the right indicating a majority of non-motor other trips taking less than 15 minutes, but occasionally as long as an hour. The distributions appear to become more right-skewed with increasing wave. By wave **4,** the majority of non-motor other trips take less than 10 minutes.

Distance:

The graphs depict the frequency distributions for distance. Since the scaling for the horizontal axis is not broken into equal intervals, the interpretation for the shapes of the distributions should be done carefully Distributions which are skewed to the right will appear to be bimodal on the graphs. Distributions which are symmetric will appear to be skewed to the left.

Driving alone (pp. D-6 & D-12): The distributions of distances were skewed to the right indicating that while a majority of other trips were within 5 miles the commute distances stretched out as high as 30 miles. With respect to wave, the frequencies of trips generally decreased uniformly over all distances, especially for those trips within 5 miles.

Taking HOV-pool (pp. D-7 & D-15): The distriions of distances were also skewed to the right; a majority of the other trips were within **5** miles while the commute distances stretched out to 30 miles. With respect to wave, the frequencies were smaller for trips less than 5 miles long, but unchanged for trips longer than 5 miles.

Taking **HOV-transit** (pp. D-8 & IT 18): The distributions of distances were also skewed to the right; a majority of the other trips were within 5 miles while the distances stretched out to 20 miles. With respect to wave, the frequencies generally decreased uniformly over all distances.

Taking non-motor (pp. D-9 & D-21): The distributions of distances were skewed to the right indicating a majority of non-motor other trips taking 5 miles or less. With respect to the first wave, the frequencies for trips decreased during waves 2 and 3, but increased back up to its original level during wave 4.

Conclusion

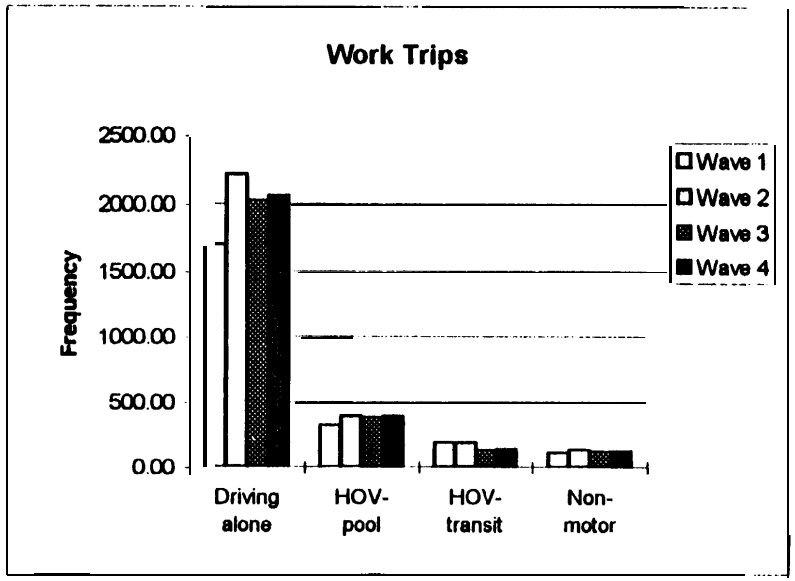
The travel trends varied in many ways with respect to frequencies and means for total trips, durations, and distances, and with respect to distributions However, the following patterns, with respect to wave, reoccurred throughout the study (with occasional exceptions which appeared to strongly contradict the pattern):

- Frequencies of work trips increased for all modes.
- Frequencies of all other trips (shopping, socio-recreational, and "other," which does not include home) decreased for all modes.
- As frequencies decreased, total trips increased, duration decreased, and distances decreased (this latter relationship with distances was mainly true for the motor modes) and vice versa.
- Relative distributions, for the most part, remained the same (The heights of the frequency distributions would go uniformly up or down with increasing or decreasing numbers of trips). In a few cases, it could be observed that a distribution shifted (when parts of the distribution would increase but other parts would not) 'which would result in such things as changing means, variances, or skewness for that distribution.
- Notable exceptions and other impressive patterns:
    - Frequencies of work trips decreased for HOV-transit (p. A-l)
    - Frequencies of socio-recreational trips increased for HOV-transit, though with a small sample this result is not overwhelming. (p. C-l)
    - HOV-transit shopping trips had an increasing mean of total trips and a decreasing mean in durations, but the expected corresponding relationship with trip frequency and mean distances did not occur. In particular, trip frequency decreased. (pp. B-l through B-5)
    - HOV-transit socio-recreational trips had a decreasing mean of total trips and, correspondingly, increasing means of durations and distances; this is somewhat surprising since frequencies increased for this group. (pp. C-l through C-5)
    - HOV-transit "other" trips (not work, shopping, socio-recreational, nor home) had a decreasing mean of distance and a decreasing mean in total trips. Trip frequency decreased and mean duration appeared unchanged (pp. D-l through D-5)

Work Trip Frequencies

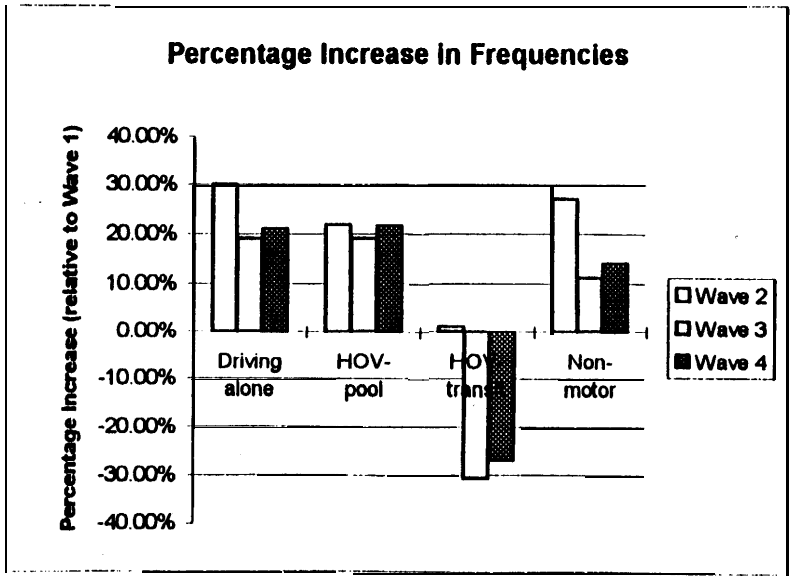
Frequencies of Work Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	1701.00	2213.00	2023.00	2059.00
HOV-pool	321.00	391.00	382.00	390.00
HOV-transit	188.00	190.00	130.00	137.00
Non-motor	107.00	136.00	119.00	122.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	30.10%	18.93%	21.05%
HOV-pool	21.81%	19.00%	21.50%
HOV-transit	1.06%	-30.85%	-27.13%
Non-motor	27.10%	11.21%	14.02%



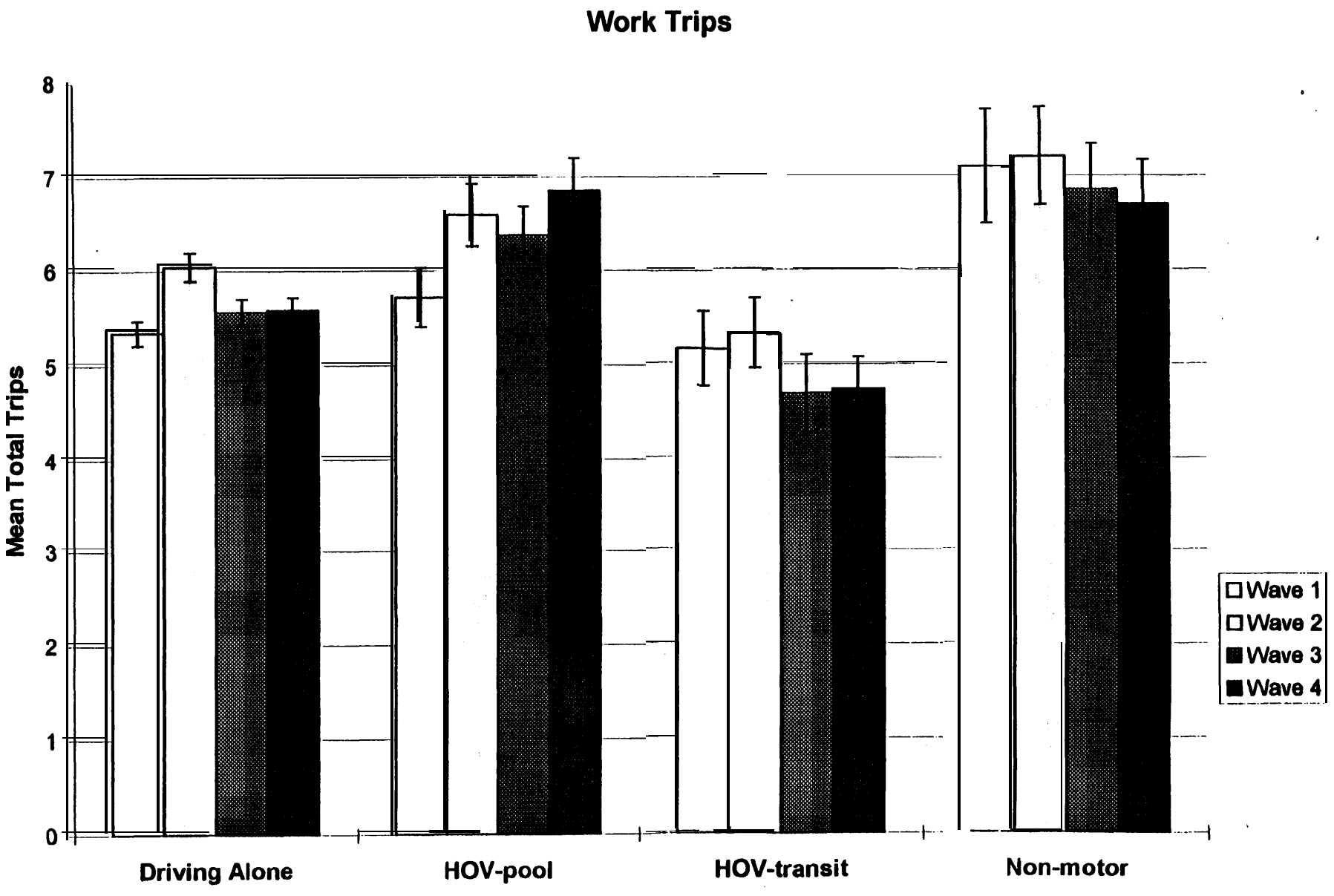
Work Trip Means

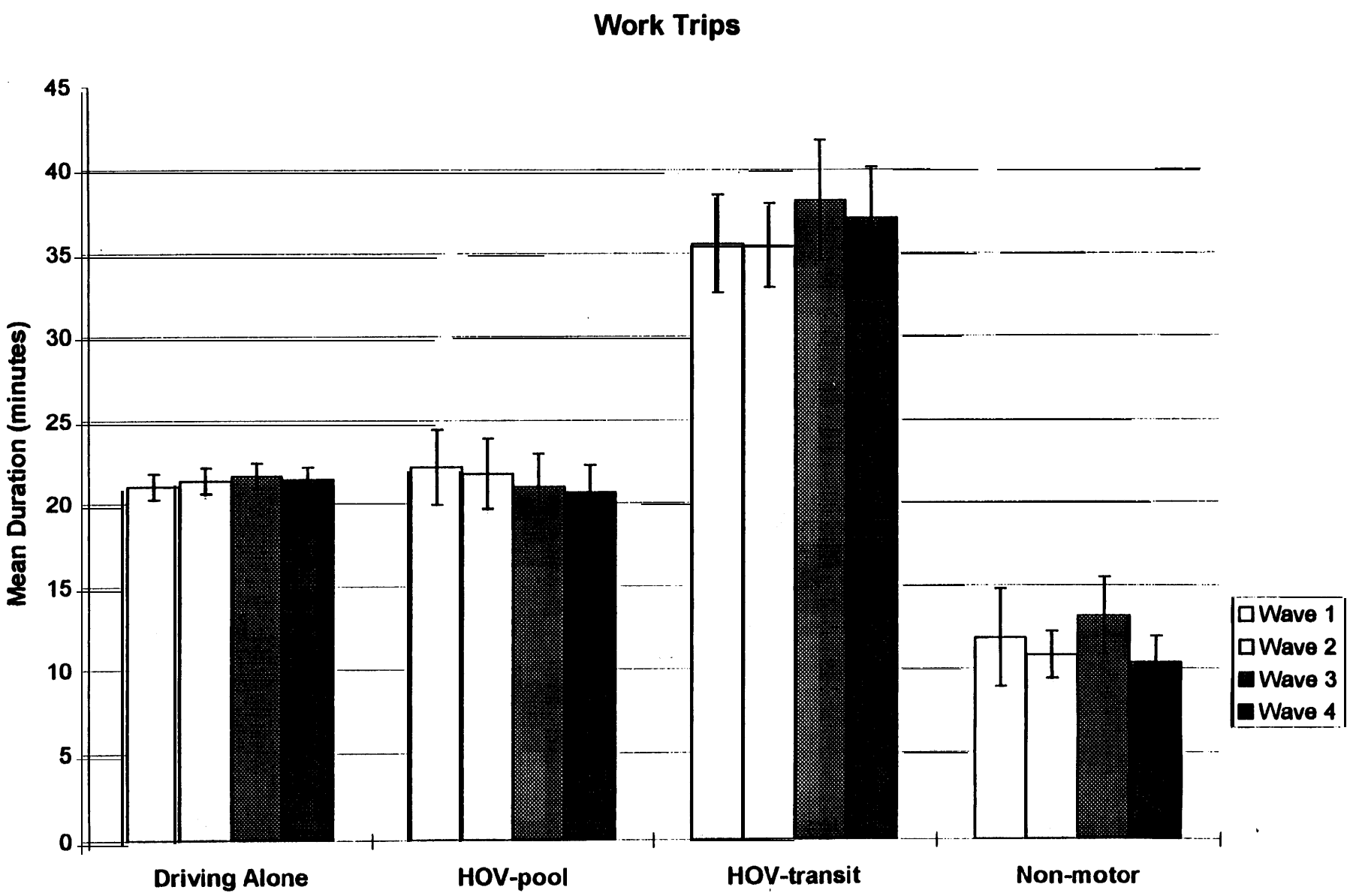
(and standard deviation and standard error)

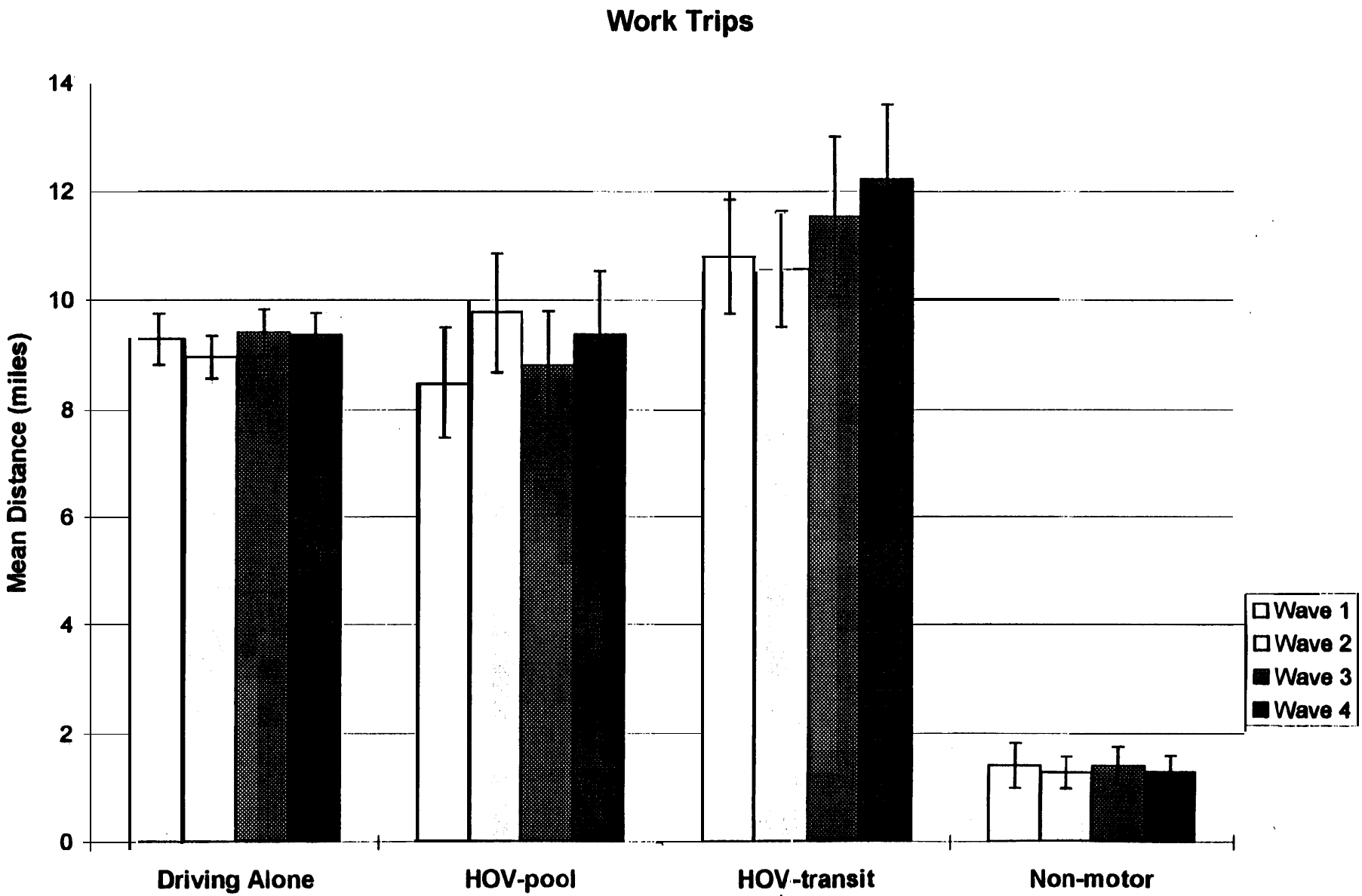
TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**5.35**	**6.04**	**5.57**	**5.59**
		2.72	3.44	3.02	2.96
		0.07	0.07	0.07	0.07
	HOV-pool	**5.72**	**6.59**	**6.37**	**6.85**
		2.74	3.32	3.03	3.51
		0.15	0.17	0.16	0.18
	HOV-transit	**5.15**	**5.32**	**4.69**	**4.74**
		2.69	2.55	2.36	1.99
		0.20	0.18	0.21	0.17
	Non-motor	**7.09**	**7.21**	**6.85**	**6.69**
		3.17	3.08	2.70	2.64
		0.31	0.26	0.25	0.24

DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**21.01**	**21.35**	**21.64**	**21.45**
		16.27	18.42	17.72	16.30
		0.39	0.39	0.39	0.36
	HOV-pool	**22.18**	**21.77**	**20.98**	**20.62**
		20.50	21.00	19.71	16.56
		1.14	1.07	1.01	0.84
	HOV-transit	**35.54**	**35.44**	**38.14**	**37.10**
		20.22	17.42	20.61	17.95
		1.47	1.26	1.81	1.53
	Non-motor	**11.83**	**10.80**	**13.16**	**10.37**
		15.12	8.18	12.69	8.63
		1.46	0.71	1.16	0.78

DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**9.28**	**8.95**	**9.40**	**9.35**
		9.41	8.86	9.36	9.15
		0.23	0.19	0.21	0.20
	HOV-pool	**8.48**	**9.77**	**8.81**	**9.36**
		8.96	10.62	9.51	11.57
		0.51	0.54	0.49	0.59
	HOV-transit	**10.80**	**10.57**	**11.54**	**12.23**
		7.05	7.19	8.32	7.95
		0.53	0.54	0.73	0.68
	Non-motor	**1.40**	**1.28**	**1.40**	**1.29**
		2.13	1.72	1.93	1.65
		0.21	0.15	0.18	0.15


Work Trips
Mean Total Trips
8
7
6
5
4
3
2
1
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Work Trips
Mean Duration (minutes)
45
40
35
30
25
20
15
10
5
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Work Trips
Mean Distance (miles)
14
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

Driving Alone to Work

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	1	2	2	6
2	302	310	362	322
3	129	199	191	197
4	331	368	356	359
5	228	259	192	276
6	220	314	253	253
7	126	148	194	177
8	140	186	167	135
>= 9	224	427	306	334
	1701	2213	2023	2059

DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	227	329	273	257
6 to 10	325	424	360	394
11 to 15	313	371	341	346
16 to 20	222	263	264	283
21 to 30	320	407	427	414
31 to 60	254	350	319	311
>= 61	40	54	39	54
missing	0	15	0	0
	1701	2213	2023	2059

DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	745	988	886	873
(5, 10]	389	508	444	491
(10, 20]	353	440	440	449
(20,30]	99	168	179	178
> 30	84	79	74	68
missing	31	30	0	0
	1701	2213	2023	2059

Taking HOV-Pool to Work

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	1	0	1
2	43	35	29	33
3	18	15	25	9
4	68	67	74	82
5	40	47	37	43
6	42	65	59	58
7	30	32	34	22
8	32	34	48	25
>= 9	48	95	76	117
	321	391	382	390

DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	64	62	68	67
6 to 10	54	77	73	76
11 to 15	53	56	64	71
16 to 20	26	48	35	50
21 to 30	51	67	68	58
31 to 60	64	71	69	56
>= 61	9	6	5	12
missing	0	4	0	0
	321	391	382	390

DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	153	176	196	203
(5, 10]	70	76	59	65
(10, 20]	57	72	85	64
(20,30]	17	32	21	36
> 30	17	25	21	22
missing	7	10	0	0
	321	391	382	390

Taking HOV-Transit to Work

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	0
2	30	26	30	21
3	21	11	10	5
4	45	49	38	47
5	21	28	10	24
6	29	26	13	22
7	9	18	9	6
8	7	13	11	6
>= 9	26	19	9	6
	188	190	130	137

DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	3	5	2	2
6 to 10	6	4	7	4
11 to 15	10	9	6	5
16 to 20	24	15	13	12
21 to 30	64	61	35	41
31 to 60	63	81	51	60
>= 61	18	15	16	13
missing	0	0	0	0
	188	190	130	137

DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	48	52	37	32
(5, 10]	36	38	25	26
(10, 20]	74	65	44	55
(20,30]	19	24	21	20
> 30	1	0	3	4
missing	10	11	0	0
	188	190	130	137

Taking Non-Motor Trips to Work

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	0
2	6	9	10	9
3	5	4	1	3
4	10	15	16	12
5	14	22	6	8
6	18	9	21	33
7	12	18	17	19
8	11	12	17	13
>= 9	31	47	31	25
	107	136	119	122

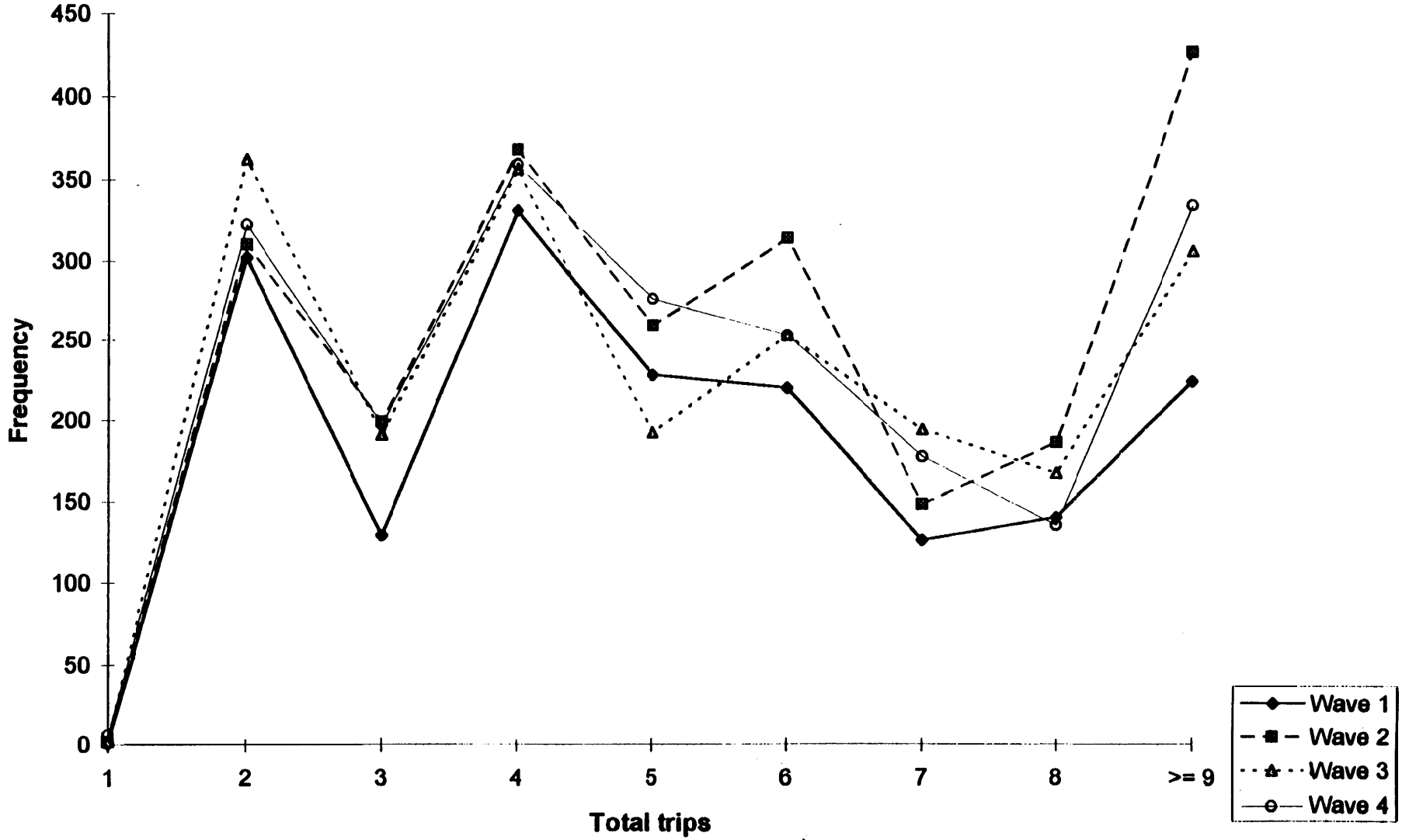
DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	39	53	42	52
6 to 10	39	38	34	40
11 to 15	17	23	20	11
16 to 20	3	8	8	10
21 to 30	4	8	6	4
31 to 60	4	4	8	5
>= 61	1	0	1	0
missing	0	2	0	0
	107	136	119	122

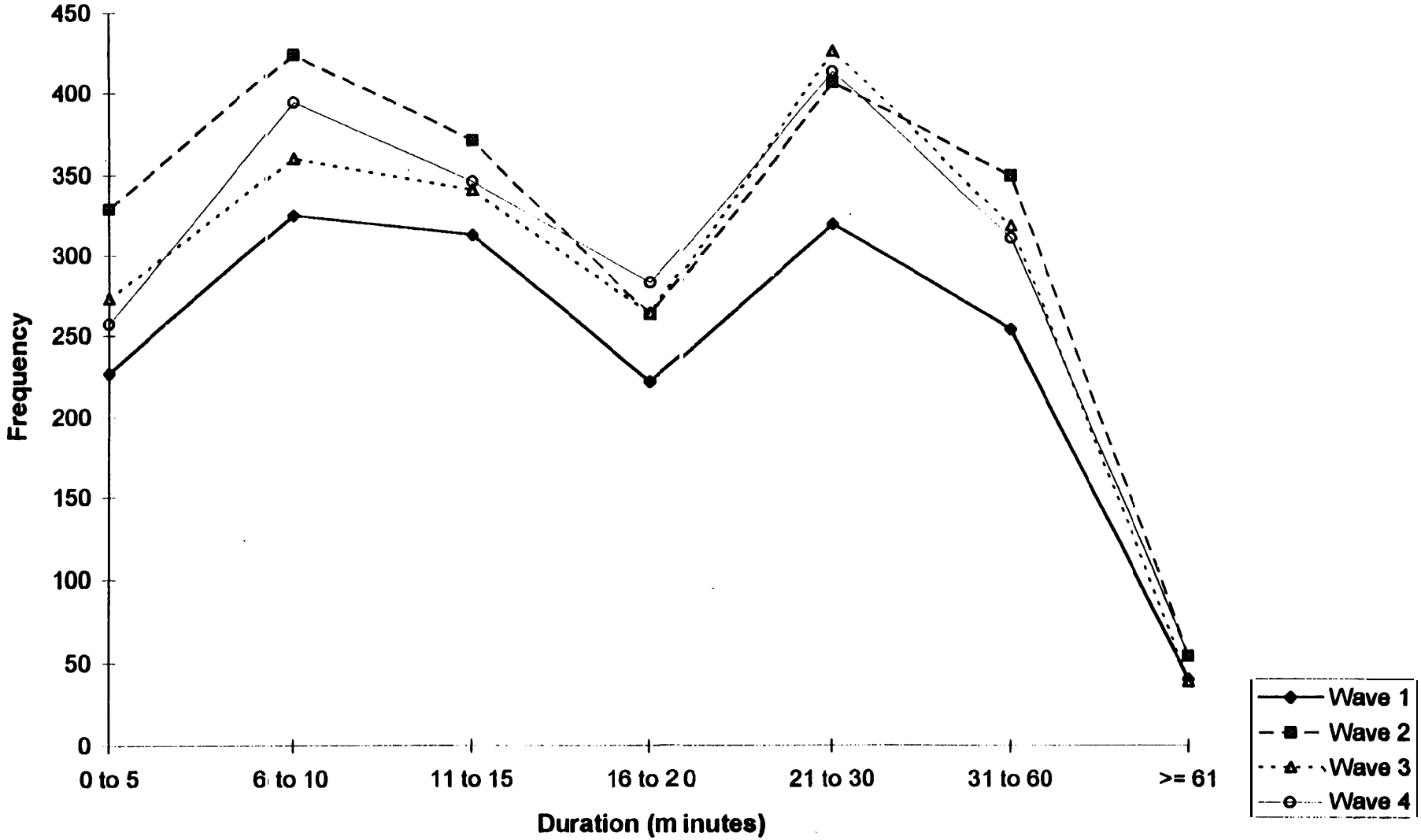
DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	96	128	114	116
(5, 10]	6	7	3	5
(10, 20]	1	1	2	1
(20,30]	0	0	0	0
> 30	0	0	0	0
missing	4	0	0	0
	107	136	119	122

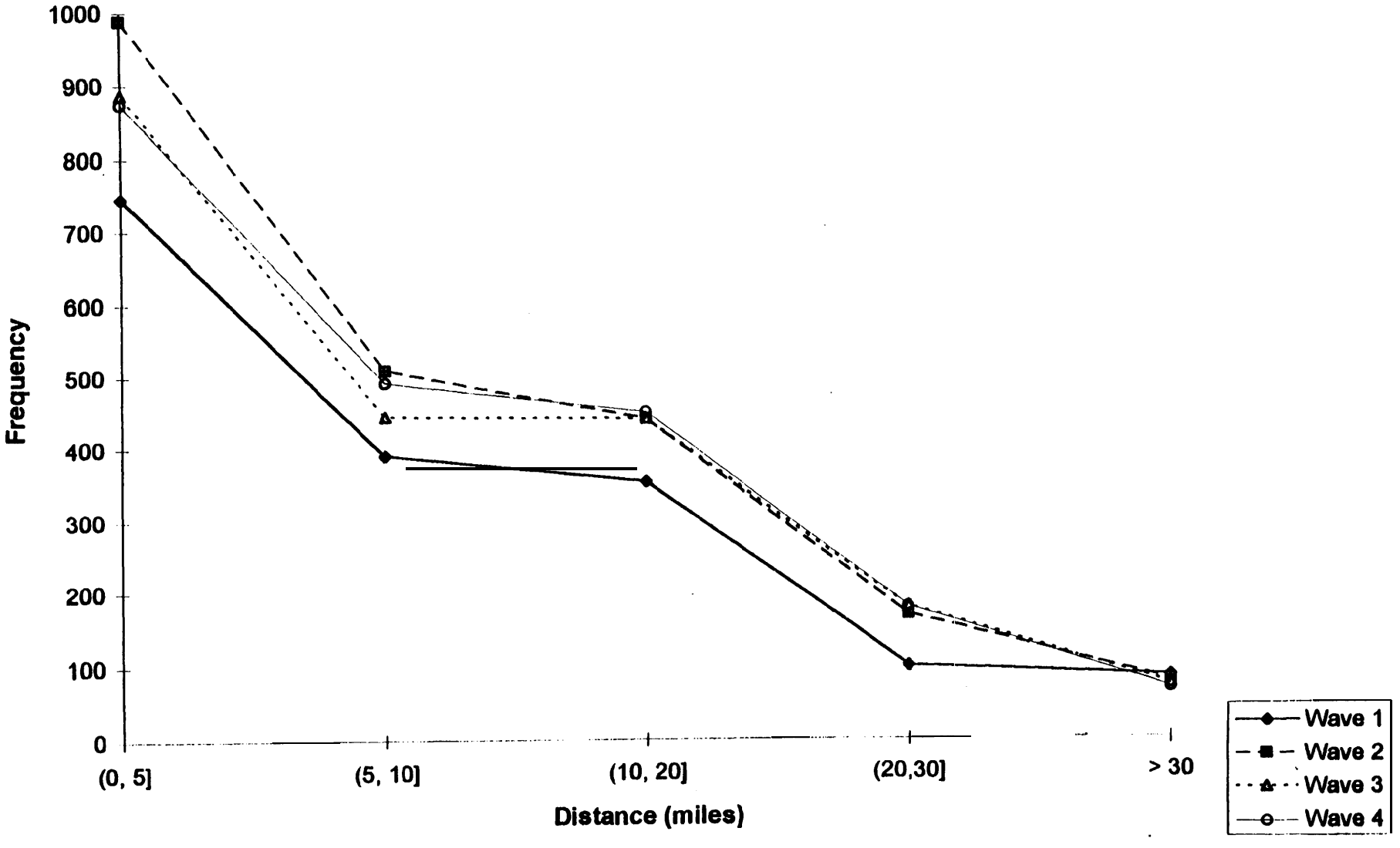
Driving Alone to Work



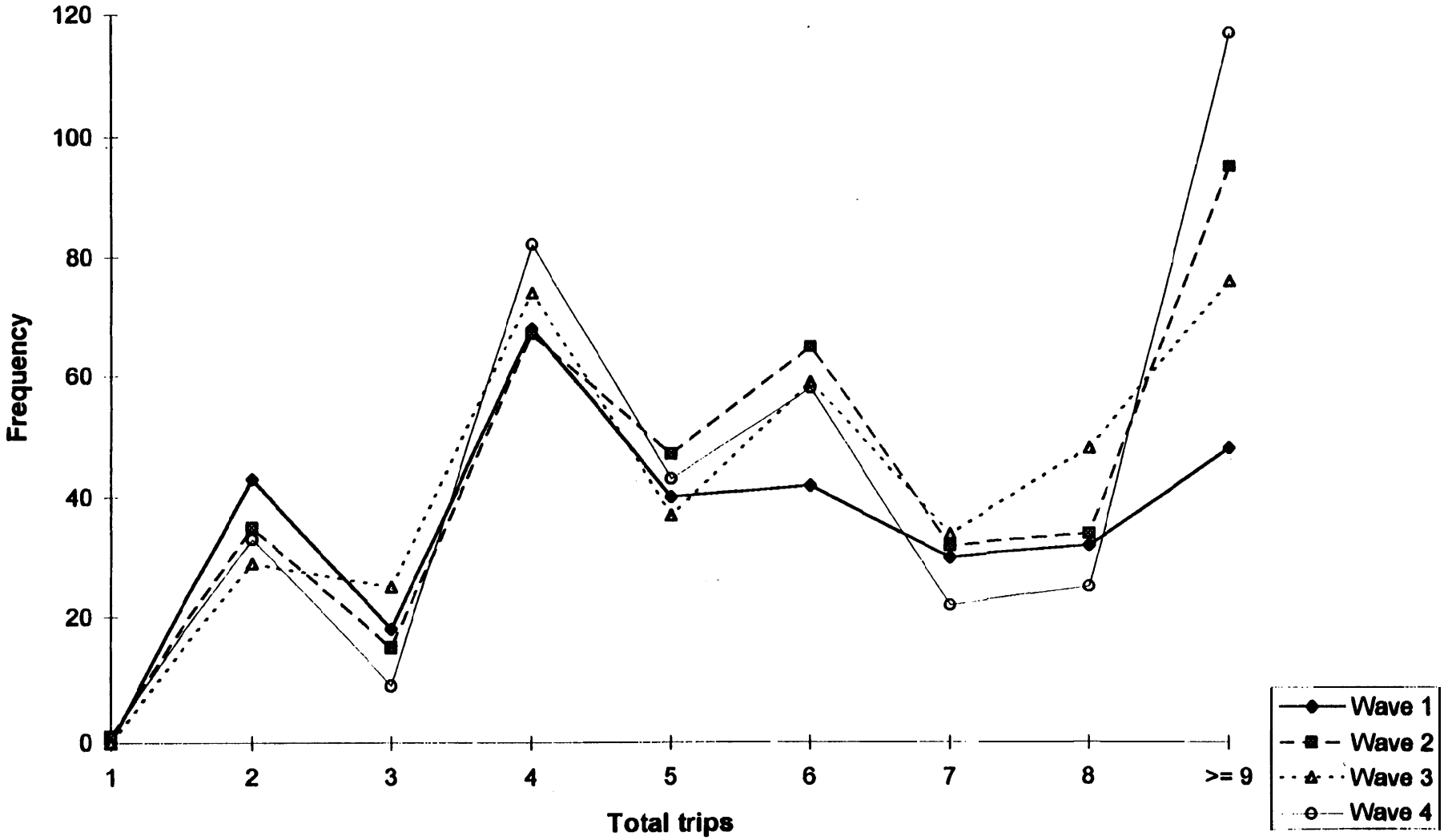
Driving Alone to Work



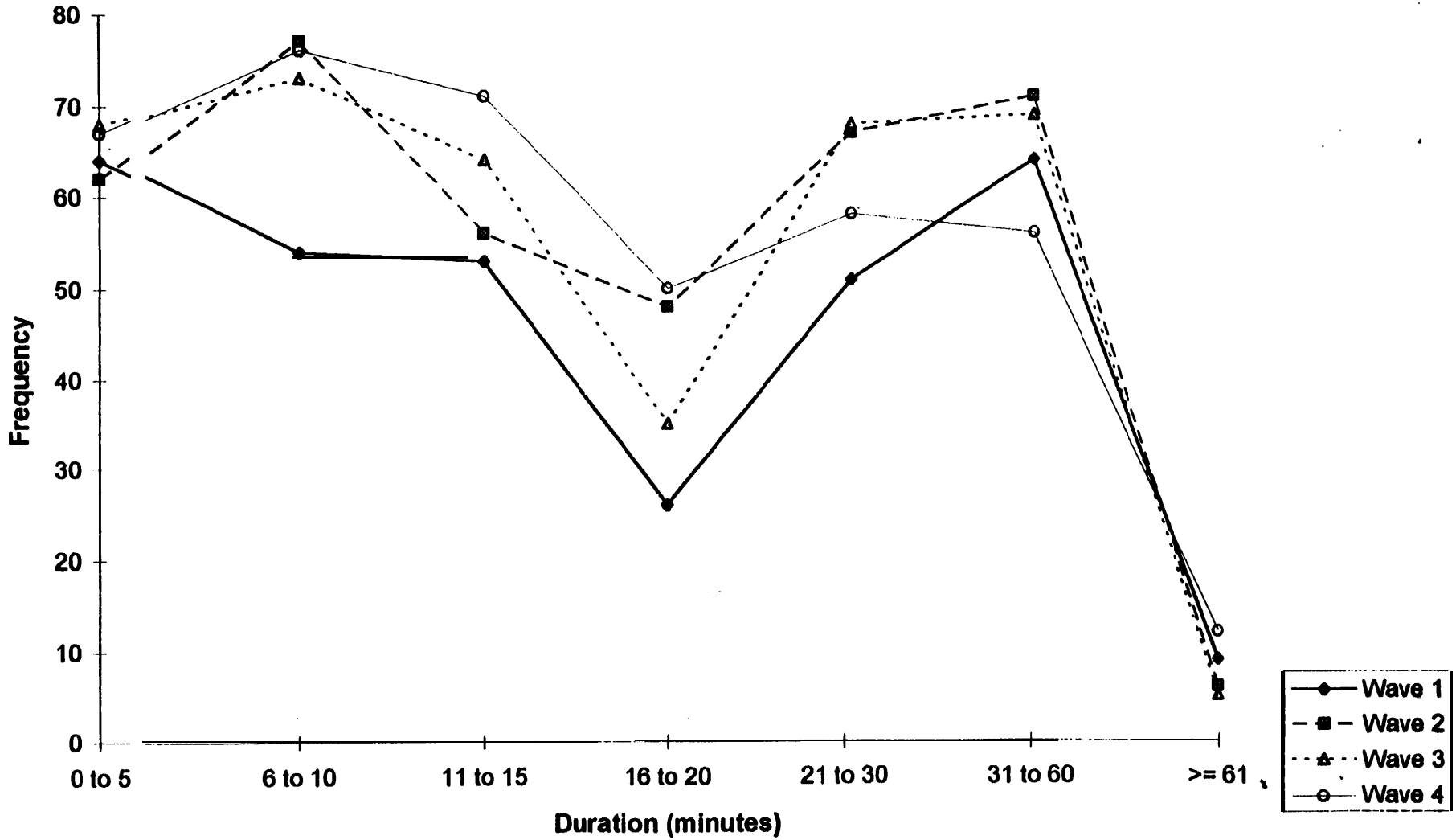
Driving Alone to Work



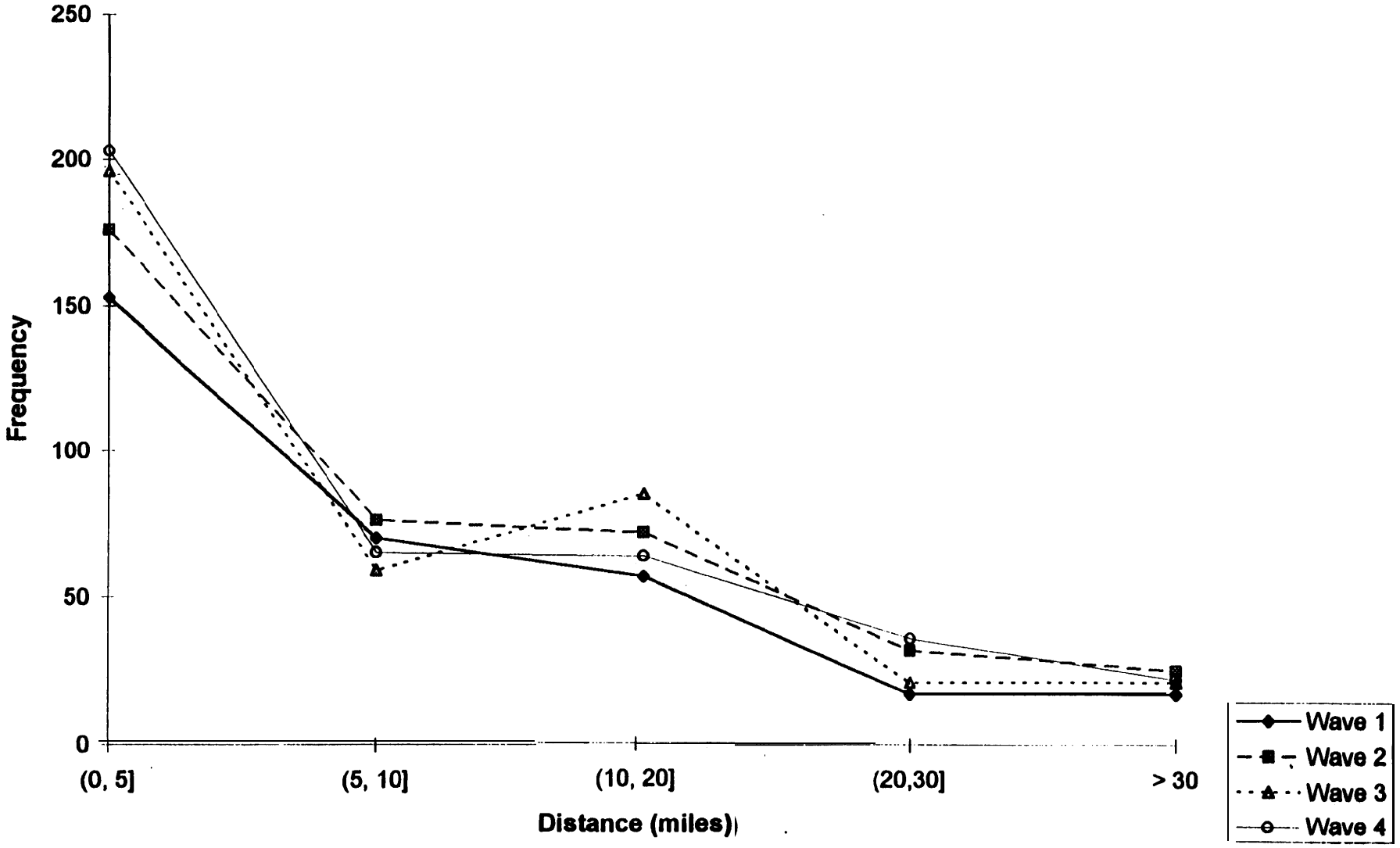
Taking HOV-Pool to Work



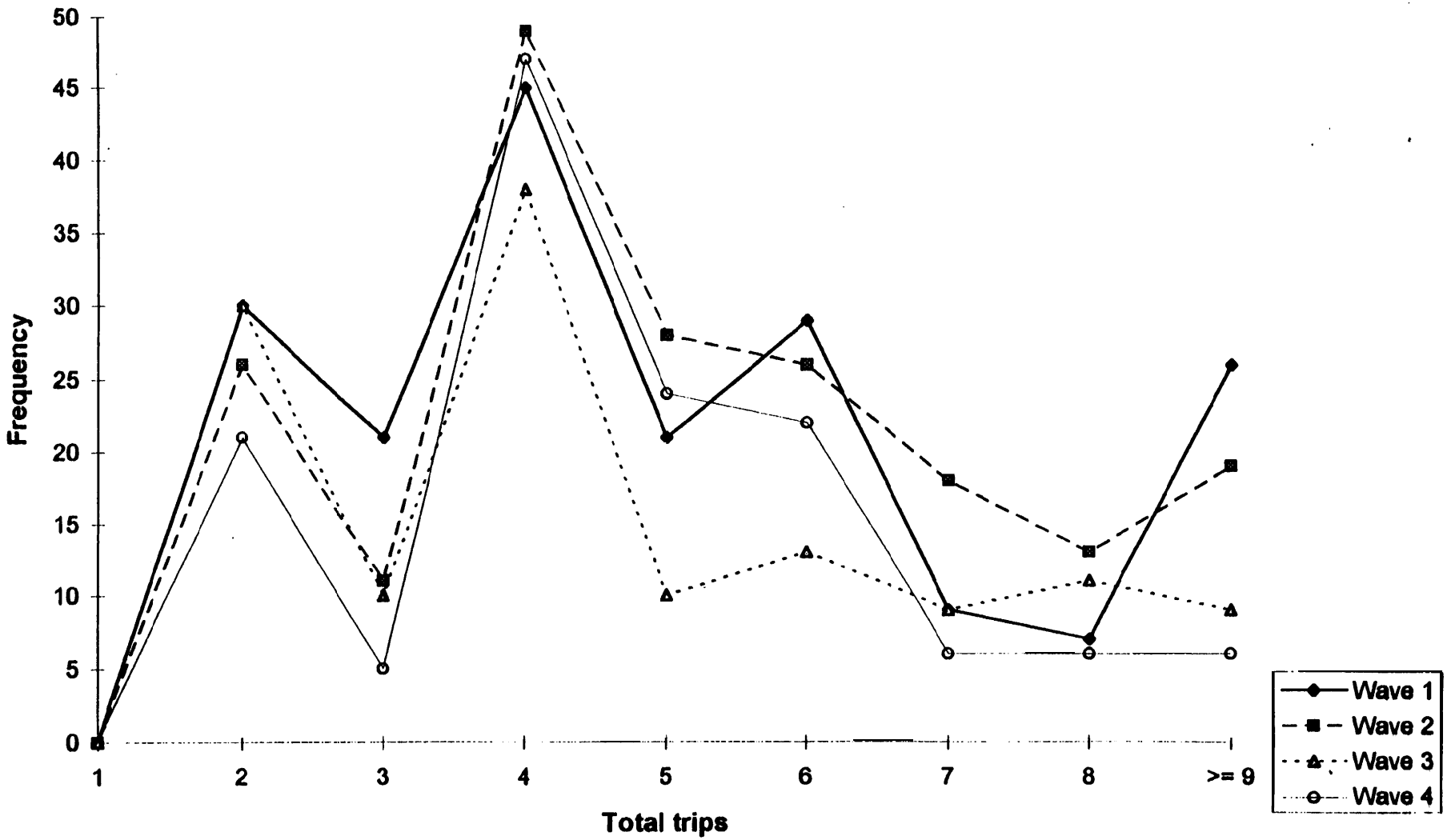
Taking HOV-Pool to Work



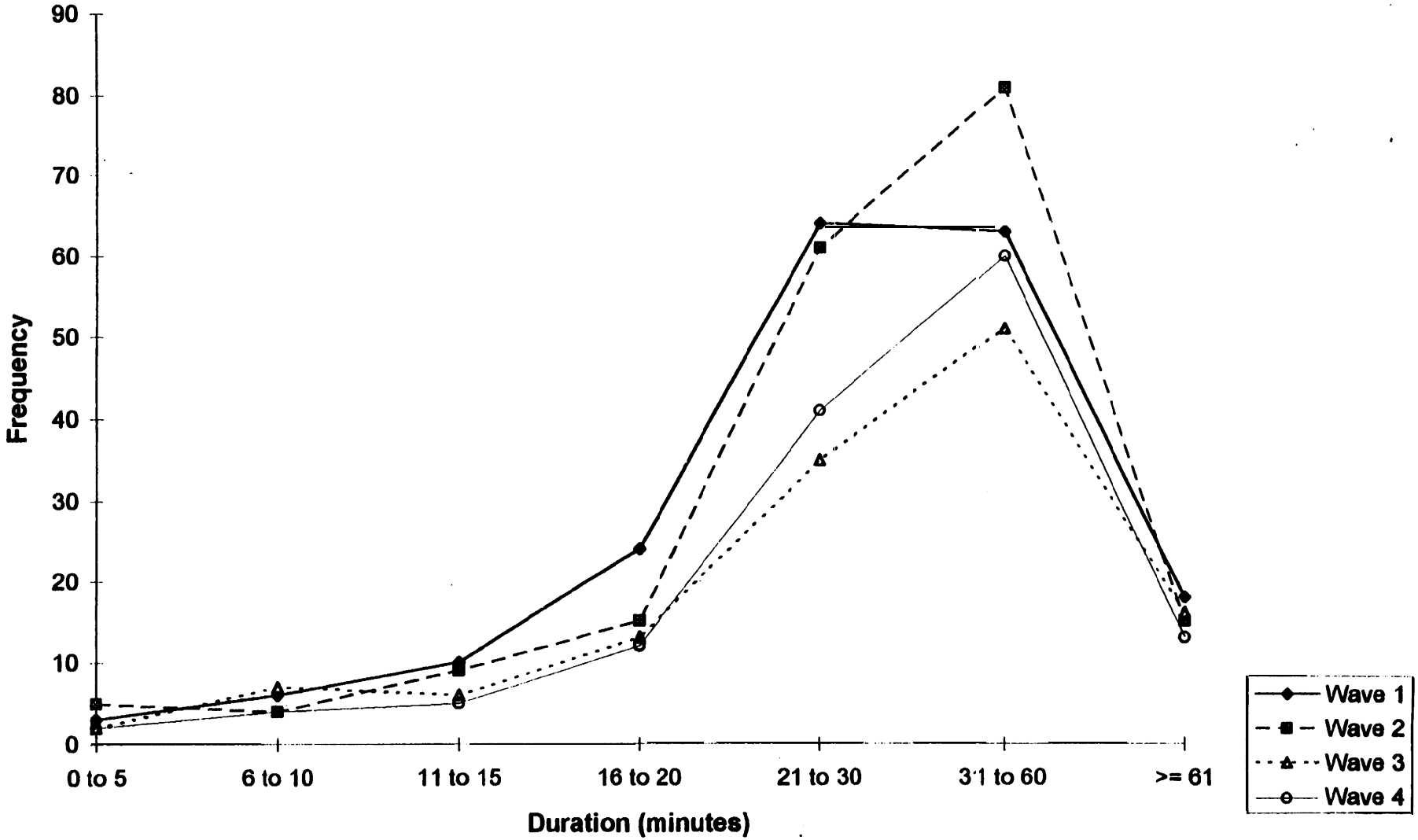
Taking HOV-Pool to Work



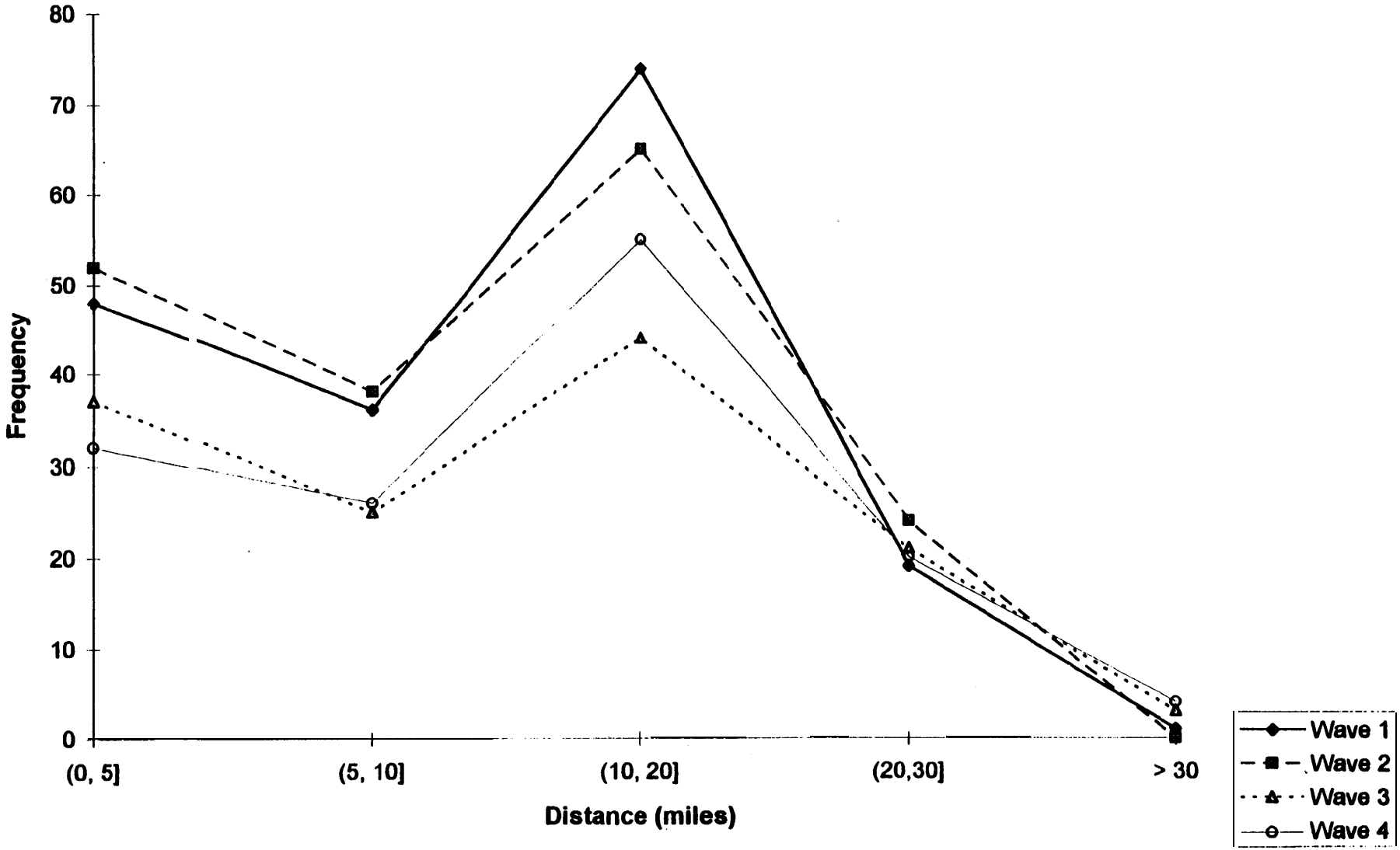
Taking HOV-Transit to Work



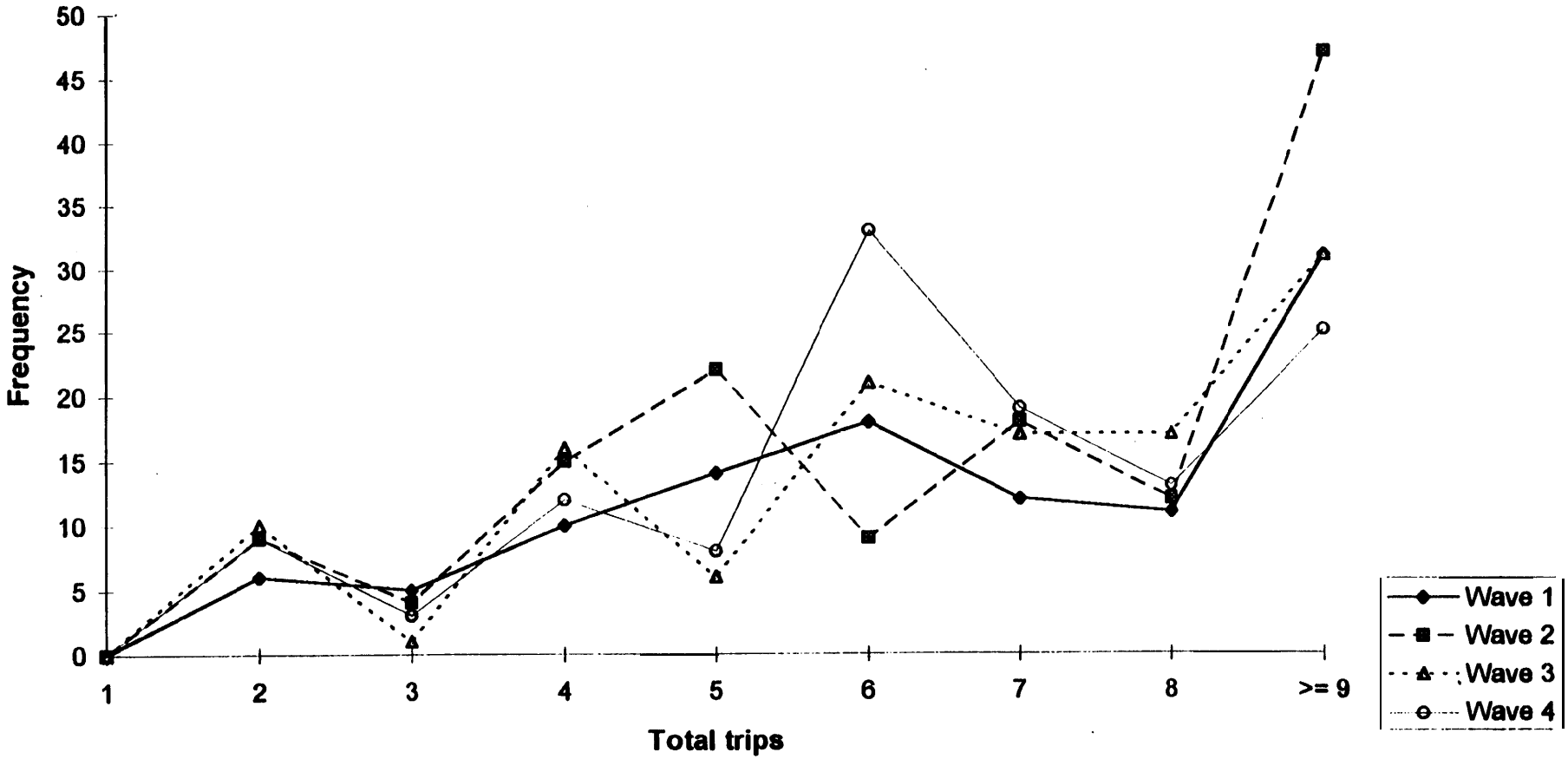
Taking HOV-Transit to Work



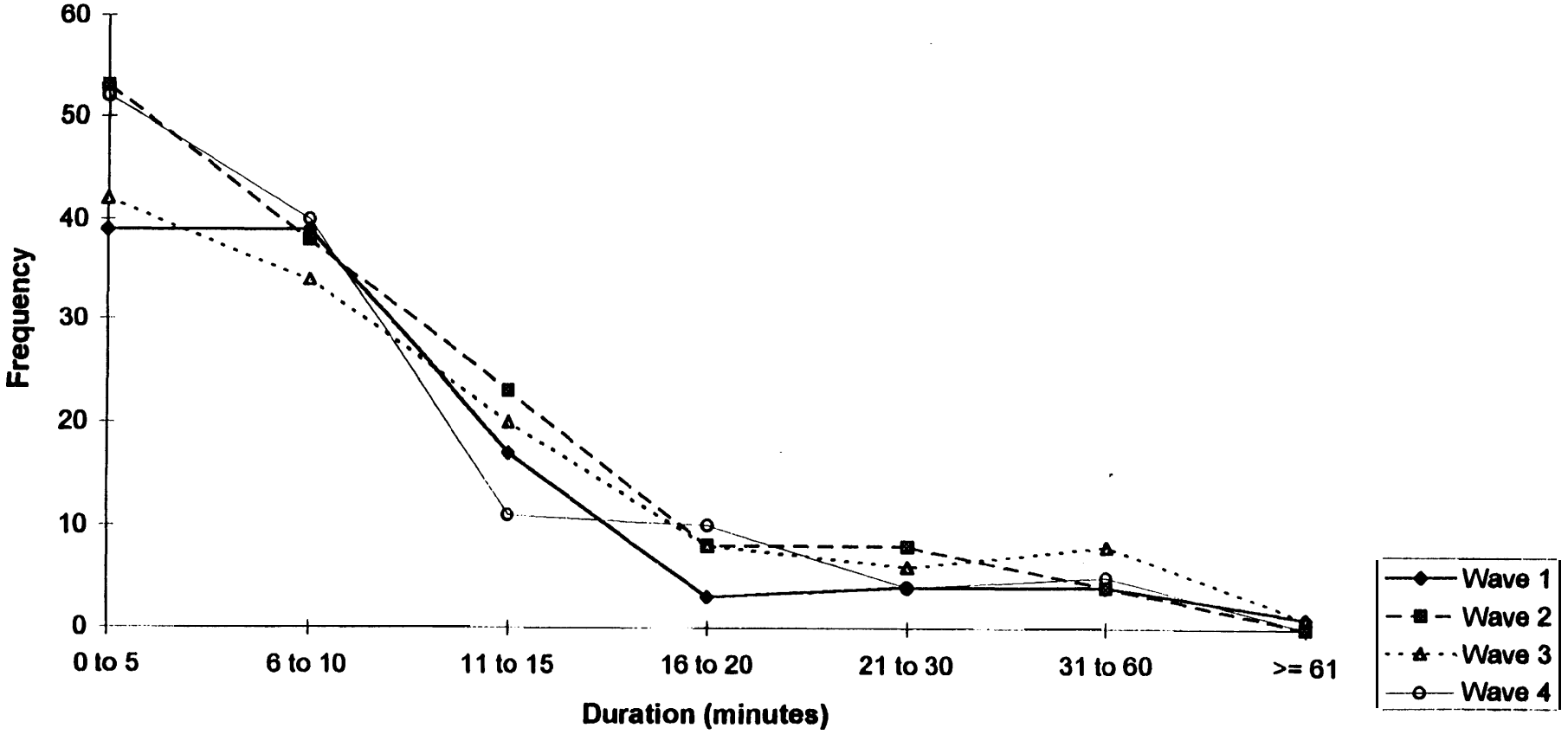
Taking HOV-Transit to Work



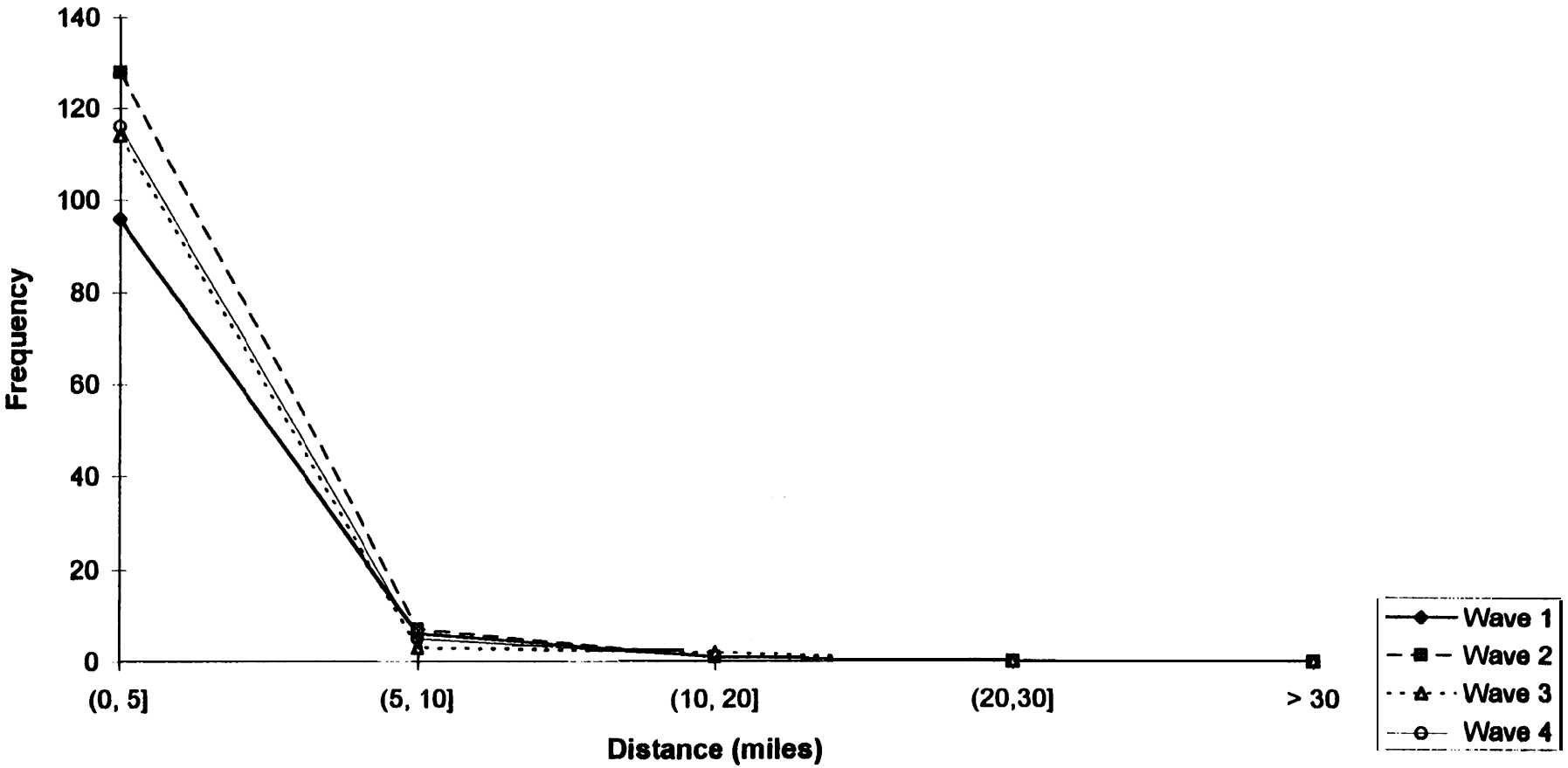
Taking Non-Motor Trips to Work



Taking Non-Motor Trips to Work



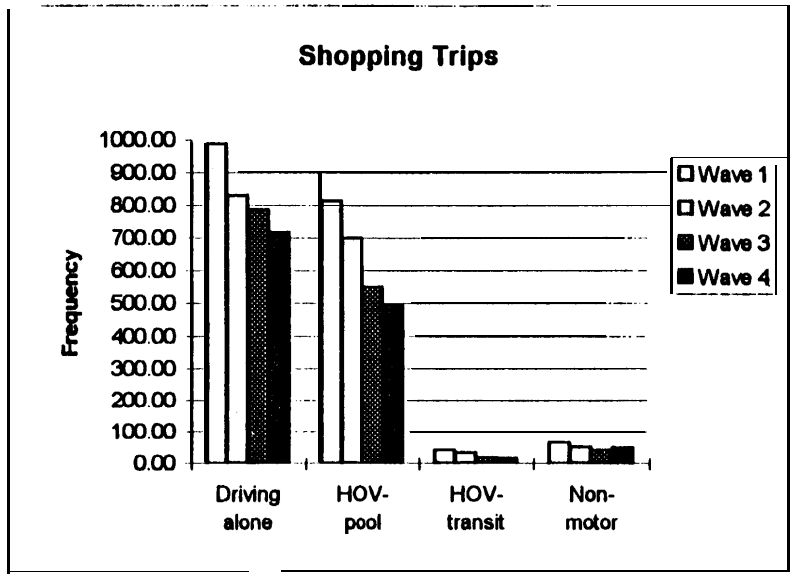
Taking Non-Motor Trips to Work



Shopping Trip Frequencies

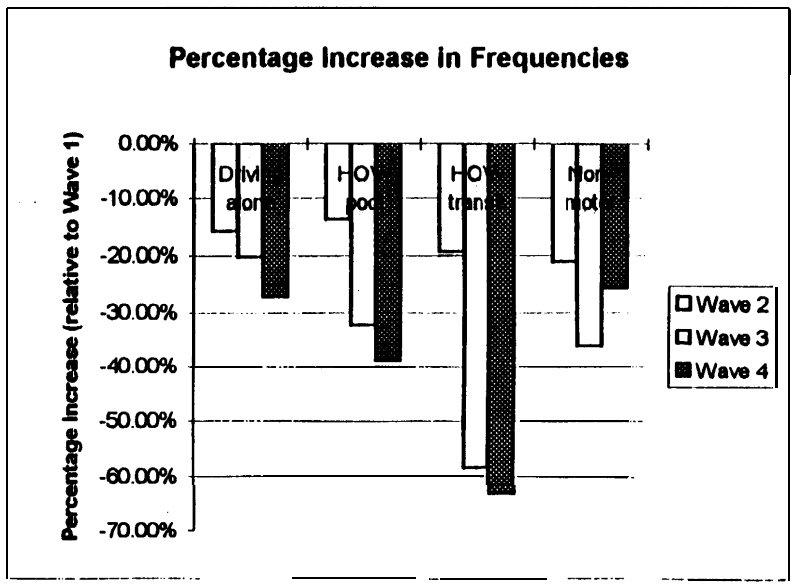
Frequencies of Shopping Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	988.00	831.00	786.00	719.00
HOV-pool	814.00	701.00	550.00	497.00
HOV-transit	41.00	33.00	17.00	15.00
Non-motor	66.00	52.00	42.00	49.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	-15.89%	-20.45%	-27.23%
HOV-pool	-13.88%	-32.43%	-38.94%
HOV-transit	-19.51%	-58.54%	-63.41%
Non-motor	-21.21%	-36.36%	-25.76%



Shopping Trip Means

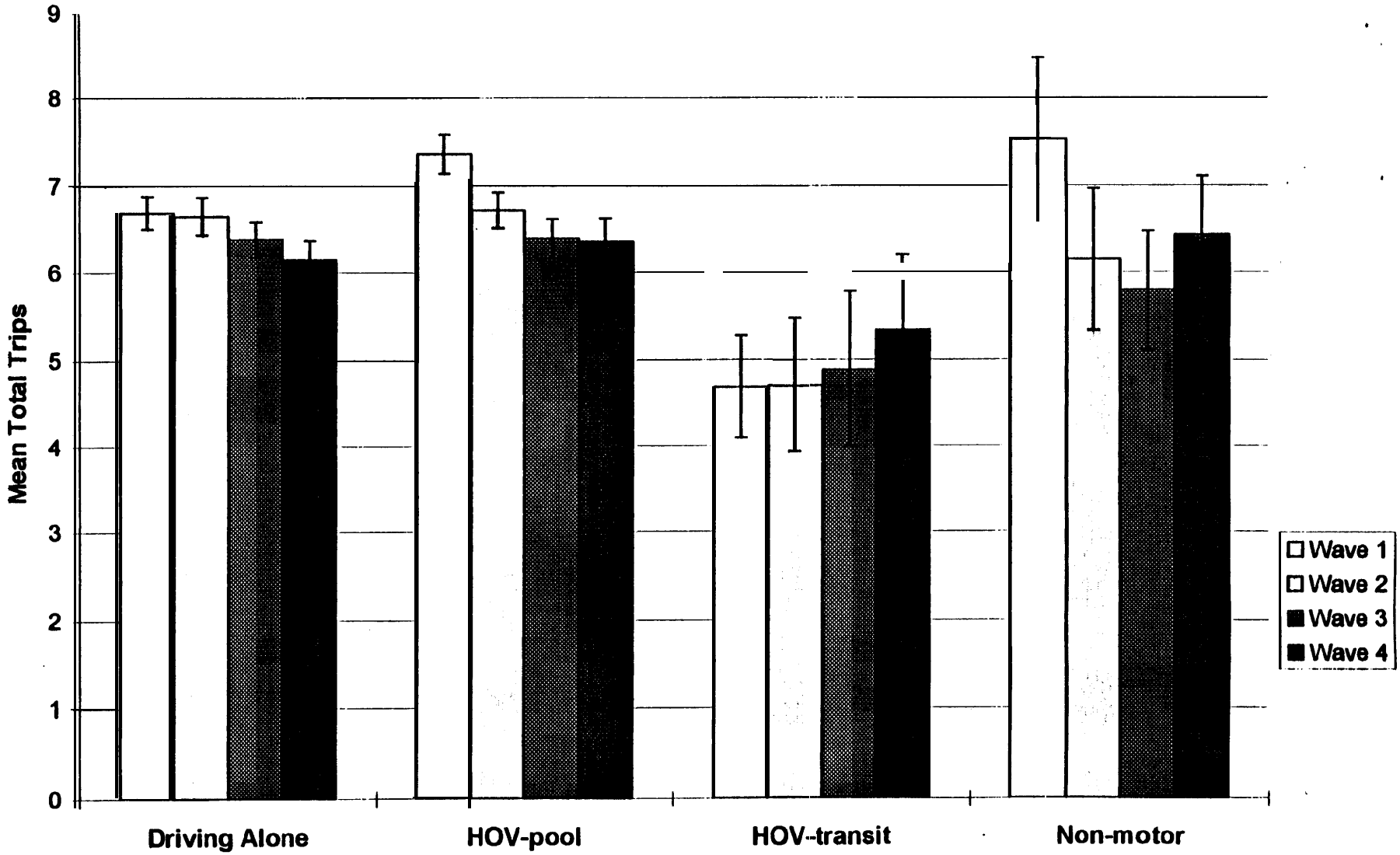
(and standard deviation and standard error)

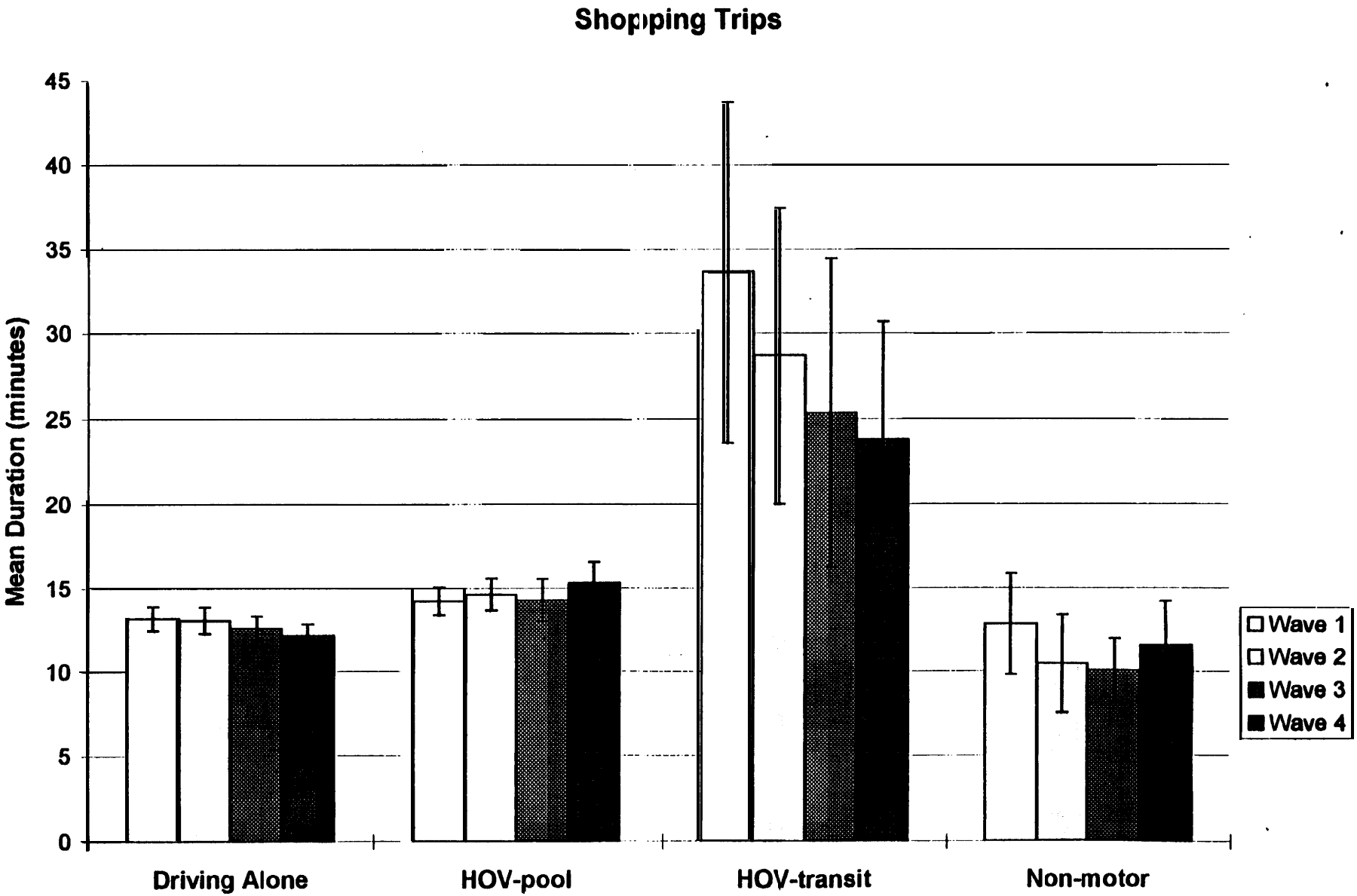
TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**6.69**	**6.65**	**6.38**	**6.15**
		2.96	3.17	2.89	2.93
		0.09	0.11	0.10	0.11
	HOV-pool	**7.36**	**6.72**	**6.39**	**6.36**
		3.14	2.75	2.69	2.93
		0.11	0.10	0.11	0.13
	HOV-transit	**4.68**	**4.70**	**4.88**	**5.33**
		1.89	2.20	1.83	1.68
		0.30	0.38	0.44	0.43
	Non-motor	**7.52**	**6.15**	**5.79**	**6.43**
		3.86	2.95	2.21	2.37
		0.48	0.41	0.34	0.34

DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**13.16**	**13.06**	**12.57**	**12.15**
		11.47	11.43	10.28	9.33
		0.36	0.40	0.37	0.35
	HOV-pool	**14.21**	**14.63**	**14.28**	**15.32**
		12.07	12.79	15.02	13.84
		0.42	0.48	0.64	0.62
	HOV-transit	**33.66**	**28.72**	**25.35**	**23.80**
		32.22	24.67	18.76	13.29
		5.03	4.36	4.55	3.43
	Non-motor	**12.83**	**10.45**	**10.05**	**11.55**
		12.38	10.43	6.16	9.19
		1.52	1.46	0.95	1.31

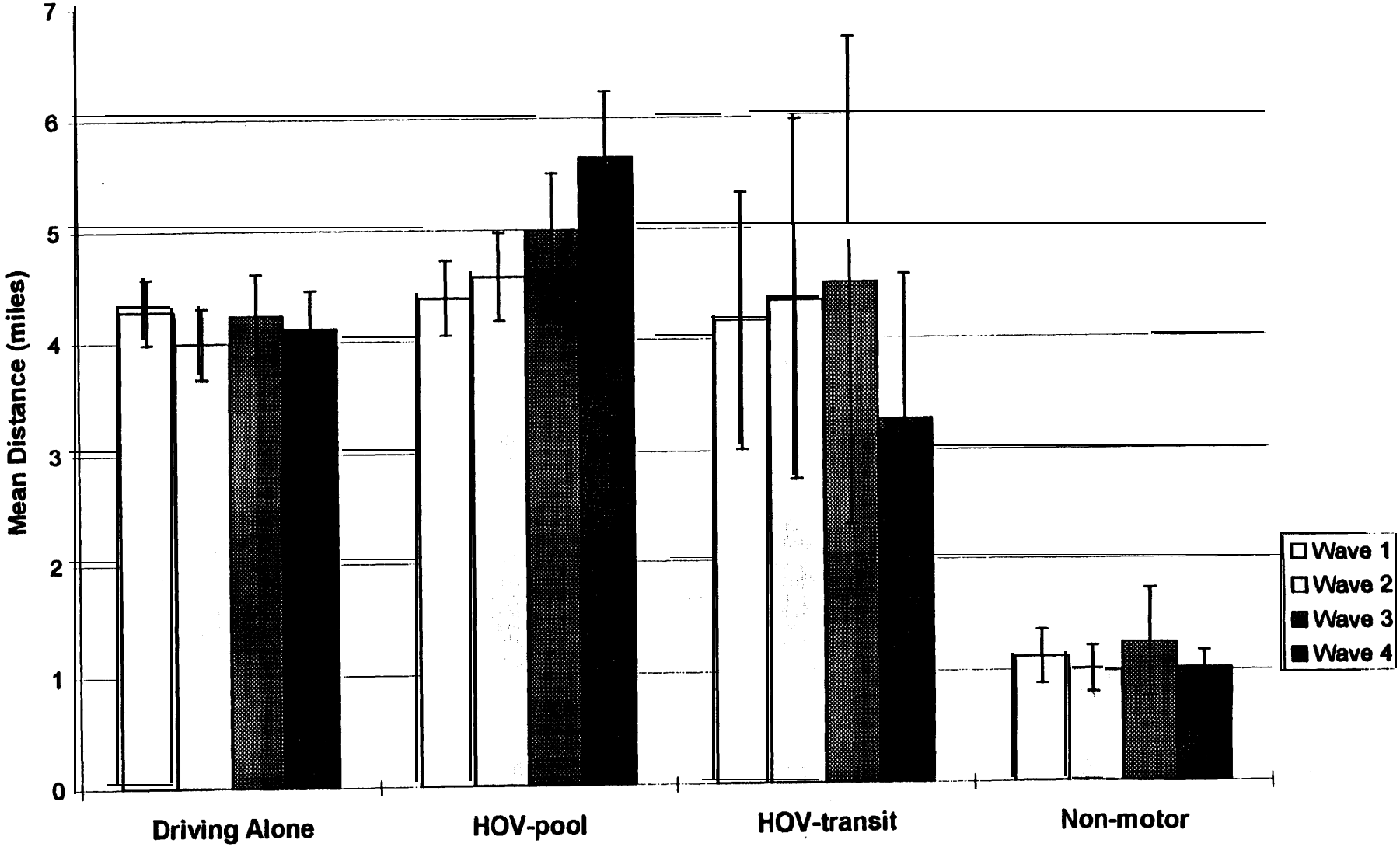
DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**4.28**	**3.99**	**4.24**	**4.12**
		4.67	4.59	5.28	4.64
		0.15	0.16	0.19	0.17
	HOV-pool	**4.39**	**4.58**	**4.99**	**5.65**
		4.83	5.23	6.13	6.53
		0.17	0.20	0.26	0.29
	HOV-transit	**4.17**	**4.35**	**4.51**	**3.28**
		3.71	4.62	4.50	2.52
		0.58	0.80	1.09	0.65
	Non-motor	**1.12**	**0.99**	**1.24**	**1.02**
		0.98	0.75	1.57	0.54
		0.12	0.10	0.24	0.08

Shopping Trips




Shopping Trips
Mean Duration (minutes)
45
40
35
30
25
20
15
10
5
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

Shopping Trips



Driving Alone to Shop

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	0
2	29	35	44	44
3	101	87	82	78
4	114	122	110	116
5	141	108	99	112
6	153	108	118	105
7	98	72	91	74
8	133	96	82	50
>= 9	219	203	160	140
	988	831	786	719

DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	332	284	251	224
6 to 10	227	214	220	216
11 to 15	192	129	153	126
16 to 20	90	64	58	69
21 to 30	97	98	75	59
31 to 60	42	31	25	23
>= 61	8	6	4	2
missing	0	5	0	0
	988	831	786	719

DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	718	636	602	550
(5, 10]	170	127	103	99
(10, 20]	76	51	67	60
(20,30]	16	12	9	6
> 30	3	2	5	4
missing	5	3	0	0
	988	831	786	719

Taking HOV-Pool to Shop

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	0
2	16	18	25	29
3	56	54	34	48
4	90	83	83	81
5	73	125	77	67
6	123	68	97	52
7	100	105	82	79
8	114	70	57	35
>= 9	242	178	95	106
	814	701	550	497

DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	247	184	178	121
6 to 10	208	177	121	119
11 to 15	132	151	112	108
16 to 20	85	77	41	63
21 to 30	81	62	67	48
31 to 60	57	39	28	30
>= 61	4	10	3	8
missing	0	1	0	0
	814	701	550	497

DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	597	504	390	311
(5, 10]	117	122	78	111
(10, 20]	80	49	64	58
(20,30]	15	16	9	9
> 30	0	4	9	8
missing	5	6	0	0
	814	701	550	497

Taking HOV-Transit to Shop

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	0
2	5	5	2	2
3	7	6	3	0
4	10	10	2	2
5	6	2	2	2
6	5	1	5	5
7	4	2	2	4
8	3	6	1	0
>= 9	1	1	0	0
	41	33	17	15

DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	4	3	2	1
6 to 10	6	2	3	2
11 to 15	4	5	1	3
16 to 20	5	3	2	1
21 to 30	8	12	5	5
31 to 60	10	5	3	3
>= 61	4	2	1	0
missing	0	1	0	0
	41	33	17	15

DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	30	24	12	13
(5, 10]	8	5	2	2
(10, 20]	3	3	3	0
(20,30]	0	1	0	0
> 30	0	0	0	0
missing	0	0	0	0
	41	33	17	15

Taking Non-Motor Trips to Shop

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	0
2	2	6	5	5
3	5	3	1	2
4	5	8	8	1
5	10	9	1	3
6	8	2	10	15
7	11	9	10	10
8	5	7	3	6
>= 9	20	8	4	7
	66	52	42	49

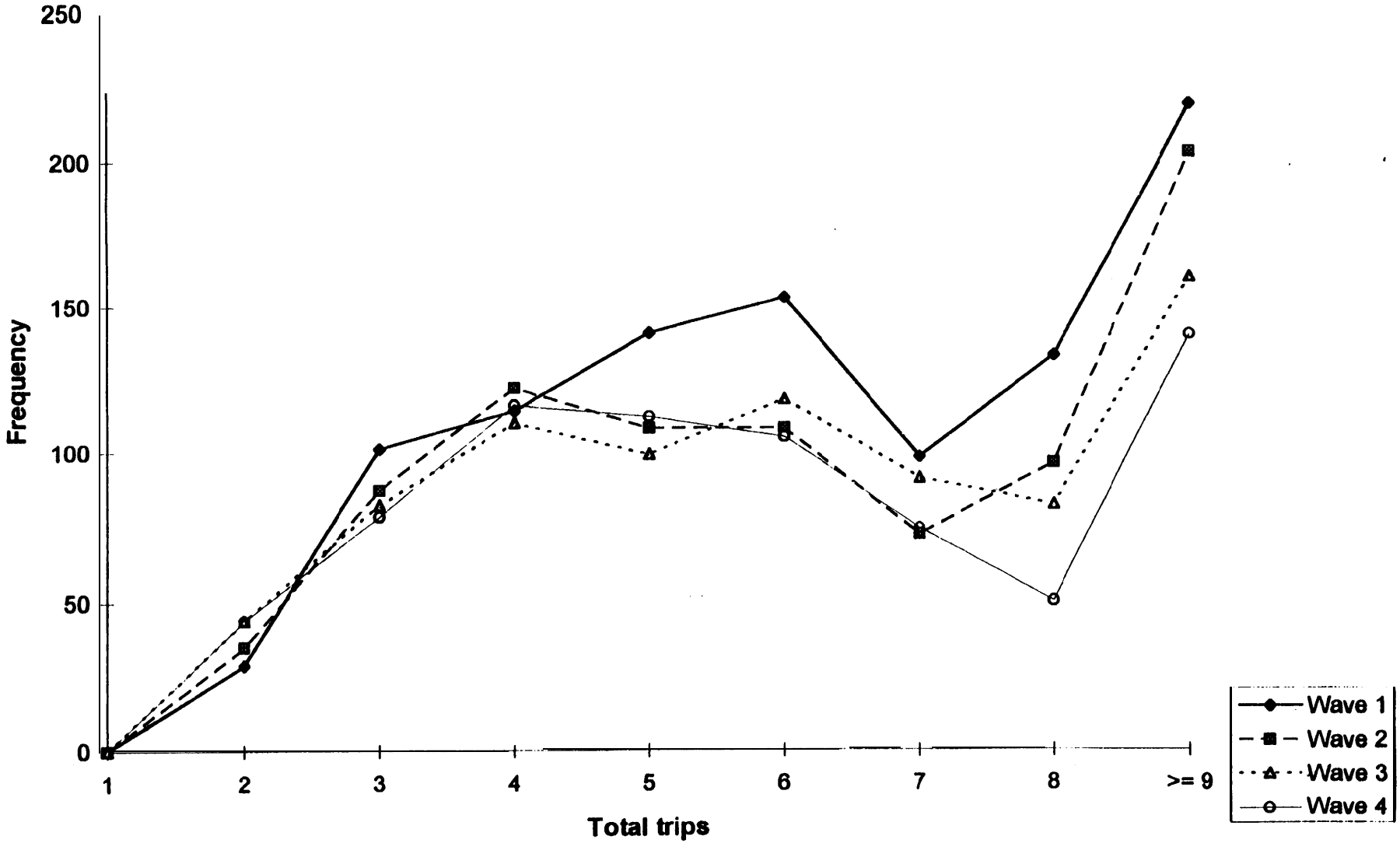
DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	27	24	17	20
6 to 10	11	17	13	11
11 to 15	12	3	6	5
16 to 20	6	4	4	7
21 to 30	7	0	2	5
31 to 60	2	3	0	1
>= 61	1	0	0	0
missing	0	1	0	0
	66	52	42	49

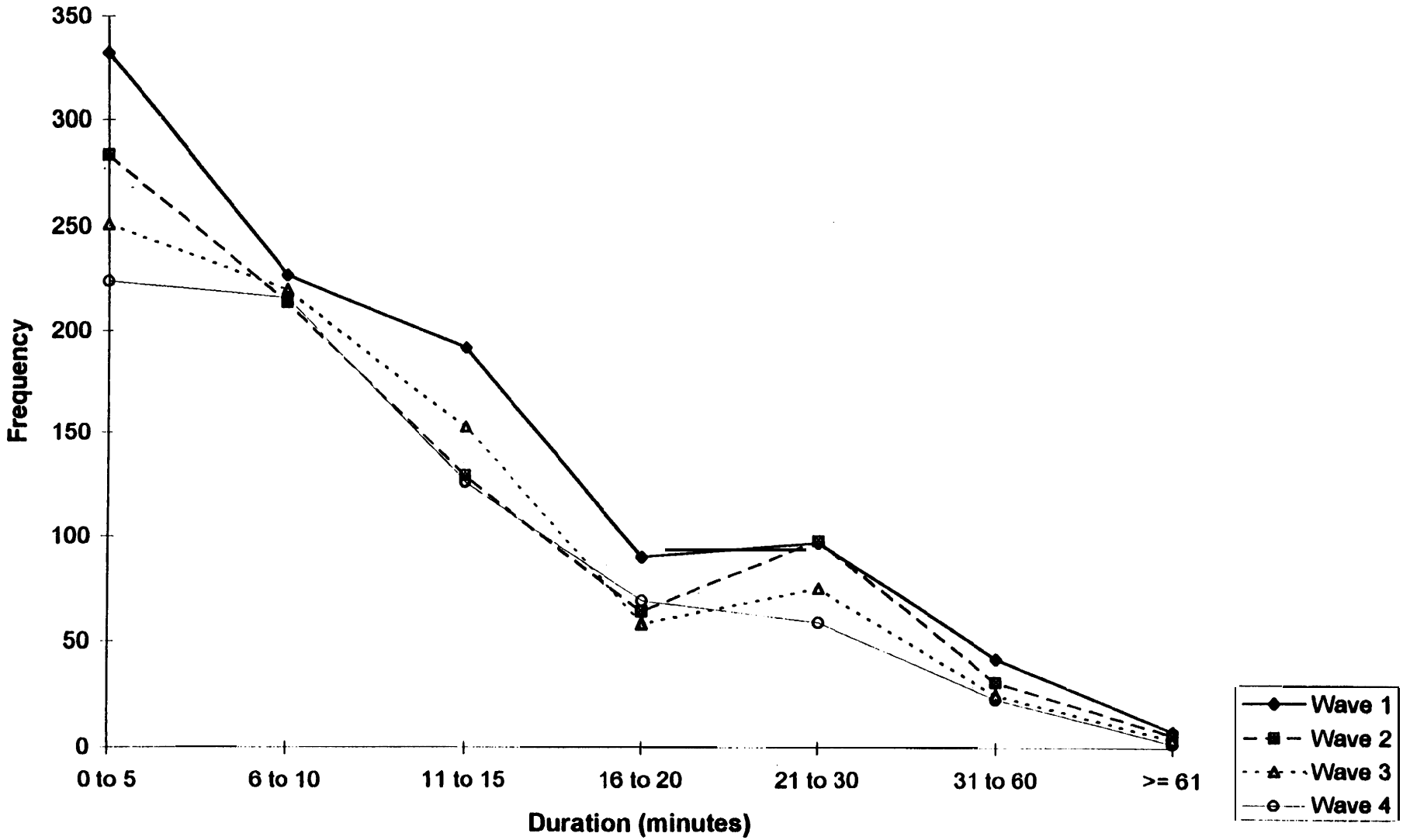
DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	65	52	41	49
(5, 10]	1	0	0	0
(10, 20]	0	0	1	0
(20,30]	0	0	0	0
> 30	0	0	0	0
missing	0	0	0	0
	66	52	42	49

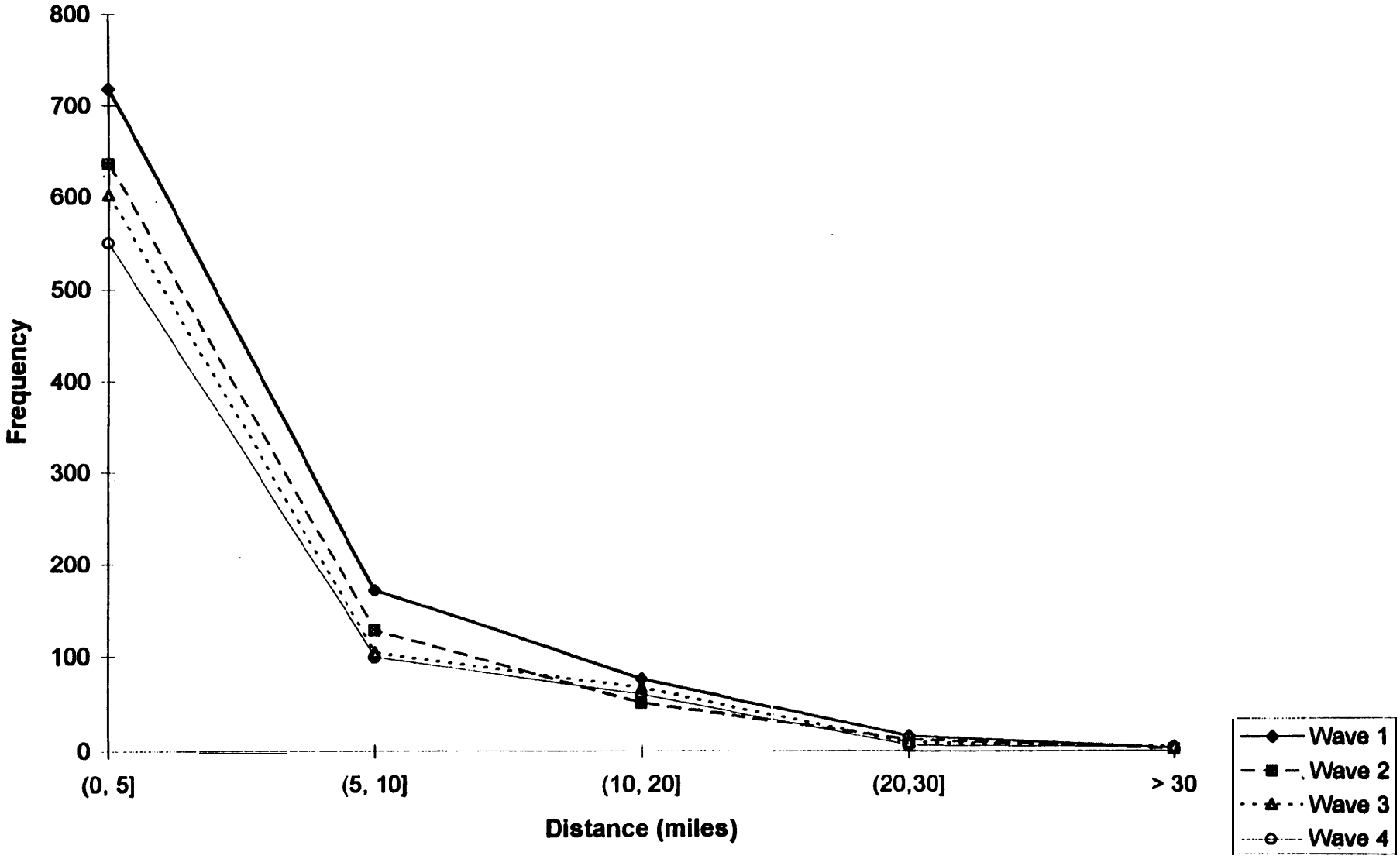
Driving Alone to Shop



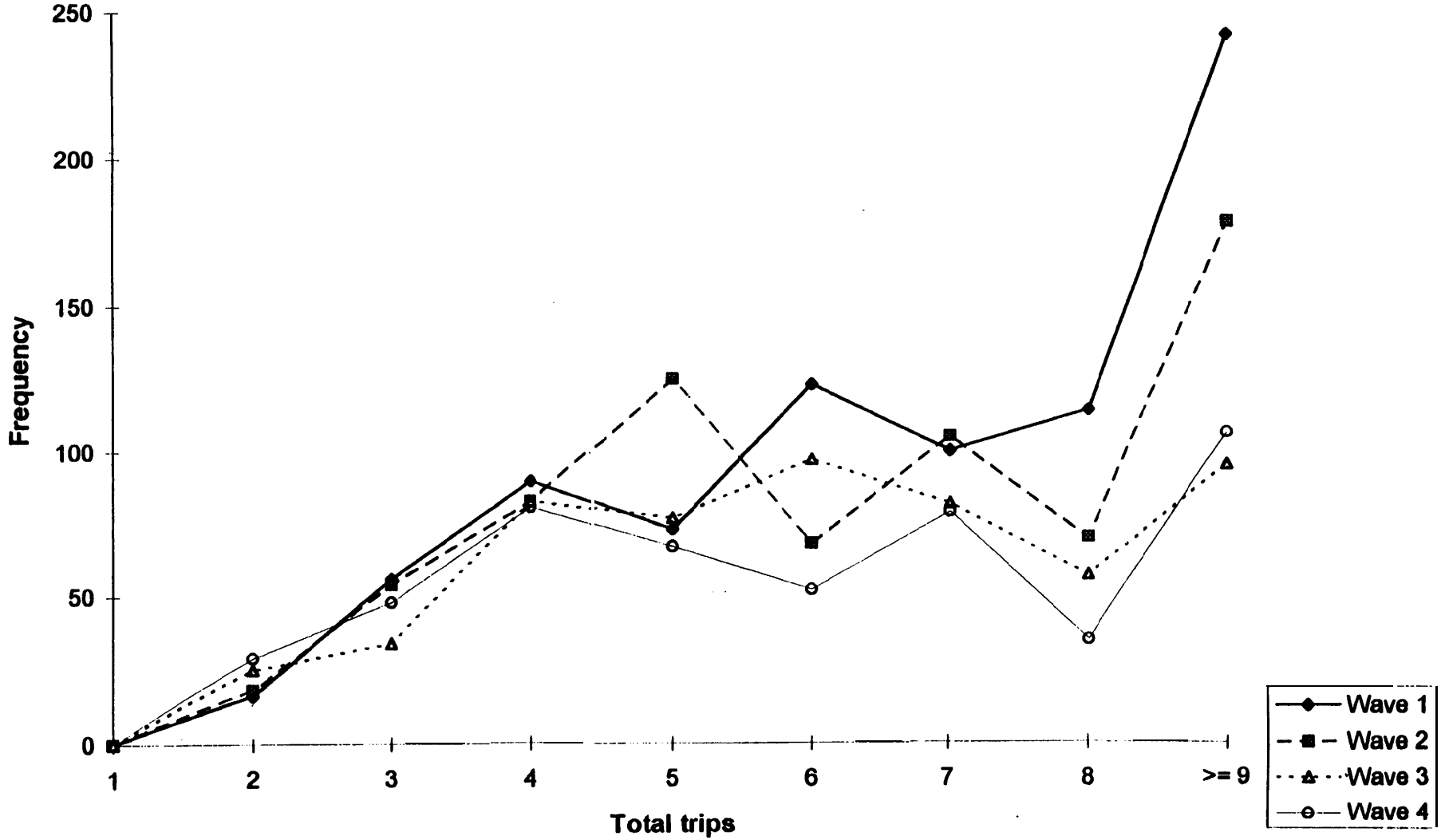
Driving Alone to Shop



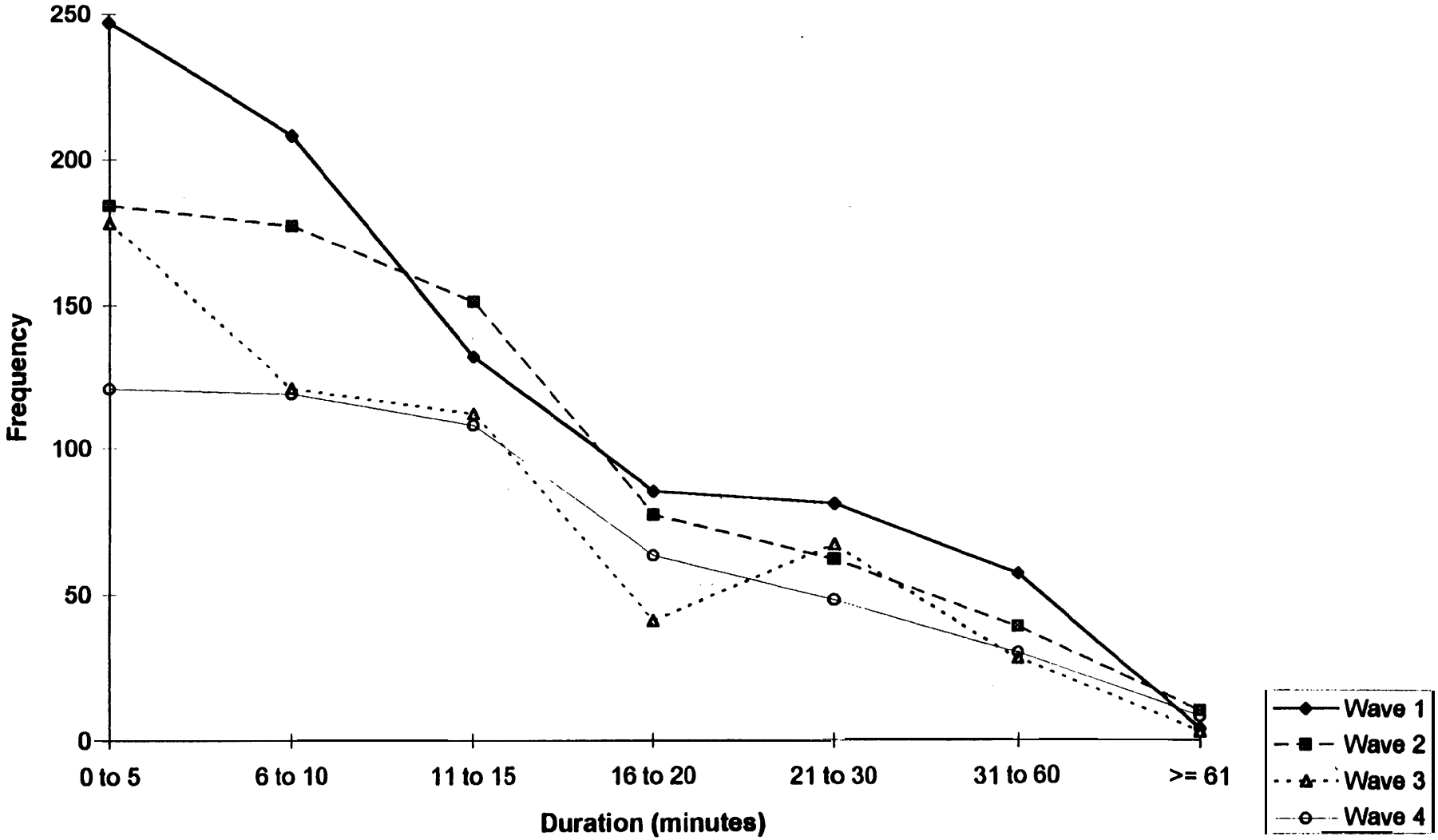
Driving Alone to Shop



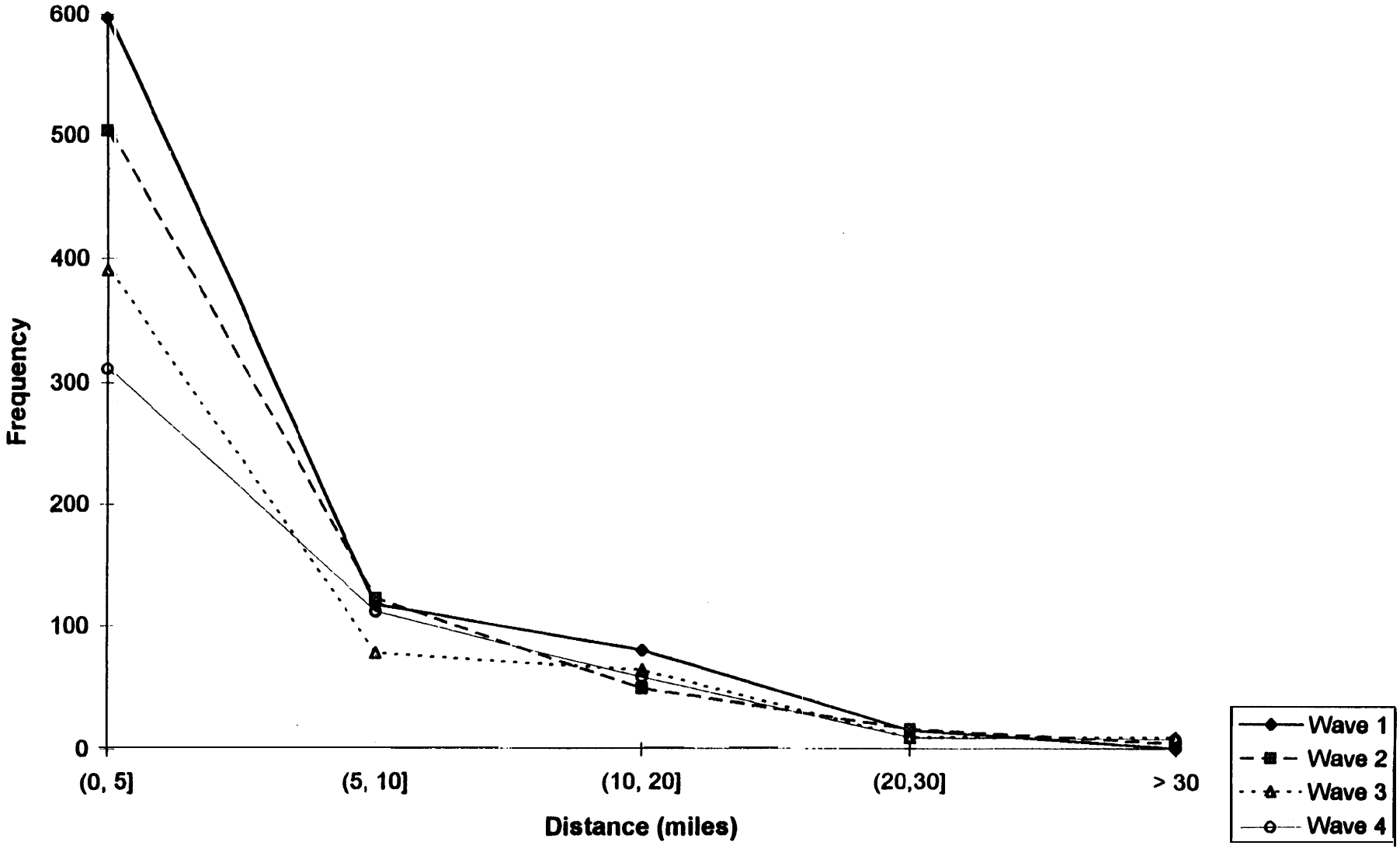
Taking HOV-Pool to Shop

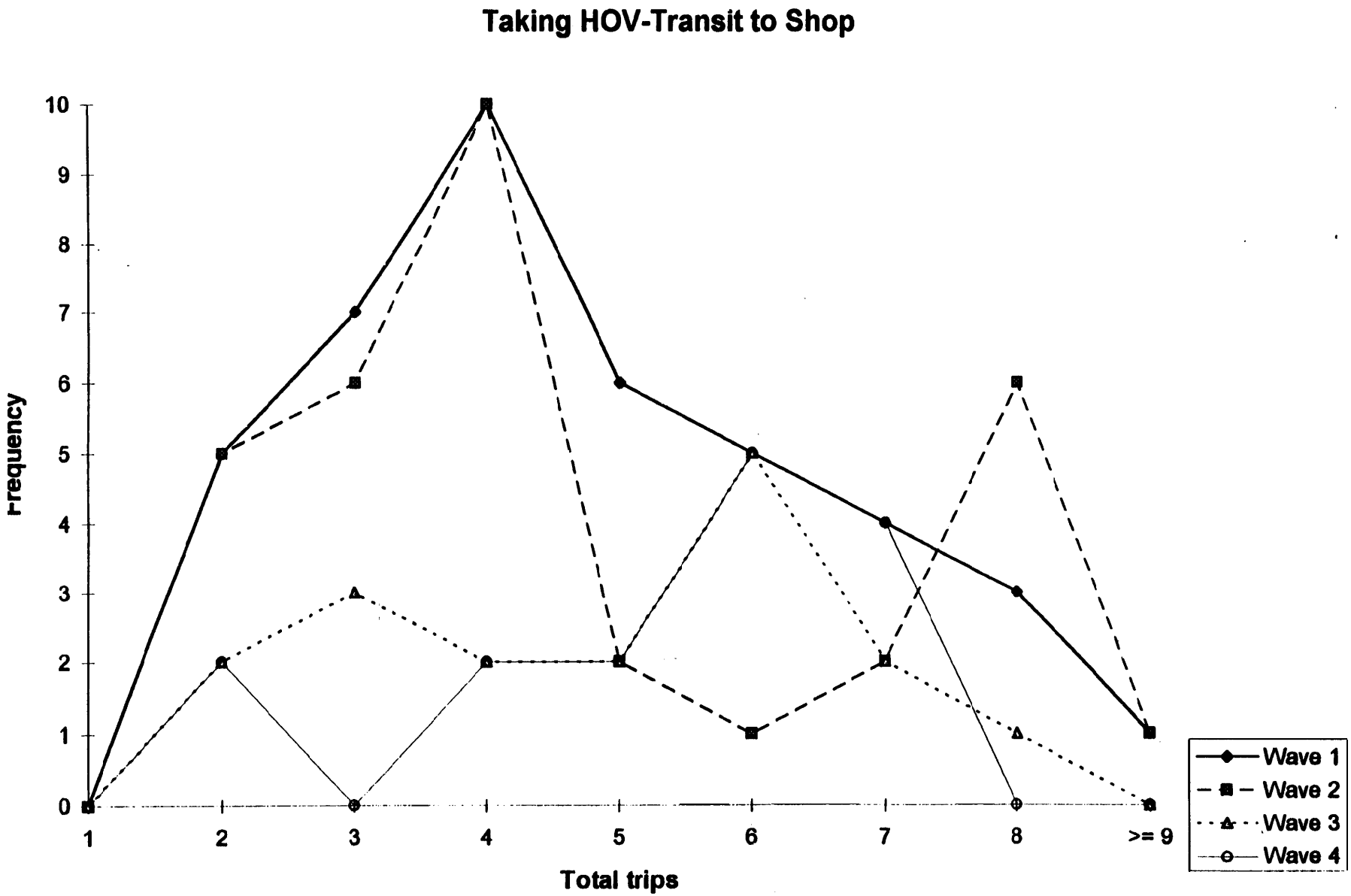


Taking HOV-Pool to Shop

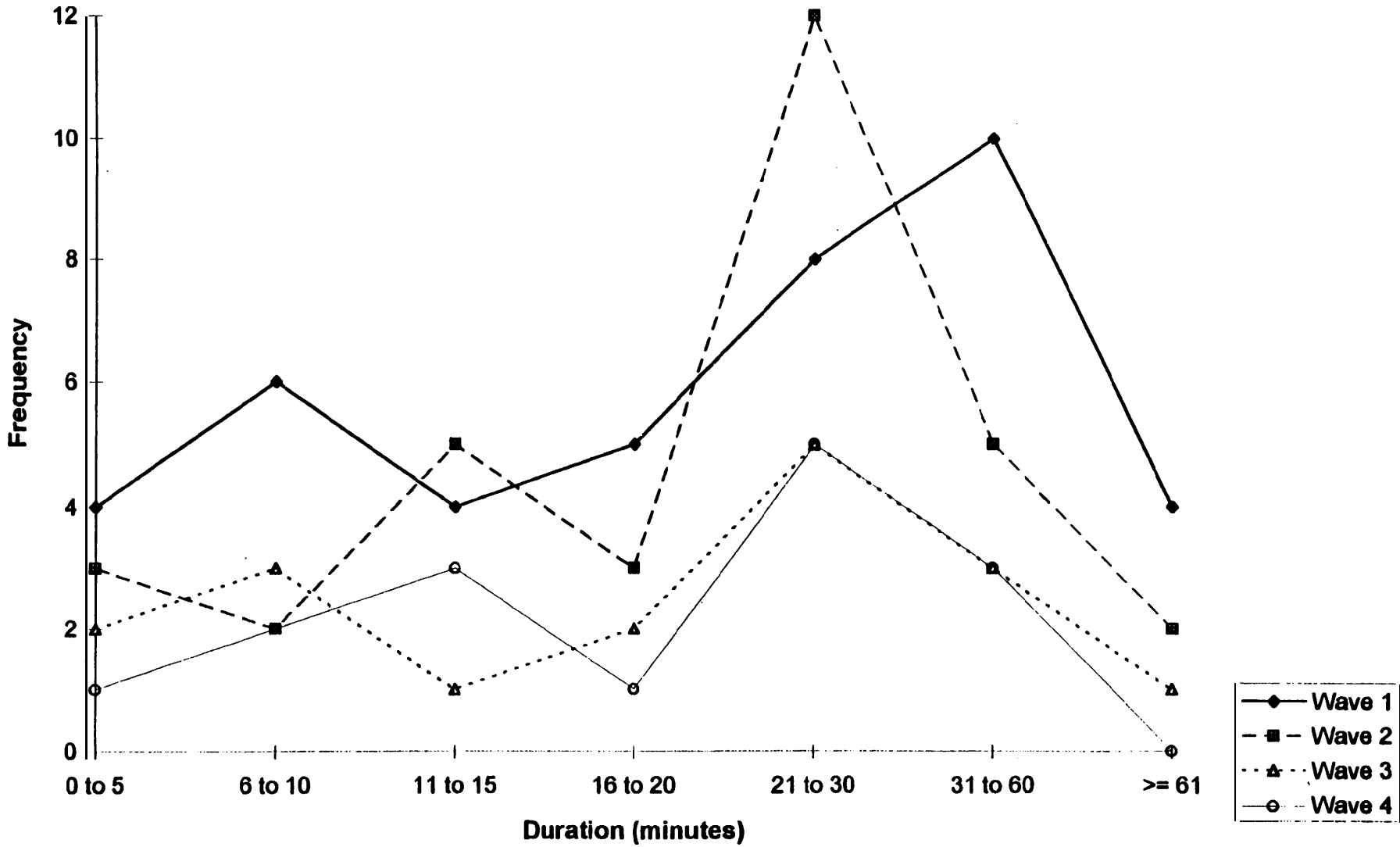


Taking HOV-Pool to Shop

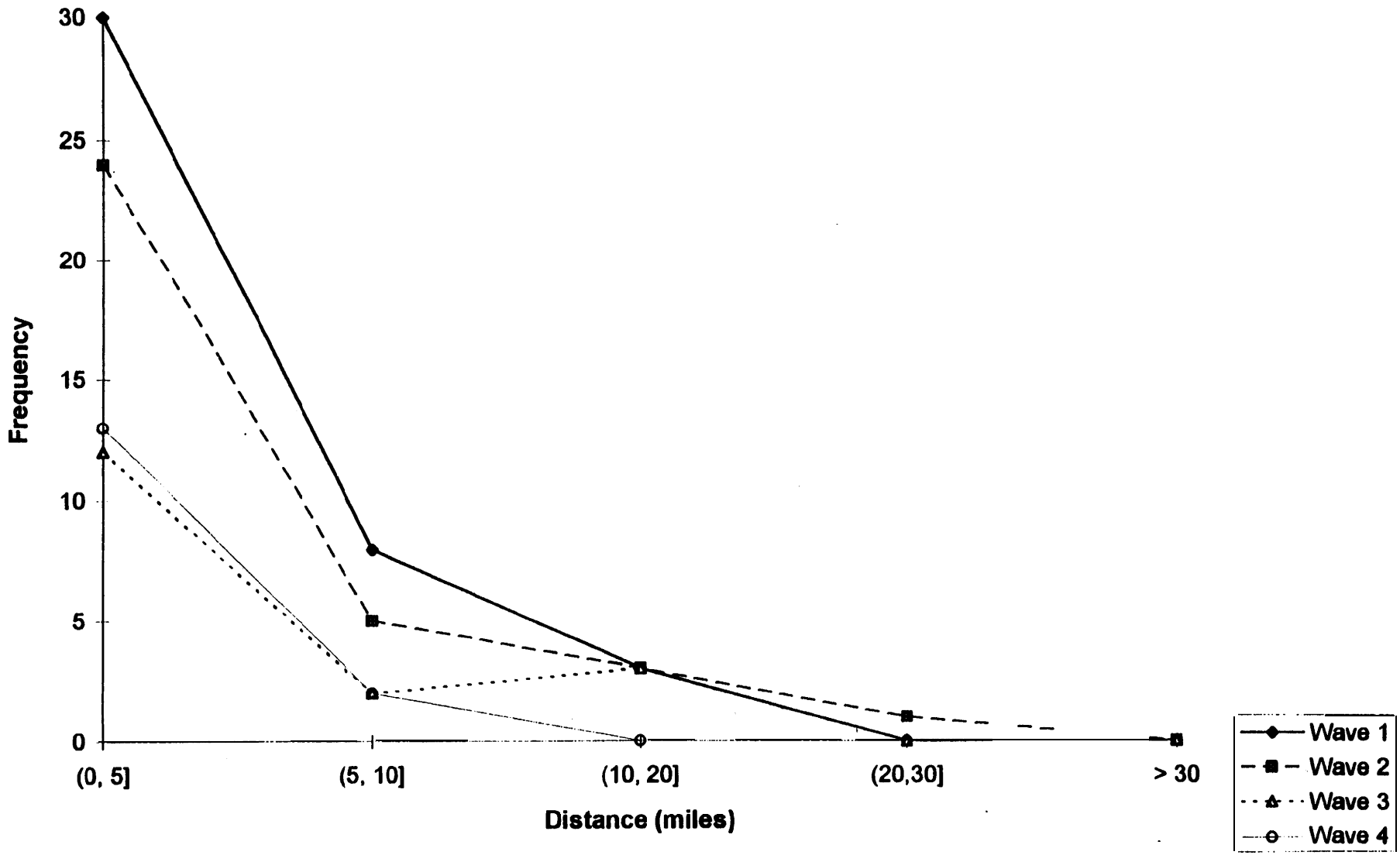



Taking HOV-Transit to Shop
Frequency
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
6
7
8
>= 9
Total trips
Wave 1
Wave 2
Wave 3
Wave 4

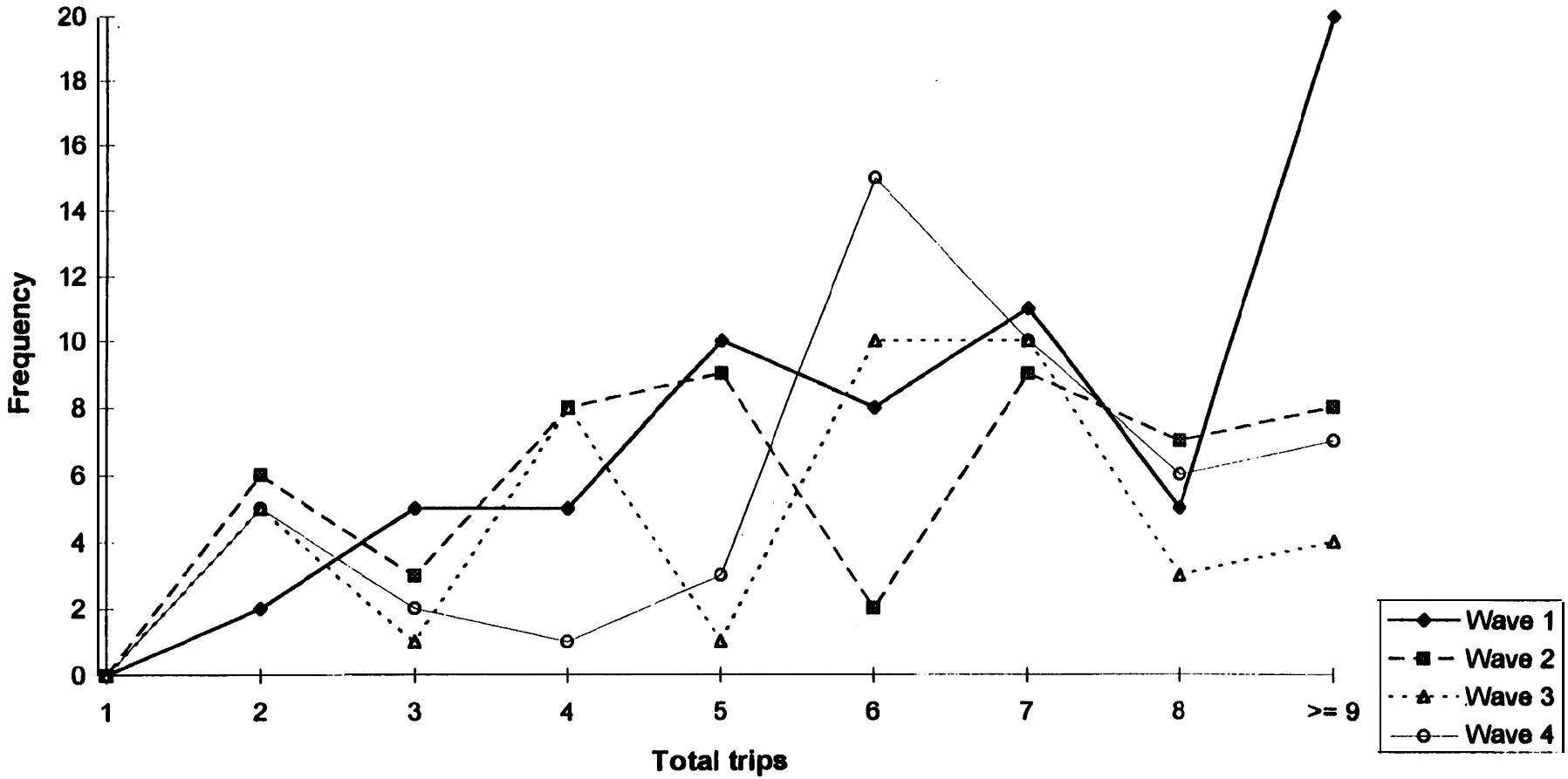
Taking HOV-Transit to Shop



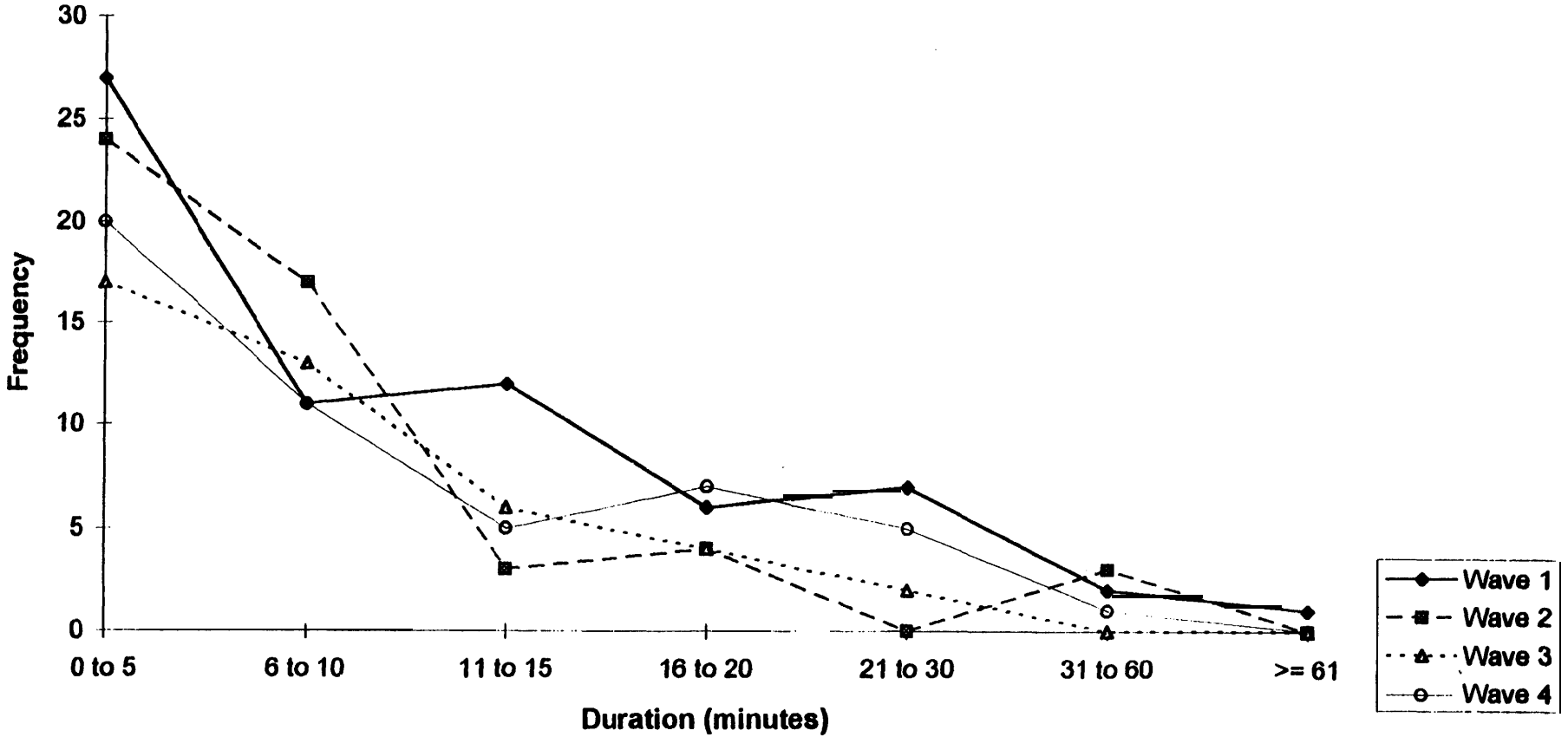
Taking HOV-Transit to Shop



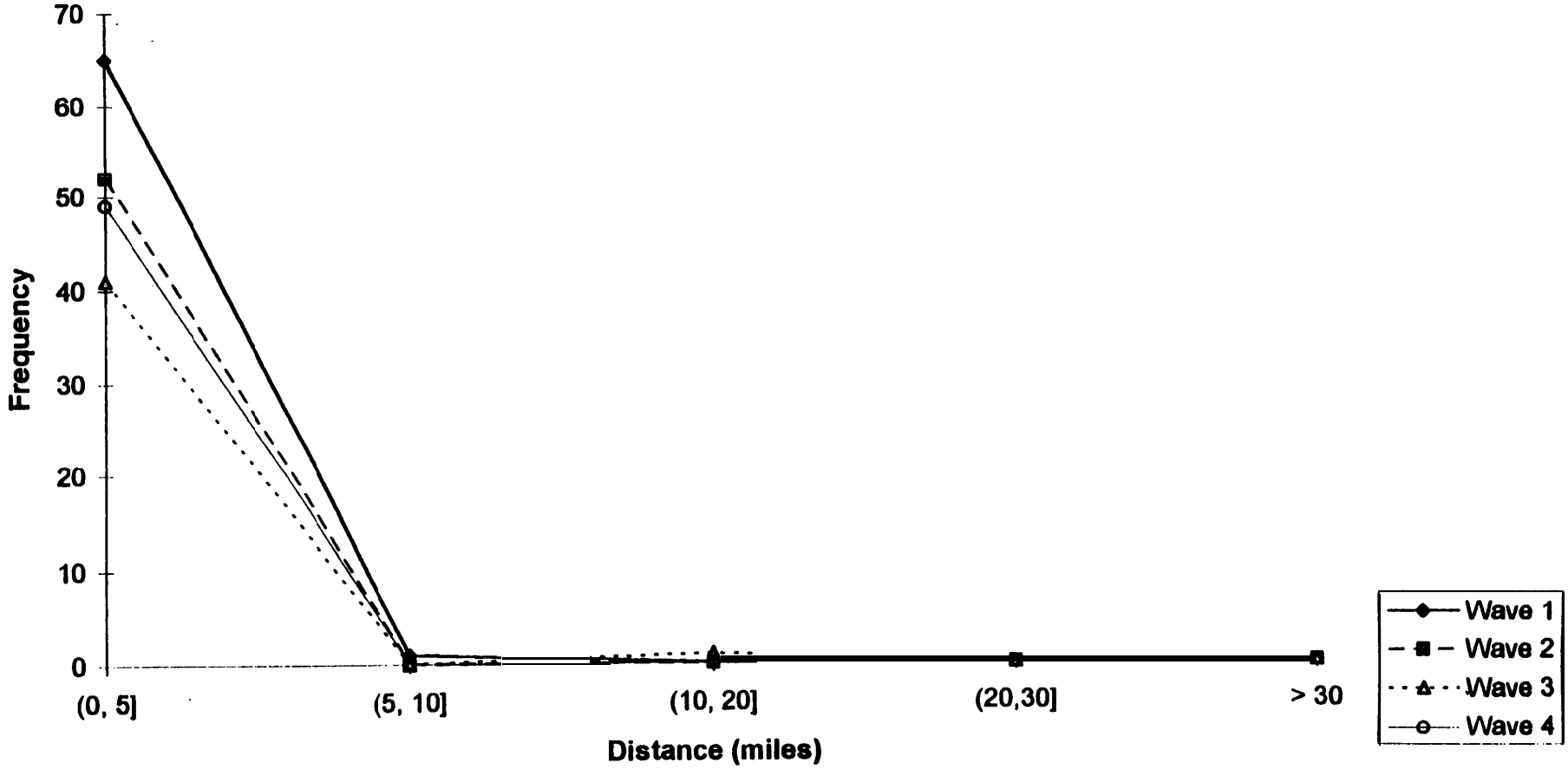
Taking Non-Motor Trips to Shop



Taking Non-Motor Trips to Shop



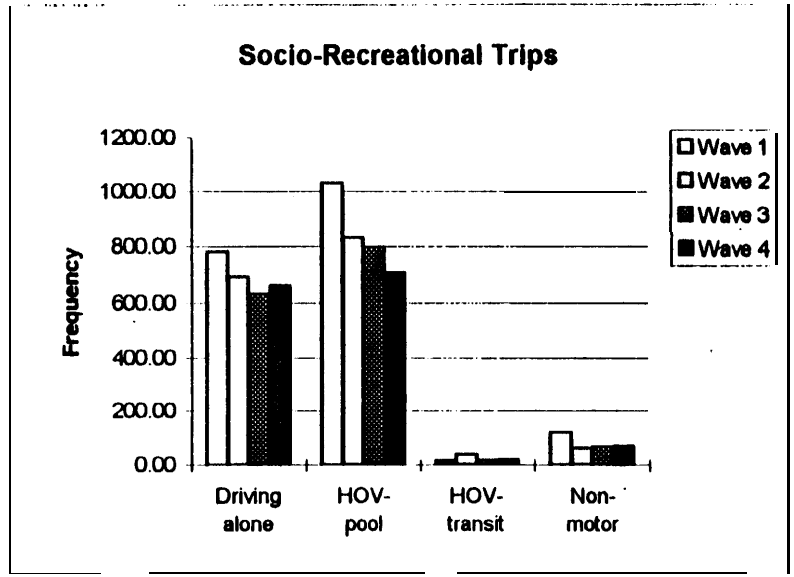
Taking Non-Motor Trips to Shop



Socio-Recreational Trip Frequencies

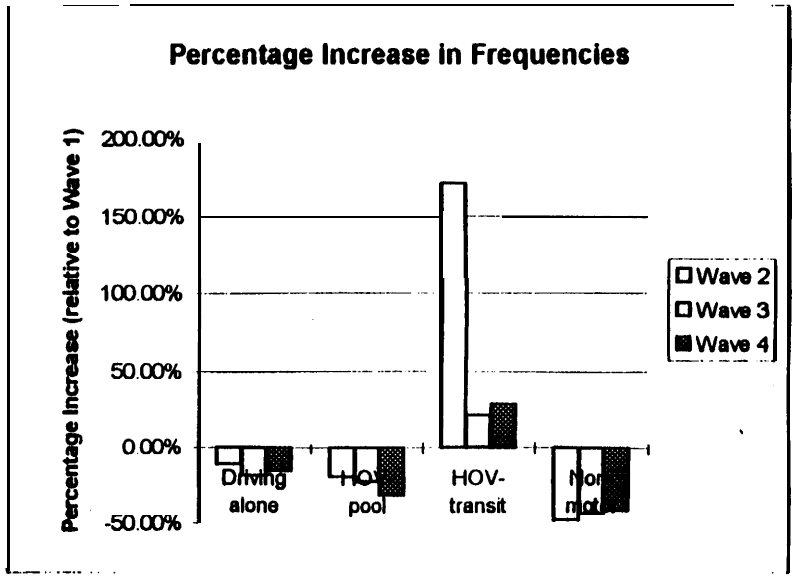
Frequencies of Socio-Recreational Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	781.00	694.00	634.00	661.00
HOV-pool	1030.00	832.00	798.00	707.00
HOV-transit	14.00	38.00	17.00	18.00
Non-motor	118.00	61.00	66.00	69.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	-11.14%	-18.82%	-15.36%
HOV-pool	-19.22%	-22.52%	-31.36%
HOV-transit	171.43%	21.43%	28.57%
Non-motor	-48.31%	-44.07%	-41.53%



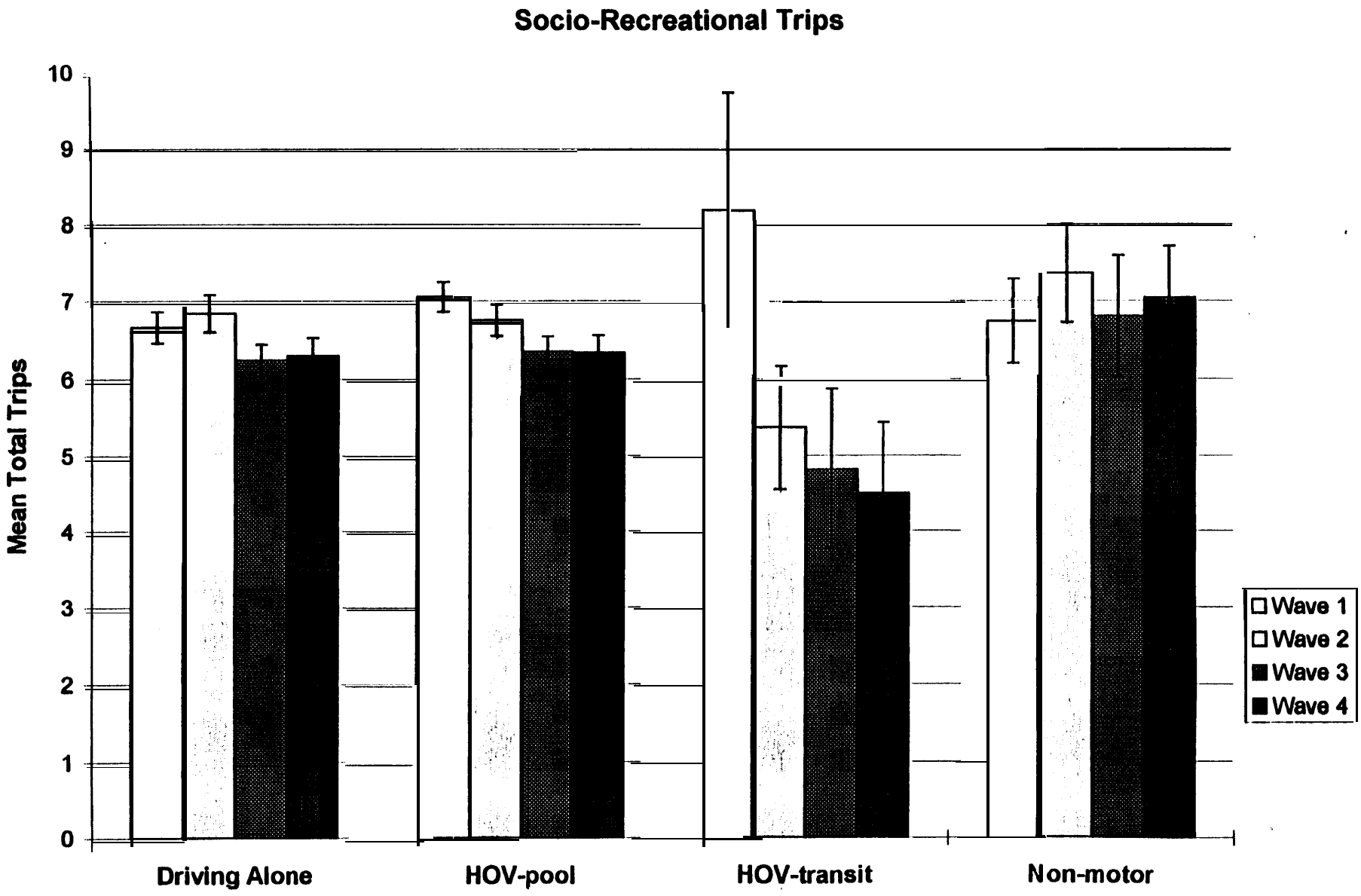
Socio-Recreational Trip Means

(and standwd deviatim and standard error)

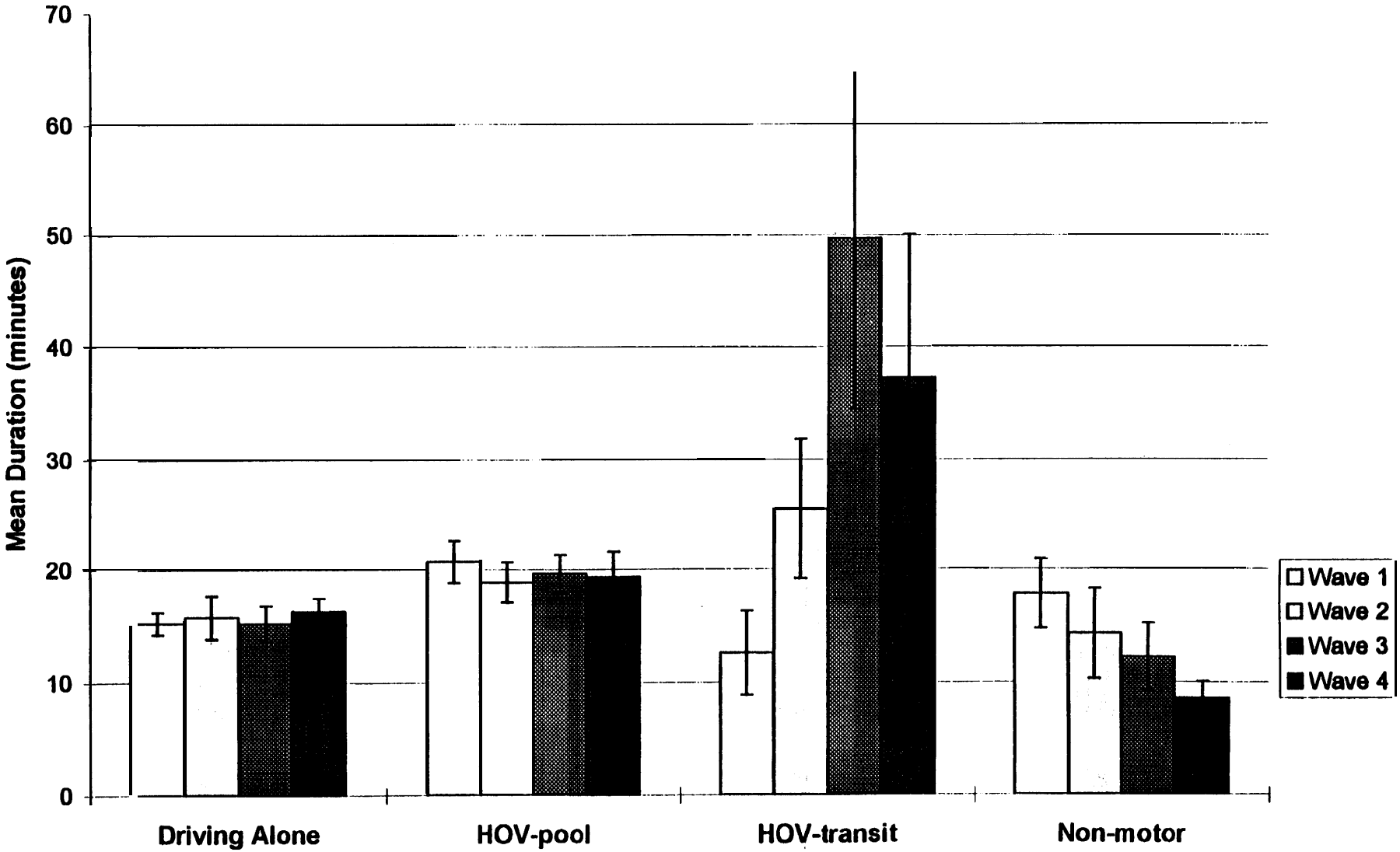
TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**6.66**	**6.84**	**6.24**	**6.30**
		2.80	3.11	2.53	2.86
		0.10	0.12	0.10	0.11
	HOV-pool	**7.05**	**6.75**	**6.35**	**6.34**
		3.09	2.83	2.75	2.91
		0.10	0.10	0.10	0.11
	HOV-transit	**8.21**	**5.37**	**4.82**	**4.50**
		2.89	2.52	2.16	1.98
		0.77	0.41	0.52	0.47
	Non-motor	**6.75**	**7.36**	**6.80**	**7.04**
		2.92	2.50	3.21	2.81
		0.27	0.32	0.40	0.34

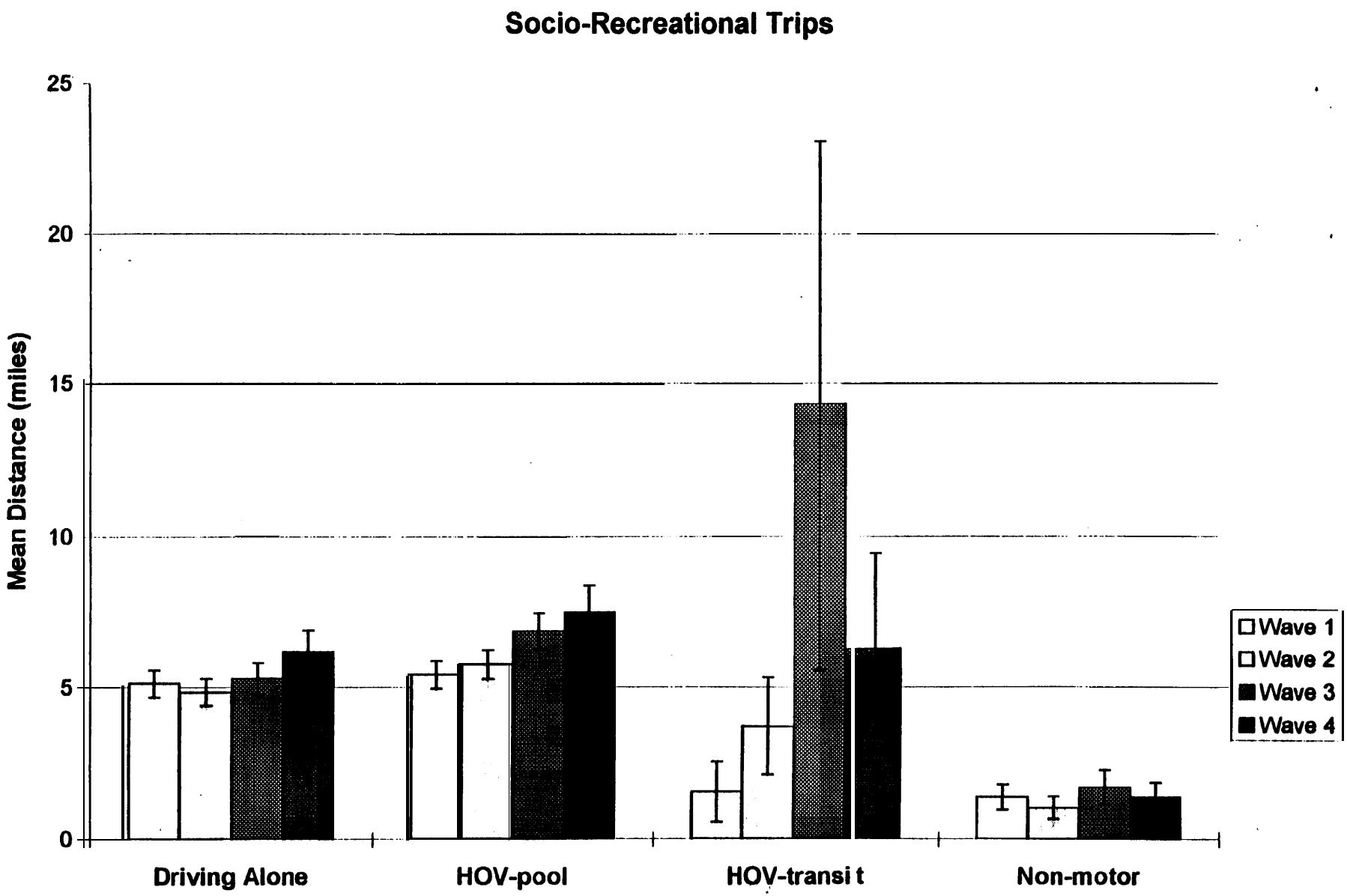
DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**15.24**	**15.77**	**15.20**	**16.27**
		14.13	25.30	20.12	15.46
		0.51	0.96	0.80	0.60
	HOV-pool	**20.73**	**18.87**	**19.63**	**19.29**
		30.47	25.49	23.62	30.10
		0.95	0.89	0.84	1.13
	HOV-transit	**12.57**	**25.50**	**49.71**	**37.28**
		6.95	19.48	31.32	27.14
		1.86	3.16	7.60	6.40
	Non-motor	**17.79**	**14.25**	**12.18**	**8.55**
		16.92	15.30	12.15	6.19
		1.56	1.99	1.50	0.75

DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**5.13**	**4.85**	**5.29**	**6.18**
		6.21	5.78	6.58	9.19
		0.22	0.22	0.26	0.36
	HOV-pool	**5.42**	**5.76**	**6.86**	**7.50**
		7.08	6.76	8.39	11.63
		0.23	0.24	0.30	0.44
	HOV-transit	**1.53**	**3.72**	**14.31**	**6.29**
		1.56	4.97	18.04	6.70
		0.49	0.81	4.38	1.58
	Non-motor	**1.37**	**1.02**	**1.68**	**1.36**
		2.18	1.41	2.31	1.90
		0.21	0.18	0.28	0.23


Socio-Recreational Trips
Mean Total Trips
10
9
8
7
6
5
4
3
2
1
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

Socio-Recreational Trips




Socio-Recreational Trips
Mean Distance (miles)
25
20
15
10
5
0
Driving Alone
HOV-pool
HOV-transi t
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

Driving Alone to Socio-Recreation

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	1
2	23	27	26	29
3	49	50	56	65
4	120	88	92	100
5	114	97	76	112
6	118	102	125	100
7	91	81	89	65
8	88	70	68	56
>= 9	178	179	102	133
	781	694	634	661

DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	216	197	181	149
6 to 10	203	189	156	178
11 to 15	140	135	126	122
16 to 20	66	44	64	72
21 to 30	96	76	66	85
31 to 60	45	38	33	45
>= 61	15	13	8	10
missing	0	2	0	0
	781	694	634	661

DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	528	476	429	414
(5, 10]	125	128	113	143
(10, 20]	89	56	73	75
(20,30]	15	16	9	14
> 30	10	8	10	15
missing	14	10	0	0
	781	694	634	661

Taking HOV-Pool to Socio-Recreation

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	2
2	40	36	47	45
3	48	37	45	41
4	141	113	117	126
5	127	129	115	105
6	123	112	149	109
7	142	115	119	72
8	139	92	70	62
>= 9	270	198	136	145
	1030	832	798	707

DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	229	137	129	144
6 to 10	258	219	184	167
11 to 15	188	187	190	144
16 to 20	109	100	88	76
21 to 30	123	101	108	94
31 to 60	73	60	79	63
>= 61	50	19	20	19
missing	0	9	0	0
	1030	832	798	707

DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	665	539	477	409
(5, 10]	181	146	155	154
(10, 20]	80	96	112	95
(20,30]	23	19	33	30
> 30	20	14	21	19
missing	61	18	0	0
	1030	832	798	707

Taking HOV-Transit to Socio-Recreation

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	0
2	0	5	1	4
3	0	7	4	2
4	1	6	4	4
5	1	2	3	2
6	2	2	2	2
7	4	7	2	3
8	1	6	0	1
>= 9	5	3	1	0
	14	38	17	18

DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	4	3	1	1
6 to 10	0	7	0	1
11 to 15	8	7	0	3
16 to 20	0	3	1	2
21 to 30	2	9	7	4
31 to 60	0	7	3	2
>= 61	0	2	5	5
missing	0	0	0	0
	14	38	17	18

DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	9	32	8	11
(5, 10]	1	3	1	4
(10, 20]	0	1	4	2
(20,30]	0	2	2	1
> 30	0	0	2	0
missing	4	0	0	0
	14	38	17	18

Taking Non-Motor Trips to Socio-Recreation

TOTAL TRIPS

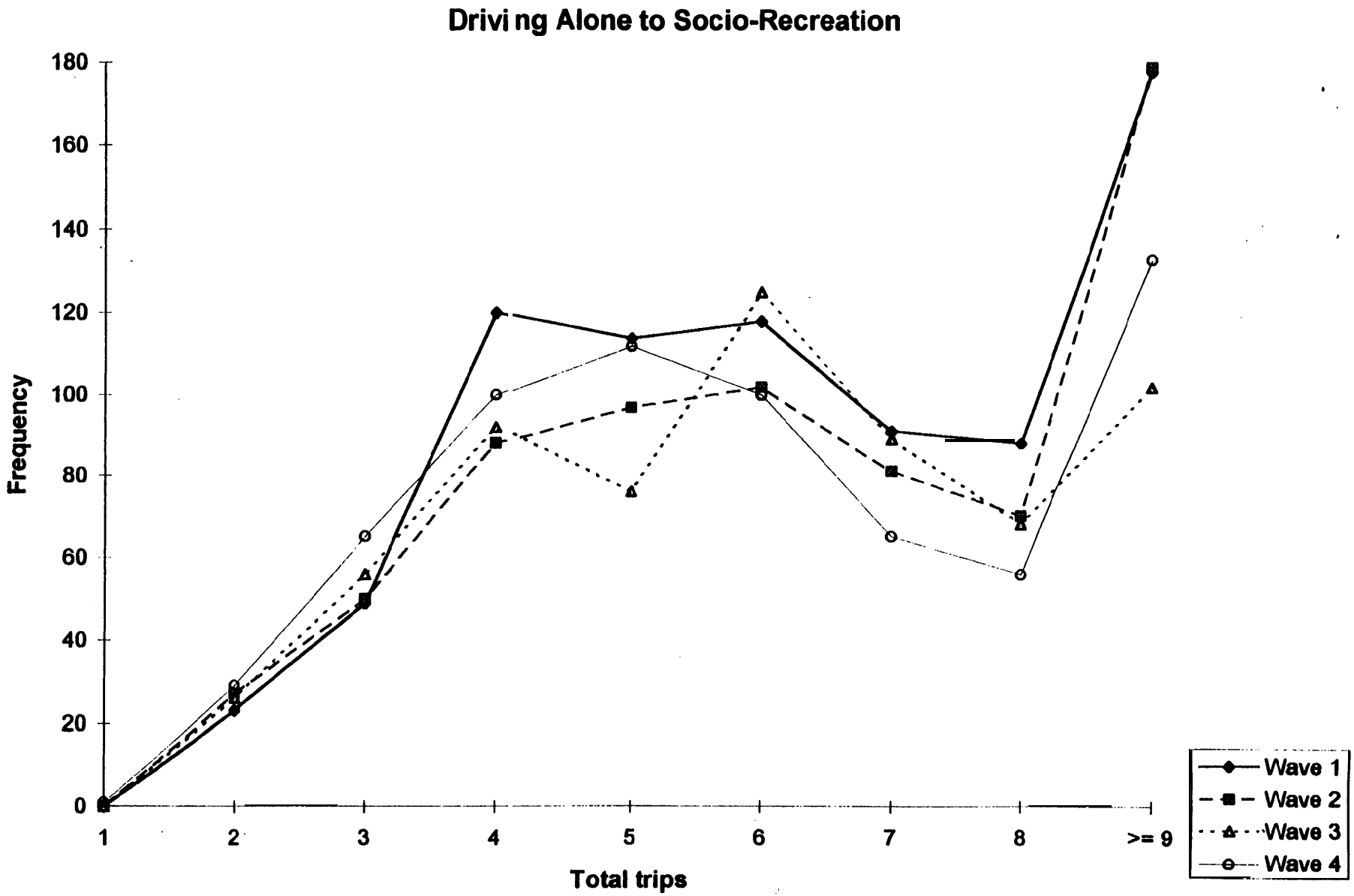
	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	0
2	2	1	1	2
3	10	2	2	2
4	18	7	14	7
5	15	3	9	7
6	19	8	10	18
7	14	14	12	11
8	10	9	4	6
>= 9	30	17	14	16
	118	61	66	69

DURATION (minutes)

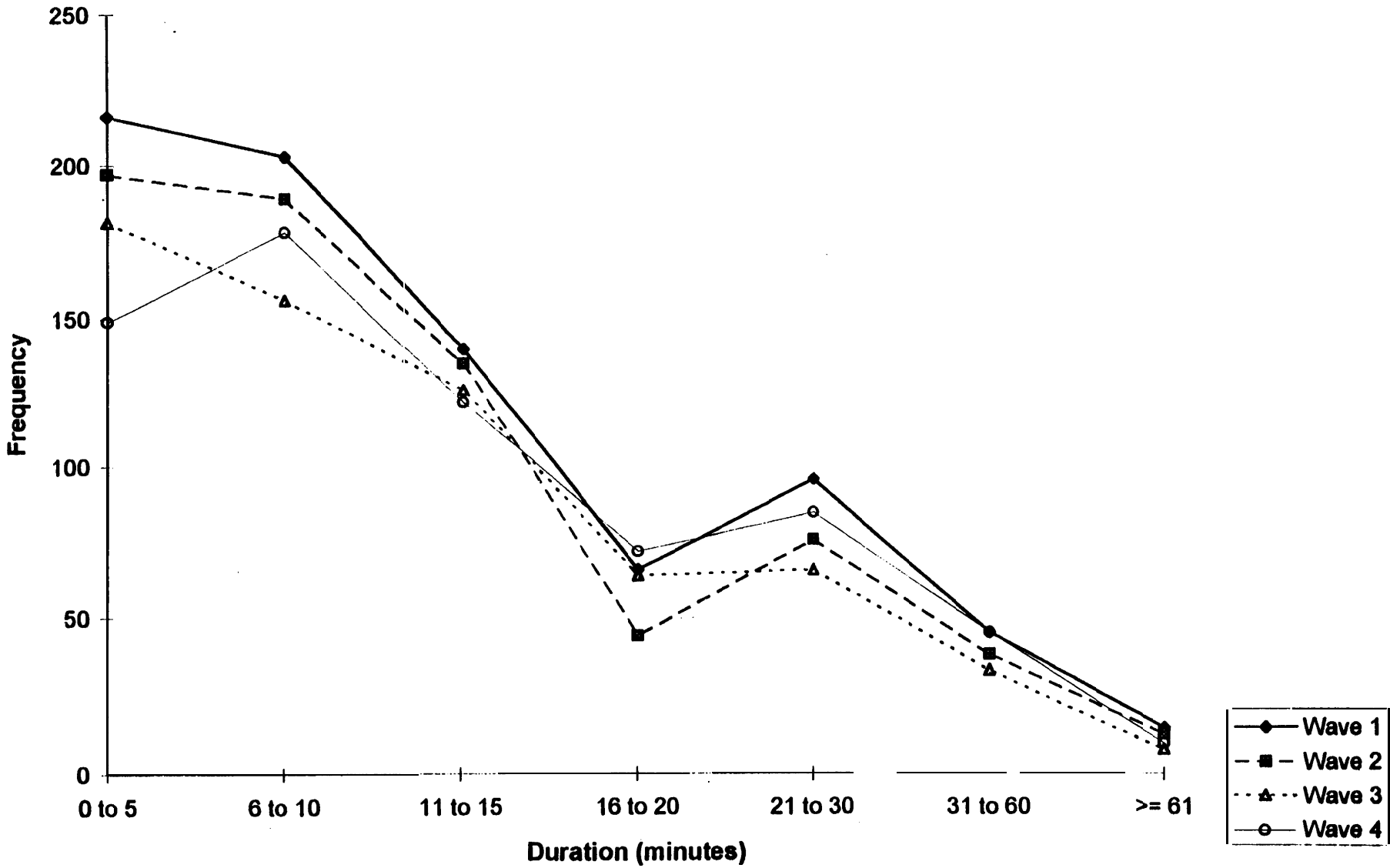
	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	38	26	24	36
6 to 10	28	11	22	19
11 to 15	13	6	11	5
16 to 20	8	8	2	4
21 to 30	10	3	3	5
31 to 60	21	3	3	0
>= 61	0	2	1	0
missing	0	2	0	0
	118	61	66	69

DISTANCE (miles)

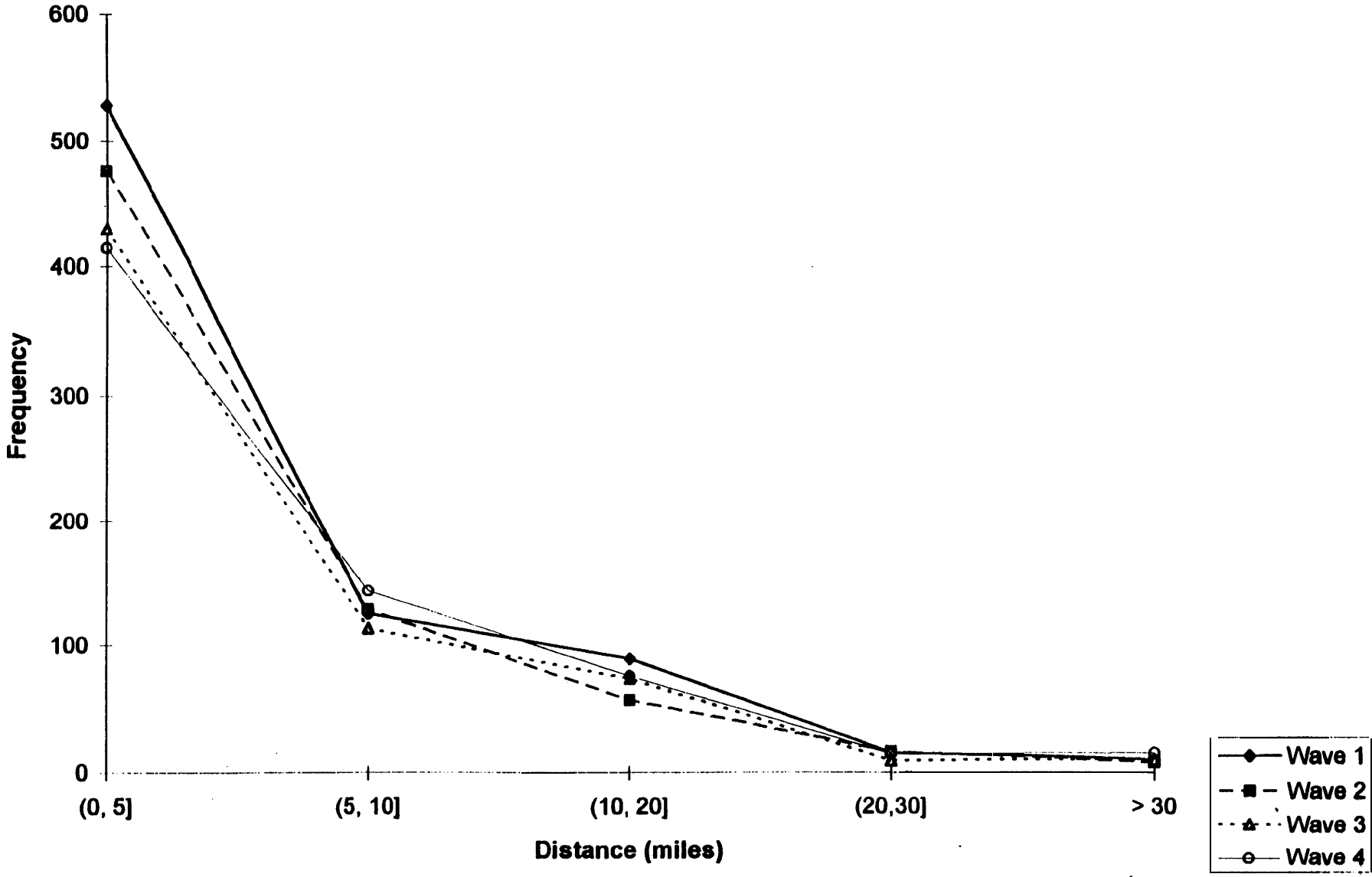
	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	107	59	60	66
(5, 10]	3	2	4	1
(10, 20]	2	0	2	2
(20,30]	0	0	0	0
> 30	0	0	0	0
missing	6	0	0	0
	118	61	66	69


Drivi ng Alone to Socio-Recreation
180
160
140
120
100
80
60
40
20
0
Frequency
1
2
3
4
5
6
7
8
>= 9
Total trips
Wave 1
Wave 2
Wave 3
Wave 4

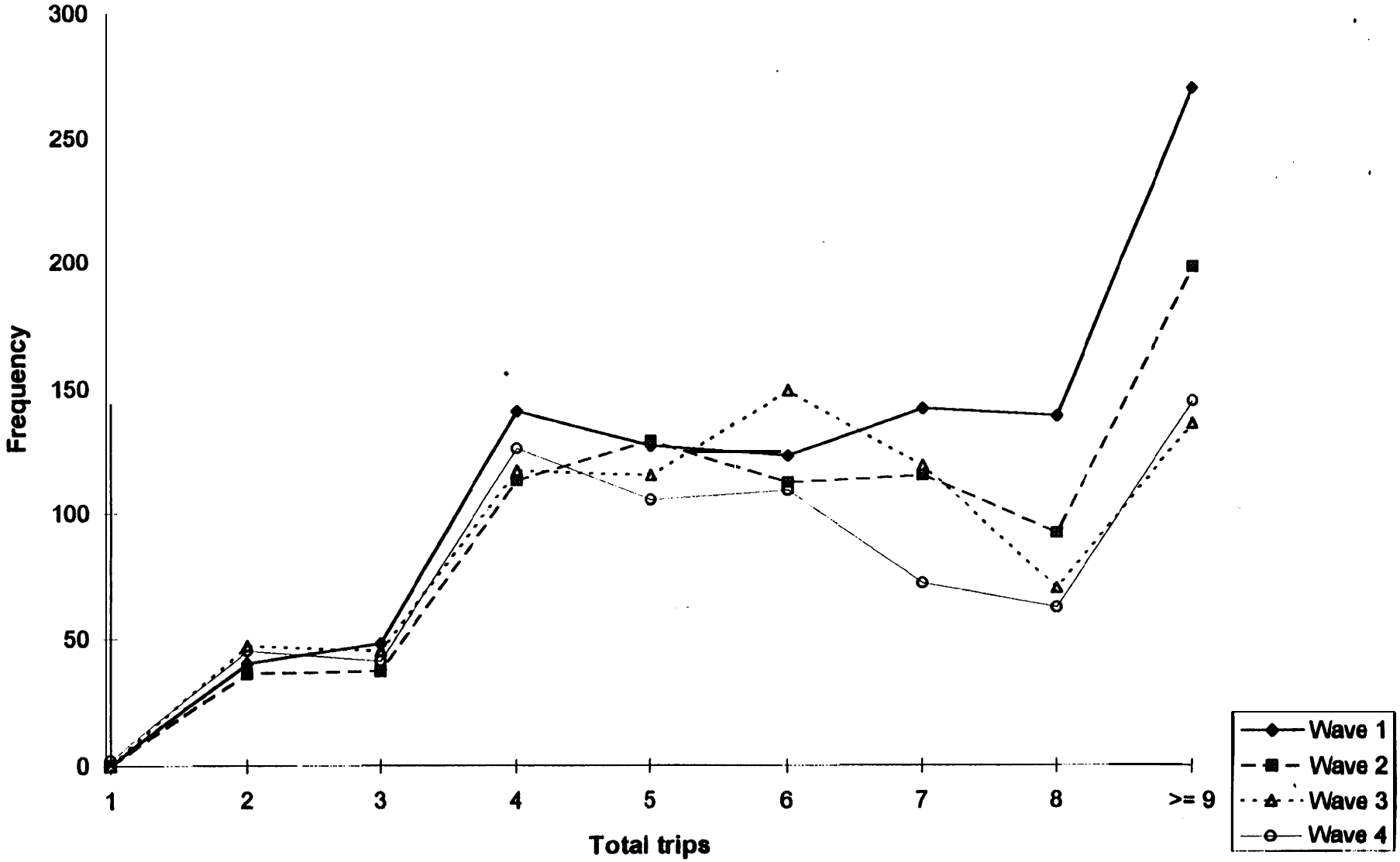
Driving Alone to Socio-Recreation



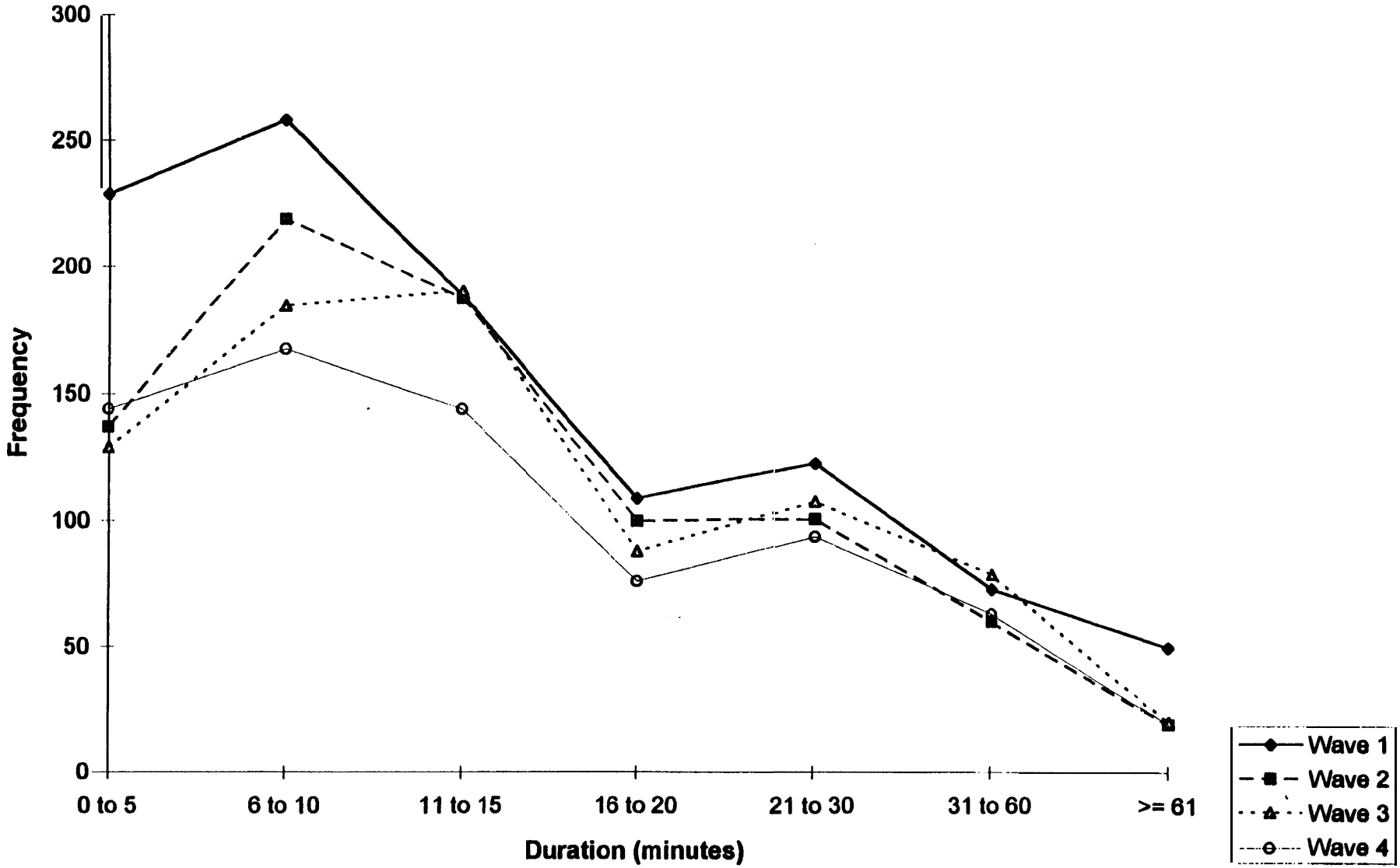
Driving Alone to Socio-Recreation



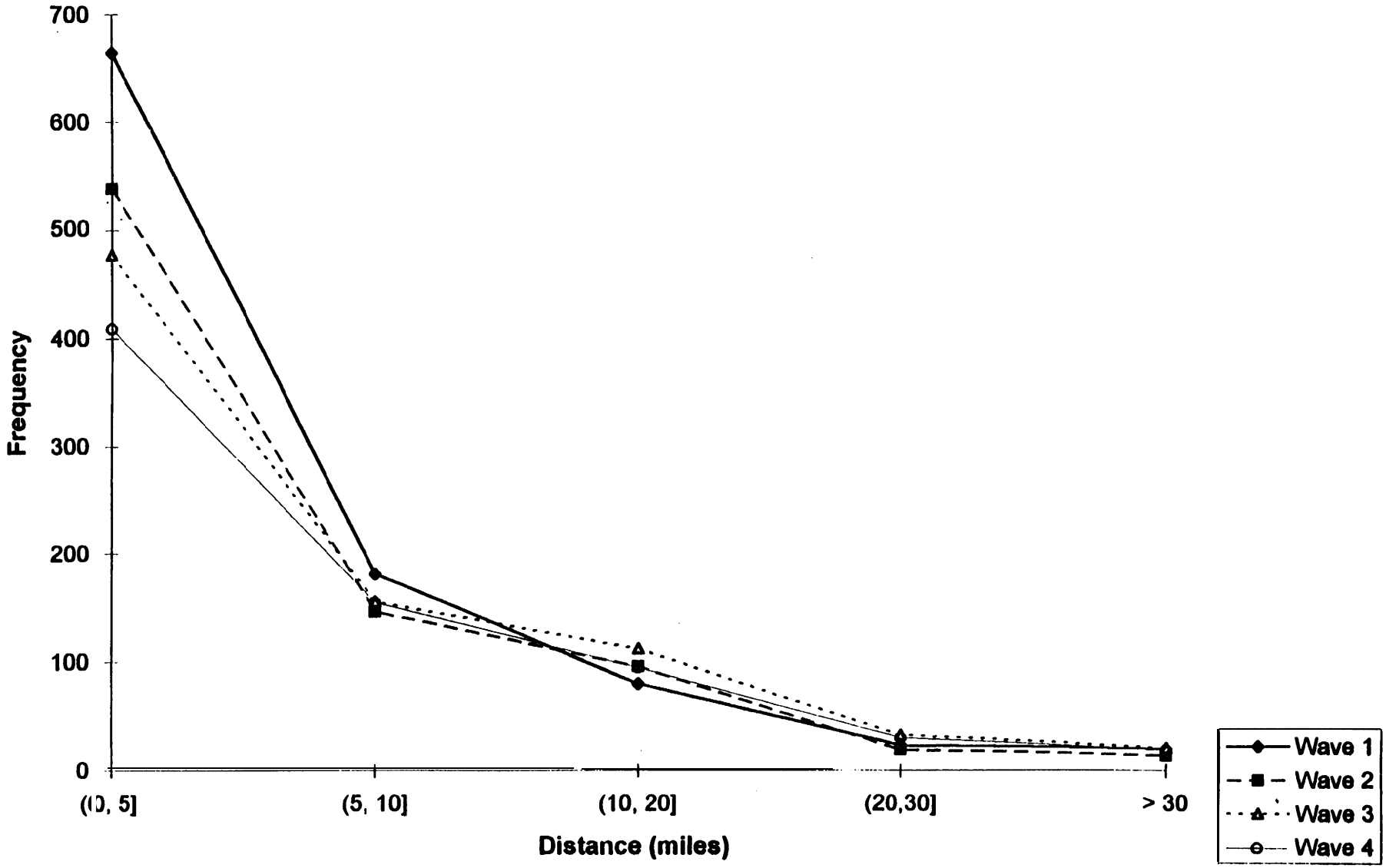
Taking HOV-Pool to Socio-Recreation

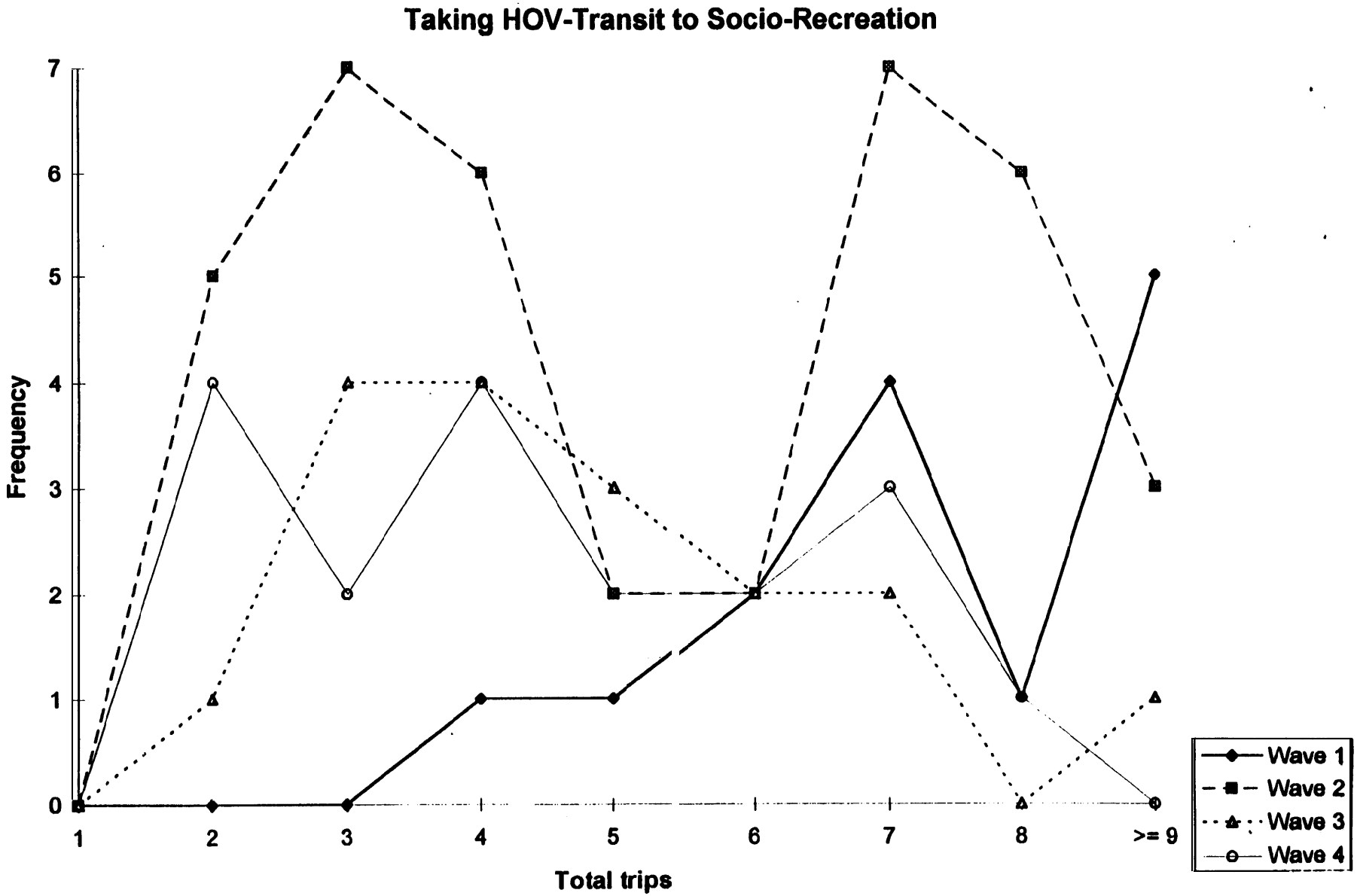


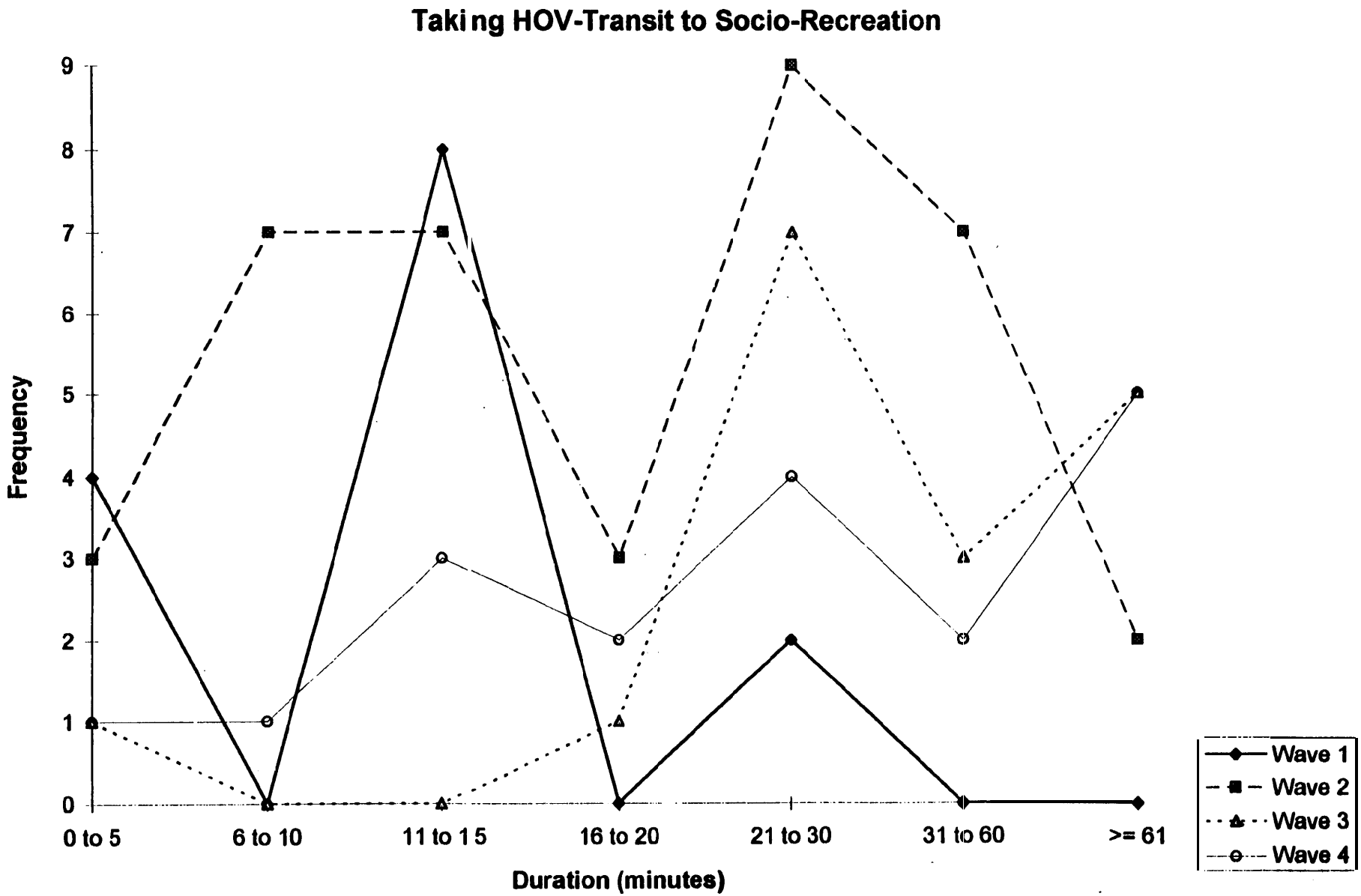
Taking HOV-Pool to Socio-Recreation



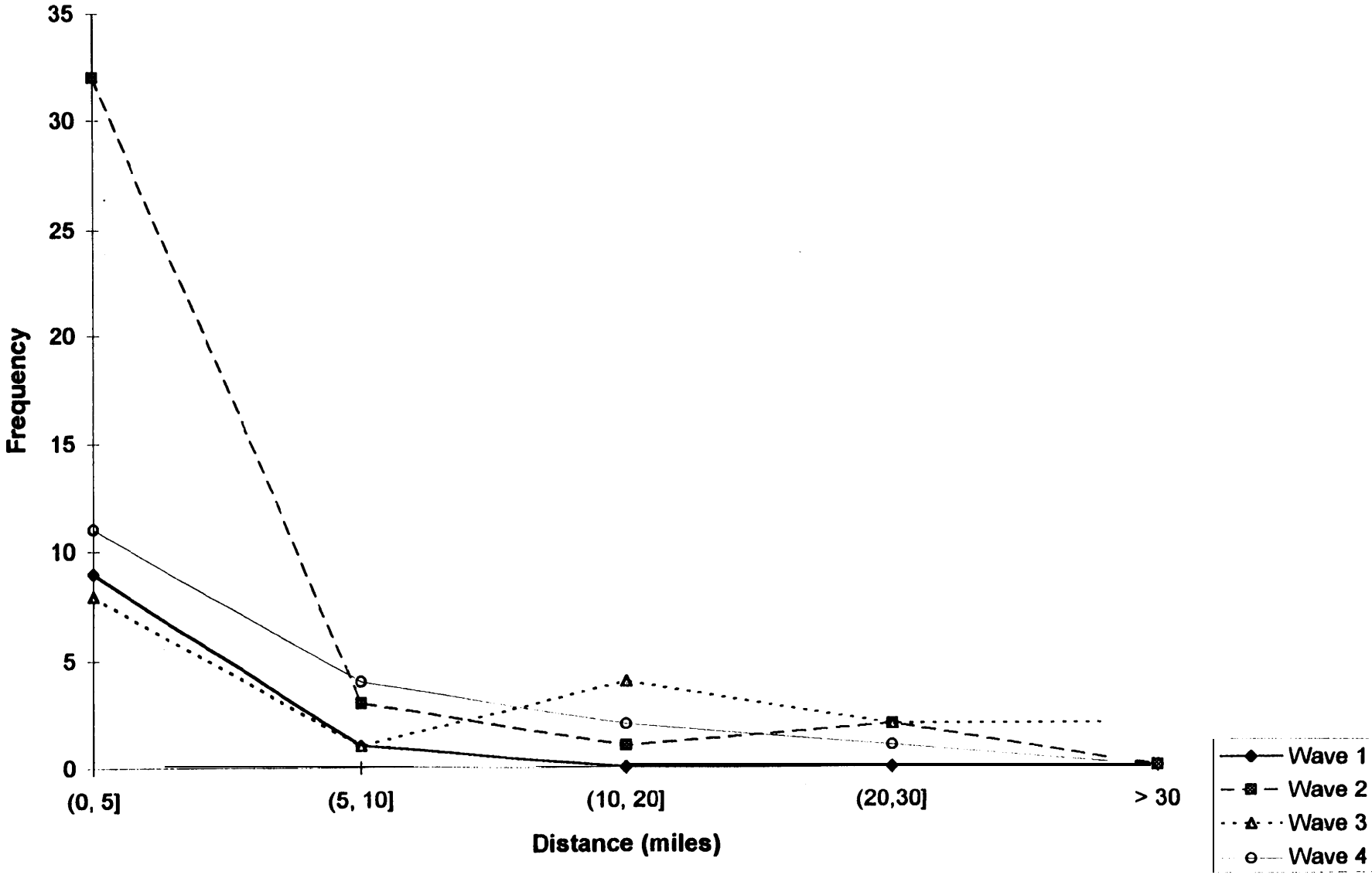
Taking HOV-Pool to Socio-Recreation



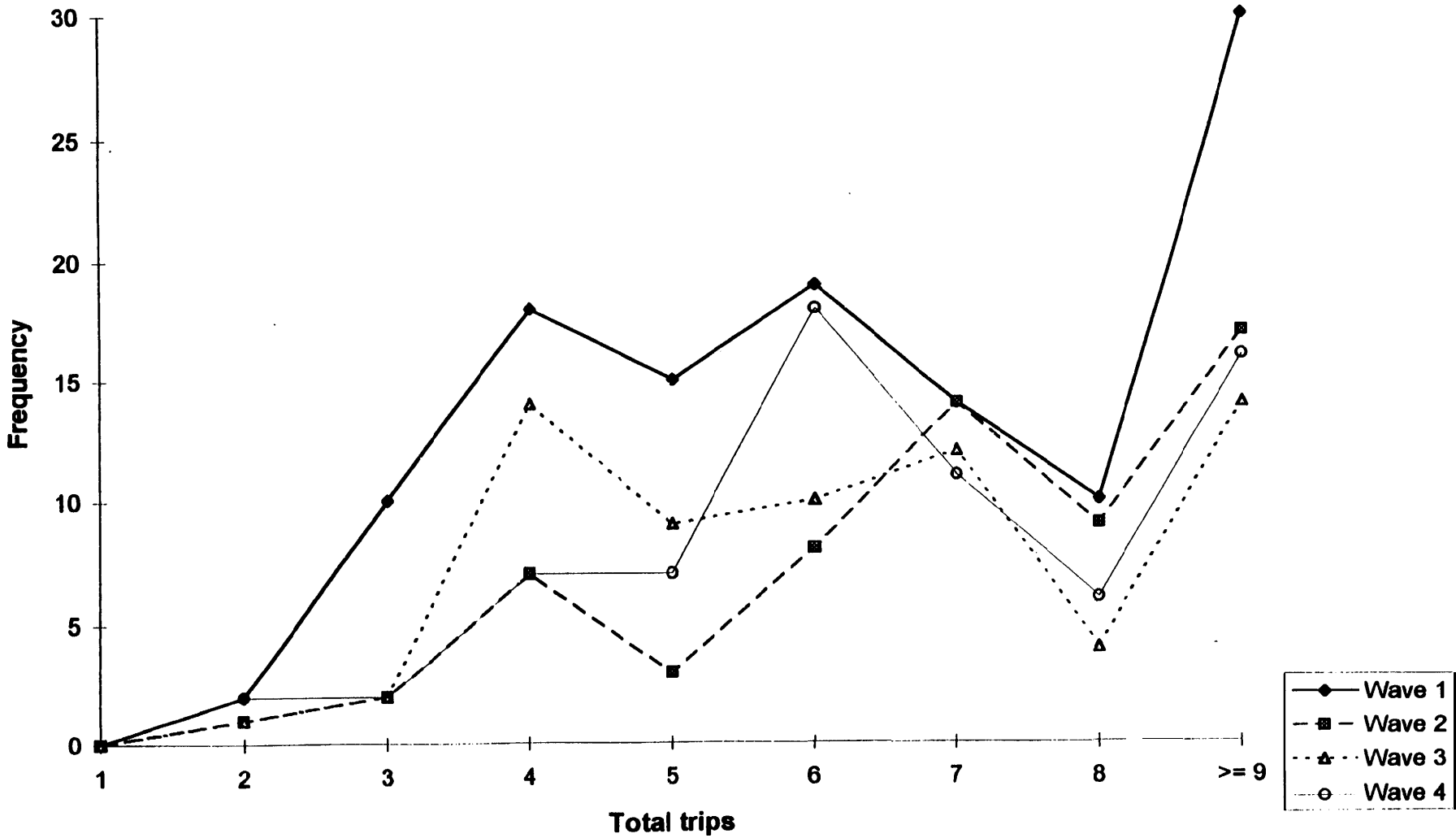

Taking HOV-Transit to Socio-Recreation
Frequency
0
1
2
3
4
5
6
7
1
2
3
4
5
6
7
8
>= 9
Total trips
Wave 1
Wave 2
Wave 3
Wave 4


Taki ng HOV-Transit to Socio-Recreation
Frequency
9
8
7
6
5
4
3
2
1
0
0 to 5
6 to 10
11 to 15
16 to 20
21 to 30
31 to 60
>= 61
Duration (minutes)
Wave 1
Wave 2
Wave 3
Wave 4

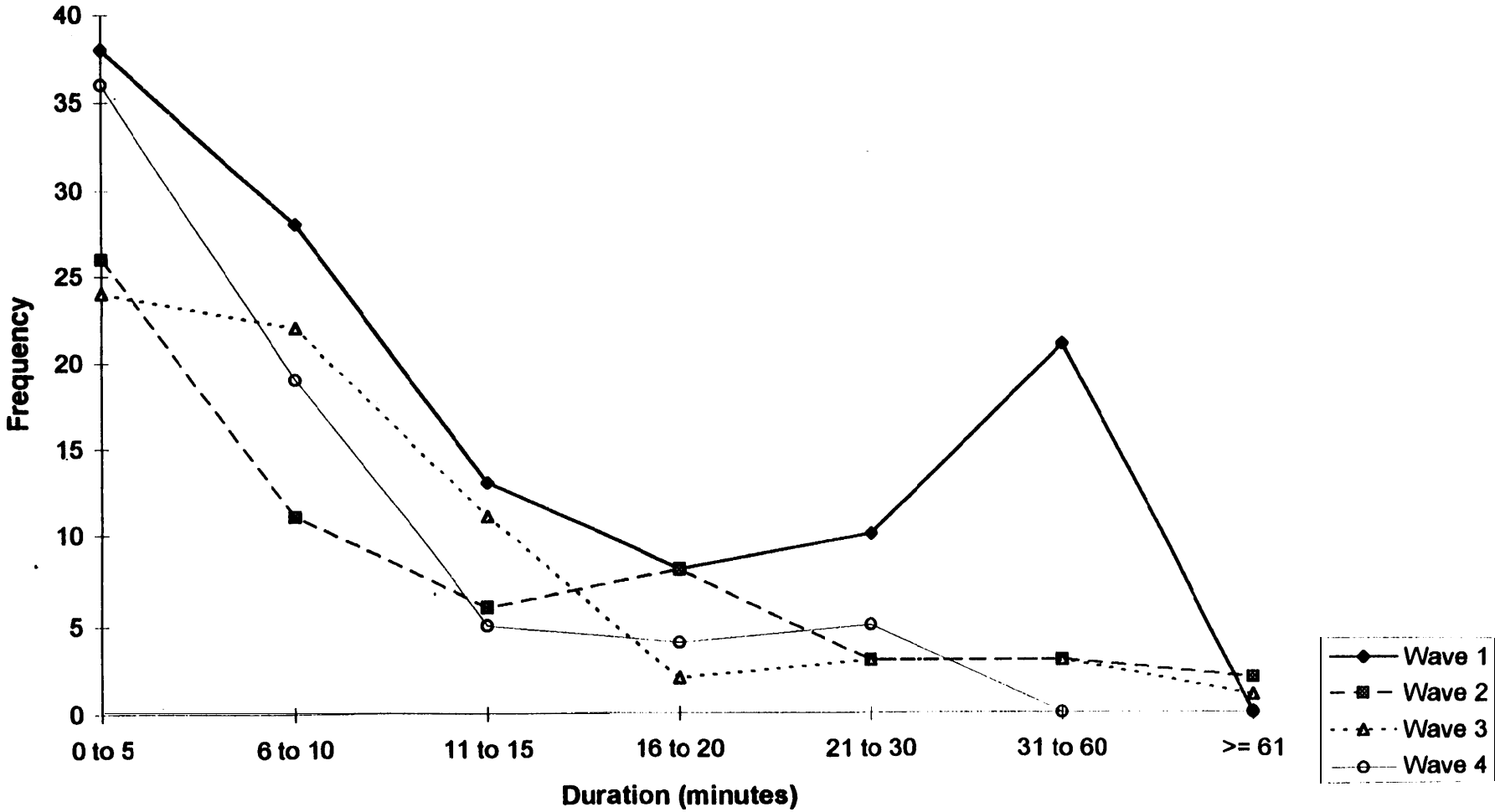
Taking HOV-Transit to Socio-Recreation



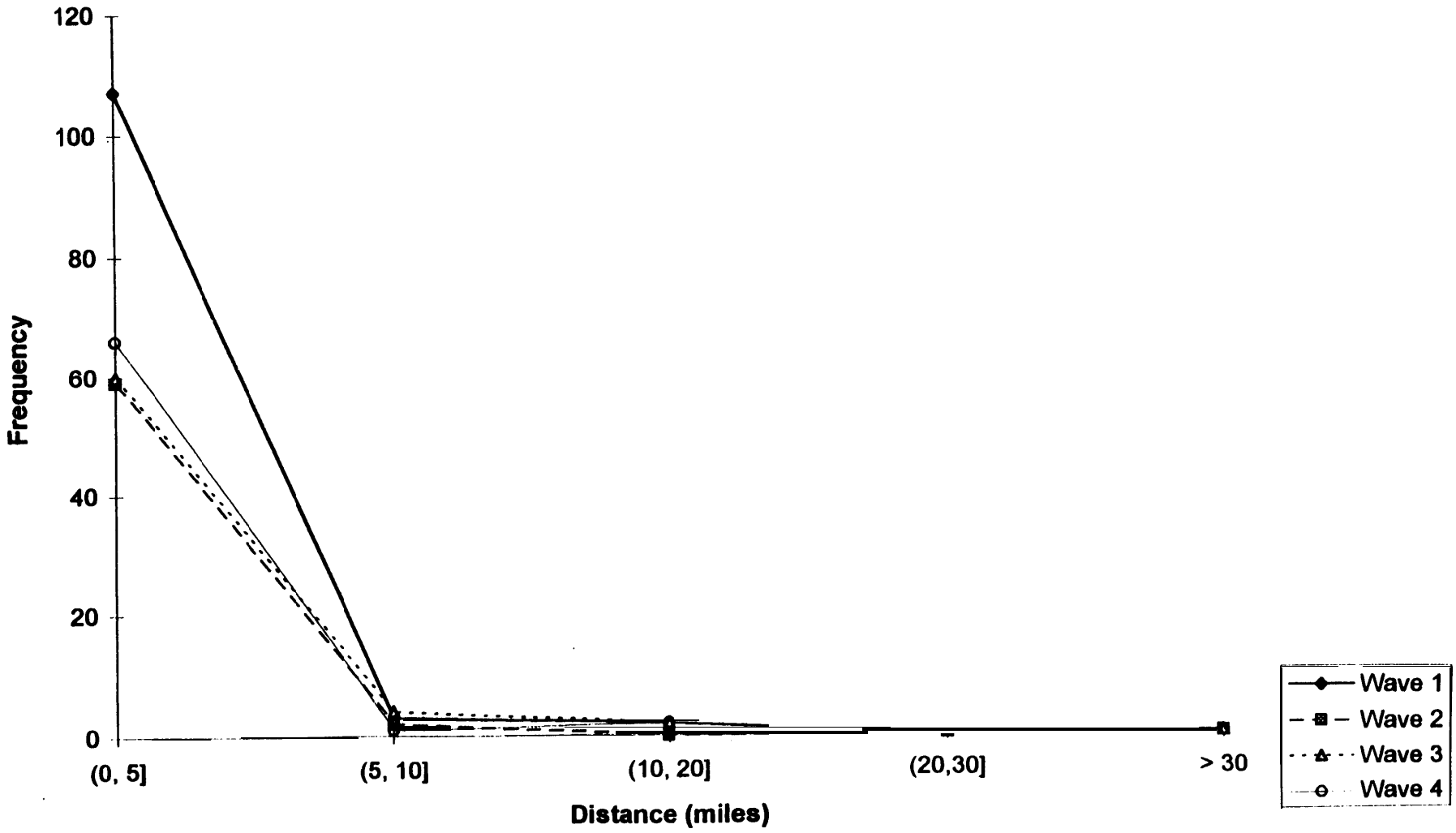
Taking Non-Motor Trips to Socio-Recreation



Taking Non-Motor Trips to Socio-Recreation



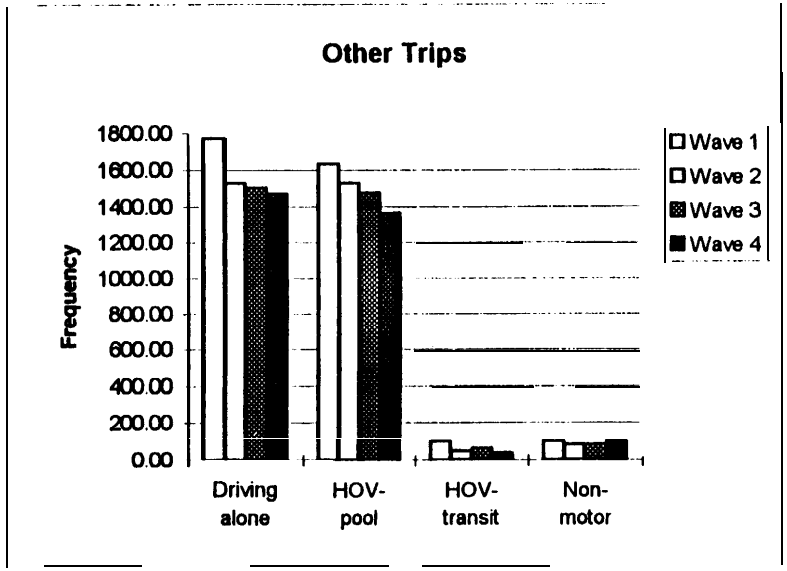
Taking Non-Motor Trips to Socio-Recreation



Other Trip Frequencies

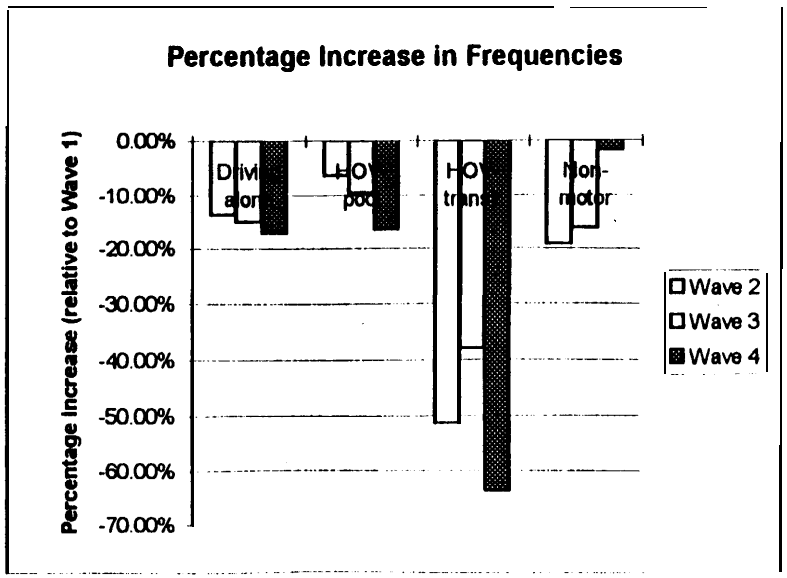
Frequencies of Other Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	1771.00	1529.00	1505.00	1470.00
HOV-pool	1633.00	1527.00	1474.00	1365.00
HOV-transit	105.00	51.00	65.00	38.00
Non-motor	104.00	84.00	87.00	102.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	-13.66%	-15.02%	-17.00%
HOV-pool	-6.49%	-9.74%	-16.41%
HOV-transit	-51.43%	-38.10%	-63.81%
Non-motor	-19.23%	-16.35%	-1.92%



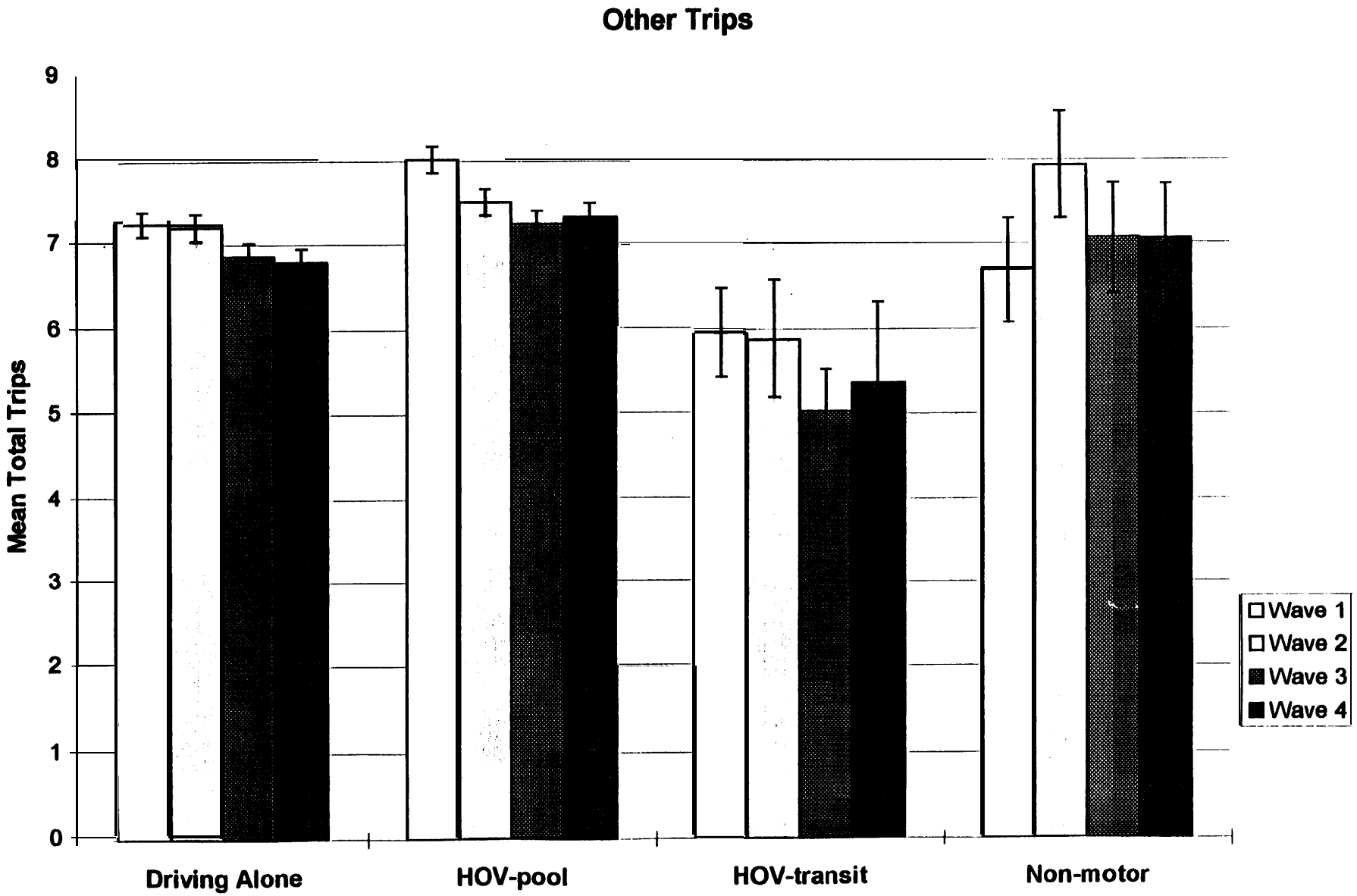
Other Trip Means

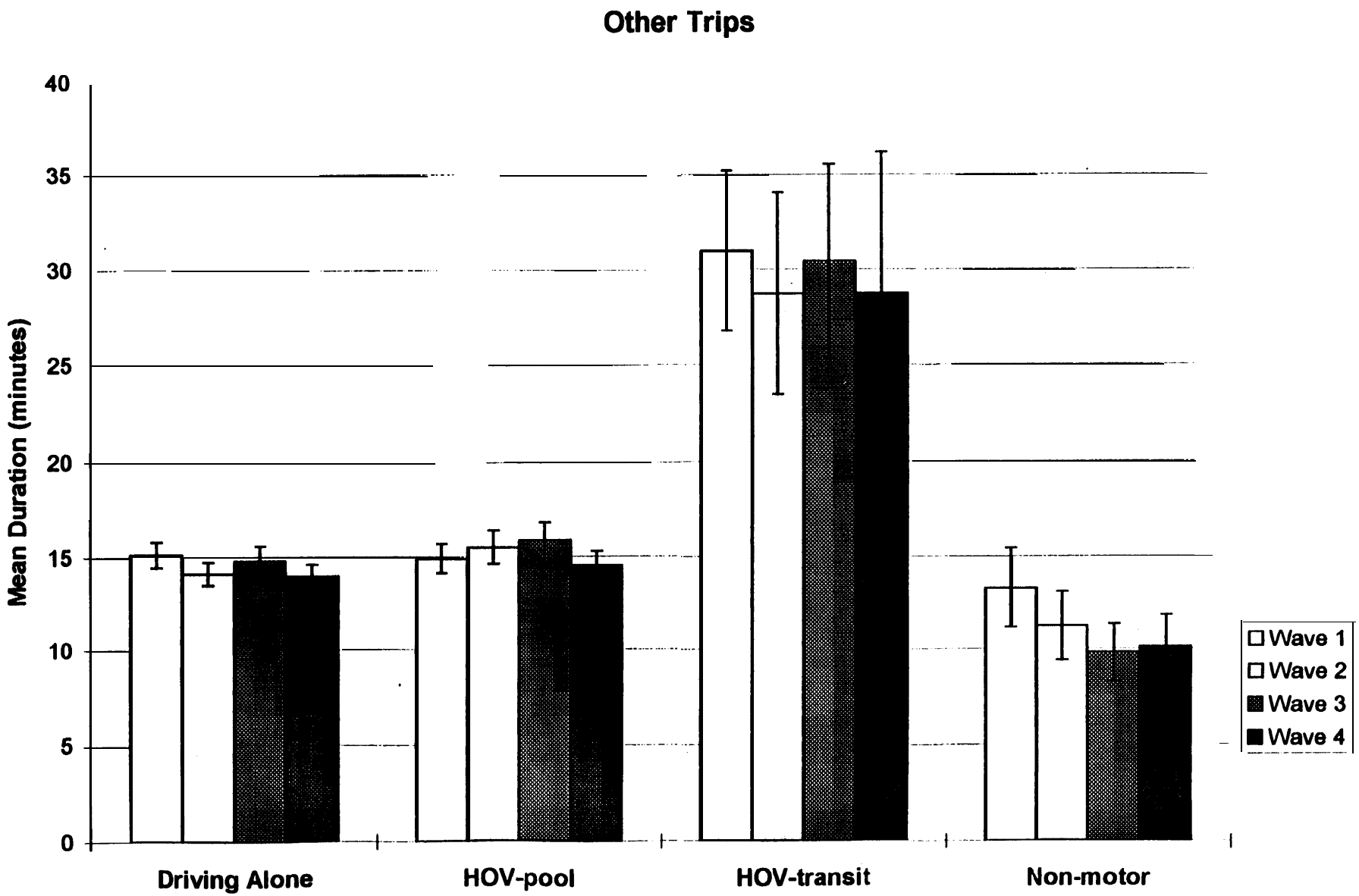
(and standard deviation and standard error)

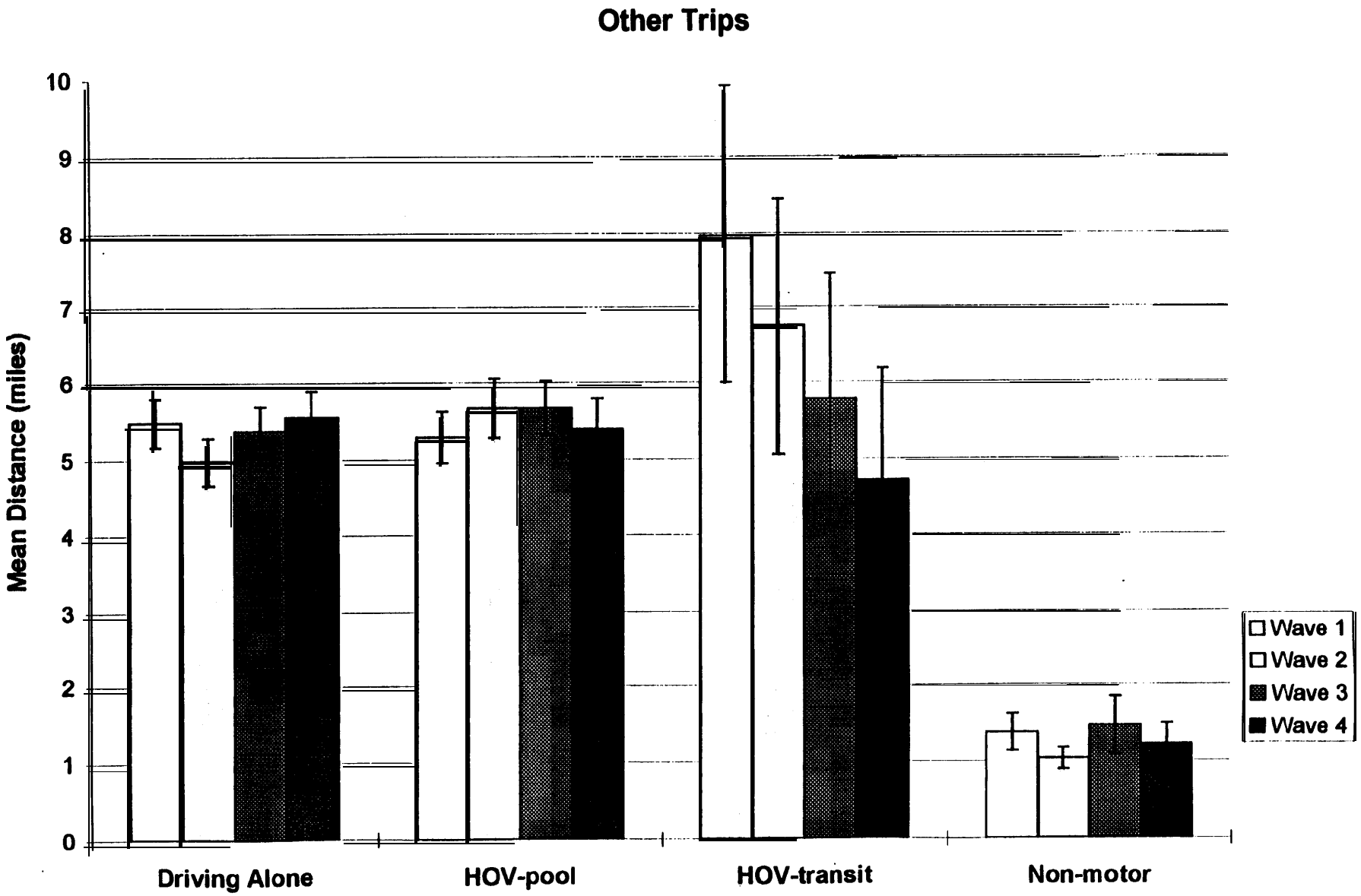
TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**7.24**	**7.20**	**6.86**	**6.79**
		3.05	3.16	2.97	2.97
		0.07	0.08	0.08	0.08
	HOV-pool	**8.02**	**7.50**	**7.24**	**7.32**
		3.30	3.15	2.99	3.10
		0.08	0.08	0.08	0.08
	HOV-transit	**5.95**	**5.88**	**5.03**	**5.37**
		2.63	2.44	2.02	2.91
		0.26	0.34	0.25	0.47
	Non-motor	**6.68**	**7.93**	**7.06**	**7.05**
		3.08	2.95	3.06	3.29
		0.30	0.32	0.33	0.33

DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**15.12**	**14.11**	**14.78**	**13.98**
		14.07	12.17	14.74	11.67
		0.33	0.31	0.38	0.30
	HOV-pool	**14.89**	**15.48**	**15.84**	**14.51**
		15.49	16.86	17.87	14.11
		0.38	0.43	0.47	0.38
	HOV-transit	**30.98**	**28.71**	**30.42**	**28.74**
		21.62	18.92	20.64	23.03
		2.11	2.65	2.56	3.74
	Non-motor	**13.29**	**11.24**	**9.80**	**10.12**
		10.85	8.53	7.22	8.73
		1.06	0.93	0.77	0.86

DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**5.48**	**4.97**	**5.37**	**5.55**
		6.64	6.06	6.27	6.60
		0.16	0.16	0.16	0.17
	HOV-pool	**5.29**	**5.67**	**5.67**	**5.39**
		6.72	7.54	6.71	7.34
		0.17	0.19	0.17	0.20
	HOV-transit	**7.96**	**6.75**	**5.78**	**4.71**
		9.91	5.99	6.73	4.53
		0.98	0.85	0.83	0.73
	Non-motor	**1.37**	**1.03**	**1.46**	**1.21**
		1.24	0.64	1.75	1.39
		0.12	0.07	0.19	0.14


Other Trips
Mean Total Trips
9
8
7
6
5
4
3
2
1
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Other Trips
Mean Duration (minutes)
40
35
30
25
20
15
10
5
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Other Trips
Mean Distance (miles)
10
9
8
7
6
5
4
3
2
1
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

Driving Alone to Other

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	0
2	40	27	48	55
3	106	107	111	108
4	199	198	209	199
5	235	210	162	197
6	222	202	235	206
7	205	141	197	180
8	243	177	171	168
>= 9	521	467	372	357
	1771	1529	1505	1470

DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	495	435	404	423
6 to 10	441	406	388	376
11 to 15	306	295	279	263
16 to 20	175	136	164	165
21 to 30	213	139	165	151
31 to 60	115	93	95	84
>= 61	26	13	10	8
missing	0	12	0	0
	1771	1529	1505	1470

DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	1157	1075	1014	977
(5, 10]	326	256	264	271
(10, 20]	186	141	170	159
(20,30]	54	37	41	43
> 30	26	16	16	20
missing	22	4	0	0
	1771	1529	1505	1470

Taking HOV-Pool to Other

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	0
2	32	39	41	34
3	56	70	69	72
4	153	148	176	164
5	151	215	136	154
6	189	172	250	200
7	195	200	201	178
8	207	172	187	139
>= 9	650	511	414	424
	1633	1527	1474	1365

DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	503	447	409	427
6 to 10	405	348	355	343
11 to 15	284	291	261	195
16 to 20	148	154	138	144
21 to 30	158	159	191	156
31 to 60	106	95	101	76
>= 61	29	29	19	23
missing	0	4	0	1
	1633	1527	1474	1365

DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	1108	991	941	918
(5, 10]	273	284	287	253
(10, 20]	162	174	190	146
(20,30]	40	49	31	32
> 30	23	21	25	16
missing	27	8	0	0
	1633	1527	1474	1365

Taking HOV-Transit to Other

TOTAL TRIPS

	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	0
2	9	4	4	7
3	6	3	15	3
4	17	12	11	6
5	16	8	8	5
6	12	2	11	7
7	27	7	10	6
8	6	7	3	0
>= 9	12	8	3	4
	105	51	65	38

DURATION (minutes)

	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	7	1	2	1
6 to 10	8	5	7	5
11 to 15	15	10	12	3
16 to 20	14	4	5	9
21 to 30	25	13	21	8
31 to 60	26	16	12	11
>= 61	10	2	6	1
missing	0	0	0	0
	105	51	65	38

DISTANCE (miles)

	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	61	24	43	27
(5, 10]	11	14	9	7
(10, 20]	18	8	8	3
(20,30]	10	4	4	1
> 30	2	0	1	0
missing	3	1	0	0
	105	51	65	38

Taking Non-Motor Trips to Other

TOTAL TRIPS

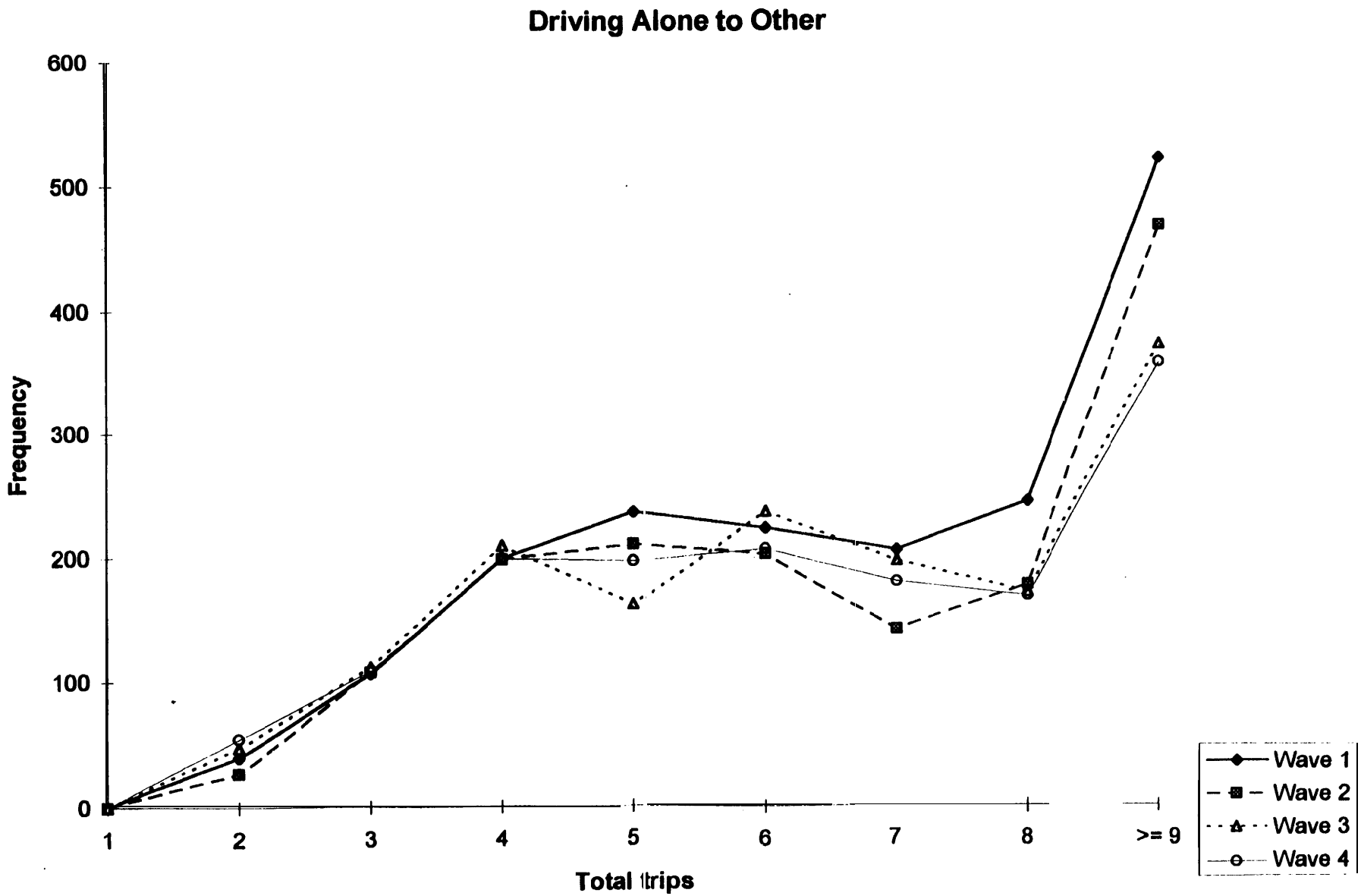
	Wave 1	Wave 2	Wave 3	Wave 4
1	0	0	0	0
2	4	3	2	8
3	6	0	1	3
4	17	6	17	15
5	14	6	10	7
6	17	14	13	20
7	10	10	15	11
8	13	11	7	9
>= 9	23	34	22	29
	104	84	87	102

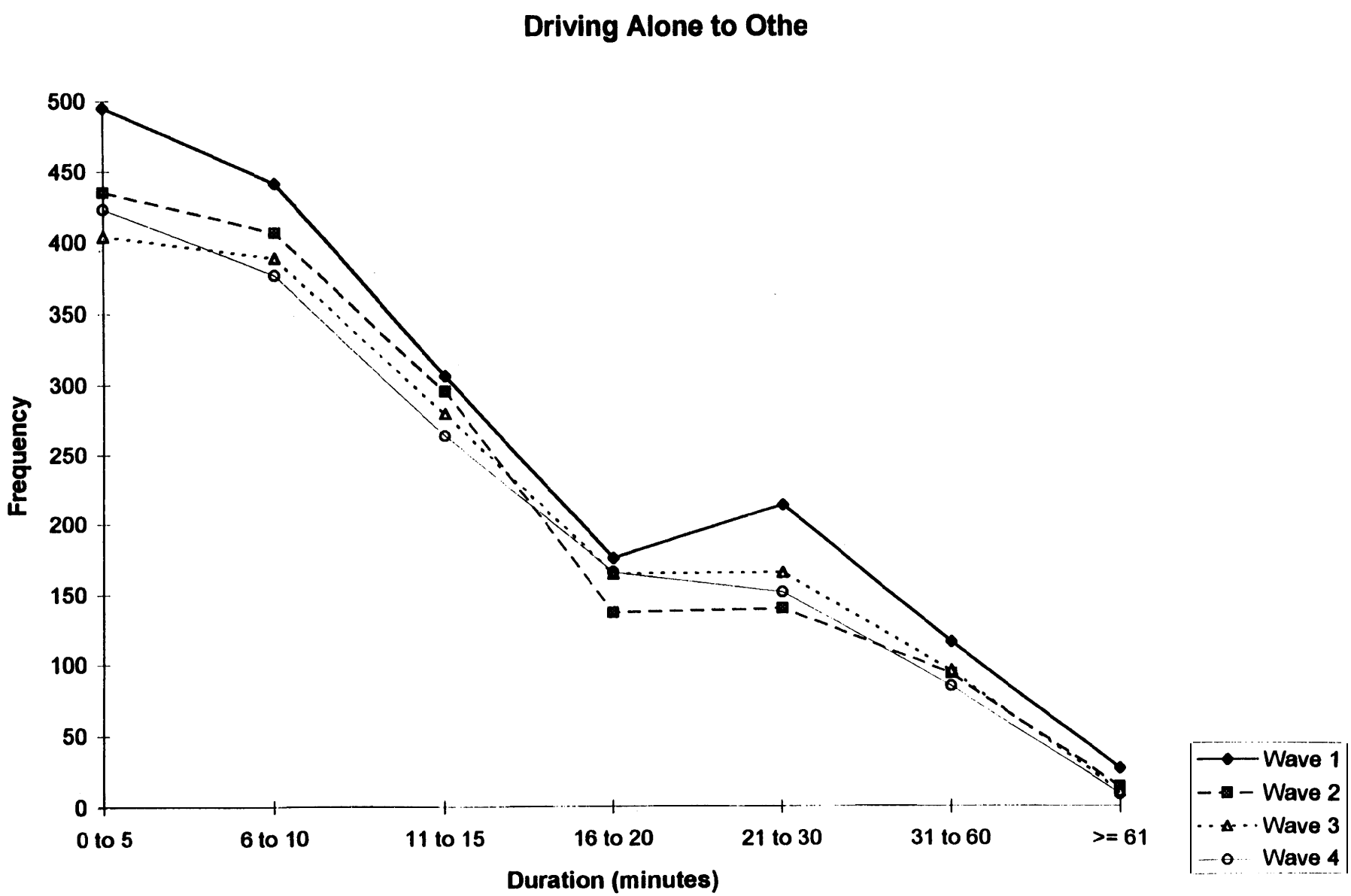
DURATION (minutes)

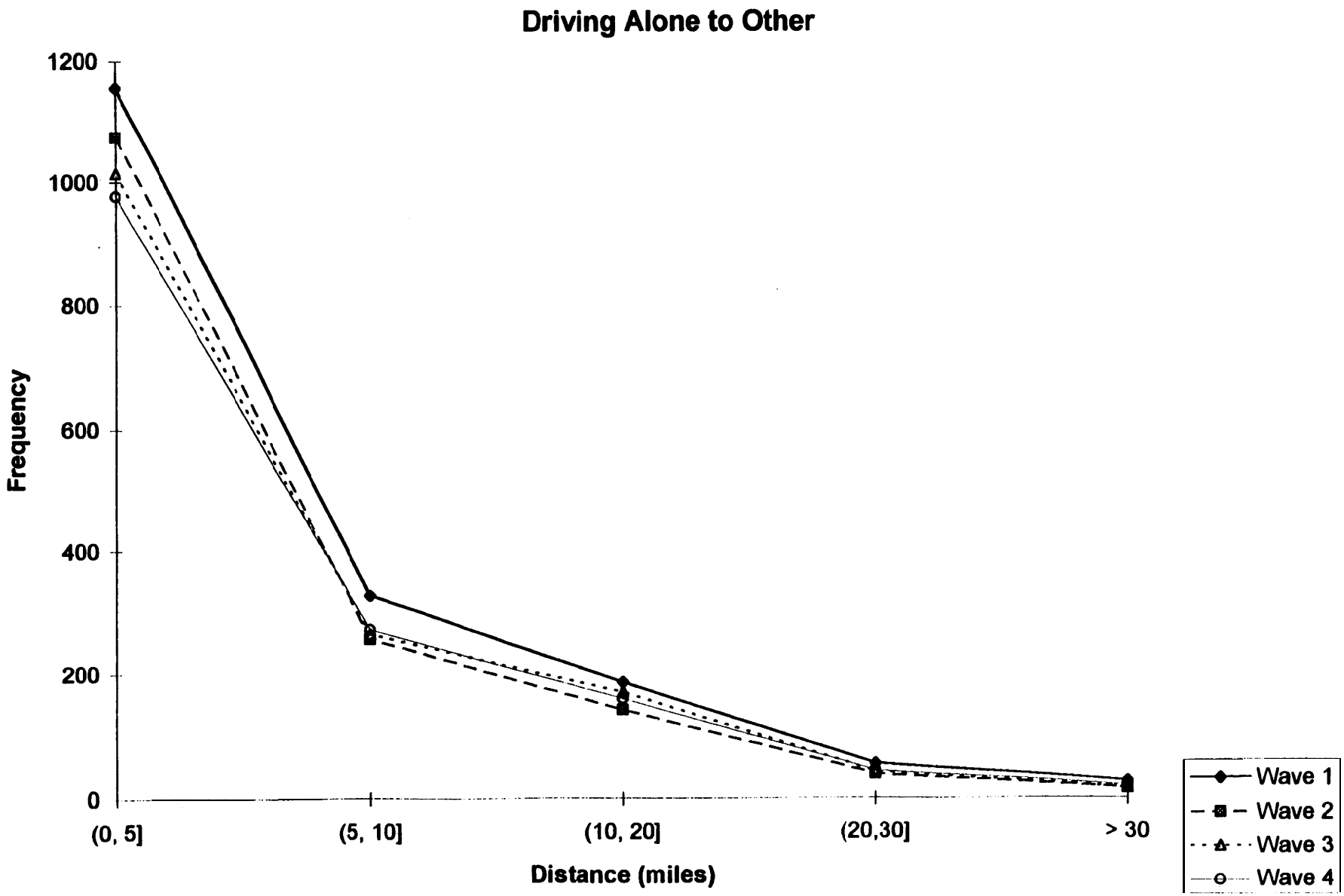
	Wave 1	Wave 2	Wave 3	Wave 4
0 to 5	36	29	36	49
6 to 10	23	26	26	21
11 to 15	15	18	15	13
16 to 20	12	4	4	9
21 to 30	15	4	5	8
31 to 60	3	3	1	2
>= 61	0	0	0	0
missing	0	0	0	0
	104	84	87	102

DISTANCE (miles)

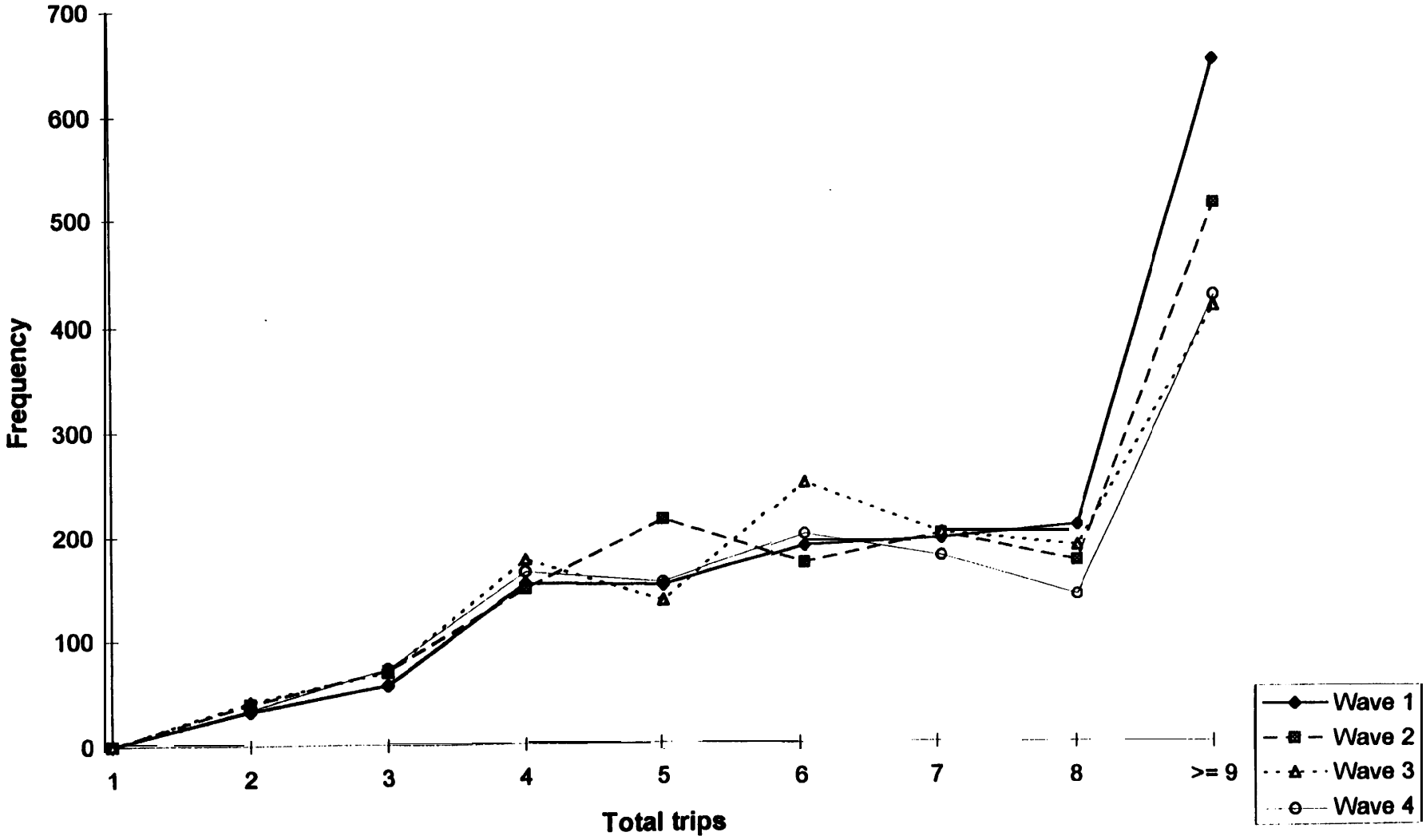
	Wave 1	Wave 2	Wave 3	Wave 4
(0, 5]	102	84	81	98
(5, 10]	2	0	5	3
(10, 20]	0	0	1	1
(20,30]	0	0	0	0
> 30	0	0	0	0
missing	0	0	0	0
	104	84	87	102


Driving Alone to Other
600
500
400
300
200
100
0
Frequency
1
2
3
4
5
6
7
8
>= 9
Total trips
Wave 1
Wave 2
Wave 3
Wave 4


Driving Alone to Othe
500
450
400
350
300
250
200
150
100
50
0
Frequency
0 to 5
6 to 10
11 to 15
16 to 20
21 to 30
31 to 60
>= 61
Duration (minutes)
Wave 1
Wave 2
Wave 3
Wave 4


Driving Alone to Other
1200
1000
800
600
400
200
0
Frequency
(0, 5]
(5, 10]
(10, 20]
(20,30]
> 30
Distance (miles)
Wave 1
Wave 2
Wave 3
Wave 4

Taking HOV-Pool to Other



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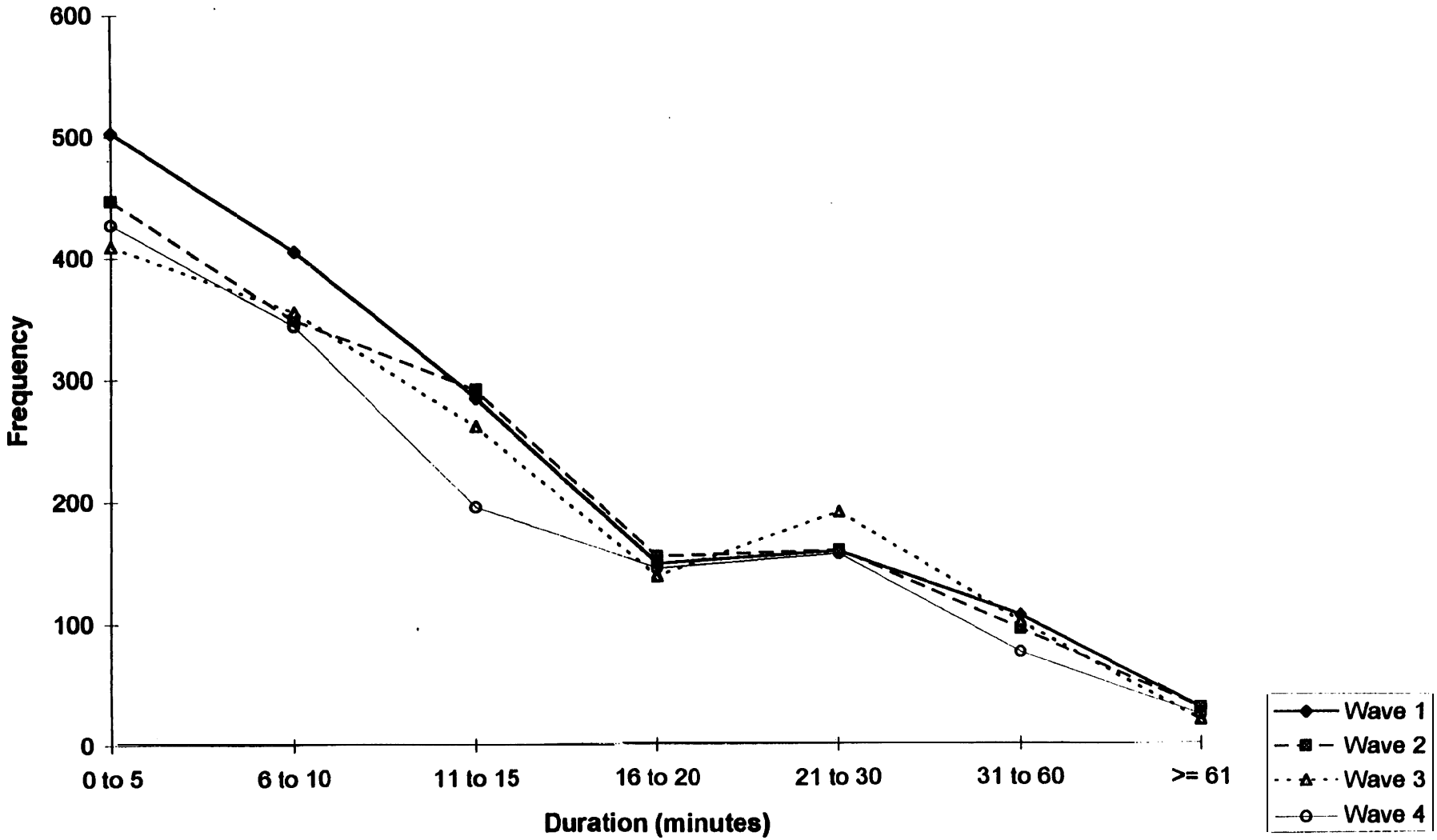

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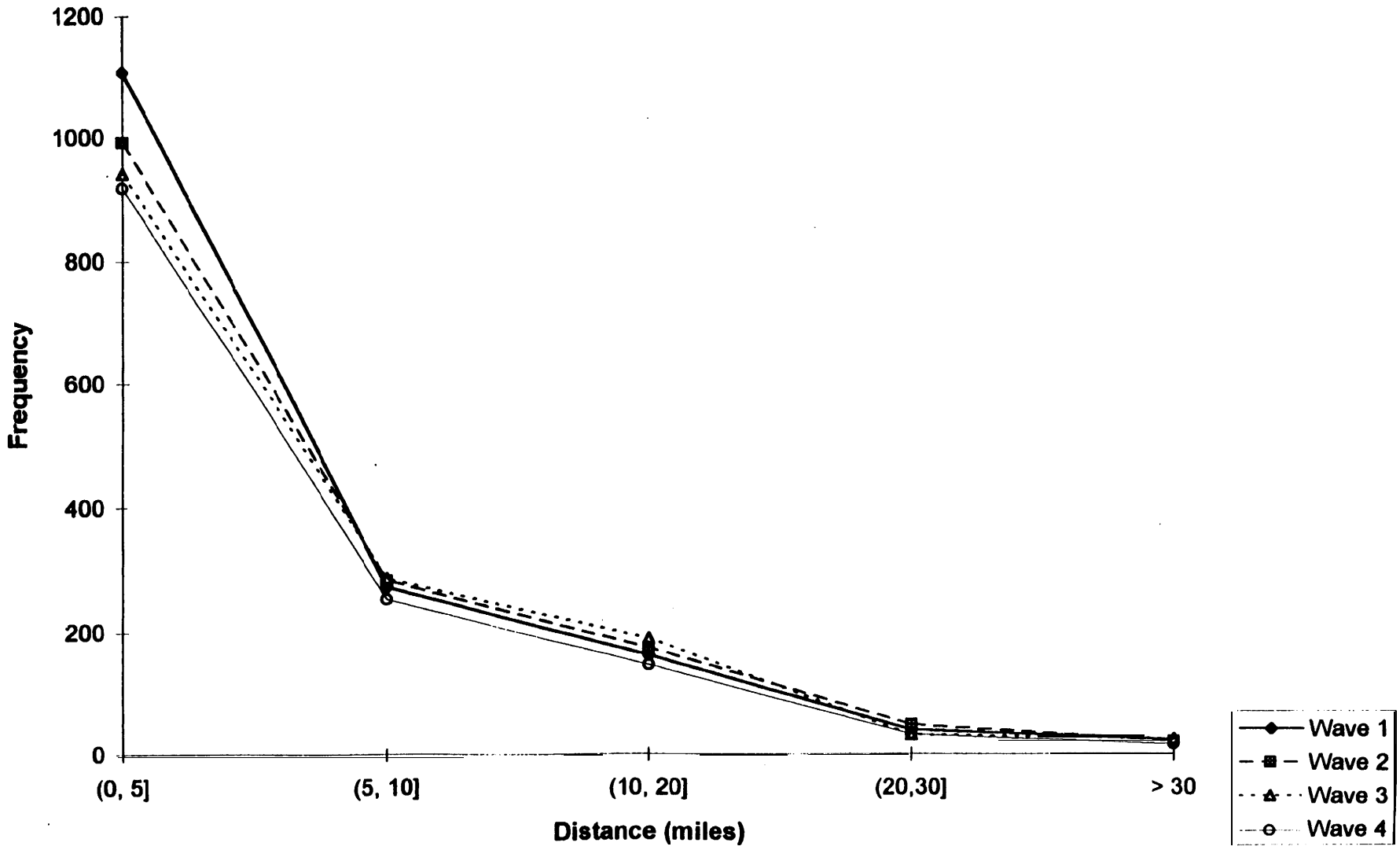
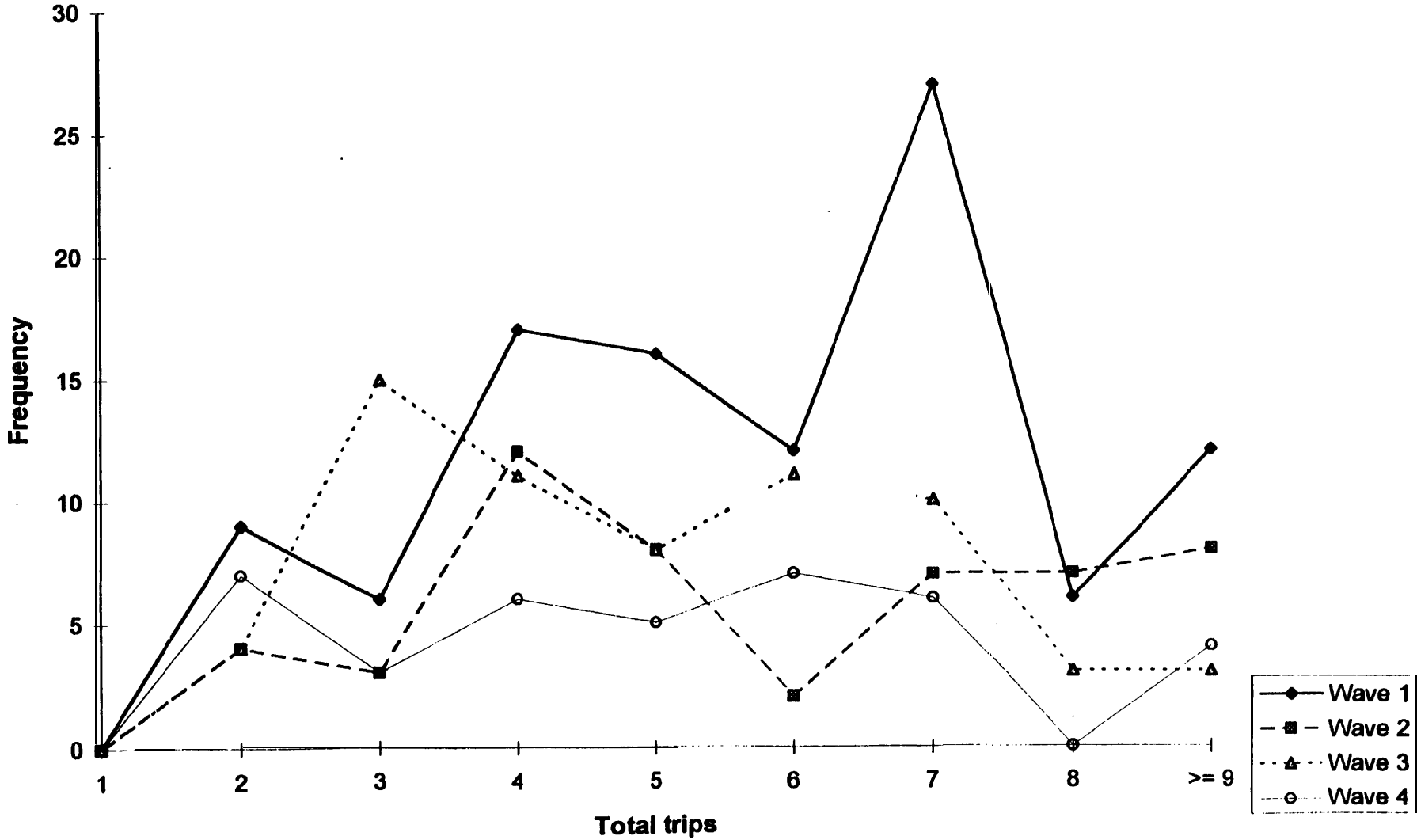


Taking HOV-Transit to Other



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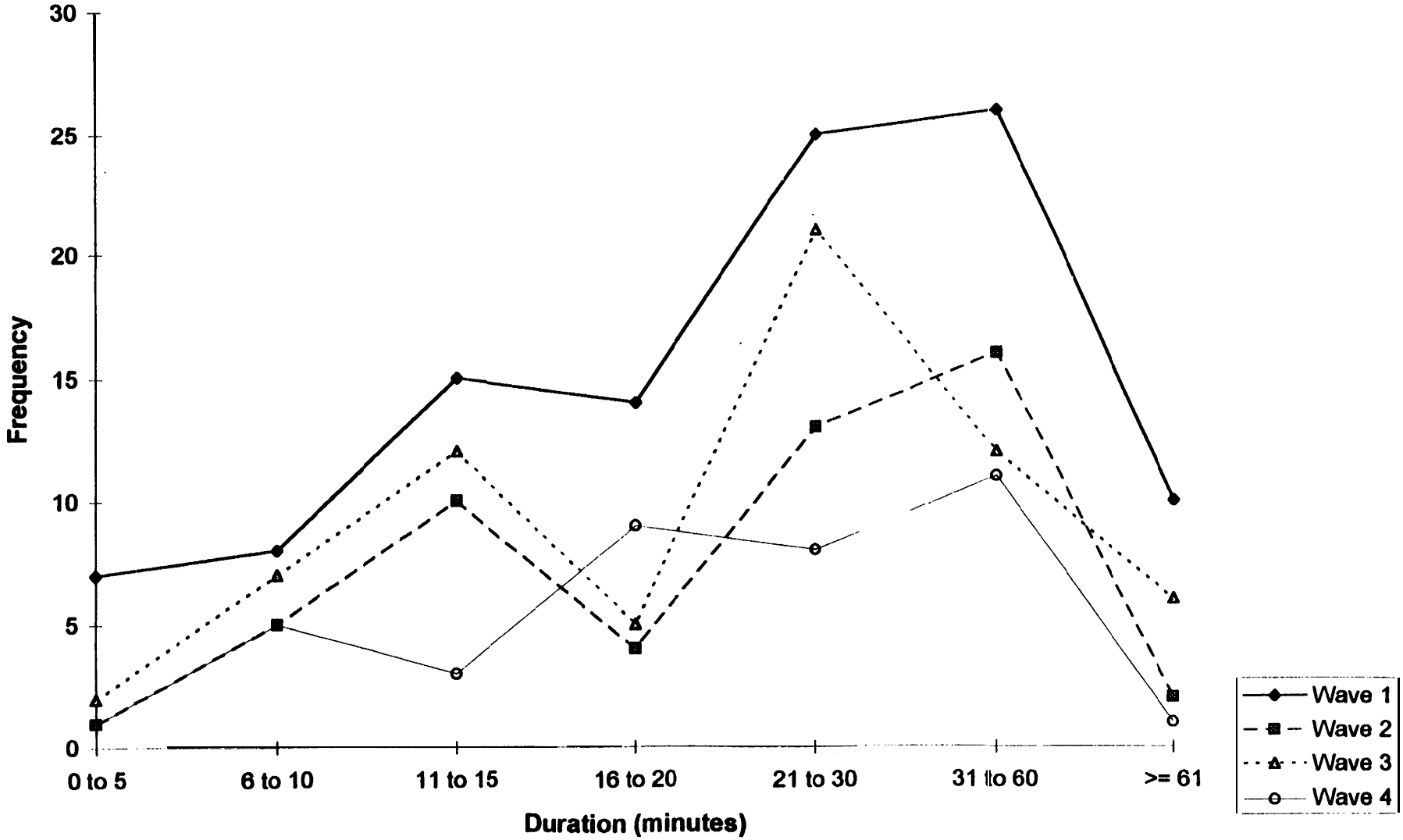
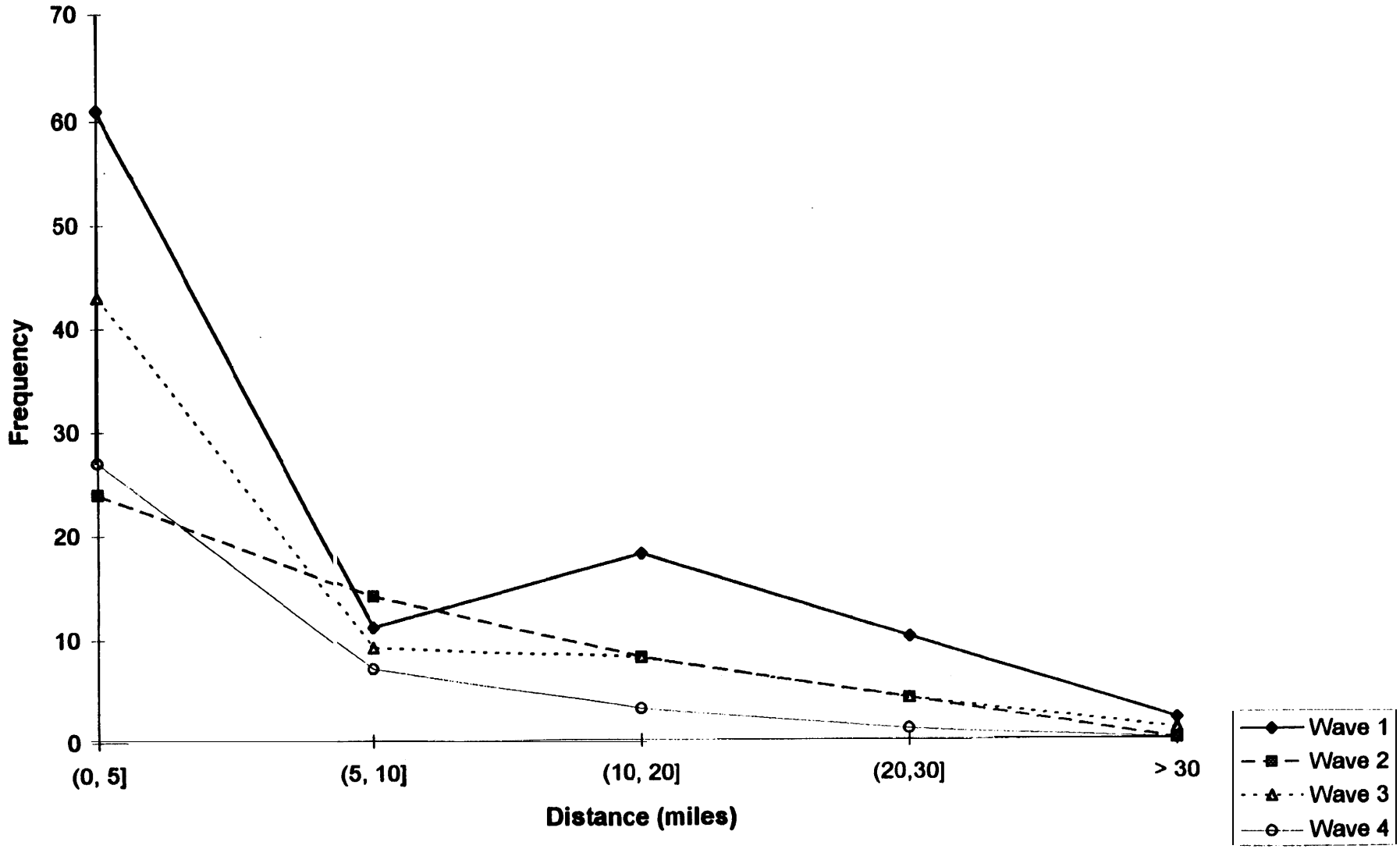
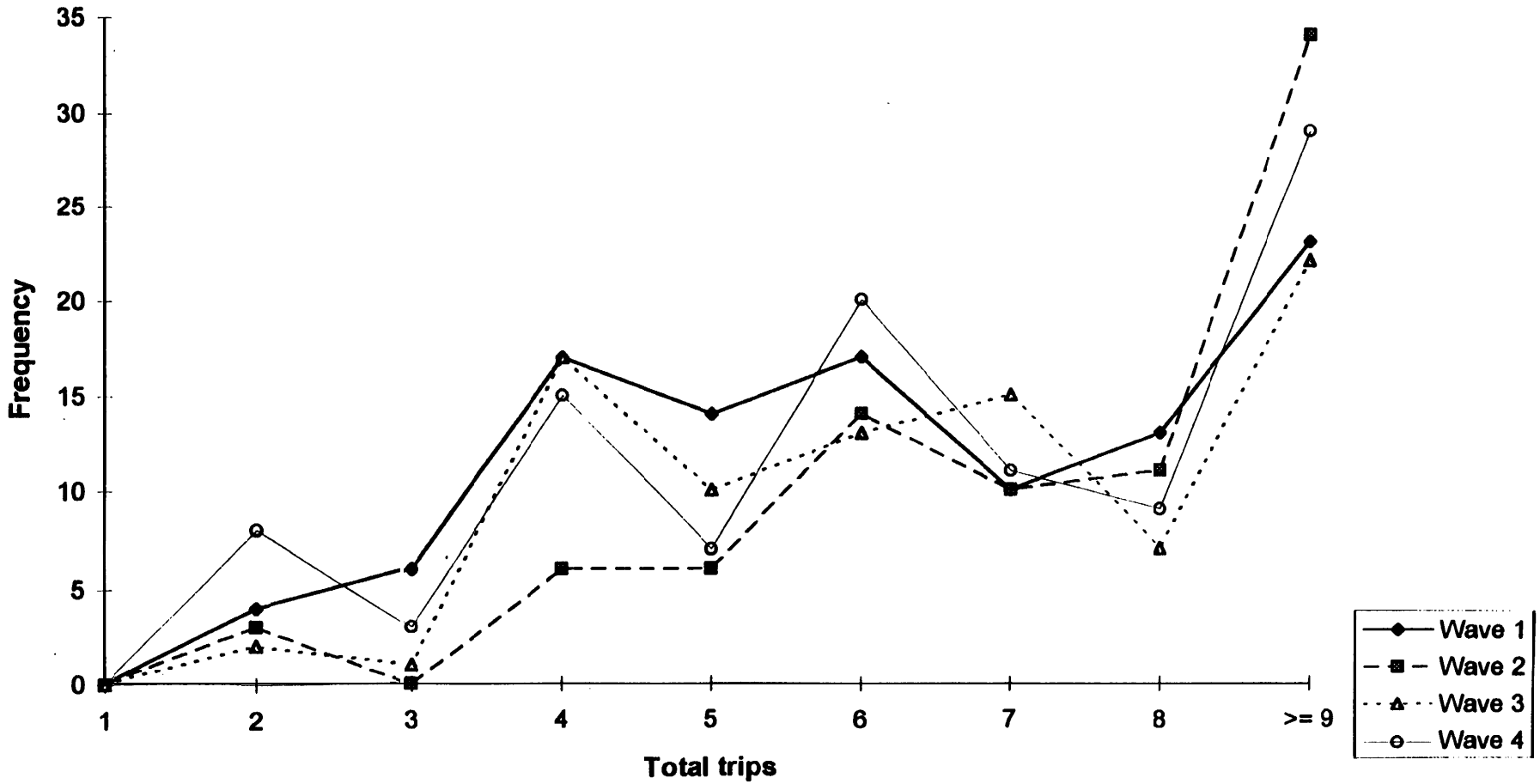


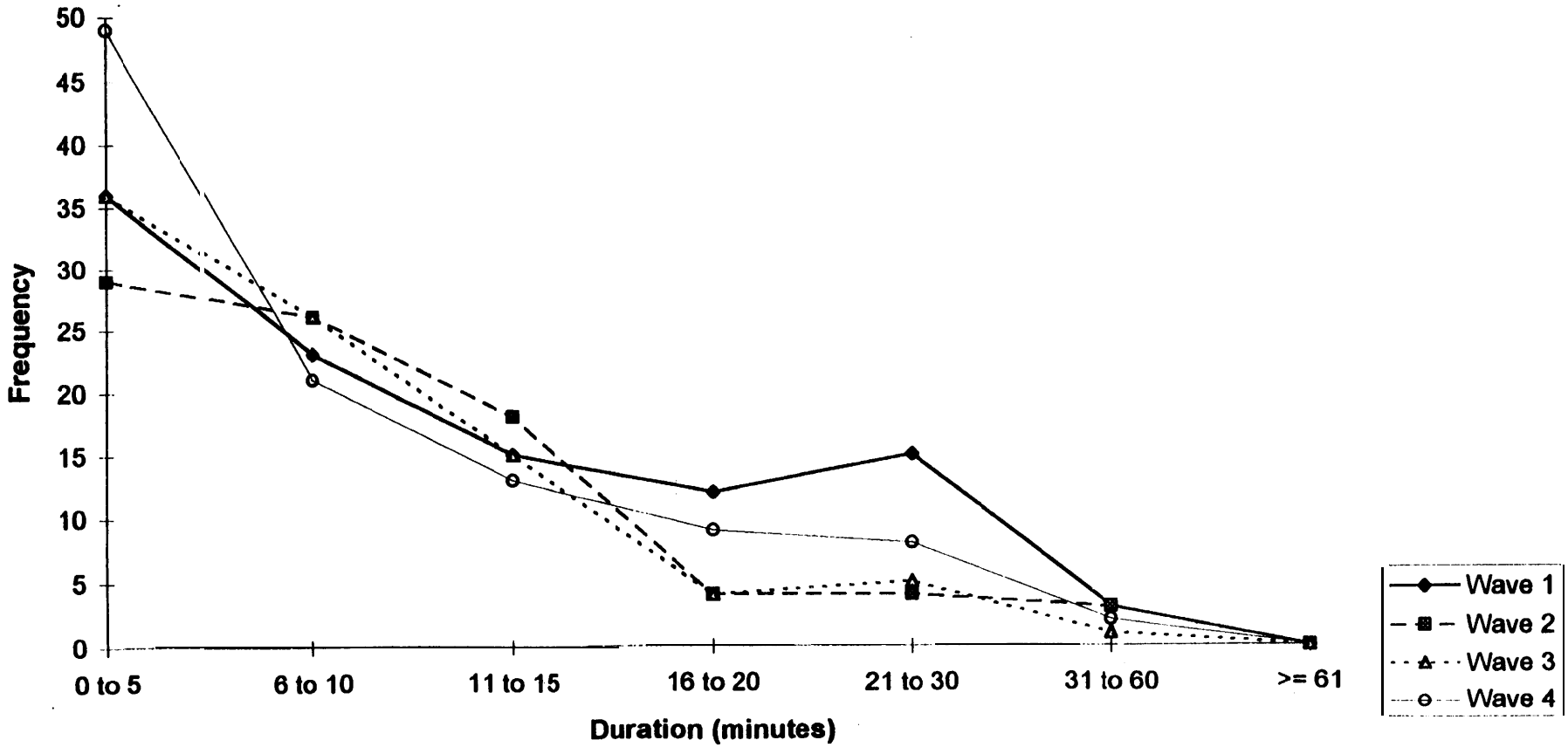
Taking HOV-Transit to Other



Taking Non-Motor Trips to Other



Taking Non-Motor Trips to Other



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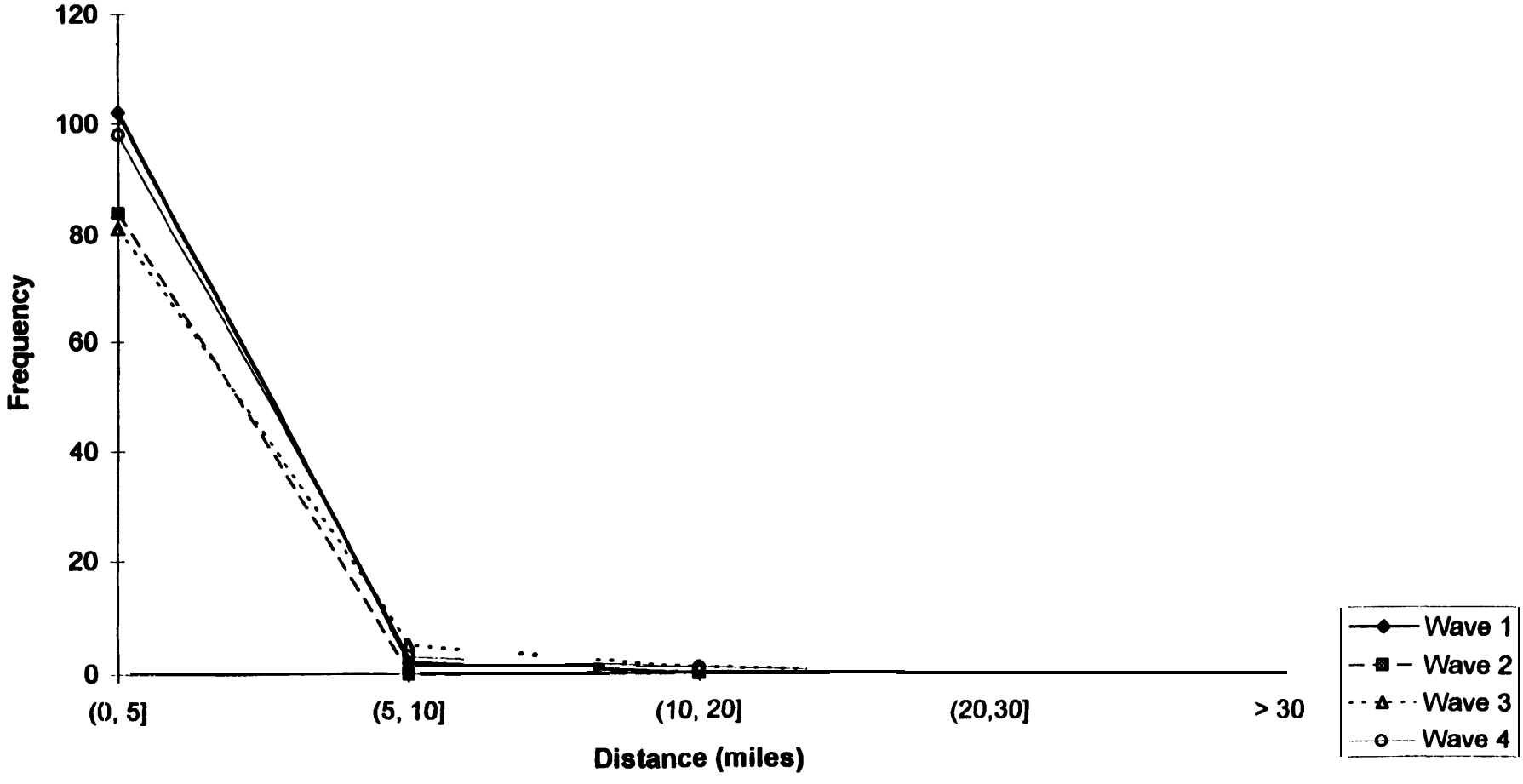

ANALYSIS OF LONGITUDINAL DATA FROM THE PUGET SOUND TRANSPORTATION PANEL (PSTP)

Task E: Modal Split Analysis

DRAFT FINAL REPORT

Volume 2: Specialized Travel Trends in the Puget Sound Panel Data 1989-1993

Submitted to

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and
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TASK E - VOLUME 2

Specialized Travel Trends in the Puget Sound Panel Data 19894993

Participants Completing All Four Waves

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May 1996

PTI 9626

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Summary

1. Introduction

The following description summarizes the trends in travel patterns over four waves of the Puget Sound Panel Data. The waves of the survey were conducted in the years 1989, 1990, 1992, and 1993. Frequencies and means were calculated for a variety of purposes and by a variety of modes, and these were compared from wave to wave. The primary goal was to study travel behavior using only those participants of the survey who completed travel in all four waves. The 1527 participants and their trip records were included in calculating the summary statistics used in the following report. This eliminated the biases in frequencies (and conceivably means) resulting from drop-outs from and add-ins to the sampling population. Therefore, these statistics may be interpreted only as a reflection of the population if it can be assumed that the sample of people who participated in all four waves of the survey is a representative sample of the population.

The trips were categorized by purpose (destinations):

(A) work,
(B) shopping,
(C) socio-recreational (visiting, free-time), or
(D) other (not including home).

The trips were further categorized by mode:

(1) driving alone,
(2) HOV-pool (carpool, vanpool, taxi),
(3) HOV-transit (bus, paratransit), or
(4) non-motor (biking, walking).

Each trip of each wave is characterized by three variables:

- Total Trips = the total number of trips made by the traveler that day,
- Duration = the length (in minutes) of the trip, and
- Distance = the length (in miles) of the trip.

Sample means for these variables were calculated along with their estimated standard error. Column charts depicting the changes in these means with increasing waves were also examined along with individual confidence intervals. Error bars at 2 standard errors above and below the sample means mark approximate 95% confidence intervals.

The Carpooling Populations

The demographics and trip characteristics were described for 5 populations of carpoolers and the trips they make. A “carpool” trip is defined as a trip made by carpool, vanpool, or taxi mode. All references to “carpools” are “HOV-pools” in this report are interchangeable; these include vanpool and taxi as well as the usual carpool modes. The populations of carpoolers are defined as subjects who take HOV-pool

(A) to work,

(B) to shop,
(C) to socio-recreation,
(D) to other non-home destinations, and
(E) to home.

Note that these populations overlap when people who carp001 to one type of destination (like work) also carp001 to other destinations (like home), as is likely to occur. For each of the 5 populations, the trip characteristics for their corresponding destinations were examined.

This analysis is distinguished from volume 1 when HOV-pool trip characteristics, by each mode for the complete population, were examined. HOV-pool trip characteristics for those who had ever taken HOV-pool trips for that mode were evaluated. For example, trip characteristics for carpooled work trips made by people who have ever carpooled to work amount to the same information as trip characteristics for carpooled work trips made by the complete population. Therefore, by the nature of the variables that were examined (trip characteristics of HOV-pool trips) the analysis was automatically restricted to the subpopulations of carpoolers.

In this analysis, different degrees of carp001 regularity were considered to distinguish the population of regular carpoolers from the population of people who have carpooled only at least once: For each of the five destinations, two population types of carpoolers were defined:

Type 1: those who carpooled more than once for that destination type, and
Type 2: those who carpooled at least once during more than one wave for that destination type.

Both are subsets of the complete population, and also type 2 carpoolers is a subset of type 1 carpoolers. It was of interest to study the trip characteristics and demographics of these populations and examine how they differed from the parent population. Examination of the trip characteristics for the two sets of carpooling populations (the overview of means) suggested that neither differed substantially in trip behavior than the other and the demographics focused on the former (type 1) of the two populations.

The Population of Mode Changers

A similar profile was conducted for the population of "mode-changers" which was defined as the set of subjects whose principal work mode changed at least once between waves during the four waves. Mode in this context is slightly different from the trip mode (car, HOV-pool, HOV-transit, and non-motor) discussed with regard to trip characteristics. The categories for work mode are

(1) car only (includes carpool/vanpool/metro vanpool)
(2) bus
(3) car/bus combination
(4) motorcycle
(5) bicycle
(6) walk
(7) other (includes school bus and ferry)

There were 156 subjects whose work modes were known to have changed at least once during the four wave period. This is only 10% of the complete sample of subjects in the study. The actual number of mode changers is probably higher since a considerable number of subjects were missing data on work modes for some waves.

The Population of Non-Motorized Travelers

The analysis includes computation and comparison of frequencies, means and household trip rates for households making no non-motorized trips (0-NMT) and households making one or more non-motorized trips (1-NMT). The data of continuing respondents is first organized into two categories: those households making no non-motorized trips and those households making one or more non-motorized trip during the travel survey period. Trip rates and frequencies were then compared for different income, household size and population density groups.

Demographic Variables

For the sample of subjects who traveled during all four waves, and the subset samples of carpoolers, mode-changers and non-motorized travelers, the analyses included, among others, the following demographic variables (and their categories):

- sex
- **age group (years 15-17, 18-24, 25-34, 35-44, 45-54, 55-64,** or 65-98)
- **employed outside of home**
- **occupation**
  - professional/technical
  - manager/administrative/business owner
  - secretary/clerical
  - retail sales
  - other sales
  - shop/production work
  - craftsman/foreman
  - equipment/vehicle operator
  - service worker
  - general laborer
  - military
  - other
- **number of work days per week**
- **drove to work alone or with others**
  - drive alone
  - drive but with others
  - ride with others
  - take turns
- **regularly took bus in past 6 months**
- **regularly pooled in past 6 months**

- **work mode (travel mode to and from work)**
  - car/carpool/vanpool
  - bus
  - car/bus
  - motorcycle
  - bicycle
  - walk
  - other
- **car required at work**
- **car required to pick up children**
- **frequency children were picked up**
- **was a student**
- **frequency of bus trips per week**
- **had a transit pass**
- **had a valid driver's license**
- **income** (subjects used one of two different categorizing schemes)
  - scheme 1 :
    - $0 - 7,500
    - $7,500 - 15,000 ($7,500 inclusive)
    - $ 15,000 - 25,000 ($15,000 inclusive)
    - $25,000 - 30,000 ($25,000 inclusive)
    - $30,000 - 35,000 ($30,000 inclusive)
    - $35,000 - 50,000 ($35,000 inclusive)
    - $50,000 - 70,000 ($50,000 inclusive)
    - $ 70,000 +
  - scheme 2:
    - $0 - 30,000
    - $ 30,000 +
- **household type (lifecycle)**
  - any child < 6
  - all children 6 - 17
  - 1 adult, <35
  - 1 adult, 35-64
  - 1 adult, 65+
  - 2+ adults, <35
  - 2+ adults, 35-64
  - 2+ adults, 65+

The summary of demographics includes frequencies (and relative proportions) of all the categories. Some modifications and assumptions to the formatting of the income and work mode variables were made in order to keep the variable definitions consistent over the four waves.

The income variable for **waves** 1 and 2 was originally defined by one set of categories whereas the income variable for **waves** 3 and 4 were based on a different set of categories. The early wave incomes were incomparable to the incomes for later waves.

Fortunately, the later wave data also included approximate incomes which were recoded into categories based on the categories used for the early wave income data. Borderline incomes such as $7,500, $15,000, $25,000, $30,000, $35,000, $50,000 were assumed to belong in the next higher income categories. Inspection of the income values suggested that many people tended to state their incomes rounded to the nearest $5000. People who overstated their incomes (even by as little as $1000) as one of the above borderline values were placed in income levels higher than they belonged. This would bias the later wave incomes upward. It is not clear how much, if any, bias in the income exists. For the purposes of examining the general demographic constitution of the population, the bias is assumed to be negligible.

For the work mode variable, the waves 1 and 2 work modes were categorized based on the above scheme. However, the waves 3 and 4 categories included the additional following: school bus, walk to school/work, metro vanpool, ferry/walk, ferry, carpool, and ferry/car. For this study, the extraneous categories categories were modified to match the category scheme used in waves 1 and 2. In particular, walk to school/work" was categorized with "walk." Similarly, "metro vanpool" and "carpool" were categorized with "car/carpool/vanpool." The rest of the categories "school bus," "ferry/walk," "ferry," and "ferry/car" were categorized as "other."

2. Carpoolers

Type 1: those who carpooled more than once for that destination type, and
Type 2: those who carpooled at least once during more than one wave for that destination type.

Work Trips (for subjects who carpool to work)

Overview of frequencies (types 1 and 2 populations)

The relative frequencies of HOV-pool work trips is larger for the population of carpooling workers than it is for the general population. Roughly 30% or more of work trips are done by HOV-pool (E-l & E-2) as compared with approximately 15% for the general population.

Trends with wave

The number of work trips for this population generally increased over the four waves for all mode types, with the exception of HOV-transit. The changes in frequency appeared to be proportional to the magnitude of the frequencies, so relative increases in the frequencies were calculated (p. E-l & E-2).

The number of work trips made by driving alone increased from wave 1 to wave 4 by 3 8.28% and 33.2 1% for the types 1 and 2 subpopulations respectively. This is a larger . increase than the 21.05% found for the general population. In other words, the people

who repeatedly carpooled to work were also driving alone to work at a greater increasing rate than the rest of the population.

The number of work trips made by HOV-pool increased by 24.62% and 26.11% for the two subpopulations. This also is larger than the increase of 2 1.50% found for the general population. This is not surprising since the population of people who repeatedly carp001 to work is expected to make more carp001 trips to work than the rest of the general population. Similarly, the number of work trips made by non-motor increased by 29.03% and 17.86% for the two subpopulations. This is larger than the increase of 14.02% found for the general population.

In contrast, the number of work trips made by HOV-transit decreased by 36.21% and 7.14% from wave 1 to wave 4. This is not inconsistent with the 27.13% decrease in HOV-transit work trips made by the general population.

Overview of means (types 1 and 2 populations)

Total Trips (pp. E-3, E-4, E-5 & E-8):

The mean total trips for trips taken to work are highest for non-motor trips (approximately 7.5 over the four waves), and lowest for HOV-transit trips (approximately 5). This implies that a typical non-motor trip to work is made by a person who travels approximately 7.5 trips per wave while a typical HOV-transit trip to work is made by a person who travels approximately 5 trips per wave.

Trends with wave:

The mean total trips for work trips made driving alone was not increasing for carpooling work trips as it was for the general population. However, the mean total trips for HOV-pool work trips did increase. For type 1 HOV-pooling workers, it was 5.77 for wave 1 and increased markedly in subsequent waves to 7.18. Similarly, for type 2 HOV-pooling workers, the mean total trips increased substantially from 5.67 in wave 1 to 7.41 in wave 4. In other words, the commuters who used HOV-pool to go to work made increasingly more total trips over the waves. The mean total trips for work trips made by HOV-transit and non-motor modes did not appear to have changed substantially.

Duration (pp. E-3, E-4, E-6 & E-9):

The relationship between work trip modes with respect to the mean duration of trips is opposite that of the relationship with respect to the mean total trips. For example, the mean total trips was greatest for non-motor trips whereas the mean duration is smallest for non-motor trips. Also, the mean total trips was smallest for HOV-transit trips while the mean duration is largest for HOV-transit trips. As with the general population, the typical non-motor work trip is approximately 10 minutes while the typical HOV-transit work trip is approximately 35 minutes for both types of working carpoolers. Work trips made by both modes driving alone and HOV-pool are also approximately 20 minutes for both types of working carpoolers.

Trends with wave:

Mean durations are relatively stable from wave to wave. However, there appeared a very slight decreasing trend in mean duration for work trips taken by HOV-pool. The mean duration for non-motor work trips fluctuated too much to reveal any trends.

Distance (pp. E-3, E-4, E-7 & E-10):

The relationship between the work trip modes with respect to the mean distance of trips is similar to the relationship with respect to the mean durations. Trips made by HOV-transit hold the highest mean distance at 1 l-l 2 miles. Trip mean distance is next highest with the two modes, driving alone and taking HOV-pool, at approximately 9 miles. Non-motor work trips are shortest at l-2 miles.

Trends with wave

Mean distances are relatively stable from wave to wave for trips made by driving alone and non-motor trips. The mean distance for HOV-pool work trips varied over the four waves without revealing any patterns for both types of carpooling workers.

Overview of distributions using boxplots (type 1 population only)

The boxplots for total trips, duration, and distance are shown on pp. E-l 1 through E-l 3. The distributions were largely skewed to the right with no change with wave. However the distribution for distances for HOV-transit trips made by this population appeared to be increasingly left-skewed. The median distance had increased.

Demographics (type 1 population only)

The sample sizes for subjects who carpool to work were fairly large. Of the 1527 subjects who submitted travel diaries in all four waves, there were 327 subjects found to have taken more than on HOV-pool trip to work. The demographics for this population of working carpoolers (K-l through K-10) resembled the demographics for the general population (J- 1 through J-l 0). The most noticeable difference is that working carpoolers tended to concentrate much more around attributes associated with the working population. For example, more of the working carpoolers were within the working ages of 25-64 than the general population. Also, there were differences in sex. 52.4% of working carpoolers were male whereas only 45.9% of the general population were male. A person who carpools to work is more likely to be male. This is reasonable to expect if there are more working males than there are working females.

Shopping Trips (for subjects who carpool to shop)

Overview of frequencies (types 1 and 2 populations)

The relative frequency of shopping trips made by HOV-pool is relatively large. For the population of carpooling shoppers, more shopping trips are made by HOV-pool than by any other mode combined (including driving alone) (F-l & F-2). This contrasts with the general population where more shopping trips are made by driving alone than by any other mode combined (including HOV-pool). For both types of the carpooling shopping population, the preferred mode is HOV-pool.

Trends with wave;

The number of shopping trips for this population consistently decreased over the four waves for all mode types. The number of shopping trips made by driving alone decreased from wave 1 to wave **4** by 22.19% and 24.18% for the types 1 and 2 subpopulations respectively. This is less of a decrease than the 27.23% found for the general population. In other words, the people who repeatedly carpooled to work were also driving alone to work at less of a decreasing rate than the rest of the population.

The number of shopping trips made by HOV-pool decreased by 22.19% and **24.18%** for the two subpopulations. This also is less of a decrease than the 38.94% found for the general population. This is not surprising since we would expect the population of people who repeatedly carp001 to shop would make be among those less affected by a general decline in HOV-pool shopping **trips.** Similarly, the number of shopping trips made 'by HOV-transit decreased by 57.14% and 85.7 1% for the two carpooling shoppers populations as compared with 63.41% for the general population. The number of shopping trips made by non-motor decreased by 20.00% and 30.43% for the two &populations as compared with the decrease of 25.76% observed for the general population.

Overview of means (types 1 and 2 populations)

Total Trips (pp. F-3, F-4, F-5 & F-8):

The mean total trips for trips taken to shop are comparable over all modes, with large fluctuations for the modes, HOV-transit and non-motor, which have small sample sizes.

Trends with wave

There is no obvious trend with the exception of HOV-pool in which it appears that the mean total trips for trips being made by HOV-pool are decreasing. In other words, a typical HOV-pool shopping trip is made by an HOV-pool shopper who is making fewer total trips of any kind. For type 1 HOV-pooling shoppers, it was 7.42 for wave 1 and decreased to 6.50 in wave 4. Similarly, for type 2 HOV-pooling shoppers, the mean total trips decreased from 7.33 in wave 1 to 4.67 in wave 4.

Duration (pp. F-3, F-4, F-6 & F-9):

There was also no outstanding differences in trip durations for the four mode types, with the possible exception of HOV-transit. HOV-transit trips appeared to take longer time with an average of 25-30 minutes over all waves, with the exception of wave 3 in which only 1 HOV-transit shopping trip was observed and it was only 10 minutes long. The shopping trips done by driving alone, HOV-pool, and non-motor modes tended to have a mean of between 10 and 15 minutes. This was true for both population types of car-pooling shoppers.

Trends with wave;

The mean durations were relatively stable from wave to wave. The mean durations for HOV-transit trips did fluctuate widely but large deviations were expected since these were means on fewer than a sample size of 10 trips.

Distance (pp. F-3, F-4, F-7 & F-10):

Trips made by HOV-pool tended to have higher mean distances than any other mode for the populations of carpoolers. This contrasts with the fact that trips made by HOV-transit had higher mean distances for the general population. Generally, however, it is very difficult to say how large the mean distance for HOV-transit trips are since very few such trips are taken. Mean HOV-pool shopping trip distances are right around 5 miles, which is just over the mean driving alone shopping trip distances which are around 4 miles. Mean non-motor work trips are shortest at 1 mile.

Trends with wave;

Mean distances are relatively constant from wave to wave for shopping trips of all modes with the exception of HOV-pool and HOV-transit. The HOV-transit mean shopping trip distances are based on small samples and thus subject to wide fluctuations. The HOV-pool mean shopping trip distances appear to be increasing. That is, the HOV-pool mean shopping trips were becoming longer.

Overview of distributions using boxplots (type 1 population only)

The boxplots for total trips, duration, and distance are shown on pp. F-l 1 through F-13. The distributions were largely skewed to the right with no change with wave.

Demographics (type 1 population only)

The sample sizes for subjects who carpool to shop were also fairly large. Of the 1527 subjects who submitted travel diaries in all four waves, there were 564 subjects found to have taken more than on HOV-pool trip to shop. The demographics for this population of shopping carpoolers (L-l through L-10) can be compared with the demographics for the general population (J-l through J-l 0). The most noticeable difference is that shopping carpoolers tended to concentrate much more around attributes associated with the shopping population. For example, an average of 62.4% of

carpooling shoppers were female, whereas only 54.1% of the general population in this survey were female. This is not surprising in populations where women shop more then men. Also, the population of shopping carpoolers had more older subjects; 28.2% of shopping carpoolers were older than 65 as compared with 18.3% of the general population. Also, 45.8% of shopping carpoolers were employed outside of home while a larger percentage 63.1% of the general population were employed outside of home.

Socio-Recreational Trips (for subjects who carpool to socio-recreation)

Overview of frequencies (types 1 and 2 populations)

The relative frequency of socio-recreational trips made by HOV-pool is relatively large. About twice as many socio-recreational trips are made by HOV-pool than are made by driving alone (G-l & G-2) for the populations of subjects who carp001 to socio-recreation. For the general population, *almost* as many socio-recreational trips were made by driving alone as there were socio-recreational trips made by HOV-pool. In all cases, the number of socio-recreational trips made by non-motor is very small and the number made by HOV-transit is negligible.

Trends with wave:

The number of socio-recreational trips for this population decreased over the four waves for all mode types. The number of socio-recreational trips made by driving alone decreased from wave 1 to wave 4 by 12.12% and 15.01% for the types 1 and 2 subpopulations respectively. This is comparable to the decrease of 15.36% observed for the general population. Similarly, the number of socio-recreational trips made by HOV-pool decreased by 30.99% and 28.36% for the two subpopulations. This is a little less of a decrease than the 3 1.36% found for the general population. Similarly, the number of socio-recreational trips made by non-motor decreased by 50.88% and 44.90% for the two subpopulations. This is a greater decrease than the 41.53% observed for the general population.

The number of socio-recreational trips made by HOV-transit also decreased by 71.43% from wave 1 to wave 4 for both socio-recreational carpooling populations. Although it is a large percentage, it is based on a small sample size; the number of trips actually decreased by only 5. This is not a strong indication that people are preferring HOV-transit less. For the general population, it was found that HOV-transit trips had increased by 28.57%, but this also was based on very small samples and was not taken to be an indication that preference for HOV-transit was increasing.

in mean distance from 5.39 to 7.29 miles for type 1 socio-recreational carpoolers (5.42 to 6.96 for type 2). And trips made *by* HOV-transit increased in mean distance from 0.77 miles to 5.10 miles for both type 1 and type 2 populations. Although the data for the latter group is based on few observations, the change is significant when considered in context with the standard errors.

Overview of distributions using boxplots (type 1 population only)

The boxplots for total trips, duration, and distance are shown on pp. G-l 1 through G-l 3. The distributions were largely skewed to the right with no change with wave.

Demographics (type 1 population only)

Of the 1527 subjects who submitted travel diaries in all four waves, there were 763 subjects found to have taken more than on HOV-pool trip to socio-recreation. The demographics for this population of socio-recreational carpoolers (M-l through M- 10) can be compared with the demographics for the general population (J-1 through J- 10). There are only slight noticeable differences between the population of socio-recreational carpoolers and the general population. 57.6% of socio-recreational carpoolers are female whereas 54.1% of the general population are comprised of females. 22.3% of socio-recreational carpoolers are older than 65 years whereas 18.3% of the general population is older than 65 years. 45.7% of socio-recreational carpoolers are not employed outside of home whereas 35.4% of the general population are not employed outside of home.

Other Trips (for subjects who carpool to other non-home places)

Overview of frequencies (types 1 and 2 populations)

The relative frequency of other trips made by HOV-pool is relatively large. More other trips are made by HOV-pool than are made by any other mode combined (including driving alone) (G-l & G-2) for the populations of subjects who carp001 to other non-home places. For the general population, the number of other trips made by driving alone was greater than the number of other trips made by HOV-pool. In all cases, the number of socio-recreational trips made by both non-motor and HOV-transit is very small.

Trends with wave:

The number of other trips for this population decreased over the four **waves** for all mode types. The number of other trips made by driving alone decreased from wave 1 to wave 4 by 18.61% and 14.16% for the types 1 and 2 subpopulations respectively. This is comparable to the decrease of 17.00% observed for the general population. Similarly, the number of other trips made by HOV-pool decreased by 17.14% and 17.70% for the two subpopulations. This is close to the decrease of 16.41% found for the general population. Similarly, the number of other trips made by HOV-transit decreased by

85.48% and 85.11% for the two subpopulations. The numbers of trips went from 62 in wave 1 down to 9 in wave **4** for the type 1 population. Similarly the numbers of trips went from 47 in wave 1 down to 7 in wave 4 for the type 2 population. The corresponding percentage change for the general population had only been 63.8 1%. The number of other trips made by non-motor decreased by 8.33% and 8.70% for the two subpopulations. This is not a very large difference, especially for a moderately small sample. The decrease is a result of a drop of only 5 trips. With the general population there also had been no notable trend.

Overview of means (types 1 and 2 populations)

Total Trips (pp. H-3, H-4, H-5 & H-8):

The mean total trips for other trips are comparable over ail modes, with large fluctuations for the modes, HOV-transit and non-motor, which have smaller sample sizes.

Trends with wave:

Mean total trips for modes driving alone and HOV-pool appear to be decreasing with increasing wave. The same cannot be said for HOV-transit and non-motor, but this is probably because the smaller samples give us fewer power to detect such changes. A typical HOV-pool other trip is made by an other HOV-pooler who is making fewer total trips of any kind as wave increases. Similarly, a typical other trip made by driving alone is made by an other HOV-pooler who is making fewer total trips. For type 1 other HOV-poolers, the mean total trips made by driving alone trips was 7.77 in wave 1 and 7.38 in wave 4 (for type 2 HOV-poolers, this was 7.92 in wave 1 and 7.54 in wave 4). For type 2 other HOV-poolers, the mean total trips made by HOV-pool was 8.11 in wave 1 and 7.42 in wave 4 (8.19 in wave 1 and 7.52 in wave 4 for type 2).

Duration (pp. H-3, H-4, H-6 & H-9):

Other trips made by HOV-transit had the longest duration (approximately 30 minutes). Other trips made by driving alone and HOV-pool had mean durations around 15 minutes. Non-motor other trips were shortest (approx. 10 minutes). This was true for both population types of carpooling shoppers.

Trends with wave:

The mean durations were relatively stable from wave to wave for all modes. It did however appear that the mean durations for HOV-transit and non-motor trips were decreasing, but the samples were small and the standard errors were large, so the trend does not appear strongly significant.

Distance (pp. H-3, H-4, H-7 & H- 10):

Other trips made by non-motor had smaller mean distances (about 1 mile). Other trips made by both driving alone and HOV-pool had relatively equal mean distances (approximately 5 miles). Other trips made by HOV-transit had mean distances which varied between 7 and 10 miles.

Trends with wave:

When viewed with their standard errors, it does not appear that mean distances changed at all over the four waves. All means were within 2 standard errors of each other.

Overview of distributions using boxplots (type 1 population only)

The boxplots for total trips, duration, and distance are shown on pp. H-l 1 through H- 13. The distributions were largely skewed to the right with little change with wave. It appeared that non-motor other trips for this population had decreasing durations.

Demographics (type 1 population only)

Of the 1527 subjects who submitted travel diaries in all four waves, there were 905 subjects found to have taken more than on HOV-pool trip to other non-home destinations. The demographics for this population of other carpoolers (N-l through N-10) can be compared with the demographics for the general population (J-l through J- 10). There are only slight noticeable differences between the population of other carpoolers and the general population. 59.2% of other carpoolers are female whereas 54.1% of the general population are comprised of females. 20.4% of other carpoolers are older than 65 years whereas 18.3% of the general population is older than 65 years. 41.4% of other carpoolers are not employed outside of home whereas 35.4% of the general population are not employed outside of home.

Home Trips (for subjects who carpooled to home places)

Overview of frequencies (types 1 and 2 populations)

For the population of subjects who carp001 home, the number of home trips made by HOV-pool is almost as much as the number of home trips made by driving alone. The number of trips home made by HOV-transit and non-motor is small in comparison (I-l & I-2).

Trends with wave:

The number of home trips for this population decreased slightly for the popular modes (driving alone and HOV-pool) and for HOV-transit. The number of non-motor home trips increased slightly. None of these changes appear substantial. This is true for both population types of home carpoolers.

Overview of means (types 1 and 2 populations)

Total Trips (pp. I-3, I-4, I-5 & I-8):

The mean total trips for home trips are approximately 6 for all modes, with the exception of HOV-transit which has mean total trips closer to 5.

Trends with wave:

Mean total trips for modes driving alone and HOV-pool appear to be decreasing with increasing wave. It is not obvious whether a similar trend exists for home trips made by HOV-transit and non-motor. The changes are not very large, however, they do appear to be significant since the samples used to obtain these means were large resulting in very small standard errors of the mean.

Duration (pp. I-3, I-4, I-6 & I-9):

Home trips made by HOV-transit had the longest duration (35-40 minutes). Home trips made by driving alone and HOV-pool had mean durations around 15-20 minutes. Non-motor home trips were shortest (1 O-l 5 minutes). This was true for both population types of carpooling shoppers.

Trends with wave:

The mean durations were relatively stable from wave to wave for all modes. It did however appear that the mean durations for non-motor trips were decreasing. For the type 1 population of home carpoolers, the mean duration decreased from 14.18 minutes in wave to 10.54 minutes in wave 4. For the type 2 population of home carpoolers, this was 14.22 in wave 1 and 10.42 in wave 4.

Distance (pp. I-3, I-4, I-7 & I-l 0):

Home trips made by non-motor had smallest mean distances (approx. 2 miles). Home trips made by both driving alone and HOV-pool had relatively equal mean distances (approx. 6 miles). Home trips made by HOV-transit had mean distances which varied between 8 and 12 miles.

Trends with wave:

HOV-transit home trips increased with wave. For the type 1 population, the mean HOV-transit home trip was 8.59 miles in wave 1 and 11.81 miles in wave 4. Similarly, for the type 2 population, it was 8.85 miles in wave 1 and 12.03 miles in wave 4. HOV-pool home trips also increased with wave. For the type 1 population, the mean HOV-pool home trip was 5.72 miles in wave 1 and 6.92 miles in wave 4. Similarly, for the type 2 population, it was 5.71 miles in wave 1 and 6.91 miles in wave 4. The home trip distances did not appear to change significantly with any of the other modes.

Overview of distributions using boxplots (type 1 population only)

The boxplots for total trips, duration, and distance are shown on pp. I-l 1 through I-13. The distributions were largely skewed to the right with no change with wave.

Demographics (type 1 population only)

Of the 1527 subjects who submitted travel diaries in all four waves, there were 1088 subjects found to have taken more than on HOV-pool trip to home. The demographics for this population of home carpoolers (O-l through O-10) can be compared with the demographics for the general population (J- 1 through J- 10). There are hardly any noticeable differences between the population of home carpoolers and the general population.

3. Mode Changers

Work Trips (for subjects who changed work modes)

Overview of frequencies

Although most work trips for this population were made by driving alone, a sizable amount of trips were also made by HOV-transit and non-motor. 45% of work trips made by this group in wave 1 were either HOV-transit or non-motor. For the general population, this proportion was only 13% (A-2). For the population of mode changers, this proportion decreased to 34% in wave 4 suggesting that people who change work modes tend to take increasingly fewer trips made HOV-transit and non-motor (Q-1).

Trends with wave:

The number of work trips for this population increased over the four waves for all mode types with the exception of HOV-transit. The number of work made by HOV-transit decreased from wave 1 to wave 4 by 36.44%. This is a little more than the decrease of 27.13% observed for the general population. The number of work trips made by driving alone, HOV-pool, and HOV-transit increased from wave 1 to wave 4 by 30.86%, 24.00%, and 21.43% respectively.

Overview of means

Total Trips (pp. Q-2 & Q-3):

Non-motor trips are associated with the largest mean total trips. A typical non-motor work trip taken by a mode-changer is taken by a person who with approximately 7 total daily trips. Compare this with an average of 5-6 total trips for work trips by any other mode taken by a mode-changer.

Trends with wave:

Mean total trips do not appear to be changing much for any mode. It does not appear that mode-changers are traveling any more or less with wave.

Duration (pp. Q-2 & Q-4):

Work trips made by HOV-transit had the longest duration (approximately 35-40 minutes). Work trips made by driving alone and HOV-pool had mean durations around 20 minutes. Non-motor other trips were shortest (10-l 5 minutes).

Trends with wave:

The mean durations were relatively stable from wave to wave for all modes. There were no obvious trends with wave.

Distance (pp. Q-2 & Q-5):

Work trips made by non-motor had smaller mean distances (about 1 mile). Work trips made by both driving alone and HOV-pool had relatively equal mean distances (8. 10 miles). Work trips made by HOV-transit had mean distances which varied between 12 and 15 miles.

Trends with wave:

HOV-transit work trips were increasing in mean distances for this group by approximately 3 miles. Distances for work trips by any other means did not appear to change.

Overview of distributions using boxplots

The boxplots for total trips, duration, and distance are shown on pp. Q-6 through Q-8. The distributions were largely skewed to the right with little change with wave. The dispersion, and possibly the median, of total trips appeared to decrease for non-motor trips. The median of distance for HOV-transit trips appeared to increase. That is, more mode-changers using HOV-transit were traveling longer distances to work. a similar pattern appears in duration times; mode-changers using HOV-transit were traveling slightly longer duration times to work.

Demographics (type 1 population only)

Of the 1527 subjects who submitted travel diaries in all four waves, there were 156 subjects found to have changed their work mode at least once during the four waves. The demographics for this population of mode-changers (P-l through P-10) can be compared with the demographics for the general population (J-l through J-10). Not surprisingly, most of this population is concentrated around the working ages of 25-54 years. Also, a fairly large percentage of this group have a history of HOV-transit or HOV-pool use. An average of 28.7% of mode-changers reported having regularly taken the bus in the prior 6 months. Only 6.1% of the general population have done the same.

Also 19.4% of mode-changers reported having regularly pooled in the prior 6 months. while only 10.5% of the general population have done the same. 15.5% of the mode-changers reported that a car was required at their work compared with 21.2% of the general population.

The wave-to-wave changes in work modes can be seen on pp. P-l 1 through P-16. Ihe work mode categories may be collapsed into four main categories: car (includes car, carpool, and vanpool), bus, car/bus, and alternative (includes motorcycle, bicycle, walk, and other). Subjects in the alternative category (approximately 10% of mode-changer) will tend to either continue to take the same work mode or change to car in the following wave. Subjects in the bus category, if they do not continue taking bus, will tend to switch to car/bus in the following mode. Subjects in the bus/car category, if they do not continue taking bus/car, will tend to switch to car in the following mode (pp. P- 11, P- 14, P-16). The wave to wave table on p. P-13 shows that mode-changers who took an alternative work mode in wave 1 ultimately ended up taking the car to work in wave 4. There are a few cases in which people who took the car to work in wave 1 switched to an alternative mode by the time of wave 4. Nevertheless, the influx of car users is greater than the outflux. Similarly, most of the subjects who took either bus, or car/bus to work in wave 1 ended up taking, the car to work in wave 4. There were 72 (=40+32) such subjects. A much smaller number of subjects (44=20+24) switched from car in wave 1 to bus or bus/car in wave 4.

4. Non-Motorized Travel

The data indicates that there was decrease in the number of households making one or more non-motorized trips during the travel survey period between wave 1 and the remaining waves (R-l). Beginning with wave 1, approximately 81 percent of the surveyed households made no non-motorized trips and approximately 19 percent of the households made one or more non-motorized trips. Data from waves 2 through 4, however, show about a 4% decrease from wave 1 in the number of households making one or more non-motorized trips (1-NMT). After the initial drop from wave 1, the percent of 0-NMT households remains steady at 85% from wave 2 through wave 4. The PSRC percentages of 0-NMT and 1-NMT households are also consistent with national data from the 1990 NPTS in which 19% percent of the surveyed households made one or more non-motorized trips and 81% of the households made no non-motorized trips.

Examining various socio-economic distributions by wave also suggests that wave 1 response distributions differ somewhat from the remaining waves (R-l through R-3). These differences can be see with greater response frequencies for certain demographic variables for 0-NMT households between waves 1 and 2 in particular. This suggests that missing data may play an important role in distinguishing the distributions of 0-NMT and 1-NMT households and thus, changes in non-motorized travel patterns from wave to wave. Additional research in this issue would be very useful for improving the survey methodology and also identifying data important for modeling non-motorized travel.

Household Trip Comparison

Three basic evaluations are conducted in this section to compare the tripmaking characteristics between 0-NMT households to l-NMT households. The analysis begins with a comparison of average trips per household by income group, turning then to comparisons by household size and population density.

Household Trips by Income

To facilitate comparisons, 0-NMT and I-NMT households were organized into three income groups: those households making less than $25,000, those households making between $25,000 and $50,000 and those households making more than $50,000. The average number of household trips were then computed for 0-NMT and I-NMT households by wave and income group (R-4). As can be seen, 0-NMT households consistently make fewer number of household trips per day than l-NMT households. The absolute differences between the average number of 0-NMT and 1-NMT household trips becomes increasingly greater as income rises.

These results are consistent with findings reported in the 1990 NPTS Travel Mode Special Reports (Niemeier and Rutherford, 1995) in which 0-NMT households were found to make greater numbers of household trips than 1-NMT households. It appears, that PSRC survey respondents tend to make fewer trips per household overall when compared to NPTS data. For example, 0-NMT and l-NMT NPTS households making less than $20,000 make 6.70 and 9.01 average trips per day, compared to 6.50 and 6.69 for the respective PSRC households.

Household Trips by Household Size

As with income, 0-NMT households tend to make fewer numbers of trips per household than I-NMT households (R-4). There average number of trips per household has remained fairly constant over the four waves for both 0-NMT and I-NMT households. The PSRC trips per household are also consistent with 1990 NPTS trips per household. For 0-NMT households with size two, PSRC data indicates that an average of 7.88 trips per household are taken compared to 6.88 from the comparable NPTS data. Similarly, PSRC I-NMT households of size two traveled an average of 9.26 trips per day compared to 8.76 in the NPTS.

Household Trips by Population Density

Examining trips per household by population density suggests mixed evidenced of trip making propensity (R-4). Both 0-NMT and I-NMT households were identified by residential census tract and the average persons per acre were computed and tabled. As can be seen, there is a slight trend for fewer trips per household as density increases. In every wave, I-NMT households make considerably more trips per day than 0-NMT households. Across waves, there is also a slight trend of fewer trips per day by both 0-NMT and l-NMT households.

Non-Motorized Trips

This section summarizes the non-motorized trip characteristics for l-NMT households. For those households making 1 or more non-motorized during each wave, a slight trend for increased trip-making can be seen. In wave 1, the average number of non-motorized trips was 3.3 trips per 1-NMT household. In wave 4, this average number of non-motorized trips had increased to approximately 4.0 trips per l-NMT household (R-5). Moreover, the greatest absolute numbers of non-motorized trips occurred in areas of high density (R-6). However, the variability associated with average number of non-motorized trips has also increased from wave to wave. The boxplot and error bar figures suggest that the average non-motorized trips made by l-NMT households has not significantly increased from wave to wave (R-7 and R-8).

Number of Non-Motorized Household Trips by Income

The data suggest that l-NMT households make similar numbers of non-motorized trips across income groups. This trend is maintained through each of the four waves of panel data (R-5). There is also little evidence to suggest that trip-making frequencies change as a function of income (R-9) or that the number of non-motorized trips increases appreciably over the four waves.

Number of Non-Motorized Household Trips by Household Size

There is no clear pattern of increasing numbers of non-motorized trips by I-NMT households by household size (R-5 and R-10). Households making any non-motorized trips tend to make about the same number, regardless of household size. For households having two or fewer members, the average number of non-motorized trips ranged between 3.2 and 4.0 trips per day in any given wave. The number of non-motorized trips for households with 3 or more members ranged between 3.2 and 5.9. However, is also important to note that higher averages of non-motorized trips were also associated with greater distributional variability and thus, make results somewhat inconclusive.

Number of Non-Motorized Household Trips by Population Density

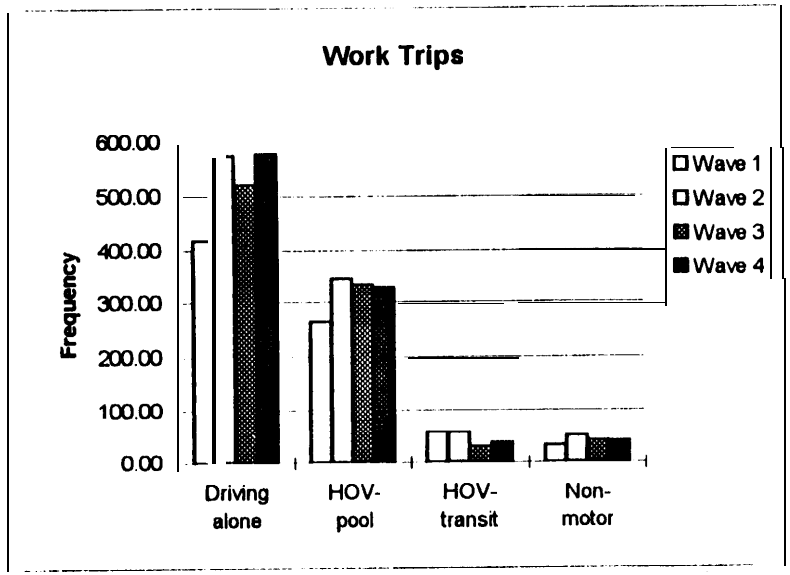
The number of non-motorized trips across population density remains fairly constant over the four waves (R-5 and R11). It is also interesting to note that there does not appear to be a consistent pattern of increasing numbers of non-motorized trips as density increases. Spatially, the census tracts with the largest numbers of non-motorized trips appear clustered in the CBD, the University District, Green Lake and South Seattle (R-6).

Work Trip Frequencies

(type 1: subjects traveling more than one HOV-pool work trip)

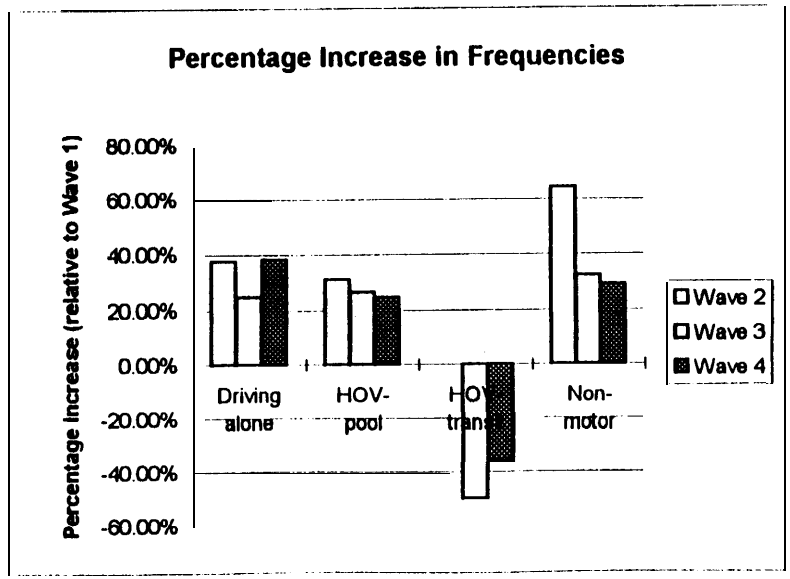
Frequencies of Work Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	418.00	575.00	522.00	578.00
HOV-pool	264.00	346.00	334.00	329.00
HOV-transit	58.00	58.00	29.00	37.00
Non-motor	31.00	51.00	41.00	40.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	37.56%	24.88%	38.28%
HOV-pool	31.06%	26.52%	24.62%
HOV-transit	0.00%	-50.00%	-36.21%
Non-motor	64.52%	32.26%	29.03%

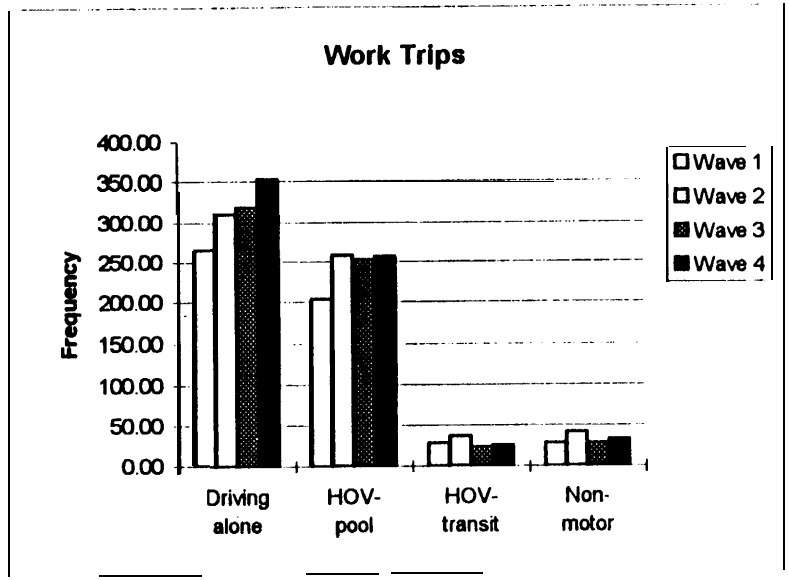


Work Trip Frequencies

(type 2: subjects traveling an HOV-pool work trip in more than one wave)

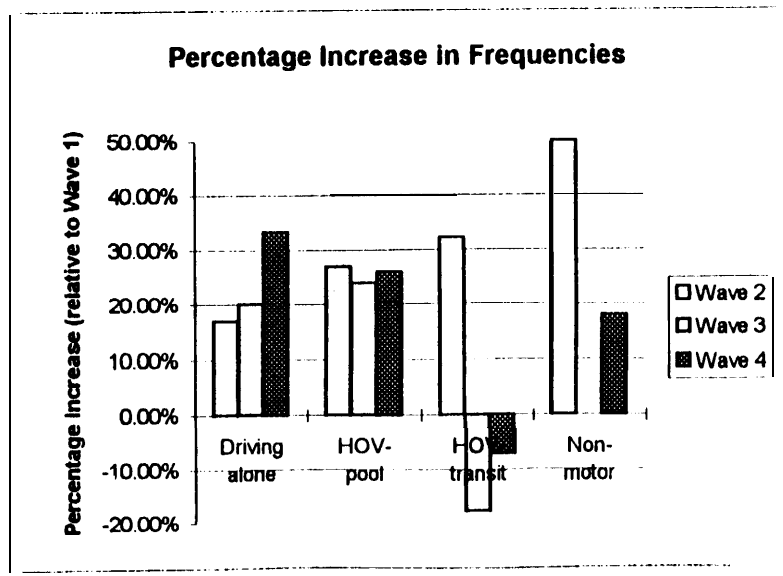
Frequencies of Work Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	265.00	310.00	318.00	353.00
HOV-pool	203.00	258.00	252.00	256.00
HOV-transit	28.00	37.00	23.00	26.00
Non-motor	28.00	42.00	28.00	33.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	16.98%	20.00%	33.21%
HOV-pool	27.09%	24.14%	26.11%
HOV-transit	32.14%	-17.86%	-7.14%
Non-motor	50.00%	0.00%	17.86%



Work Trip Means

(and standard deviation and standard error)
(type 1: subjects traveling more than one HOV-pool work trip)

TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**6.21**	**7.08**	**6.01**	**6.13**
		2.91	3.88	2.88	3.20
		0.14	0.16	0.13	0.13
	HOV-pool	**5.77**	**6.67**	**6.47**	**7.18**
		2.78	3.37	3.06	3.53
		0.17	0.18	0.17	0.19
	HOV-transit	**5.50**	**5.67**	**4.86**	**5.30**
		2.96	3.12	2.42	2.22
		0.39	0.41	0.45	0.36
	Non-motor	**7.39**	**8.35**	**7.07**	**7.02**
		3.30	2.97	3.16	3.21
		0.59	0.42	0.49	0.51

DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**20.01**	**19.59**	**21.34**	**20.27**
		17.47	17.98	14.93	14.58
		0.85	0.75	0.65	0.61
	HOV-pool	**22.16**	**21.58**	**21.26**	**20.23**
		19.51	16.52	19.81	15.97
		1.20	0.89	1.08	0.88
	HOV-transit	**35.79**	**38.40**	**41.90**	**34.08**
		19.51	17.33	22.00	17.01
		2.56	2.28	4.09	2.80
	Non-motor	**11.00**	**10.55**	**12.49**	**8.82**
		10.80	5.96	14.72	7.25
		1.94	0.83	2.30	1.15

DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**8.89**	**7.76**	**10.02**	**9.23**
		9.07	8.18	9.75	8.81
		0.45	0.35	0.43	0.37
	HOV-pool	**8.76**	**10.25**	**9.04**	**8.96**
		9.16	11.01	9.63	10.35
		0.57	0.60	0.53	0.57
	HOV-transit	**11.30**	**12.19**	**12.27**	**12.72**
		6.54	6.61	9.22	8.02
		0.91	0.89	1.71	1.32
	Non-motor	**1.66**	**1.22**	**1.03**	**1.22**
		2.08	1.58	1.04	1.81
		0.39	0.22	0.16	0.29

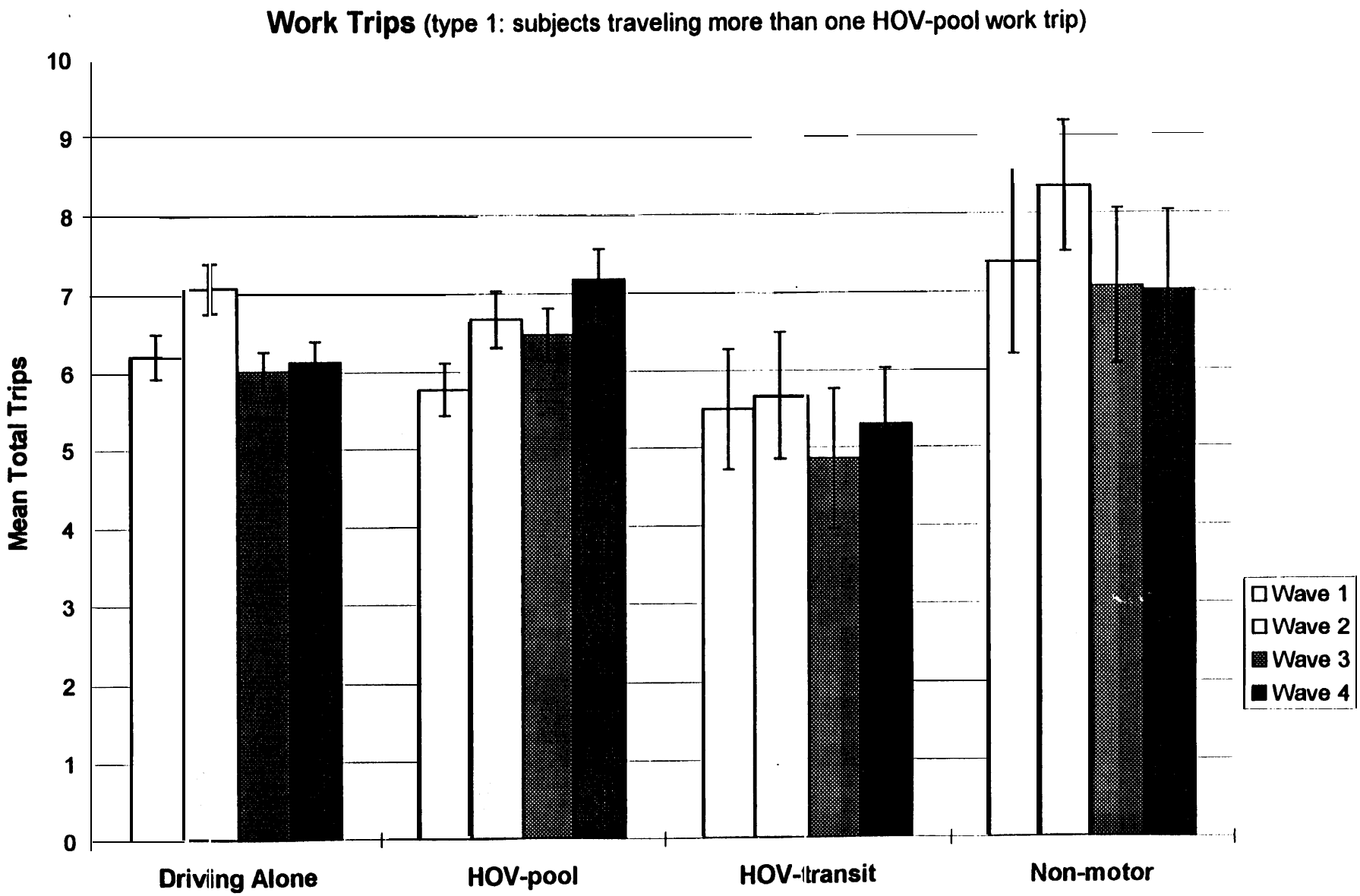
Work Trip Means

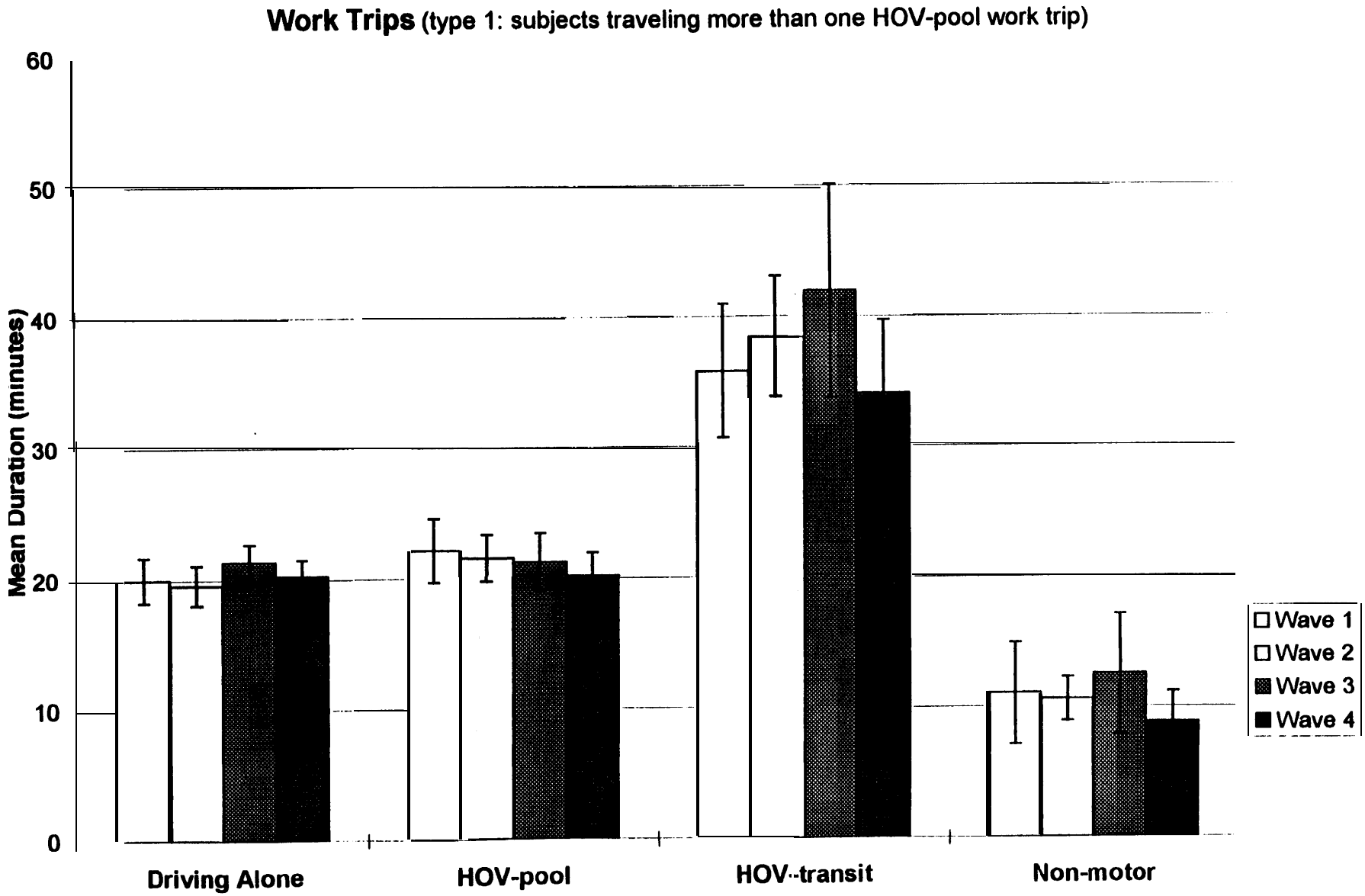
(and standard deviation and standard error)
(type 2: subjects traveling an HOV-pool work trip in more than one wave)

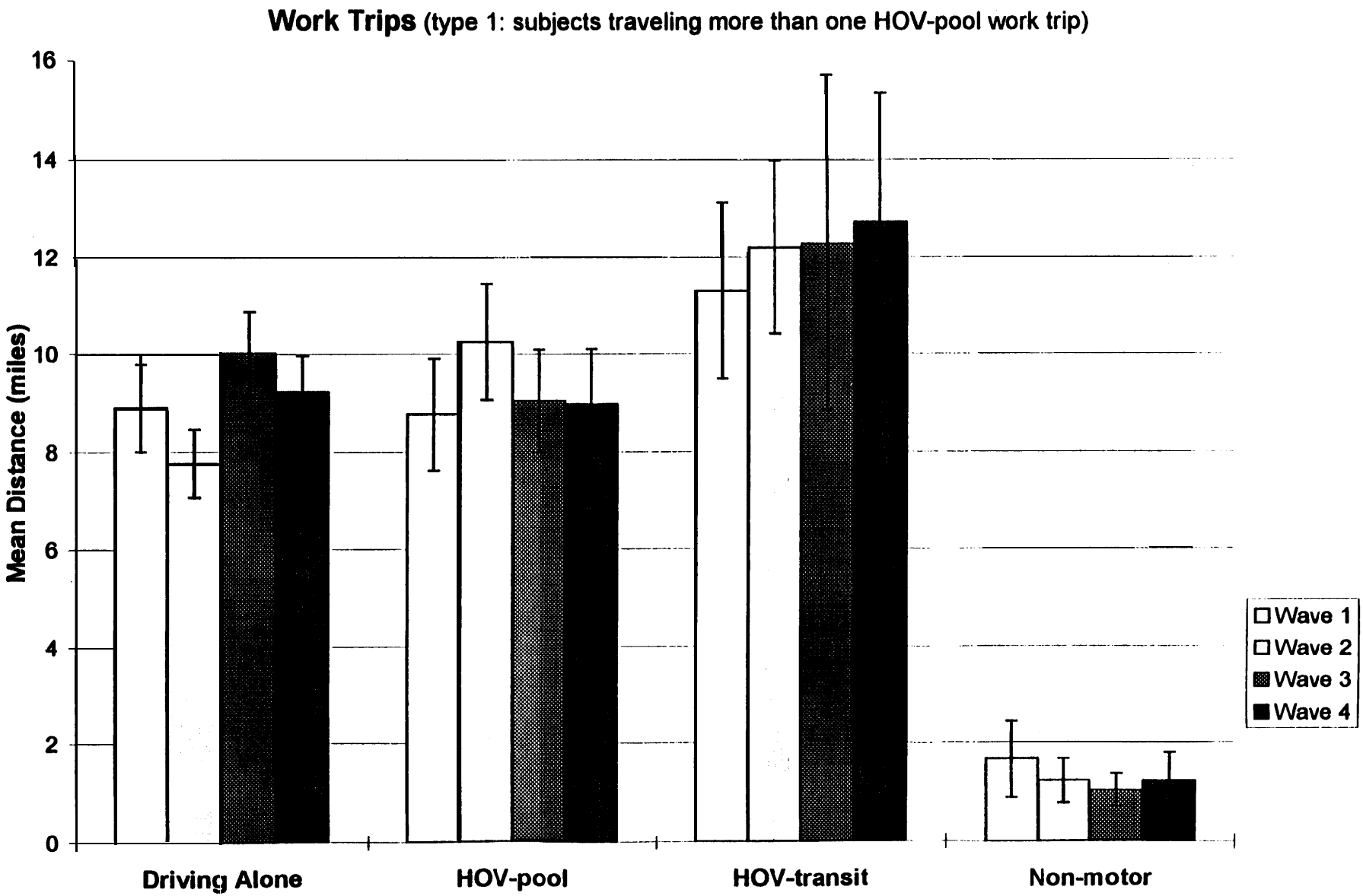
TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**6.47**	**6.56**	**6.08**	**6.15**
		3.06	2.91	2.81	2.99
		0.19	0.17	0.16	0.16
	HOV-pool	**5.67**	**6.24**	**6.60**	**7.41**
		2.91	2.90	3.10	3.66
		0.20	0.18	0.20	0.23
	HOV-transit	**6.07**	**6.16**	**5.26**	**5.35**
		3.52	3.57	2.40	2.46
		0.67	0.59	0.50	0.48
	Non-motor	**7.50**	**8.76**	**7.64**	**7.55**
		3.39	2.86	3.03	3.20
		0.64	0.44	0.57	0.56

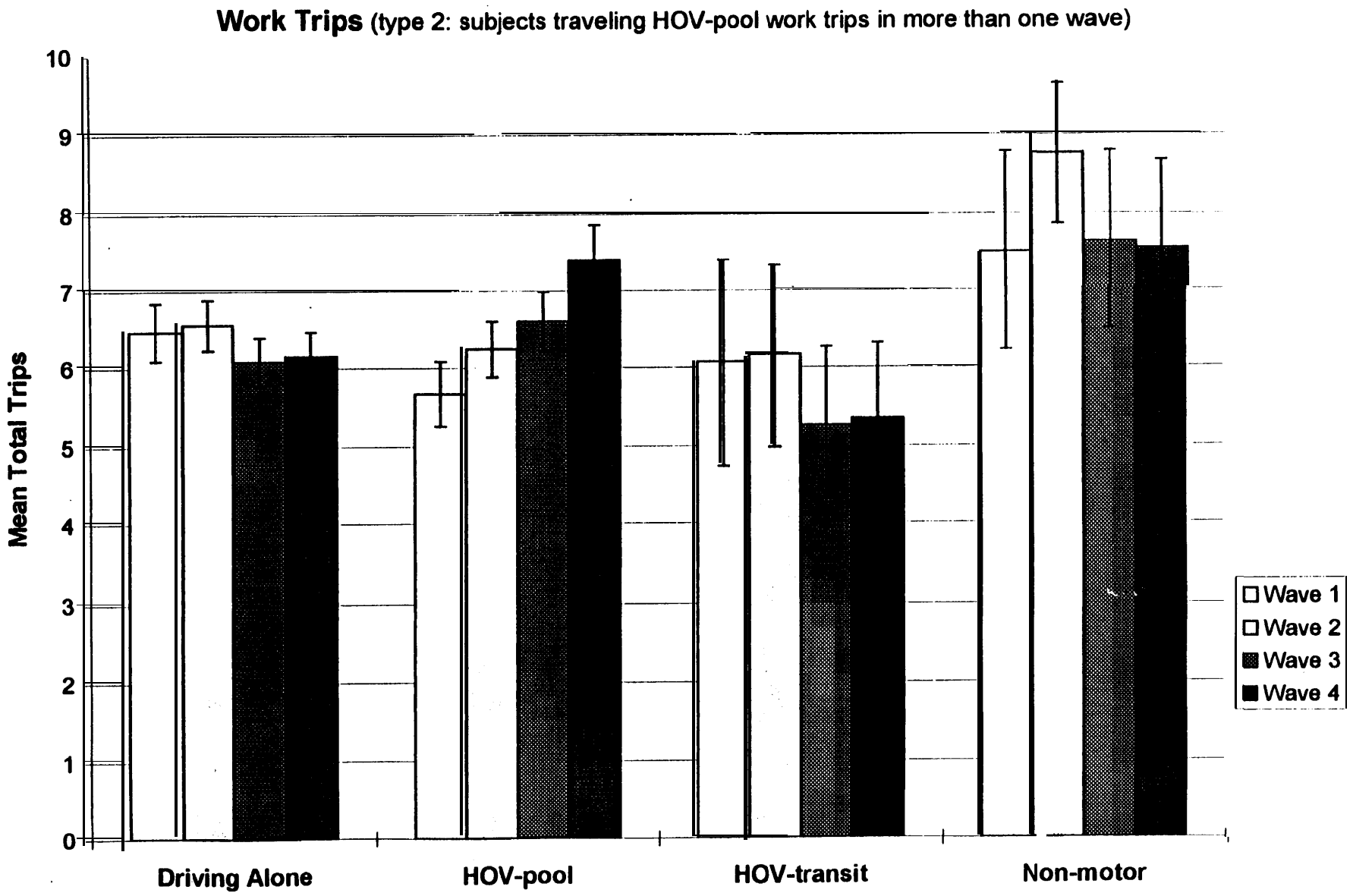
DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**19.55**	**18.75**	**21.41**	**19.64**
		17.20	13.95	15.58	13.41
		1.06	0.80	0.87	0.71
	HOV-pool	**21.86**	**21.29**	**20.32**	**19.60**
		19.24	17.32	19.59	14.98
		1.35	1.08	1.23	0.94
	HOV-transit	**38.54**	**35.08**	**35.30**	**33.42**
		23.06	16.74	17.86	17.26
		4.36	2.75	3.72	3.38
	Non-motor	**10.39**	**10.83**	**12.61**	**7.91**
		10.31	6.32	16.36	5.44
		1.95	0.98	3.09	0.95

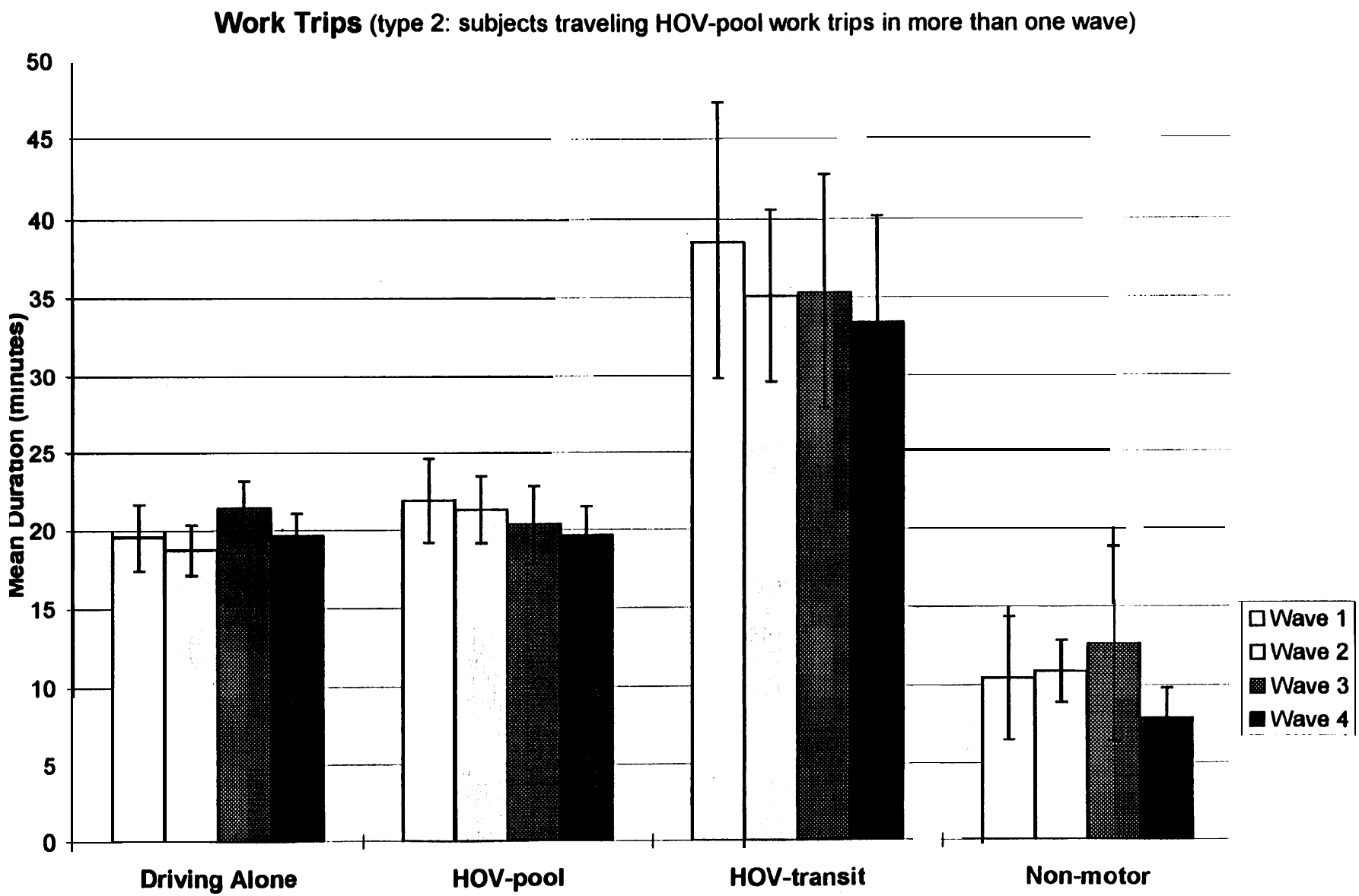
DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**8.16**	**7.88**	**10.31**	**9.04**
		8.17	8.03	10.58	8.63
		0.51	0.46	0.59	0.46
	HOV-pool	**8.73**	**10.28**	**8.43**	**8.55**
		8.41	11.62	9.42	10.15
		0.60	0.73	0.59	0.63
	HOV-transit	**10.87**	**11.16**	**11.77**	**12.23**
		7.30	7.34	10.11	8.63
		1.49	1.22	2.11	1.69
	Non-motor	**1.69**	**1.31**	**0.94**	**1.20**
		2.14	1.69	0.92	1.76
		0.42	0.26	0.17	0.31

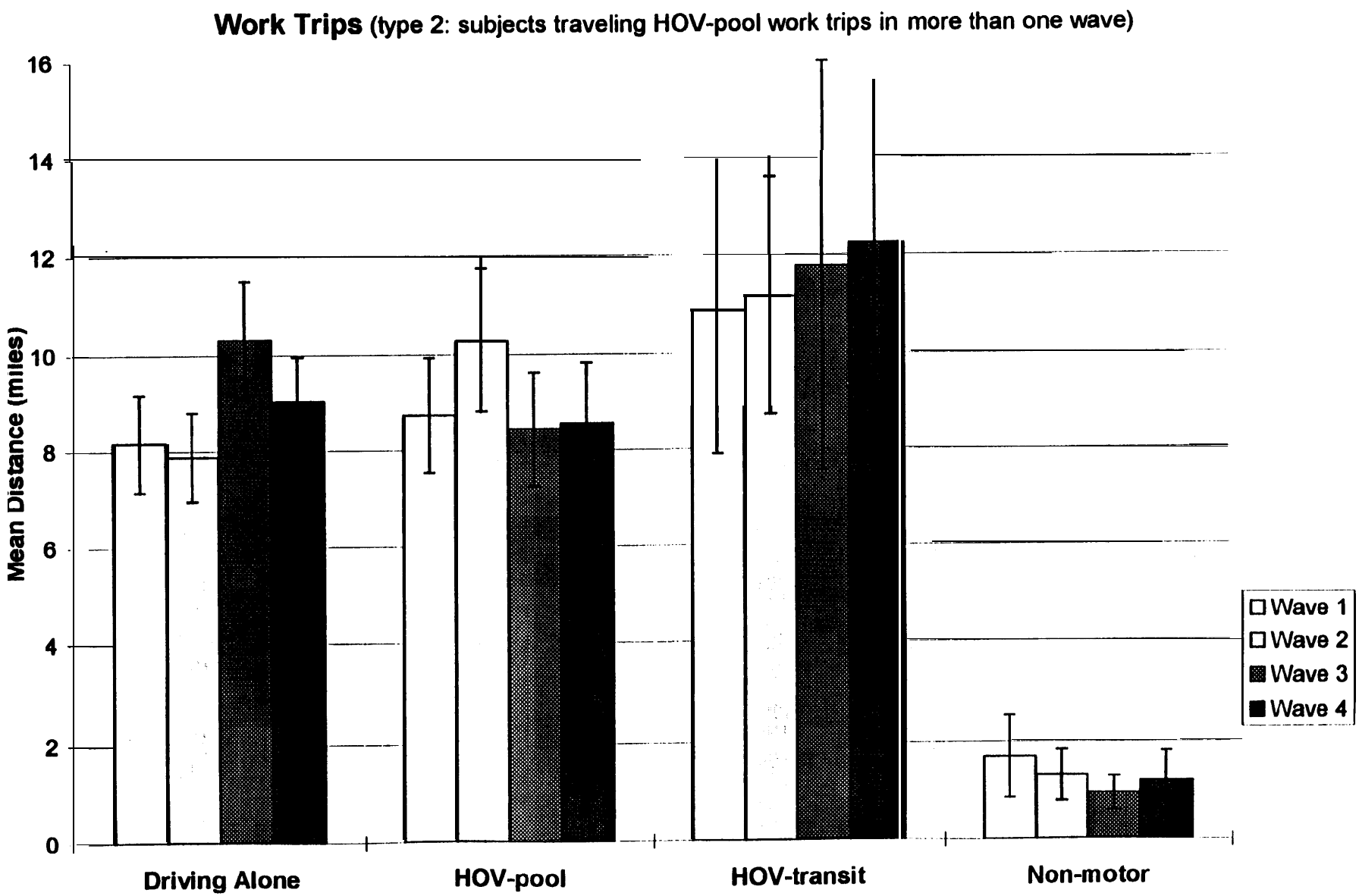

Work Trips (type 1: subjects traveling more than one HOV-pool work trip)
Mean Total Trips
10
9
8
7
6
5
4
3
2
1
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Work Trips (type 1: subjects traveling more than one HOV-pool work trip)
Mean Duration (minutes)
60
50
40
30
20
10
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Work Trips (type 1: subjects traveling more than one HOV-pool work trip)
Mean Distance (miles)
16
14
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

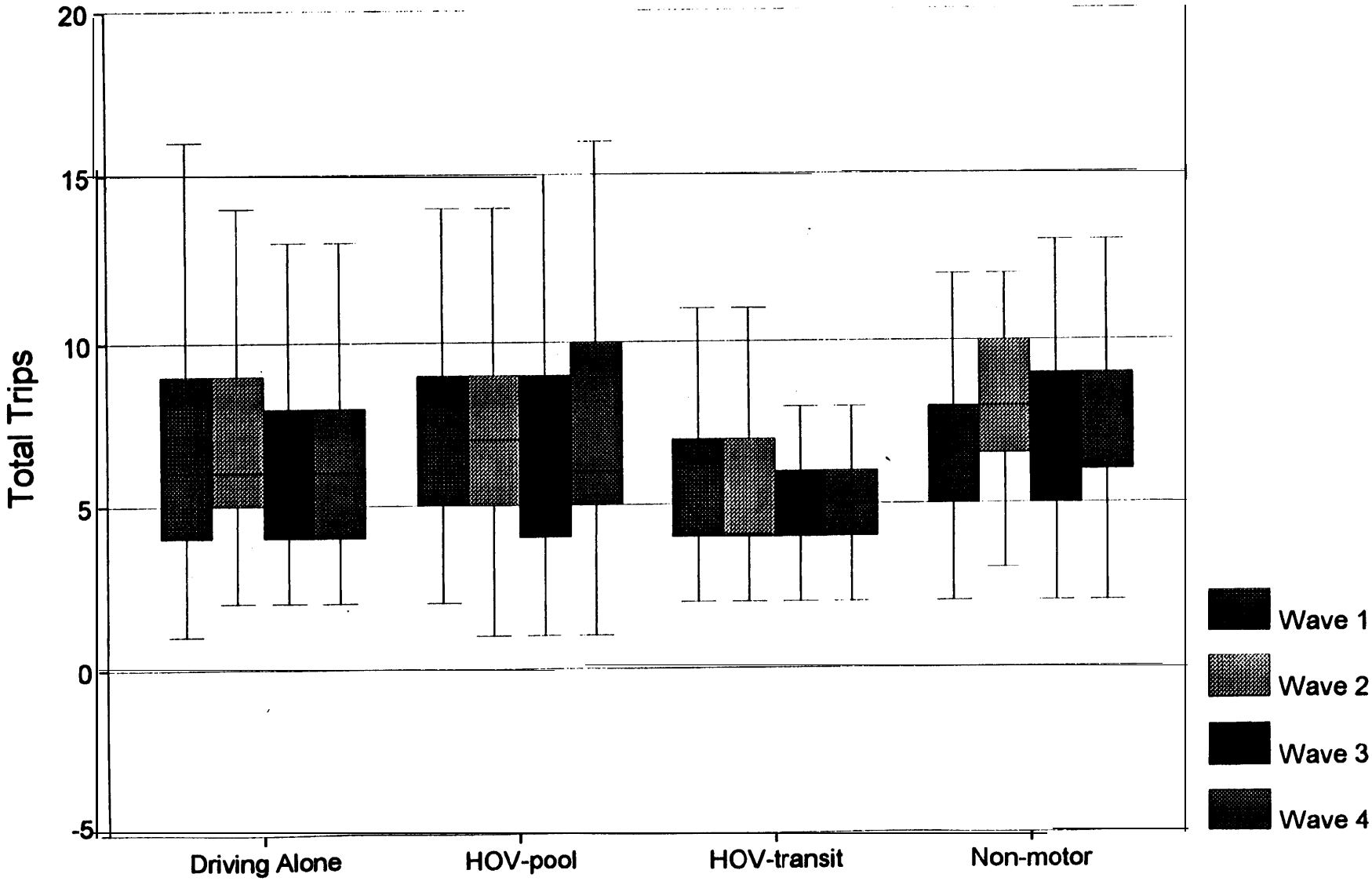

Work Trips (type 2: subjects traveling HOV-pool work trips in more than one wave)
Mean Total Trips
10
9
8
7
6
5
4
3
2
1
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Work Trips (type 2: subjects traveling HOV-pool work trips in more than one wave)
Mean Duration (minutes)
50
45
40
35
30
25
20
15
10
5
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Work Trips (type 2: subjects traveling HOV-pool work trips in more than one wave)
Mean Distance (miles)
16
14
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

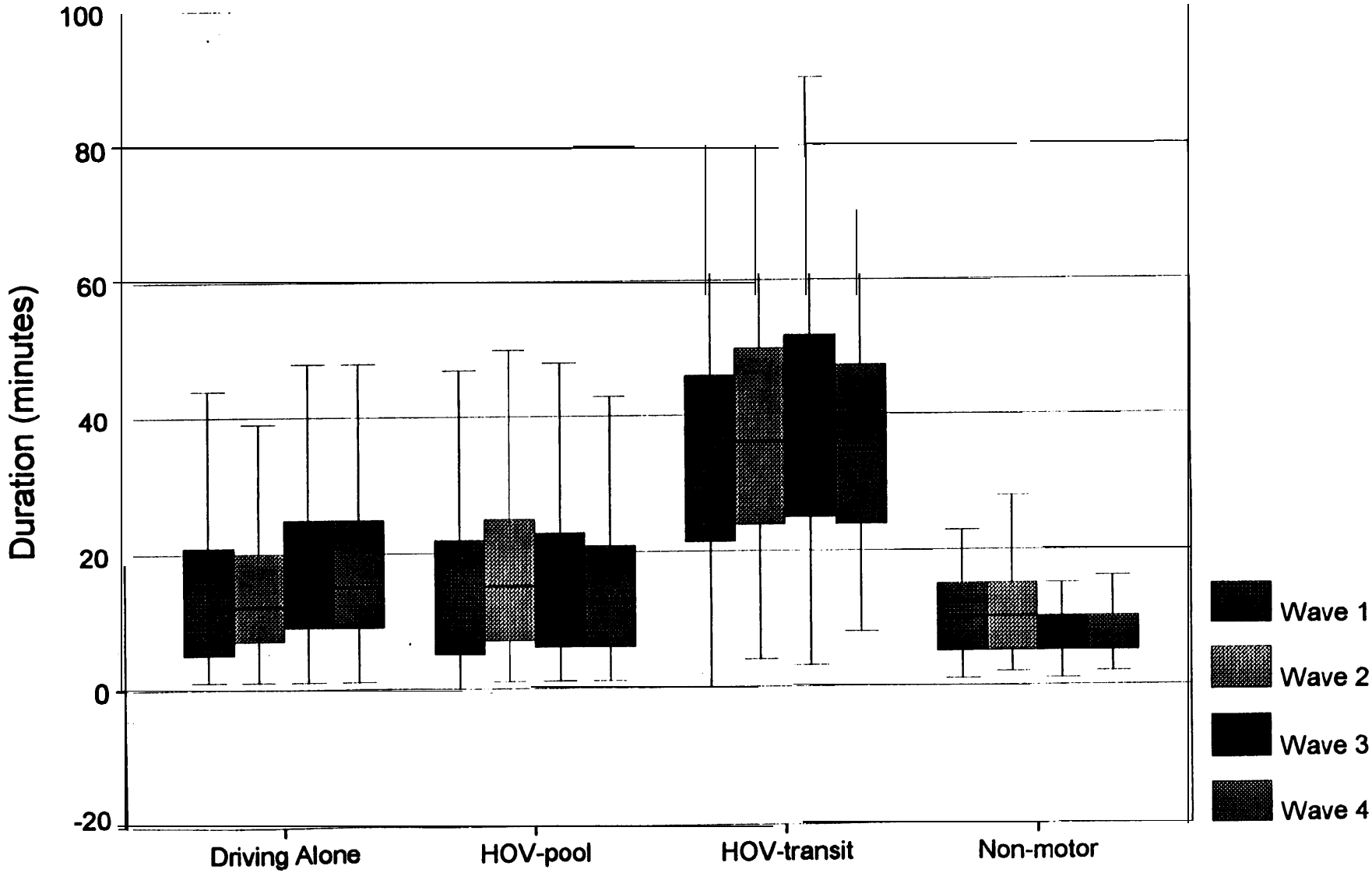
Work Trips

(subjects who carpooled to work more than once)



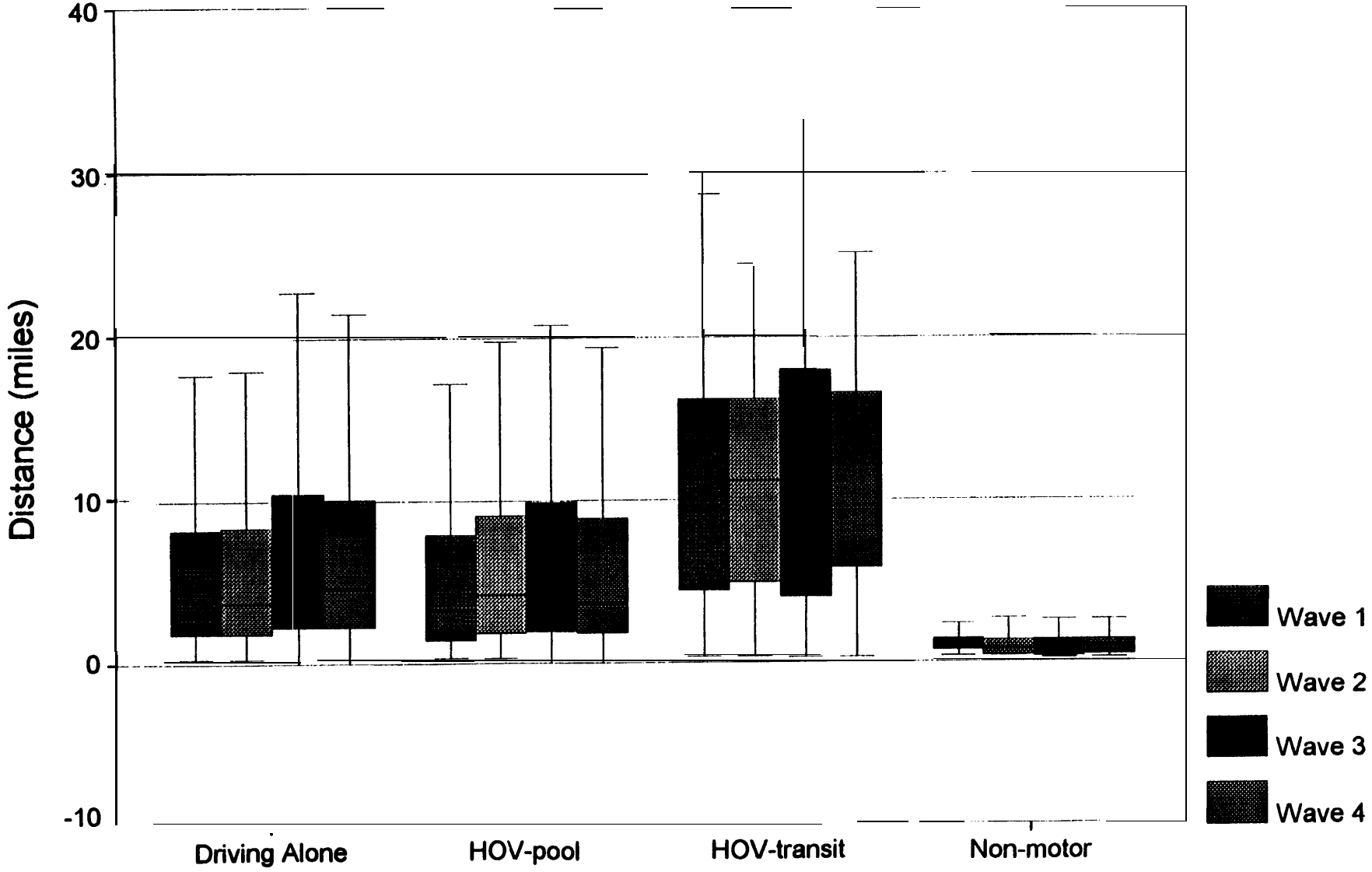
Work Trips

(subjects who carpooled to work more than once)



Work Trips

(subjects who carpooled to work more than once)

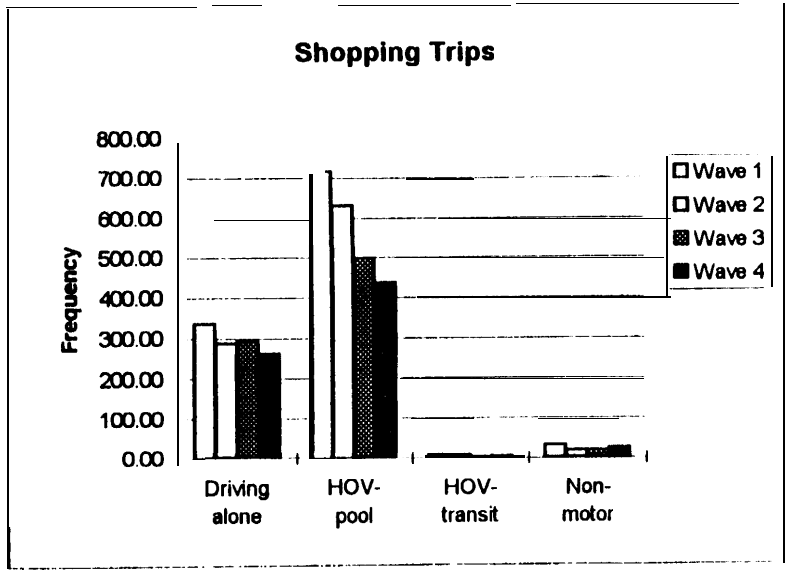


Shopping Trip Frequencies

(type 1: subjects traveling more than one HOV-pool shopping trip)

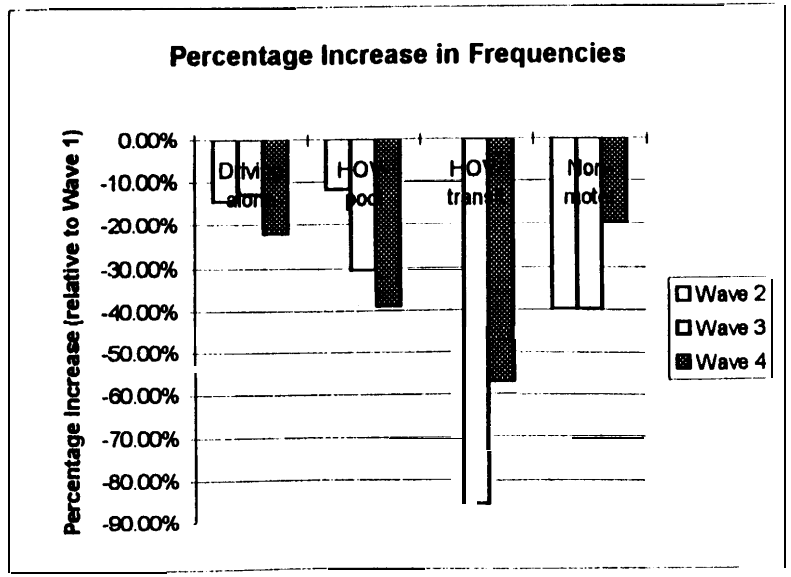
Frequencies of Shopping Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	338.00	289.00	294.00	263.00
HOV-pool	718.00	632.00	498.00	437.00
HOV-transit	7.00	7.00	1.00	3.00
Non-motor	30.00	18.00	18.00	24.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	-14.50%	-13.02%	-22.19%
HOV-pool	-11.98%	-30.64%	-39.14%
HOV-transit	0.00%	-85.71%	-57.14%
Non-motor	-40.00%	-40.00%	-20.00%

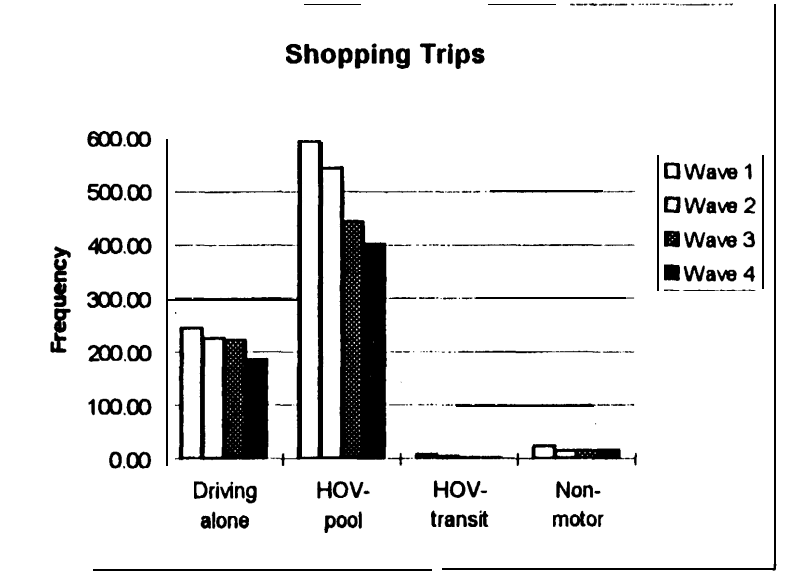


Shopping Trip Frequencies

(type 2: subjects traveling an HOV-pool shopping trip in more than one wave)

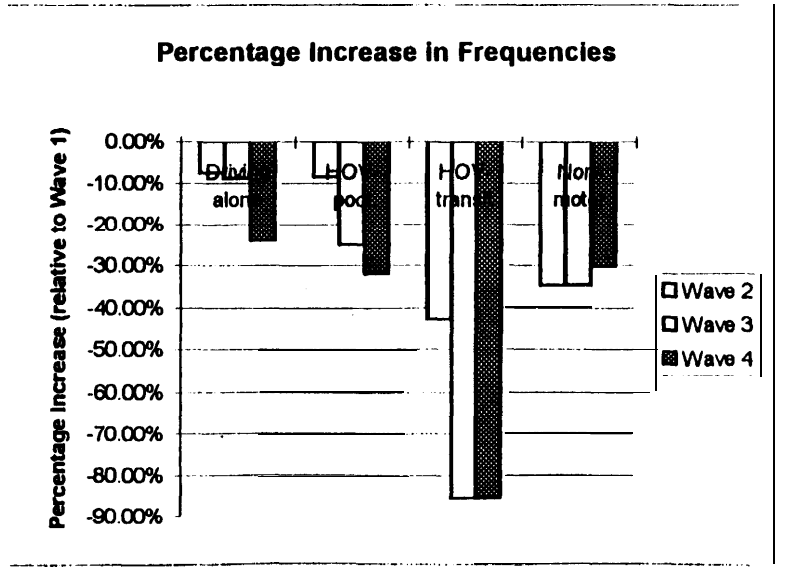
Frequencies of Shopping Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	244.00	225.00	222.00	185.00
HOV-pool	594.00	543.00	444.00	403.00
HOV-transit	7.00	4.00	1.00	1.00
Non-motor	23.00	15.00	15.00	16.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	-7.79%	-9.02%	-24.18%
HOV-pool	-8.59%	-25.25%	-32.15%
HOV-transit	-42.86%	-85.71%	-85.71%
Non-motor	-34.78%	-34.78%	-30.43%



Shopping Trip Means

(and standard deviation and standard error)
(type 1: subjects traveling more than HOV-pool shopping trip)

TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**7.25**	**7.24**	**7.23**	**6.87**
		3.19	3.05	3.28	3.54
		0.17	0.18	0.19	0.22
	HOV-pool	**7.42**	**6.76**	**6.44**	**6.50**
		3.15	2.76	2.69	2.95
		0.12	0.11	0.12	0.14
	HOV-transit	**5.00**	**3.57**	**8.00**	**5.67**
		1.29	1.62	not available	0.58
		0.49	0.61	not available	0.33
	Non-motor	**8.93**	**4.78**	**6.00**	**6.67**
		4.91	2.65	2.35	2.62
		0.90	0.62	0.55	0.53

DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**12.51**	**12.28**	**11.15**	**11.40**
		10.19	11.76	9.35	8.42
		0.55	0.69	0.55	0.52
	HOV-pool	**14.34**	**14.29**	**13.98**	**15.36**
		11.88	12.48	13.95	13.86
		0.44	0.50	0.63	0.66
	HOV-transit	**32.57**	**25.00**	**10.00**	**28.33**
		28.40	9.57	not available	2.89
		10.73	3.62	not available	1.67
	Non-motor	**12.43**	**10.44**	**10.72**	**9.58**
		12.52	6.22	7.25	7.35
		2.29	1.47	1.71	1.50

DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**4.13**	**3.59**	**3.72**	**3.66**
		4.74	3.87	4.40	4.41
		0.26	0.23	0.26	0.27
	HOV-pool	**4.49**	**4.46**	**4.82**	**5.65**
		4.94	5.02	5.90	6.48
		0.18	0.20	0.26	0.31
	HOV-transit	**5.44**	**4.31**	**0.30**	**4.03**
		6.64	4.03	not available	0.29
		2.51	1.52	not available	0.17
	Non-motor	**1.07**	**0.97**	**0.83**	**1.07**
		0.73	0.69	0.50	0.57
		0.13	0.16	0.12	0.12

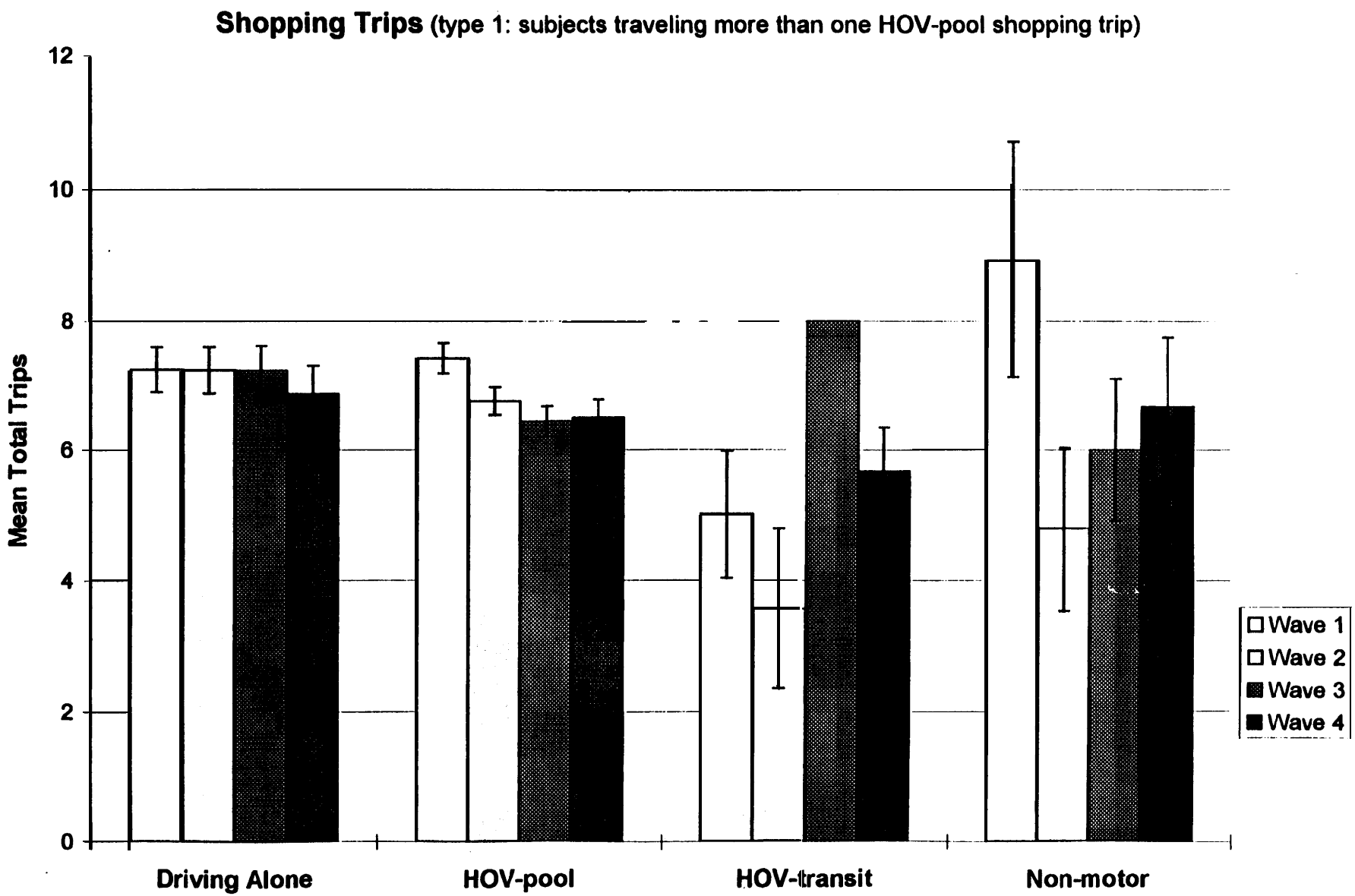
Shopping Trip Means

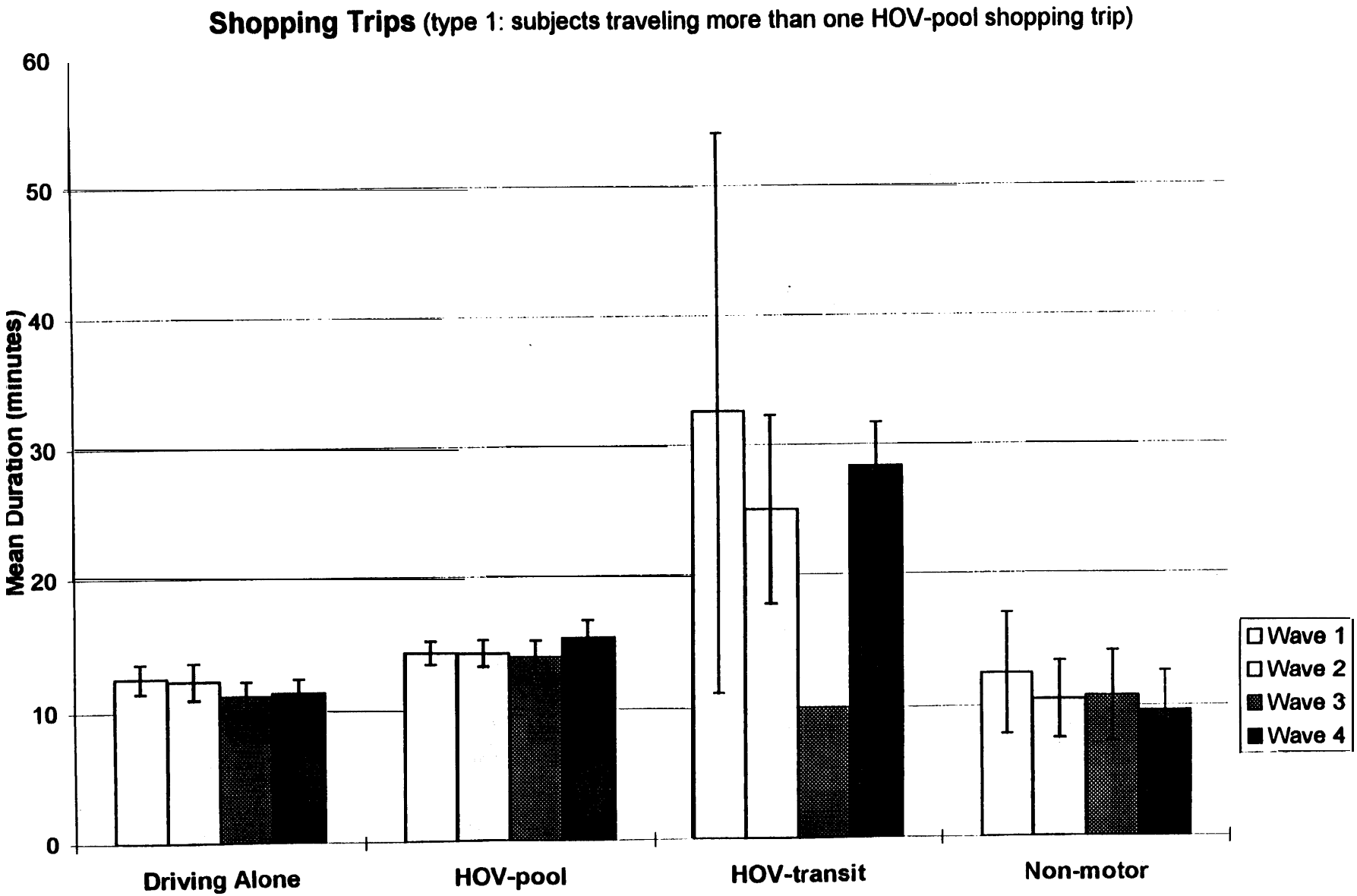
(and standard deviation and standard error)
(type 2: subjects traveling an HOV-pool shopping trip in more than one wave)

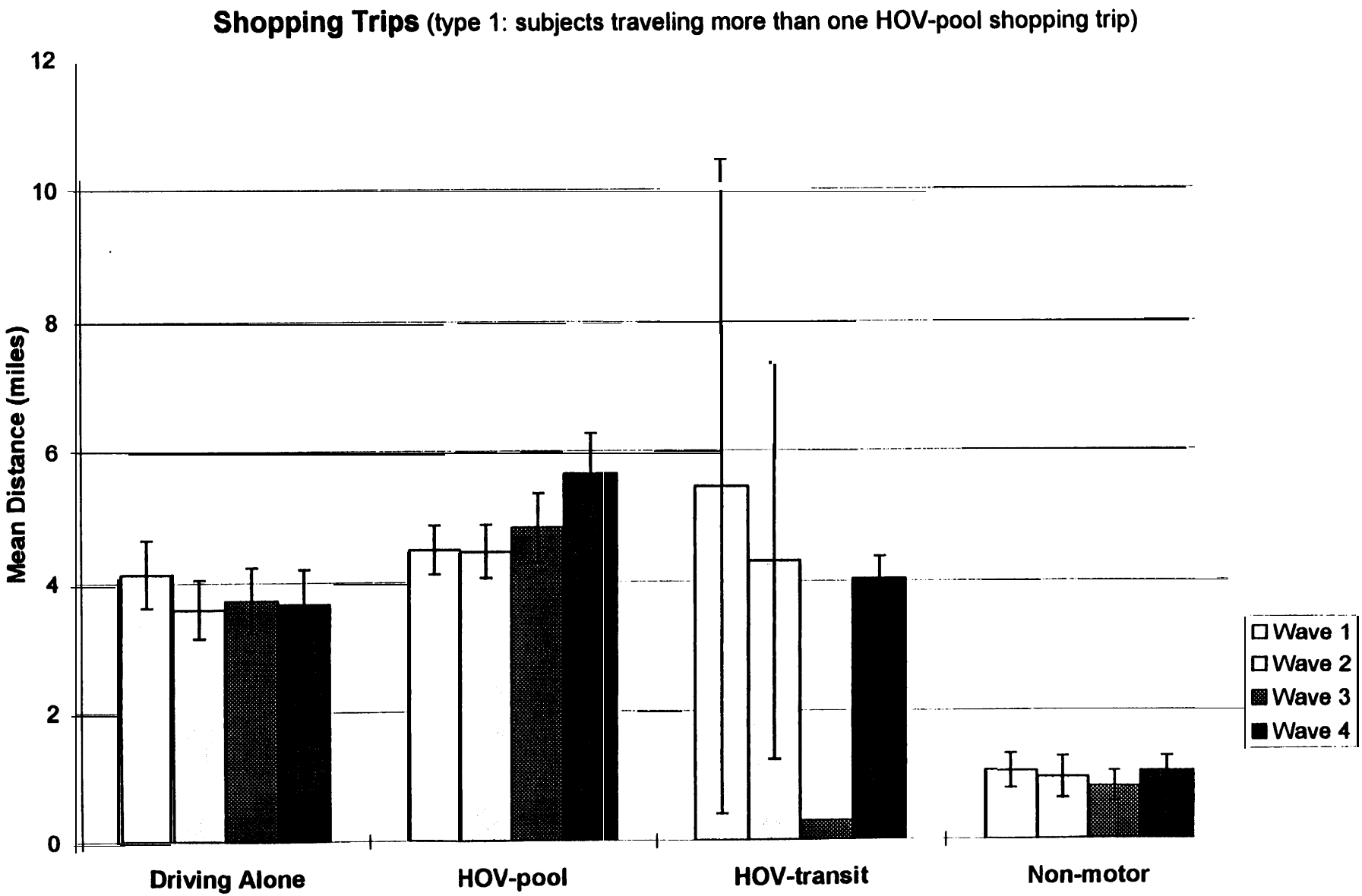
TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**7.54**	**7.27**	**5.00**	**8.09**
		3.30	3.04	1.29	4.04
		0.21	0.12	0.49	0.84
	HOV-pool	**7.33**	**5.66**	**4.25**	**4.67**
		3.11	2.70	1.71	2.69
		0.21	0.12	0.86	0.69
	HOV-transit	**7.58**	**6.39**	**8.00**	**6.33**
		3.38	2.74	not available	2.26
		0.23	0.13	not available	0.58
	Non-motor	**6.88**	**6.54**	**5.00**	**6.88**
		3.35	2.95	not available	2.50
		0.25	0.15	not available	0.63

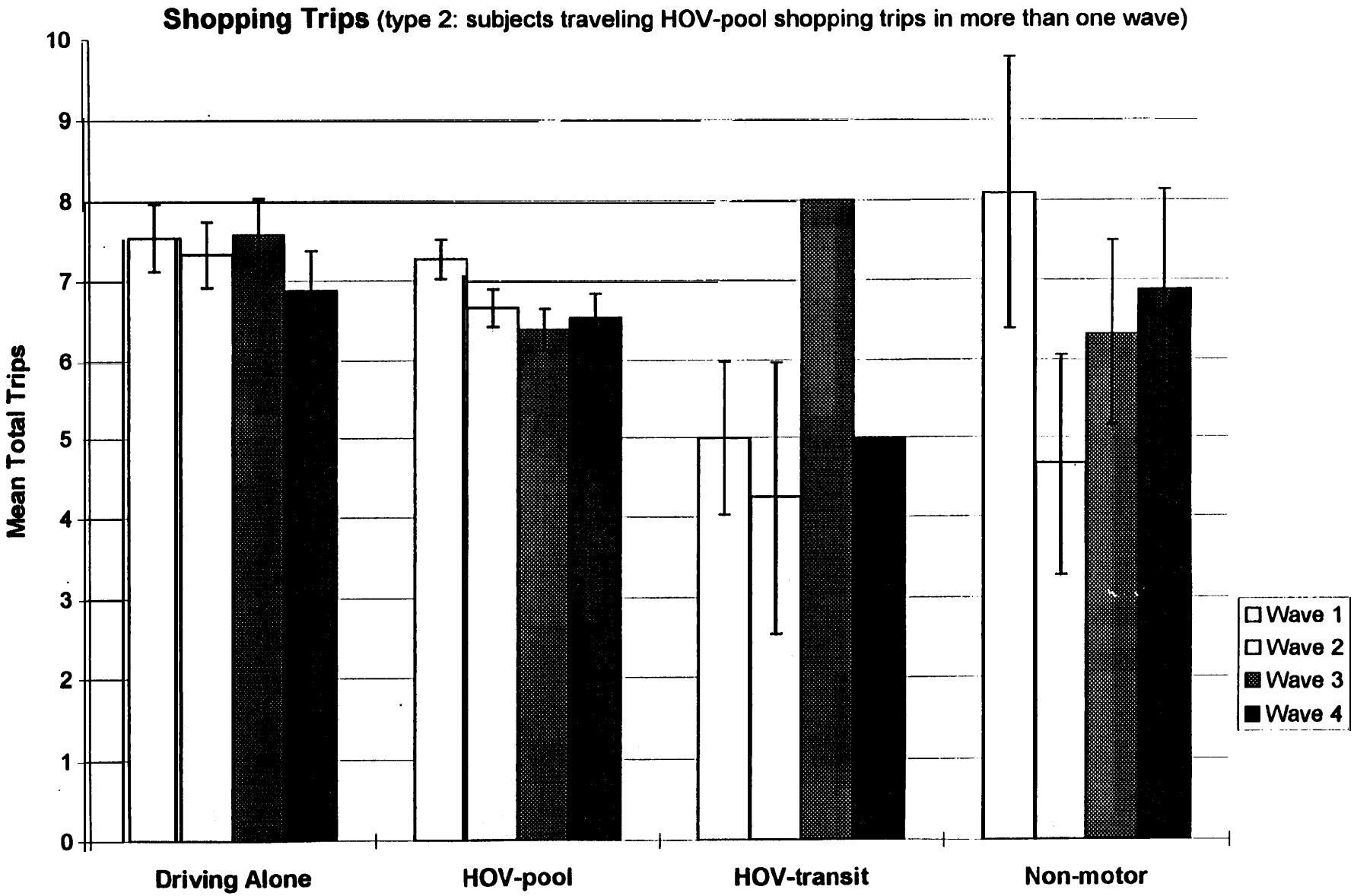
DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**12.43**	**14.14**	**32.57**	**9.26**
		10.10	11.85	28.40	10.31
		0.65	0.49	10.73	2.15
	HOV-pool	**11.93**	**14.50**	**20.00**	**9.93**
		10.24	12.96	9.13	6.44
		0.68	0.56	4.57	1.66
	HOV-transit	**10.84**	**13.88**	**10.00**	**10.00**
		9.69	14.03	not available	7.31
		0.65	0.67	not available	1.89
	Non-motor	**10.94**	**15.38**	**25.00**	**9.38**
		8.12	14.08	not available	6.50
		0.60	0.70	not available	1.63

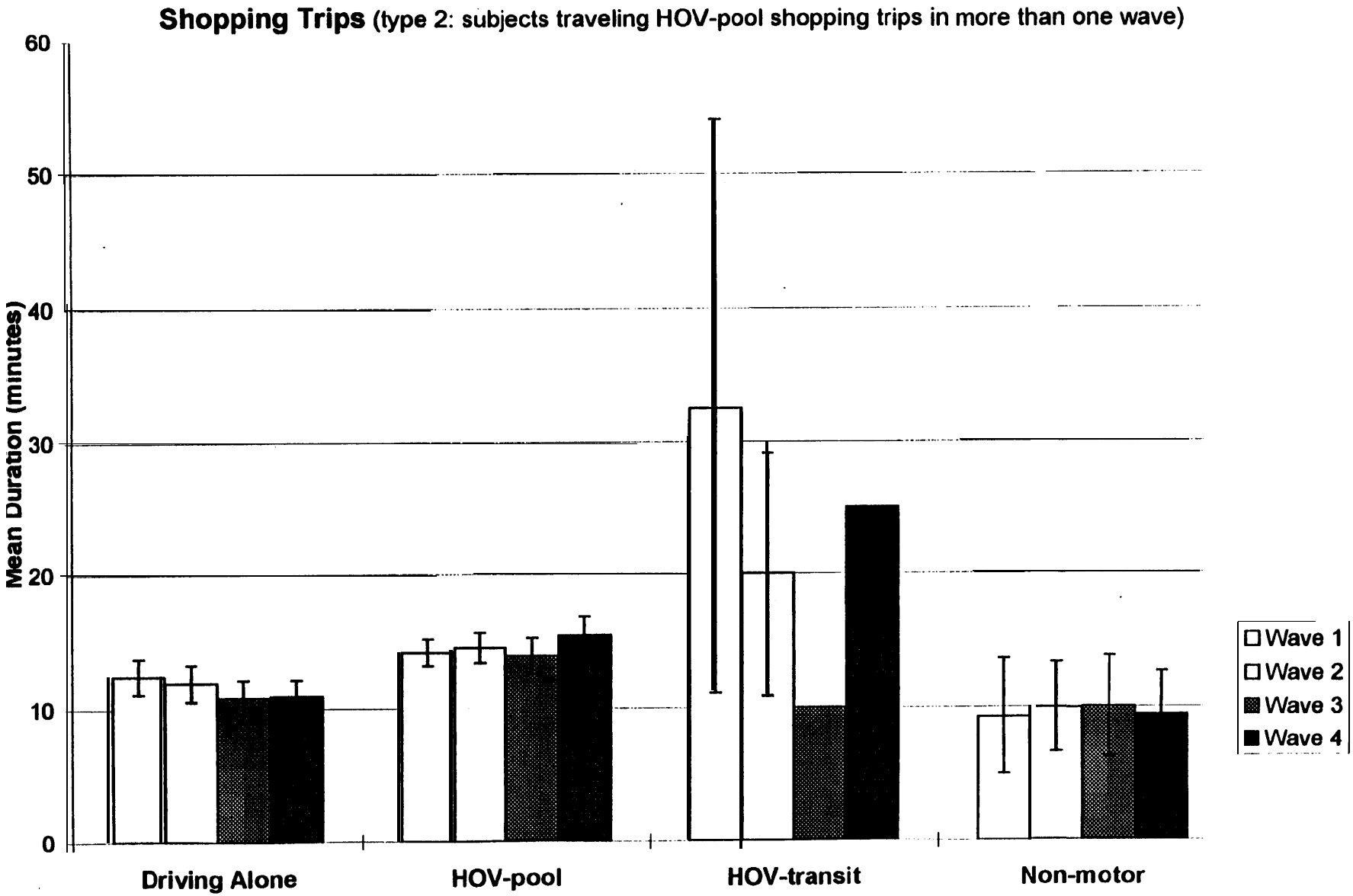
DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**4.19**	**4.31**	**5.44**	**1.06**
		4.69	4.60	6.64	0.67
		0.30	0.19	2.51	0.14
	HOV-pool	**3.40**	**4.56**	**2.00**	**0.96**
		3.41	5.25	1.13	0.76
		0.23	0.23	0.57	0.20
	HOV-transit	**3.74**	**4.83**	**0.30**	**0.79**
		4.48	6.06	not available	0.51
		0.30	0.29	not available	0.13
	Non-motor	**3.35**	**5.72**	**3.70**	**0.97**
		3.85	6.65	not available	0.51
		0.28	0.33	not available	0.13

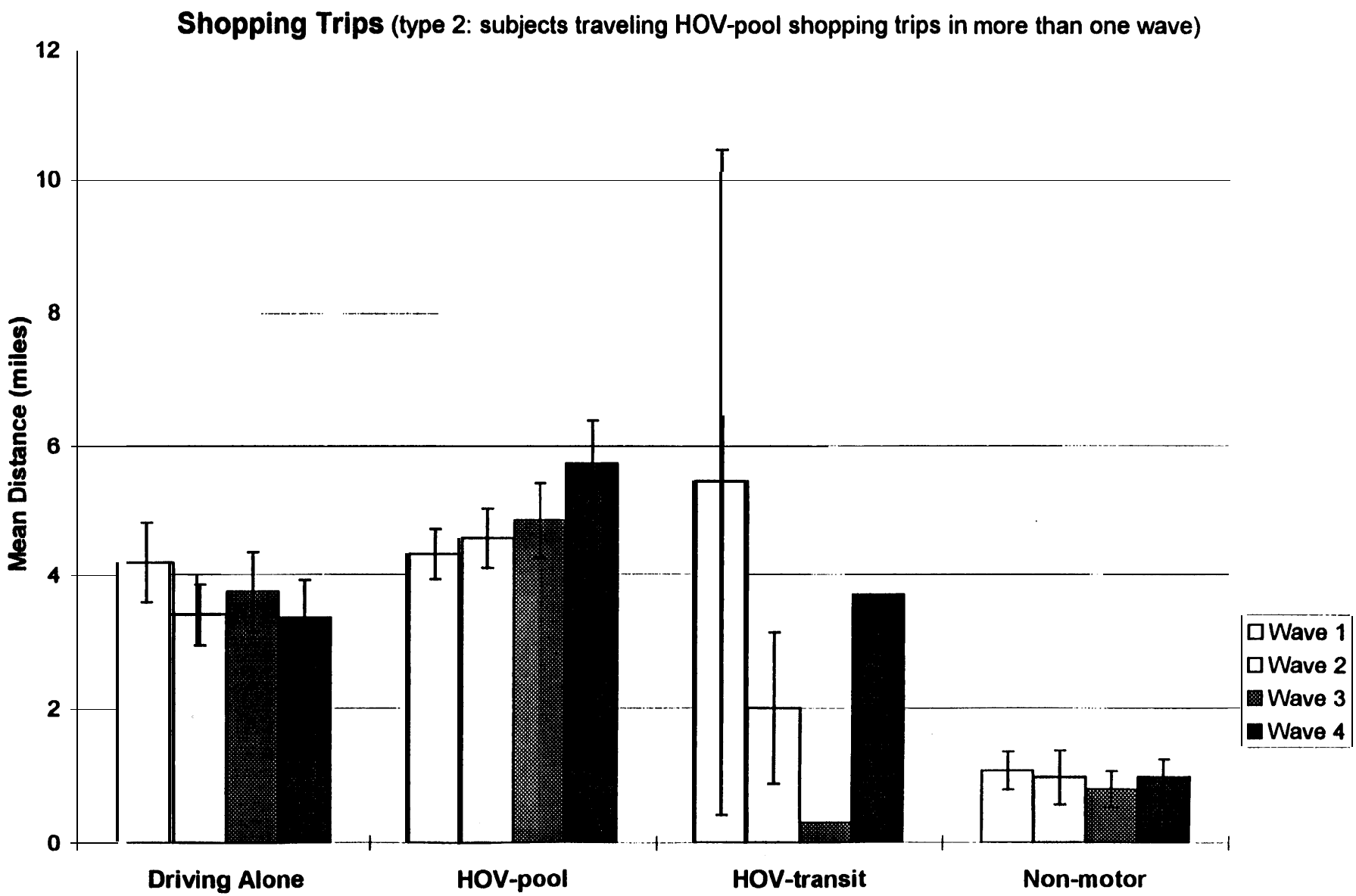

Shopping Trips (type 1: subjects traveling more than one HOV-pool shopping trip)
Mean Total Trips
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Shopping Trips (type 1: subjects traveling more than one HOV-pool shopping trip)
Mean Duration (minutes)
60
50
40
30
20
10
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Shopping Trips (type 1: subjects traveling more than one HOV-pool shopping trip)
Mean Distance (miles)
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

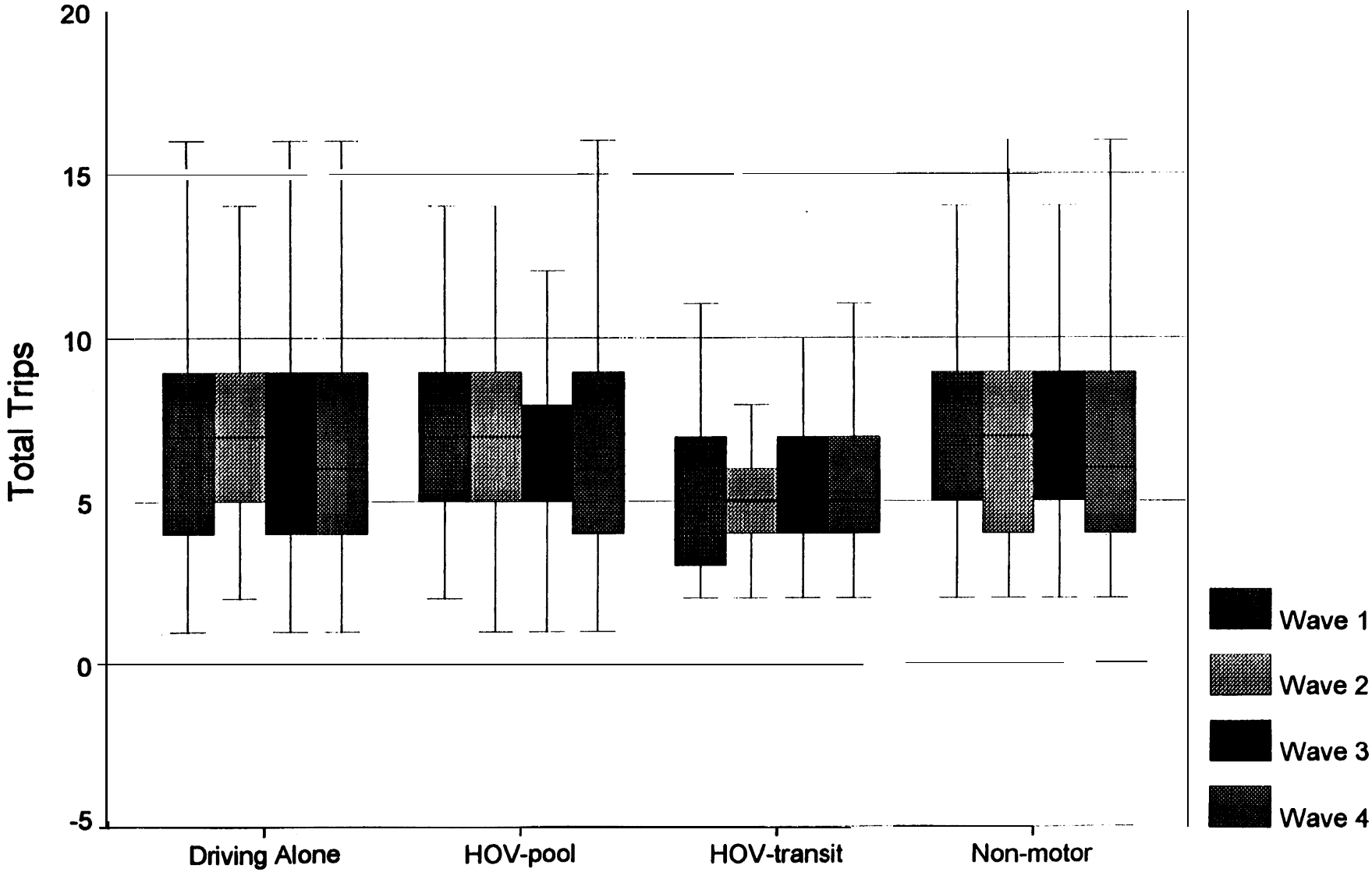

Shopping Trips (type 2: subjects traveling HOV-pool shopping trips in more than one wave)
Mean Total Trips
10
9
8
7
6
5
4
3
2
1
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Shopping Trips (type 2: subjects traveling HOV-pool shopping trips in more than one wave)
Mean Duration (minutes)
60
50
40
30
20
10
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Shopping Trips (type 2: subjects traveling HOV-pool shopping trips in more than one wave)
Mean Distance (miles)
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

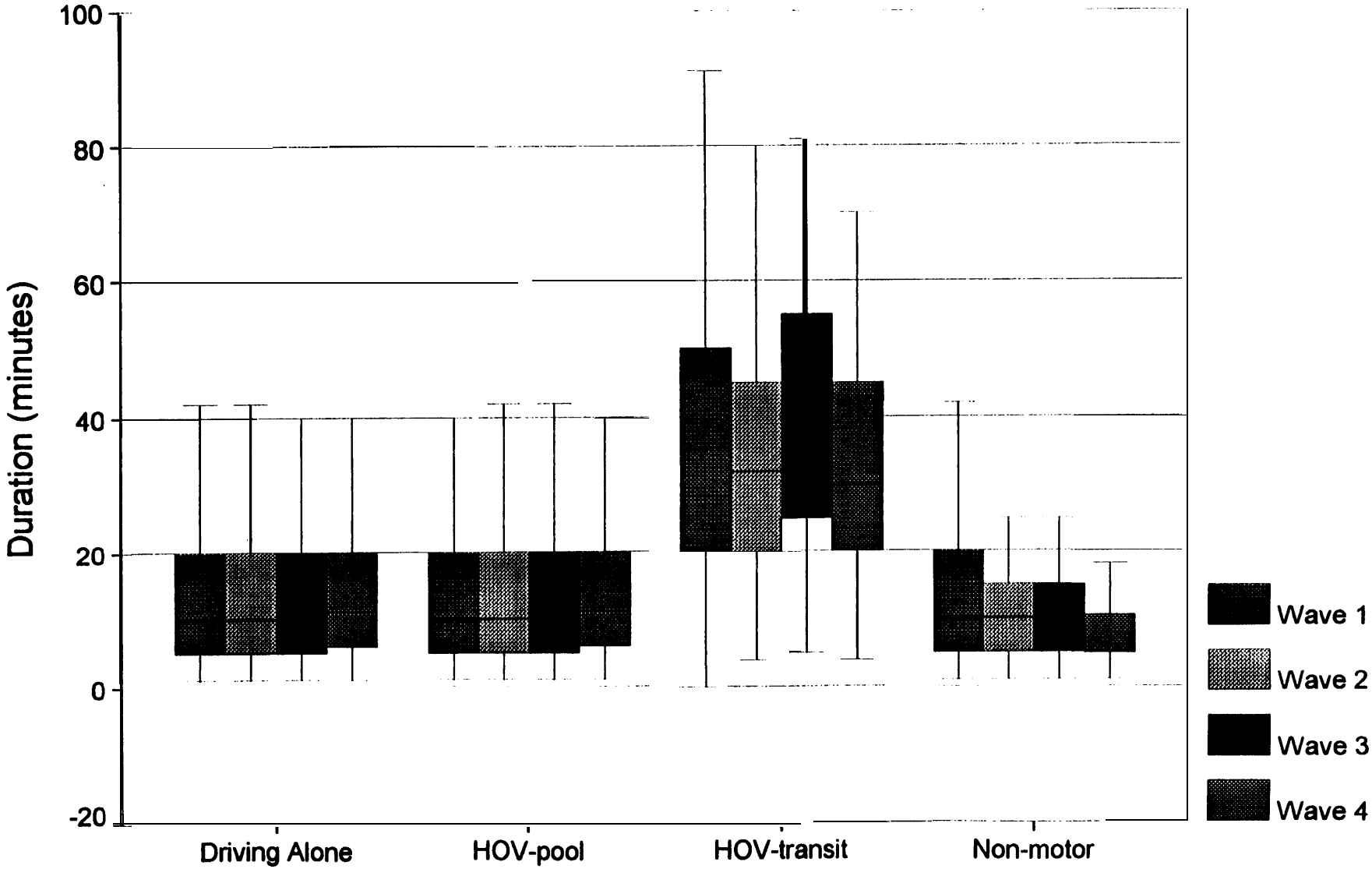
Shopping Trips

(subjects who carpooled to shop more than once)



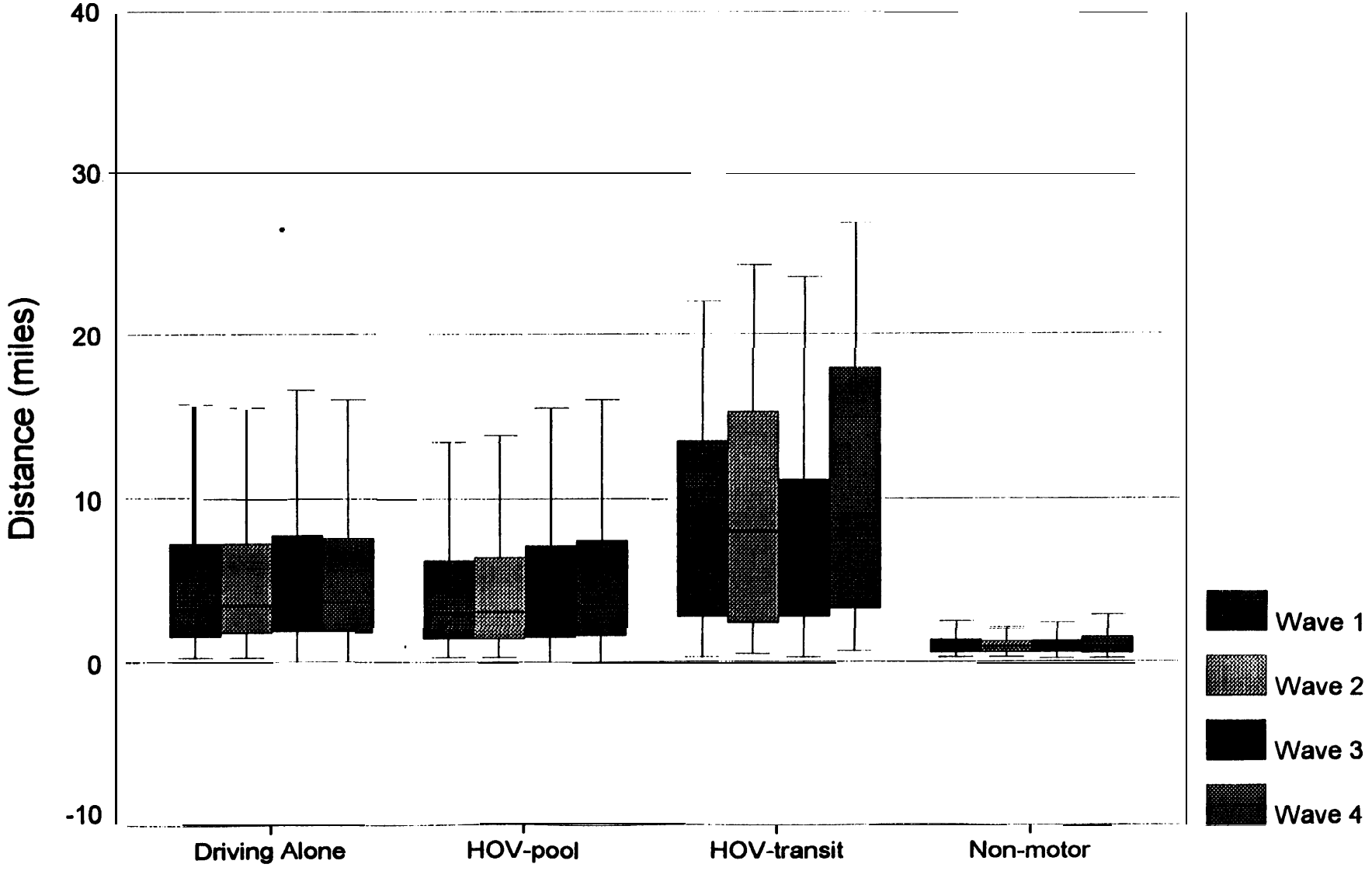
Shopping Trips

(subjects who carpooled to shop more than once)



Shopping Trips

(subjects who carpooled to shop more than once)

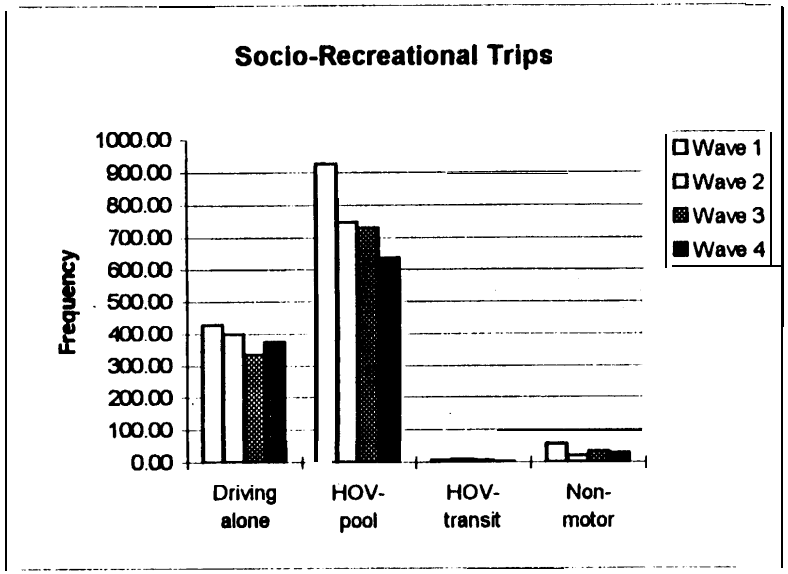


Socio-Recreational Trip Frequencies

(type 1: subjects traveling more than one HOV-pool socio-recreational trip)

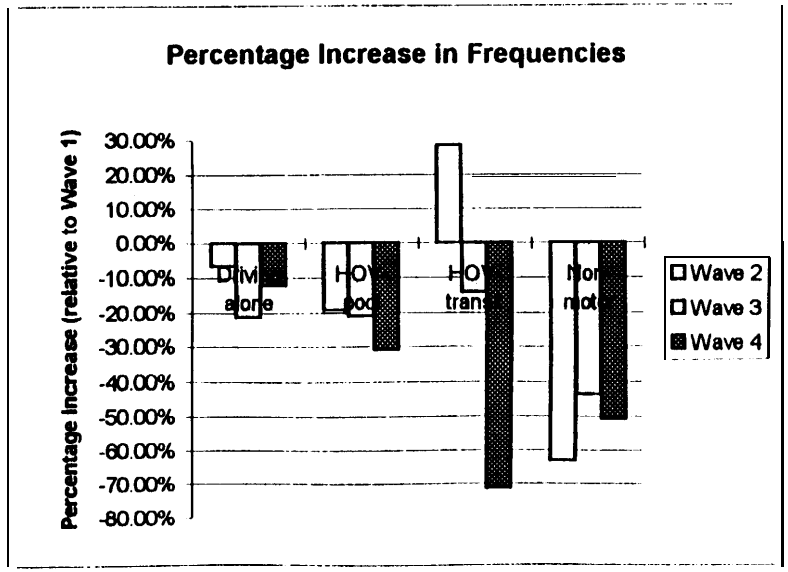
Frequencies of Socio-Recreational Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	429.00	400.00	337.00	377.00
HOV-pool	926.00	748.00	730.00	639.00
HOV-transit	7.00	9.00	6.00	2.00
Non-motor	57.00	21.00	32.00	28.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	-6.76%	-21.45%	-12.12%
HOV-pool	-19.22%	-21.17%	-30.99%
HOV-transit	28.57%	-14.29%	-71.43%
Non-motor	-63.16%	-43.86%	-50.88%

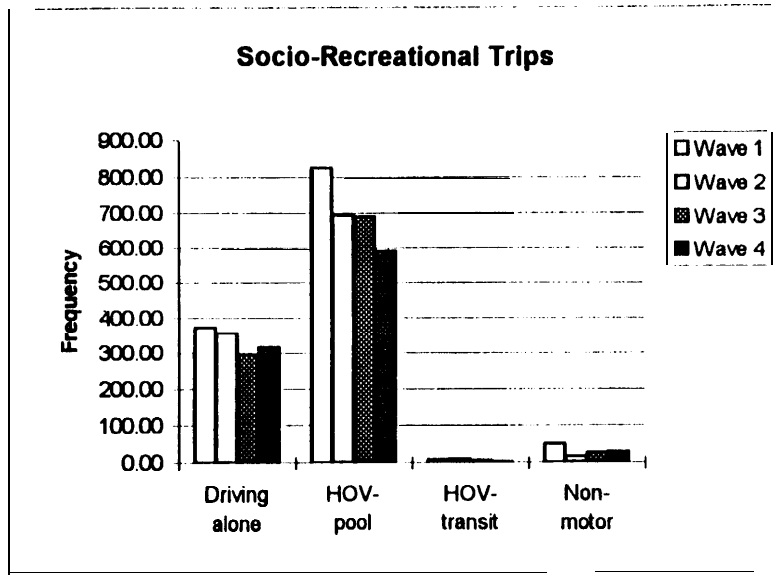


Socio-Recreational Trip Frequencies

(type 2: subjects traveling an HOV-pool socio-recreational trip in more than one wave)

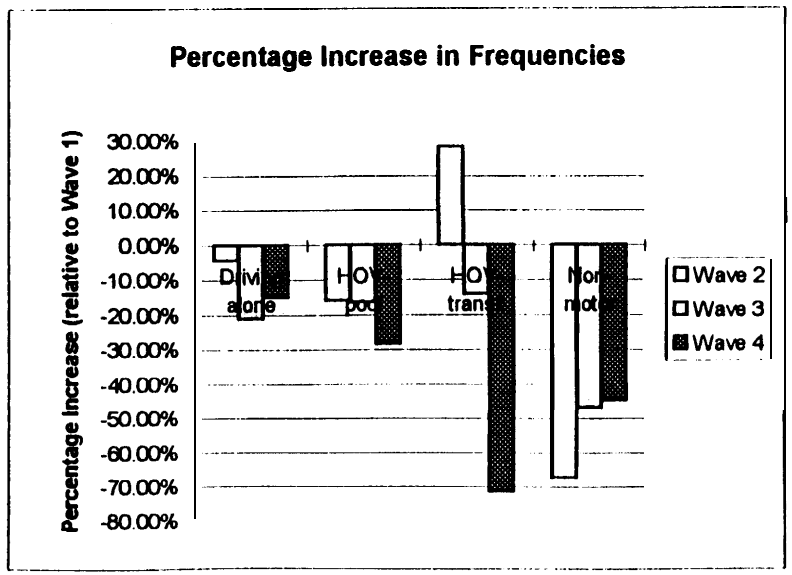
Frequencies of Socio-Recreational Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	373.00	356.00	294.00	317.00
HOV-pool	825.00	694.00	689.00	591.00
HOV-transit	7.00	9.00	6.00	2.00
Non-motor	49.00	16.00	26.00	27.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	-4.56%	-21.18%	-15.01%
HOV-pool	-15.88%	-16.48%	-28.36%
HOV-transit	28.57%	-14.29%	-71.43%
Non-motor	-67.35%	-46.94%	-44.90%



Socio-Recreational Trip Means

(and standard deviation and standard error)
(type 1: subjects traveling more than one HOV-pool socio-recreational trip)

TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	7.18	7.23	6.63	6.97
		2.97	3.21	2.62	3.05
		0.14	0.16	0.14	0.16
	HOV-pool	7.17	6.82	6.41	6.45
		3.08	2.81	2.78	2.96
		0.10	0.10	0.10	0.12
	HOV-transit	10.29	5.67	4.67	7.00
		2.50	2.87	1.63	0.00
		0.94	0.96	0.67	0.00
	Non-motor	7.14	7.52	6.50	8.00
		2.92	2.86	2.50	3.66
		0.39	0.62	0.44	0.69

DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	14.47	13.94	14.83	16.46
		13.44	12.35	17.93	14.75
		0.65	0.62	0.98	0.76
	HOV-pool	21.23	18.89	19.58	19.00
		31.74	26.39	23.47	30.34
		1.04	0.97	0.87	1.20
	HOV-transit	15.43	18.89	64.00	15.00
		7.35	13.12	38.92	1.41
		2.78	4.37	15.89	1.00
	Non-motor	19.77	15.81	13.62	8.18
		18.02	18.78	14.05	5.75
		2.39	4.10	2.48	1.09

DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	4.96	5.02	5.02	6.71
		6.33	5.90	5.64	11.00
		0.31	0.30	0.31	0.57
	HOV-pool	5.39	5.74	6.83	7.29
		7.04	6.74	8.21	11.20
		0.24	0.25	0.30	0.44
	HOV-transit	0.77	4.04	29.50	5.10
		0.46	7.44	23.48	1.70
		0.27	2.48	9.59	1.20
	Non-motor	1.16	1.70	2.04	1.81
		1.01	2.23	2.95	2.73
		0.14	0.49	0.52	0.52

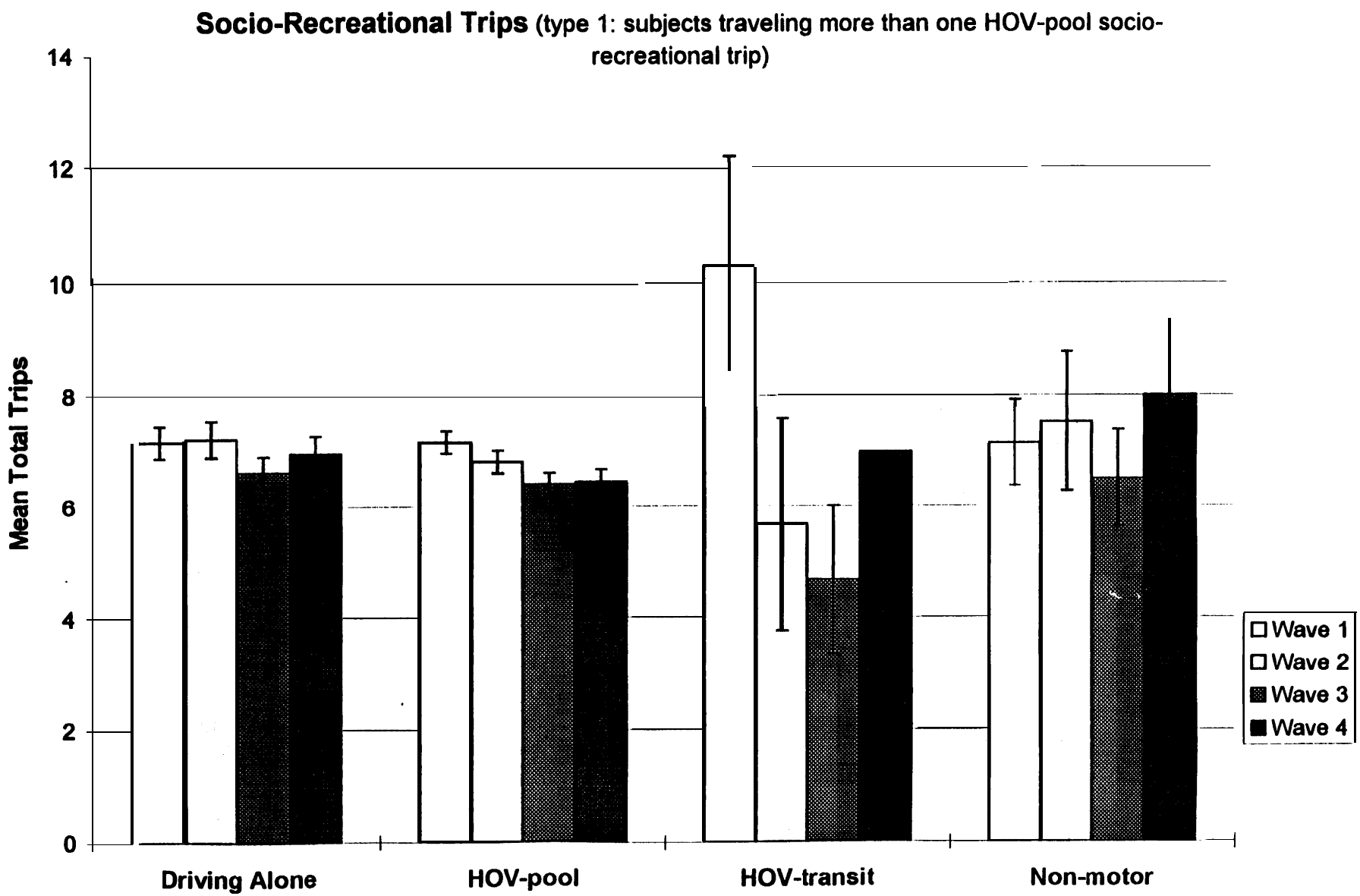
Socio-Recreational Trip Means

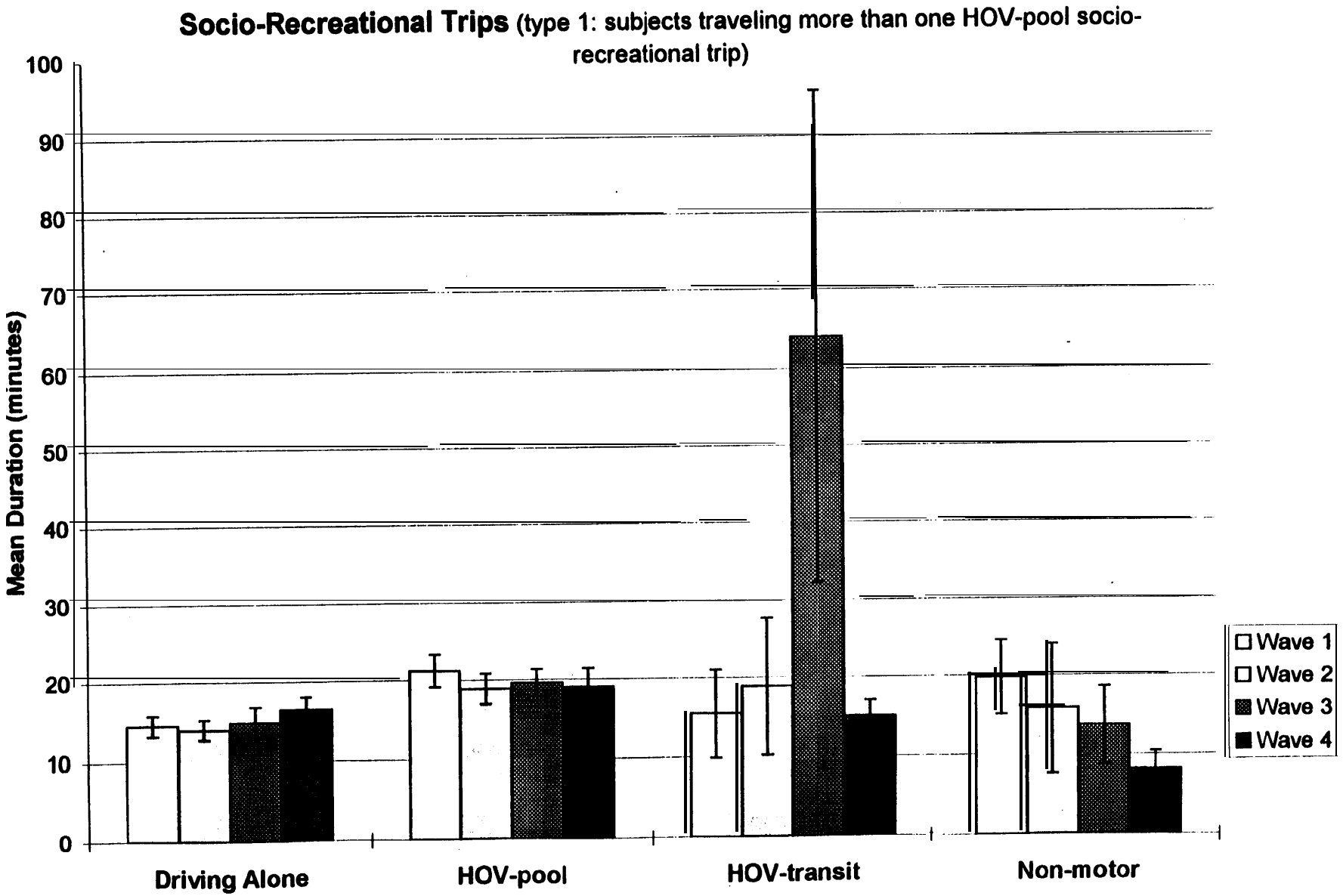
(and standard deviation and standard error)
(type 2: subjects traveling an HOV-pool socio-rec trip in more than one wave)

TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**7.30**	**7.39**	**6.72**	**6.98**
		2.99	3.23	2.63	3.04
		0.15	0.17	0.15	0.17
	HOV-pool	**7.14**	**6.81**	**6.41**	**6.49**
		3.11	2.84	2.71	2.99
		0.11	0.11	0.10	0.12
	HOV-transit	**10.29**	**5.67**	**4.67**	**7.00**
		2.50	2.87	1.63	0.00
		0.94	0.96	0.67	0.00
	Non-motor	**7.47**	**7.44**	**6.69**	**8.22**
		2.88	3.16	2.60	3.53
		0.41	0.79	0.51	0.68

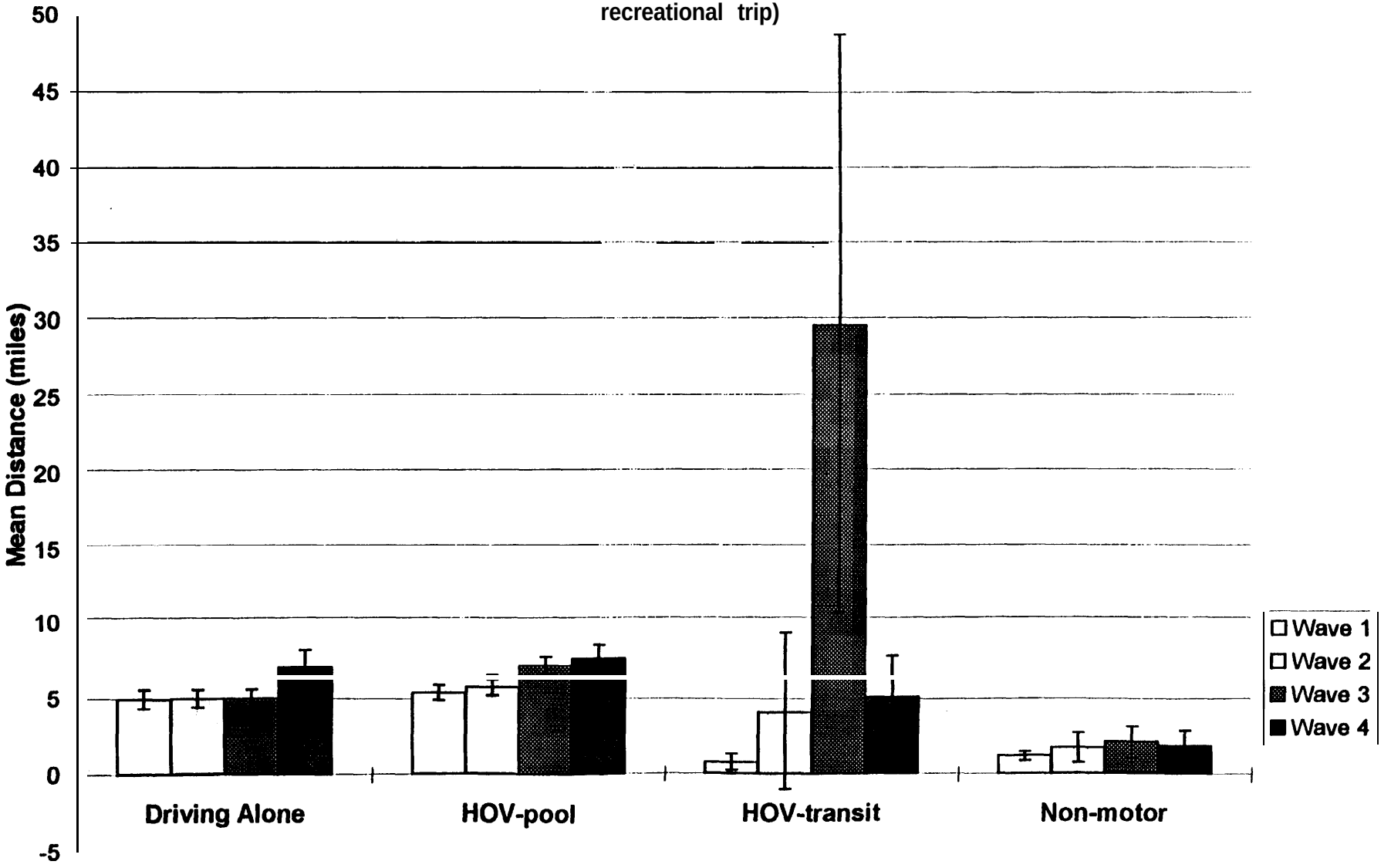
DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**14.14**	**14.01**	**14.99**	**16.33**
		13.03	12.61	18.94	14.72
		0.67	0.67	1.10	0.83
	HOV-pool	**20.48**	**18.88**	**19.43**	**18.80**
		28.44	27.17	23.38	30.75
		0.99	1.04	0.89	1.26
	HOV-transit	**15.43**	**18.89**	**64.00**	**15.00**
		7.35	13.12	38.92	1.41
		2.78	4.37	15.89	1.00
	Non-motor	**18.92**	**17.94**	**14.04**	**7.93**
		17.34	20.95	15.37	5.70
		2.48	5.24	3.01	1.10

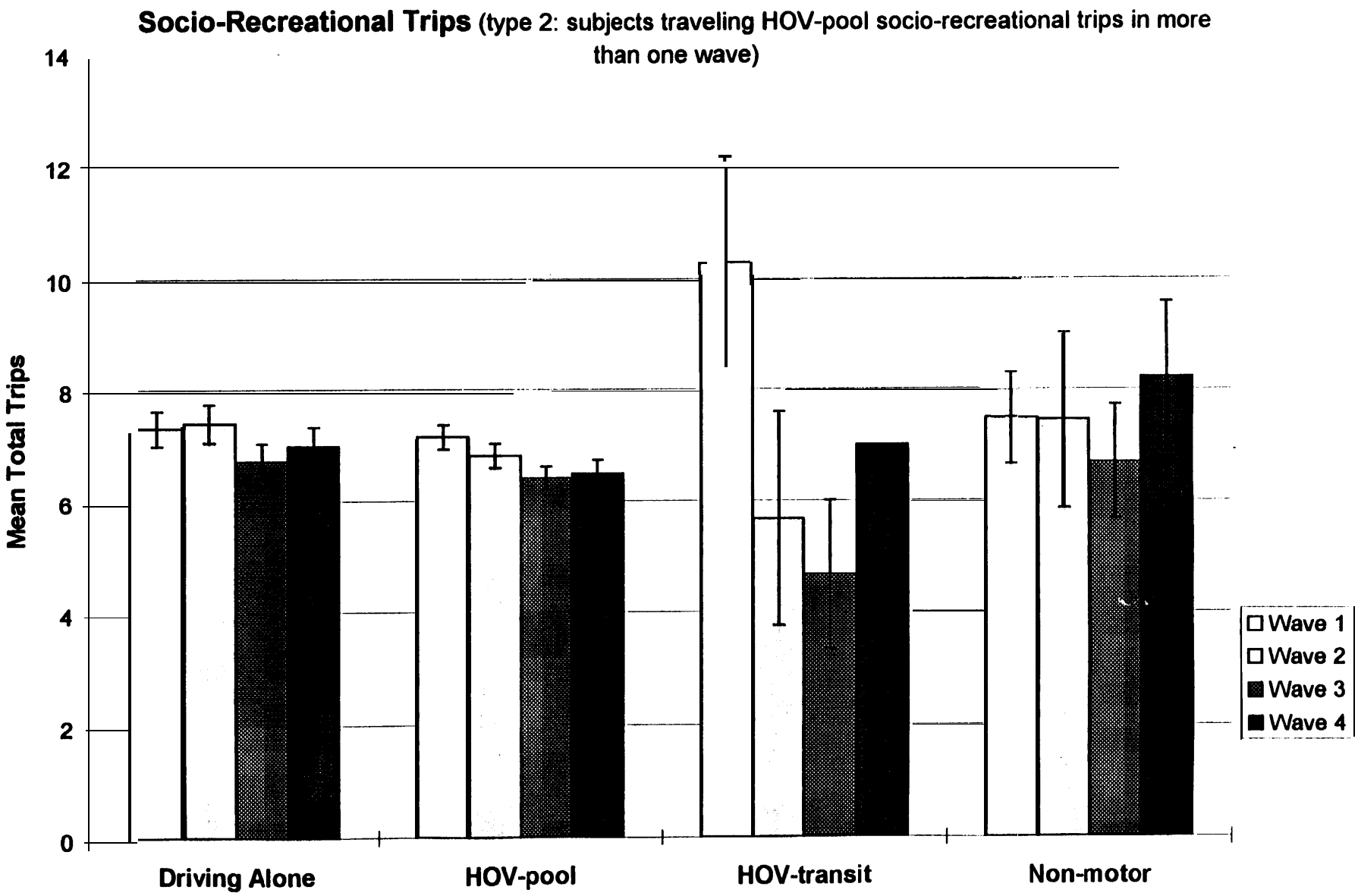
DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**4.89**	**5.02**	**5.18**	**6.54**
		6.19	6.01	5.78	9.00
		0.32	0.32	0.34	0.51
	HOV-pool	**5.42**	**5.68**	**6.68**	**6.96**
		7.22	6.71	7.82	10.12
		0.26	0.26	0.30	0.42
	HOV-transit	**0.77**	**4.04**	**29.50**	**5.10**
		0.46	7.44	23.48	1.70
		0.27	2.48	9.59	1.20
	Non-motor	**1.21**	**2.06**	**2.37**	**1.86**
		1.09	2.46	3.19	2.76
		0.16	0.62	0.63	0.53

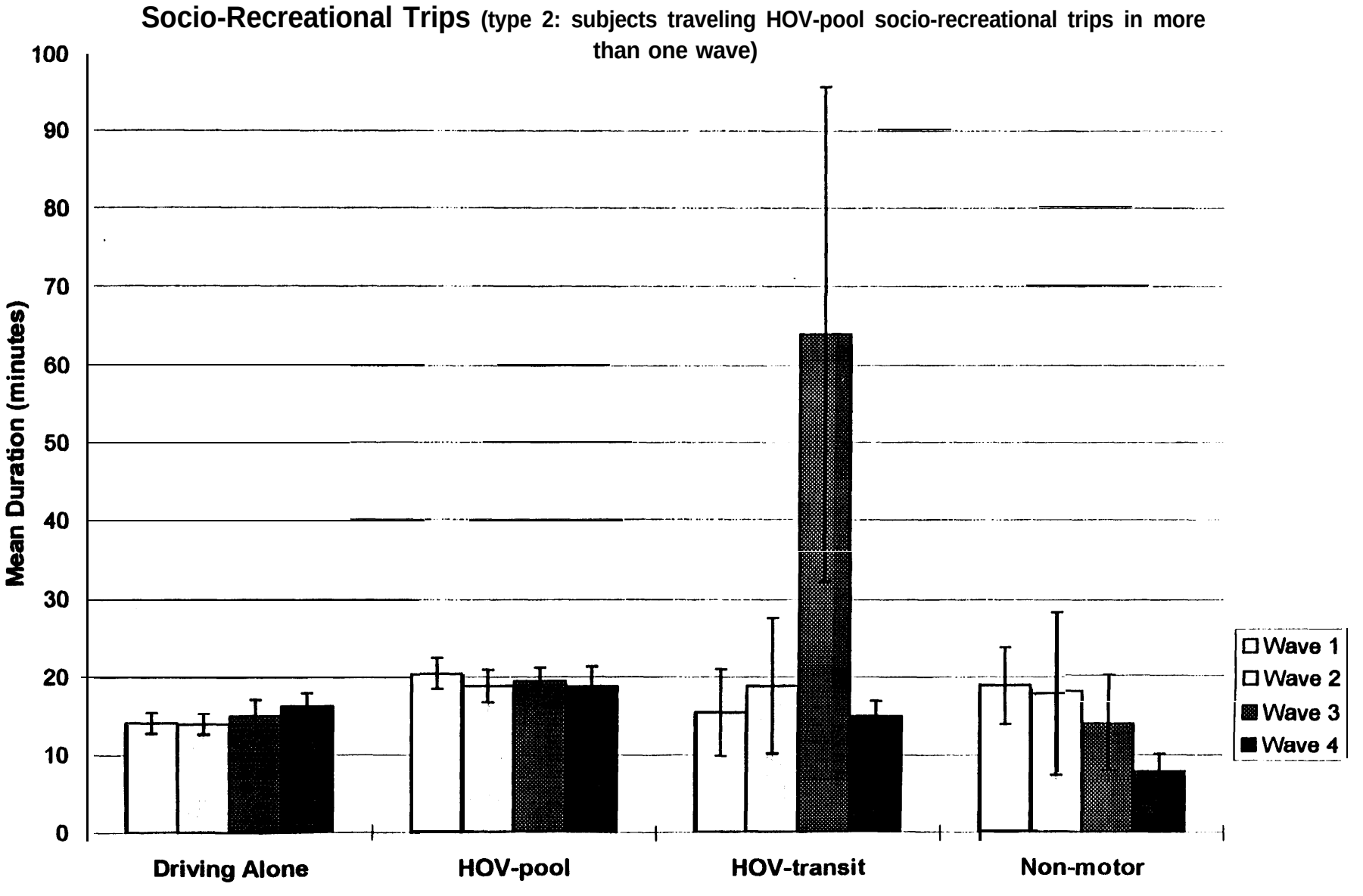

Socio-Recreational Trips (type 1: subjects traveling more than one HOV-pool socio-recreational trip)
Mean Total Trips
14
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

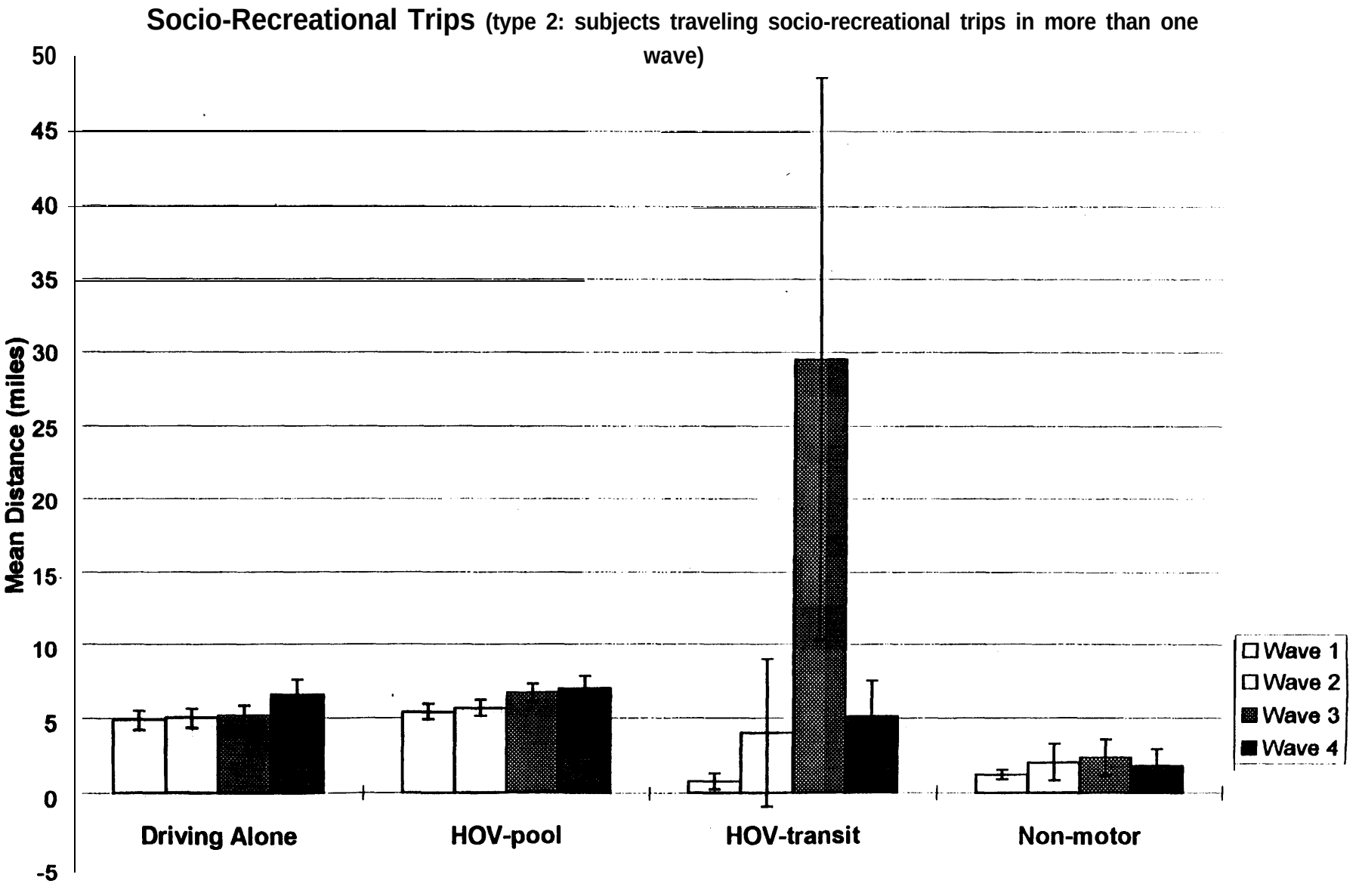

Socio-Recreational Trips (type 1: subjects traveling more than one HOV-pool socio-recreational trip)
Mean Duration (minutes)
100
90
80
70
60
50
40
30
20
10
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

Socio-Recreational Trips (type 1: subjects traveling more than one HOV-pool socio-recreational trip)



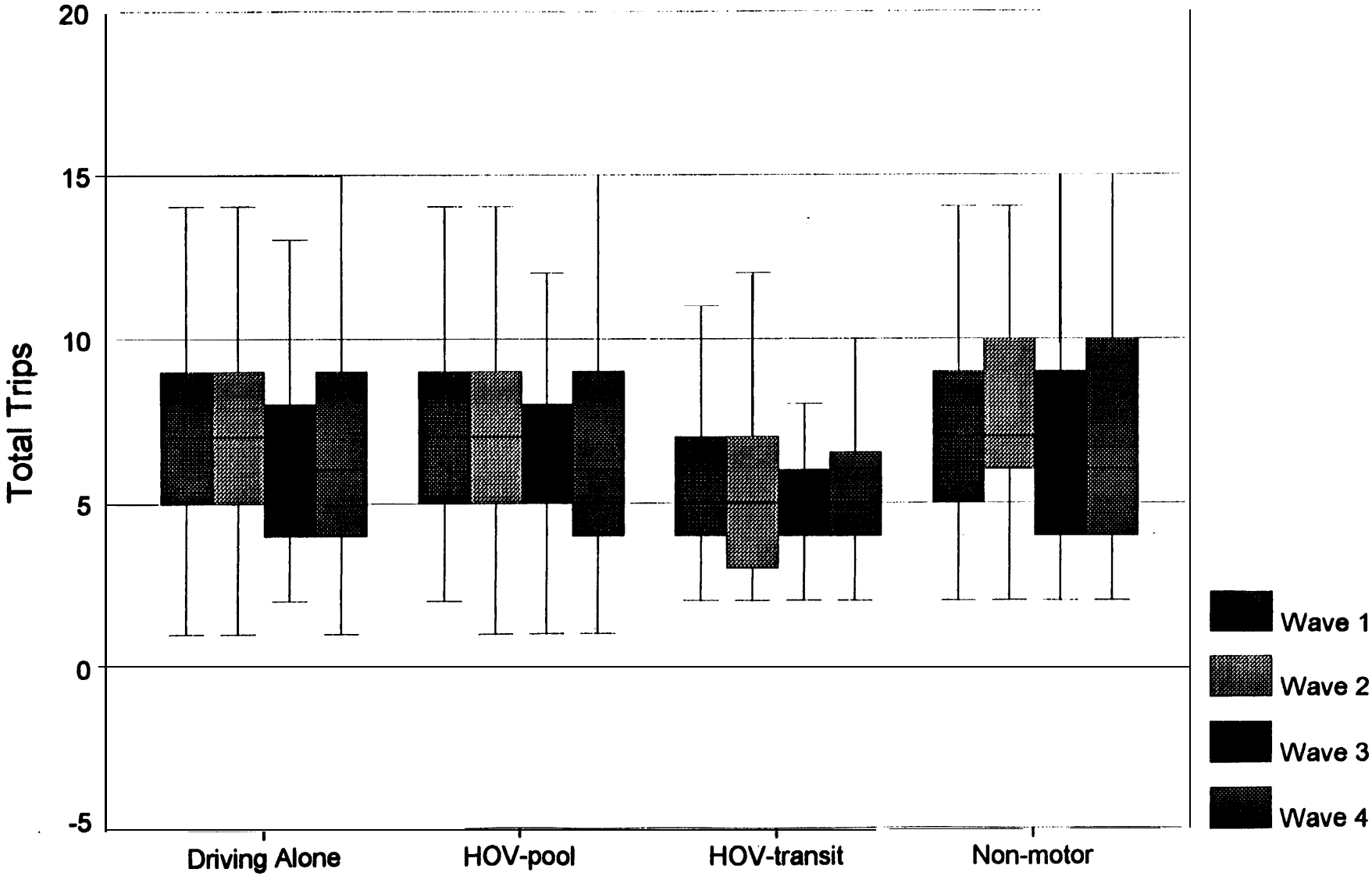

Socio-Recreational Trips (type 2: subjects traveling HOV-pool socio-recreational trips in more than one wave)
Mean Total Trips
14
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Socio-Recreational Trips (type 2: subjects traveling HOV-pool socio-recreational trips in more than one wave)
Mean Duration (minutes)
100
90
80
70
60
50
40
30
20
10
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Socio-Recreational Trips (type 2: subjects traveling socio-recreational trips in more than one wave)
Mean Distance (miles)
50
45
40
35
30
25
20
15
10
5
0
-5
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

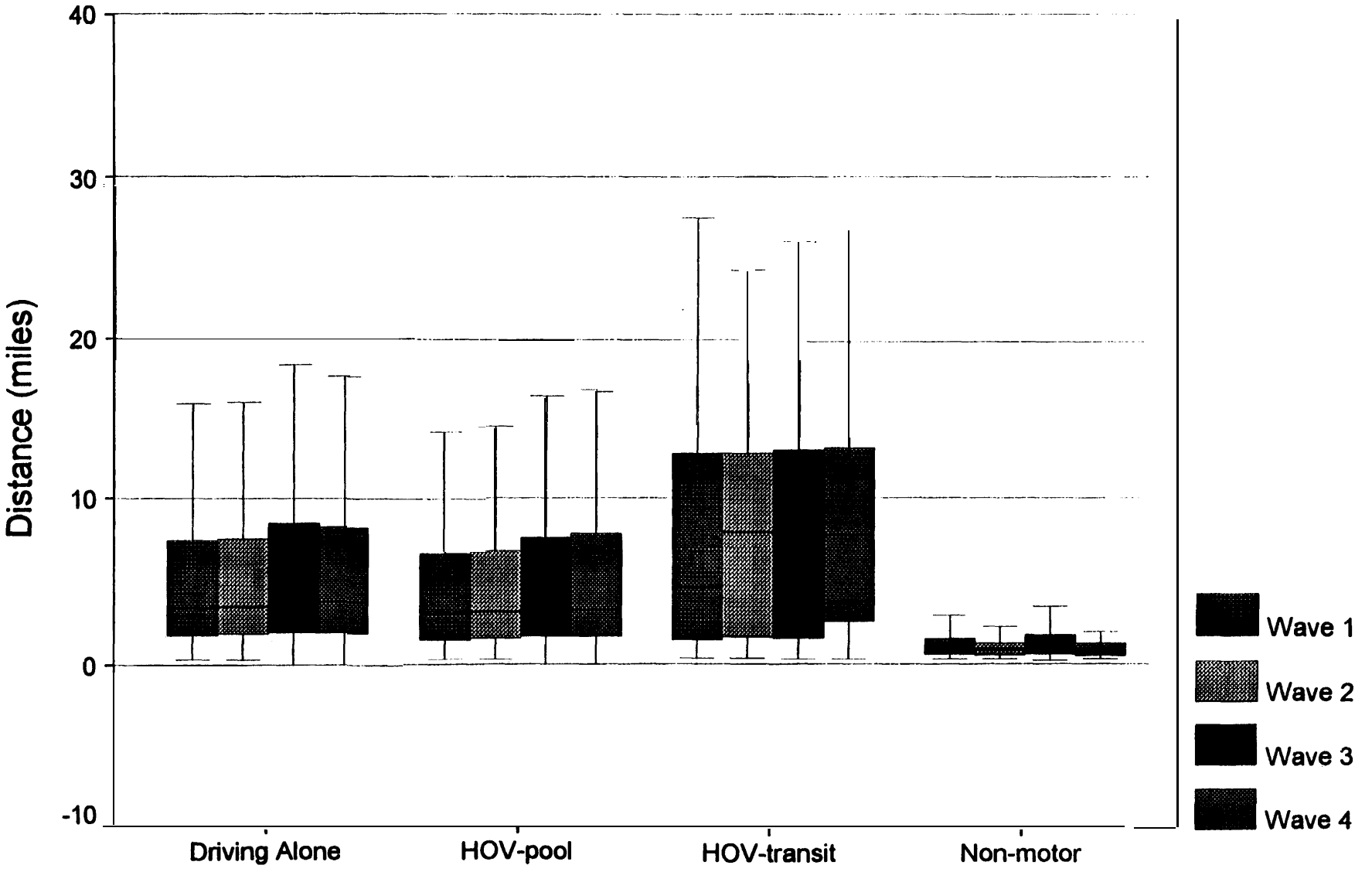
Socio-Recreational Trips

(subjects who carpooled to socio-recreation more than once)



Socio-Recreational Trips

(subjects who carpooled to socio-recreation more than once)

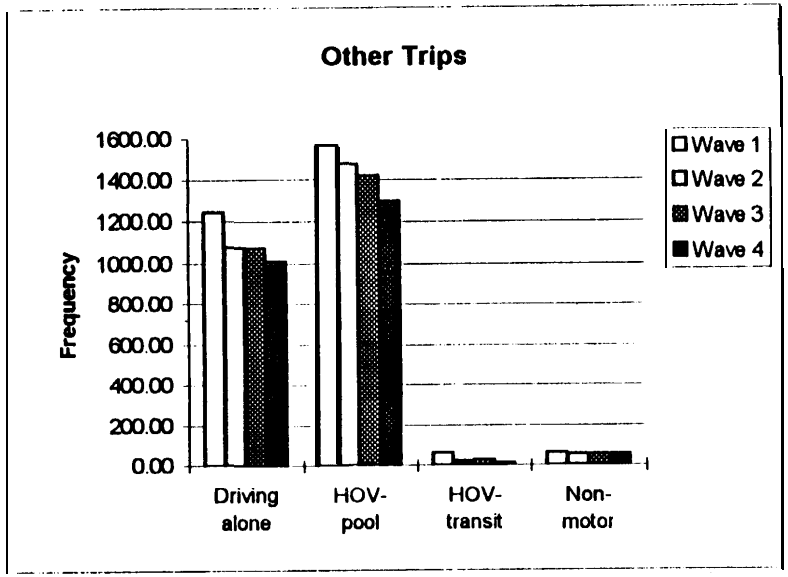


Other Trip Frequencies

(type 1: subjects traveling more than one HOV-pool other trip)

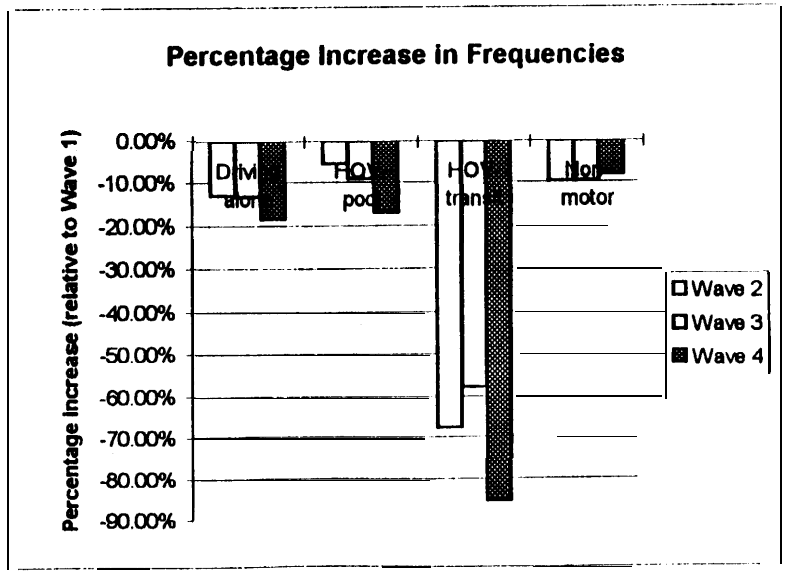
Frequencies of Other Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	1241.00	1078.00	1074.00	1010.00
HOV-pool	1564.00	1476.00	1419.00	1296.00
HOV-transit	62.00	20.00	26.00	9.00
Non-motor	60.00	54.00	54.00	55.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	-13.13%	-13.46%	-18.61%
HOV-pool	-5.63%	-9.27%	-17.14%
HOV-transit	-67.74%	-58.06%	-85.48%
Non-motor	-10.00%	-10.00%	-8.33%

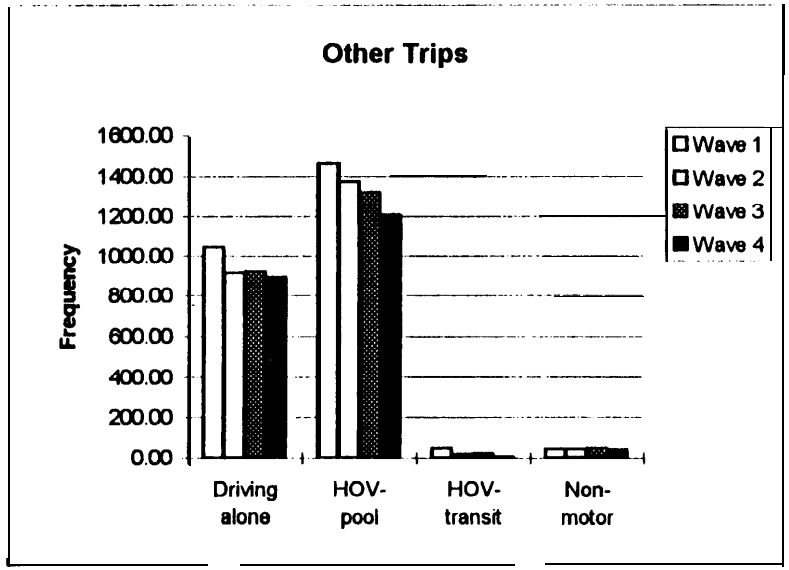


Other Trip Frequencies

(type 2: subjects traveling an HOV-pool other trip in more than one wave)

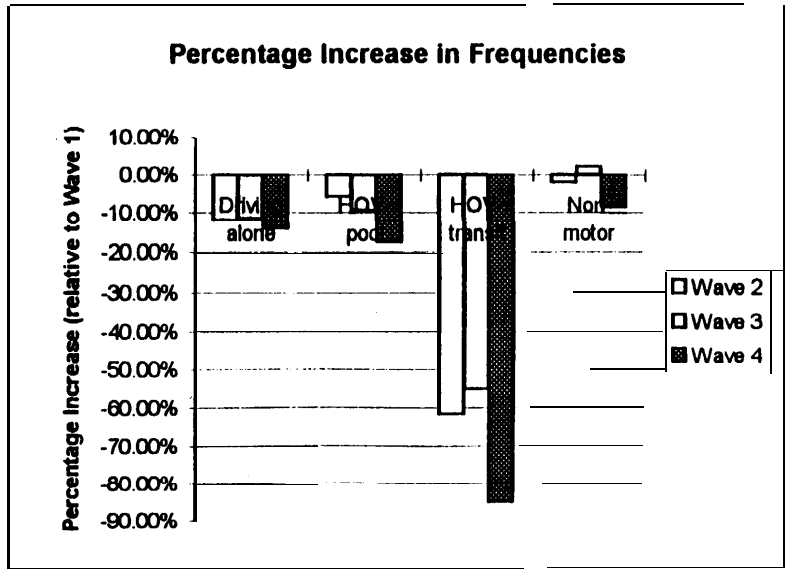
Frequencies of Other Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	1045.00	919.00	923.00	897.00
HOV-pool	1463.00	1375.00	1321.00	1204.00
HOV-transit	47.00	18.00	21.00	7.00
Non-motor	46.00	45.00	47.00	42.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	-12.06%	-11.67%	-14.16%
HOV-pool	-6.02%	-9.71%	-17.70%
HOV-transit	-61.70%	-55.32%	-85.11%
Non-motor	-2.17%	2.17%	-8.70%



Other Trip Means

(and standard deviation and standard error)
(type 1: subjects traveling more than one HOV-pool other trip)

TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**7.77**	**7.69**	**7.40**	**7.38**
		3.16	3.28	3.02	3.01
		0.09	0.10	0.09	0.09
	HOV-pool	**8.11**	**7.55**	**7.31**	**7.42**
		3.30	3.16	3.01	3.11
		0.08	0.08	0.08	0.09
	HOV-transit	**6.60**	**5.80**	**6.00**	**7.00**
		2.84	2.12	1.81	3.84
		0.36	0.47	0.35	1.28
	Non-motor	**7.30**	**8.52**	**7.22**	**6.91**
		3.37	3.14	3.38	3.37
		0.44	0.43	0.46	0.45

DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**14.34**	**13.64**	**14.02**	**13.29**
		12.20	11.60	15.12	11.37
		0.35	0.35	0.46	0.36
	HOV-pool	**14.78**	**15.19**	**15.67**	**14.30**
		15.65	16.57	17.08	14.03
		0.40	0.43	0.45	0.39
	HOV-transit	**33.32**	**33.05**	**27.08**	**30.33**
		23.91	22.35	18.71	16.03
		3.04	5.00	3.67	5.34
	Non-motor	**11.72**	**10.39**	**9.15**	**8.91**
		9.72	9.31	5.69	9.04
		1.25	1.27	0.77	1.22

DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**5.18**	**4.87**	**4.98**	**5.17**
		6.11	5.73	5.64	6.04
		0.17	0.17	0.17	0.19
	HOV-pool	**5.23**	**5.50**	**5.65**	**5.35**
		6.75	7.18	6.69	7.42
		0.17	0.19	0.18	0.21
	HOV-transit	**8.81**	**8.25**	**7.10**	**7.44**
		11.46	6.58	8.41	5.16
		1.49	1.51	1.65	1.72
	Non-motor	**1.24**	**1.11**	**1.39**	**1.07**
		1.18	0.70	1.46	0.92
		0.15	0.10	0.20	0.12

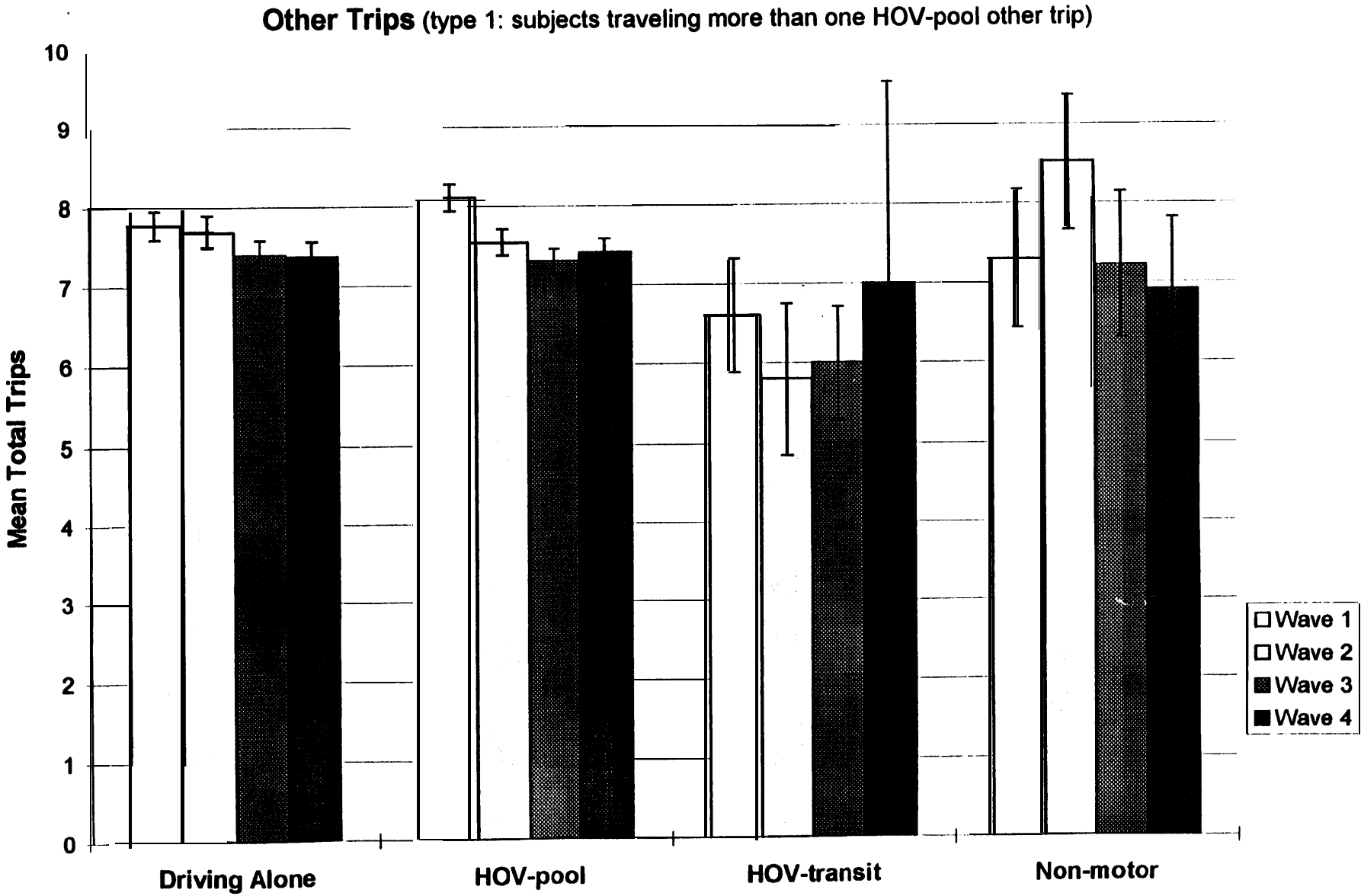
Other Trip Means

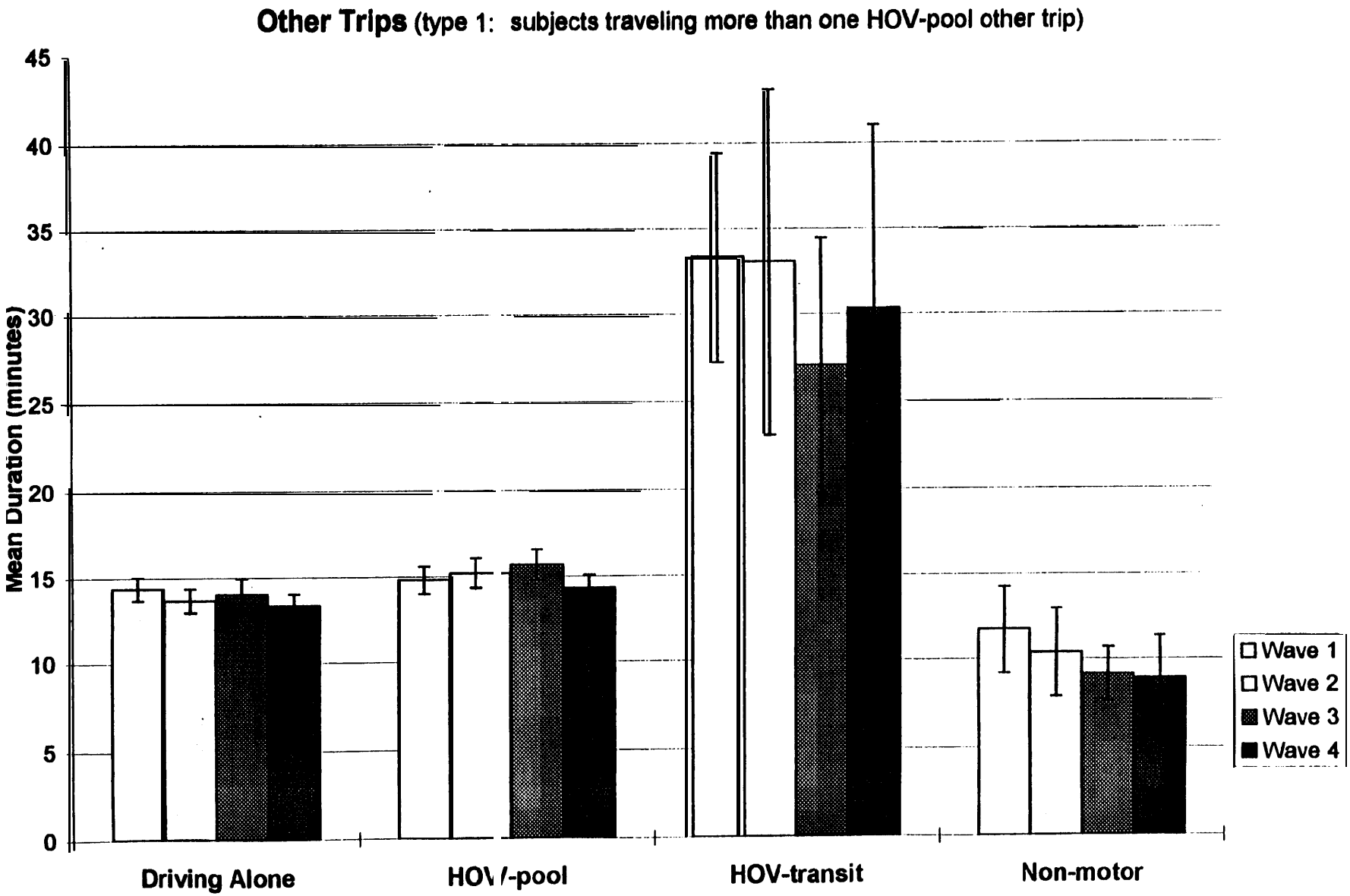
(and standard deviation and standard error)
(type 2: subjects traveling and HOV-pool other trip in more than one wave)

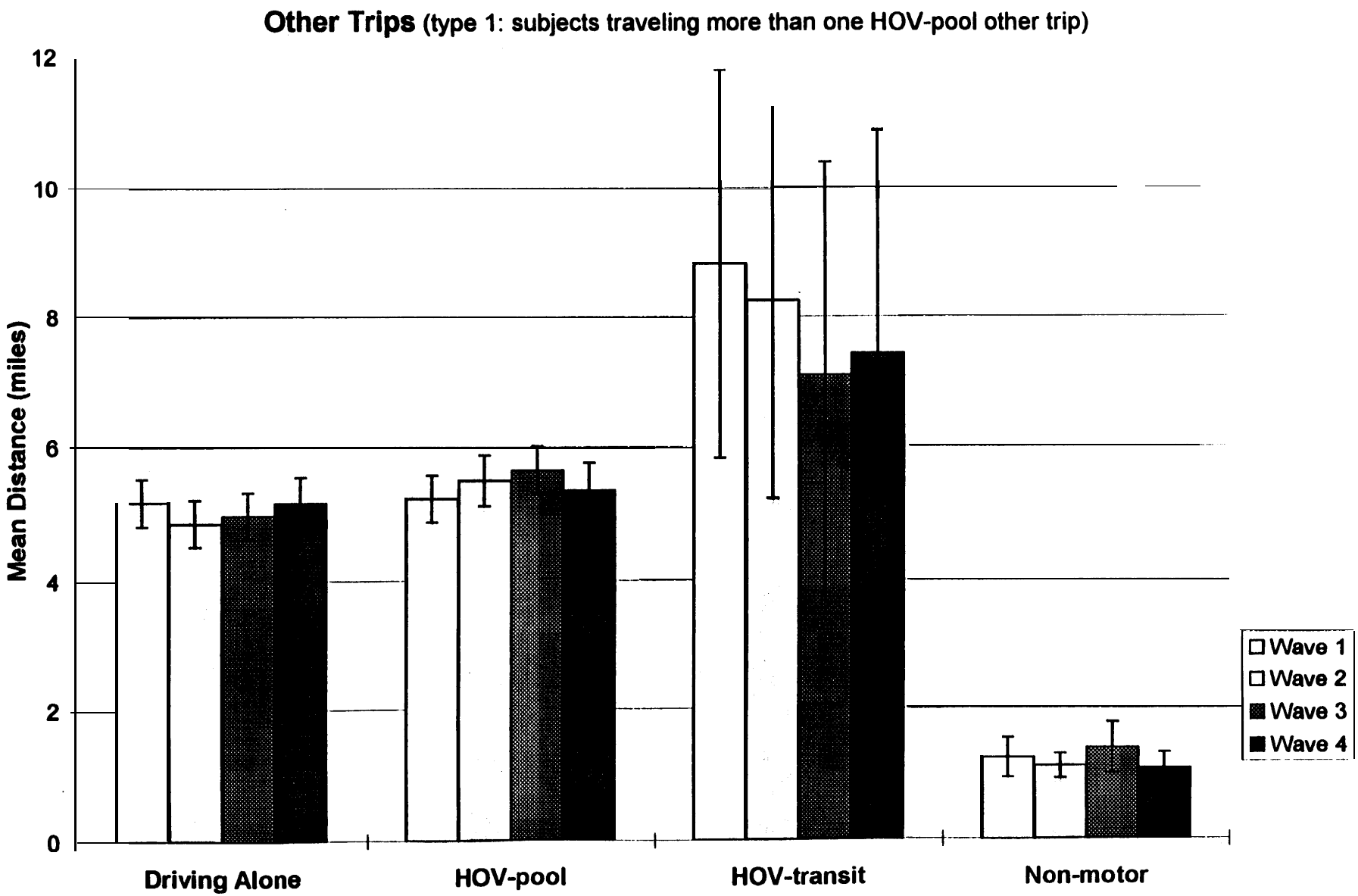
TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**7.92**	**7.84**	**7.46**	**7.54**
		3.19	3.36	2.95	3.00
		0.10	0.11	0.10	0.10
	HOV-pool	**8.19**	**7.58**	**7.33**	**7.52**
		3.34	3.20	3.03	3.14
		0.09	0.09	0.08	0.09
	HOV-transit	**6.72**	**5.61**	**6.00**	**8.00**
		2.48	1.97	1.90	3.70
		0.36	0.46	0.41	1.40
	Non-motor	**7.28**	**9.07**	**6.96**	**7.02**
		3.07	3.13	3.18	3.55
		0.45	0.47	0.46	0.55

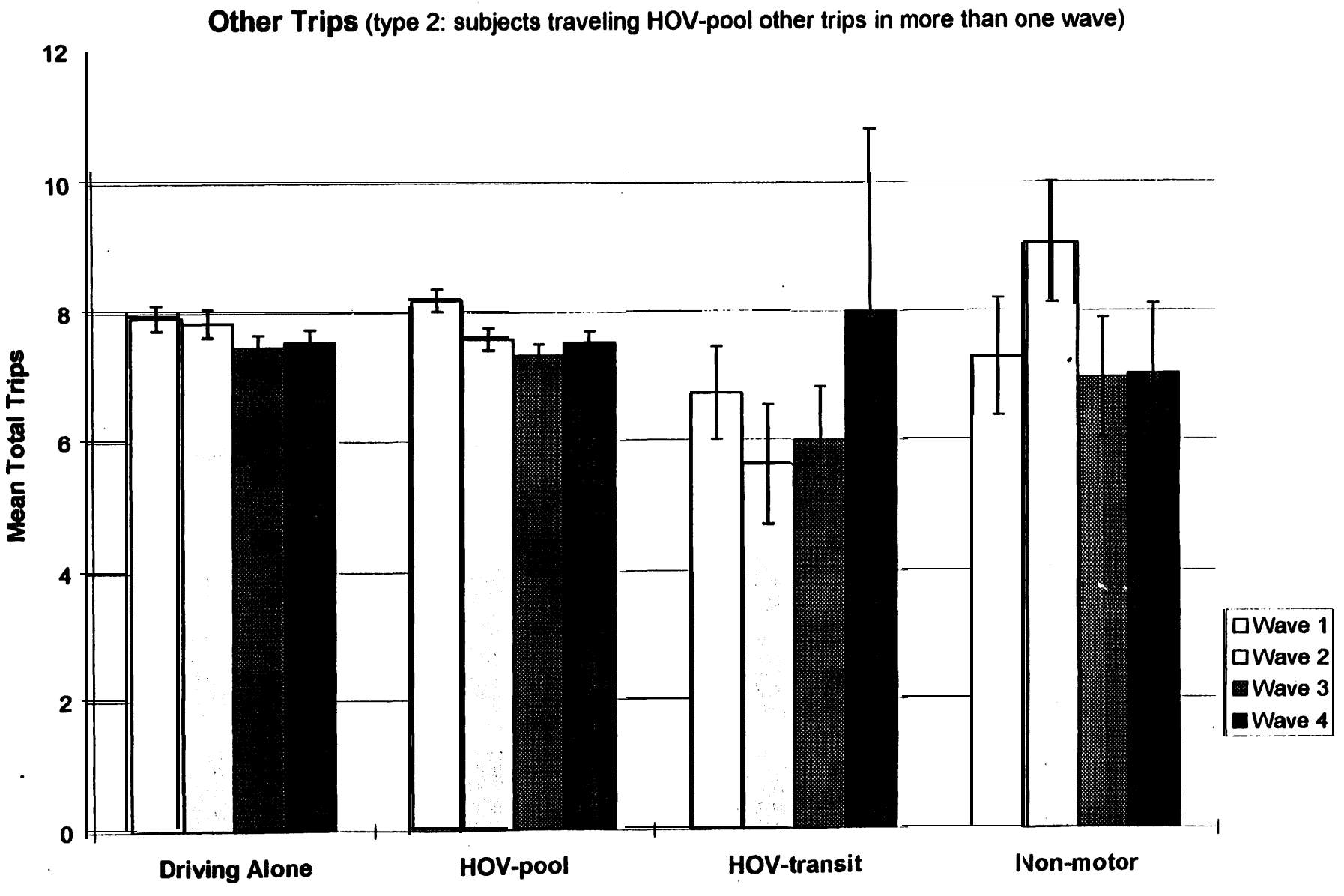
DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**14.38**	**13.52**	**13.81**	**13.16**
		12.37	11.49	15.64	11.33
		0.38	0.38	0.51	0.38
	HOV-pool	**14.48**	**14.98**	**15.14**	**14.09**
		15.59	16.61	16.77	13.74
		0.41	0.45	0.46	0.40
	HOV-transit	**34.21**	**31.67**	**29.00**	**24.00**
		25.73	22.97	20.16	10.65
		3.75	5.41	4.40	4.03
	Non-motor	**11.67**	**10.02**	**9.26**	**8.40**
		8.41	9.95	5.74	9.63
		1.24	1.48	0.84	1.49

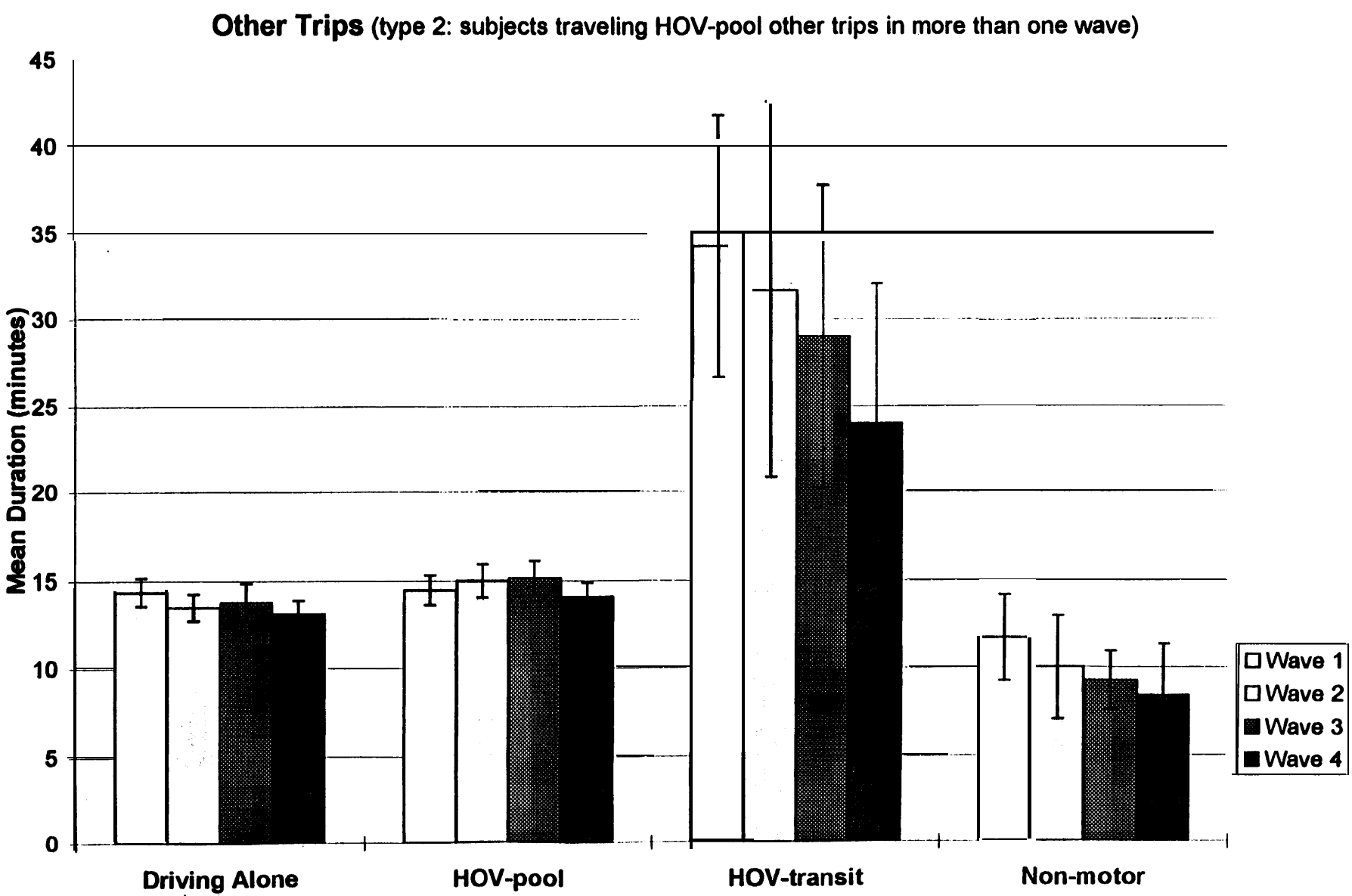
DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**5.24**	**4.93**	**4.92**	**5.11**
		6.31	5.87	5.61	6.04
		0.20	0.19	0.18	0.20
	HOV-pool	**5.05**	**5.32**	**5.40**	**5.39**
		6.45	6.68	6.31	7.58
		0.17	0.18	0.17	0.22
	HOV-transit	**9.75**	**7.57**	**8.25**	**7.90**
		12.54	6.05	9.00	5.60
		1.87	1.43	1.96	2.12
	Non-motor	**1.28**	**1.12**	**1.22**	**1.03**
		1.25	0.74	0.91	0.71
		0.18	0.11	0.13	0.11

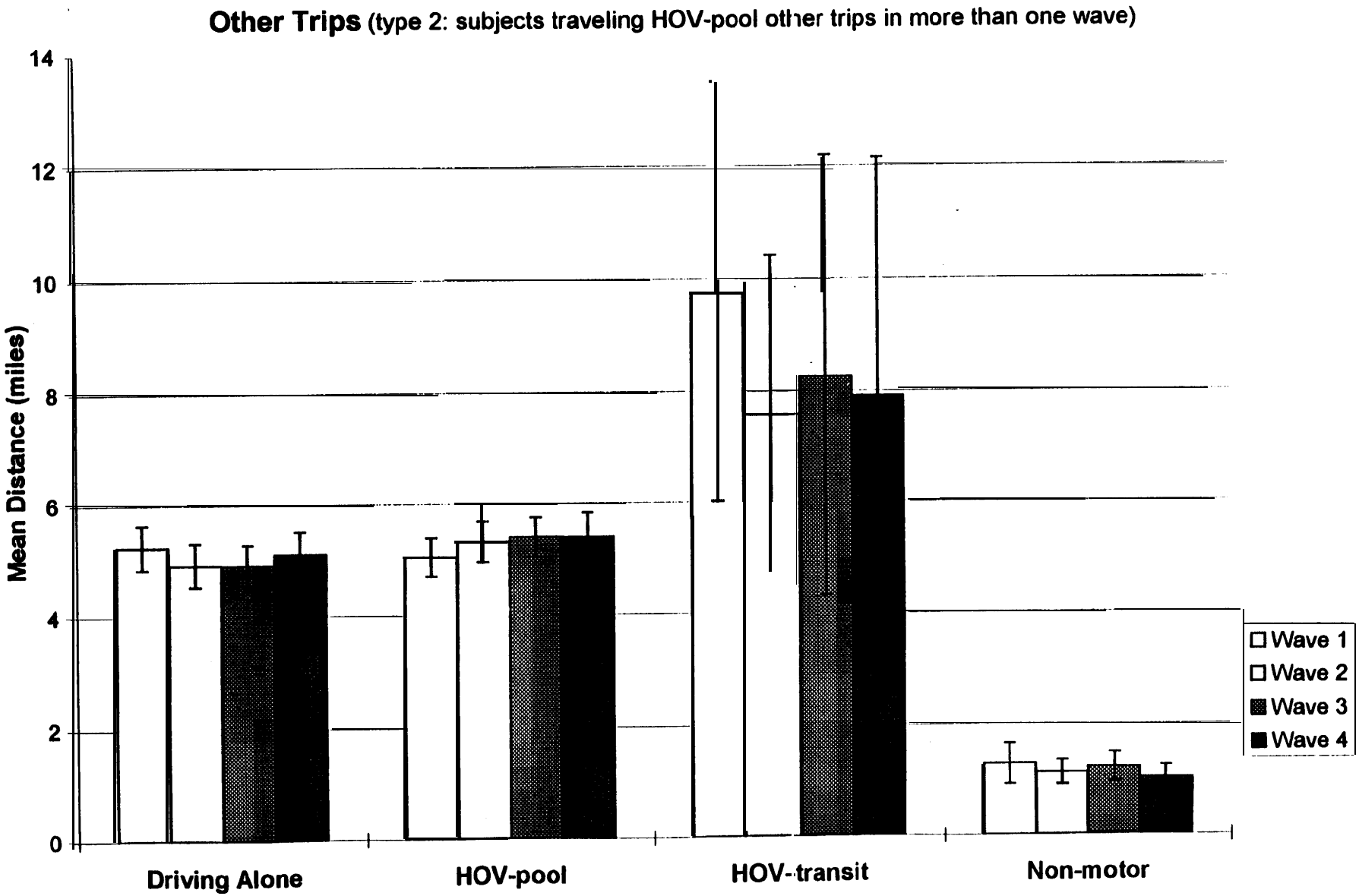

Other Trips (type 1: subjects traveling more than one HOV-pool other trip)
Mean Total Trips
10
9
8
7
6
5
4
3
2
1
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Other Trips (type 1: subjects traveling more than one HOV-pool other trip)
Mean Duration (minutes)
45
40
35
30
25
20
15
10
5
0
Driving Alone
HOV /-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Other Trips (type 1: subjects traveling more than one HOV-pool other trip)
Mean Distance (miles)
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

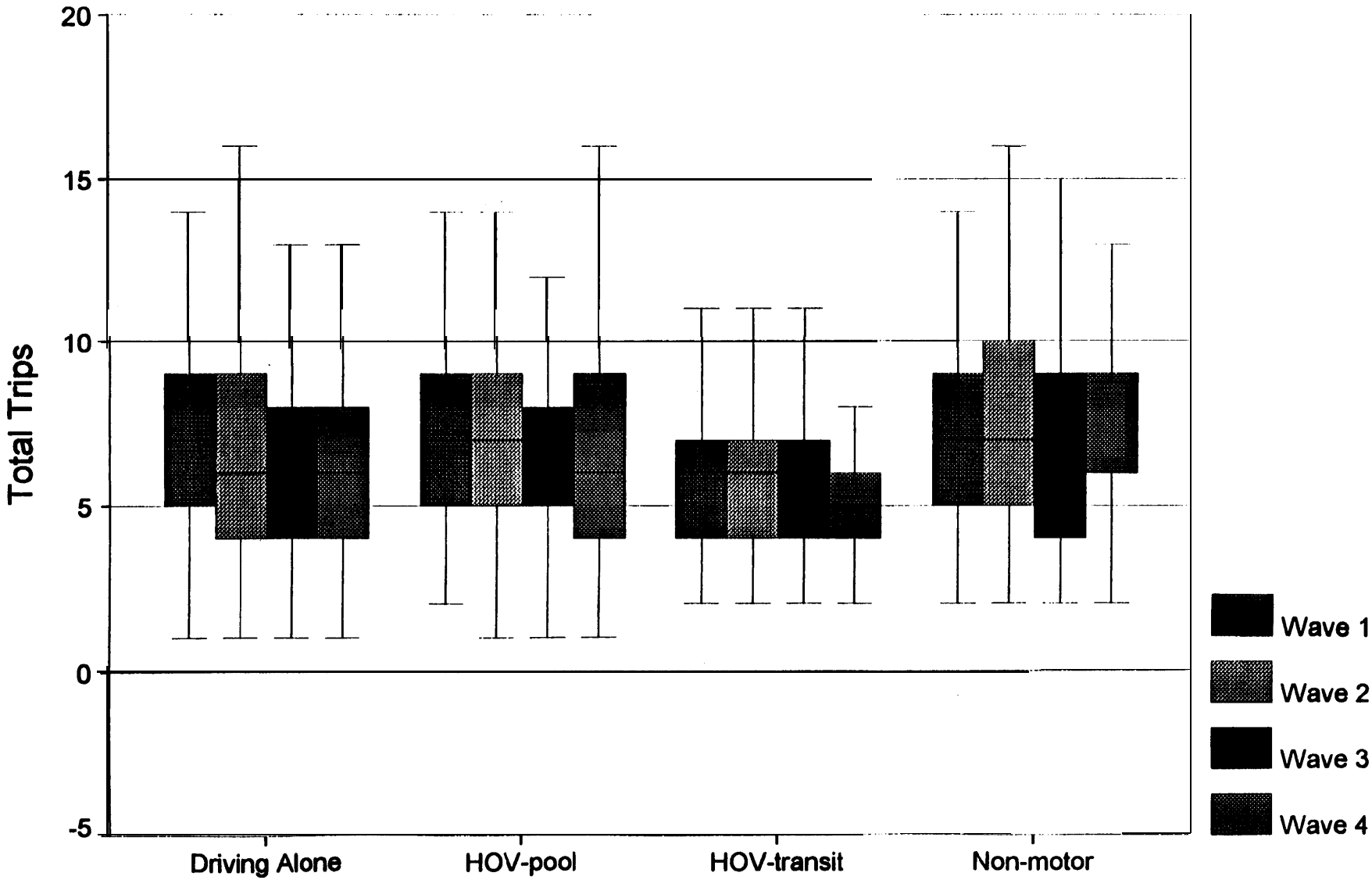

Other Trips (type 2: subjects traveling HOV-pool other trips in more than one wave)
Mean Total Trips
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Other Trips (type 2: subjects traveling HOV-pool other trips in more than one wave)
Mean Duration (minutes)
45
40
35
30
25
20
15
10
5
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Other Trips (type 2: subjects traveling HOV-pool other trips in more than one wave)
Mean Distance (miles)
14
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

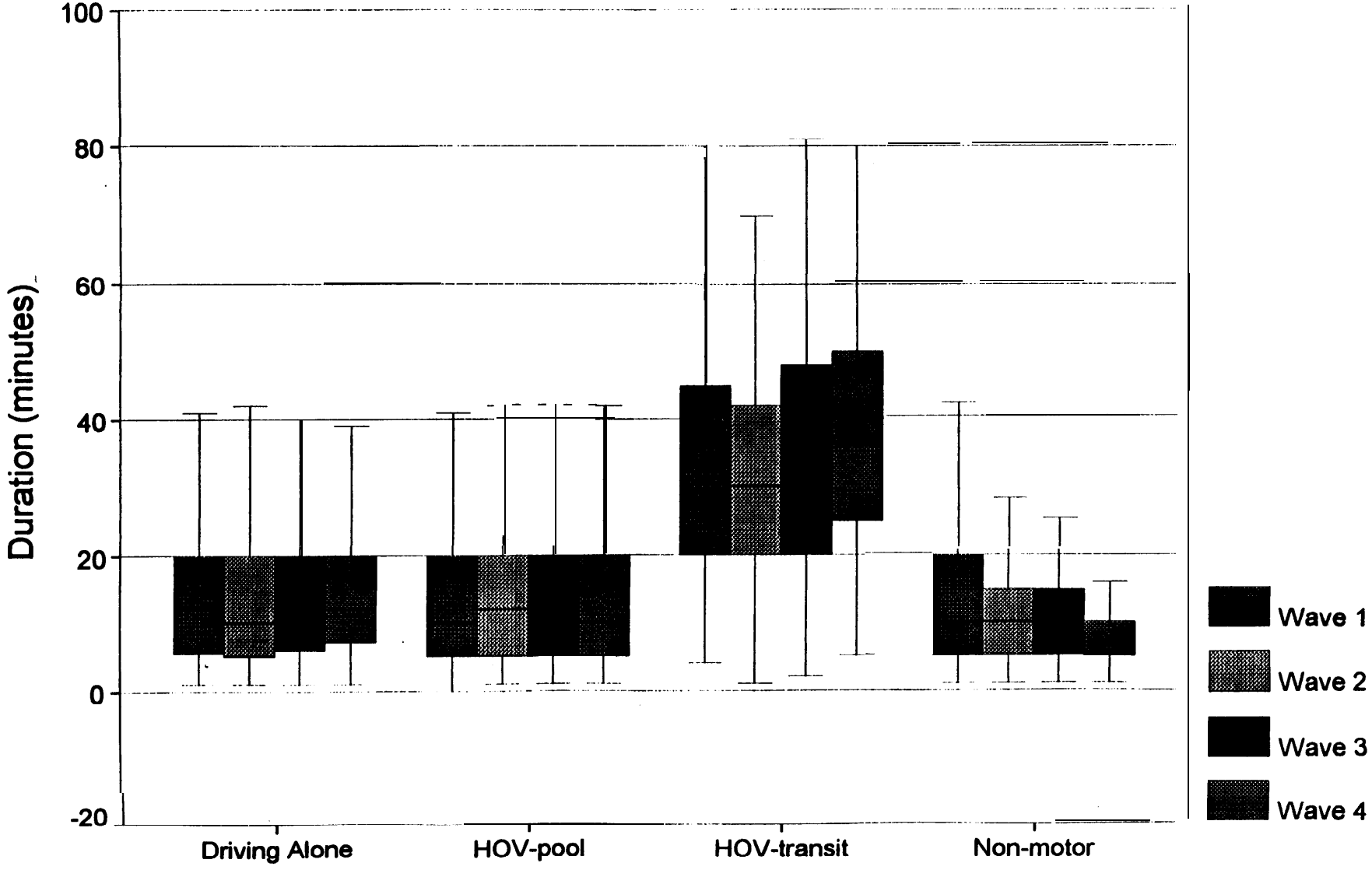
Other Trips

(subjects who carpooled to other non-home places more than once)



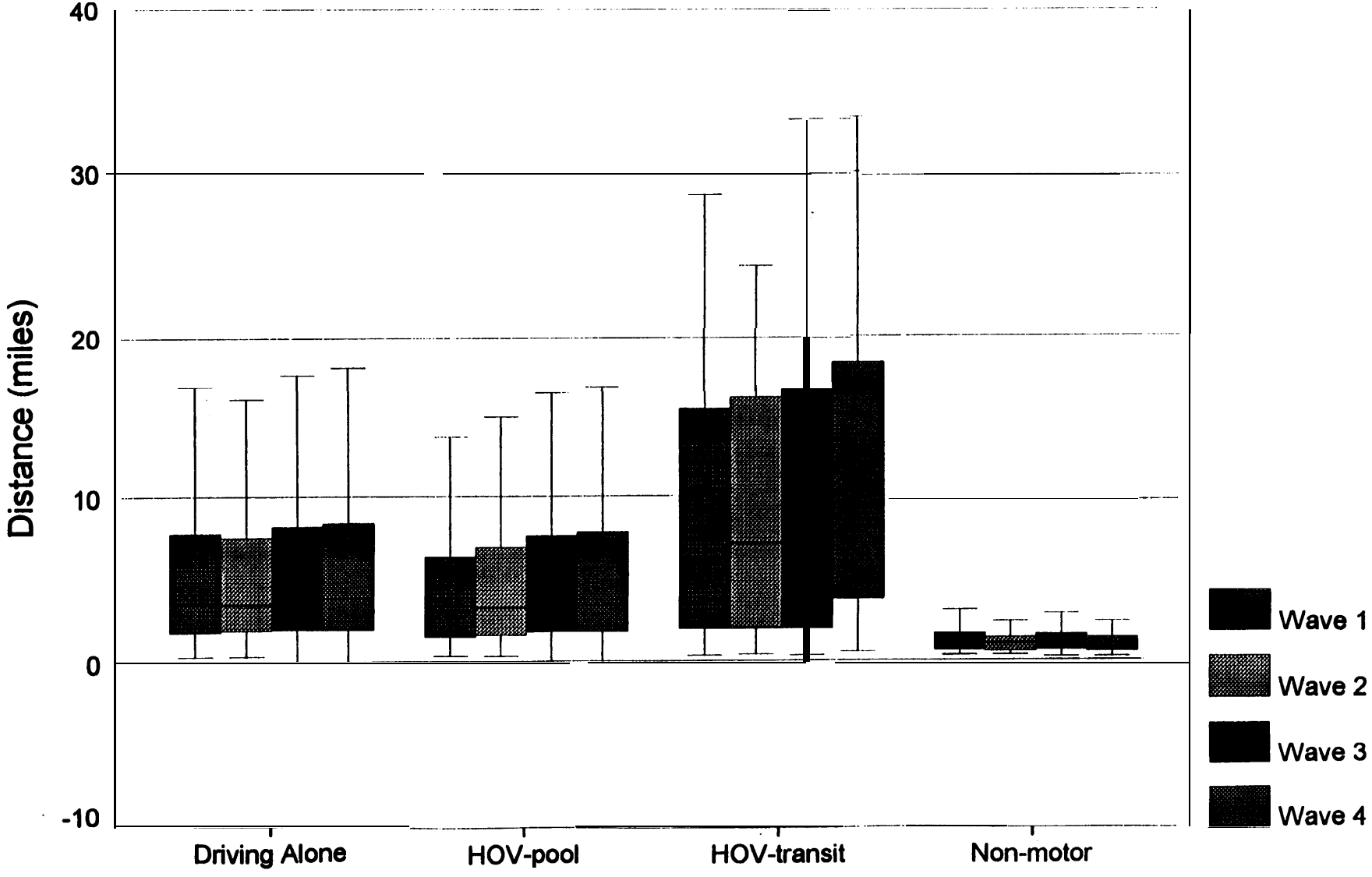
Other Trips

(subjects who carpooled to other non-home places more than once)



Other Trips

(subjects who carpooled to other non-home places more than once)

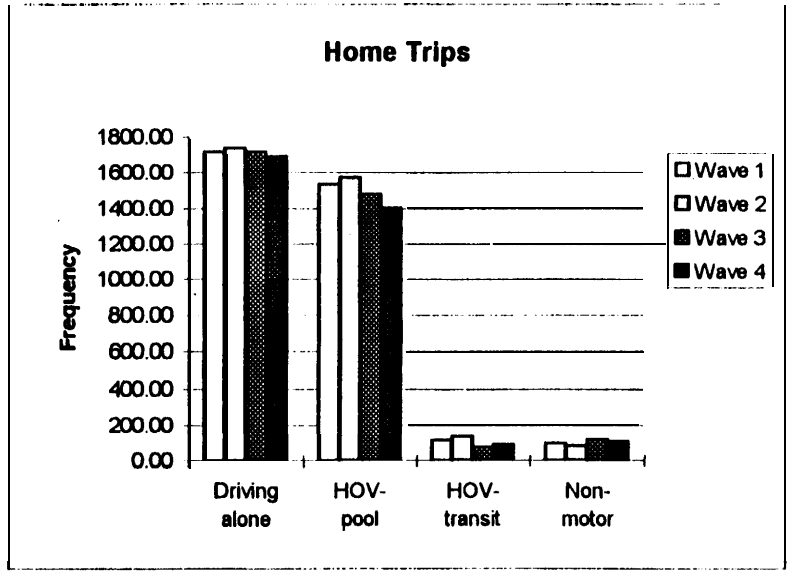


Home Trip Frequencies

(type 1: subjects traveling more than one HOV-pool home trip)

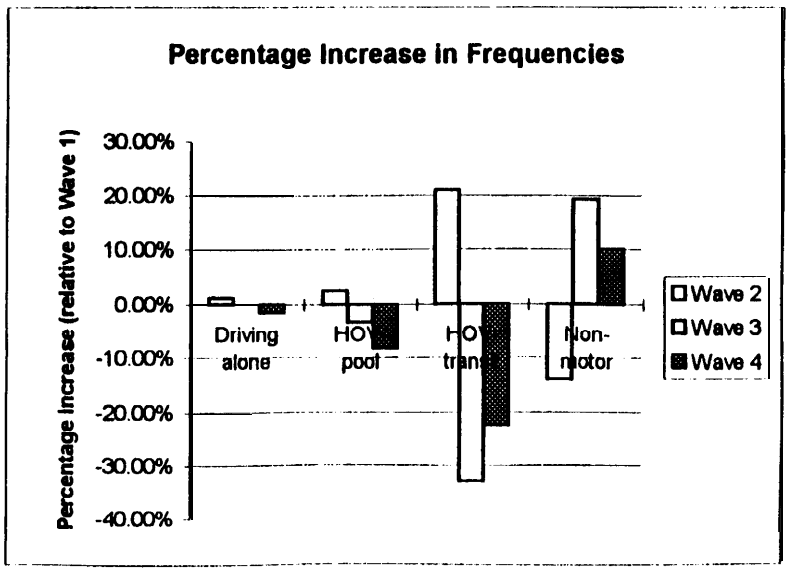
Frequencies of Home Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	1718.00	1738.00	1718.00	1690.00
HOV-pool	1534.00	1572.00	1481.00	1405.00
HOV-transit	115.00	139.00	77.00	89.00
Non-motor	99.00	85.00	118.00	109.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	1.16%	0.00%	-1.63%
HOV-pool	2.48%	-3.46%	-8.41%
HOV-transit	20.87%	-33.04%	-22.61%
Non-motor	-14.14%	19.19%	10.10%

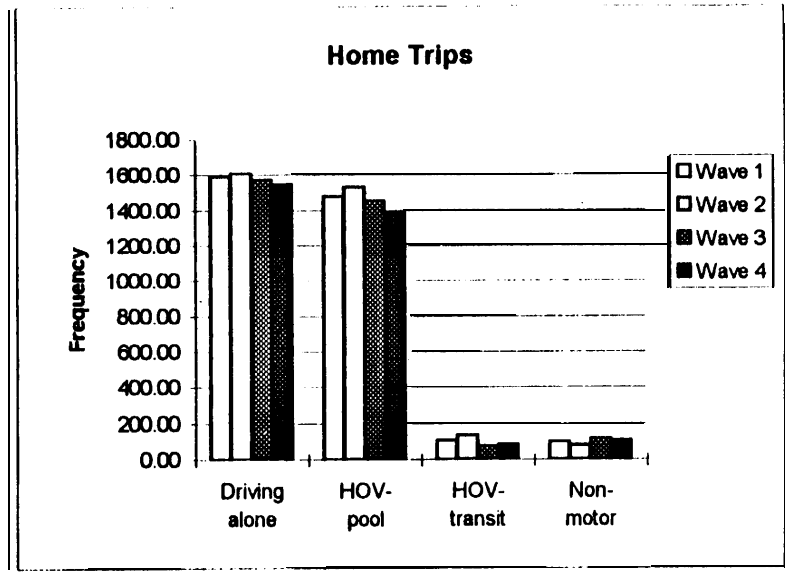


Home Trip Frequencies

(type 2: subjects traveling an HOV-pool home trip in more than one wave)

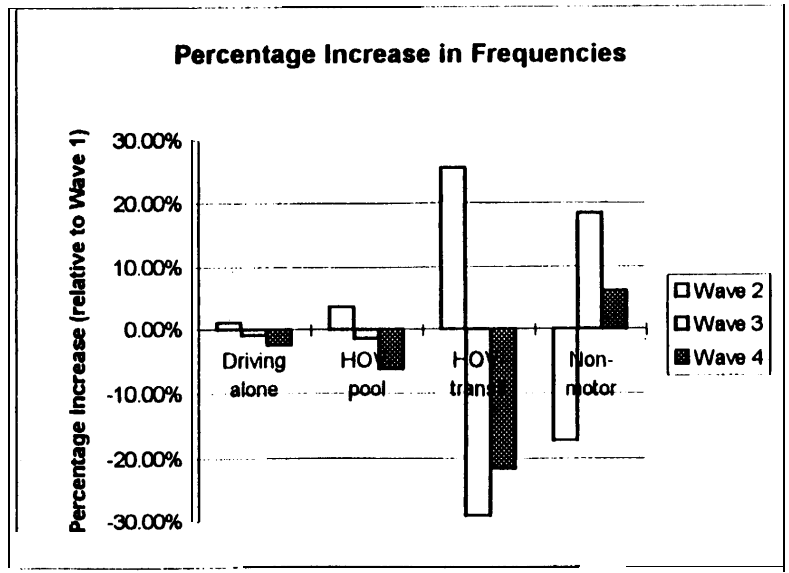
Frequencies of Home Trips, by mode and wave

	Wave 1	Wave 2	Wave 3	Wave 4
Driving alone	1590.00	1607.00	1573.00	1548.00
HOV-pool	1477.00	1531.00	1453.00	1383.00
HOV-transit	106.00	133.00	75.00	83.00
Non-motor	98.00	81.00	116.00	104.00



Percentage Increase (relative to Wave 1)

	Wave 2	Wave 3	Wave 4
Driving alone	1.07%	-1.07%	-2.64%
HOV-pool	3.66%	-1.62%	-6.36%
HOV-transit	25.47%	-29.25%	-21.70%
Non-motor	-17.35%	18.37%	6.12%



Home Trip Means

(and standard deviation and standard error)
(type 1: subjects traveling more than one HOV-pool home trip)

TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**6.35**	**6.24**	**5.82**	**5.87**
		3.16	3.08	2.96	3.00
		0.08	0.07	0.07	0.07
	HOV-pool	**6.70**	**6.43**	**6.28**	**6.33**
		3.10	3.07	2.96	3.14
		0.08	0.08	0.08	0.08
	HOV-transit	**4.66**	**5.12**	**4.97**	**4.80**
		2.42	2.47	2.28	1.76
		0.23	0.21	0.26	0.19
	Non-motor	**6.13**	**6.95**	**6.39**	**5.58**
		2.91	3.10	3.00	2.76
		0.29	0.34	0.28	0.26

DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**16.85**	**17.18**	**18.56**	**17.73**
		15.34	16.12	16.75	14.92
		0.37	0.39	0.40	0.36
	HOV-pool	**16.46**	**16.88**	**17.72**	**17.16**
		18.50	19.32	17.98	15.36
		0.47	0.49	0.47	0.41
	HOV-transit	**36.08**	**37.55**	**37.79**	**37.18**
		20.56	20.71	24.90	17.77
		1.92	1.78	2.84	1.88
	Non-motor	**14.18**	**12.42**	**11.68**	**10.54**
		13.27	9.23	10.16	8.00
		1.33	1.01	0.94	0.77

DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**6.50**	**6.62**	**7.27**	**6.96**
		7.55	7.59	8.12	7.99
		0.18	0.18	0.20	0.19
	HOV-pool	**5.72**	**5.82**	**6.87**	**6.92**
		6.77	6.97	8.73	10.65
		0.17	0.18	0.23	0.28
	HOV-transit	**8.59**	**9.60**	**9.68**	**11.81**
		6.42	7.14	8.59	8.52
		0.61	0.62	0.98	0.90
	Non-motor	**2.25**	**1.73**	**1.36**	**2.11**
		3.51	2.07	1.32	3.16
		0.35	0.22	0.12	0.30

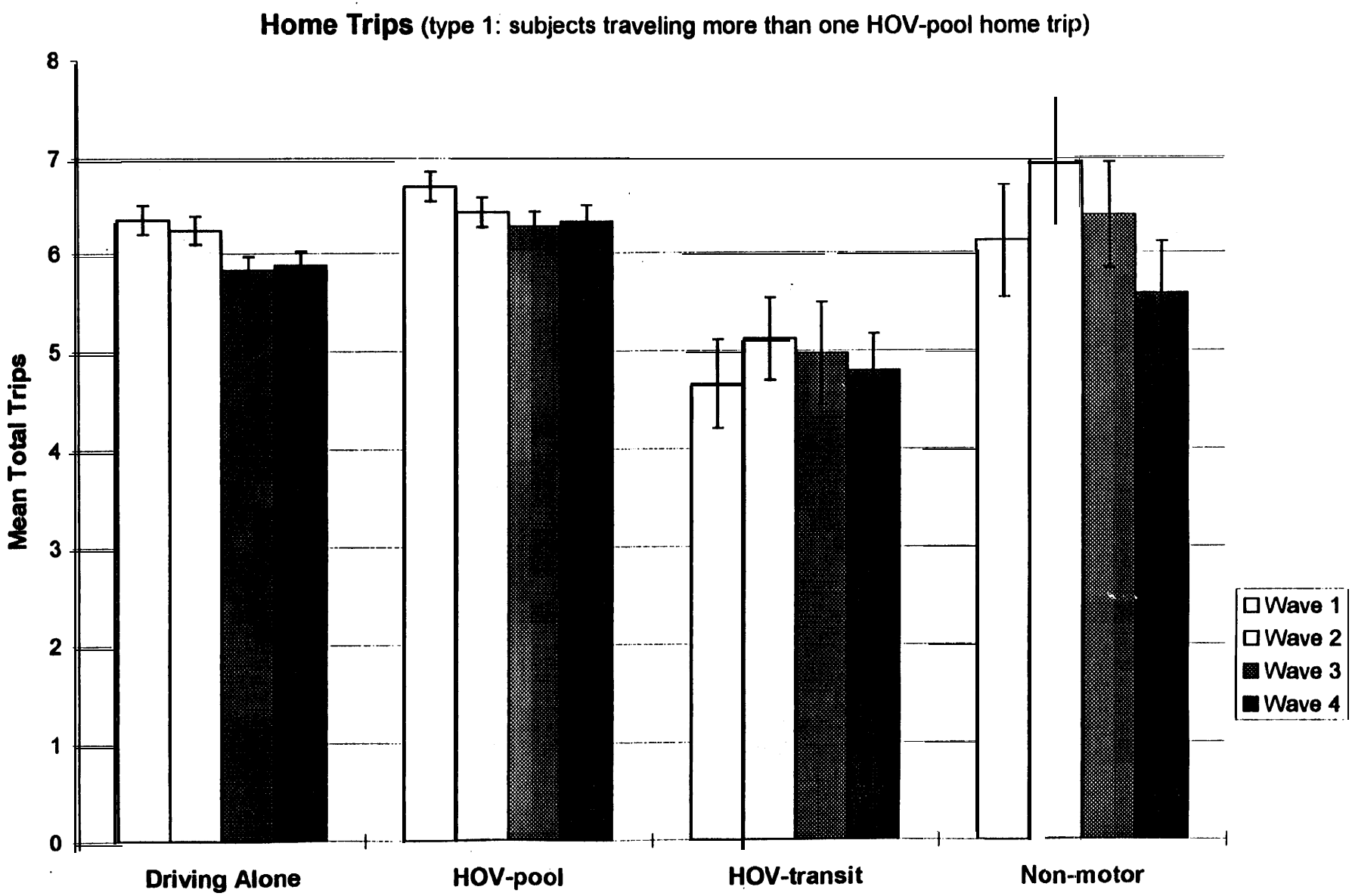
Home Trip Means

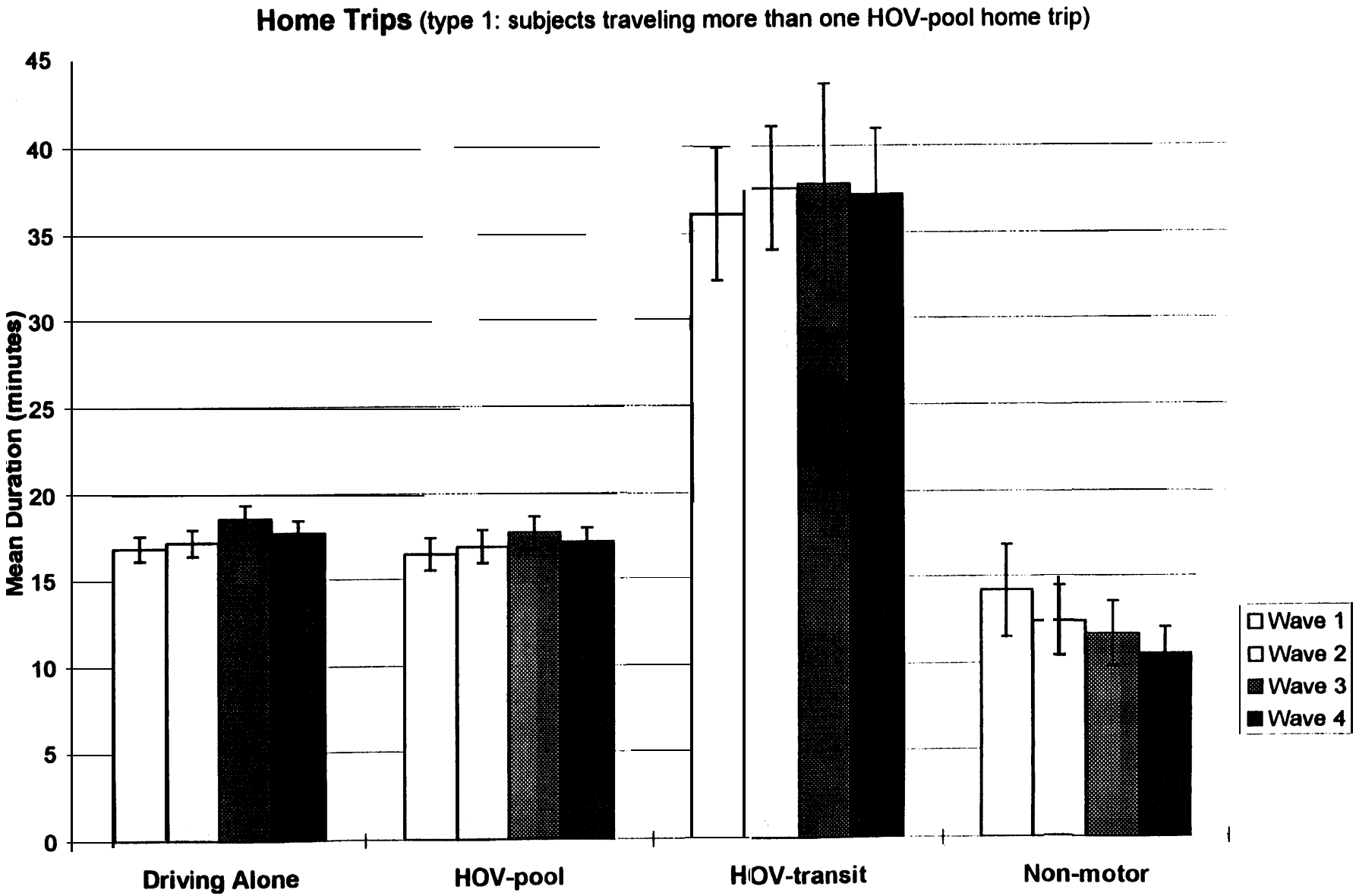
(and standard deviation and standard error)
(type 2: subjects traveling an HOV-pool home trip in more than one wave)

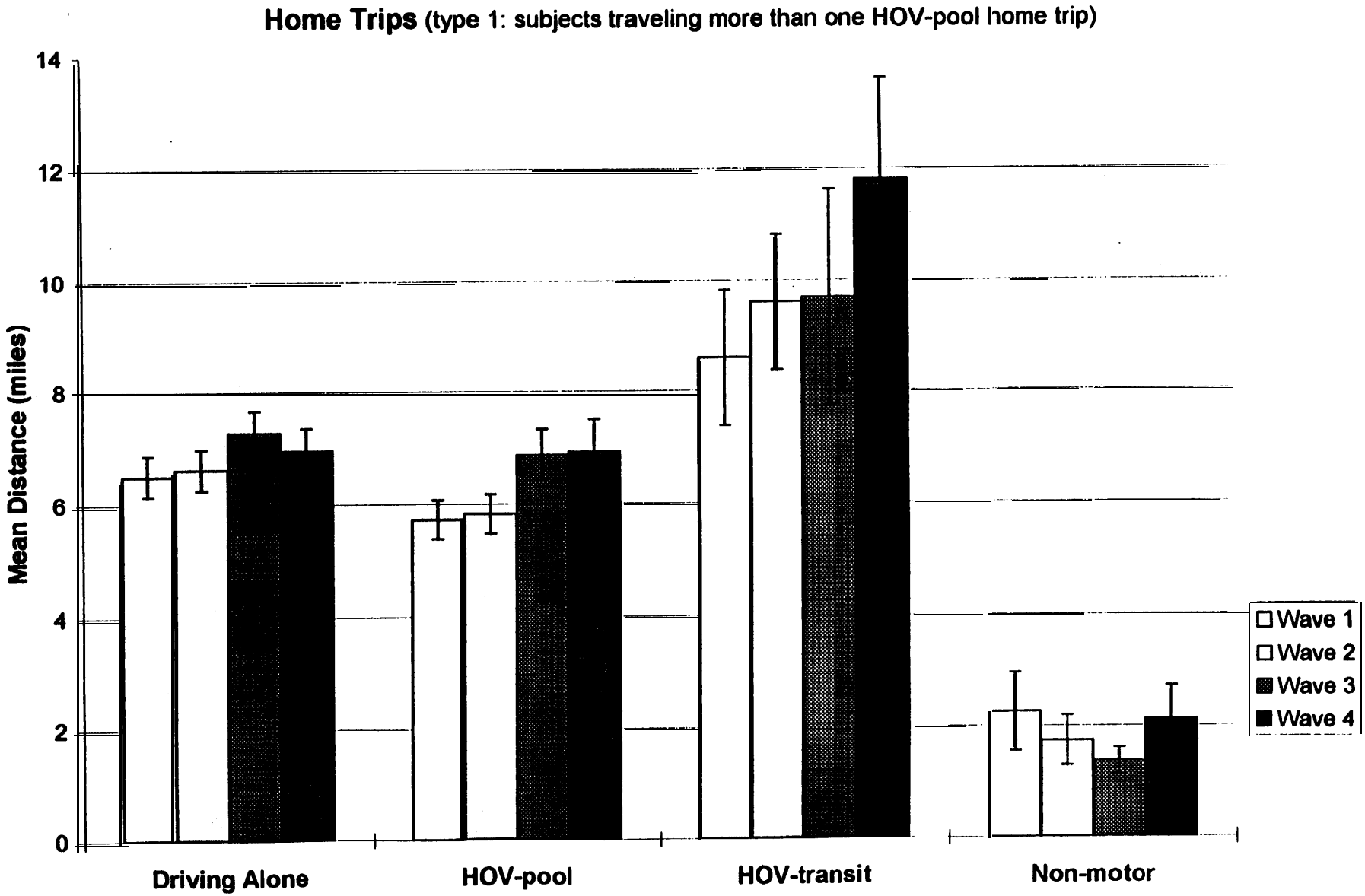
TOTAL TRIPS		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**6.40**	**6.26**	**5.88**	**5.92**
		3.15	3.07	2.98	3.02
		0.08	0.08	0.08	0.08
	HOV-pool	**6.75**	**6.44**	**6.31**	**6.35**
		3.11	3.05	2.97	3.15
		0.08	0.08	0.08	0.08
	HOV-transit	**4.75**	**5.19**	**5.05**	**4.86**
		2.45	2.45	2.25	1.78
		0.24	0.21	0.26	0.20
	Non-motor	**6.14**	**7.01**	**6.41**	**5.61**
		2.92	3.15	3.01	2.80
		0.29	0.35	0.28	0.27

DURATION (minutes)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**16.53**	**16.98**	**18.20**	**17.45**
		15.05	16.01	16.58	14.28
		0.38	0.40	0.42	0.36
	HOV-pool	**16.30**	**16.79**	**17.55**	**17.16**
		18.12	19.39	17.87	15.41
		0.47	0.50	0.47	0.41
	HOV-transit	**36.75**	**37.52**	**37.79**	**37.57**
		21.09	21.08	25.23	18.09
		2.05	1.85	2.91	1.99
	Non-motor	**14.22**	**12.67**	**11.48**	**10.42**
		13.33	9.38	10.14	7.88
		1.35	1.06	0.94	0.77

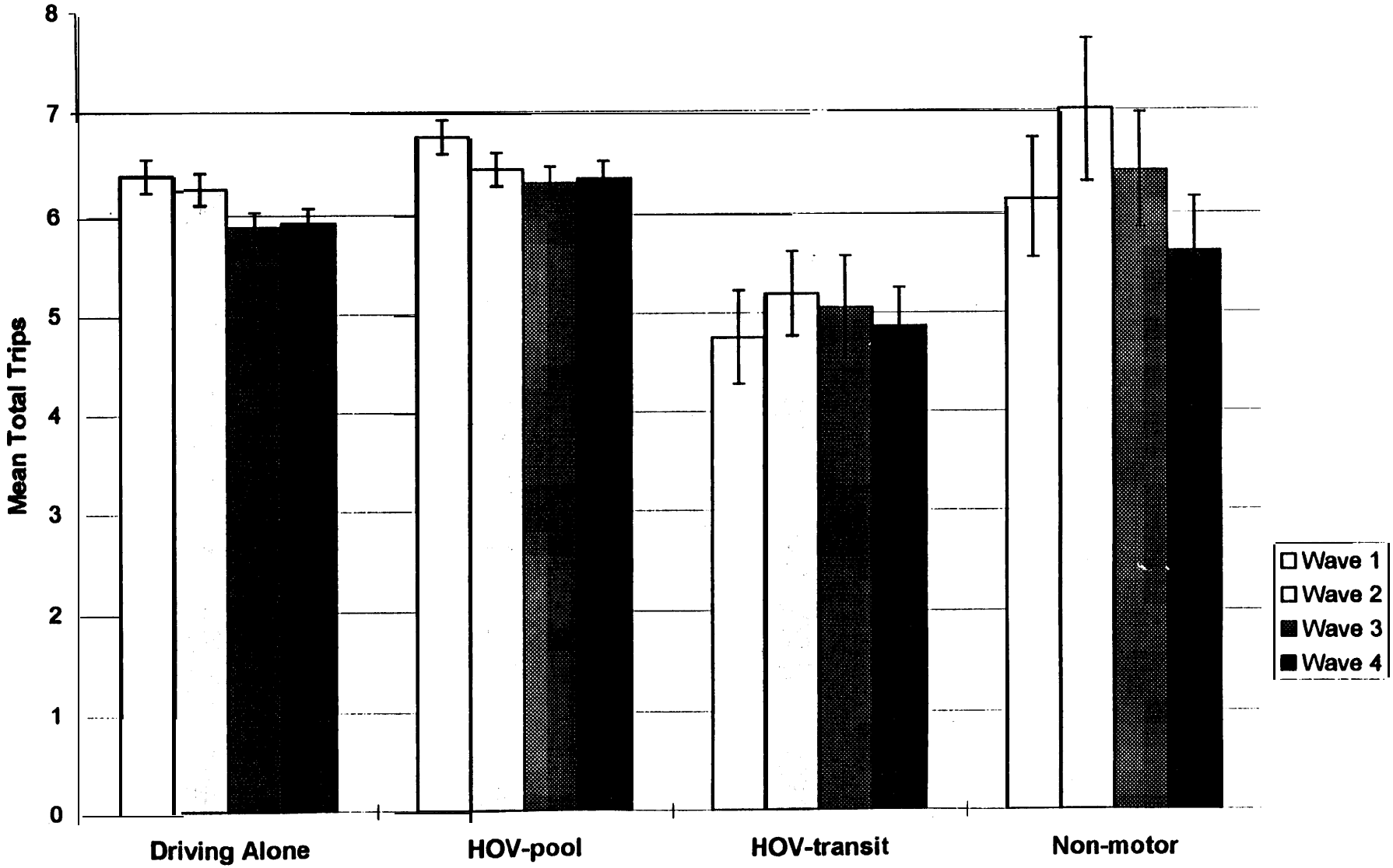
DISTANCE (miles)		Wave 1	Wave 2	Wave 3	Wave 4
	Driving alone	**6.40**	**6.57**	**7.13**	**6.91**
		7.33	7.45	8.00	7.98
		0.18	0.19	0.20	0.20
	HOV-pool	**5.71**	**5.79**	**6.81**	**6.91**
		6.74	6.92	8.60	10.69
		0.18	0.18	0.23	0.29
	HOV-transit	**8.85**	**9.68**	**9.84**	**12.03**
		6.51	7.18	8.65	8.65
		0.65	0.64	1.00	0.95
	Non-motor	**2.27**	**1.80**	**1.34**	**2.15**
		3.52	2.10	1.33	3.23
		0.36	0.23	0.12	0.32

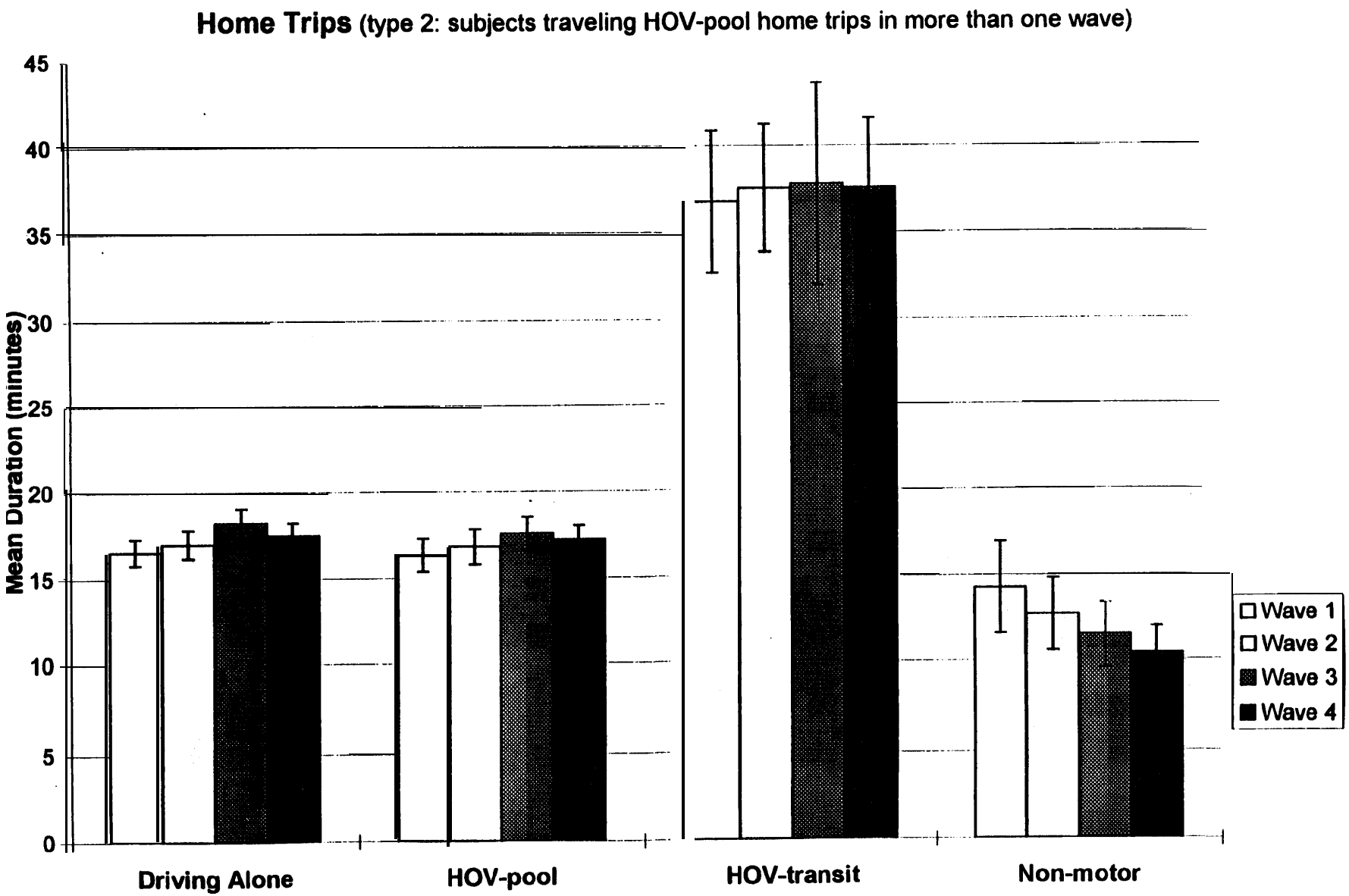

Home Trips (type 1: subjects traveling more than one HOV-pool home trip)
Mean Total Trips
8
7
6
5
4
3
2
1
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

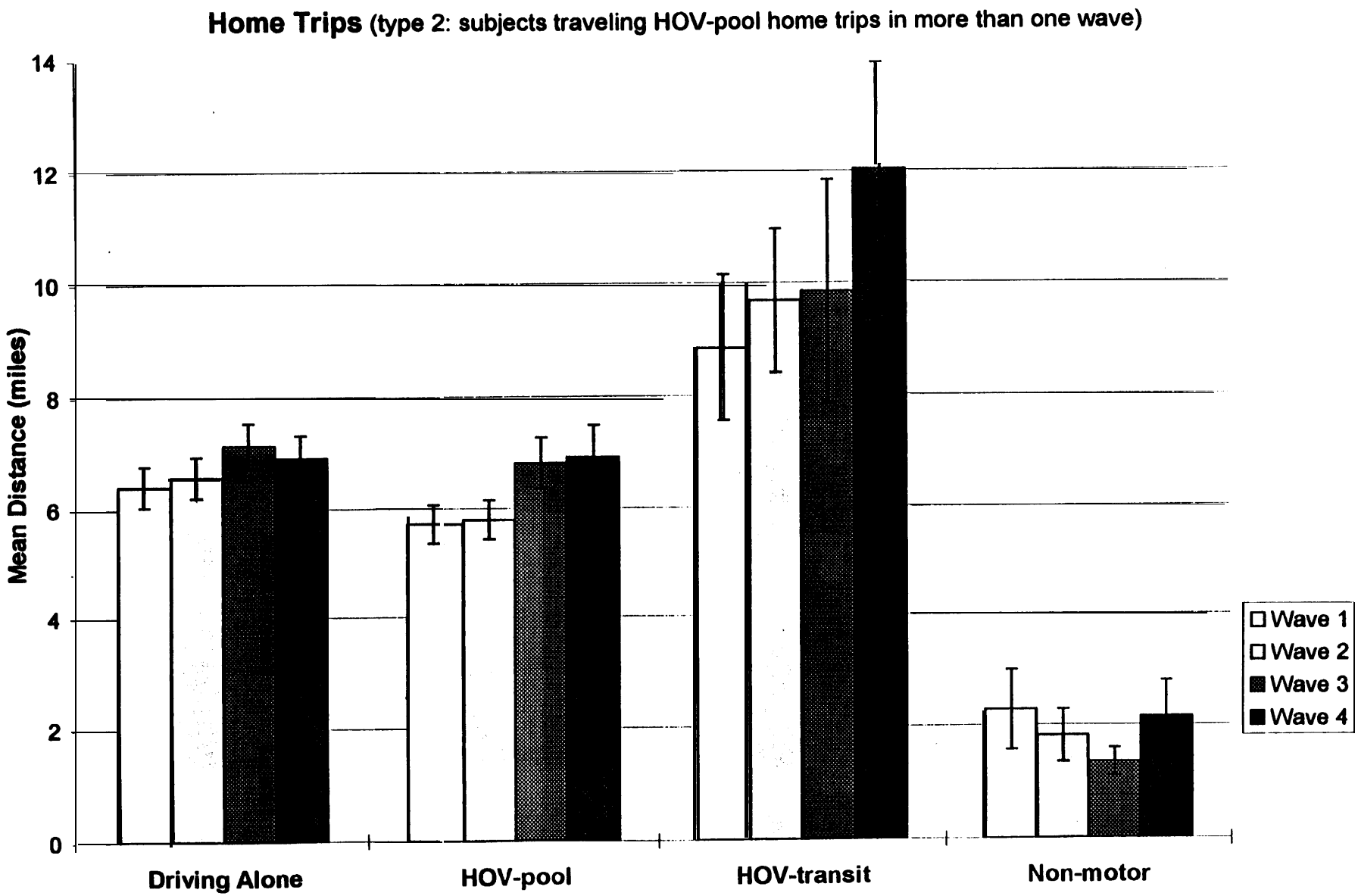

Home Trips (type 1: subjects traveling more than one HOV-pool home trip)
Mean Duration (minutes)
45
40
35
30
25
20
15
10
5
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Home Trips (type 1: subjects traveling more than one HOV-pool home trip)
Mean Distance (miles)
14
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

Home Trips (type 2: subjects traveling HOV-pool home trips in more than one wave)

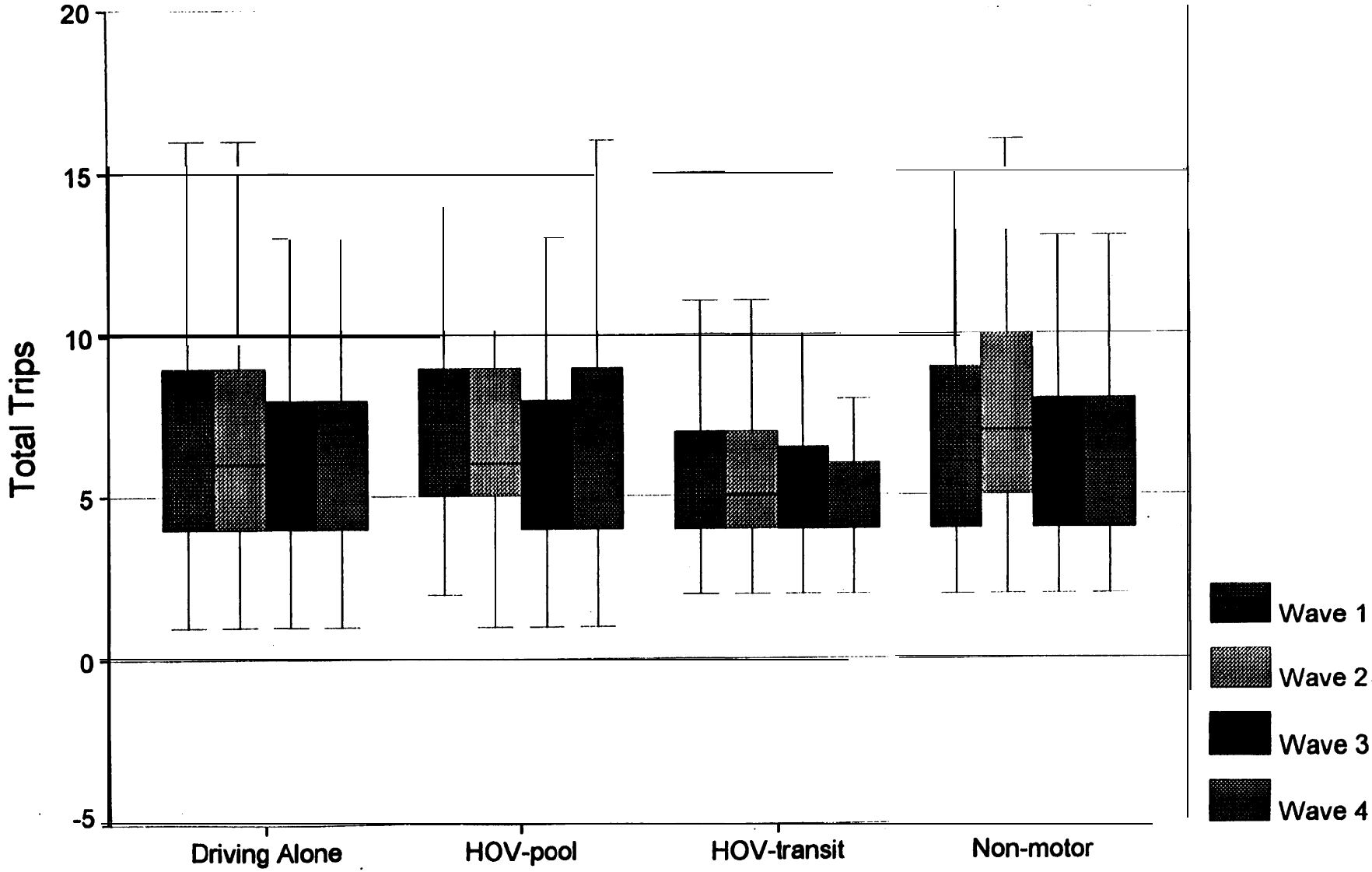



Home Trips (type 2: subjects traveling HOV-pool home trips in more than one wave)
Mean Duration (minutes)
45
40
35
30
25
20
15
10
5
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4


Home Trips (type 2: subjects traveling HOV-pool home trips in more than one wave)
Mean Distance (miles)
14
12
10
8
6
4
2
0
Driving Alone
HOV-pool
HOV-transit
Non-motor
Wave 1
Wave 2
Wave 3
Wave 4

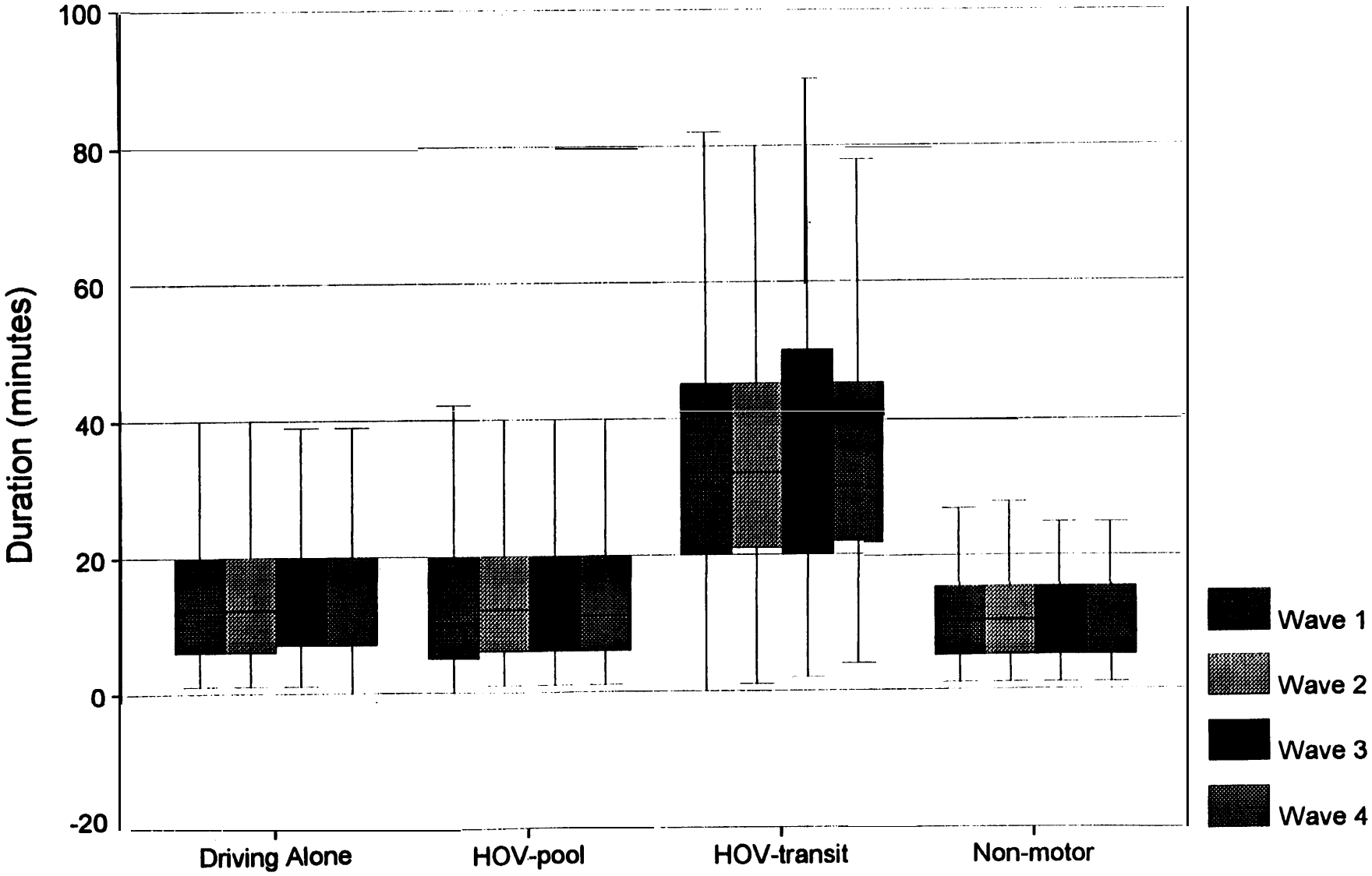
Home Trips

(subjects who carpooled home more than once)



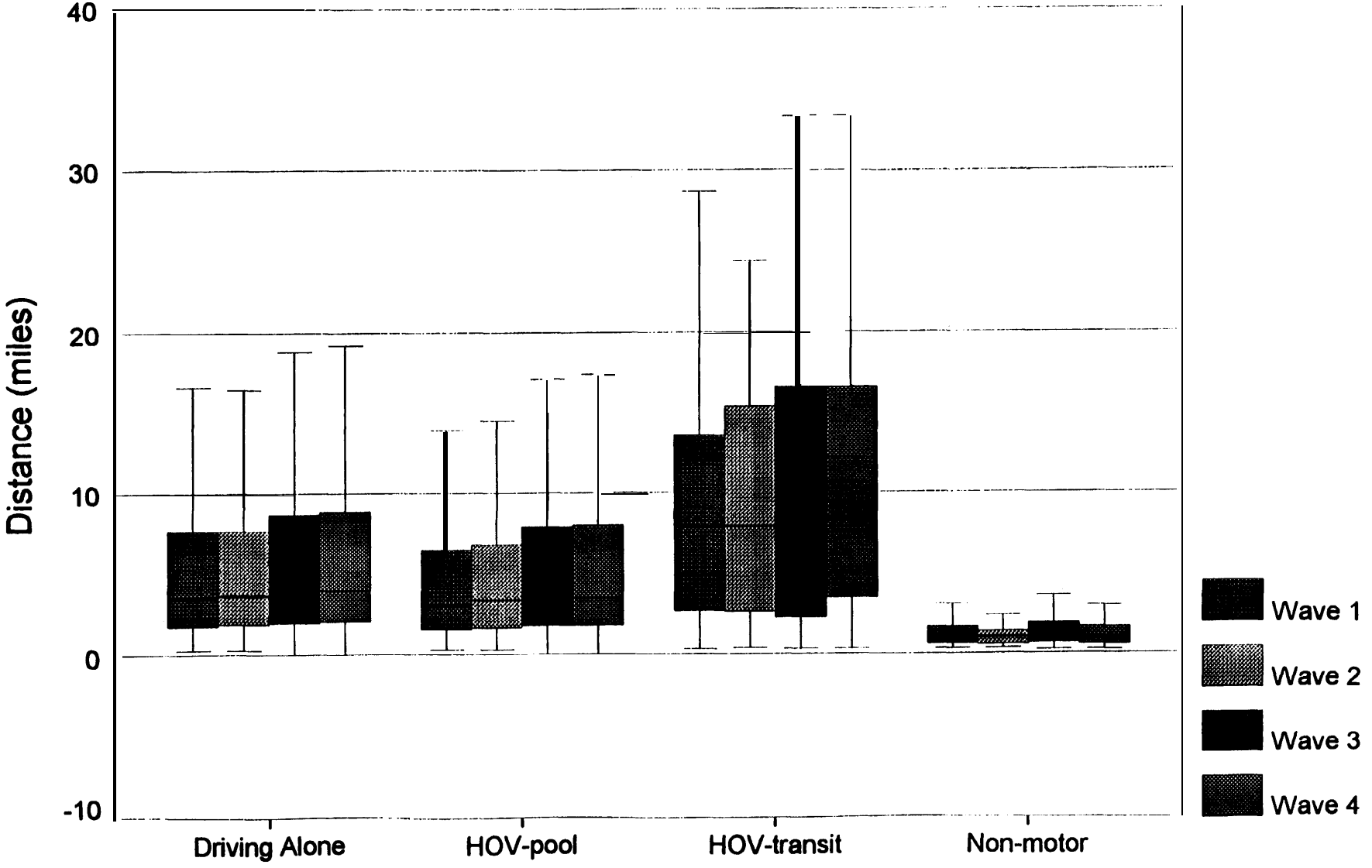
Home Trips

(subjects who carpooled home more than once)



Home Trips

(subjects who carpooled home more than once)



Frequencies (participants in all waves)

Sex				
female	825	828	827	821
male	702	699	698	702
missing	0	0	2	4
	1527	1527	1527	1527
Age group				
15-17	25	18	2	0
18-24	35	34	39	39
25-34	254	225	167	137
35-44	411	416	411	383
45-54	318	331	342	375
55-64	251	248	256	260
65-98	225	253	308	329
missing	8	2	2	4
	1527	1527	1527	1527
Employed outside home				
no	546	553	483	577
yes	981	974	1042	860
missing	0	0	2	90
	1527	1527	1527	1527
Occupation				
professional/technic	255	318	318	305
manager/admin/busine	158	191	91	117
secretary/clerical	152	148	181	173
retail sales	28	32	60	25
other sales	44	39	17	33
shop/production work	13	18	26	23
craftsman/foreman	125	84	86	73
equipment/vehicle op	39	41	22	22
service worker	90	60	70	52
general laborer	36	32	47	34
military	12	5	2	2
other	9	6	1	1
missing	566	553	606	667
	1527	1527	1527	1527

Number of work days per week				
0	0	1	1	1
1	14	11	9	17
2	36	37	27	30
3	44	51	56	57
4	65	66	83	74
5	711	731	670	684
6	67	60	62	59
7	27	17	12	17
missing	563	553	607	588
	1527	1527	1527	1527
Drove to work alone or with others				
drive alone	680	746	711	688
drive but with other	62	62	80	43
ride with others	26	34	33	36
take turns	30	35	43	54
missing	729	650	660	706
	1527	1527	1527	1527
Regularly took bus in past 6 months				
no	662	847	1067	1112
yes	17	117	109	127
missing	848	563	351	288
	1527	1527	1527	1527
Regularly pooled in past 6 months				
no	618	783	973	1035
yes	59	180	194	208
missing	850	564	360	284
	1527	1527	1527	1527

Travel mode to and from work				
car/carpool/vanpool	797	846	805	755
bus	79	57	39	42
car/bus	49	57	43	33
motorcycle	2	3	1	0
bicycle	4	3	5	4
walk	16	14	12	10
other	1	0	1	1
missing	579	547	621	682
	1527	1527	1527	1527
Car required at work				
no	446	620	836	989
yes	322	347	289	334
missing	759	560	402	204
	1527	1527	1527	1527
Car required to pick up children				
no	616	776	953	1108
yes	153	190	171	211
missing	758	561	403	208
	1527	1527	1527	1527
Frequency children were picked up				
0	0	788	376	568
1	14	15	14	27
2	33	43	34	35
3	21	34	28	41
4	12	11	11	13
5	73	82	85	103
6	0	1	0	0
7	0	0	0	3
missing	1374	553	979	737
	1527	1527	1527	1527
Was a student				
no	1397	1462	1479	1411
yes	129	65	46	26
missing	1	0	2	90
	1527	1527	1527	1527

No. of bus trips per week				
0	1314	1344	1333	1289
1	8	8	5	7
2	23	17	28	25
3	2	3	0	0
4	24	19	17	13
5	8	5	4	5
6	15	17	17	12
7	2	3	0	1
8	15	16	12	13
9	0	0	1	1
10	91	78	52	45
more than 10	12	17	16	14
missing	13	0	42	102
	1527	1527	1527	1527
Had a transit pass				
no	113	1434	1353	0
yes	92	93	134	147
missing	1322	0	40	1380
	1527	1527	1527	1527
Had a valid driver's license				
no	82	72	62	0
yes	1444	1455	1427	1379
missing	1	0	38	148
	1527	1527	1527	1527
Income (in thousands of dollars)				
[0, 7.5)	16	18	8	14
[7.5, 15)	73	60	33	32
[15, 25)	180	169	120	125
[25, 30)	163	115	88	72
[30, 35)	216	153	99	113
[35, 50)	436	403	323	310
[50, 70)	203	320	283	290
70+	116	173	201	227
[0,30)	14	29	0	0
30+	31	66	0	0
missing	79	21	372	344
	1527	1527	1527	1527

Household type (lifecycle)				
any child < 6	255	252	184	157
all children 6-17	328	358	352	326
1 adult, <35	19	17	14	11
1 adult, 35-64	71	71	88	88
1 adult, 65+	41	44	51	55
2+ adults, <35	58	50	29	18
2+ adults, 35-64	517	501	503	472
2+ adults, 65+	238	233	304	308
missing	0		2	92
	1527	1527	1527	1527

Percentages (Participants in all waves)

					Average
Sex					
female	54.0	54.2	54.2	53.8	54.1
male	46.0	45.8	45.7	46.0	45.9
missing	0.0	0.0	0.1	0.3	0.1
	100.0	100.0	100.0	100.0	
Age group					
15-17	1.6	1.2	0.1	0.0	0.7
18-24	2.3	2.2	2.6	2.6	2.4
25-34	16.6	14.7	10.9	9.0	12.8
35-44	26.9	27.2	26.9	25.1	26.5
45-54	20.8	21.7	22.4	24.6	22.4
55-64	16.4	16.2	16.8	17.0	16.6
65-98	14.7	16.6	20.2	21.5	18.3
missing	0.5	0.1	0.1	0.3	0.3
	100.0	100.0	100.0	100.0	
Employed outside home					
no	35.8	36.2	31.6	37.8	35.4
yes	64.2	63.8	68.2	56.3	63.1
missing	0.0	0.0	0.1	5.9	1.5
	100.0	100.0	100.0	100.0	
Occupation					
professional/technic	16.7	20.8	20.8	20.0	19.6
manager/admin/busine	10.3	12.5	6.0	7.7	9.1
secretary/clerical	10.0	9.7	11.9	11.3	10.7
retail sales	1.8	2.1	3.9	1.6	2.4
other sales	2.9	2.6	1.1	2.2	2.2
shop/production work	0.9	1.2	1.7	1.5	1.3
craftsman/foreman	8.2	5.5	5.6	4.8	6.0
equipment/vehicle op	2.6	2.7	1.4	1.4	2.0
service worker	5.9	3.9	4.6	3.4	4.5
general laborer	2.4	2.1	3.1	2.2	2.5
military	0.8	0.3	0.1	0.1	0.3
other	0.6	0.4	0.1	0.1	0.3
missing	37.1	36.2	39.7	43.7	39.2
	100.0	100.0	100.0	100.0	

Number of work days per week					
0	0.0	0.1	0.1	0.1	0.1
1	0.9	0.7	0.6	1.1	0.8
2	2.4	2.4	1.8	2.0	2.2
3	2.9	3.3	3.7	3.7	3.4
4	4.3	4.3	5.4	4.8	4.7
5	46.6	47.9	43.9	44.8	45.8
6	4.4	3.9	4.1	3.9	4.1
7	1.8	1.1	0.8	1.1	1.2
missing	36.9	36.2	39.8	38.5	37.9
	100.0	100.0	100.0	100.0	
Drove to work alone or with others					
drive alone	44.5	48.9	46.6	45.1	46.3
drive but with other	4.1	4.1	5.2	2.8	4.1
ride with others	1.7	2.2	2.2	2.4	2.1
take turns	2.0	2.3	2.8	3.5	2.7
missing	47.7	42.6	43.2	46.2	44.9
	100.0	100.0	100.0	100.0	
Regularly took bus in past 6 months					
no	43.4	55.5	69.9	72.8	60.4
yes	1.1	7.7	7.1	8.3	6.1
missing	55.5	36.9	23.0	18.9	33.6
	100.0	100.0	100.0	100.0	
Regularly pooled in past 6 months					
no	40.5	51.3	63.7	67.8	55.8
yes	3.9	11.8	12.7	13.6	10.5
missing	55.7	36.9	23.6	18.6	33.7
	100.0	100.0	100.0	100.0	

Travel mode to and from work					
car/carpool/vanpool	52.2	55.4	52.7	49.4	52.4
bus	5.2	3.7	2.6	2.8	3.6
car/bus	3.2	3.7	2.8	2.2	3.0
motorcycle	0.1	0.2	0.1	0.0	0.1
bicycle	0.3	0.2	0.3	0.3	0.3
walk	1.0	0.9	0.8	0.7	0.9
other	0.1	0.0	0.1	0.1	0.1
missing	37.9	35.8	40.7	44.7	39.8
	100.0	100.0	100.0	100.0	
Car required at work					
no	29.2	40.6	54.7	64.8	47.3
yes	21.1	22.7	18.9	21.9	21.2
missing	49.7	36.7	26.3	13.4	31.5
	100.0	100.0	100.0	100.0	
Car required to pick up children					
no	40.3	50.8	62.4	72.6	56.5
yes	10.0	12.4	11.2	13.8	11.9
missing	49.6	36.7	26.4	13.6	31.6
	100.0	100.0	100.0	100.0	
Frequency children were picked up					
0	0.0	51.6	24.6	37.2	28.4
1	0.9	1.0	0.9	1.8	1.2
2	2.2	2.8	2.2	2.3	2.4
3	1.4	2.2	1.8	2.7	2.0
4	0.8	0.7	0.7	0.9	0.8
5	4.8	5.4	5.6	6.7	5.6
6	0.0	0.1	0.0	0.0	0.0
7	0.0	0.0	0.0	0.2	0.1
missing	90.0	36.2	64.1	48.3	59.7
	100.0	100.0	100.0	100.0	
Was a student					
no	91.5	95.7	96.9	92.4	94.1
yes	8.4	4.3	3.0	1.7	4.4
missing	0.1	0.0	0.1	5.9	1.5
	100.0	100.0	100.0	100.0	

No. of bus trips per week					
0	86.1	88.0	87.3	84.4	86.5
1	0.5	0.5	0.3	0.5	0.5
2	1.5	1.1	1.8	1.6	1.5
3	0.1	0.2	0.0	0.0	0.1
4	1.6	1.2	1.1	0.9	1.2
5	0.5	0.3	0.3	0.3	0.4
6	1.0	1.1	1.1	0.8	1.0
7	0.1	0.2	0.0	0.1	0.1
8	1.0	1.0	0.8	0.9	0.9
9	0.0	0.0	0.1	0.1	0.1
10	6.0	5.1	3.4	2.9	4.4
more than 10	0.8	1.1	1.0	0.9	1.0
missing	0.9	0.0	2.8	6.7	2.6
	100.0	100.0	100.0	100.0	
Had a transit pass					
no	7.4	93.9	88.6	0.0	47.5
yes	6.0	6.1	8.8	9.6	7.6
missing	86.6	0.0	2.6	90.4	44.9
	100.0	100.0	100.0	100.0	
Had a valid driver's license					
no	5.4	4.7	4.1	0.0	3.6
yes	94.6	95.3	93.5	90.3	93.4
missing	0.1	0.0	2.5	9.7	3.1
	100.0	100.0	100.0	100.0	
Income (in thousands of dollars)					
[0, 7.5)	1.0	1.2	0.5	0.9	0.9
[7.5, 15)	4.8	3.9	2.2	2.1	3.3
[15, 25)	11.8	11.1	7.9	8.2	9.8
[25, 30)	10.7	7.5	5.8	4.7	7.2
[30, 35)	14.1	10.0	6.5	7.4	9.5
[35, 50)	28.6	26.4	21.2	20.3	24.1
[50, 70)	13.3	21.0	18.5	19.0	18.0
70+	7.6	11.3	13.2	14.9	11.8
[0,30)	0.9	1.9	0.0	0.0	0.7
30+	2.0	4.3	0.0	0.0	1.6
missing	5.2	1.4	24.4	22.5	13.4
	100.0	100.0	100.0	100.0	

Household type (lifecycle)					
any child < 6	16.7	16.5	12.0	10.3	13.9
all children 6-17	21.5	23.4	23.1	21.3	22.3
1 adult, <35	1.2	1.1	0.9	0.7	1.0
1 adult, 35-64	4.6	4.6	5.8	5.8	5.2
1 adult, 65+	2.7	2.9	3.3	3.6	3.1
2+ adults, <35	3.8	3.3	1.9	1.2	2.6
2+ adults, 35-64	33.9	32.8	32.9	30.9	32.6
2+ adults, 65+	15.6	15.3	19.9	20.2	17.8
missing	0.0	0.1	0.1	6.0	1.6
	100.0	100.0	100.0	100.0	

Frequencies (working carpoolers)

(participants making more than 1 HOV-pool work trip over all waves)

Sex				
female	156	156	156	155
male	171	171	171	172
missing	0	0	0	0
	327	327	327	327
Age group				
15-17	5	2	0	0
18-24	8	9	9	8
25-34	76	64	43	32
35-44	105	107	111	107
45-54	74	81	85	97
55-64	39	42	48	50
65-98	20	22	31	33
missing	0	0	0	0
	327	327	327	327
Employed outside home				
no	49	52	33	55
yes	278	275	294	255
missing	0	0	0	17
	327	327	327	327
Occupation				
professional/technical	69	91	91	83
manager/admin/business	52	61	29	38
secretary/clerical	38	31	54	47
retail sales	6	8	19	6
other sales	16	16	7	18
shop/production worker	4	6	6	7
craftsman/foreman	45	25	32	25
equipment/vehicle operator	9	8	5	6
service worker	20	13	15	13
general laborer	9	13	14	12
military	4	2	0	0
other	3	1	0	0
missing	52	52	55	72
	327	327	327	327

Number of work days per week				
0				
1	2	0	1	2
2	13	6	6	5
3	12	15	12	13
4	11	15	23	24
5	210	211	207	200
6	19	21	19	23
7	9	7	4	6
missing	51	52	55	54
	327	327	327	327
Travel mode to and from work				
car/carpool/vanpool	214	239	235	224
bus	20	14	11	13
car/bus	25	25	13	9
motorcycle	0	0	0	0
bicycle	2	1	1	0
walk	5	2	4	1
other	1	0	1	1
missing	60	46	62	79
	327	327	327	327
Drove to work alone or with others				
drive alone	136	156	161	155
drive but with other	43	35	35	25
ride with others	20	30	29	30
take turns	16	29	33	38
missing	112	77	69	79
	327	327	327	327
Regularly took bus in past 6 months				
no	132	234	233	255
yes	4	37	30	35
missing	191	56	64	37
	327	327	327	327

Regularly pooled in past 6 months				
no	117	163	170	177
yes	19	108	92	113
missing	191	56	65	37
	327	327	327	327
Car required at work				
no	100	165	174	200
yes	95	107	85	102
missing	132	55	68	25
	327	327	327	327
Car required to pick up children				
no	150	216	202	240
yes	45	56	57	58
missing	132	55	68	29
	327	327	327	327
Frequency children were picked up				
0	0	220	84	118
1	4	1	5	5
2	11	13	15	9
3	6	10	4	14
4	5	3	3	4
5	19	28	29	28
6	0	0	0	0
7	0	0	0	1
missing	282	52	187	148
	327	327	327	327
Was a student				
no	294	314	322	306
yes	33	13	5	4
missing	0	0	0	17
	327	327	327	327

No. of bus trips per week				
0	272	278	289	277
1	1	5	1	2
2	4	3	6	3
3	1	1	0	0
4	7	3	2	1
5	6	1	2	3
6	3	3	0	3
7	1	2	0	1
8	3	5	2	4
9	0	0	0	0
10	25	25	18	11
more than 10	3	1	2	4
missing	1	0	5	18
	327	327	327	327
Had a transit pass				
no	33	303	296	0
yes	21	24	26	28
missing	273	0	5	299
	327	327	327	327
Had a valid driver's license				
no	19	13	9	0
yes	308	314	313	303
missing	0	0	5	24
	327	327	327	327
Income (in thousands of dollars)				
[0, 7.5)	0	0	1	0
[7.5, 15)	7	7	3	6
[15, 25)	25	21	17	16
[25, 30)	32	11	14	12
[30, 35)	56	38	16	20
[35, 50)	97	93	78	63
[50, 70)	54	87	79	73
70+	34	46	53	67
[0,30)	3	4	0	0
30+	6	15	0	0
missing	13	5	66	70
	327	327	327	327

Household type (lifecycle)				
any child < 6	54	56	42	39
all children 6-17	92	97	83	80
1 adult, <35	3	2	3	2
1 adult, 35-64	9	7	10	11
1 adult, 65+	3	3	3	3
2+ adults, <35	20	17	8	5
2+ adults, 35-64	124	123	142	132
2+ adults, 65+	22	22	36	35
missing	0	0	0	20
	327	327	327	327

Percentages (working carpoolers)

(participants who took more than 1 HOV-pool work trip over all waves)

					Average
Sex					
female	47.7	47.7	47.7	47.4	47.6
male	52.3	52.3	52.3	52.6	52.4
missing	0.0	0.0	0.0	0.0	0.0
	100.0	100.0	100.0	100.0	
Age group					
15-17	1.5	0.6	0.0	0.0	0.5
18-24	2.4	2.8	2.8	2.4	2.6
25-34	23.2	19.6	13.1	9.8	16.4
35-44	32.1	32.7	33.9	32.7	32.9
45-54	22.6	24.8	26.0	29.7	25.8
55-64	11.9	12.8	14.7	15.3	13.7
65-98	6.1	6.7	9.5	10.1	8.1
missing	0.0	0.0	0.0	0.0	0.0
	100.0	100.0	100.0	100.0	
Employed outside home					
no	15.0	15.9	10.1	16.8	14.5
yes	85.0	84.1	89.9	78.0	84.3
missing	0.0	0.0	0.0	5.2	1.3
	100.0	100.0	100.0	100.0	
Occupation					
professional/technical	21.1	27.8	27.8	25.4	25.5
manager/admin/business	15.9	18.7	8.9	11.6	13.8
secretary/clerical	11.6	9.5	16.5	14.4	13.0
retail sales	1.8	2.4	5.8	1.8	3.0
other sales	4.9	4.9	2.1	5.5	4.4
shop/production worker	1.2	1.8	1.8	2.1	1.7
craftsman/foreman	13.8	7.6	9.8	7.6	9.7
equipment/vehicle operator	2.8	2.4	1.5	1.8	2.1
service worker	6.1	4.0	4.6	4.0	4.7
general laborer	2.8	4.0	4.3	3.7	3.7
military	1.2	0.6	0.0	0.0	0.5
other	0.9	0.3	0.0	0.0	0.3
missing	15.9	15.9	16.8	22.0	17.7
	100.0	100.0	100.0	100.0	

Number of work days per week					
0	0.0	0.0	0.0	0.0	0.0
1	0.6	0.0	0.3	0.6	0.4
2	4.0	1.8	1.8	1.5	2.3
3	3.7	4.6	3.7	4.0	4.0
4	3.4	4.6	7.0	7.3	5.6
5	64.2	64.5	63.3	61.2	63.3
6	5.8	6.4	5.8	7.0	6.3
7	2.8	2.1	1.2	1.8	2.0
missing	15.6	15.9	16.8	16.5	16.2
	100.0	100.0	100.0	100.0	
Travel mode to and from work					
car/carpool/vanpool	65.4	73.1	71.9	68.5	69.7
bus	6.1	4.3	3.4	4.0	4.5
car/bus	7.6	7.6	4.0	2.8	5.5
motorcycle	0.0	0.0	0.0	0.0	0.0
bicycle	0.6	0.3	0.3	0.0	0.3
walk	1.5	0.6	1.2	0.3	0.9
other	0.3	0.0	0.3	0.3	0.2
missing	18.3	14.1	19.0	24.2	18.9
	100.0	100.0	100.0	100.0	
Drove to work alone or with others					
drive alone	41.6	47.7	49.2	47.4	46.5
drive but with other	13.1	10.7	10.7	7.6	10.5
ride with others	6.1	9.2	8.9	9.2	8.4
take turns	4.9	8.9	10.1	11.6	8.9
missing	34.3	23.5	21.1	24.2	25.8
	100.0	100.0	100.0	100.0	
Regularly took bus in past 6 months					
no	40.4	71.6	71.3	78.0	65.3
yes	1.2	11.3	9.2	10.7	8.1
missing	58.4	17.1	19.6	11.3	26.6
	100.0	100.0	100.0	100.0	

Regularly pooled in past 6 months					
no	35.8	49.8	52.0	54.1	47.9
yes	5.8	33.0	28.1	34.6	25.4
missing	58.4	17.1	19.9	11.3	26.7
	100.0	100.0	100.0	100.0	
Car required at work					
no	30.6	50.5	53.2	61.2	48.9
yes	29.1	32.7	26.0	31.2	29.8
missing	40.4	16.8	20.8	7.6	21.4
	100.0	100.0	100.0	100.0	
Car required to pick up children					
no	45.9	66.1	61.8	73.4	61.8
yes	13.8	17.1	17.4	17.7	16.5
missing	40.4	16.8	20.8	8.9	21.7
	100.0	100.0	100.0	100.0	
Frequency children were picked up					
0	0.0	67.3	25.7	36.1	32.3
1	1.2	0.3	1.5	1.5	1.1
2	3.4	4.0	4.6	2.8	3.7
3	1.8	3.1	1.2	4.3	2.6
4	1.5	0.9	0.9	1.2	1.1
5	5.8	8.6	8.9	8.6	8.0
6	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.3	0.1
missing	86.2	15.9	57.2	45.3	51.2
	100.0	100.0	100.0	100.0	
Was a student					
no	89.9	96.0	98.5	93.6	94.5
yes	10.1	4.0	1.5	1.2	4.2
missing	0.0	0.0	0.0	5.2	1.3
	100.0	100.0	100.0	100.0	

No. of bus trips per week					
0	83.2	85.0	88.4	84.7	85.3
1	0.3	1.5	0.3	0.6	0.7
2	1.2	0.9	1.8	0.9	1.2
3	0.3	0.3	0.0	0.0	0.2
4	2.1	0.9	0.6	0.3	1.0
5	1.8	0.3	0.6	0.9	0.9
6	0.9	0.9	0.0	0.9	0.7
7	0.3	0.6	0.0	0.3	0.3
8	0.9	1.5	0.6	1.2	1.1
9	0.0	0.0	0.0	0.0	0.0
10	7.6	7.6	5.5	3.4	6.0
more than 10	0.9	0.3	0.6	1.2	0.8
missing	0.3	0.0	1.5	5.5	1.8
	100.0	100.0	100.0	100.0	
Had a transit pass					
no	10.1	92.7	90.5	0.0	48.3
yes	6.4	7.3	8.0	8.6	7.6
missing	83.5	0.0	1.5	91.4	44.1
	100.0	100.0	100.0	100.0	
Had a valid driver's license					
no	5.8	4.0	2.8	0.0	3.2
yes	94.2	96.0	95.7	92.7	94.7
missing	0.0	0.0	1.5	7.3	2.2
	100.0	100.0	100.0	100.0	
Income (in thousands of dollars)					
[0, 7.5)	0.0	0.0	0.3	0.0	0.1
[7.5, 15)	2.1	2.1	0.9	1.8	1.7
[15, 25)	7.6	6.4	5.2	4.9	6.0
[25, 30)	9.8	3.4	4.3	3.7	5.3
[30, 35)	17.1	11.6	4.9	6.1	9.9
[35, 50)	29.7	28.4	23.9	19.3	25.3
[50, 70)	16.5	26.6	24.2	22.3	22.4
70+	10.4	14.1	16.2	20.5	15.3
[0,30)	0.9	1.2	0.0	0.0	0.5
30+	1.8	4.6	0.0	0.0	1.6
missing	4.0	1.5	20.2	21.4	11.8
	100.0	100.0	100.0	100.0	

Household type (lifecycle)					
any child < 6	16.5	17.1	12.8	11.9	14.6
all children 6-17	28.1	29.7	25.4	24.5	26.9
1 adult, <35	0.9	0.6	0.9	0.6	0.8
1 adult, 35-64	2.8	2.1	3.1	3.4	2.9
1 adult, 65+	0.9	0.9	0.9	0.9	0.9
2+ adults, <35	6.1	5.2	2.4	1.5	3.8
2+ adults, 35-64	37.9	37.6	43.4	40.4	39.8
2+ adults, 65+	6.7	6.7	11.0	10.7	8.8
missing	0.0	0.0	0.0	6.1	1.5
	100.0	100.0	100.0	100.0	

Frequencies (shopping carpoolers)

(participants making more than 1 HOV-pool shopping trip overall waves)

Sex				
female	351	353	353	350
male	213	211	211	213
missing	0	0	0	1
	564	564	564	564
Age group				
15-17	6	4	0	0
18-24	13	15	13	11
25-34	102	87	63	51
35-44	138	144	150	146
45-54	74	78	92	100
55-64	92	85	74	76
65-98	136	150	172	179
missing	3	1	0	1
	564	564	564	564
Employed outside home				
no	305	308	273	304
yes	259	256	291	227
missing	0	0	0	33
	564	564	564	564
Occupation				
professional/technical	50	73	77	75
manager/admin/business	36	47	13	23
secretary/clerical	45	46	64	56
retail sales	12	10	16	7
other sales	8	10	4	5
shop/production worker	5	5	9	7
craftsman/foreman	40	21	26	22
equipment/vehicle operator	10	11	4	3
service worker	28	19	28	19
general laborer	11	9	11	10
military	4	2	0	0
other	2	3	0	0
missing	313	308	312	337
	564	564	564	564

Number of work days per week				
0	0	0	1	0
1	8	7	5	8
2	17	20	19	20
3	14	15	24	23
4	18	19	14	15
5	170	175	171	181
6	18	17	16	12
7	6	3	2	2
missing	313	308	312	303
	564	564	564	564
Travel mode to and from work				
car/carpool/vanpool	214	230	230	209
bus	15	10	8	8
car/bus	12	14	8	5
motorcycle	1	2	1	0
bicycle	0	0	0	0
walk	7	4	2	1
other	0	0	1	1
missing	315	304	314	340
	564	564	564	564
Drove to work alone or with others				
drive alone	174	192	187	179
drive but with other	25	22	27	12
ride with others	6	14	15	11
take turns	10	10	13	18
missing	349	326	322	344
	564	564	564	564
Regularly took bus in past 6 months				
no	171	229	410	395
yes	3	25	22	35
missing	390	310	132	134
	564	564	564	564

Regularly pooled in past 6 months				
no	153	199	352	354
yes	19	55	78	77
missing	392	310	134	133
	564	564	564	564
Car required at work				
no	127	177	336	389
yes	82	78	71	84
missing	355	309	157	91
	564	564	564	564
Car required to pick up children				
no	156	193	337	390
yes	52	62	70	85
missing	356	309	157	89
	564	564	564	564
Frequency children were picked up				
0	0	195	143	220
1	4	4	6	11
2	14	11	15	11
3	7	8	11	16
4	5	6	4	3
5	22	32	34	46
6	0	0	0	0
7	0	0	0	1
missing	512	308	351	256
	564	564	564	564
Was a student				
no	528	542	545	521
yes	35	22	19	10
missing	1	0	0	33
	564	564	564	564

No. of bus trips per week				
0	506	515	524	496
1	5	7	3	3
2	9	7	8	13
3	0	1	0	0
4	9	7	7	3
5	4	1	0	0
6	2	4	2	1
7	0	0	0	0
8	4	1	1	2
9	0	0	1	0
10	18	19	12	10
more than 10	1	2	1	1
missing	6	0	5	35
	564	564	564	564
Had a transit pass				
no	36	546	519	0
yes	19	18	40	53
missing	509	0	5	511
	564	564	564	564
Had a valid driver's license				
no	33	34	30	0
yes	531	530	529	505
missing	0	0	5	59
	564	564	564	564
Income (in thousands of dollars)				
[0, 7.5)	5	6	1	7
[7.5, 15)	31	24	14	15
[15, 25)	87	78	49	51
[25, 30)	80	54	48	39
[30, 35)	91	64	37	46
[35, 50)	140	153	128	124
[50, 70)	56	92	99	98
70+	26	52	51	62
[0,30)	2	9	0	0
30+	8	22	0	0
missing	38	10	137	122
	564	564	564	564

Household type (lifecycle)				
any child < 6	113	109	78	66
all children 6-17	112	126	140	130
1 adult, <35	3	3	2	0
1 adult, 35-64	4	4	4	5
1 adult, 65+	8	8	11	12
2+ adults, <35	13	12	10	4
2+ adults, 35-64	150	143	136	130
2+ adults, 65+	161	159	183	185
missing	0	0	0	32
	564	564	564	564

Percentages (shopping carpoolers)

(participants who took more than 1 HOV-pool shopping trip over all waves)

					Average
Sex					
female	62.2	62.6	62.6	62.1	62.4
male	37.8	37.4	37.4	37.8	37.6
missing	0.0	0.0	0.0	0.2	0.1
	100.0	100.0	100.0	100.0	
Age group					
15-17	1.1	0.7	0.0	0.0	0.5
18-24	2.3	2.7	2.3	2.0	2.3
25-34	18.1	15.4	11.2	9.0	13.4
35-44	24.5	25.5	26.6	25.9	25.6
45-54	13.1	13.8	16.3	17.7	15.2
55-64	16.3	15.1	13.1	13.5	14.5
65-98	24.1	26.6	30.5	31.7	28.2
missing	0.5	0.2	0.0	0.2	0.2
	100.0	100.0	100.0	100.0	
Employed outside home					
no	54.1	54.6	48.4	53.9	52.8
yes	45.9	45.4	51.6	40.2	45.8
missing	0.0	0.0	0.0	5.9	1.5
	100.0	100.0	100.0	100.0	
Occupation					
professional/technical	8.9	12.9	13.7	13.3	12.2
manager/admin/business	6.4	8.3	2.3	4.1	5.3
secretary/clerical	8.0	8.2	11.3	9.9	9.4
retail sales	2.1	1.8	2.8	1.2	2.0
other sales	1.4	1.8	0.7	0.9	1.2
shop/production worker	0.9	0.9	1.6	1.2	1.2
craftsman/foreman	7.1	3.7	4.6	3.9	4.8
equipment/vehicle operator	1.8	2.0	0.7	0.5	1.3
service worker	5.0	3.4	5.0	3.4	4.2
general laborer	2.0	1.6	2.0	1.8	1.9
military	0.7	0.4	0.0	0.0	0.3
other	0.4	0.5	0.0	0.0	0.2
missing	55.5	54.6	55.3	59.8	56.3
	100.0	100.0	100.0	100.0	

Number of work days per week					
0	0.0	0.0	0.2	0.0	0.1
1	1.4	1.2	0.9	1.4	1.2
2	3.0	3.5	3.4	3.5	3.4
3	2.5	2.7	4.3	4.1	3.4
4	3.2	3.4	2.5	2.7	3.0
5	30.1	31.0	30.3	32.1	30.9
6	3.2	3.0	2.8	2.1	2.8
7	1.1	0.5	0.4	0.4	0.6
missing	55.5	54.6	55.3	53.7	54.8
	100.0	100.0	100.0	100.0	
Travel mode to and from work					
car/carpool/vanpool	37.9	40.8	40.8	37.1	39.2
bus	2.7	1.8	1.4	1.4	1.8
car/bus	2.1	2.5	1.4	0.9	1.7
motorcycle	0.2	0.4	0.2	0.0	0.2
bicycle	0.0	0.0	0.0	0.0	0.0
walk	1.2	0.7	0.4	0.2	0.6
other	0.0	0.0	0.2	0.2	0.1
missing	55.9	53.9	55.7	60.3	56.5
	100.0	100.0	100.0	100.0	
Drove to work alone or with others					
drive alone	30.9	34.0	33.2	31.7	32.5
drive but with other	4.4	3.9	4.8	2.1	3.8
ride with others	1.1	2.5	2.7	2.0	2.1
take turns	1.8	1.8	2.3	3.2	2.3
missing	61.9	57.8	57.1	61.0	59.5
	100.0	100.0	100.0	100.0	
Regularly took bus in past 6 months					
no	30.3	40.6	72.7	70.0	53.4
yes	0.5	4.4	3.9	6.2	3.8
missing	69.1	55.0	23.4	23.8	42.8
	100.0	100.0	100.0	100.0	

Regularly pooled in past 6 months					
no	27.1	35.3	62.4	62.8	46.9
yes	3.4	9.8	13.8	13.7	10.2
missing	69.5	55.0	23.8	23.6	43.0
	100.0	100.0	100.0	100.0	
Car required at work					
no	22.5	31.4	59.6	69.0	45.6
yes	14.5	13.8	12.6	14.9	14.0
missing	62.9	54.8	27.8	16.1	40.4
	100.0	100.0	100.0	100.0	
Car required to pick up children					
no	27.7	34.2	59.8	69.1	47.7
yes	9.2	11.0	12.4	15.1	11.9
missing	63.1	54.8	27.8	15.8	40.4
	100.0	100.0	100.0	100.0	
Frequency children were picked up					
0	0.0	34.6	25.4	39.0	24.8
1	0.7	0.7	1.1	2.0	1.1
2	2.5	2.0	2.7	2.0	2.3
3	1.2	1.4	2.0	2.8	1.9
4	0.9	1.1	0.7	0.5	0.8
5	3.9	5.7	6.0	8.2	6.0
6	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.2	0.1
missing	90.8	54.6	62.2	45.4	63.3
	100.0	100.0	100.0	100.0	
Was a student					
no	93.6	96.1	96.6	92.4	94.7
yes	6.2	3.9	3.4	1.8	3.8
missing	0.2	0.0	0.0	5.9	1.5
	100.0	100.0	100.0	100.0	

No. of bus trips per week					
0	89.7	91.3	92.9	87.9	90.5
1	0.9	1.2	0.5	0.5	0.8
2	1.6	1.2	1.4	2.3	1.6
3	0.0	0.2	0.0	0.0	0.1
4	1.6	1.2	1.2	0.5	1.1
5	0.7	0.2	0.0	0.0	0.2
6	0.4	0.7	0.4	0.2	0.4
7	0.0	0.0	0.0	0.0	0.0
8	0.7	0.2	0.2	0.4	0.4
9	0.0	0.0	0.2	0.0	0.1
10	3.2	3.4	2.1	1.8	2.6
more than 10	0.2	0.4	0.2	0.2	0.3
missing	1.1	0.0	0.9	6.2	2.1
	100.0	100.0	100.0	100.0	
Had a transit pass					
no	6.4	96.8	92.0	0.0	48.8
yes	3.4	3.2	7.1	9.4	5.8
missing	90.2	0.0	0.9	90.6	45.4
	100.0	100.0	100.0	100.0	
Had a valid driver's license					
no	5.9	6.0	5.3	0.0	4.3
yes	94.1	94.0	93.8	89.5	92.9
missing	0.0	0.0	0.9	10.5	2.9
	100.0	100.0	100.0	100.0	
Income (in thousands of dollars)					
[0, 7.5)	0.9	1.1	0.2	1.2	0.9
[7.5, 15)	5.5	4.3	2.5	2.7	3.8
[15, 25)	15.4	13.8	8.7	9.0	11.7
[25, 30)	14.2	9.6	8.5	6.9	9.8
[30, 35)	16.1	11.3	6.6	8.2	10.6
[35, 50)	24.8	27.1	22.7	22.0	24.2
[50, 70)	9.9	16.3	17.6	17.4	15.3
70+	4.6	9.2	9.0	11.0	8.5
[0,30)	0.4	1.6	0.0	0.0	0.5
30+	1.4	3.9	0.0	0.0	1.3
missing	6.7	1.8	24.3	21.6	13.6
	100.0	100.0	100.0	100.0	

Household type (lifecycle)					
any child < 6	20.0	19.3	13.8	11.7	16.2
all children 6-17	19.9	22.3	24.8	23.0	22.5
1 adult, <35	0.5	0.5	0.4	0.0	0.4
1 adult, 35-64	0.7	0.7	0.7	0.9	0.8
1 adult, 65+	1.4	1.4	2.0	2.1	1.7
2+ adults, <35	2.3	2.1	1.8	0.7	1.7
2+ adults, 35-64	26.6	25.4	24.1	23.0	24.8
2+ adults, 65+	28.5	28.2	32.4	32.8	30.5
missing	0.0	0.0	0.0	5.7	1.4
	100.0	100.0	100.0	100.0	

Frequencies (socio-recreational carpoolers)

(participantsmaking more than 1 HOV-pool socio-recreational trip over all waves)

Sex				
female	438	441	440	439
male	325	322	322	324
missing	0	0	1	0
	763	763	763	763
Age group				
15-17	13	10	0	0
18-24	20	21	26	25
25-34	129	110	78	65
35-44	186	192	203	190
45-54	138	145	143	159
55-64	134	128	126	124
65-98	139	155	186	200
missing	4	2	1	0
	763	763	763	763
Employed outside home				
no	347	349	302	349
yes	416	414	460	377
missing	0	0	1	37
	763	763	763	763
Occupation				
professional/technical	109	129	133	140
manager/admin/business	60	82	40	39
secretary/clerical	75	71	78	74
retail sales	16	14	30	15
other sales	20	19	6	19
shop/production worker	7	7	6	11
craftsman/foreman	55	34	37	31
equipment/vehicle operator	13	11	8	8
service worker	36	27	43	28
general laborer	11	16	18	12
military	4	1	0	0
other	2	3	0	0
missing	355	349	364	386
	763	763	763	763

Number of work days per week				
0	0	1	1	0
1	12	10	8	11
2	22	24	19	22
3	18	25	35	25
4	27	30	33	30
5	291	292	267	296
6	24	26	30	24
7	15	6	4	9
missing	354	349	366	346
	763	763	763	763
Travel mode to and from work				
car/carpool/vanpool	359	375	371	356
bus	16	15	9	10
car/bus	20	18	7	3
motorcycle	1	2	0	0
bicycle	0	0	0	0
walk	6	5	5	3
other	1	0	0	0
missing	360	348	371	391
	763	763	763	763
Drove to work alone or with others				
drive alone	301	322	311	305
drive but with other	30	35	41	23
ride with others	18	17	17	13
take turns	11	12	14	28
missing	403	377	380	394
	763	763	763	763
Regularly took bus in past 6 months				
no	293	374	552	572
yes	7	37	27	31
missing	463	352	184	160
	763	763	763	763

Regularly pooled in past 6 months				
no	272	331	485	513
yes	28	80	91	93
missing	463	352	187	157
	763	763	763	763
Car required at work				
no	196	254	423	512
yes	144	158	127	145
missing	423	351	213	106
	763	763	763	763
Car required to pick up children				
no	257	309	451	536
yes	85	103	98	119
missing	421	351	214	108
	763	763	763	763
Frequency children were picked up				
0	0	314	176	275
1	8	8	8	16
2	22	22	20	20
3	8	19	14	20
4	5	6	7	7
5	42	45	49	62
6	0	0	0	0
7	0	0	0	2
missing	678	349	489	361
	763	763	763	763
Was a student				
no	701	730	738	711
yes	62	33	24	15
missing	0	0	1	37
	763	763	763	763

No. of bus trips per week				
0	691	702	706	684
1	2	5	2	3
2	13	8	11	15
3	1	2	0	0
4	10	9	6	2
5	3	1	0	0
6	2	5	5	2
7	2	1	0	1
8	4	6	2	2
9	0	0	1	1
10	26	22	14	9
more than 10	1	2	1	2
missing	8	0	15	42
	763	763	763	763
Had a transit pass				
no	38	735	696	0
yes	29	28	52	62
missing	696	0	15	701
	763	763	763	763
Had a valid driver's license				
no	39	32	25	0
yes	723	731	723	703
missing	1	0	15	60
	763	763	763	763
Income (in thousands of dollars)				
[0, 7.5)	7	8	2	9
[7.5, 15)	40	30	20	17
[15, 25)	74	76	54	52
[25, 30)	101	62	51	43
[30, 35)	97	82	43	61
[35, 50)	211	199	161	144
[50, 70)	101	151	138	141
70+	58	89	92	110
[0,30)	5	16	0	0
30+	19	39	0	0
missing	50	11	202	186
	763	763	763	763

Household type (lifecycle)				
any child < 6	142	141	95	75
all children 6-17	172	188	198	192
1 adult, <35	4	4	4	3
1 adult, 35-64	14	12	16	21
1 adult, 65+	13	15	14	16
2+ adults, <35	20	16	12	8
2+ adults, 35-64	242	235	223	205
2+ adults, 65+	156	152	200	203
missing	0	0	1	40
	763	763	763	763

Percentages (socio-recreational carpoolers)

(participants who took more than 1 HOV-pool socio-recreational trip over all waves)

					Average
Sex					
female	57.4	57.8	57.7	57.5	57.6
male	42.6	42.2	42.2	42.5	42.4
missing	0.0	0.0	0.1	0.0	0.0
	100.0	100.0	100.0	100.0	
Age group					
15-17	1.7	1.3	0.0	0.0	0.8
18-24	2.6	2.8	3.4	3.3	3.0
25-34	16.9	14.4	10.2	8.5	12.5
35-44	24.4	25.2	26.6	24.9	25.3
45-54	18.1	19.0	18.7	20.8	19.2
55-64	17.6	16.8	16.5	16.3	16.8
65-98	18.2	20.3	24.4	26.2	22.3
missing	0.5	0.3	0.1	0.0	0.2
	100.0	100.0	100.0	100.0	
Employed outside home					
no	45.5	45.7	39.6	45.7	44.1
yes	54.5	54.3	60.3	49.4	54.6
missing	0.0	0.0	0.1	4.8	1.2
	100.0	100.0	100.0	100.0	
Occupation					
professional/technical	14.3	16.9	17.4	18.3	16.7
manager/admin/business	7.9	10.7	5.2	5.1	7.2
secretary/clerical	9.8	9.3	10.2	9.7	9.8
retail sales	2.1	1.8	3.9	2.0	2.5
other sales	2.6	2.5	0.8	2.5	2.1
shop/production worker	0.9	0.9	0.8	1.4	1.0
craftsman/foreman	7.2	4.5	4.8	4.1	5.2
equipment/vehicle operator	1.7	1.4	1.0	1.0	1.3
service worker	4.7	3.5	5.6	3.7	4.4
general laborer	1.4	2.1	2.4	1.6	1.9
military	0.5	0.1	0.0	0.0	0.2
other	0.3	0.4	0.0	0.0	0.2
missing	46.5	45.7	47.7	50.6	47.6
	100.0	100.0	100.0	100.0	

Number of work days per week					
0	0.0	0.1	0.1	0.0	0.1
1	1.6	1.3	1.0	1.4	1.3
2	2.9	3.1	2.5	2.9	2.9
3	2.4	3.3	4.6	3.3	3.4
4	3.5	3.9	4.3	3.9	3.9
5	38.1	38.3	35.0	38.8	37.6
6	3.1	3.4	3.9	3.1	3.4
7	2.0	0.8	0.5	1.2	1.1
missing	46.4	45.7	48.0	45.3	46.4
	100.0	100.0	100.0	100.0	
Travel mode to and from work					
car/carpool/vanpool	47.1	49.1	48.6	46.7	47.9
bus	2.1	2.0	1.2	1.3	1.7
car/bus	2.6	2.4	0.9	0.4	1.6
motorcycle	0.1	0.3	0.0	0.0	0.1
bicycle	0.0	0.0	0.0	0.0	0.0
walk	0.8	0.7	0.7	0.4	0.7
other	0.1	0.0	0.0	0.0	0.0
missing	47.2	45.6	48.6	51.2	48.2
	100.0	100.0	100.0	100.0	
Drove to work alone or with others					
drive alone	39.4	42.2	40.8	40.0	40.6
drive but with other	3.9	4.6	5.4	3.0	4.2
ride with others	2.4	2.2	2.2	1.7	2.1
take turns	1.4	1.6	1.8	3.7	2.1
missing	52.8	49.4	49.8	51.6	50.9
	100.0	100.0	100.0	100.0	
Regularly took bus in past 6 months					
no	38.4	49.0	72.3	75.0	58.7
yes	0.9	4.8	3.5	4.1	3.3
missing	60.7	46.1	24.1	21.0	38.0
	100.0	100.0	100.0	100.0	

Regularly pooled in past 6 months					
no	35.6	43.4	63.6	67.2	52.5
yes	3.7	10.5	11.9	12.2	9.6
missing	60.7	46.1	24.5	20.6	38.0
	100.0	100.0	100.0	100.0	
Car required at work					
no	25.7	33.3	55.4	67.1	45.4
yes	18.9	20.7	16.6	19.0	18.8
missing	55.4	46.0	27.9	13.9	35.8
	100.0	100.0	100.0	100.0	
Car required to pick up children					
no	33.7	40.5	59.1	70.2	50.9
yes	11.1	13.5	12.8	15.6	13.3
missing	55.2	46.0	28.0	14.2	35.9
	100.0	100.0	100.0	100.0	
Frequency children were picked up					
0	0.0	41.2	23.1	36.0	25.1
1	1.0	1.0	1.0	2.1	1.3
2	2.9	2.9	2.6	2.6	2.8
3	1.0	2.5	1.8	2.6	2.0
4	0.7	0.8	0.9	0.9	0.8
5	5.5	5.9	6.4	8.1	6.5
6	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.3	0.1
missing	88.9	45.7	64.1	47.3	61.5
	100.0	100.0	100.0	100.0	
Was a student					
no	91.9	95.7	96.7	93.2	94.4
yes	8.1	4.3	3.1	2.0	4.4
missing	0.0	0.0	0.1	4.8	1.2
	100.0	100.0	100.0	100.0	

No. of bus trips per week					
0	90.6	92.0	92.5	89.6	91.2
1	0.3	0.7	0.3	0.4	0.4
2	1.7	1.0	1.4	2.0	1.5
3	0.1	0.3	0.0	0.0	0.1
4	1.3	1.2	0.8	0.3	0.9
5	0.4	0.1	0.0	0.0	0.1
6	0.3	0.7	0.7	0.3	0.5
7	0.3	0.1	0.0	0.1	0.1
8	0.5	0.8	0.3	0.3	0.5
9	0.0	0.0	0.1	0.1	0.1
10	3.4	2.9	1.8	1.2	2.3
more than 10	0.1	0.3	0.1	0.3	0.2
missing	1.0	0.0	2.0	5.5	2.1
	100.0	100.0	100.0	100.0	
Had a transit pass					
no	5.0	96.3	91.2	0.0	48.1
yes	3.8	3.7	6.8	8.1	5.6
missing	91.2	0.0	2.0	91.9	46.3
	100.0	100.0	100.0	100.0	
Had a valid driver's license					
no	5.1	4.2	3.3	0.0	3.2
yes	94.8	95.8	94.8	92.1	94.4
missing	0.1	0.0	2.0	7.9	2.5
	100.0	100.0	100.0	100.0	
Income (in thousands of dollars)					
[0, 7.5)	0.9	1.0	0.3	1.2	0.9
[7.5, 15)	5.2	3.9	2.6	2.2	3.5
[15, 25)	9.7	10.0	7.1	6.8	8.4
[25, 30)	13.2	8.1	6.7	5.6	8.4
[30, 35)	12.7	10.7	5.6	8.0	9.3
[35, 50)	27.7	26.1	21.1	18.9	23.5
[50, 70)	13.2	19.8	18.1	18.5	17.4
70+	7.6	11.7	12.1	14.4	11.5
[0,30)	0.7	2.1	0.0	0.0	0.7
30+	2.5	5.1	0.0	0.0	1.9
missing	6.6	1.4	26.5	24.4	14.7
	100.0	100.0	100.0	100.0	

Household type (lifecycle)					
any child < 6	18.6	18.5	12.5	9.8	14.9
all children 6-17	22.5	24.6	26.0	25.2	24.6
1 adult, <35	0.5	0.5	0.5	0.4	0.5
1 adult, 35-64	1.8	1.6	2.1	2.8	2.1
1 adult, 65+	1.7	2.0	1.8	2.1	1.9
2+ adults, <35	2.6	2.1	1.6	1.0	1.8
2+ adults, 35-64	31.7	30.8	29.2	26.9	29.7
2+ adults, 65+	20.4	19.9	26.2	26.6	23.3
missing	0.0	0.0	0.1	5.2	1.3
	100.0	100.0	100.0	100.0	

Frequencies (other carpoolers)

(participants making more than 1 HOV-pool other trip over all waves)

Sex				
female	536	538	537	531
male	369	367	367	370
missing	0	0	1	4
	905	905	905	905
Age group				
15-17	22	16	2	0
18-24	24	29	35	35
25-34	166	144	110	86
35-44	253	262	262	255
45-54	151	158	174	192
55-64	133	124	118	117
65-98	149	171	203	216
missing	7	1	1	4
	905	905	905	905
Employed outside home				
no	375	393	339	390
yes	530	512	565	473
missing	0	0	1	42
	905	905	905	905
Occupation				
professional/technic	138	165	167	171
manager/admin/busine	77	96	47	49
secretary/clerical	85	83	99	100
retail sales	25	18	36	17
other sales	23	20	8	17
shop/production work	5	7	12	13
craftsman/foreman	65	35	45	35
equipment/vehicle op	21	22	12	14
service worker	54	36	46	37
general laborer	17	20	20	19
military	7	5	1	1
other	3	5	0	0
missing	385	393	412	432
	905	905	905	905

Number of work days per week				
0	0	1	1	0
1	13	10	7	12
2	29	30	24	24
3	33	33	41	37
4	41	43	45	44
5	353	355	334	361
6	31	32	33	34
7	19	8	5	8
missing	386	393	415	385
	905	905	905	905
Travel mode to and from work				
car/carpool/vanpool	449	465	444	426
bus	27	12	10	13
car/bus	24	32	20	17
motorcycle	2	2	1	0
bicycle	2	1	3	2
walk	9	7	5	4
other	0	0	1	1
missing	392	386	421	442
	905	905	905	905
Drove to work alone or with others				
drive alone	368	386	359	365
drive but with other	47	50	62	33
ride with others	18	23	20	21
take turns	18	23	32	41
missing	454	423	432	445
	905	905	905	905
Regularly took bus in past 6 months				
no	355	460	659	674
yes	12	48	45	59
missing	538	397	201	172
	905	905	905	905

Regularly pooled in past 6 months				
no	328	391	561	586
yes	38	117	140	148
missing	539	397	204	171
	905	905	905	905
Car required at work				
no	259	333	513	605
yes	172	177	157	191
missing	474	395	235	109
	905	905	905	905
Car required to pick up children				
no	298	349	525	611
yes	134	161	145	183
missing	473	395	235	111
	905	905	905	905
Frequency children were picked up				
0	0	356	203	309
1	11	10	10	22
2	29	35	25	28
3	18	24	25	32
4	11	10	9	12
5	65	76	77	94
6	0	1	0	0
7	0	0	0	3
missing	771	393	556	405
	905	905	905	905
Was a student				
no	820	854	868	842
yes	84	51	36	21
missing	1	0	1	42
	905	905	905	905

No. of bus trips per week				
0	806	827	820	794
1	5	6	3	5
2	17	12	17	18
3	1	2	0	0
4	12	9	6	7
5	7	1	4	4
6	5	10	7	4
7	1	1	0	1
8	9	4	3	5
9	0	0	0	0
10	36	30	19	16
more than 10	0	3	0	1
missing	6	0	26	50
	905	905	905	905
Had a transit pass				
no	61	876	809	0
yes	34	29	71	85
missing	810	0	25	820
	905	905	905	905
Had a valid driver's license				
no	40	33	24	0
yes	864	872	857	841
missing	1	0	24	64
	905	905	905	905
Income (in thousands of dollars)				
[0, 7.5)	9	9	3	9
[7.5, 15)	43	35	22	21
[15, 25)	100	93	69	62
[25, 30)	104	81	51	44
[30, 35)	137	96	54	69
[35, 50)	249	237	189	194
[50, 70)	132	184	176	161
70+	55	95	105	136
[0,30)	2	19	0	0
30+	15	40	0	0
missing	59	16	236	209
	905	905	905	905

Household type (lifecycle)				
any child < 6	196	191	131	107
all children 6-17	235	258	275	263
1 adult, <35	7	7	6	4
1 adult, 35-64	18	14	22	23
1 adult, 65+	21	23	24	27
2+ adults, <35	26	19	13	11
2+ adults, 35-64	235	230	222	214
2+ adults, 65+	167	163	211	210
missing	0	0	1	46
	905	905	905	905

Percentages (other carpoolers)

(participants who took more than 1 HOV-pool other trip over all waves)

					Average
Sex					
female	59.2	59.4	59.3	58.7	59.2
male	40.8	40.6	40.6	40.9	40.7
missing	0.0	0.0	0.1	0.4	0.1
	100.0	100.0	100.0	100.0	
Age group					
15-17	2.4	1.8	0.2	0.0	1.1
18-24	2.7	3.2	3.9	3.9	3.4
25-34	18.3	15.9	12.2	9.5	14.0
35-44	28.0	29.0	29.0	28.2	28.6
45-54	16.7	17.5	19.2	21.2	18.7
55-64	14.7	13.7	13.0	12.9	13.6
65-98	16.5	18.9	22.4	23.9	20.4
missing	0.8	0.1	0.1	0.4	0.4
	100.0	100.0	100.0	100.0	
Employed outside home					
no	41.4	43.4	37.5	43.1	41.4
yes	58.6	56.6	62.4	52.3	57.5
missing	0.0	0.0	0.1	4.6	1.2
	100.0	100.0	100.0	100.0	
Occupation					
professional/technical	15.2	18.2	18.5	18.9	17.7
manager/admin/business	8.5	10.6	5.2	5.4	7.4
secretary/clerical	9.4	9.2	10.9	11.0	10.1
retail sales	2.8	2.0	4.0	1.9	2.7
other sales	2.5	2.2	0.9	1.9	1.9
shop/production worker	0.6	0.8	1.3	1.4	1.0
craftsman/foreman	7.2	3.9	5.0	3.9	5.0
equipment/vehicle operator	2.3	2.4	1.3	1.5	1.9
service worker	6.0	4.0	5.1	4.1	4.8
general laborer	1.9	2.2	2.2	2.1	2.1
military	0.8	0.6	0.1	0.1	0.4
other	0.3	0.6	0.0	0.0	0.2
missing	42.5	43.4	45.5	47.7	44.8
	100.0	100.0	100.0	100.0	

Number of work days per week					
0	0.0	0.1	0.1	0.0	0.1
1	1.4	1.1	0.8	1.3	1.2
2	3.2	3.3	2.7	2.7	3.0
3	3.6	3.6	4.5	4.1	4.0
4	4.5	4.8	5.0	4.9	4.8
5	39.0	39.2	36.9	39.9	38.8
6	3.4	3.5	3.6	3.8	3.6
7	2.1	0.9	0.6	0.9	1.1
missing	42.7	43.4	45.9	42.5	43.6
	100.0	100.0	100.0	100.0	
Travel mode to and from work					
car/carpool/vanpool	49.6	51.4	49.1	47.1	49.3
bus	3.0	1.3	1.1	1.4	1.7
car/bus	2.7	3.5	2.2	1.9	2.6
motorcycle	0.2	0.2	0.1	0.0	0.1
bicycle	0.2	0.1	0.3	0.2	0.2
walk	1.0	0.8	0.6	0.4	0.7
other	0.0	0.0	0.1	0.1	0.1
missing	43.3	42.7	46.5	48.8	45.3
	100.0	100.0	100.0	100.0	
Drove to work alone or with others					
drive alone	40.7	42.7	39.7	40.3	40.9
drive but with other	5.2	5.5	6.9	3.6	5.3
ride with others	2.0	2.5	2.2	2.3	2.3
take turns	2.0	2.5	3.5	4.5	3.1
missing	50.2	46.7	47.7	49.2	48.5
	100.0	100.0	100.0	100.0	
Regularly took bus in past 6 months					
no	39.2	50.8	72.8	74.5	59.3
yes	1.3	5.3	5.0	6.5	4.5
missing	59.4	43.9	22.2	19.0	36.1
	100.0	100.0	100.0	100.0	

Regularly pooled in past 6 months					
no	36.2	43.2	62.0	64.8	51.6
yes	4.2	12.9	15.5	16.4	12.3
missing	59.6	43.9	22.5	18.9	36.2
	100.0	100.0	100.0	100.0	
Car required at work					
no	28.6	36.8	56.7	66.9	47.3
yes	19.0	19.6	17.3	21.1	19.3
missing	52.4	43.6	26.0	12.0	33.5
	100.0	100.0	100.0	100.0	
Car required to pick up children					
no	32.9	38.6	58.0	67.5	49.3
yes	14.8	17.8	16.0	20.2	17.2
missing	52.3	43.6	26.0	12.3	33.6
	100.0	100.0	100.0	100.0	
Frequency children were picked up					
0	0.0	39.3	22.4	34.1	24.0
1	1.2	1.1	1.1	2.4	1.5
2	3.2	3.9	2.8	3.1	3.3
3	2.0	2.7	2.8	3.5	2.8
4	1.2	1.1	1.0	1.3	1.2
5	7.2	8.4	8.5	10.4	8.6
6	0.0	0.1	0.0	0.0	0.0
7	0.0	0.0	0.0	0.3	0.1
missing	85.2	43.4	61.4	44.8	58.7
	100.0	100.0	100.0	100.0	
Was a student					
no	90.6	94.4	95.9	93.0	93.5
yes	9.3	5.6	4.0	2.3	5.3
missing	0.1	0.0	0.1	4.6	1.2
	100.0	100.0	100.0	100.0	

No. of bus trips per week					
0	89.1	91.4	90.6	87.7	89.7
1	0.6	0.7	0.3	0.6	0.6
2	1.9	1.3	1.9	2.0	1.8
3	0.1	0.2	0.0	0.0	0.1
4	1.3	1.0	0.7	0.8	1.0
5	0.8	0.1	0.4	0.4	0.4
6	0.6	1.1	0.8	0.4	0.7
7	0.1	0.1	0.0	0.1	0.1
8	1.0	0.4	0.3	0.6	0.6
9	0.0	0.0	0.0	0.0	0.0
10	4.0	3.3	2.1	1.8	2.8
more than 10	0.0	0.3	0.0	0.1	0.1
missing	0.7	0.0	2.9	5.5	2.3
	100.0	100.0	100.0	100.0	
Had a transit pass					
no	6.7	96.8	89.4	0.0	48.2
yes	3.8	3.2	7.8	9.4	6.1
missing	89.5	0.0	2.8	90.6	45.7
	100.0	100.0	100.0	100.0	
Had a valid driver's license					
no	4.4	3.6	2.7	0.0	2.7
yes	95.5	96.4	94.7	92.9	94.9
missing	0.1	0.0	2.7	7.1	2.5
	100.0	100.0	100.0	100.0	
Income (in thousands of dollars)					
[0, 7.5)	1.0	1.0	0.3	1.0	0.8
[7.5, 15)	4.8	3.9	2.4	2.3	3.4
[15, 25)	11.0	10.3	7.6	6.9	9.0
[25, 30)	11.5	9.0	5.6	4.9	7.8
[30, 35)	15.1	10.6	6.0	7.6	9.8
[35, 50)	27.5	26.2	20.9	21.4	24.0
[50, 70)	14.6	20.3	19.4	17.8	18.0
70+	6.1	10.5	11.6	15.0	10.8
[0,30)	0.2	2.1	0.0	0.0	0.6
30+	1.7	4.4	0.0	0.0	1.5
missing	6.5	1.8	26.1	23.1	14.4
	100.0	100.0	100.0	100.0	

Household type (lifecycle)					
any child < 6	21.7	21.1	14.5	11.8	17.3
all children 6-17	26.0	28.5	30.4	29.1	28.5
1 adult, <35	0.8	0.8	0.7	0.4	0.7
1 adult, 35-64	2.0	1.5	2.4	2.5	2.1
1 adult, 65+	2.3	2.5	2.7	3.0	2.6
2+ adults, <35	2.9	2.1	1.4	1.2	1.9
2+ adults, 35-64	26.0	25.4	24.5	23.6	24.9
2+ adults, 65+	18.5	18.0	23.3	23.2	20.8
missing	0.0	0.0	0.1	5.1	1.3
	100.0	100.0	100.0	100.0	

Frequencies (home carpoolers)

(participants making more than 1 carpool home trip over all waves)

Sex				
female	604	606	605	599
male	484	482	481	485
missing	0	0	2	4
	1088	1088	1088	1088
Age group				
15-17	20	16	1	0
18-24	27	27	34	33
25-34	191	166	122	98
35-44	310	316	316	299
45-54	193	202	219	243
55-64	164	159	156	158
65-98	179	200	238	253
missing	4	2	2	4
	1088	1088	1088	1088
Employed outside home				
no	436	443	386	454
yes	652	645	700	578
missing	0	0	2	56
	1088	1088	1088	1088
Occupation				
professional/technical	173	204	211	209
manager/admin/business	96	130	57	71
secretary/clerical	100	99	122	117
retail sales	26	22	41	19
other sales	25	22	11	21
shop/production work	10	12	16	15
craftsman/foreman	85	54	57	50
equipment/vehicle operator	25	23	12	13
service worker	62	42	48	41
general laborer	23	27	30	21
military	11	5	1	1
other	3	5	0	0
missing	449	443	482	510
	1088	1088	1088	1088

Number of work days per week				
0	0	1	1	0
1	13	11	7	13
2	32	33	25	28
3	34	39	45	39
4	45	43	50	51
5	454	465	429	450
6	42	43	42	43
7	20	10	7	11
missing	448	443	482	453
	1088	1088	1088	1088
Travel mode to and from work				
car/carpool/vanpool	523	559	538	513
bus	47	33	19	26
car/bus	39	44	27	18
motorcycle	2	2	1	0
bicycle	3	2	3	3
walk	11	9	8	8
other	1	0	0	0
missing	462	439	492	520
	1088	1088	1088	1088
Drove to work alone or with others				
drive alone	432	469	435	438
drive but with other	47	55	71	41
ride with others	25	33	32	32
take turns	20	27	37	47
missing	564	504	513	530
	1088	1088	1088	1088
Regularly took bus in past 6 months				
no	424	562	774	794
yes	8	77	67	86
missing	656	449	247	208
	1088	1088	1088	1088

Regularly pooled in past 6 months				
no	387	496	674	703
yes	43	143	162	176
missing	658	449	252	209
	1088	1088	1088	1088
Car required at work				
no	294	430	613	719
yes	204	210	186	218
missing	590	448	289	151
	1088	1088	1088	1088
Car required to pick up children				
no	359	467	641	740
yes	140	173	159	196
missing	589	448	288	152
	1088	1088	1088	1088
Frequency children were picked up				
0	0	476	265	393
1	13	12	11	22
2	30	36	31	32
3	16	31	24	38
4	12	10	11	11
5	69	79	83	100
6	0	1	0	0
7	0	0	0	3
missing	948	443	663	489
	1088	1088	1088	1088
Was a student				
no	996	1040	1050	1011
yes	91	48	36	21
missing	1	0	2	56
	1088	1088	1088	1088

No. of bus trips per week				
0	941	969	966	937
1	6	6	5	6
2	18	12	22	19
3	2	3	0	0
4	18	12	8	9
5	8	4	4	5
6	9	15	9	6
7	2	2	0	1
8	8	9	9	9
9	0	0	1	1
10	62	52	34	27
more than 10	4	4	3	5
missing	10	0	27	63
	1088	1088	1088	1088
Had a transit pass				
no	85	1033	974	0
yes	56	55	88	106
missing	947	0	26	982
	1088	1088	1088	1088
Had a valid driver's license				
no	61	53	44	0
yes	1026	1035	1018	993
missing	1	0	26	95
	1088	1088	1088	1088
Income (in thousands of dollars)				
[0, 7.5)	9	9	3	10
[7.5, 15)	48	35	21	20
[15, 25)	126	117	74	74
[25, 30)	118	82	65	47
[30, 35)	161	117	66	85
[35, 50)	314	293	237	228
[50, 70)	154	230	212	209
70+	73	122	135	163
[0,30)	6	20	0	0
30+	22	46	0	0
missing	57	17	275	252
	1088	1088	1088	1088

Household type (lifecycle)				
any child < 6	220	218	157	131
all children 6-17	269	294	299	285
1 adult, <35	6	5	7	3
1 adult, 35-64	10	7	16	21
1 adult, 65+	15	17	17	20
2+ adults, <35	34	26	16	13
2+ adults, 35-64	330	321	318	301
2+ adults, 65+	204	200	256	256
missing	0	0	2	58
	1088	1088	1088	1088